

NVTA'S



Bus Rapid Transit Action Plan

*CONNECTING FAST, FREQUENT, AND RELIABLE
TRANSIT ACROSS NoVA AND BEYOND*



FINAL TECHNICAL REPORT

Connecting Fast, Frequent, and
Reliable Transit Across NoVA and Beyond

BUS RAPID TRANSIT ACTION PLAN



FINAL TECHNICAL REPORT

December 2025



TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 BACKGROUND 3

2.1 What is BRT?.....3

2.2 Best Practices3

2.3 Community Engagement 16

2.4 BRT Planning Working Group 43

3.0 BRT SYSTEM 45

3.1 BRT Types Definition 45

3.2 Identification and Screening of Corridors..... 47

3.3 Final BRT System52

3.4 Impact of BRT On Local Bus Service 61

4.0 BRT SYSTEM EVALUATION 64

4.1 Analysis Methodology 64

4.2 Evaluation Results 69

4.3 Public Comments on Proposed BRT System 117

5.0 PLANNING FOR UNCERTAINTY 131

5.1 Scenarios Considered 131

5.2 Scenario Evaluation Results 139

6.0 IMPLEMENTATION CONSIDERATIONS..... 144

6.1 BRT Facilities 144

6.2 Funding..... 156

6.3 Governance..... 169

6.4 Technology 184

APPENDIX A. BEST PRACTICES SPREADSHEETSA-1

APPENDIX B. 2024 PERCEPTION SURVEY.....B-1

APPENDIX C. PHASE 1 FOCUS GROUP REPORT.....C-1



- C.1 Approach and Methodology C-1
- C.2 Research Caveats and Limitations C-2
- C.3 Key Findings C-2
- C.4 Detailed Findings C-4
- C.5 Bus Rapid Transit (BRT) C-7
- C.6 Elevator Pitch and “Slogans” C-15
- C.7 Core Values C-18

- APPENDIX D. PHASE 1 ONLINE SURVEY INSTRUMENTD-1**

- APPENDIX E. PHASE 3 FOCUS GROUP REPORT E-1**
 - E.1 Approach and MethodologyE-1
 - E.2 Key FindingsE-2
 - E.3 Non-RidersE-4
 - E.4 Riders E-17

- APPENDIX F. PHASE 3 FOCUS GROUP RECRUITMENT SCREENER F-1**

- APPENDIX G. PHASE 3 FOCUS GROUP DISCUSSION GUIDE AND ACTIVITY GUIDEG-1**

- APPENDIX H. PHASE 3 ONLINE SURVEY INSTRUMENT H-1**

- APPENDIX I. PHASE 3 ONLINE SURVEY WEIGHTING I-1**

- APPENDIX J. INDIVIDUAL ROUTE PROFILESJ-1**

- APPENDIX K. DETAILED EVALUATION METHODOLOGYK-1**
 - K.1 Evaluation of Potential BRT RoutesK-1
 - K.2 Performance MeasuresK-1
 - K.3 Calculation MethodologyK-5
 - K.4 Rating MethodologyK-31

- APPENDIX L. MODELING METHODOLOGY L-1**

- APPENDIX M. JURISDICTIONAL BRT SYSTEM FEEDBACK TO BE CONSIDERED FOR FUTURE PLANNING STUDIES M-1**



LIST OF TABLES

Table 1 Segmentation of Groups.....21

Table 2 Surveys Completed—Transit Rider Status (2024 Survey) 24

Table 3 Surveys Completed—Area of Residence (2024 Survey)..... 24

Table 4 The Top Three Priorities for Riders and Non-Riders 25

Table 5 Phase 1 Pop-Up Results Summary 30

Table 6 Segmentation of Groups..... 32

Table 7 Schedule of Discussions 32

Table 8 Responses by Language 36

Table 9 Margins of Error by Rider Type 36

Table 10 Primary Mode of Transportation by Rider Type 37

Table 11 Likelihood to Consider BRT by Rider Type 38

Table 12 Most Important Characteristics of a BRT System by Rider Type 39

Table 13 Demographic Profile of Survey Respondents 39

Table 14 Survey Responses During Pop-Up Events 41

Table 15 Summary of Service Levels by BRT Type 46

Table 16 Summary of Amenities and Features by BRT Type 47

Table 17 Non-BRT Local Routes 51

Table 18 BRT Routes and Type..... 57

Table 19 Ridership Performance Measures 65

Table 20 Performance Measures to Evaluate Transportation Impacts 66

Table 21 Land Use Performance Measures 67

Table 22 Readiness Performance Measures..... 67

Table 23 Costs Performance Measures..... 68

Table 24 Revenue Performance Measures 68

Table 25 Cost Effectiveness Performance Measures 68

Table 26 Feasibility Performance Measures 69

Table 27 Hours and Miles of Service by Route..... 109

Table 28 Vehicle Needs by Route..... 111

Table 29 Staffing Needs by Route 112



Table 30 Vehicle Size and Peak Load Factor by Route 114

Table 31 EV Chargers and Facility Needs by Route..... 115

Table 32 BRT Route Evaluation Results by Category..... 116

Table 33 How Well Coverage Meets Needs by Rider Type 118

Table 34 Comments on BRT System Coverage 119

Table 35 How Well Span Meets Rider Needs by Rider Types 121

Table 36 Comments on BRT System Span of Service..... 121

Table 37 How Well Frequency Meets Needs by Rider Type 123

Table 38 Comments on BRT System Frequencies 123

Table 39 Potential Trip Purpose by Rider Type..... 125

Table 40 Potential Frequency of Use by Rider Type 126

Table 41 Potential Time of Day of Use by Rider Type..... 126

Table 42 Additional Comment by General Theme 128

Table 43 Summary of Route Specific Comments 130

Table 44 Proposed VMT Fee by Time Period..... 136

Table 45 VMT Pricing by Household Income Level..... 137

Table 46 Scenario Evaluation Results 140

Table 47 Scenario Ridership by Route 142

Table 48 Summary of Agency Operations and Maintenance Facilities 145

Table 49 Sample Bus Operations & Maintenance Facility Size Requirements 149

Table 50 Construction Cost Estimates—Single Facility 151

Table 51 Potential Land Acquisition Costs—Single Facility..... 152

Table 52 Vehicle Facility Spare Requirements—Multiple Facilities 154

Table 53 Construction Cost Estimates—Multiple Facilities 154

Table 54 BRT Stop Requirements and Amenities 155

Table 55 Project Eligibility for SMART SCALE 162

Table 56 FY2024 NVTA Funding Estimate 164

Table 57 NVTA Goals, Objectives, and Performance Measures..... 165

Table 58 Local Bus Systems 172

Table A-1 Peer BRT System Metrics A-1

Table A-2 Peer BRT System Operating Characteristics and Best Practices A-3



Table A-3 Peer BRT System Best Practices & Other Notes..... A-6

Table A-4 Peer BRT System Best Practices & Other Notes (Continued)A-10

Table C-1 Segmentation of Groups..... C-1

Table C-2 Schedule of Groups C-1

Table C-3 Measuring Success of Transportation Improvements C-13

Table C-4 Demographic Profile C-21

Table E-1 Segmentation of Groups.....E-1

Table E-2 Schedule of DiscussionsE-2

Table E-3 Important BRT Benefits Among Non-ridersE-6

Table E-4 Route Prioritization Among Non-ridersE-10

Table E-5 Important BRT Benefits Among RidersE-19

Table E-6 Important BRT Benefits Among RidersE-22

Table E-7 Demographic ProfileE-28

Table K-1 List of Performance MeasuresK-3

Table K-2 ZEV Fleet EstimatesK-8

Table K-3 Running CO₂ Emissions Rates (g/mile) by SpeedK-9

Table K-4 EPDO Crash Value ConversionK-12

Table K-5 Unit Costs for Capital Cost Estimates (2024\$)K-17

Table K-6 O&M Cost Methodology.....K-19

Table K-7 Peer BRT SystemsK-19

Table K-8 Operations and Maintenance Unit CostsK-19

Table K-9 Published Bus Fares by Operator and Service TypeK-20

Table K-10 Average Fare Collected per Bus Trip by Agency, 2022.K-20

Table K-11 Potential Funding Opportunities ScoringK-22

Table K-12 Ease of Implementation ScoringK-24

Table K-13 BRT Level of Service by TypeK-25

Table K-14 Northern Virginia 2022 Deadhead Hours by Agency.....K-26

Table K-15 Northern Virginia 2022 Deadhead Miles by AgencyK-26

Table K-16 Vehicle Operating Assumptions.K-27

Table K-17 Staffing Assumptions.K-28

Table K-18 Sample of Facility Requirements.K-29



Table K-19 Vehicle Battery Capacity AssumptionsK-30

Table K-20 Sample Route Rating Methodology.....K-31

Table L-1 NVTA BRT Baseline Network Update L-2

Table L-2 BRT Corridors: Operation Span and Frequency L-4

Table L-3 BRT Corridors: Speed and Runtime L-6



LIST OF FIGURES

| | | |
|-----------|--|----|
| Figure 1 | Illustration of Elements Used to Maximize Transit Ridership | 6 |
| Figure 2 | Bus Priority and BRT Has a Range of Implementation Types and Levels | 8 |
| Figure 3 | Map of Local BRT Peers | 10 |
| Figure 4 | Examples of Transit Supportive Land Use Types and Densities | 11 |
| Figure 5 | Average Density among Key Peers..... | 12 |
| Figure 6 | Average and Ranges of BRT Peer Level of Service | 12 |
| Figure 7 | Key Trip Generators for BRT | 13 |
| Figure 8 | Common Federal and Local Funding Sources | 14 |
| Figure 9 | Where Participants Live..... | 17 |
| Figure 10 | Familiarity with Ongoing Bus Initiatives | 18 |
| Figure 11 | Response to Question “How familiar are you with Bus Rapid Transit (BRT)?” | 19 |
| Figure 12 | Response to Question “How favorable are you towards Bus Rapid Transit (BRT) operating in Northern Virginia?” | 19 |
| Figure 13 | Top Influential Benefits of Using BRT | 20 |
| Figure 14 | Top 3 Words | 24 |
| Figure 15 | Response to Question “How likely would you be to consider using BRT?” | 25 |
| Figure 16 | Responses to Question: “Which of these is most important? A BRT system that... (Top 3)” | 25 |
| Figure 17 | Top BRT Priorities by Jurisdictions | 26 |
| Figure 18 | Responses to Question: “What types of places would you want BRT to take you to?” | 26 |
| Figure 19 | Preferred Destinations/Times of Day | 27 |
| Figure 20 | BRT Types and Percent Willing to Consider Each BRT Type Over Their Current Primary Mode of Transportation | 27 |
| Figure 21 | Key Features for Considering Public Transport Usage..... | 28 |
| Figure 22 | Phase 1 Pop-Up Locations..... | 29 |
| Figure 23 | Pop-One-Word Responses | 31 |
| Figure 24 | Sample Route Profile Materials Used in Focus Groups | 34 |
| Figure 25 | Likelihood of Using BRT by Jurisdiction | 38 |
| Figure 26 | Pop-up Locations for Phase 3 Engagement..... | 42 |
| Figure 27 | Phase 3 Social Media Graphics | 43 |



Figure 28 Agencies Represented on the BRT Planning Working Group 44

Figure 29 Key Attributes of the Five Types of BRT 45

Figure 30 Map of Universe of Potential Corridors 48

Figure 31 Possible Benchmarks for Density and Land Use 49

Figure 32 Existing Activity Density 50

Figure 33 Regional BRT System Service Provided by Jurisdiction 53

Figure 34 BRT System by Route 54

Figure 35 Bidirectional Miles of BRT by Type 55

Figure 36 BRT System by BRT Type 56

Figure 37 List of Performance Measures 65

Figure 38 Boardings by Stop—Systemwide Analysis 70

Figure 39 2045 BRT Boardings by Route—Tested Individually 71

Figure 40 2045 BRT Boardings by Route—Tested Together 72

Figure 41 Change in Boardings—Systemwide Analysis vs. Individual Route Analysis..... 73

Figure 42 2045 BRT Service Efficiency 74

Figure 43 Origin Location of New Transit Trips 75

Figure 44 2045 BRT Mode Shift 76

Figure 45 New Transit Trips as a Percentage of Boardings 77

Figure 46 2045 EEA Mode Shift 78

Figure 47 Percentage of New Transit Trips Starting in EEAs 79

Figure 48 Portion of BRT Boardings Occurring during Peak Periods 80

Figure 49 Ridership Impacts to other High-Capacity Transit 81

Figure 50 2045 Congestion Reduction caused by the Proposed BRT System 82

Figure 51 2045 BRT Congestion Reduction 83

Figure 52 2045 BRT VMT Reduction 84

Figure 53 2045 Daily BRT Vehicle Emissions Reduction 85

Figure 54 Improvements in Jobs Accessible by Transit 86

Figure 55 2045 BRT Transit Accessibility Improvement 87

Figure 56 2045 EEA Transit Accessibility Improvement 88

Figure 57 2045 BRT Connections to Other High Capacity Transit 89

Figure 58 2045 BRT Safety 90



Figure 59 2045 BRT Run Time Improvement..... 91

Figure 60 2045 Activity Density 92

Figure 61 2045 Future Land Use Density by Route 93

Figure 62 Percentage of Residents in Key Socioeconomic Groups—BRT System 94

Figure 63 Percentage Residents of Color by BRT Route 94

Figure 64 Percentage Residents with a Disability by BRT Route..... 95

Figure 65 Percentage Low-Income Households by BRT Route 95

Figure 66 Percentage Zero-Car Households by BRT Route..... 96

Figure 67 Percentage One-Car Households by BRT Route 96

Figure 68 Average Percentage in Key Socioeconomic Groups by Route 97

Figure 69 Existing Jobs and Population per Square Mile by Route..... 98

Figure 70 Walking Infrastructure Availability by Route 99

Figure 71 2045 BRT Bicycle Infrastructure Availability 99

Figure 72 Bikeshare Stations within One-Half Mile of BRT Stops by Route 100

Figure 73 Transit Supportive Policy Score by Route 101

Figure 74 Capital Cost Estimates by Route (2024 dollars) 102

Figure 75 2045 BRT Annual Operating Cost Estimate (2024 dollars) 103

Figure 76 Operating Cost per Revenue Hour by Route (2024 dollars)..... 103

Figure 77 2045 Fare Recovery Ratio by Route 104

Figure 78 2045 BRT Potential Funding Opportunities..... 105

Figure 79 Capital Cost per Daily Rider by Route (2024 dollars)..... 106

Figure 80 2045 Congestion Reduction Relative to Cost by Route 107

Figure 81 GHG Reduction Cost Effectiveness by Route 108

Figure 82 2045 BRT Ease of Implementation..... 109

Figure 83 BRT Revenue Miles by Jurisdiction..... 111

Figure 84 Overall BRT System Ratings 117

Figure 85 Telework by Household Income 132

Figure 86 HBW and NHW Trip Generation Adjustments by Household Income Level..... 133

Figure 87 Reallocation of Population Growth..... 135

Figure 88 Reallocation of Employment Growth 135

Figure 89 Hourly Parking Costs (2007\$)..... 137



Figure 90 Standard Daily Parking Costs (2045 costs in 2007\$) 138

Figure 91 Scenario Daily Parking Costs (2045 costs in 2007\$)..... 138

Figure 92 Average Daily BRT Boardings by Scenario 140

Figure 93 Existing Operating Facilities by Agency 147

Figure 94 Existing Customer Facilities..... 148

Figure 95 Potential Operations & Maintenance Facility Locations—Multiple Facilities 153

Figure 96 Sample Bus Operations & Maintenance Facility Layout—HRT Southside 155

Figure 97 SMART SCALE Process 161

Figure 98 Commonwealth of Virginia Funds Dedicated to Regional Transportation Efforts 163

Figure 99 DMVMoves Initial Bus Priority Network 164

Figure 100 Locally Proposed Financial Plan—The One 169

Figure 101 Existing Bus Service in Northern Virginia 172

Figure 102 Current Metrobus Cost Allocation Formula 174

Figure 103 Restructured Metrobus Cost Allocation Formula 175

Figure 104 Example Implementation of Intermittent Bus Lanes 185

Figure 105 Two Types of Lane Guidance..... 188

Figure C-1 Examples of Bus Rapid Transit Systems C-9

Figure E-1 Proposed BRT System Map used with Focus Groups E-8

Figure E-2 Proposed Route Map—Columbia Pike to Crystal City E-11

Figure E-3 Proposed Route Profile—Columbia Pike to Crystal City E-13

Figure E-4 Proposed BRT System Map E-20

Figure E-5 Proposed Route Map—Columbia Pike to Crystal City E-23

Figure E-6 Confusion with Proposed Route Map (from the Participants’ Perspective) E-23

Figure E-7 Proposed Route Profile—Columbia Pike to Crystal City E-24

Figure K-1 NVTA Equity Emphasis Areas K-6

Figure K-2 Map of High Capacity Transit Connections K-11

Figure K-3 Example ½ Mile Straight-Line Buffer and Network Based Access Shed Analysis K-15

Figure L-1 BRT Routes and Stations in Cube Network..... L-8



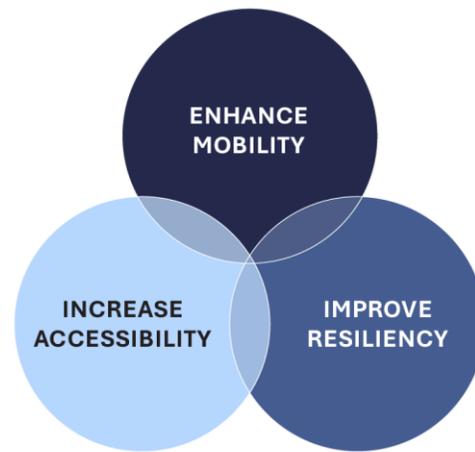
1.0 INTRODUCTION

The Northern Virginia Transportation Authority (NVTA) is a regional organization responsible for preparing Northern Virginia's long-range transportation plan, TransAction. NVTA uses its revenues to fund multimodal projects that reduce congestion safely, sustainably, and equitably.

The latest update to TransAction was adopted in December 2022 and identified a vision for a high-capacity Bus Rapid Transit (BRT) system stretching across Northern Virginia and beyond to meet the mobility needs of Northern Virginians, while reducing congestion and dependency on driving.

NVTA has already invested more than \$880 million towards building five different BRT lines in the region, which are at different stages of implementation. These include Crystal City-Potomac Yard Transitway (Metroway), The One (Richmond Highway BRT), Duke Street Transitway, West End Transitway, and Route 7 BRT.

NVTA recognizes that a high-quality regional BRT system is best achieved in a collaborative manner that maximizes the return on investments. This will require coordinated efforts from a range of entities in the region, including NVTA, each of the local member jurisdictions, the Virginia Department of Transportation (VDOT), the Virginia Department of Rail and Public Transportation (DRPT), the Potomac and Rappahannock Transportation Commission (PRTC), the Virginia Railway Express (VRE), the Washington Metropolitan Area Transit Authority (WMATA), the Metropolitan Washington Council of Governments/ Transportation Planning Board (MWCOG/TPB), and the Northern Virginia Transportation Commission (NVTC). Coordination with neighboring jurisdictions and agencies in Washington, DC, and Maryland is also necessary to integrate a Northern Virginia BRT system into the larger regional transit network. With so many collaborators, each entity has important and unique roles to play in the process.



| MOBILITY | ACCESSIBILITY | RESILIENCY |
|---|---|---|
| <ul style="list-style-type: none"> ▶ Congestion reduction ▶ Travel time reliability | <ul style="list-style-type: none"> ▶ Access to jobs ▶ More travel options | <ul style="list-style-type: none"> ▶ Transportation safety ▶ Reduction of vehicle emissions |

The BRT Action Plan (previously referred to as a Preliminary Deployment Plan for a regional BRT system) builds upon NVTA's BRT investments to date to create a regionally connected BRT system providing fast, frequent and reliable transit service. Developed with the help of a multi-agency BRT Planning Working Group established by NVTA in early 2021, the Action Plan evaluated the impact of, and opportunities and challenges with, 28 potential BRT routes serving multiple areas in Northern Virginia, as well as popular destinations in Maryland and Washington, DC.

The [BRT Action Plan](#) was approved by NVTA in July, 2025 and provides the blueprint for jurisdictions and agencies to develop BRT lines incrementally in addition to supplying the information necessary to demonstrate how they can successfully function as an integrated system once fully implemented. The Action Plan's primary goal is to facilitate the development of a consistent and comprehensive regional approach to BRT deployment over the next 10 years and to encourage a seamless connection between current and planned future BRT segments across the region.



This technical report is a companion document to the Action Plan, providing more in-depth details on the development of the Plan, including methodologies, processes, and findings as follows:

- ♦ **Chapter 2** provides background information on BRT best practices in the Washington, DC region and across the country, in addition to an overview of the public engagement efforts conducted as part of this project to learn more about public perceptions of BRT.
- ♦ **Chapter 3** outlines the proposed BRT system that is included in the BRT Action Plan, including defining bus priority treatments, identification and screening of corridors, and service level assumptions.
- ♦ **Chapter 4** details the extensive evaluations conducted on each of the 28 BRT routes, and the BRT system as a whole.
- ♦ **Chapter 5** considers a set of potential future conditions which could impact that costs and benefits of BRT.
- ♦ **Chapter 6** highlights a number of important implementation considerations that must be addressed for the BRT system, including facility needs, funding, governance, and technology needs and integration.
- ♦ Several **appendices** provide detailed technical background, such as survey instruments, model coding, and other information.

The Action Plan will serve as a vital link between TransAction and NVTA's Six Year Program to spur BRT planning and implementation efforts by the jurisdictions and other entities in Northern Virginia and across the larger metro Washington, DC region. By evaluating potential BRT routes, both individually and as a system, the Action Plan identifies the most promising BRT options in the region. The Action Plan lays the groundwork for NVTA's member jurisdictions and regional partners to further develop BRT plans and projects and pursue a range of Federal, state, regional, and local funding sources.



2.0 BACKGROUND

2.1 What is BRT?

BRT is a high-quality, bus-based transit system that delivers fast, frequent, and reliable transit service. The defining characteristics of a BRT system include high-frequency service, expansive service hours, limited-stop routes, bus priority features, and improved customer facilities. These features support high-ridership capacity and increased reliability over local bus service. A connected BRT system will provide Northern Virginia with:

- ◆ New travel options/alternatives to driving
- ◆ Reduced travel times
- ◆ Improved access to jobs and destinations
- ◆ Increased economic growth

How It Works

Improved stations have **offboard fare collection** and **platform-level, all-door boarding**



Frequent, reliable service shortens wait times



Transitways with **dedicated lanes** provide faster trips



Transit signal priority and queue jumping let BRT buses go first at traffic lights, reducing delay



2.2 Best Practices

Northern Virginia is a rapidly growing region with densely populated activity centers and economic anchors. However, traffic congestion and inconsistent transit connectivity pose barriers to achieving a better quality of life for residents and employees. These characteristics suggest that the region would be supportive of, and benefit from, the additional high-capacity transit of a unified BRT system. A successful BRT system could significantly enhance the quality of local and regional public transit, help mitigate traffic congestion, and promote economic development.

To better understand the challenges and opportunities of implementing a regional BRT system in Northern Virginia, NVTA reviewed relevant literature and peer transit agencies in the Washington, DC region and nationally. This section documents best practices for BRT planning, implementation, operation, and design from this review.

2.2.1 Literature Review

This section discusses the key findings from the review of relevant national and local literature on Bus Rapid Transit. The national and local documents studied include:



- ◆ National:
 - » APTA Bus Transit Service Standards—Bus Rapid Transit Service Design and Operations, 2020
 - » APTA Bus Transit Service Standards—Bus Rapid Transit Branding, Imaging, and Marketing, 2020
 - » TCRP Synthesis 164—Bus Rapid Transit Current State of Practice
 - » TCRP Report 118—Bus Rapid Transit Practitioner’s Guide, 2007
 - » Florida DOT—National Synthesis of Transit and Complete Streets Practices, 2018
- ◆ Local and Regional:
 - » National Capital Region Transportation Planning Board—Bus Lane Enforcement Study, 2017
 - » BaltimoreLink Transit Priority Toolkit, 2019
 - » Virginia DRPT—Multimodal System Design Guidelines, 2020



Findings

BRT-Supportive Land Use and Density: BRT should be considered in areas with strong demand for transit, such as city centers, Central Business Districts, universities, and shopping districts. These areas typically have a moderate- to high-intensity of mixed uses and population density, especially at Transit-Oriented Development (TOD) nodes. To further encourage multimodal transportation, they should also be walkable and pedestrian-friendly (e.g., have slower-speed roads).

Possible benchmarks for density and land use are:¹



¹ DRPT Multimodal System Design Guidelines, 2020.



Healthcare facilities, entertainment and sports complexes, and intercity travel hubs may also generate demand for BRT service. A successful BRT system will connect many nodes with high ridership potential across a unified network.

Some localities in the U.S. and Northern Virginia have enacted policies to promote more transit-supportive development. New York, for example, provides funding for localities to rezone districts for TOD. Meanwhile, California and Washington have policies that remove parking minimums and incentivize higher-density development near transit stations, respectively. Locally, both Fairfax County and Arlington County have zoning policies that encourage mixed-uses and TOD, while the City of Alexandria has reduced parking minimums in transit areas. These policies are most successful when implemented in a unified way across municipal boundaries, where regional organizations and individual communities work closely together to spur collective economic growth.

BRT Operations: High frequency service, expansive service hours, limited-stop routes, and bus priority features are the defining characteristics of a BRT system. These features support high ridership capacity and improved reliability as compared to local bus service. According to BRT literature, weekday service should have headways of 15 minutes or less throughout the day, or maximum headways of 10 minutes during peak periods and 20 minutes during off-peak periods.² During weekends, these can increase to 30 minutes.

The industry standard for BRT service is to operate seven days a week to avoid turning BRT routes into "commuter-oriented" routes. Wherever possible, operating hours should remain consistent across weekdays, weekends, and holidays. Service hours should capture diverse ridership patterns, such as:

- ◆ Beginning and end of the "traditional" work day.
- ◆ Beginnings and ends of shifts for non-traditional shift workers.
- ◆ Opening and closing times for retail.
- ◆ Higher education class times.
- ◆ Popular times for entertainment and recreation.
- ◆ Timed connections to other intercity travel and intracity transit services.

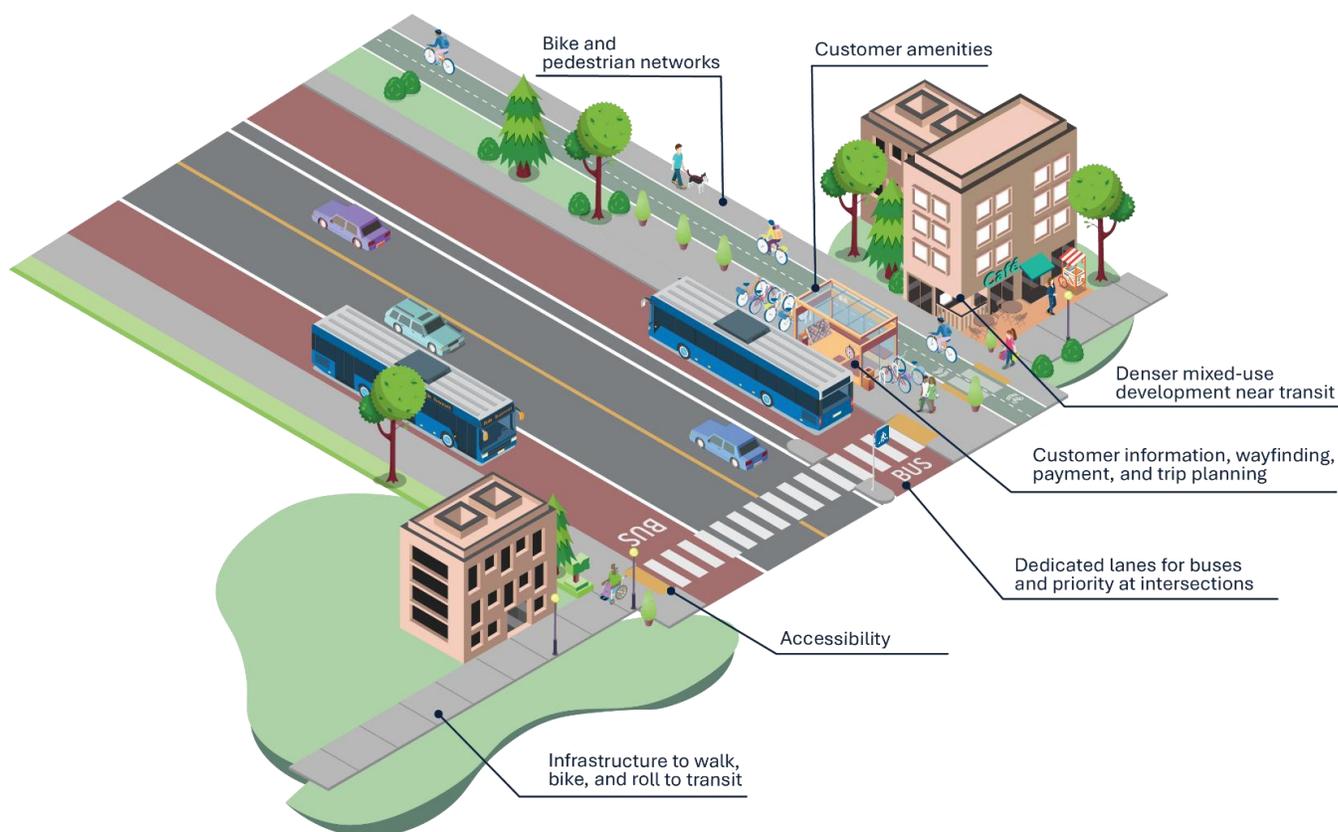
Maximizing Ridership: A number of features identify BRT as a 'premium' transit service, that provides fast and reliable service. Utilizing and enforcing bus lanes and other transit priority strategies, which make buses a faster and more reliable travel option, attracts ridership. Some priority features that improve speed and reliability (or customers' perception of reliability) include:

- ◆ Dedicated lanes
- ◆ Transit signal priority
- ◆ Traffic queue jump signals
- ◆ Raised platform boarding
- ◆ Off-board fare collection
- ◆ Bus tracker displays

² Many systems operate more frequently than these minimums.



Figure 1 Illustration of Elements Used to Maximize Transit Ridership



Wider urban design improvements outside of transit infrastructure can also improve ridership and create a better environment for both pedestrians and transit. Transit agencies and municipalities in Charlotte, North Carolina, Jacksonville, Florida, and Tampa, Florida saw increases in ridership after making significant investments in pedestrian and bicycle infrastructure. These cities gave special attention to urban design features that are Americans with Disabilities Act (ADA) accessible and advance overall safety, such as:

- ◆ Dedicated bicycle lanes
- ◆ Multi-use paths
- ◆ Reduced travel lane widths
- ◆ Additional and enhanced crosswalks
- ◆ Upgraded pedestrian signals
- ◆ Bicycle lanes with dedicated signals

Revenue, Funding, and Costs: There are several key considerations in determining the overall cost of constructing and operating a BRT system, including:

- ◆ Running ways and/or other priority street treatments.
- ◆ Signal priority technology.



- ◆ Streetscape and urban design features.
- ◆ Vehicle sizes, styles, associated technologies, and propulsion systems (i.e., zero-emission or diesel).
- ◆ Stations and passenger amenities.
- ◆ Fare collection strategies.
- ◆ Branding.
- ◆ Service level.

Some BRT features and operations strategies are more costly than others. For example, grade-separated busways are the most expensive roadway infrastructure, followed by at-grade busways and mixed-traffic lanes, respectively. The costs of different types of BRT stations tend to follow the costs of roadway infrastructure; that is, busway stations are typically more expensive to construct than stations at mixed-traffic or bus lanes. Larger articulated buses (60') are also more costly than smaller (40'), standard ones. Enhanced onboard feature, amenities, and technology, in addition to zero-emission propulsion, will also increase vehicle costs.

More expensive improvements and service will require more up-front costs, but, in a transit-supportive environment, they can also increase the reliability of transit and the comfort of passengers. These impacts are likely to increase ridership. Some case studies suggest that more pleasant station design can impact larger land and economic development patterns as well. Therefore, it is important to weigh the costs of BRT improvements against their potential long-term benefits.

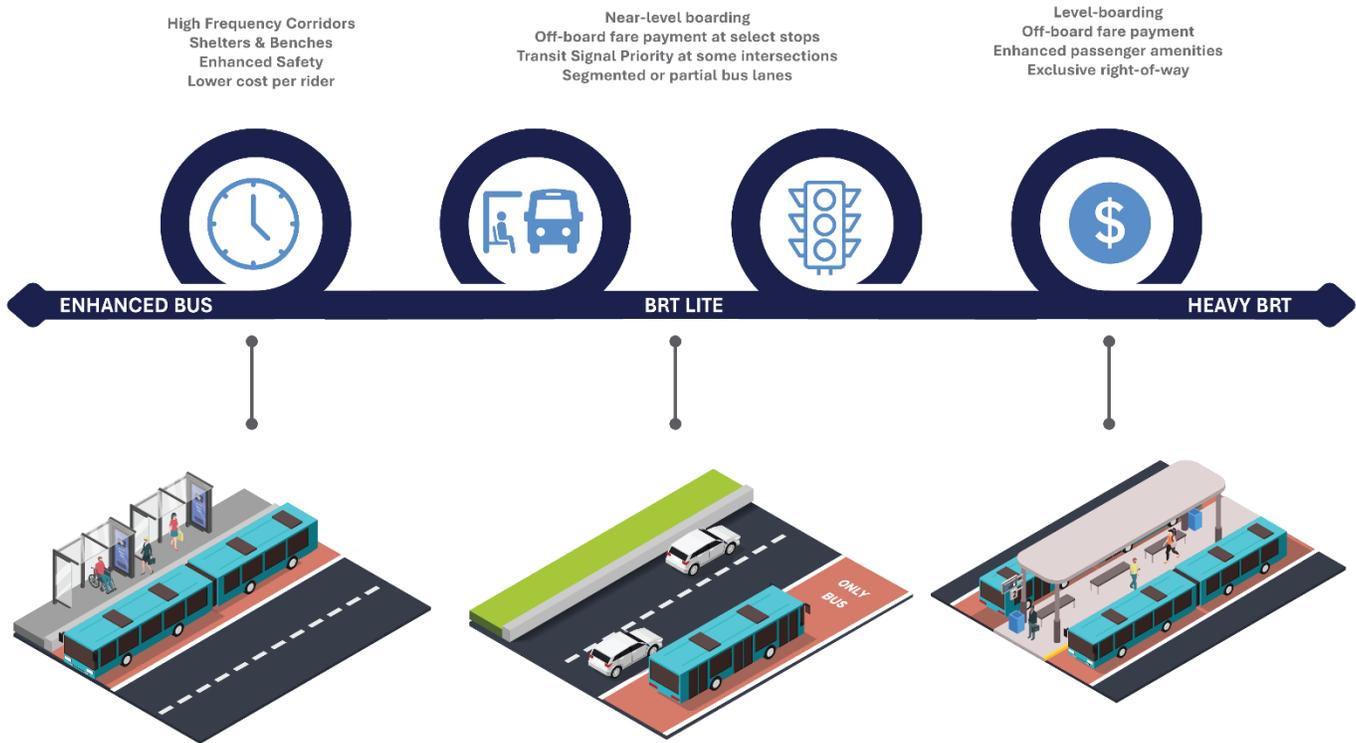
There are multiple funding avenues for BRT construction and operations, including Federal, state, and local grants and dedicated funds. However, certain grants may require specific application materials and operations criteria which cannot be overlooked. To name one, the Federal Transportation Administration (FTA) Capital Investment Grants require applicants to submit several time horizons of ridership forecasts and requires the proposed BRT service to operate for a minimum number of hours. A complete overview of potential funding sources for BRT in Northern Virginia can be found in Section 6.2.

Cost-Effective Strategies: A key benefit of BRT construction and operation is that an effective system can be designed and constructed in accordance with different levels of funding availability. For example, higher-cost infrastructure improvements often have lower-cost alternatives (e.g., dedicated bus lanes with physical barriers could be substituted with lane markings), and expensive bus priority treatments can be reserved for roadway conditions with the highest congestion and transit ridership.

These investments can also compound over time; initial infrastructure improvements can be low-cost, and higher-cost improvements can be made as more funds become available. However, proper enforcement is crucial for making low-cost transit infrastructure successful. Two primary strategies for bus lane enforcement are (1) policing and (2) automatic cameras; both of these strategies have their own legal and financial considerations.



Figure 2 Bus Priority and BRT Has a Range of Implementation Types and Levels



From an operational perspective, replacing low-ridership, indirect bus routes with more direct BRT routes on high-traffic corridors can offer more effective service without increasing operating costs. Moreover, in an analogous manner to physical improvements, BRT service can expand over time if premium service is not initially feasible.

Governance Options: Close and frequent coordination between agencies (i.e., state, local, and regional), traffic engineers, and transit service planners is essential for the successful construction and operation of BRT. In some scenarios, like bus lane construction, several different entities may be responsible for approving, installing, coordinating, and maintaining BRT features and technologies. Then, another entity is often responsible for enforcing rules. To ensure a smooth and coordinated approach to BRT implementation, transit agencies, engineers, and planners must proactively integrate planning and service with public policies and regulations. Some strategies include:

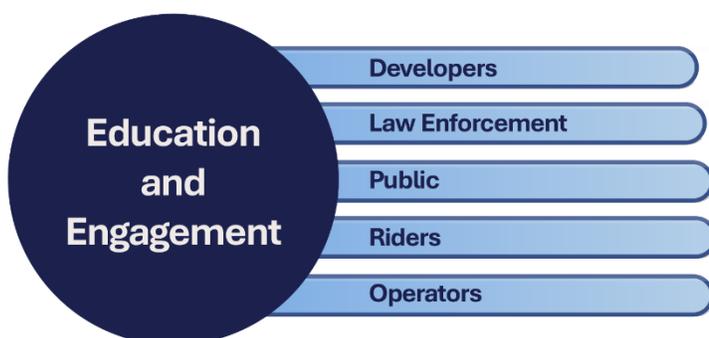
- 
Enabling Legislation
 - Advocating for and supporting legislation that allows cross-jurisdictional transit construction, operation, and enforcement.
- 
Supporting Policies/Plans
 - Writing agency policies and plans that align with municipal transportation plans.
- 
Reducing Legal Barriers
 - Creating a catalog of applicable laws to reveal potential barriers to BRT implementation.

A complete overview of governance issues facing BRT in Northern Virginia can be found in Section 6.3.



Engagement and Education: Transit agencies and planning officials should begin the public engagement and education campaign early in the BRT planning process and continue it throughout implementation. Engagement efforts should target the general public, as well as transit riders, law enforcement, transit operators, and developers.

A lack of information can confuse and frustrate those who are riding and operating BRT, as well as other drivers on the road. It can also dissuade developers who are not convinced about the potential payoffs of TOD from investing in BRT-supportive land development. Thus, a robust engagement and education process can be the deciding factor in whether a stakeholder group will support a proposed BRT system, and whether the system will be successful.



An effective public outreach process will be bolstered by dedicated BRT branding and marketing efforts. Branding provides a sense of consistency that helps community members navigate the planning process and understand the proposed system throughout different stages of implementation. These efforts should respond to community needs and characteristics; names, colors, imagery, and values (e.g., environmental sustainability, equity, etc.) should resonate with communities and demonstrate the positive impacts of a proposed BRT system.

Peer Review

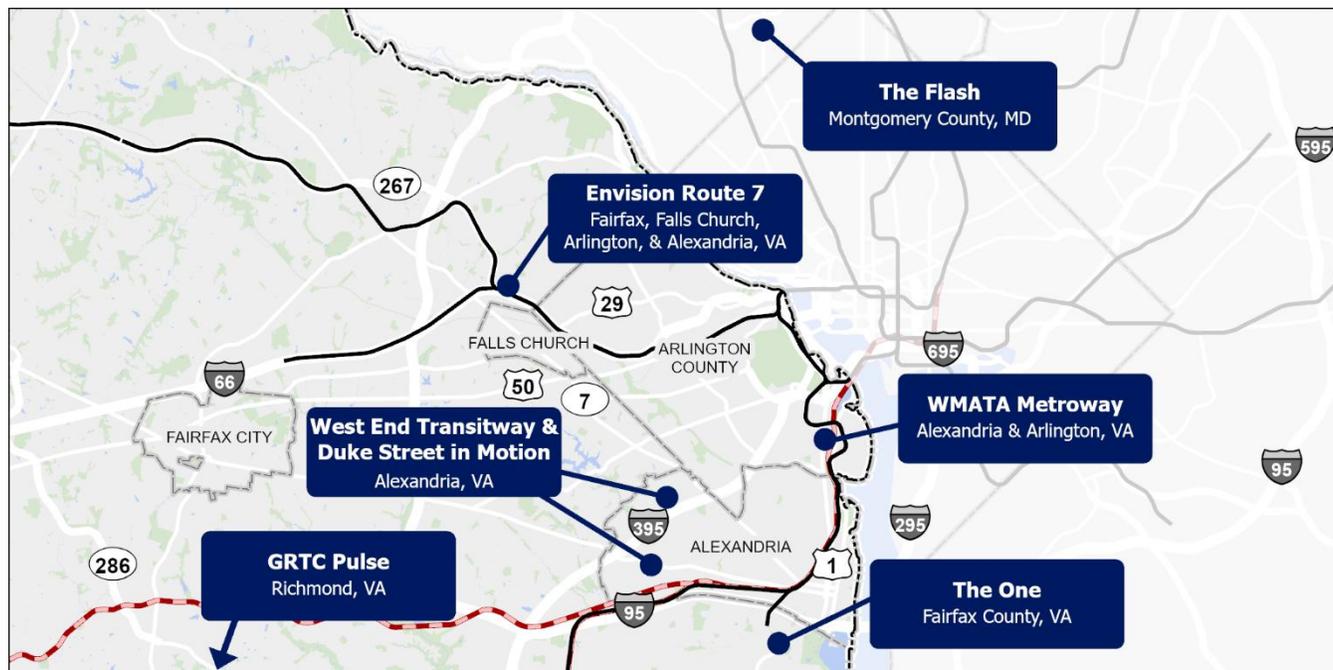
This section discusses the key findings from the review of relevant peer agencies in Washington, DC region and nationally. The initial review of potential peers included 21 BRT corridors or networks from across North America. Information from this review was used to support the findings summarized in this section. However, in cases of specific calculations, such as activity density and cost, only data from the peers that were found to be most useful references for this study were used. These key peers include:

♦ Local:

- » **WMATA Metroway—Alexandria & Arlington, Virginia:** As the region's first BRT line, Metroway is a prime candidate for use as a benchmark to develop density thresholds.
- » **Envision Route 7—Fairfax, Falls Church, Arlington & Alexandria, Virginia:** This BRT line is still being planned, and therefore no data is available to use as a benchmark for ridership and productivity. However, as a local example, it could be used to determine a minimal threshold for overall activity.
- » **West End Transitway and Duke Street in Motion—Alexandria, Virginia:** These BRT lines are still being planned, and therefore no data is available to use as a benchmark for ridership and productivity. However, as local examples, they could be used to determine a minimal threshold for overall activity.
- » **GRTC Pulse—Richmond, Virginia:** This BRT line should be considered as a candidate for developing thresholds due to its relative success (roughly 41 passengers per revenue hour) and for the involvement of DRPT, which will be a key player in future BRT work in Northern Virginia.
- » **The One—Fairfax County, Virginia:** Currently in design, The One BRT is a prime candidate for use as a benchmark to develop density thresholds.
- » **The Flash—Montgomery County, Maryland:** A network of BRT routes now over 10 years into planning; the Flash system represents a local example of phased implementation of a BRT system with different approaches to each corridor.



Figure 3 Map of Local BRT Peers



◆ **National:**

- » **Pace Pulse—Chicago region, Illinois:** A good example of a planned network of BRT, with two lines already in service, in a suburban environment. *Activity Density: 10,300*
- » **IndyGo Red, Blue, and Purple Lines—Indianapolis, Indiana:** The overlap between these lines and existing high-ridership routes make the system an ideal peer, as Northern Virginia also has overlapping transit agencies and routes. *Activity Density: 18,600*
- » **The Rapid Silver and Laker Lines—Grand Rapids, Michigan:** The inter-jurisdictional alignment of these routes and larger variation in density along the alignments makes the system a valuable peer, as Northern Virginia also has large variations in the built-environment. *Activity Density: 11,100*

The following BRT examples were reviewed but not recommended as peer references for this plan:

- ◆ Metro Busway—Los Angeles, California
- ◆ MTS Rapid—San Diego, California
- ◆ VTA Rapid Bus—Bay Area, California
- ◆ RFTA Veloci—Aspen, Colorado
- ◆ Metro Transit BRT—Minneapolis, Minnesota
- ◆ KCATA MAX—Kansas City, Missouri
- ◆ ABQ Ride ART—Albuquerque, New Mexico
- ◆ CDTA BusPlus—Albany, New York
- ◆ VIA Primo—San Antonio, Texas
- ◆ CapMetro Rapid—Austin, Texas



- ◆ RapidRide, SODO Busway, and Sound Transit Express—Seattle, Washington
- ◆ YRT VIVA—York, Ontario, Canada

Findings

Based on this review peer BRT systems, findings were developed on a number of key topics that were used to guide the development of potential BRT routes in Northern Virginia.

BRT-Supportive Land Use and Density: For most peers, land use along BRT routes changes based on proximity to the corridor and stations. Corridor-adjacent and station area development typically include mixed-uses, office and commercial spaces, multifamily residential complexes (e.g., garden apartments, condominiums, and townhouses), shopping districts, and industrial uses. The densest areas are at route termini and other important activity anchors along the corridor. Meanwhile, service areas further from stations are less dense with single-family residential neighborhoods. In Grand Rapids, Michigan and Aspen, Colorado, service areas also include rural land uses.

Figure 4 Examples of Transit Supportive Land Use Types and Densities



At least ten of the studied peer localities have integrated TOD into public policies and plans. The majority of these policies are integrated into municipal codes through zoning policies and official planning documents, such as Small Area Plans and long-range plans. Typical provisions include:

- ◆ Added density allowances (e.g., by-right apartment homes).
- ◆ Mixed-use zones.
- ◆ Special or additional land use allowances near existing or planned high-capacity transit stations, including BRT stations.
- ◆ More restrictive regulations on car-oriented land uses (e.g., gas stations, parking lots).
- ◆ Increased permitting for construction near transit.
- ◆ Recommendations for planned growth around regional activity centers and major corridors.

In two cases, these policy changes have been led and funded by transit agencies. In the Chicago metropolitan area, Pace created a Transit Supportive Guidelines document designed to be referenced by elected officials, municipal staff, developers, and others who may interface with land use policy and development. In Albany, CDTA funded the city’s Transit Oriented Development Guidebook, which sets a framework for implementing zoning overlays around existing and planned BRT stations.

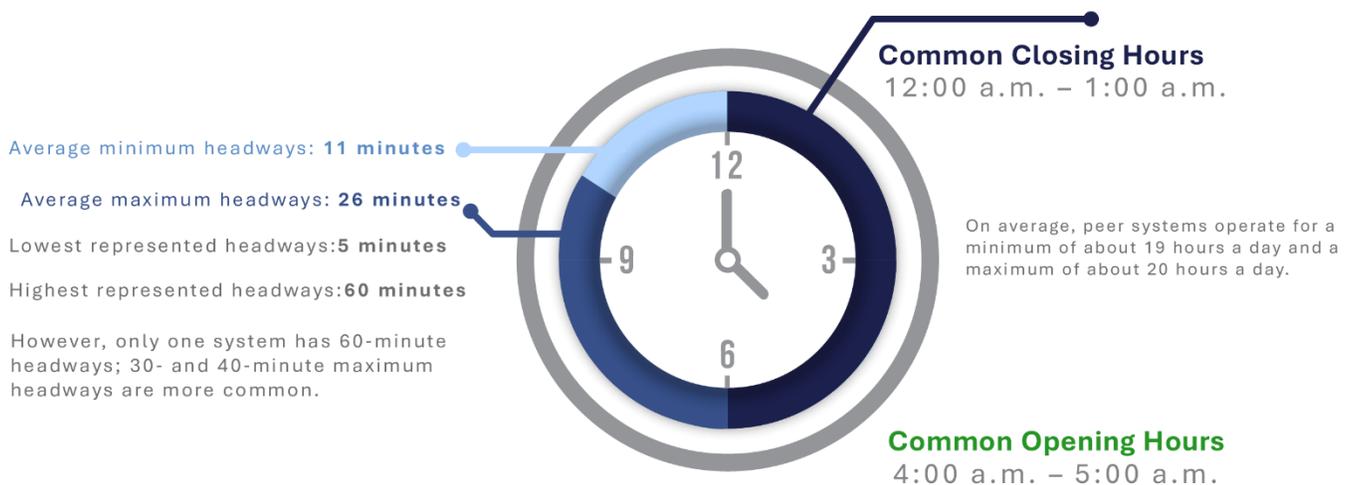
Specific density metrics along BRT corridors also vary. Among the key peers identified, activity density³ averaged about 16,700 people and jobs per square mile, or roughly 26 per acre. For comparison, the Transit Quality of Service Manual, Third Edition (Chapter 3, page 3-20, Exhibit 3-8)⁴, suggests that 15 dwelling units per acre is minimum density for local bus with a frequency of 6 trips per hour (10-minute headways).

BRT Operations: Notably, there is no significant association between activity density and either frequency of service or hours of operation across the studied peers. In other words, these BRT systems do not necessarily run less frequently or for fewer hours in suburban areas than in urban areas. Moreover, while most systems have shorter spans on weekends than weekdays, the average difference in operating hours between them is less than two hours. This indicates that many peers strive to offer similar hours of service across days of the week, even if the frequency of service may vary.

Figure 5 Average Density among Key Peers



Figure 6 Average and Ranges of BRT Peer Level of Service



Maximizing Ridership: The majority of peers cite their leveraging of existing travel demand, as well as forecasted travel demand, as a primary strategy for maximizing ridership. One common tactic is to identify highly trafficked, moderately developed corridors with high ridership levels and either (1) add new BRT service or (2) upgrade existing local bus service to BRT. The intention of this strategy is to make transit travel a convenient option for as many riders as possible.

³ The number of jobs plus the population per square mile within ½ mile of BRT stations.

⁴ <https://nap.nationalacademies.org/download/24766#>.



On highly-congested roads, priority strategies (e.g., dedicated rights-of-way) help to make BRT more reliable, and to make transit commutes more comparable to driving a single-occupancy vehicle.

In addition to high-demand corridors, peer systems also rely on connections to high-demand activity centers to generate ridership. Common examples of key trip generators are:

- ◆ Multimodal transfers (i.e., Metrorail or subway stations, commuter rail stations, Amtrak stations, other key bus routes, transit centers, and/or Park-and-Rides)
- ◆ Micromobility (e.g., bikeshare) hubs
- ◆ Commercial centers
- ◆ Universities
- ◆ Medical centers
- ◆ Office parks and business districts
- ◆ Town centers and Downtowns

Figure 7 Key Trip Generators for BRT



Pedestrian-supportive urban, station, and vehicle design are also key aspects of BRT implementation for most peers. These efforts make BRT a more convenient and attractive transit option and help to accommodate more riders. Common urban design priorities among peers are:

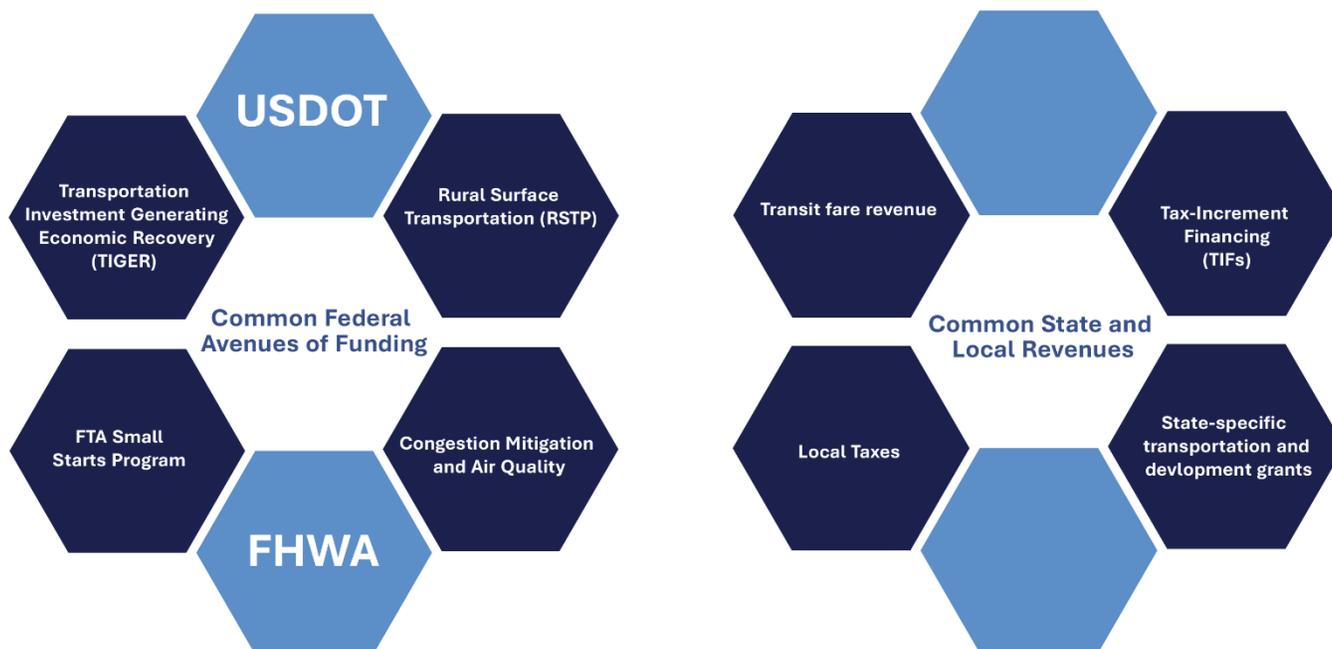
- ◆ Multimodal access for pedestrians, bicycles, and micromobility.
- ◆ Pedestrian safety and accessibility features, such as repaired sidewalks, buffered sidewalks, signalized crosswalks, and ADA curb ramps.
- ◆ Accessible stations with heated shelters, Wi-Fi, emergency telephones, and security cameras.
- ◆ Buses with more room for standing passengers.
- ◆ Green space.
- ◆ Creative wayfinding and signage.

Revenue, Funding, and Costs: On average, key peer BRT systems cost roughly \$200 million to construct and \$8 million per year to operate per line. There is a wide spectrum of BRT costs, though, with differences of over \$600 million and \$17 million in construction and annual operating costs, respectively, between the least expensive and most expensive systems. These differences are in part to the length and varying service characteristics of each BRT system, as well as a result of systems being built in different years (i.e., costs are not adjusted for inflation). For instance, there is a moderate association between the percent of dedicated right-of-way (ROW) and construction cost per line for key peers.



The construction of all peer systems were funded, or intend to be funded, by a mix of Federal, state, and local sources. Common Federal avenues for funding are Transportation Investment Generating Economic Recovery (TIGER) and Rural Surface Transportation (RSTP) grants from the U.S. DOT, the FTA Capital Investment Grant (CIG) Small Starts Program, and Congestion Mitigation and Air Quality grants from the FHWA. Typical state and local revenues include tax-increment financing (TIFs), state-specific transportation and development grants, local taxes, and transit fare revenue. In two cases, voters approved sales and income tax increases to fund public transit.

Figure 8 Common Federal and Local Funding Sources



Several peer systems also had or have funding sources in addition to common Federal, state, and local sources. Examples include:

- ◆ Developer contributions, including fees and naming rights.
- ◆ Air rights.
- ◆ Grants from regional agencies (e.g., NVTA).
- ◆ Car rental fees and motor vehicle excise taxes.

Cost-Effective Strategies: All of the studied peers cited measures that localities and transit agencies have taken, or plan to take, in order to build and maintain a cost-effective BRT system. These strategies fit into five broad objectives which each include several specific, practicable tactics.

- ◆ **Implement BRT in phases:** Peer BRT systems exemplify several ways in which BRT can be implemented incrementally. For example, ROW changes can be made over time, and mixed-traffic designs can be used in the interim. Vehicle and station improvements can be made once service and ridership levels are already established. A phased implementation allows localities and agencies to provide the best possible service with the funding that they currently have, rather than hitting financial setbacks which can hinder performance and negatively impact the public's perception of BRT.



- ♦ **Build long-term, aspirational goals into the BRT design:** In some cases, BRT “light” is an interim service which localities ultimately intend to replace with BRT “heavy” or even light rail. These aspirations can be built into the design of a BRT system to make the transition easier and more feasible when additional funding is available. Platforms can be designed to accommodate larger vehicles in the future, and rights-of-way can be constructed to allow for light rail and wider urban design improvements (e.g., bicycle and pedestrian infrastructure) to be made in the future.
- ♦ **Study multiple build and no-build alternatives:** Different alignment alternatives, priority treatments, and levels of service will have different construction and operating costs and attract different levels of ridership. During BRT planning and design, different alternatives with different levels of investment should be established and weighed against one another. They can also be compared to existing transit ridership to establish corridors as higher or lower priority investments.
- ♦ **Leverage existing resources:** Many of the studied peers utilized existing transit assets and infrastructure and added, or plan to add, enhanced features and amenities as ridership momentum and capital increase. For example, the existing fleet of local buses can be used until larger buses (e.g., articulated) or branded buses can be purchased. Existing infrastructure and bus stations can also be used initially and improved over time.
- ♦ **Optimize service and operations for both BRT and local buses:** Finally, at least four peers cited route optimization as a means to remain cost-efficient. For example, local bus service can be restructured or suspended to respond to changes in ridership and make the most efficient use of both the local and BRT systems.

Cost-Effective Strategies

Implement BRT in phases

Build long-term, aspirational goals into the BRT design

Study multiple build and no-build alternatives

Leverage existing resources

Optimize service and operations for both BRT and local buses

Governance Options: Planning, managing, building, and operating BRT projects is a cooperative effort between leading stakeholders with distinct roles. Among peers, BRT planning is typically guided by municipalities and their comprehensive and long-range transportation plans, with transit agencies and other regional entities as advisors. Operating agencies can be Government entities within a municipality (e.g., Fairfax County DOT) or an interjurisdictional public agency (e.g., WMATA). In one case of interjurisdictional BRT, several participating governments drew up an agreement which allowed the project to run smoothly with consistent design and operation. This agreement also outlines how much cost each municipality is responsible for and what revenue they will get. Other specific roles, such as grant administration and NEPA sponsorship, can be delegated to whichever stakeholder has the resources and experience to take on these responsibilities.

Engagement and Education: The objectives and strategies of public engagement varied among the studied peers. For example, Minneapolis created an educational campaign which demonstrated to the public what BRT is and is not, and what it can and cannot deliver. Meanwhile, the most recent outreach campaigns for Envision Route 7 were focused on



determining the best route and station alternatives and achieving public buy-in, with the objective of achieving high ridership on a proposed BRT route. In Indianapolis, transit designers worked closely with local businesses and residents to minimize the impacts of BRT construction on the community. These three examples present a timeline of how and why public outreach strategies should be utilized throughout the process of BRT implementation, from planning and design through construction.

2.2.2 Lessons Learned

The following section summarizes the key takeaways from both the literature review and the peer review.

- ◆ **BRT-Supportive Land Use and Density:** BRT should be considered in areas with strong demand for transit, with moderate- to high-intensities of mixed uses, population density, and jobs. Routes should be anchored by strong activity centers and Transit-Oriented Development. However, BRT need not be precluded from suburban and rural areas where ridership can support the system.
- ◆ **BRT Operations:** High-frequency service with extensive operating hours is a cornerstone of BRT. These features support high ridership capacity by capturing many diverse work and leisure trips, and by providing consistent, reliable service throughout the week.
- ◆ **Maximizing Ridership:** An efficient, accessible, and pleasant BRT system will attract and sustain ridership. Transit priority strategies help to keep BRT efficient and reliable. Meanwhile, urban design features that promote multimodal transportation options make BRT a more accessible and attractive transit option.
- ◆ **Revenue, Funding, and Costs:** The cost of a BRT system will be dependent on the levels of infrastructure investment and service proposed, which vary widely across different peer BRT systems. Regardless of the proposed level of service, there are multiple Federal, state, and local funding avenues to support BRT implementation.
- ◆ **Cost-Effective Strategies:** BRT can be an extremely cost-effective option for high-capacity transit. An effective system can be designed and constructed in accordance with different budgets or built in phases with investments that compound over time. Aspirational goals for BRT can be planned for the future when the system is well-established, and more funding becomes available.
- ◆ **Governance Options:** To ensure a smooth and coordinated approach to BRT implementation, transit agencies, engineers, and planners must proactively integrate planning and service with public policies and regulations. Some systems may also require interjurisdictional coordination between governments that allow for a consistently operated, managed, and branded BRT system across municipalities.
- ◆ **Engagement and Education:** The public engagement process for BRT implementation should begin during the planning stages, continue throughout construction, and carry-on after new service opens. In order to maximize public buy-in and minimize confusion during implementation, the engagement process should target a diverse audience outside of just transit users.

2.3 Community Engagement

Over the course of the development of the BRT Action Plan, NVTA conducted several phases of community engagement, reaching out to members of the public to gauge their opinions on BRT and educate them on the potential benefits of a BRT system. This section highlights some of the engagement efforts that occurred at various points during the study, especially those focused on general community sentiment towards BRT as a transportation option. Additional engagement was conducted around the Draft BRT Action Plan, which was focused on collecting specific reactions to the routes proposed therein. These route-specific comments are summarized in Section 4 alongside the analysis results for each route.



2.3.1 Phase 1 Community Engagement

During Phase 1 of the project, which occurred between October 2023–July 2024, NVTA engaged with an array of audiences to share information about the planning process in diverse communities and collect feedback that was used to guide the development of the BRT Action Plan. These activities included **perception survey, focus groups, online survey, and pop up events.**

a. Perception Survey

NVTA periodically conducts a regional Perception Survey, addressing a wide range of transportation issues in Northern Virginia. This survey tracks changes in residents’ perceptions of transportation issues by asking many of the same questions year after year. The fifth iteration of this survey was conducted as part of the BRT Action Plan project between November 28–December 14, 2023. The main goal of the survey was to identify current awareness and priorities and to assess any changes that may have occurred on any of the key measures from the earlier two waves of research, including:

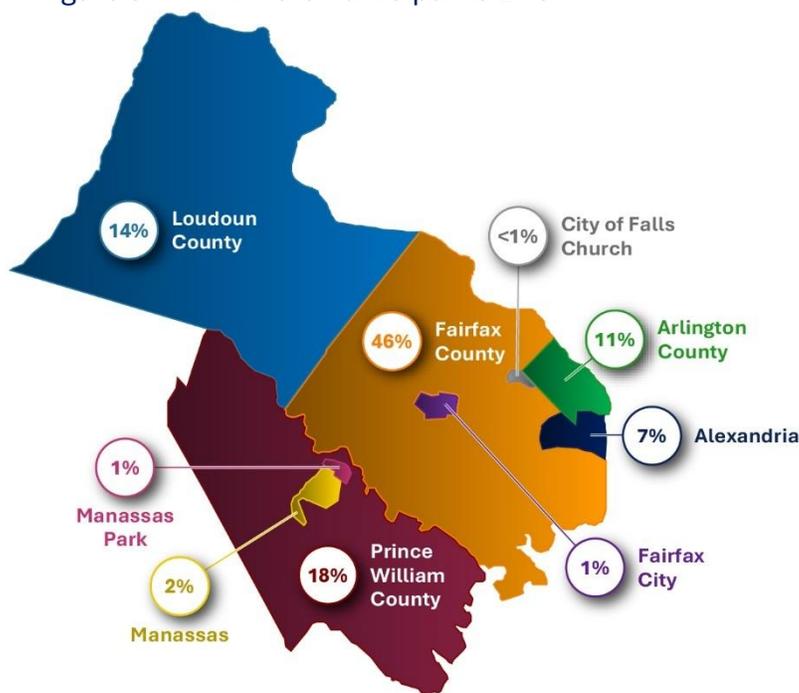
Transportation issue awareness and perceptions

- ◆ Perceptions of quality life in terms of transportation and future outlook.
- ◆ Identification of key factors impacting transportation quality of life.
- ◆ Identification of regional transportation priorities and key projects.

To support the development of the BRT Action Plan, this version of the perception survey added questions designed to specifically understand perceptions of BRT among Northern Virginians. About 80% of the questionnaire remained unchanged to ensure continuity in tracking findings from previous NVTA survey waves.

A complete report on the results of this survey can be found in Appendix B—this section highlights only the findings related to BRT.

Figure 9 Where Participants Live



Approach and Methodology

The approach was a scientific study using an opt-in online panel.⁵ Survey respondents were required to be 18 years of age or older and residents of Northern Virginia, more specifically, residents of Arlington County, Fairfax County, Loudoun County, Prince William County, and the cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas

⁵ Confidence Interval and Margin of Error: All sample surveys and polls, whether or not they use probability sampling, are subject to multiple sources of error which are most often not possible to quantify or estimate. Online opt-in panels such as the one used for this study do not use probability sampling and accordingly the strict calculation of sampling error is not typically done. In the hypothetical case of a perfectly random sample and no response or measurement errors, a sample of this size (n=606) would produce a margin of error of ± 3.98% at a 95% confidence interval. Margins of error for subgroups would be higher.



Park. The aim was to get an overall representation of regional demographics based on age, gender, and race according to the U.S. Census. The intentions for the survey also included achieving a proportionate sample that represents each county/city by population size according to the U.S. Census. Typically, sample quotas were used in order to hit these demographic targets; weighting was not needed for this survey.

Summary of BRT-related Results

Generally, this survey identified potential opportunity for BRT in Northern Virginia. Despite limited familiarity with BRT, residents had a favorable outlook on BRT, seeing many more benefits than drawbacks. The survey results highlight how important it will be to educate the public on how easy BRT is to use, and especially its travel time and reliability benefits. If BRT can deliver on these promises, there is strong potential to draw in new riders. Summarized below are some of the highlights of the survey results.

As shown in Figure 10, nearly half of respondents were not aware of any of the initiatives that were specifically asked about in the survey such as Metroway Potomac Yard Line, Richmond Highway Bus Rapid Transit, Better Bus Network/Better Bus Network Redesign Study, etc.

Figure 10 Familiarity with Ongoing Bus Initiatives

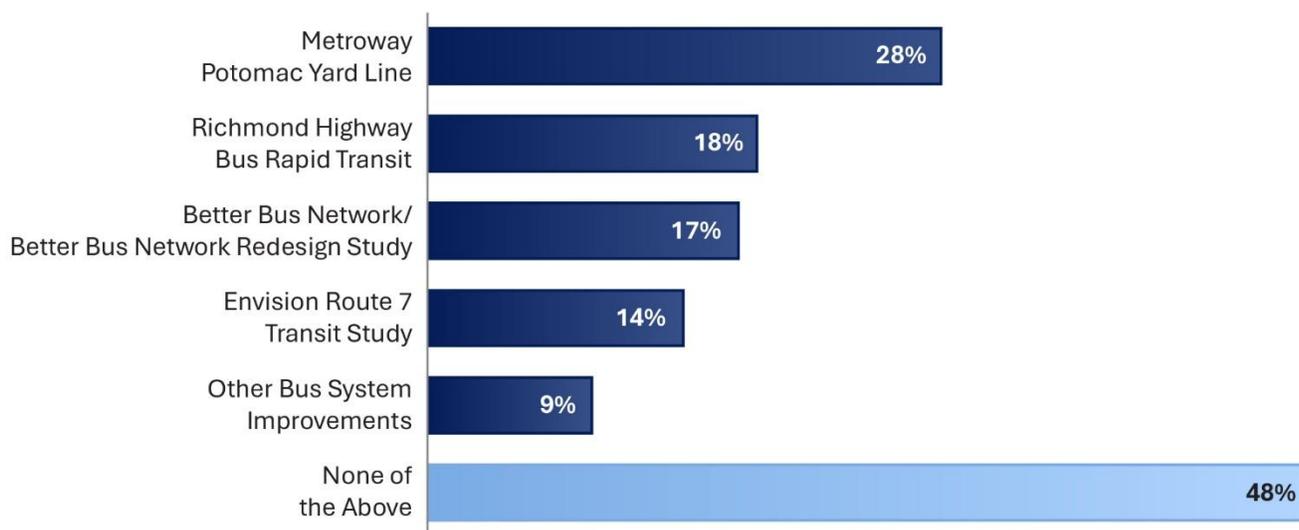


Figure 11 and Figure 12 show the results regarding familiarity of BRT among survey respondents and how favorable they are towards BRT in Northern Virginia. Familiarity with BRT is somewhat limited, with most respondents (69%) reporting that they were not too or not at all familiar with BRT, as shown in Figure 11. Despite this lack of familiarity, views are generally Favorable (51%) or Neutral (41%), as shown in Figure 12. Leveraging key benefits would help further strengthen interest. More than half would consider using BRT (54% for commuting and 63% for recreational/personal travel).



Figure 11 Response to Question “How familiar are you with Bus Rapid Transit (BRT)?”

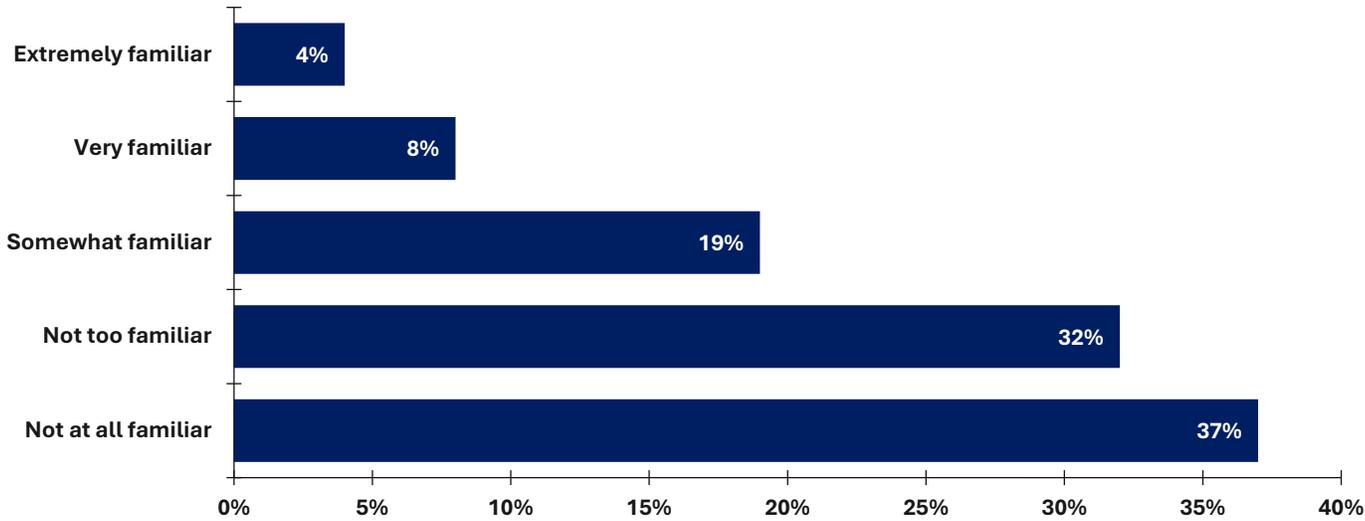
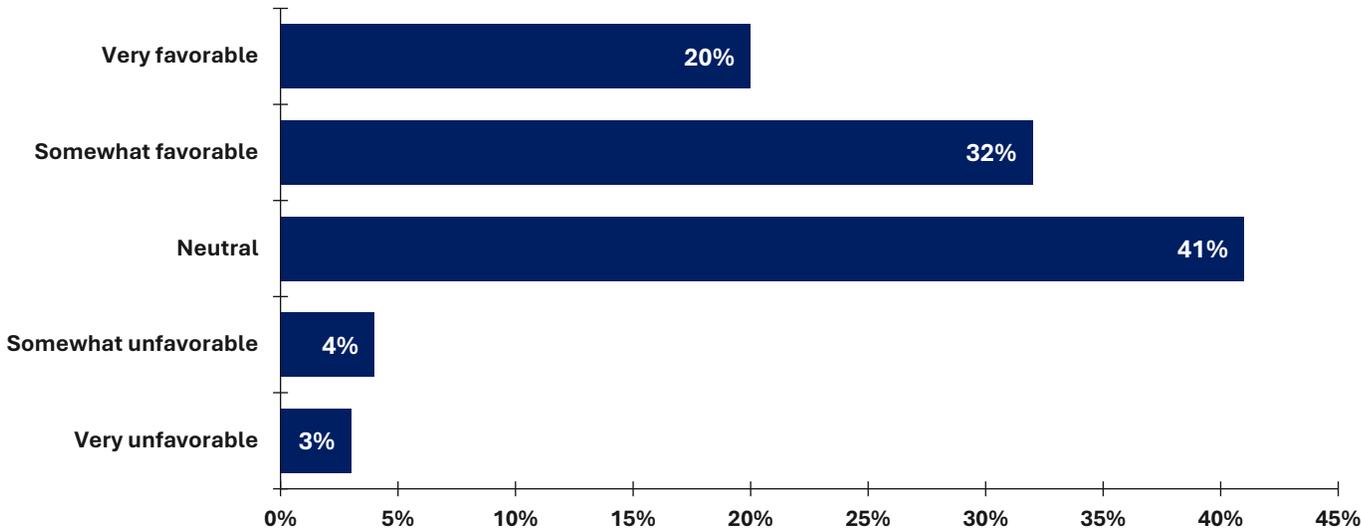


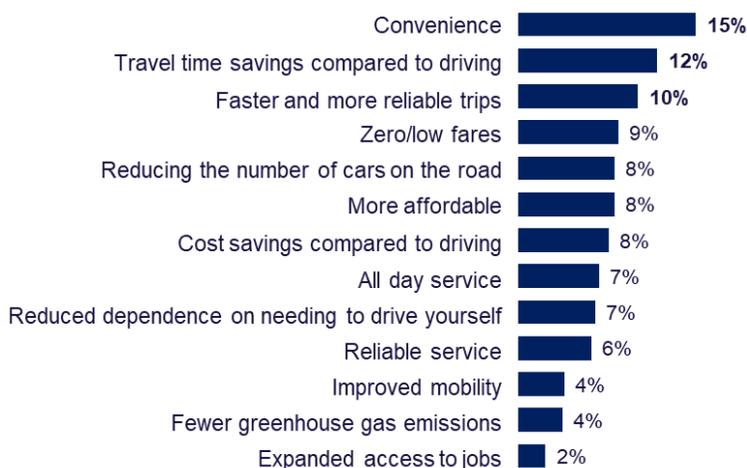
Figure 12 Response to Question “How favorable are you towards Bus Rapid Transit (BRT) operating in Northern Virginia?”



The strong majority (84%) felt that the positives associated with BRT outweighed any negatives and the most influential benefits were Convenience (15%); Time savings compared to driving (12%); and Faster and more reliable trips (10%). Figure 13 shows the top influential benefits of using BRT.



Figure 13 Top Influential Benefits of Using BRT



Focus Groups

In order to build an understanding of the public’s baseline familiarity with, understanding of, and support for BRT in Northern Virginia, NVTa commissioned a research team to recruit, conduct, and analyze online discussion groups, examining current and future transportation needs in Northern Virginia. On March 5th and March 6th of 2024, the research team conducted virtual focus groups with residents of Northern Virginia. A summary of results of this research are presented in this section. Please see Appendix C for additional findings.

Approach and Methodology

A total of four online discussion groups were held on Tuesday March 5th and Wednesday March 6th of 2024. In order to qualify, residents needed to be 18 years of age or older and live in one of the nine cities or counties that make up Northern Virginia.

The research team used a series of screening questions to identify participants. Participants were chosen to provide a mix of demographics, transit ridership, and location of residence. The research team chose 42 participants total (9-12 participants per group). Responses to the screening questions were used to place participants into one of two segments:

- ◆ **Riders:** Those who have used public transit in Northern Virginia in the past 6 months.
- ◆ **Non-Riders** (includes Lapsed Riders): Those who have either not ridden transit in Northern Virginia in the past 6 months, or have never ridden public transit in Northern Virginia. Note that only those who indicated at least any likelihood to consider using transit were included.

The participants were invited to the group discussion that fit their segment (with two group discussions available for each segment). The focus groups were conducted in two parts: the day prior to their scheduled group session/interview, activities were made available to participants through an online platform to complete “assignments.” The following day, the research team hosted online discussion groups.



Table 1 Segmentation of Groups

| Group | Participants |
|------------|-----------------|
| Riders | 15 |
| Non-Riders | 14 |
| Total | 29 ¹ |

¹ Note that this is the total number of participants that attended the groups. There were some participants that filled out the activities prior to the groups but did not attend their assigned group.

Research Caveats and Limitations

Typically, qualitative research is used to provide answers to attitudinal questions, as well as to provide insight and in-depth understanding of consumer perceptions and opinions.

By nature, this research method does not usually allow for statistical analysis and interpretation. Rather, it is a tool for decision-making purposes. The findings from this type of research should be used to provide insight and direction into decision-making rather than as a sole basis for decision-making.

Qualitative research tends to provide answers to questions like “Why?” and “How?,” whereas quantitative research tends to provide answers to questions such as “How many?” or “How much?” The statements made in this report, including the conclusions and implications or any recommendations, are based upon the attitudes and opinions of the participants and are not necessarily projectable or generalizable to the population at large. Please note that the number of respondents answering a certain way has been cited in various instances only for the purpose of adding perspective to a statement, NOT for the purpose of quantitative analysis.

Summary of Results

Unsurprisingly, Non-Riders were far more dependent on their personal vehicles to get around, with only the (very) occasional trip into Washington, DC using the Metro. On the other hand, while many Riders did actually have their own personal vehicle, they would more often opt for transit when available, with the most common mode of transportation for them being Metrorail. Aside from Metrorail, most Riders did have experience riding buses, though to varying degrees.

Safety was a large deterrent to public transit use and more specifically, bus usage in the region, especially among Non-Riders. They noted stories of crime or harassment that they had heard about from the news, family, or friends.

Riders pointed to the easy accessibility of Metrorail or other systems as their reason for choosing public transportation. These systems were near them and therefore easy to use. The disconnect between using Metrorail and using bus services in the region was often because participants had an easier time reading and understanding Metrorail schedules, understanding the locations of Metrorail stations, and ultimately understanding how they can get where they need to go. A handful of participants did say that they used buses to fill in the gaps of Metro service, whether that is geographically, or because they were traveling at a time of day when there was little to no service on Metrorail.



Some of the key findings from this set of focus groups related specifically to BRT in Northern Virginia are highlighted below.



Reducing congestion in Northern Virginia needs to be at the forefront of BRT development.

The first priority that all participants could agree on was that reducing congestion in Northern Virginia needs to be at the forefront of BRT development. This means that the areas in the region with the worst congestion should be the areas where a BRT line is first implemented.



Creating lines and networks that connect areas in Northern Virginia rather than feeding directly to DC should be a priority.

On top of relieving congestion, one other key priority was identified: creating lines and a network that connects areas in Northern Virginia and does not just feed directly to DC. As a few participants pointed out, there are enough ways for them to go into DC. A new network can avoid redundancies by connecting them across the Northern Virginia region, perpendicular to Metrorail. This can also allow BRT to connect commercial and employment hubs across the region.



People are not familiar with the terms “Bus Rapid Transit” or “BRT”

When participants were first asked about BRT and what they think it is, it was clear that both Riders and Non-Riders had little or no prior knowledge of BRT. Guesses as to what it could refer to mostly centered around “a faster bus service,” express bus, or another type of limited stop service.

After defining BRT for participants, they tended to lean into the express bus comparisons, citing other express bus services they had seen in places like New York City or San Francisco. It should be noted that participants latched onto the word “Bus” in “Bus Rapid Transit.” In their mind this meant that BRT was more similar to traditional bus service than anything else. They had a hard time imagining how it would be different from the current local bus system.

As participants further explored the definition of BRT, some felt that assertions that the service would be “faster” were difficult to believe. They pointed out that ultimately it was very difficult to make anything in Northern Virginia “fast” given the current high level of congestion in the region.



There is an appetite for a more efficient system like BRT, even among Non-Riders

Notably, prior to talking about and introducing BRT, a handful of participants commented that they would love it if bus service was made more like rail service, with direct lines, more noticeable stations, and designated bus lanes. These comments exhibited that there was an appetite for a more efficient system like BRT, even among Non-Riders. Participants were clear that there were specific aspects of BRT service that they would like to see:



- ◆ All day service—commuting hours have changed greatly with the advent of remote work and many people who rely on the transit system most worked in service jobs or other professions that were not on a typical 9-5 schedule. Therefore, service needs to be all day with an adequate level of frequency to serve everyone.
- ◆ A new BRT system must be integrated with and connected to other regional transit systems—not only to avoid redundant service, but also to foster communications between jurisdictions on building and maintaining a new BRT network. Participants across all groups feel that the local jurisdictions in Northern Virginia did not currently communicate and work together enough.
- ◆ Similarly, a new BRT network needed to be integrated with Metrorail—while it should not be treated as solely a feeder system into the Metrorail network, it should connect people to Metrorail stations in Northern Virginia.
- ◆ A new BRT network should use fare media supported by the larger regional network. It is important that riders can, for example, transfer between BRT and other regional systems using simply their SmarTrip card or other fare media supported regionally.
- ◆ BRT should be built to accommodate the growth of the region. During discussions of sustainability, participants seemed wary of the ability of a BRT system to keep up with the growth of the region without needing an upgrade. Building a BRT network that supports and accommodates regional growth was very important. Additionally, ensuring that there is long-term funding to keep these projects and services in place while the region continues to grow was equally important.

Online Survey

During the Spring of 2024, NVTA conducted an online survey, titled “Future of Transportation in NoVA,” to evaluate public awareness and priorities regarding the development of a BRT system in Northern Virginia. The survey was open from May 20, 2024–June 23, 2024 and was available for participants to participate in Korean, Spanish, and English. Members of the public could complete the surveys online, either through web access or on-site via digital devices at community pop-up events held across Northern Virginia. Please see Appendix D for the final questionnaire.

NVTA promoted the survey using several methods to strategically engage different communities:

- ◆ **Social Media**—The survey was promoted through paid and earned social media.
- ◆ **Future of Transportation Toolkit**—NVTA provided its Authority members and regional partners with a Stakeholder Communications Toolkit to raise awareness and promote digital and in-person feedback opportunities. The toolkit included background information, recommended posts for social media platforms, draft email/newsletter text, and talking points.
- ◆ **Pop-up events**—NVTA conducted a series of pop-up events that helped spread the word about the effort and encouraged people to participate in the survey. These events were strategically deployed to meet transit- and non-transit users at locations with heavy foot traffic. In particular, several of these events were targeted toward Equity Emphasis Areas (EEAs) where people may not have been otherwise exposed to other efforts to publicize the survey. More information of the pop-up events can be found later in this section.



This approach ensured comprehensive data collection from diverse respondent groups, enhancing the survey’s comprehensiveness and relevance to NVTA’s objective. In total, the survey team collected a total of 1,239 completed



surveys. Respondents were segmented by transit rider status and jurisdictions to facilitate detailed analysis as shown in Table 2. Approximately 65% of the survey respondents came from residents of Northern Virginia.

Table 2 Surveys Completed—Transit Rider Status (2024 Survey)

| Rider Status | # of Completed Surveys | % |
|--------------|------------------------|-------------|
| Riders | 235 | 19% |
| Non-Riders | 1,004 | 81% |
| Total | 1,239 | 100% |

Table 3 Surveys Completed—Area of Residence (2024 Survey)

| Region | # of Completed Surveys | % |
|------------------------------|------------------------|-------------|
| Northern Virginia | 811 | 65% |
| Outside of Northern Virginia | 398 | 32% |
| Preferred not to answer | 30 | 2% |
| Total | 1,239 | 100% |

Summary of Results

In the survey, the participants were asked “what three words best describe what you think transportation in Northern Virginia should look like in the future?”

As shown in Figure 14, the results suggested that future transportation in Northern Virginia should prioritize convenience, accessibility, reliability and affordability while improving public transportation, efficiency and safety. There were significant differences in transportation priorities between transit riders and non-riders, particularly regarding "Efficient" and "Reliable," with nearly one-fourth of riders (23%) choosing “reliable” compared to 13% of non-riders, whereas non-riders were more likely to say a system should be “efficient” (17% vs 10% of riders). Additionally, riders placed a strong emphasis on words related to being "Fast/Faster," indicating their crucial need for faster trips.

Overall, three in ten of Northern Virginia residents (30%) would like to consider using BRT. This was slightly higher for current transit riders (32%) than for non-riders (29%), indicating a similar level of interest in using BRT. Arlington County residents showed the greatest likelihood of using BRT (35%).

Figure 14 Top 3 Words

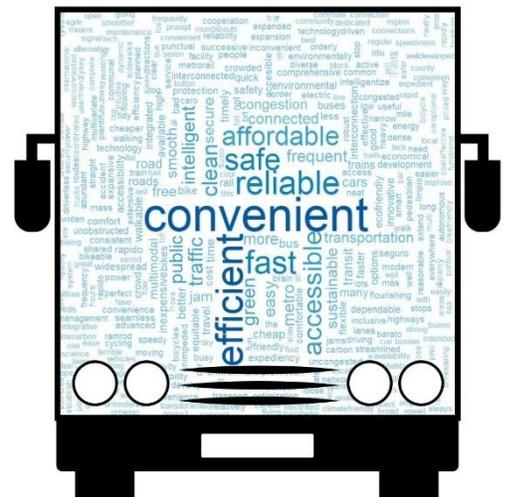


Figure 15 Response to Question “How likely would you be to consider using BRT?”



The survey participants were asked about their top three priorities regarding the “most important ways for local governments to prioritize routes when planning the development of BRT systems” in Northern Virginia. Figure 16 identifies the most common answers across all respondents and Table 4 shows the top three priorities for riders and non-riders separately.

Figure 16 Responses to Question: “Which of these is most important? A BRT system that... (Top 3)”

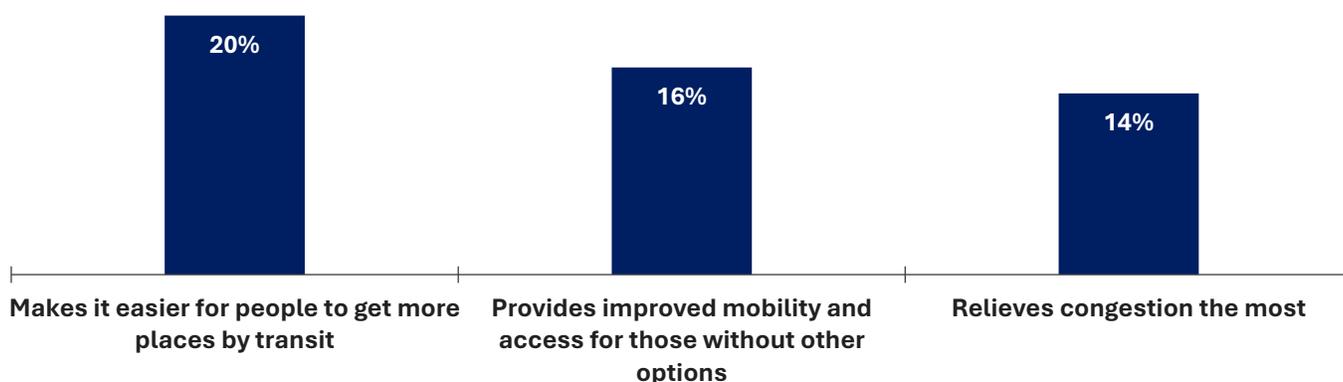


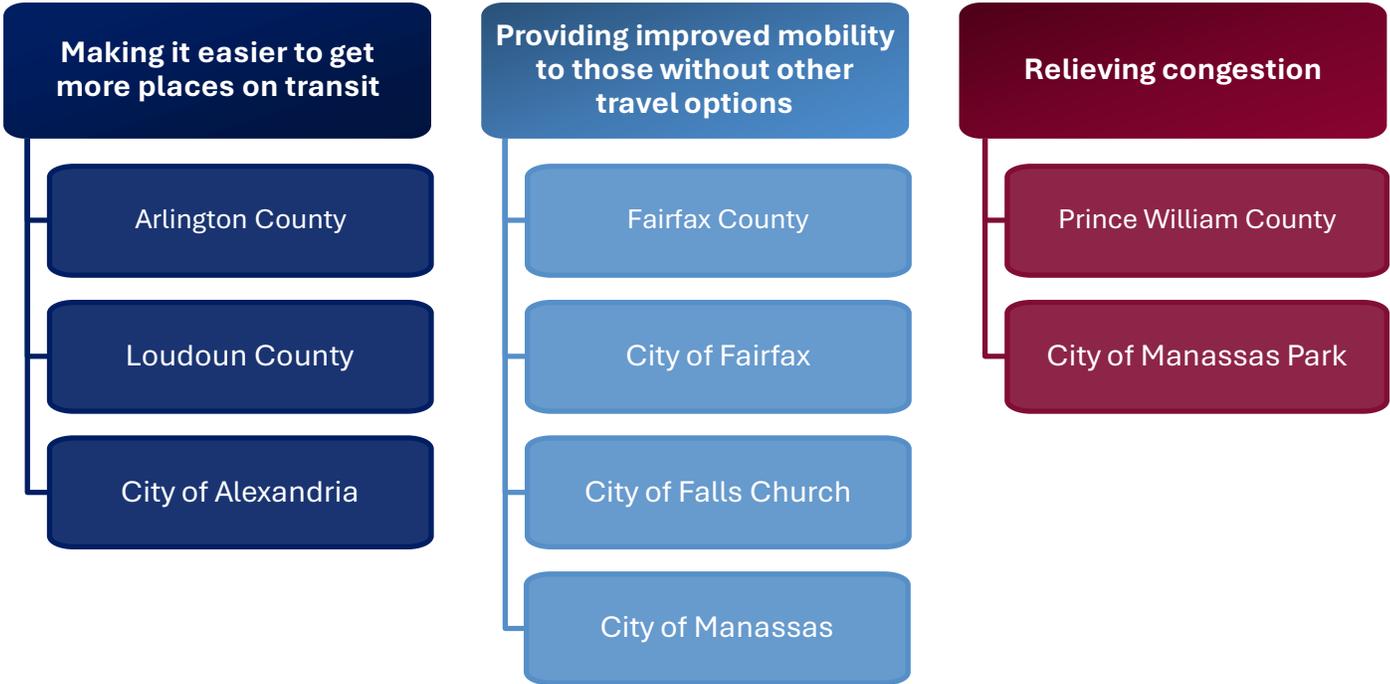
Table 4 The Top Three Priorities for Riders and Non-Riders

| Riders | Non-Riders |
|---|---|
| Making it easier to get to more places on transit (23%) | Make it easier to get to more places on transit (19%) |
| Ensuring a safe and secure mode of travel (16%) | Providing improved mobility to those without other travel (16%) |
| Providing improved mobility to those without other travel (14%) | Relieving congestion (15%) |

There was some variation in the top priority based on jurisdiction, indicating different priorities across the region. The top priority for each jurisdiction is in Figure 17.

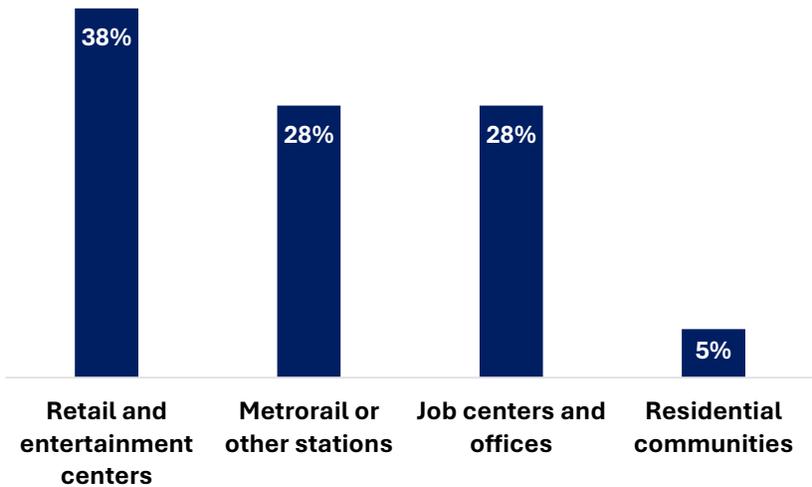


Figure 17 Top BRT Priorities by Jurisdictions



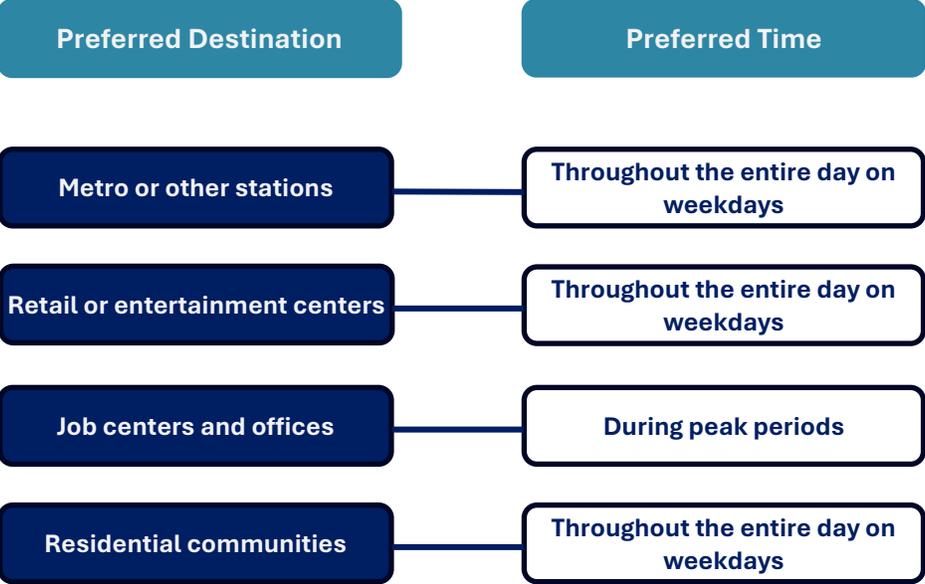
The survey asked participants to provide information about the types of places that they would want to use BRT to access. As shown in Figure 18, the most common response was “retail and entertainment centers.” This was the most popular destination type across all Northern Virginia jurisdictions with the exception of Prince William County and City of Manassas, who preferred greater access to Metrorail stations or other transit.

Figure 18 Responses to Question: “What types of places would you want BRT to take you to?”



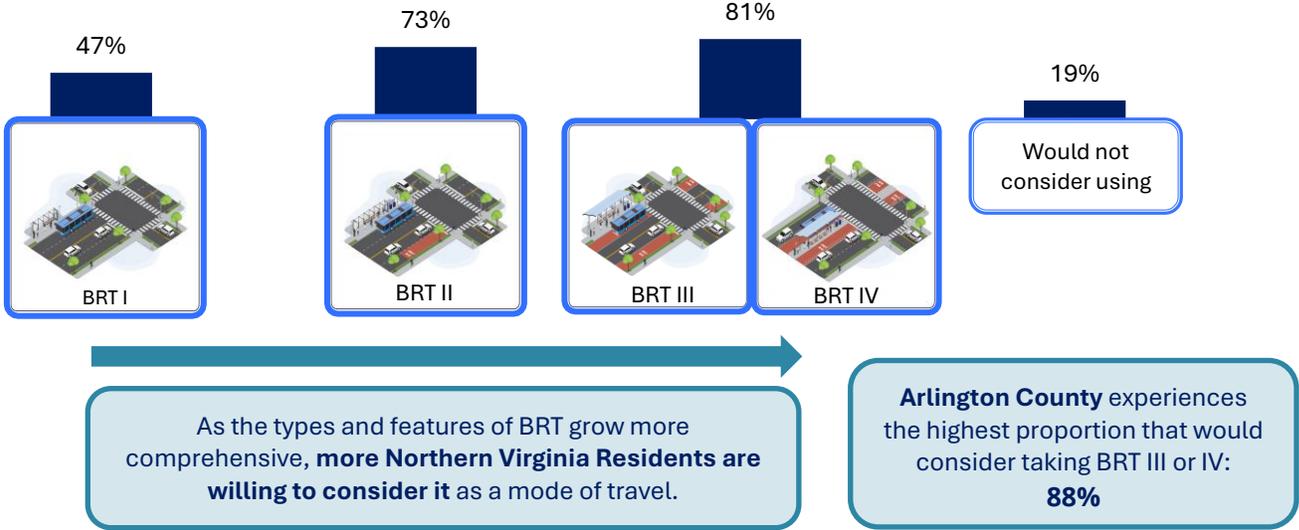
Depending on the type of location, priorities for peak or all-day service differ, as presented in Figure 19.

Figure 19 Preferred Destinations/Times of Day



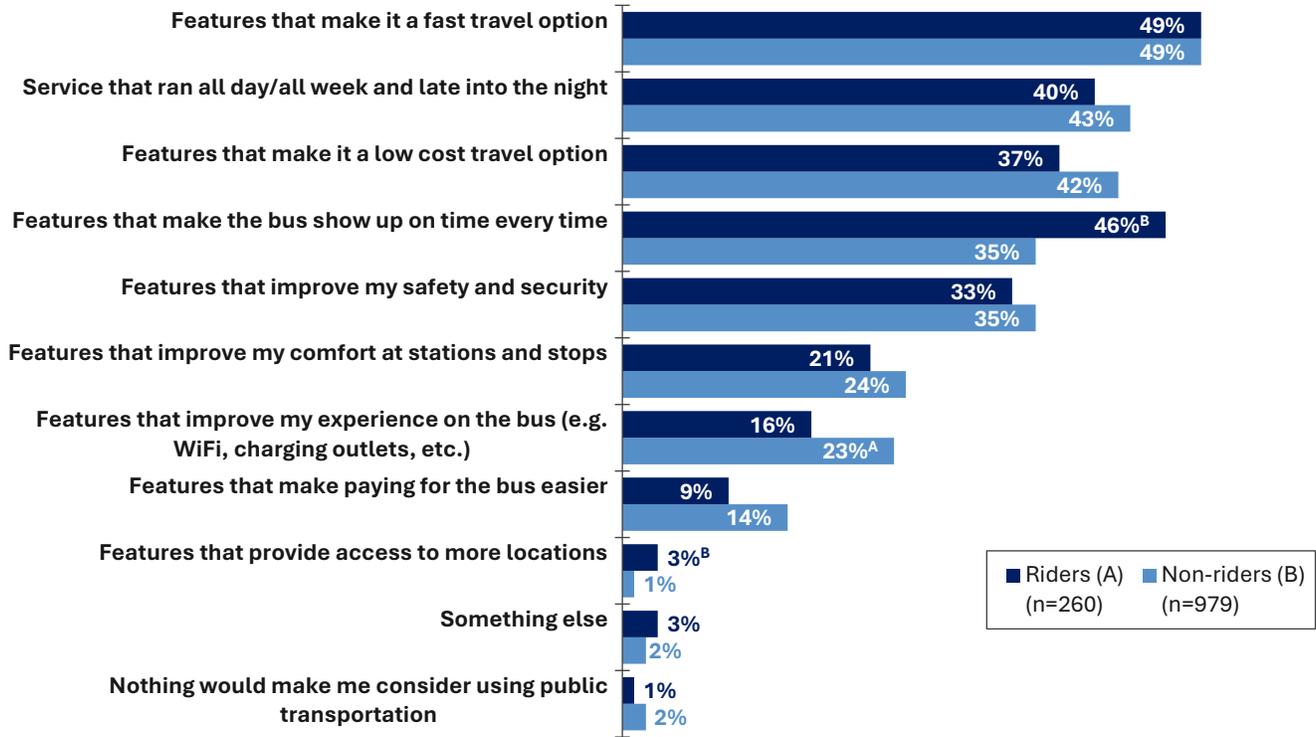
To evaluate whether respondents would consider BRT over their current primary mode of transportation, four distinct types of BRT systems were defined in the survey, ranging from basic to advanced configurations. This helped to assess preferences of respondents related to different potential features of BRT. Images were utilized to help respondents visualize different BRT types and their features. Using a laddering technique, this set of questions attempted to identify the necessary BRT features to spur additional ridership on BRT.

Figure 20 BRT Types and Percent Willing to Consider Each BRT Type Over Their Current Primary Mode of Transportation



Participants were asked to select from a list the three most important features they would like a new public transportation system to have for them to consider using it. The results showed that both riders and non-riders prioritize features that make BRT a faster travel option with consistent all-day service (49% and 40%-43%, respectively). However, riders placed greater emphasis on features that make the bus show up on time every time (46%) compared to non-riders (35%). While the majority of jurisdictions valued features that make public transportation a fast travel option, Prince William County, City of Manassas, and City of Manassas Park preferred service that runs all day/all week and late into the night.

Figure 21 Key Features for Considering Public Transport Usage



The results indicate that about 6 in 10 of Northern Virginia residents (61%) showed that they were likely to support the removal of traffic lanes or reducing on-street parking to accommodate BRT. Among riders, two-thirds (66%) expressed some level of support, as compared with 64% of non-riders. While the number of respondents reporting support were similar, the portion that were extremely likely to support these types of changes were higher for transit riders than non-riders (43% compared to 31% non-riders). Arlington County showed the greatest likelihood among jurisdictions (81%).



Pop Up Events

Phase 1 of the BRT Action Plan kicked off the project’s community engagement with a focus on educating transit users and drivers in the Northern Virginia region. NVTA’s Perception Survey confirmed that the public remained generally unaware of BRT, as well as its purpose, goals, and opportunities for the region. Consequently, NVTA prioritized the opportunity to educate and inform the public in this phase of community engagement while utilizing the outreach as a means to also draw in future users for BRT.



A series of community pop-up events throughout Northern Virginia were targeted to drivers and transit users to educate, inform, and collect feedback with a survey tool and on-site polling activity to inform NVTA’s investment in the future of transportation in Northern Virginia. These events were strategically deployed to meet transit- and non-transit users where they are at locations with heavy foot traffic. In particular, several of these events were targeted in EEAs where people may not have been otherwise exposed to other efforts to publicize the survey.

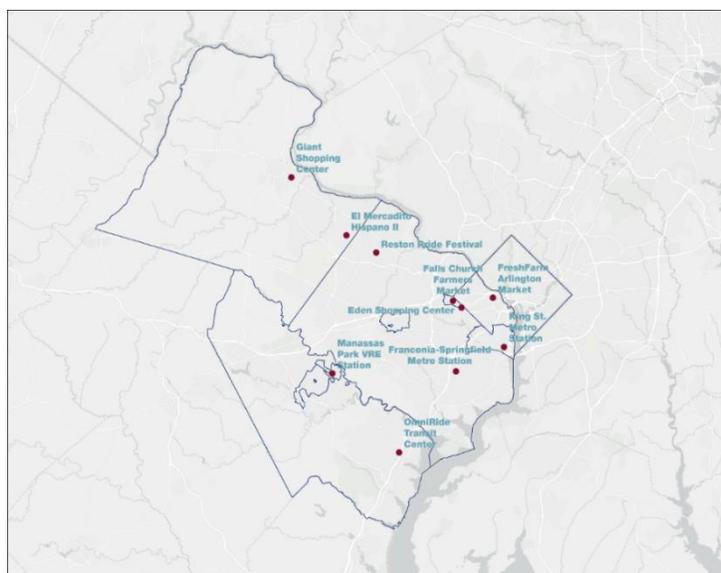
With priority goals to educate, inform, and collect feedback, the BRT Action Plan team utilized a comprehensive suite of multilingual engagement tools at events to:

- ◆ Expand awareness of NVTA and its mission by sharing NVTA’s Annual Report, QR code to BRT page, and providing an NVTA subject matter expert on site
- ◆ Expand BRT education, awareness, and recruit future BRT and transit riders
- ◆ Inform the community about the BRT project
- ◆ Collect feedback on various aspects of BRT via the online survey described in the previous section

Pop-up events were strategically dispersed across Northern Virginia to maximize reach across the region and engage a balance of both drivers and transit users. The event booth featured innovative and engaging branded pop-up banners, a-frames, tablecloth, take-one flyers, table-top signs, and premium giveaways, including a snack bag of candy with a customized card to thank participants for taking the survey or to remind them to take the survey later if not completed on site. The multilingual team wore a BRT branded t-shirt to demonstrate a professional presentation and further validate the team efforts. Each event featured Spanish speakers and/or Korean and Vietnamese speakers.

The pop-up events utilized a digital on-site survey and printed one-word activity cards to actively engage community members and collect feedback to inform

Figure 22 Phase 1 Pop-Up Locations



the BRT Action Plan’s next steps. Across 10 pop-events the NVTA team had more than 4,200 interactions with members of the public, as outlined in Table 5.

Table 5 Phase 1 Pop-Up Results Summary

| Total Number of Pop-up | 10 Events |
|-------------------------------|-----------|
| Total Rack Cards | 2,654 |
| Survey’s Submitted On-Site | 269 |
| One Word Activities complete | 406 |
| Total Interactions in English | 3,687 |
| Total Interactions in Spanish | 326 |
| Total Number of Interactions | 4,233 |

The event teams encouraged participants to distill their thoughts into a single word, capturing succinctly, yet powerfully, what they envisioned for future transportation improvements in Northern Virginia. This dual approach provided the project team with valuable quantitative and qualitative data, while also collecting concise, impactful, and constructive input.

Event participants were asked to provide a one-word response to two questions:

- ◆ TODAY, transportation in Northern Virginia is...
- ◆ IN THE FUTURE, transportation in Northern Virginia should be...

The larger and bolded words in the below word clouds provide a visual artifact to represent the majority of one-word responses provided at the pop-up events. Below, ‘Today’ is represented in the red bus graphic on the next page and ‘Future’ is represented in the blue bus graphic.



Methodology

A total of four online discussion groups were held on Tuesday, March 11, 2025 and Wednesday, March 12, 2025. In order to qualify, residents needed to be 18 years of age or older and live in one of the nine cities or counties that make up Northern Virginia.

The research team used a series of screening questions to identify participants (see Appendix F). Responses to the screening questions were used to place participants into one of two segments: current transit riders and non-riders. Participants were chosen to provide a mix of demographics, transit ridership, and location of residence (see Demographic Profile in Appendix E). The research team recruited and invited 41 participants in total (9-12 participants per group). In total, 34 of those invited actually participated in the groups. The rider and non-rider segments were defined as:

- ◆ **Riders:** Those who have used public transit in Northern Virginia in the past 6 months. To ensure the rider group reflected a mix of usage patterns, a limit was placed on those who only use Metrorail and do so with low frequency. This was done to avoid over-representation of occasional event-based riders (e.g., someone who rode Metrorail once in the past six months for a special outing).
- ◆ **Non-riders (includes lapsed riders):** Those who have either not ridden transit in Northern Virginia in the past 6 months, or have never ridden public transit in Northern Virginia. Note that only those who indicated at least any likelihood to consider using transit were included.

Participants were invited to the group discussion that fit their segment (with two group discussions available for each segment). Participants were also asked to join the Quallie online bulletin board to participate in individual activities the day prior to their group discussion.

Table 6 Segmentation of Groups

| Group | Participants |
|--------------|--------------|
| Riders | 17 |
| Non-Riders | 17 |
| Total | 34 |

Note that this is the total number of participants that attended the groups. There were some participants that filled out the activities prior to the groups but did not attend their assigned group.

Table 7 Schedule of Discussions

| Group | Recruited Participants | Assigned Discussion Group Time |
|--------------|------------------------|----------------------------------|
| Non-Riders | 11 | March 11 th , 5:30 PM |
| Riders | 8 | March 11 th , 8:00 PM |
| Riders | 9 | March 12 th , 5:30 PM |
| Non-Riders | 6 | March 12 th , 8:00 PM |
| Total | 34 | |

Note that this is the total number of participants that attended the groups. There were some participants that filled out the activities prior to the groups but did not attend their assigned group.

The discussion and activity guides used during the Focus Groups can be found in Appendix G.



Research Caveats and Limitations

Typically, qualitative research is used to provide answers to attitudinal questions, as well as to provide insight and in-depth understanding of consumer perceptions and opinions.

By nature, this research method does not usually allow for statistical analysis and interpretation. Rather, it is a tool for decision-making purposes. The findings from this type of research should be used to provide insight and direction into decision-making rather than as a sole basis for decision-making.

Qualitative research tends to provide answers to questions like “Why?” and “How?,” whereas quantitative research tends to provide answers to questions such as “How many?” or “How much?” The statements made in this report, including the conclusions and implications or any recommendations, are based upon the attitudes and opinions of the participants and are not necessarily projectable or generalizable to the population at large.

Please note that the number of respondents answering a certain way has been cited in various instances only for the purpose of adding perspective to a statement, NOT for the purpose of quantitative analysis.

Key Findings

Both groups expressed general support for BRT, especially for its potential to reduce traffic congestion, improve transit reliability, and save time. Non-riders particularly emphasized the importance of direct routes and more frequent, reliable services, while riders valued time savings and reduced congestion most highly.

Benefits and Priorities

- ◆ **More frequent and more reliable services:** Both groups preferred the benefit of better transit services, specifically more frequent and reliable options to key destinations.
- ◆ **Reduced traffic congestion:** Both groups agreed that one of the primary benefits of BRT would be the alleviation of congestion, benefiting both public transit riders and drivers.
- ◆ **Direct routes & efficiency:** Non-riders and riders alike favored the potential for BRT to offer direct routes, eliminating transfers and reducing overall travel time.
- ◆ **Cost-effectiveness & affordability:** Non-riders highlighted the financial benefits of BRT, particularly as a more affordable alternative to personal vehicles. Riders also noted the importance of affordability but were more focused on service quality and frequency.
- ◆ **Environmental sustainability:** Both groups expressed interest in BRT’s potential to reduce emissions and contribute to environmental sustainability, though it was a secondary concern compared to time savings and cost-effectiveness.

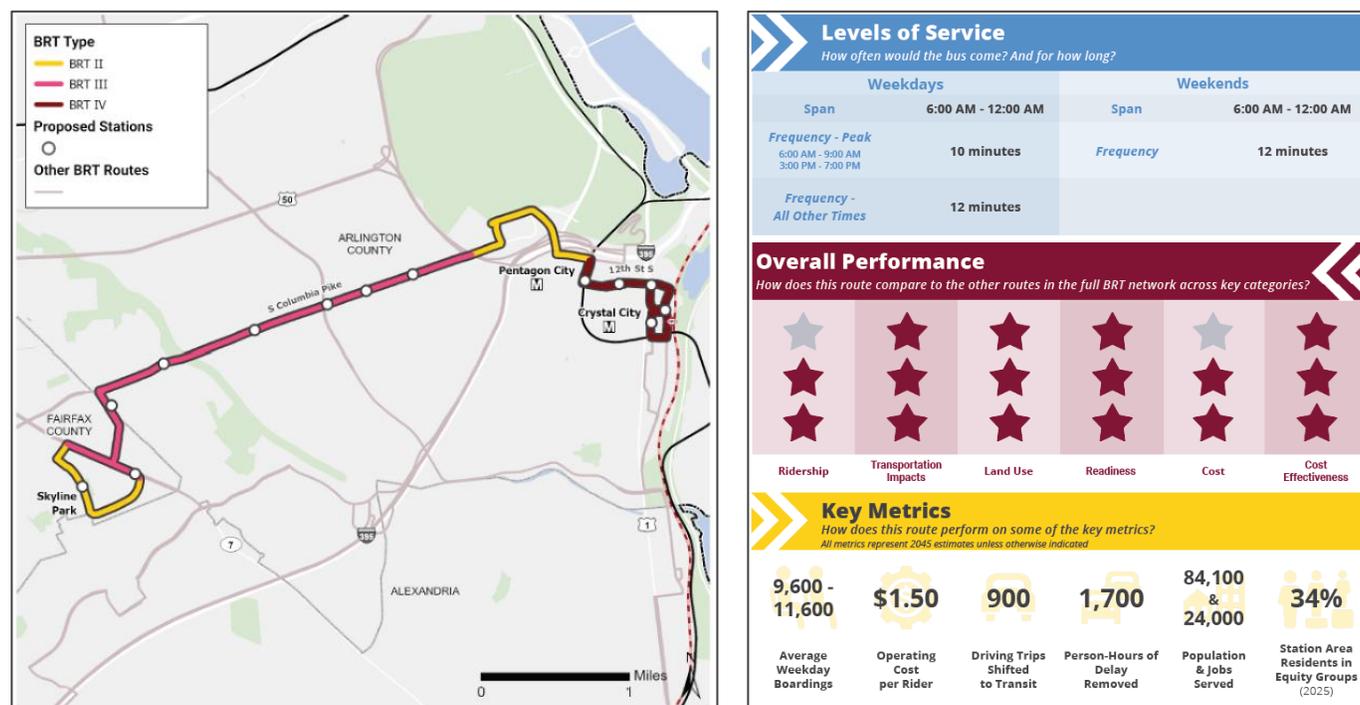
Both groups emphasized the importance of prioritizing routes that would address **high traffic areas** and **connect underserved regions**. Non-riders stressed equity, highlighting the need for routes that enhance mobility for low-income populations and people with disabilities. Riders supported these priorities but also emphasized the importance of routes that would attract high ridership, particularly in suburban areas with limited public transit options.

Comments on Draft Materials

Participants were asked to review and react to a number of draft materials that NVTA was considering using as part of the public engagement. The discussions around these materials were used to refine the materials that were ultimately shared with the public, especially the route profiles which included a route map, operational details, and performance metrics for each route as shown in Figure 24.



Figure 24 Sample Route Profile Materials Used in Focus Groups



Some of the key discussion points related to these materials included:

- Both groups expressed confusion regarding the BRT route map, citing issues with understanding the proposed routes, stops, and connections. Suggestions included **clearer labeling**, the inclusion of **recognizable landmarks** allowing people to orient themselves, and **better integration with existing transit systems** such as Metrorail and VRE. Riders were specifically concerned about the color coding of lines and the relationship between overlapping routes, finding the map more difficult to interpret than it would need to be in order to be useful.
- Both riders and non-riders appreciated the frequency information provided in the Level of Service section of the draft route profile, with riders particularly valuing the inclusion of weekday and weekend schedules. However, there was a call for more context, including average travel times and a clearer understanding of how the BRT system would compare to existing transit services in terms of convenience, pricing, and service quality. Non-riders specifically questioned the sufficiency of service frequency and raised concerns about whether the system could meet actual demand, particularly during peak hours.
- Both groups had mixed reactions to the Key Metrics and Overall Performance sections of the draft route profile. While some found the information on operating costs and potential ridership helpful, most felt the metrics were too abstract or difficult to relate to their own experiences. A desire for more tangible, user-centric data was evident, such as clearer comparisons to existing transportation options, statistics related to reductions in travel time and the environmental impact of BRT. On the whole, participants thought these measures were more useful for planners and stakeholders than for the general public.

Based on these comments, the route profiles were redesigned so that metrics were clearly defined, the information that was most important to the public was located together on the same page, and more labels were added.



Branding and Messaging

Participants were asked to react to the proposed project name and tagline. Some of the key insights from these discussions are outlined below. Both riders and non-riders emphasized the importance of highlighting qualities like speed, reliability, and convenience in the BRT name. Words such as "efficient," "affordable," "energy-efficient," and "equitable" were also suggested.

Bus Rapid Transit (BRT) Action Plan

Connecting fast, frequent and reliable transit across Northern Virginia and beyond.

- ◆ **Initial Impression:** The proposed project name was generally understood but considered too generic. Terms like "fast," "frequent," and "reliable" were clear, but "Action Plan" felt abstract, making it seem more like a concept than an actual service.
- ◆ **Desire for Simplicity:** Many participants felt the name was too long and recommended something more direct and memorable.
- ◆ **Distinguishing BRT from Regular Buses:** Another concern was that the proposed name did not clearly differentiate BRT from regular bus services. Suggestions included using terms like "Express" or "Plus" to emphasize the enhanced service level.
- ◆ **Perception of "Action Plan":** The term "Action Plan" was seen by some as making the BRT feel temporary, which could affect perceptions of its long-term viability. A more concrete and finalized name was suggested to establish a stronger identity.
- ◆ **"Connecting" vs. Other Terms:** The term "connecting" received mixed reactions. While it reflected the BRT's goal of linking destinations, some felt it was redundant and suggested alternatives like "expanding" or "linking."
- ◆ **Local vs. Regional Focus:** There was strong support for the BRT system serving both local and regional areas. Some participants felt that the primary focus should be on improving local transit within Northern Virginia, while others emphasized the need for comprehensive regional connectivity, including connections to DC, to ensure access to key destinations.

Online Survey

Feedback on the Draft BRT Action Plan was primarily obtained through a structured survey designed to gather specific and general comments from transit riders and non-riders across Northern Virginia. The survey focused on building and understanding public perceptions, identifying potential benefits and concerns, and verifying the planned routes meet the needs of the community. This section provides a detailed overview of the general findings of this survey.

The survey was available on NVTA's website between April 18 and May 18, 2025, and was promoted through various channels, including digitally through social media platforms and published in several news articles, in addition to being promoted in person during a series of pop-up events. NVTA received a total of 587 responses to the survey. For a full copy of the survey instrument, please refer to Appendix H. The survey was available in English and Spanish.



Table 8 Responses by Language

| Number of Responses | |
|---------------------|------------|
| English | 531 |
| Spanish | 56 |
| Total | 587 |

NVTA hosted a number of in-person events at key locations across the region where staff was available to introduce the plan, answer questions, and assist in filling out the survey on tablet computers. This was done to boost visibility of the Draft BRT Action Plan and gather feedback from members of the public who are typically underrepresented in such processes. In order to adjust the data to more accurately represent each jurisdiction’s relative population, smoothing weights were created and applied to each record. A full weighting sheet can be found in Appendix I.

Survey Limitations

This survey relied on non-probability (convenience) sampling rather than probability sampling. While this allowed for the collection of data from a large group of people relatively quickly, it also yields a sample that is not necessarily representative of the region’s population as certain groups are likely over- or under-represented. The results should not be considered representative of the population at large or of various sub-groups within the population. Rather, *results should be viewed as indicative of the attitudes and opinions of those who engaged with or had the opportunity to engage with the BRT Action Plan* at various levels throughout the engagement period. In order to adjust the data to more accurately represent each jurisdiction’s relative population, smoothing weights were created and applied to each record.

Margins of Error

Statistical significance means that there is a 95% chance that a difference found in this research would also have been found if all members of the population had been surveyed. Statistical differences are shown, when applicable, using letters shown next to relevant percentages to compare between groups.

For example, if the percentage for Riders (B) was significantly greater than the percentage for Non-Riders (C), there would be a ‘C’ next to the greater Rider percentage.

Due to differing response rates, the standard error varies from question to question and from segment to segment. The standard error for the entire dataset is ±4.0 percentage points at the 95% confidence level, though that will increase for individual questions or segmented analyses with smaller base sizes.

Table 9 Margins of Error by Rider Type

| Margins of Error by Day | | | | | | |
|--|------|-----------|-----------|-----------|-----------|-----------|
| If the percentage found is around: | 50% | 40% | 30% | 20% | 10% | 1% |
| | | or 60% | or 70% | or 80% | or 90% | or 99% |
| Then, the standard error, in percentage points would be: | | | | | | |
| Total (n=587) | ±4.0 | ±4.0 | ±3.7 | ±3.2 | ±2.4 | ±0.8 |
| Riders (n=247) | ±6.2 | ±6.1 | ±5.7 | ±5.0 | ±3.7 | ±1.2 |
| Non-Riders (n=329) | ±5.4 | ±5.3 | ±5.0 | ±4.3 | ±3.2 | ±1.1 |



Topline Findings

What follows are topline findings from the survey. Sample comments are also shown to illustrate the type of feedback that was received.

Primary Mode of Transportation

The survey first asked respondents to indicate what mode of transportation they primarily use to travel. This was the basis of the rider and non-rider designations, with riders being those who specified using some form of public transportation as their primary mode, and non-riders being those who selected something else. In total, 61% of the respondents could be considered non-riders (77% of those non-riders specifically identifying driving a single-occupancy vehicle as their primary mode). The remainder were classified as riders.

Table 10 Primary Mode of Transportation by Rider Type

Q1. What is your primary way of traveling?

| | Total | Riders (B) | Non-Riders (C) |
|--|-------|---------------|-------------------|
| n= | 587 | 247 | 329 |
| Drive a car, truck, SUV, or motorcycle | 47% | - | 77% |
| Metrorail | 21% | 56% | - |
| Take a local or commuter bus | 14% | 38% | - |
| Walk | 4% | - | 7% |
| Personal bicycle | 3% | - | 5% |
| Ride in a car, truck, SUV or motorcycle driven by a friend | 3% | - | 5% |
| Commuter rail | 2% | 4% | - |

Base = Those Answering

Top Mentions

Note that those who answered "something else" as their primary mode of travel are not classified as Riders or Non-riders

Likelihood to Use BRT

While 72% of respondents indicated that they were very or extremely likely to use BRT if it was available, it is well known that survey respondents typically overpredict how likely they were to purchase or use products or services in the future. They do this for many reasons, including optimistic bias and hypothetical bias. To account for these common problems and sources of bias in survey research, a factor can be applied to those who said they were extremely or very likely to consider using BRT in the future. This factor assumed that only 60% of those who rated extremely likely would seriously consider using BRT in future and 20% of those saying they would be just very likely to consider would actually do so.

Results indicated that three in ten (31%) are likely to consider using BRT. With this factor applied, among riders, 38% could be considered likely to consider BRT. Similarly, 28% of non-riders could be considered likely to consider using BRT.



Table 11 Likelihood to Consider BRT by Rider Type

Q17. If BRT was available in your area, overall how likely would you be to use it?

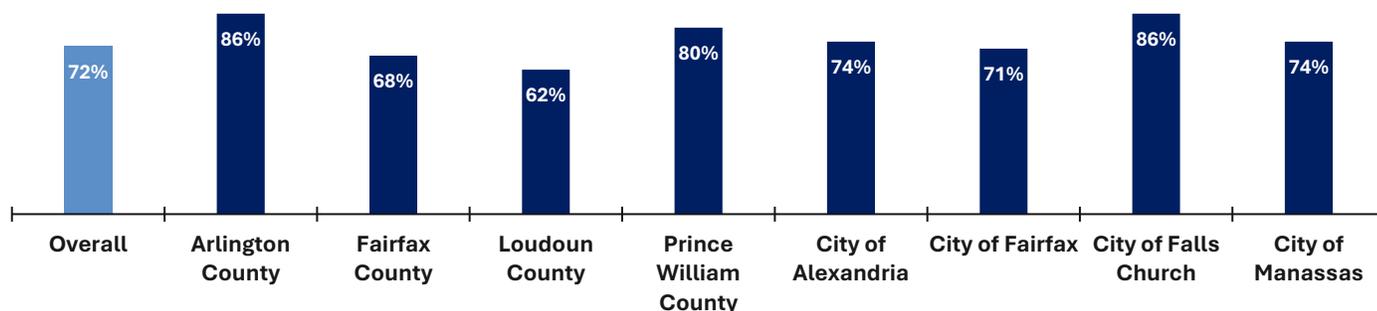
| Likelihood | Total | Riders (B) | Non-Riders (C) | Factored (Extremely likely = 0.6, Very likely = 0.2) | | |
|-----------------------|-------|------------------|-----------------|---|------------|----------------|
| | | | | Total | Riders (B) | Non-Riders (C) |
| n= | 587 | 247 | 329 | 587 | 247 | 329 |
| Extremely/Very likely | 72% | 82% ^C | 66% | 31% | 38% | 28% |
| Extremely likely | 42% | 53% ^C | 36% | 25% | 32% | 22% |
| Very likely | 30% | 28% | 30% | 6% | 6% | 6% |
| Somewhat likely | 21% | 18% | 23% | 69% | 62% | 72% |
| Not very likely | 5% | 1% | 8% ^B | | | |
| Not at all likely | 2% | - | 3% | | | |

Base= Those Answering

Note that those who answered “something else” as their primary mode of travel are not classified as Riders or Non-riders.

Arlington County and City of Falls Church show the greatest level of interest (86% each), indicating these jurisdictions are more receptive to BRT.

Figure 25 Likelihood of Using BRT by Jurisdiction



Prioritization of Features

The most important characteristics of a BRT system, according to respondents, were mainly focused on two features, both centered around reliability:

- ◆ Dedicated lanes and other features that allow for BRT to travel quickly and reliably (27% overall); and
- ◆ Service that shows up reliably on time (25% overall).



Table 12 Most Important Characteristics of a BRT System by Rider Type

Q11A/Q11B. What is the most important characteristic of a BRT system for you to consider using it?

| Characteristic | Total | Riders (B) | Non-Riders (C) |
|--|-------|------------|------------------|
| n= | 577 | 245 | 321 |
| Dedicated lanes and other features that allow for BRT to travel quickly and reliably | 27% | 19% | 32% ^B |
| Service that reliably shows up on time | 25% | 30% | 22% |
| Ability to get to my destination without transferring | 16% | 21% | 14% |
| Service that is cheap to use | 11% | 10% | 12% |
| Simple connections to other BRT lines or other transit systems | 10% | 10% | 11% |
| Features that make stops/stations nicer | 2% | 3% | 2% |
| Features that improve your experience while onboard the bus | 2% | 3% | 1% |

Base = Those Answering

Up to three responses accepted

Top Mentions

Note that those who answered “something else” as their primary mode of travel are not classified as Riders or Non-riders.

Interestingly “dedicated lanes and other features that allow for BRT to travel quickly and reliably” was chosen more frequently as the most important characteristic among non-riders (32%, compared to 19% of riders). This indicated that providing these types of features will likely be important in driving mode shift and encouraging new users to use BRT.

Demographic Profile

Table 13 presents an overview of the demographics of the survey respondents by Rider Type.

Table 13 Demographic Profile of Survey Respondents

| Demographic Profile | Total | Riders (B) | Non-Riders (C) |
|---|------------|------------|-----------------|
| S1/S2. Jurisdiction of Residence | 573 | 243 | 320 |
| Arlington County | 8% | 12% | 6% |
| City of Alexandria, VA | 6% | 9% | 5% |
| City of Falls Church, VA | 1% | 1% | <1% |
| Manassas, VA | 1% | 1% | 2% |
| Manassas Park, VA | 1% | 1% | 1% |
| Net: Fairfax County | 41% | 39% | 43% |
| Fairfax City, VA | 1% | <1% | 1% |
| Herndon, VA | 4% | 2% | 5% |
| Vienna, VA | 5% | 2% | 7% ^B |



| Demographic Profile | Total | Riders (B) | Non-Riders (C) |
|--|------------|------------------|------------------|
| Somewhere else in Fairfax County | 32% | 35% | 31% |
| Net: Loudoun County | 16% | 5% | 22% ^B |
| Leesburg, VA | 3% | - | 5% |
| Somewhere else in Loudoun County | 13% | 5% | 17% ^B |
| Net: Prince William County | 18% | 21% | 16% |
| Dumfries, VA | 2% | 2% | 3% |
| Somewhere else in Prince William County | 15% | 19% | 13% |
| Somewhere else | 7% | 11% ^C | 5% |
| D3. Age | 554 | 236 | 308 |
| 18-34 | 39% | 41% | 38% |
| 35-54 | 43% | 42% | 44% |
| 55+ | 18% | 17% | 18% |
| D4. Race/Ethnicity | 501 | 219 | 274 |
| White or Caucasian | 50% | 36% | 59% ^B |
| Asian | 19% | 17% | 21% |
| Hispanic or Latino | 18% | 27% ^C | 12% |
| Black or African American | 13% | 18% ^C | 9% |
| American Indian or Alaska Native | 2% | 1% | 2% |
| Native Hawaiian or other Pacific Islander | 1% | 1% | 1% |
| Middle Eastern/Arab | <1% | <1% | <1% |
| Mixed Race | <1% | <1% | - |
| Other | <1% | - | <1% |

Note that those who answered “something else” as their primary mode of travel are not classified as Riders or Non-riders

Pop Up Events

Similar to Phase 1 community engagement, NVTa conducted a series of pop-events to raise project awareness and promote the online survey. The pop-ups helped spread the word about the Draft BRT Action Plan and encouraged people to participate in the survey. These events involved a series of 10 strategically placed pop-ups across Northern Virginia, with each location selected for its close proximity to multiple proposed BRT routes. This ensured events were easily accessible to a wide range of transit- and non-transit users. Figure 26 shows the location of all the 10 pop-up events. Six of the pop-ups specifically targeted engaging drivers, setting up at high-traffic areas such as farmers’ markets, retail centers, and food



distribution centers. Meanwhile, four events targeted transit users, positioned at metro stations and commuter lots where public transit users are most likely to be seen. Over the course of these pop-up events, a total of 4,614 in-person interactions occurred; 27% of these interactions were conducted in Spanish or other non-English language.

One of the key goals of these events was to gather feedback on the proposed BRT System and its constituent routes via the structured survey. During each event, multilingual staff were available to introduce the plan, answer questions, and assist in filling out the survey on tablet computers. These events were successful in gathering comments; as shown in Table 14, more than 40% of survey responses were gathered during these events.



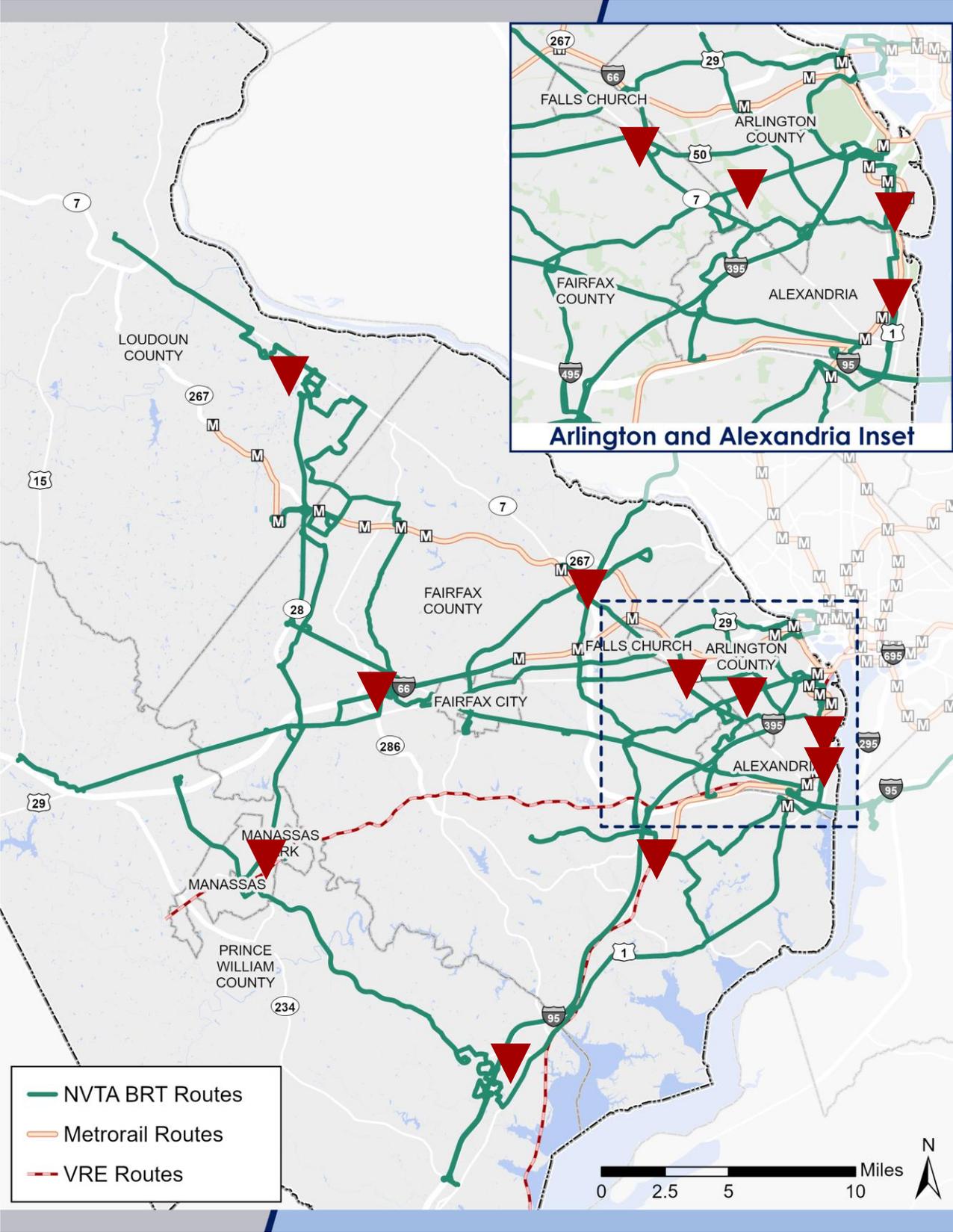
Table 14 Survey Responses During Pop-Up Events

| | Number of Responses |
|-------------------------------|---------------------|
| During Pop-Up Events | 257 |
| Outside of Pop-Up Event Hours | 330 |
| Total | 587 |

Note that this reflects only those who participated in their assigned focus group.



Figure 26 Pop-up Locations for Phase 3 Engagement



Media Publication

As part of the Phase 3 public outreach, NVTA’s communications team strengthened the project’s digital presence by amplifying educational information about BRT, in addition to information regarding the opportunity to provide input on the Draft Plan across multiple platforms. NVTA developed a full suite of content, including copy and graphics, along with the overall approach and strategy to garner the most attention from partners and the community. A social media campaign ran on NVTA’s platforms (X, LinkedIn and Facebook) throughout the duration of the public comment opportunity, a press release was issued, specific news outlets were targeted, and partners were asked to help amplify the message to online audiences. Examples of graphics used on social media are shown in Figure 27. The media outreach resulted in 21 articles about the BRT Action Plan reaching an audience of 11.5 million.

Figure 27 Phase 3 Social Media Graphics



2.4 BRT Planning Working Group

Beginning in 2021, NVTA staff established a BRT Planning Working Group that meets approximately quarterly each year. Members of the Working Group included staff from Northern Virginia jurisdictions and transportation agencies, WMATA, MWCOG/TPB, District Department of Transportation (DDOT), Montgomery County, and Prince George’s County. A full list is shown in Figure 28. Members were encouraged to provide feedback throughout the project, and those comments were incorporated into the final products wherever possible.

After the project initiated in October 2023, in its November 2023 meeting, the BRT Planning Working Group was provided an overview of this project to develop the BRT Action Plan. At its February 2024 meeting, NVTA reviewed the preliminary results of the December 2023 perception survey and an overview of the plans for engagement in the spring of 2024. The BRT Planning Working Group was also engaged to discuss how the members informed, engaged, educated and sought input from the business community.

In June 2024, the BRT Planning Working Group was provided a status update on BRT Action Plan planning activities, including the results of the four Focus Groups that were conducted in March 2024, technical approach for defining the BRT system, and the preliminary evaluation methodology for Phase 2 of the project.

In the December 2024 meeting, NVTA staff provided updates on Phase 2 of the project. This included reviewing the network definition and the proposed routes, sharing draft route level evaluation results, and discussing planned scenario tests. Working Group members had the opportunity to provide comments on the route design and scenarios.



Once Phase 3 was underway, the BRT Planning Working Group was able to review the individual route and system-level evaluation findings for the proposed BRT network at the March 2025 meeting. NVTA staff also shared results from the scenario tests, outlined operational and policy considerations, and gave an overview of the Phase 3 engagement schedule and goals.

In June 2025, the BRT Planning Working Group had its final meeting before adoption of the BRT Action Plan. NVTA staff provided a status update on the BRT Action Plan, including key results from the Phase 3 survey and responses to comments that had been received from the Working Group members. NVTA staff also discussed major findings and next steps for the BRT Action Plan, as well as future work.

Figure 28 Agencies Represented on the BRT Planning Working Group



3.0 BRT SYSTEM

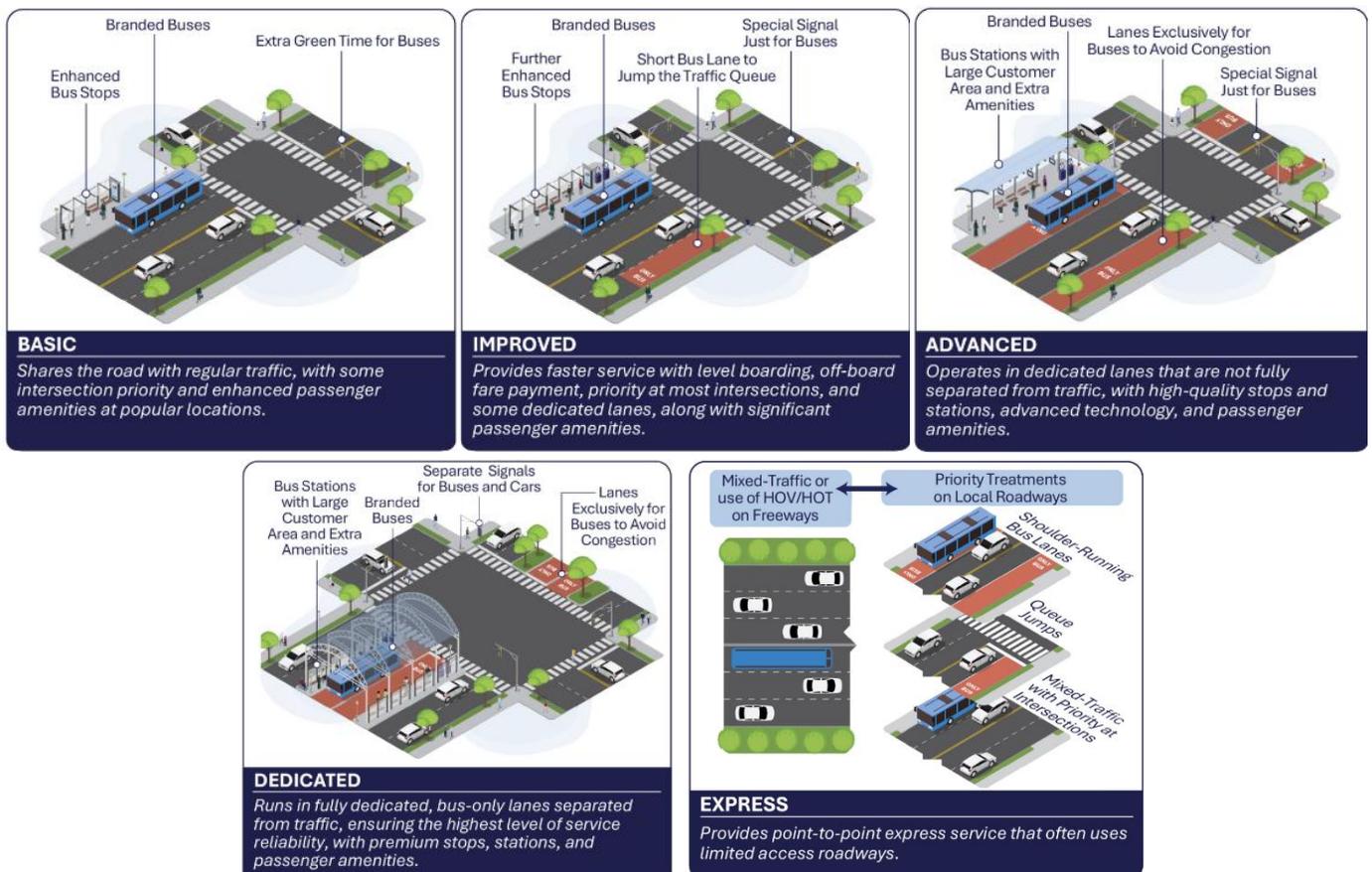
This chapter provides an overview of process used to develop the BRT system that was ultimately tested as part of the BRT Action Plan. This includes the definition of the different BRT service and infrastructure appropriate in different contexts, screening of a potential universe of corridors, and the definition of the individual BRT routes that make up the recommended BRT system. Each route in the resulting BRT system (and the system as a whole) was then evaluated based on the methodology outlined in Section 4.1.

3.1 BRT Types Definition

The peer review (Section 2) showed that characteristics for BRT implementation vary throughout the United States. BRT systems can be deployed in a number of different ways based on local context. BRT operations typically include measures that ensure fast, frequent, and reliable service throughout the day. Stations are typically spaced farther apart than regular local fixed-route bus stops. However, BRT service can operate at different intensities with varying amenities and priority treatments.

Five potential BRT types that would be suitable for operations in Northern Virginia have been identified: Basic, Improved, Advanced, Dedicated, and Express BRT (Figure 29).

Figure 29 Key Attributes of the Five Types of BRT



- ◆ **Basic BRT:** Basic BRT has all-day, frequent service with enhanced shelters that feature lighting, passenger information and receptacles. Basic BRT buses operate in mixed traffic with Transit Signal Priority at key intersections.
- ◆ **Improved BRT:** Improved BRT operates all-day, frequent service with super stops and additional amenities, which may include off-board fare payment, real-time passenger information, level boarding and added safety features. Improved BRT also includes queue jumps, which are curbside running lanes for buses at intersections that can range in length from short, tactical sections to longer stretches.
- ◆ **Advanced BRT:** Advanced BRT operates all day with frequent service, additional amenities, and priority features, like dedicated curbside running bus lanes. End stations and larger transit hubs are staffed and include parking, pick-up and drop-off areas, bathrooms, and other amenities.
- ◆ **Dedicated BRT:** Dedicated BRT operates in fully-dedicated/separated ROW, providing all-day, frequent service with amenities and priority features. Dedicated BRT end stations and transit hubs also include staff, parking, pick-up and drop-off areas, bathrooms, and other amenities.
- ◆ **Express BRT:** Express BRT connects two distinct areas via freeways, and may operate over a shorter span than other BRT types depending on the level of demand. Express BRT may incorporate priority treatments on local streets at either end point based on need.

These BRT types were developed to provide a framework for conceptual planning as part of this process. The passenger amenities and bus priority treatments expand from Basic (least amenities) to Dedicated (most amenities), but with all routes having all-day, frequent service.

The service characteristics assumed for each type of service are displayed in Table 15. The amenities and features assumed to be provided within each BRT service are shown in Table 16.

Table 15 Summary of Service Levels by BRT Type

| BRT Type | Schedule | Span | Weekday Frequency | Weekend Frequency | Average Speed | Stop Density |
|-----------|-------------|---------------------|--|--------------------|---------------|--|
| Basic | 7-days | Minimum of 18 hours | Minimum 15-minute peak 20-minute off-peak | 20-minutes all day | >10 mph | > 0.3/mile urban > 0.5/mile non-urban |
| Improved | 7-days | Minimum of 18 hours | Minimum 15-minute peak 20-minute off-peak | 20-minutes all day | >12 mph | > 0.3/mile urban > 0.5/mile non-urban |
| Advanced | 7-days | Minimum of 18 hours | Minimum 10-minute peak 15-minute off-peak | 20-minutes all day | >14 mph | > 0.3/mile urban > 0.5/mile non-urban |
| Dedicated | 7-days | Minimum of 18 hours | Minimum 10-minute peak 15-minute off-peak | 20-minutes all day | >17 mph | > 0.3/mile urban > 0.5/mile non-urban |
| Express | 5 to 7-days | Minimum of 12 hours | Minimum 15-minute peak 20-minute off-peak | 30-minutes all day | >20 mph | N/A |



Table 16 Summary of Amenities and Features by BRT Type

| BRT Type | All-day Frequent Service | Enhanced Stops / Shelters | Super Stops | Full Stations | Transit Signal Priority | Queue Jumps | Curbside Bus Lanes | Separated Busway |
|-----------|--------------------------|---------------------------|-------------|---------------|-------------------------|-------------|--------------------|------------------|
| Basic | ◆ | ◆ | | | ◆ | ◆ | | |
| Improved | ◆ | ◆ | ◆ | | ◆ | ◆ | ◆ | |
| Advanced | ◆ | | ◆ | ◆ | ◆ | ◆ | ◆ | |
| Dedicated | ◆ | | ◆ | ◆ | ◆ | ◆ | | ◆ |
| Express | ◆ | ◆ | ◆ | | ◆ | ◆ | | |

3.2 Identification and Screening of Corridors

The first step in developing the benchmark BRT system for Northern Virginia was to identify the list of potential corridors, referred to as the “Universe of Potential Corridors,” that should be considered for inclusion in the BRT System. These corridors were screened based on land use characteristics to identify the corridor segments that meet minimum thresholds identified in the review of peer BRT systems highlighted in Section 2.2.

3.2.1 Universe of Potential Corridors

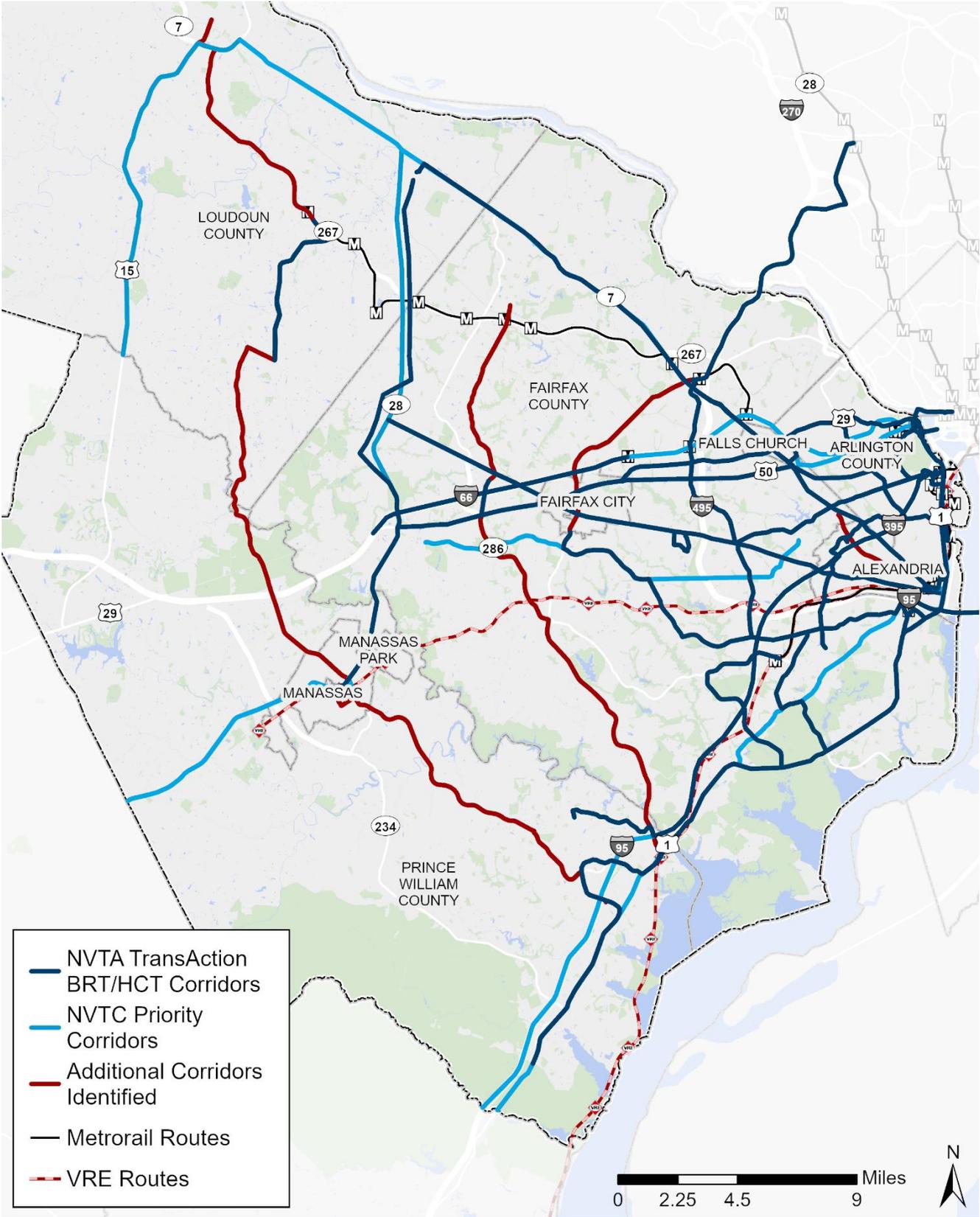
The Universe of Potential Corridors was developed based on three primary sources:

- ◆ All corridors included in the most recent TransAction BRT/High Capacity Transit (HCT) Network were included in the Universe of Potential Corridors;
- ◆ Additional priority corridors identified as part of the NVTC Regional Bus Analysis were added; and
- ◆ Additional corridors identified based on population and employment density thresholds and BRT best practices determined in the peer review. Corridors were added if significant portions of the adjacent block groups met density thresholds, connected key activity generators, were adjacent to significant equity populations, and were not already served by current high-capacity transit networks or corridors already identified from the above sources.

A map of the universe of potential corridors identified through this process is shown in Figure 30.



Figure 30 Map of Universe of Potential Corridors



3.2.2 Screening of Corridors

Once the Universe of Corridors was confirmed, the corridors were screened for BRT service based on land use thresholds identified in the review of best practices from peer BRT systems. The peer review showed that BRT-supportive land uses have a higher density and mix of commercial, leisure, and residential uses in combination with significant developments in and around terminal stations. Corridors were screened according to the following metrics and qualities:

- ◆ Density
- ◆ Demographics
- ◆ Anticipated growth
- ◆ Existing ridership and potential regional connections
- ◆ Activity centers and strong anchors
- ◆ Input from the BRT Planning Working Group

These metrics are compared against activity densities and qualitative factors from the peer agency review as shown in Figure 31.

Figure 31 Possible Benchmarks for Density and Land Use⁶

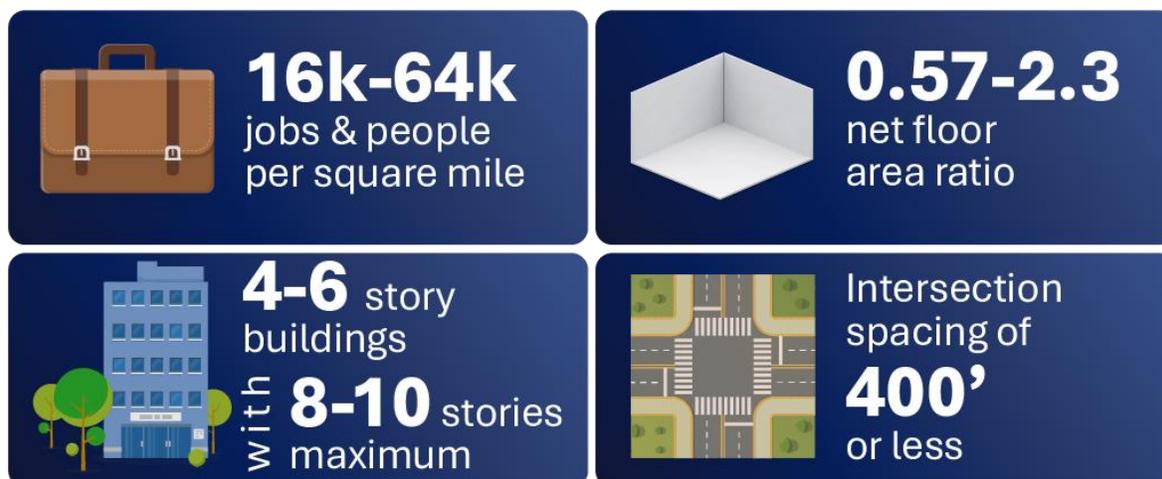


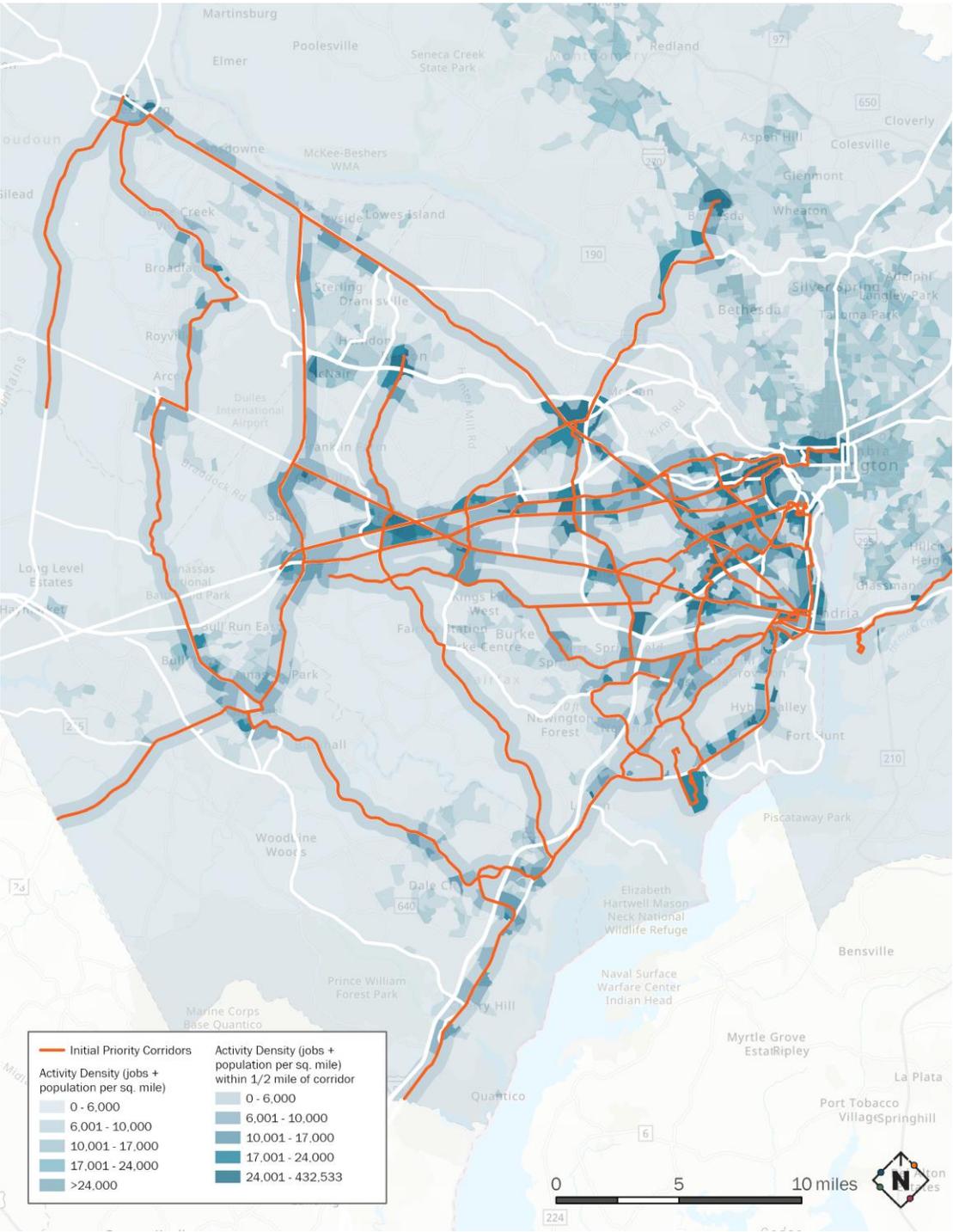
Figure 32 is a map of existing activity density that highlights (in darker shading) the densities located adjacent to the potential corridor alignments. Findings from the analysis of activity densities include:

- ◆ In Arlington County and the City of Alexandria, many of the potential corridors meet the minimum density necessary to support BRT.
- ◆ Areas outside of Arlington County and the City of Alexandria have clusters of high-activity density, but fewer stretches of contiguous density that can support BRT service.
- ◆ Corridors with supportive density include U.S. 1, I-66, portions of U.S. 50, U.S. 29, Route 28, Route 7, and Chain Bridge Road.

⁶ DRPT Multimodal System Design Guidelines, 2020.

- ◆ Corridors with supportive density connect some of the region’s densest activity centers.

Figure 32 Existing Activity Density



Based on this screening and input from the BRT Planning Working Group, a final list of 28 corridors was advanced for the purpose of defining BRT routes. These routes are further detailed in Section 3.3. From the original Universe of Potential Corridors, 11 corridors were identified as more suitable for local non-BRT service based on their density and other characteristics. These corridors are listed in Table 17.



Table 17 Non-BRT Local Routes

| Corridor Name | Segment | Activity Density (Present) | Activity Density (2045) | Justification for Not Including in BRT Network |
|---------------------|--|----------------------------|-------------------------|--|
| Route 267 | Route 267–Downtown Leesburg to Ashburn Metro Station | 3,853 | 6,712 | Extremely low density, infrastructure not compatible (limited access). Does not meet minimum density threshold of 11,000. |
| Route 286 / 123 | Route 286 / 123–Fair Oaks Mall to Woodbridge Train Station | 2,903 | 6,031 | Extremely low density, infrastructure not compatible (limited access). Does not meet minimum density threshold of 11,000. |
| Seminary Rd | Seminary Rd–Bailey's Crossroads to Route 7 / King St | 14,211 | 16,564 | Although the activity density exceeds the minimum threshold (by 5,564) in 2045, nearly all of that density is concentrated west of I-395, which will be served by Envision Route 7 and West End Transitway. Furthermore, the City of Alexandria has not identified this corridor for BRT service and already provides local bus with 10 minute frequency. |
| Loudoun County Pkwy | Loudoun County Pkwy–Ashburn Metrorail Station to Route 50 | 4,231 | 10,368 | Lower density, density that exists is in small pockets, infrastructure not compatible (limited access). Does not meet minimum density threshold of 11,000. |
| Braddock Road | Braddock Road–Union Mill Rd to I-495 | 3,923 | 4,044 | Does not meet minimum density threshold of 11,000. Does not have activity centers, anchors, nor sufficient mix of land uses. |
| Braddock Road | Braddock Road–I-495 to Route 613/Lincolnia Rd | 5,972 | 6,538 | Does not meet minimum density threshold of 11,000. Does not have activity centers, anchors, nor sufficient mix of land uses. |
| King Street | Leesburg Pike–I-395 to U.S.-1 | 16,996 | 25,372 | Although the activity density exceeds the minimum threshold (by more than double) in 2045, nearly all of that density is concentrated in Old Town Alexandria. Furthermore, the City of Alexandria has not identified this corridor for BRT service and already provides local bus with 10 minute frequency. |
| Route 28 | Route 28–Bull Run to Nokesville | 3,225 | 4,519 | Extremely low density. Does not meet minimum density threshold of 11,000. The portion from Manassas to Washington Dulles International Airport is recommended for a BRT route. |
| Telegraph Road | Telegraph Road–Route 1/Richmond Highway to King St Metrorail | 5,204 | 10,010 | Lower density, the density that does exist is location in one place, around Huntington Metro. Does not meet density threshold of 11,000. Mostly low density residential with low or little opportunity for new and/or redevelopment. Parallel to VRE and The One BRT. Has local service covering nearly 100%. Note that a portion of Telegraph Rd is now covered from South Van Dorn St. to Huntington Metro and was added as part of a longer route utilizing Old Keene Mill Road |
| U.S.-15 | U.S.-15–Bull Run to Leesburg Pike | 1,499 | 2,024 | Extremely low density, infrastructure not compatible (limited access). Does not meet minimum density threshold of 11,000. |
| Wilson Blvd | Wilson Blvd–Washington Blvd to Rosslyn Station | 27,996 | 33,642 | This corridor sits on top of the BOS Metrorail lines. It is not included in Arlington County plans for bus priority. |



3.3 Final BRT System

The 28 corridors identified through the screening process were advanced for further definition of specific BRT routes, including determination of end points, BRT types, and stop locations. This regional BRT system was developed in coordination with NVTA's BRT Planning Working Group and was designed to incorporate planning efforts that were already underway at the start of this study. The system will evolve as additional planning efforts continue to fine-tune routings, station locations, BRT Types, and other specifics of each route.

To convert the corridors to viable BRT routes with stops, a wide variety of data points were reviewed together. The first step was to identify where along the corridors BRT-supportive land use density exists or will exist in the future. These densities, coupled with existing transportation facilities (airports, BRT stations, transit centers, rail stations) and activity centers, were utilized to sketch out end points for each route. This process once again leveraged the Guiding Principles from Best Practices from Chapter 2 that demonstrated that high-demand activity centers, regional connections, and strong anchors are key to BRT success.

Existing and future travel demand and existing transit ridership were also reviewed and incorporated into the decision-making process. Once the basic alignment and endpoints were established, the alignment was refined, including determining how buses would turn around at each endpoint. Once the routes were finalized, they were overlaid with density, activity centers, and existing transit to determine stop locations. In locating stops, the following were used as guiding principles:

- ◆ A minimum distance of 0.33 miles between stops;
- ◆ Co-location with high-ridership local bus stops in order to enable transfers;
- ◆ Adjacent to activity centers;
- ◆ Adjacent to dense locations with active transportation infrastructure;
- ◆ Taking into account the user experience and walking distances; and
- ◆ Providing transfers to other modes and other BRT routes in the network.

Aerial photography and Google Street View were utilized to confirm locations.

Service levels, including frequencies and service spans were identified based on the service assumptions associated with the BRT Types outlined in Section 3.1. Where ridership was likely to be particularly high, passenger loads were also evaluated to determine where larger articulated vehicles and/or higher frequencies would be necessary to avoid excessive crowding.

The proposed BRT system includes 28 routes covering Northern Virginia as shown in Figure 34. The proposed BRT system includes 700 miles of bidirectional BRT corridors that connect Northern Virginia by supplementing existing rail networks and improving transit connections within and between jurisdictions. It also facilitates travel between key origin-destination pairs and local points of interest, such as airports, employment centers, and hospitals. The system design encourages transfers to Metrorail and VRE to extend the reach of high-capacity and commuter transit options throughout the region.



This vision of a connected, BRT network across Northern Virginia includes:



The BRT system includes each of NVTA’s member jurisdictions and provides connections into neighboring jurisdictions in Maryland and Washington, DC as shown in Figure 33.

Figure 33 Regional BRT System Service Provided by Jurisdiction

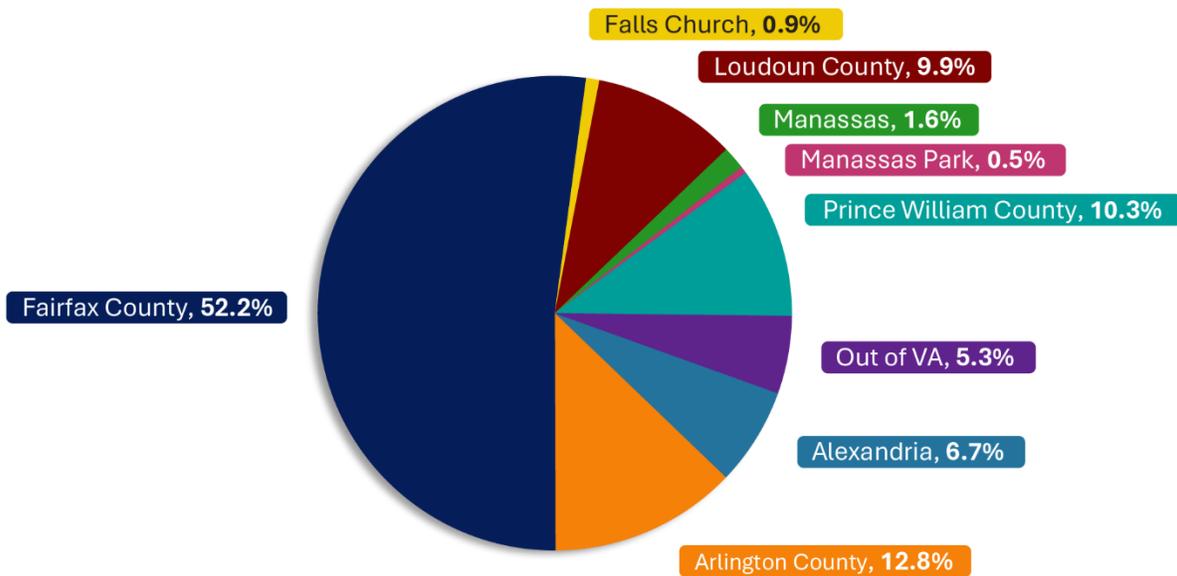
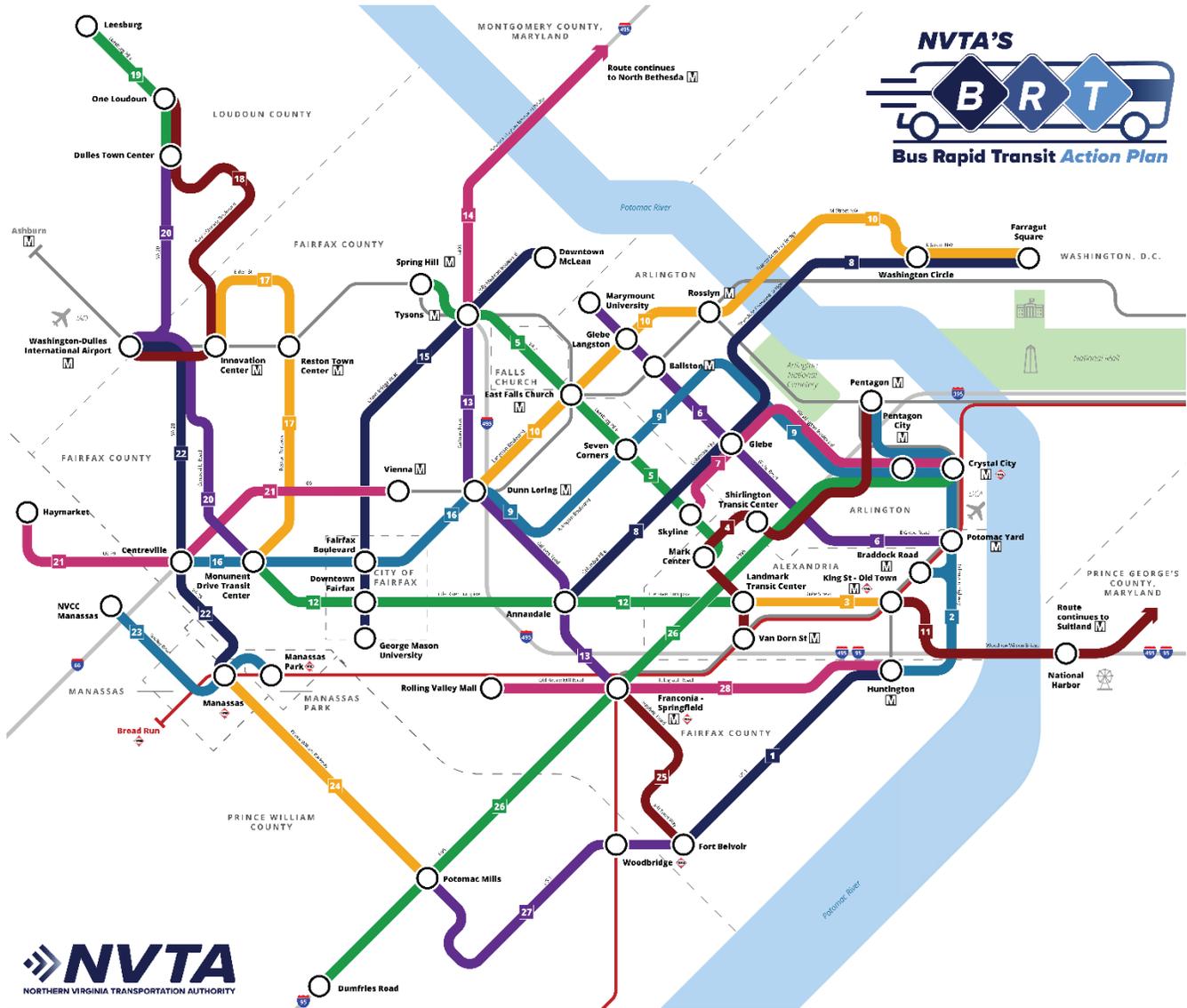


Figure 34 BRT System by Route



One System - 28 Routes

- | | | |
|--|---------------------------------|----------------------------------|
| 1 ★ Richmond Highway | 11 Beltway South | 21 I-66 Express |
| 2 ★ Metroway | 12 Little River Turnpike | 22 VA 28 South |
| 3 ★ Duke Street Transitway | 13 Gallows Road | 23 Manassas Connector |
| 4 ★ West End Transitway | 14 Beltway North | 24 Prince William Parkway |
| 5 ★ Route 7 | 15 Chain Bridge Road | 25 Fort Belvoir Express |
| 6 Glebe Road | 16 Fairfax Boulevard | 26 I-95 Express |
| 7 Columbia Pike to Crystal City | 17 West Ox Road | 27 US 1 South |
| 8 Columbia Pike to D.C. | 18 Sterling Connector | 28 Old Keene Mill Road |
| 9 Arlington Boulevard | 19 Loudoun Connector | |
| 10 Langston Boulevard | 20 VA 28 North | |

★ BRT projects that have received NVTA funding
 Route numbers are for identification purposes only and do not indicate ranking or priority.

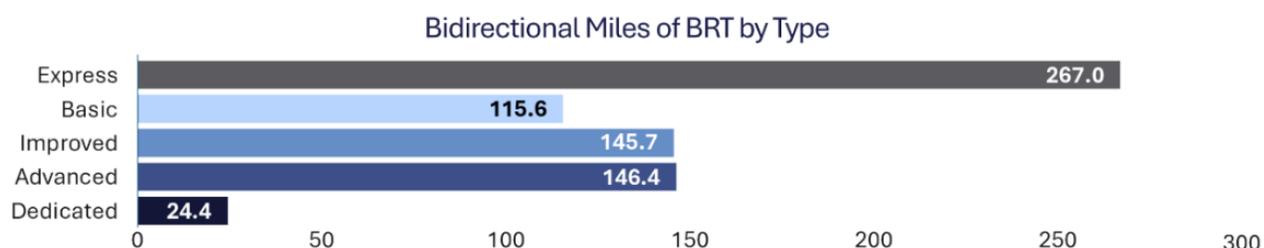
- BRT Station
Not all stations are shown
- Metrorail
- Metrorail Connection at Station
- Virginia Railway Express (VRE)
- VRE Connection at Station
- Jurisdictional Boundary

This diagrammatic map is not to geographical scale.



The need for bus priority treatments, and thus the appropriate BRT Types for each segment were based primarily on the built environment and density. Treatments were generally based on density that reflects activity—the greater the density, the greater the priority is needed due to increased levels of traffic, driveways, and weaving driving behavior. This process also accounted for areas where there is limited space in the ROW for widening and/or reallocating existing lanes for bus only operation. Where planning for BRT routes and treatments has already begun, those studies and recommendations were incorporated into the BRT system. As shown in Figure 35, the Express BRT accounts for the majority of the BRT System’s mileage, covering very long distance routes. Figure 36 illustrates how different BRT Types were assumed across the region.

Figure 35 Bidirectional Miles of BRT by Type



Details about each route can be found in the [Individual Route Profiles](#) in Appendix J. Additionally, Table 18 summarizes some of the assumptions associated with each BRT route, including key connections, BRT Types, frequencies, and span of service.



Figure 36 BRT System by BRT Type

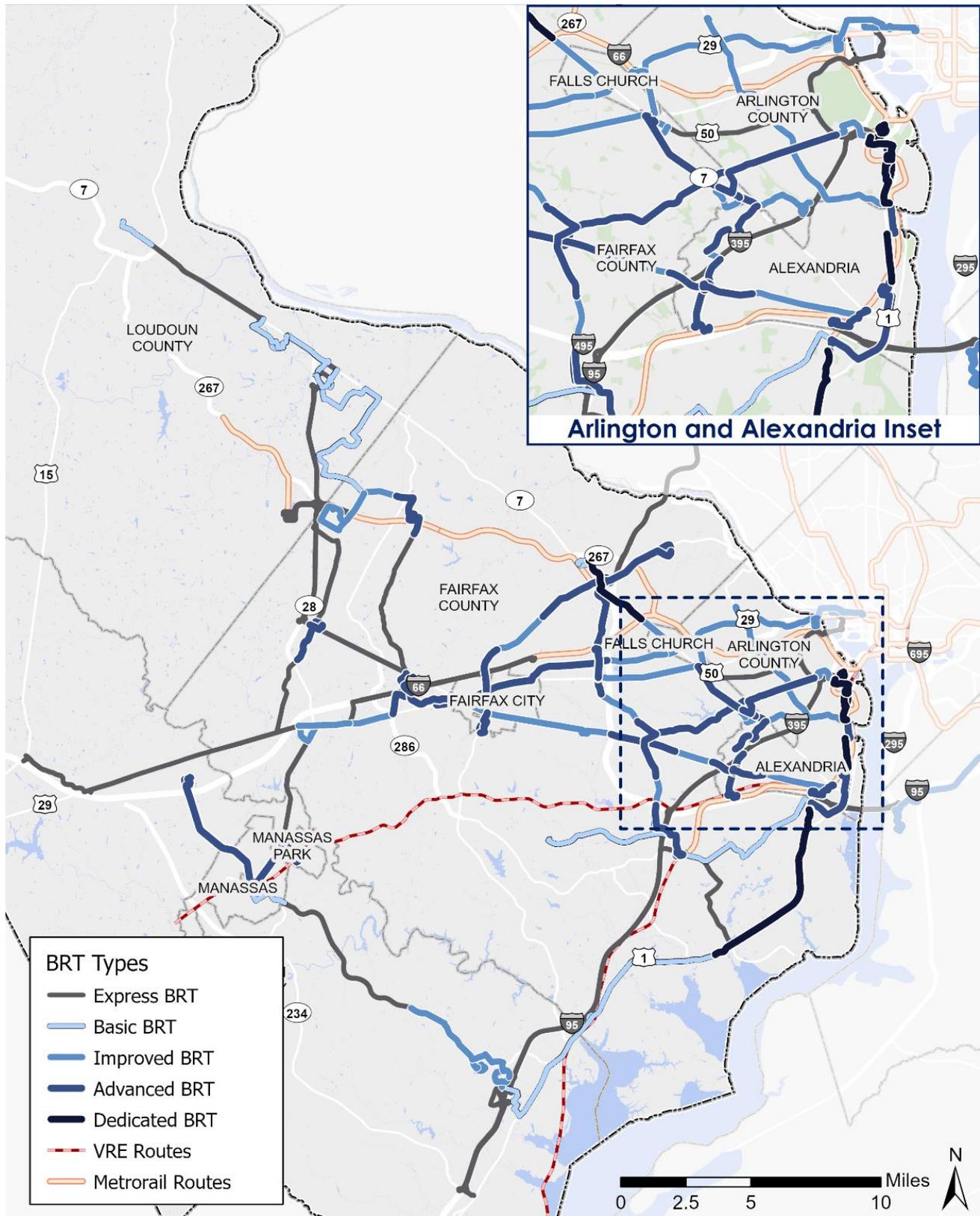


Table 18 BRT Routes and Type

| # | BRT Name | Major Activity Destinations, Activity Centers, Anchors | Connections to Other BRT | Span of Service | Frequency | Basic BRT | Improved BRT | Advanced BRT | Dedicated BRT | Express BRT | BRT Type Assignment |
|---|-------------------------------|---|---|------------------|--|-----------|--------------|--------------|---------------|-------------|---|
| 1 | Richmond Highway | Fort Belvoir, Hybla Valley, Kings Crossing, Huntington Metro | 3: Metroway Extension, Franconia-Springfield-Ft. Belvoir, U.S. 1 South | 6:00 AM–12:00 AM | Weekday Peak: 6 min. Weekday Off-Peak: 12 min. Weekend: 12 min. | | | | ◆ | | BRT Type was determined to align with the jurisdictional plan for the corridor. |
| 2 | Metroway | Huntington Metro, Old Town Alexandria, Braddock Road Metro, Potomac Yard Metro, Crystal City Metro, Pentagon City Metro | 2: Glebe Rd, The One | 6:00 AM–12:00 AM | Weekday Peak: 6 min. Weekday Off-Peak: 12 min. Weekend: 12 min. | | | ◆ | | | In keeping with other City of Alexandria BRT plans in this area, and the current Metroway service, the corridor would be Advanced BRT between Huntington Metro and the beginning of the median transitway north of Braddock Rd Metro. |
| 3 | Duke Street Transitway | Landmark Mall, King Street Metro | 3: I-495 Bi-State Connector South, West End Transitway, Little River Turnpike | 6:00 AM–12:00 AM | Weekday Peak: 10 min. Weekday Off-Peak: 15 min. Weekend: 15 min. | | ◆ | ◆ | | | BRT Type was determined to align with the jurisdictional plan for the corridor. |
| 4 | West End Transitway | Van Dorn Metrorail, Landmark Mall, Mark Center, Shirlington Transit Center, Pentagon | 4: Envision Route 7, Little River Turnpike, Duke Street, Metroway | 6:00 AM–12:00 AM | Weekday Peak: 10 min. Weekday Off-Peak: 15 min. Weekend: 15 min. | | ◆ | ◆ | | ◆ | BRT Type was determined to align with the jurisdictional plan for the corridor. |
| 5 | Route 7 | Spring Hill Metrorail Station, Tysons Corner, Falls Church, East Falls Church Metrorail Station, Seven Corners Transit Center, Bailey's Crossroads, Skyline, NVCC Alexandria, Southern Towers, Mark Center Transit Center | 8: West End Transitway, Columbia Pike-DC, Columbia Pike-Crystal City, Glebe, U.S. 29 East, Gallows Rd, I-495, Chain Bridge Rd | 6:00 AM–12:00 AM | Weekday Peak: 8 min. Weekday Off-Peak: 12 min. Weekend: 12 min. | ◆ | ◆ | ◆ | ◆ | | BRT Type was determined to align with the jurisdictional plan for the corridor. |
| 6 | Glebe Road | Potomac Yards Metrorail Station, Ballston, Seven Corners Transit Center | 5: Metroway, Columbia Pike-DC, Columbia Pike-Crystal City, Envision Route 7, U.S. 29 East | 6:00 AM–12:00 AM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | | ◆ | | | | Improved BRT for the entire extent. Given the width of the corridor and number of lanes, congestion, where present in the peak periods, is primarily at intersections, and can be addressed with Improved BRT treatments, including TSP, queue jumps, and tactical bus lanes. A few portions of the corridor may be candidates for Advanced BRT if there is a strong desire to encourage more development and/or redevelopment. |
| 7 | Columbia Pike to Crystal City | Skyline, Pentagon City, Crystal City | 6: VA 7, Columbia Pike to DC, 95 Express, U.S. 50 East, Metroway, Franconia-Ft. Belvoir | 6:00 AM–12:00 AM | Weekday Peak: 10 min. Weekday Off-Peak: 12 min. Weekend: 12 min. | | ◆ | ◆ | ◆ | | Hybrid of Improved, Advanced, and Dedicated BRT. Columbia Pike is primarily Advanced BRT, with segments of other types near the western terminus, Pentagon City and in segments overlapping Metroway. |
| 8 | Columbia Pike to DC | Annandale, Bailey's Crossroads | 6: Chain Bridge, Envision Route 7, Glebe, Little River Turnpike, Columbia Pike-Crystal City, U.S. 29 East | 6:00 AM–12:00 AM | Weekday Peak: 10 min. Weekday Off-Peak: 15 min. Weekend: 15 min. | | ◆ | ◆ | | ◆ | Advanced BRT is recommended for testing for the majority of the route, with Express BRT into DC. This is a high-ridership corridor with significant existing transit service. |
| 9 | Arlington Boulevard | Dunn Loring Metro, Merrifield, Seven Corners, Crystal City. | 7: Gallows Rd, U.S. 29 West, U.S. 29 East, VA 7, I-95/I-395, Columbia Pike-Crystal City, Metroway | 6:00 AM–12:00 AM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | | ◆ | ◆ | ◆ | ◆ | Hybrid of Improved, Advanced, Dedicated, and Express BRT. Express BRT operates on the portions of U.S. 50 are limited access expressway with no access to adjacent land uses. |



| # | BRT Name | Major Activity Destinations, Activity Centers, Anchors | Connections to Other BRT | Span of Service | Frequency | Basic BRT | Improved BRT | Advanced BRT | Dedicated BRT | Express BRT | BRT Type Assignment |
|----|-----------------------|---|---|--|--|-----------|--------------|--------------|---------------|-------------|---|
| 10 | Langston Boulevard | Dunn Loring Metro, Merrifield, Falls Church, East Falls Church Metro, Rosslyn Metro, George Washington University, Farragut North | 5: Gallows Rd, Envision Route 7, U.S. 50 East, U.S. 29 West, Columbia Pike-DC | 6:00 AM–12:00 AM | Weekday Peak: 10 min. Weekday Off-Peak: 15 min. Weekend: 15 min. | | ◆ | ◆ | | ◆ | Primarily Improved BRT, with some sections of Advanced BRT to access the Dunn Loring-Merrifield Metro station. |
| 11 | Beltway South | King Street Metro, Eisenhower Metro, National Harbor/MGM, Oxon Hill, Suitland Metro | Duke St | Weekday: 6:00 AM–12:00 AM Weekend: 7:00 AM–7:00 PM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | | ◆ | ◆ | | ◆ | Hybrid of Advanced BRT, Express BRT, and Improved BRT. In keeping with other City of Alexandria BRT plans in this area, the corridor would be Advanced BRT between King Street and I-495, where density is highest. Advanced BRT is needed in the denser areas of the corridor to maintain reliability and speeds, given congestion, turning movements, and driveways. Express BRT is applied on I-495 from Alexandria to Oxon Hill, where is transitions to Improved BRT for circulation around National Harbor. Improved BRT is also recommended between National Harbor and Suitland Metro, where density is much lower. |
| 12 | Little River Turnpike | 7: Landmark Mall, Annandale, NVCC Annandale, Old Town Fairfax, Fairfax Government Center, Monument Drive Transit Center, Fair Oaks Mall | 8: U.S. 29 West, Gallows Rd, Columbia Pike-DC, West End Transitway, Duke Street, Chain Bridge, Route 28 North, Reston-Fair Oaks | 6:00 AM–12:00 AM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | | ◆ | ◆ | | | Hybrid of Improved BRT and Advanced BRT. Advanced BRT is needed in the denser areas of the corridor to maintain reliability and speeds, given congestion, turning movements, and driveways. This includes the segments closest to I-395, through Annandale and Fairfax to Fair Oaks Mall. Advanced BRT is applied in the other sections that are lower density residential portions of the corridor where there is less congestion and that congestion is primarily experience at intersections. There is also less opportunity for new and/or redevelopment in these portions. |
| 13 | Gallows Road | Tysons Corner, Dunn Loring Metrorail Station, Merrifield, Inova Fairfax, Annandale, Springfield Mall, Springfield Metrorail Station | 8: I-495, Chain Bridge, Envision Route 7, U.S. 29 West, U.S. 29 East, Columbia Pike, Little River Turnpike, 95 Express | 6:00 AM–12:00 AM | Weekday Peak: 10 min. Weekday Off-Peak: 15 min. Weekend: 15 min. | | ◆ | ◆ | | | Hybrid of Improved BRT and Advanced BRT. Advanced BRT is needed in the denser areas of the corridor to maintain reliability and speeds, given congestion, turning movements, and driveways. This includes the segments from Tysons to Inova Fairfax, greater Annandale, and Springfield. Improved BRT II applied in the other sections that are lower density residential portions of the corridor where there is less congestion, and that congestion is primarily experience at intersections. There is also less opportunity for new and/or redevelopment in these portions. |
| 14 | Beltway North | Tysons, Montgomery Mall, North Bethesda Metro, Pike and Rose | 4: Chain Bridge, Gallows, Envision Route 7, MD 355 (RideOn) | Weekday: 6:00 AM-12:00 AM Weekend: 7:00 AM–7:00 PM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | | | ◆ | | ◆ | Express BRT that would utilize I-495, and Advanced BRT on local roads in Maryland per jurisdictional plans. |
| 15 | Chain Bridge Road | Tysons, Oakton, Fairfax, GMU | 5: I-495 North, Gallows Rd, Envision Route 7, U.S. 29 West, Little River Turnpike | 6:00 AM–12:00 AM | Weekday Peak: 10 min. Weekday Off-Peak: 15 min. Weekend: 15 min. | | ◆ | ◆ | | | Advanced BRT is needed in the denser areas of the corridor to maintain reliability and speeds, given congestion, turning movements, and driveways. This includes the segments from McLean to Vienna and portions between Oakton and GMU. Improved BRT is applied between Vienna and Oakton that is lower density residential and/or where dedicated ROW is not possible. There is also less opportunity for new and/or redevelopment in this portion. |



| # | BRT Name | Major Activity Destinations, Activity Centers, Anchors | Connections to Other BRT | Span of Service | Frequency | Basic BRT | Improved BRT | Advanced BRT | Dedicated BRT | Express BRT | BRT Type Assignment |
|----|--------------------|--|---|--|--|-----------|--------------|--------------|---------------|-------------|--|
| 16 | Fairfax Boulevard | Centreville, Fairfax Government Center, City of Fairfax, Merrifield, Dunn Loring Metro | 8: Route 28 South, Little River Turnpike, Chain Bridge Rd, Gallows Rd, Route 28 North, Reston-Fair Oaks, U.S. 29 East, U.S. 50 East | 6:00 AM–12:00 AM | Weekday Peak: 10 min. Weekday Off-Peak: 15 min. Weekend: 15 min. | | ◆ | ◆ | | | Hybrid of Improved BRT and Advanced BRT. Advanced BRT is needed in the denser areas of the corridor to maintain reliability and speeds, given congestion, turning movements, and driveways. This includes all of the segments from Dunn Loring Metro to the U.S. 29/286 interchange. From that point to Chantilly would be Improved BRT. Improved BRT is applied in this lower density residential portion of the corridor where there is less congestion and that congestion is primarily experience at intersections. There is also less opportunity for new and/or redevelopment in this portion. |
| 17 | West Ox Road | McNair, Herndon, Reston, Fair Oaks. | 5: Route 28 North, Little River Turnpike, U.S. 29 West, Northwest BRT, Little River Turnpike | 6:00 AM–12:00 AM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | | ◆ | ◆ | | ◆ | Express BRT is proposed for the section of the route on Fairfax County Parkway. Within Reston and Fair Oaks, Improved BRT and Advanced BRT are recommended. |
| 18 | Sterling Connector | Washington Dulles International Airport, Innovation Center, Sterling Mall, Dulles Town Center, One Loudoun | 3: Route 28 North, Route 28 South, Leesburg-Dulles Town Center | 6:00 AM–12:00 AM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | ◆ | ◆ | | | | This route operates on multiple streets in order to connect activity centers adjacent to VA 28 where Basic BRT is most appropriate. Improved BRT is included in Herndon and accessing Innovation Metro station. Express BRT is used to access Dulles Airport. |
| 19 | Loudoun Connector | Leesburg, One Loudoun, Dulles Town Center. | 2: Route 28 North, Northwest BRT | 6:00 AM–12:00 AM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | ◆ | | | | ◆ | Hybrid of Express BRT and Basic BRT is recommended based on the lower density land use and roadway types along this route. Express section is on Route 7 east of Leesburg. |
| 20 | VA 28 North | Fair Oaks Mall, Centreville, Washington Dulles International Airport, Dulles Town Center | 6: Little River Turnpike, U.S. 29 West, Reston-Fair Oaks, Route 28 South, Northwest, Leesburg-Dulles Town Center | 6:00 AM–12:00 AM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | | ◆ | | | ◆ | This route mostly operates on limited-access highways like U.S. 50 and VA 28; therefore it mostly operates as Express BRT. When it overlaps with other BRT routes it adopts Advanced BRT in Fair Oaks and Chantilly. |
| 21 | I-66 Express | Haymarket, Centreville, Vienna Metro station. | 2: U.S. 29 West, Route 28 North | Weekday: 6:00 AM–12:00 AM Weekend: 7:00 AM–7:00 PM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 30 min. | | ◆ | | | ◆ | Most of the alignment is Express BRT along I-66 and U.S. 29, with Improved BRT II in a section through Centreville. |
| 22 | VA 28 South | Old Town Manassas, Centreville, Chantilly, Washington Dulles International Airport | 4: Manassas, U.S. 29 West, Route 28 North, Northwest | 6:00 AM–12:00 AM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | | ◆ | ◆ | | ◆ | Hybrid of Improved, Advanced, and Express BRT. BRT Express is applied from Manassas Park to Centreville, from Centreville to Westfields Blvd, and north of U.S. 50. These segments are a combination of very low density and limited access facilities. Advanced BRT is between Manassas and Manassas Park and between Westfields Blvd and U.S. 50 to provide reliability and speed improvements, particularly in places where peak period peak congestion is heavy, which may require significant sections of tactical bus lanes. |
| 23 | Manassas Connector | NVCC, Manassas Mall, Prince William Medical Center, Old Town Manassas, VRE, Signal Hill Shopping Center | Route 28 South, Prince William Parkway | 6:00 AM–12:00 AM | Weekday Peak: 10 min. Weekday Off-Peak: 15 min. Weekend: 15 min. | | | ◆ | | | Proposed as Advanced BRT for the entire extent. According to the MWCOG Cooperative Land Use Forecasts, this corridor will have an activity density of ~45,000 by 2045. To support the anticipated growth and transformation to a mixed-use and multimodal corridor Advanced BRT is appropriate to encourage more sustainable redevelopment and development while preserving ROW. |



| # | BRT Name | Major Activity Destinations, Activity Centers, Anchors | Connections to Other BRT | Span of Service | Frequency | Basic BRT | Improved BRT | Advanced BRT | Dedicated BRT | Express BRT | BRT Type Assignment |
|----|------------------------|--|---|---|--|-----------|--------------|--------------|---------------|-------------|---|
| 24 | Prince William Parkway | Potomac Mills Mall, Manassas | 4: Manassas, Route 28 South, I-95/I-395, U.S. 1 South | 6:00 AM–12:00 AM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | ◆ | ◆ | | | ◆ | This route connects two denser areas (Potomac Mills and Manassas) along an alignment that's mostly very low density, so BRT Express is recommended for the majority of the alignment. Closer to Manassas, Basic BRT is recommended because the alignment approaches Manassas VRE station without using major corridors like VA 28. As the route approaches County Center and Potomac Mills, Improved BRT is recommended as it coincides with a Prince William County study for bus lanes and signal priority in the area. |
| 25 | Fort Belvoir Express | Franconia Springfield Metro, Fort Belvoir. | 3: I-95/I-395, Old Keene Mill, Gallows Rd, The One, U.S. 1 South | Weekday: 5:00 AM-7:00 PM Weekend: 7:00 AM–7:00 PM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 30 min. | | | | | ◆ | Express BRT is recommended based on the lack of intermediate stops, lower density land use, and roadway types along this route. |
| 26 | I-95 Express | Dumfries, Potomac Mills, Franconia-Springfield Metro, Crystal City. | 5: Old Keene Mill, Gallows Rd, U.S. 50 East, Columbia Pike to Crystal City, Metroway, | Weekday: 6:00 AM–12:00 AM Weekend: 7:00 AM–7:00 PM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 30 min. | | | | ◆ | ◆ | Almost entirely Express BRT service on I-95 and I-395 with a segment of Dedicated BRT overlapping with Metroway. |
| 27 | U.S. 1 South | Potomac Mills Mall, Sentara Northern Virginia Medical Center, Potomac Town Center, Fort Belvoir | 4: Prince William Parkway, I-95/I-395, Franconia-Springfield-Ft. Belvoir, The One | 6:00 AM–12:00 AM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | ◆ | ◆ | | | | Given this corridor's lower density and status as a major U.S. highway, this route was mostly classified as Basic BRT. The Improved BRT designation of the alignment around Dale City and Potomac Mills is based on previous studies for peak-period bus lanes and other transit priority infrastructure in this area. |
| 28 | Old Keene Mill Road | Rolling Valley P&R, Backlick Transit Center, Franconia Springfield Metro, Kingstown, Huntington Metro. | 5: I-95/I-395 Express, Gallows Rd, Franconia Springfield-Ft. Belvoir, The One, Metroway Extension | 6:00 AM–12:00 AM | Weekday Peak: 15 min. Weekday Off-Peak: 20 min. Weekend: 20 min. | ◆ | | | | | Basic BRT is recommended based on the land use and roadways along this route. |



3.4 Impact of BRT On Local Bus Service

The introduction of new BRT service can lead to competition and complications with existing service since it is often implemented along corridors where bus service is already successful. Adjustments made with careful consideration can reduce these frictions between different service types and create complementary networks that may improve overall network connectivity. This section provides information from several existing reports that address best practices for coordinating or mitigating impacts between BRT and established transit services.

BRT is an investment designed to maximize transit use in high-travel-demand corridors. As such, it should exhibit characteristics that differentiate it from traditional fixed-route bus services, such as the following:

- ◆ Faster travel times than traditional fixed-route bus service;
- ◆ Shorter wait times at stations;
- ◆ Limited stops or stations, generally located at major street intersections or activity centers; and
- ◆ Unique branding to differentiate BRT from other transit services and identify it as a higher-order rapid transit service.

The operational attributes of BRT should define the service as distinct from local bus services. Service design should serve the unique needs of the corridor while emphasizing speed and reliability beyond that offered by local bus service. These attributes, along with a high degree of connectivity with other transit modes, will enhance the overall efficiency of all transit services and provide the customer with more flexibility in making a trip.

While seen as a premium service, BRT should not be implemented at the expense of existing fixed-route service, but rather in a way that complements and enhances other transit services. Enhancing connectivity between BRT and fixed-route bus service can improve the travel experience by reducing travel times and increasing overall accessibility to travel destinations.

3.4.1 Relationship with Parallel Local Services⁷

Many transit agencies establish BRT in corridors with existing, well-utilized local transit service. In these cases, transit agencies must decide on the respective roles of BRT and local service and how to modify parallel local services, if at all. The usual options include the following:

- ◆ Removal of the parallel service;
- ◆ Reduction in the parallel service; and
- ◆ No changes to parallel service.

In deciding on these options, there are several factors to be considered:

- ◆ Ridership and potential for new ridership in the corridor;
- ◆ Station/stop spacing;
- ◆ Physical attributes of the route, especially physical separation of BRT service and stops from other modes of transportation;

⁷ For purposes of this discussion parallel local bus is assumed to be operating in the same corridor as BRT.



- ◆ Transfer convenience/demand;
- ◆ Transit system operating budget and how reductions in local service could partially offset the cost of operating the BRT; and
- ◆ Public and community support for the BRT project.

Where local service is maintained, the higher speeds and reliability of BRT will attract some portion of the riders currently using local bus service in a corridor. That will result in lower ridership on the local bus service and may allow for a decrease in frequency and a corresponding reduction in operating costs. Demand patterns and stop spacing should influence the balance in frequency between BRT and local bus frequencies to provide good service to all customers on a corridor.

If all parallel service is to be removed, then service levels on the new BRT system must be able to handle the passenger volumes currently carried by the local service, as well as potential increases in ridership expected as a result of the new, more attractive BRT service.

Access to bus stops must also be considered when integrating BRT and local bus service on a corridor. Maintaining BRT access to locations that have previously been adjacent to a bus stop is a common goal. This access is especially important for customers with a disability. Aligning the BRT stop locations with local bus stops can provide that access, but will offset the speed advantages of BRT. If station spacing for the planned BRT route results in unacceptable walking distances to stops, it may be desirable to retain parallel local service, especially if the BRT is on an established transit corridor. BRT stops should also consider connections to other BRT and local bus service so that transfers across the transit system are possible.

If the BRT is operating on a running way that does not allow space for passing of other vehicles, then the parallel local service would need to operate on another running way, typically in general traffic lanes on the corridor, depending on the nature of the BRT running way.

These factors must all be balanced with the available funding, and the decision to remove or reduce local service to accommodate new BRT routes should be made with support from the public in order to ensure the success of the system.

3.4.2 Modifications to Local Services

Local arterial bus services—those that run on high-traffic roads and transport passengers along higher-density corridors—and feeder bus services, those that collect and transport passengers between denser and more sparse areas of the transit network—operate in conjunction with BRT services to extend the benefits of BRT and to integrate BRT into the overall transit network. To take maximum advantage of BRT, these routes may need to be modified to reflect the presence of BRT. These modifications could include the following:

- ◆ Route diversions to ensure that each route intersects the BRT in at least one location where passengers can transfer conveniently at a station;
- ◆ Route diversions where the local route may use a section of busway or BRT corridor for a portion of its route;
- ◆ Route extensions along a busway section or BRT corridor to take advantage of the faster operating speed and to connect passengers on feeder and arterial routes to more transfer opportunities;
- ◆ The elimination of route sections where bus service can be replaced by walking to a BRT station; and



- ♦ Timing changes to provide a timed transfer or pulse operation at major transfer locations (particularly late at night when service frequencies may be low).

How the BRT services and local transit services connect will depend on the overall objectives and design of the BRT system and the preferred service design structure. Other influencing factors may include passenger demand and station location.

Where the route structure places a high reliance on transfers, travel from low-frequency services to high-frequency services will be more convenient than travel from high-frequency services to low-frequency services. This is most evident when the service frequencies of the BRT routes are much greater than those of the local connecting services. In cases where frequencies of both the BRT routes and local connecting services are more closely matched, there may be a case for timed transfers. Generally, lower frequencies require that connections be timed to minimize passenger transfer waiting times. In cases where both the BRT routes and local connecting routes have good frequencies (typically 10 minutes or better), timed transfers are usually not required.

The local services connecting with the BRT systems may require time allowances for connections. This may be required to ensure that connecting passengers have sufficient time to transfer from one service to another and is generally used when service frequencies are moderate to low. Decisions regarding timing at stations or major transit transfer points can also be affected by other factors, such as local weather conditions.

BRT systems also provide opportunities to interface with other transit services, including other types of rapid transit, regional commuter operations, and inter-city motorcoach services. The latter two may also run along the BRT corridor, linking their respective origins with destinations along the corridor. Transit systems may also choose to partner with other transit services by offering joint ticketing or transfer privileges between services. In Pittsburgh, seven regional transit operators meet at the East Busway Penn Station, with transfer privileges provided as well as access to the Amtrak and Greyhound stations. Los Angeles County Metropolitan Transportation Authority (LACMTA) operates a BRT service that runs on reserved lanes for buses on limited-access highways, which are used by suburban express routes to downtown and supplemented by local, limited stop and express bus routes, as well as commuter rail. Métrobus BRT in Quebec City uses a combination of exclusive lanes and mixed traffic with transit priority measures and is supported by a network of local, express and circulator shuttle services.



4.0 BRT SYSTEM EVALUATION

Two of the main purposes of the BRT Action Plan were to evaluate the potential benefits, costs, and impacts of implementing a regional BRT system in Northern Virginia and to identify the relative strengths of each proposed BRT route to inform decisions about implementation, phasing, and funding. This chapter outlines the methodology used for evaluating the proposed BRT routes using a set of measures designed to consider ridership, operations, financial needs, and governance. The entire BRT system, as defined in Section 3.3, was evaluated using this methodology to quantify the costs and benefits of implementing a regional BRT system (see Section 4.2.1). Each of the proposed BRT routes was also analyzed individually, to help jurisdictions and other regional agencies build an understanding of what would be necessary for BRT to be successful in different corridors (see Section 4.2.2). This chapter considers feedback from the public as part of the evaluation, and highlights the results of the public outreach and survey efforts conducted in the Spring of 2025 (see Section 4.3)

4.1 Analysis Methodology

To provide a comprehensive view of the impacts, costs, and benefits of BRT service, this evaluation considered performance and needs across eight categories, as shown in Figure 37. These categories include 27 performance measures that present a comprehensive, high-level overview of the potential benefits, tradeoffs, opportunities, and challenges associated with implementing BRT across Northern Virginia. These measures were developed to align with criteria for potential funding sources—including NVTA’s TransAction measures, the FTA’s CIG criteria, and Virginia’s SMART SCALE criteria—and incorporate input from NVTA’s partner jurisdictions via the BRT Planning Working Group and the public. Beyond these performance measures, NVTA also considered the operating needs of BRT routes, such as the number of vehicles and drivers needed, the need for additional bus facilities, and technology needs. Some of these measures can only be estimated at the route level, and not at the system level.

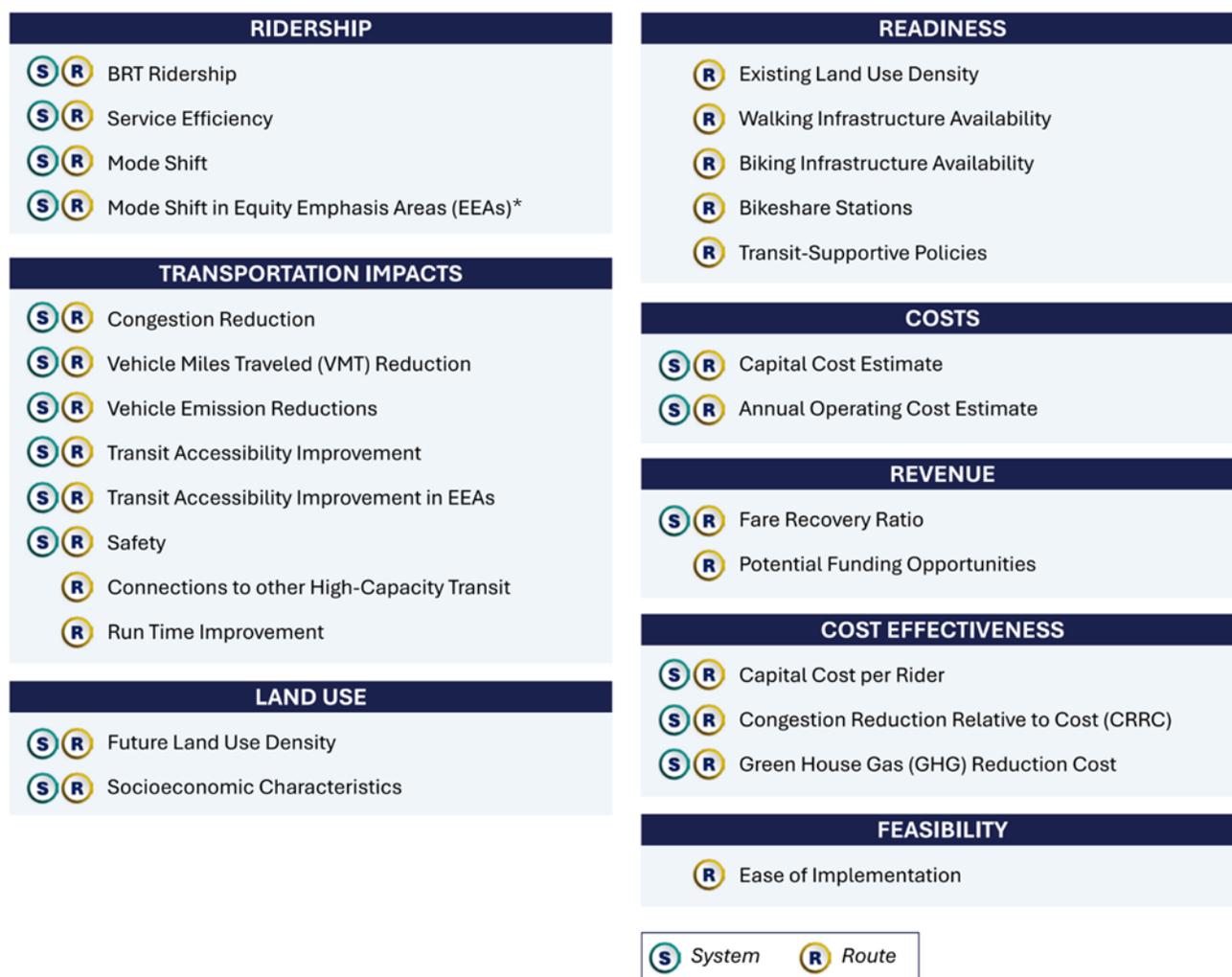
Since implementation of a regional BRT system could take decades, the majority of these measures were analyzed for the future year of 2045. These measures were evaluated using the latest version of the NVTA travel demand model, which incorporates the MWCOC Round 10.0 Cooperative Land Use Forecasts and assumptions about changes to the underlying transportation network based on the regional Constrained Long Range Plan (CLRP) in addition to projects that have already been fully funded by NVTA. A few measures, including project readiness and socioeconomic characteristics, were best evaluated for existing conditions instead.

The BRT system shown in the previous chapter was evaluated as a comprehensive regional system, as well as evaluated individually, to understand the benefits of the overall system and the relative merits of each route. It should be noted that the numbers used in this BRT Action Plan to reference the BRT routes do not indicate priorities or rankings.

More detailed information on how each of these performance measures were calculated can be found in Appendix K.



Figure 37 List of Performance Measures



*Equity Emphasis Areas are areas with higher than average concentrations of low income households and people of color.

4.1.1 Ridership

This category of measures focuses on the ability of a BRT route or the BRT system to attract riders, with a particular focus on shifting travelers away from driving and onto transit. All four of the measures in Table 19 were calculated for each individual route and for the BRT system as a whole.

Table 19 Ridership Performance Measures

| Measure | Definition |
|--------------------|---|
| BRT Boardings | Quantifies the estimated average number of daily boardings (i.e., unlinked trips) on the proposed BRT routes in 2045. |
| Service Efficiency | BRT Boardings per revenue hour. |
| Mode Shift | Captures the change in overall transit usage (all modes) with and without implementation of BRT. Essentially quantifying the number of driving trips that are shifted onto transit because the BRT. |



| Measure | Definition |
|--------------------|--|
| Mode Shift in EEAs | Same as above, but only considering the number of new transit trips that started in one of NVTA's Equity Emphasis Areas (EEA). |

In addition to these four performance measures, the analysis also provides two other pieces of ridership-related data for informational purposes:

- ♦ **BRT Boarding Share During Peak Periods:** the share of a route's average daily ridership that occurred during the morning and evening peaks. It was calculated from weekday boardings between 6 a.m. to 9 a.m. and 4 p.m. to 7 p.m.
- ♦ **Ridership Impacts on other High Capacity Transit:** Quantifies where certain BRT routes may be competing with or complementing existing high-capacity transit, including Metrorail and VRE. This quantifies the change in ridership to those rail systems.

4.1.2 Transportation Impacts

The implementation of BRT, and the attraction of more travelers to transit quantified under the Ridership performance measures in Section 4.1.1, will have other impacts on the transportation system. Moving trips from driving alone to transit will cause reductions in congestion, vehicle miles traveled (VMT), and emissions. Simultaneously, BRT will improve the travel experience for transit customers, making it easier and faster for them to get where they need to go. The measures in Table 20 were developed to capture many of those impacts. Most measures were evaluated for each BRT route and the overall BRT system unless otherwise noted below.

Table 20 Performance Measures to Evaluate Transportation Impacts

| Measure | Definition |
|--|--|
| Congestion Reduction | The reduction in total person-hours of delay (PHD) caused by BRT. Person-hours of delay was measured as the difference between the forecasted person-hours spent traveling and the hypothetical number of person-hours spent traveling where all roads operating at free-flow speed. Congestion reduction was quantified for both auto users and transit passengers based on average vehicle occupancy and transit ridership levels. |
| VMT Reduction | The reduction in vehicle-miles traveled (VMT), as caused by an increase in transit use. |
| Vehicle Emission Reductions | The change in emissions was approximated based on the VMT Reduction, with an assumed emissions rate depending upon a vehicle's size and speed. |
| Transit Accessibility Improvement | Change in access to jobs by transit that was caused by BRT. It was calculated from the change in number of jobs accessible within 60 minutes via transit for residents of Northern Virginia. |
| Transit Accessibility Improvement in EEAs | Same as above, but calculated only for residents of EEAs. |
| Safety | Captures the effect of crash reduction related to reducing auto travel due to mode shift. High level analysis, as crash rates do not change in this methodology; reductions in crashes are achieved by reducing VMT. Quantified as a total dollar value of cost reductions. |
| Connections to other high capacity transit | Quantifies how well a proposed BRT route is connected to the planned high-capacity transit system (Metrorail, VRE, other BRT lines) by counting the number of connections to the services. (Only calculated for individual BRT routes.) |
| Run Time Improvement | Estimated change in end-to-end run time for each route, comparing the BRT service to local bus service. (Only calculated for individual BRT routes.) |



4.1.3 Land Use

The Land Use category was developed to identify routes with density and demographics to support BRT service. Table 21 outlines these performance measures, all of which were used to evaluate individual BRT routes and the entire BRT system.

Table 21 Land Use Performance Measures

| Measure | Definition |
|-------------------------------|--|
| Future Land Use Density | Density of population and jobs within one half mile of each proposed BRT stop in 2045, based on the MWCOG Round 10.0 Cooperative Land Use Forecasts. |
| Socioeconomic Characteristics | Provides an equity lens for BRT evaluation, quantifying the extent to which a BRT route or network serves specific populations that are more likely to rely on transit for their mobility needs. These populations include residents of color, residents with a disability, low-income households, no-car households, and one-car households. Evaluation is conducted based on existing conditions, as future data is not available. |

4.1.4 Readiness

This category comprises performance measures designed to quantify how ready each corridor is for implementation. This evaluation relies on data from current conditions instead of conditions in 2045. Table 22 outlines the performance measures used in this category, all of which are only evaluated for individual routes.

Table 22 Readiness Performance Measures

| Measure | Definition |
|-------------------------------------|---|
| Existing Land Use | This measure was calculated based on 2023 land use density within half mile of proposed stops. The calculation was essentially identical to the Future Land Use Density measure, except this measure considered what is already on the ground to help prioritize implementation of BRT routes that already have supportive land use density in place. |
| Walking Infrastructure Availability | Calculated as the portion of the population and employment within a one-half mile radius of a BRT station that is accessible to the station via pedestrian infrastructure (e.g., sidewalks). |
| Biking Infrastructure Availability | Calculated as the portion of the population and employment within a two-mile radius of a BRT station that is accessible to the station via biking infrastructure (e.g., trails). |
| Bikeshare Stations | The number of bikeshare stations located within one-half mile of the stops on each BRT route. |
| Transit Supportive Policies | The Transit Supportive Policies measure indicated whether routes are in areas with zoning conducive to successful higher-capacity transit, such as mixed land uses and higher density. This was a qualitative measure and was assessed at the route level by researching local zoning and transit-supportive policies for each NVTA jurisdiction. |

4.1.5 Costs

This category develops planning-level cost estimates to implement BRT in Northern Virginia. Both one-time capital costs and annually recurring operating and maintenance costs are considered for each BRT route and for the overall BRT system, as shown in Table 23. Cost estimates were developed in 2024 dollars.



Table 23 Costs Performance Measures

| Measure | Definition |
|--------------------------------|---|
| Capital Cost Estimate | Capital costs were estimated at a planning level based on assumed characteristics about each route, including number of station-stops, vehicles, and running way and intersection improvements. |
| Annual Operating Cost Estimate | An annual operating and maintenance cost was estimated for each route based on the planned service levels. |

4.1.6 Revenue

The Revenue category considers potential revenue sources for each proposed BRT route. As shown in Table 24, this includes an estimate of potential fare revenue and other sources of capital and operating funds.

Table 24 Revenue Performance Measures

| Measure | Definition |
|---------------------------------|---|
| Fare Recovery Ratio | Estimates the portion of each BRT route's annual operating and maintenance costs that are covered by fares, based on an assumed average fare and ridership estimates. This measure was analyzed for each individual BRT route and the BRT system as a whole. |
| Potential Funding Opportunities | A qualitative assessment of a BRT route's likelihood of obtaining funding from a variety of Federal, state, and local grant programs. Criteria for each of these grant programs vary, but most rely on similar performance measures to those being used in this BRT Action Plan, including ridership, customer base and equity, cost effectiveness, environmental benefits, and density. Because of how it is assessed, this measure was evaluated for each individual BRT route, but not for the overall BRT system. |

4.1.7 Cost Effectiveness

The Cost Effectiveness category includes performance measures that relate potential benefits to the size of the investment, as shown in Table 25. All measures were calculated for each BRT route and the overall BRT system.

Table 25 Cost Effectiveness Performance Measures

| Measure | Definition |
|--|---|
| Capital Cost per Rider | The capital cost per unlinked passenger trip (i.e., boarding) was evaluated based on results from the costs and ridership measures. |
| Congestion Reduction Relative to Cost (CRRC) | Reduction in person-hours of delay (PHD) relative to the total capital cost. |
| Greenhouse Gas (GHG) Reduction Cost | Estimated capital cost per GHG removed, based on the estimated Capital Cost and Vehicle Emission Reduction measures. |

4.1.8 Feasibility

The Feasibility measure considers some of the qualitative aspects of the ease of implementing a proposed BRT route. As this is a planning-level study, this measure does not address the engineering feasibility of implementation of BRT, but instead considers the ease of implementation from the perspective of inter-agency coordination, as outlined in Table 26.



Table 26 Feasibility Performance Measures

| Measure | Definition |
|------------------------|--|
| Ease of Implementation | Qualitatively rates the overall feasibility of implementing individual BRT routes, considering the difficulty of coordinating between multiple jurisdictions and agencies, the relative difficulty of implementing larger infrastructure projects, and the difficulty of implementing new cross-jurisdictional operating agreements. |

4.2 Evaluation Results

Each proposed BRT route was evaluated independently across the full list of categories and their corresponding performance measures. The complete BRT system was also evaluated together to understand the synergies of implementing a comprehensive regional BRT system. This section includes the results of these analyses across each performance measure. Some of the key benefits of the proposed BRT system include:



Increase in New Transit Trips
Shift almost **27,000 trips** from driving to transit every day – more than **35%** of those new transit trips will be made from an **Equity Emphasis Area**



Congestion & Emissions Reduction
The shift from driving to transit results in **12,000 person-hours of delay** removed daily and **23 tons** of CO₂ emissions avoided daily



Increase in Transit Accessibility to Jobs
On average, Northern Virginians will be able to access more than **17,000 additional jobs** within 60 minutes by transit – and residents of **Equity Emphasis Areas** will see even bigger improvements



Crash Avoidance Savings
Northern Virginia could save almost **\$10M*** annually in damages/injuries from **crashes avoided**

*savings in 2024 dollars



Fare Revenues
Fare Revenues are expected to cover **15%** of the **BRT systems operating costs** – although this varies from 1% to 42% by route

It should be noted that when evaluating the routes individually, the totals for all 28 routes may be greater or less than when all 28 routes are evaluated together. This is because each BRT route would function a little differently when part of a comprehensive regional BRT system than it would as an individual route. For example, the number of vehicles needed to operate the proposed BRT system is lower than the sum of the number of vehicles needed to operate each route independently, as there are efficiencies in operating a larger system.

4.2.1 Ridership

The ridership category is made up of BRT boardings, service efficiency, mode shift, and NVT equity emphasis area (EEA) mode shift. A portion of these BRT riders are likely to be passengers who would otherwise be using other types of transit, especially in corridors where there is significant local bus service, like Route 7 and Richmond Highway. Encouraging travelers to change their trips from driving to transit—or mode shift—tends to be successful on routes with higher ridership, but also on some routes where the BRT represents the debut of high-quality, high-capacity transit in

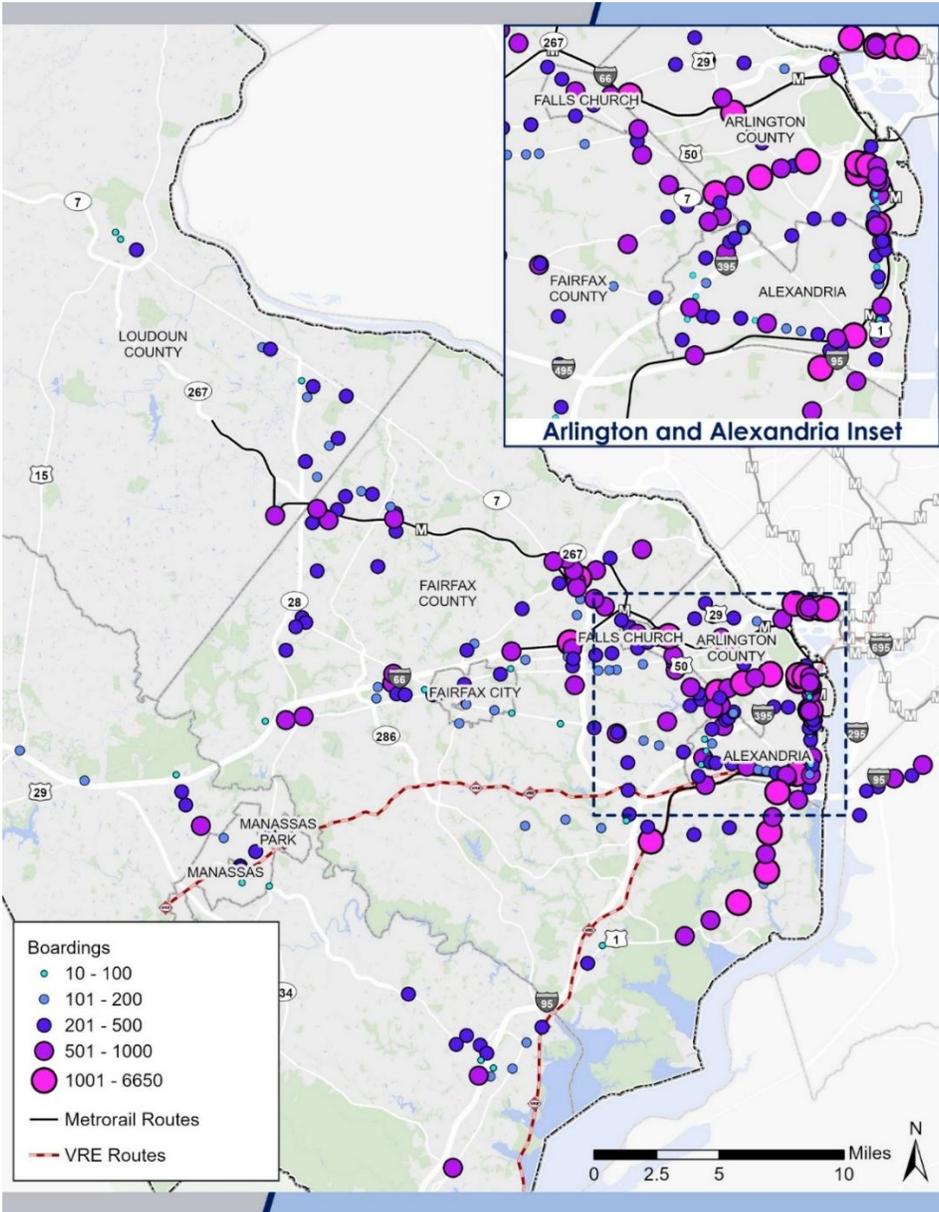


the community. While routes such as the Manassas Connector and VA Route 28 South may not have the highest ridership, a high percentage of that ridership is comprised of trips that would have otherwise been taken as drive alone trips.

BRT Boardings

When considered as a complete system, the proposed BRT system is forecast to have 143,300 boardings on an average weekday in 2045—or more than 47 million riders annually. For reference, in FY2024 (the twelve-month period ending on June 30, 2024), bus ridership in Northern Virginia was approximately 33.6 million, and rail ridership was 60.2 million. This would be more riders than the bus systems in either the Pittsburgh or Phoenix regions, which each carried approximately 39 million passengers in 2023. Figure 38 shows forecasted ridership by stop for the complete proposed BRT system.

Figure 38 Boardings by Stop—Systemwide Analysis



Average weekday boardings in 2045 on the BRT routes varies significantly, and is dependent on if the routes are evaluated individually (as shown in Figure 39) or together as a system (as shown in Figure 40). Generally, higher ridership routes tend to be in areas with higher planned density. This includes Route 7 and Richmond Highway, which have already received NVTa funding, followed by Columbia Pike to Crystal City, Langston Boulevard, and Columbia Pike to DC. As shown below, these patterns hold when the routes are tested individually, or as part of a regional BRT system.

Figure 39 2045 BRT Boardings by Route—Tested Individually

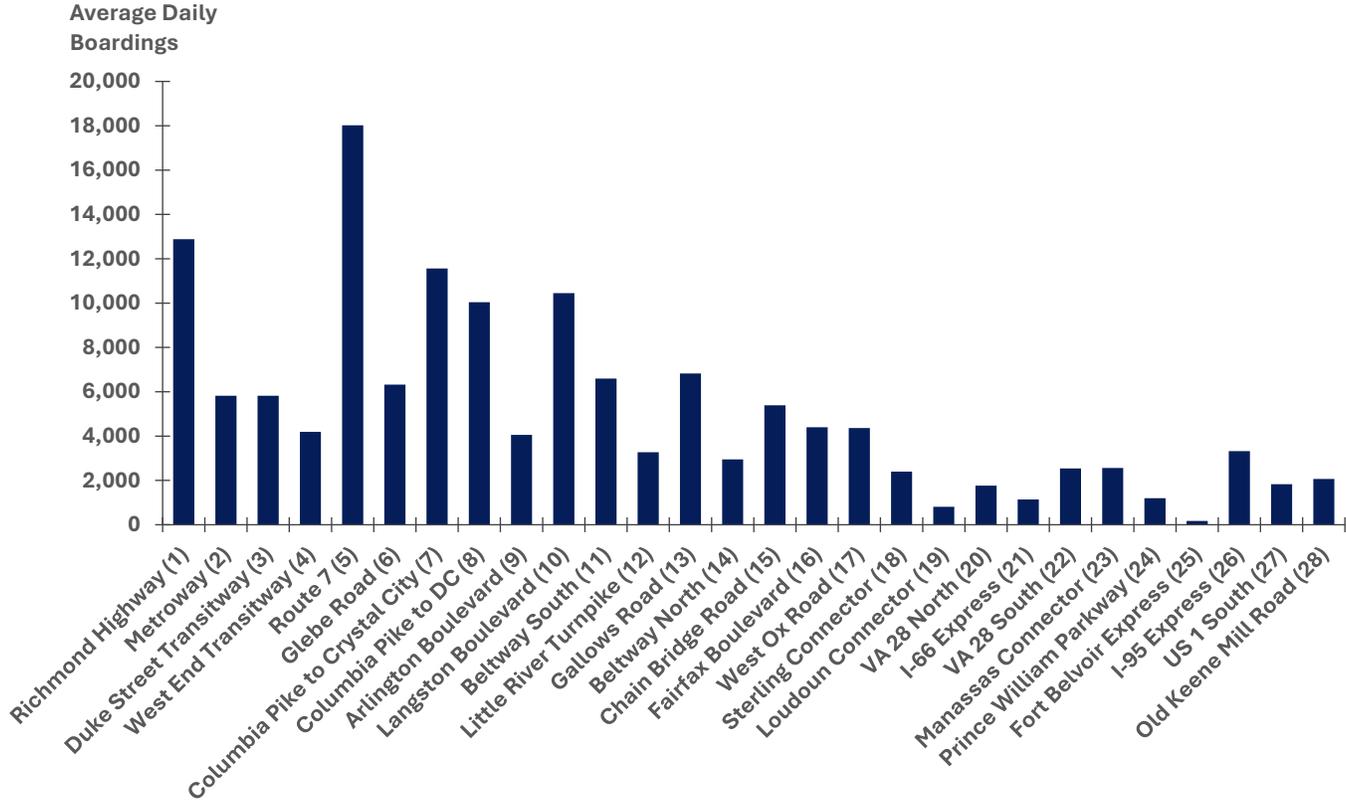
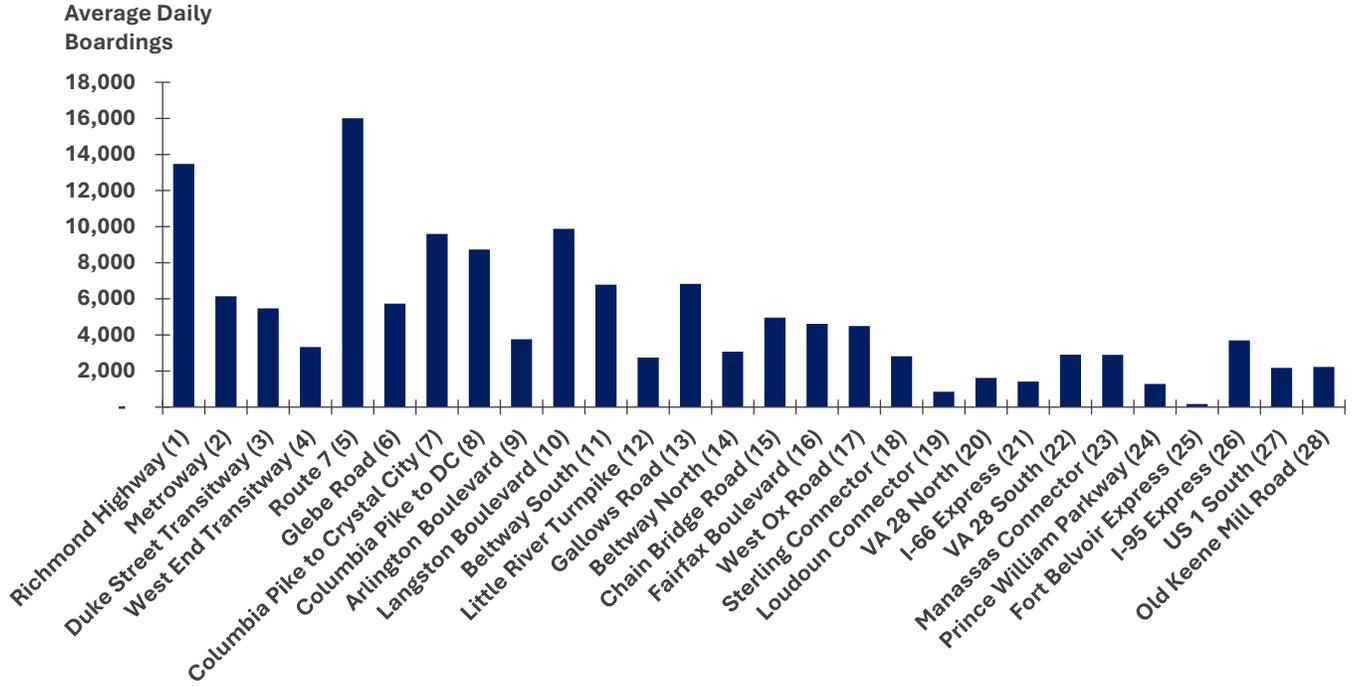


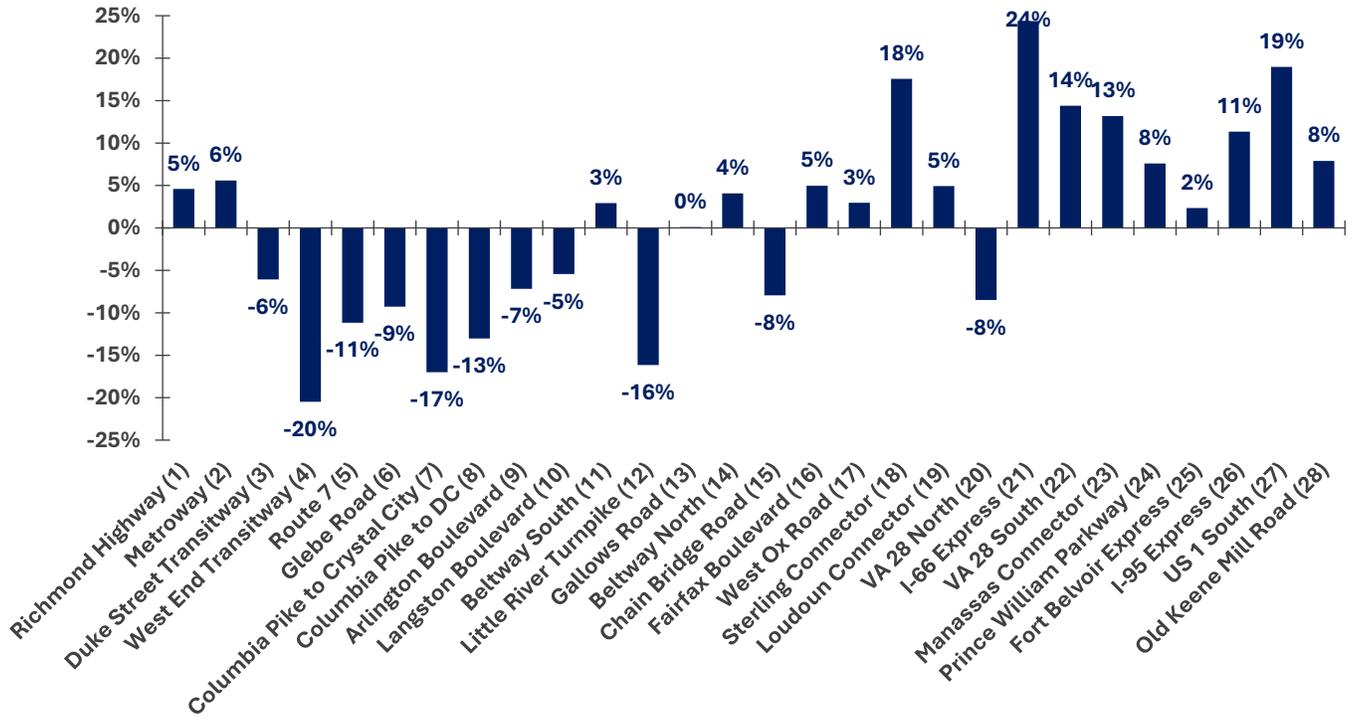
Figure 40 2045 BRT Boardings by Route—Tested Together



Ridership on some routes is higher when tested individually than as a system; this is true for routes that may share a market, such as the two routes on Columbia Pike. In other cases, ridership may be higher when tested as a system than when the routes are tested individually, as transfer opportunities can encourage additional ridership in some areas. Figure 41 visualizes which routes see an increase in ridership when included as part of the larger system (positive values) and which see a decrease (negative numbers). The decreases in ridership tend to occur in the inner jurisdictions where the proposed routes are physically closer together and the service areas of routes are more likely to overlap. While routes in the outer jurisdictions where the routes are more physically separated from one another are more likely to experience the benefit of transfer opportunities from implementing the complete system. One interesting exception to this finding is the Richmond Highway route, which sees added ridership from transfers in the complete system, primarily due to the addition of the U.S. 1 South route which connects at Fort Belvoir.



Figure 41 Change in Boardings—Systemwide Analysis vs. Individual Route Analysis

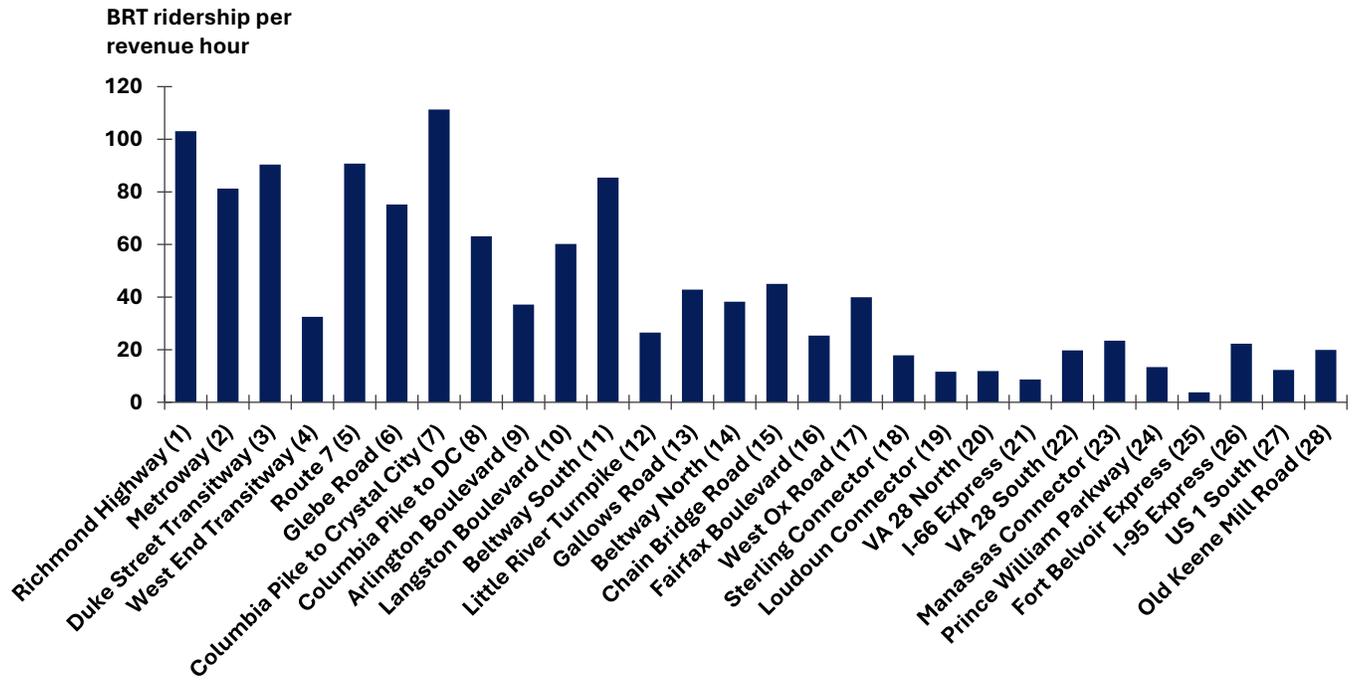


Service Efficiency

The complete proposed BRT system is estimated to have efficiency of approximately 43 riders per revenue hour in 2045. When evaluated individually, service efficiency varies considerably route, as shown in Figure 42. For reference, other BRT systems around the country achieve service efficiencies between 9 and 42 passengers per revenue hour. The Pulse in Richmond achieved 41 passengers per revenue hour in 2023, while Metroway delivered 9 passengers per revenue hour. Many of the routes with the highest number of boardings also have very high service efficiency, such as Richmond Highway, Route 7, and Columbia Pike to Crystal City. However, several routes that do not necessarily have the highest boardings do well in service efficiency, such as Duke Street Transitway and Beltway South.



Figure 42 2045 BRT Service Efficiency

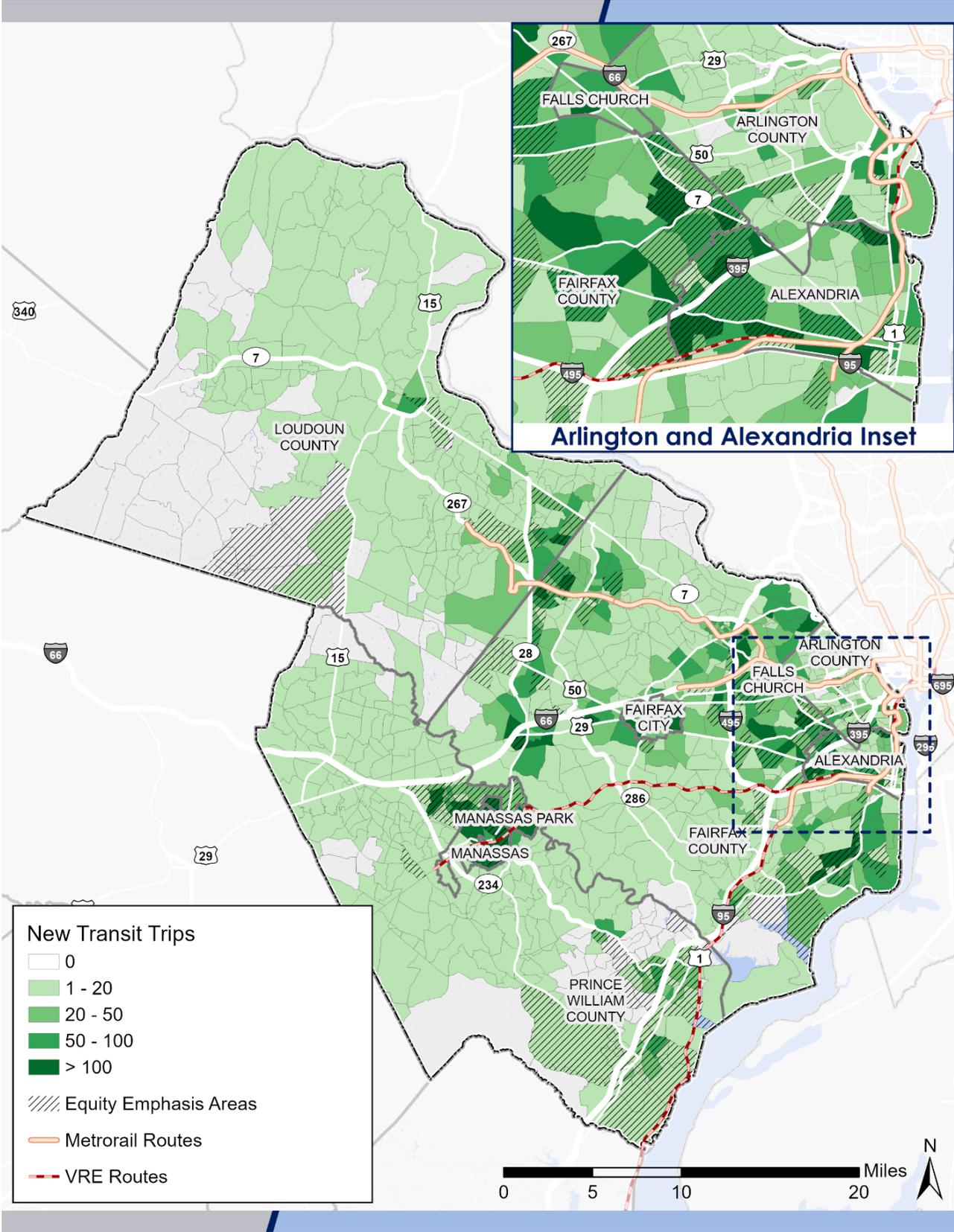


Mode Shift

By design, not all BRT riders would be new transit passengers; some would be shifting their travel from existing transit services—primarily from local bus services. However, the regional BRT system would shift about 27,000 trips from driving to transit on an average weekday. Figure 43 illustrates the origin location of these new transit trips.



Figure 43 Origin Location of New Transit Trips



When evaluated individually, the highest number of new transit trips is forecast to occur on the Route 7 BRT, with more than 4,200 new transit trips daily (Figure 44). Interestingly, many of the other routes, such as the Manassas Connector, Gallows Road, and VA 28 South routes, show large numbers of new transit trips despite having lower ridership, as the BRT service represents a major improvement to transit service. As shown in Figure 45, new transit trips represent a higher portion of boardings on many of the corridors in the outer jurisdictions where the proposed BRT service would be a very significant improvement over the existing service. Routes that have low mode shift but high ridership, such as Beltway South and Columbia Pike to Crystal City indicate that ridership would largely be drawn from riders of existing transit services.

Figure 44 2045 BRT Mode Shift

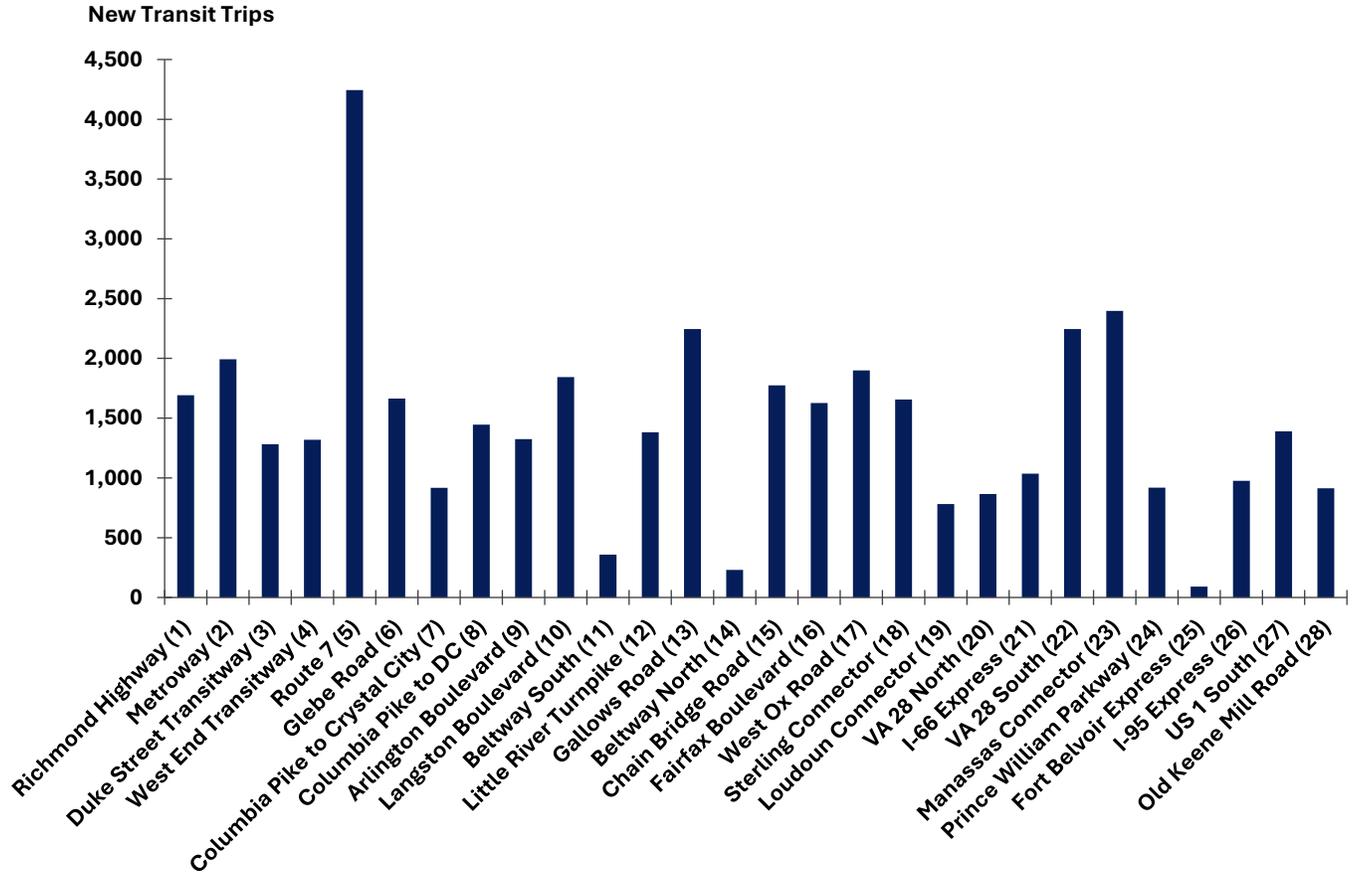
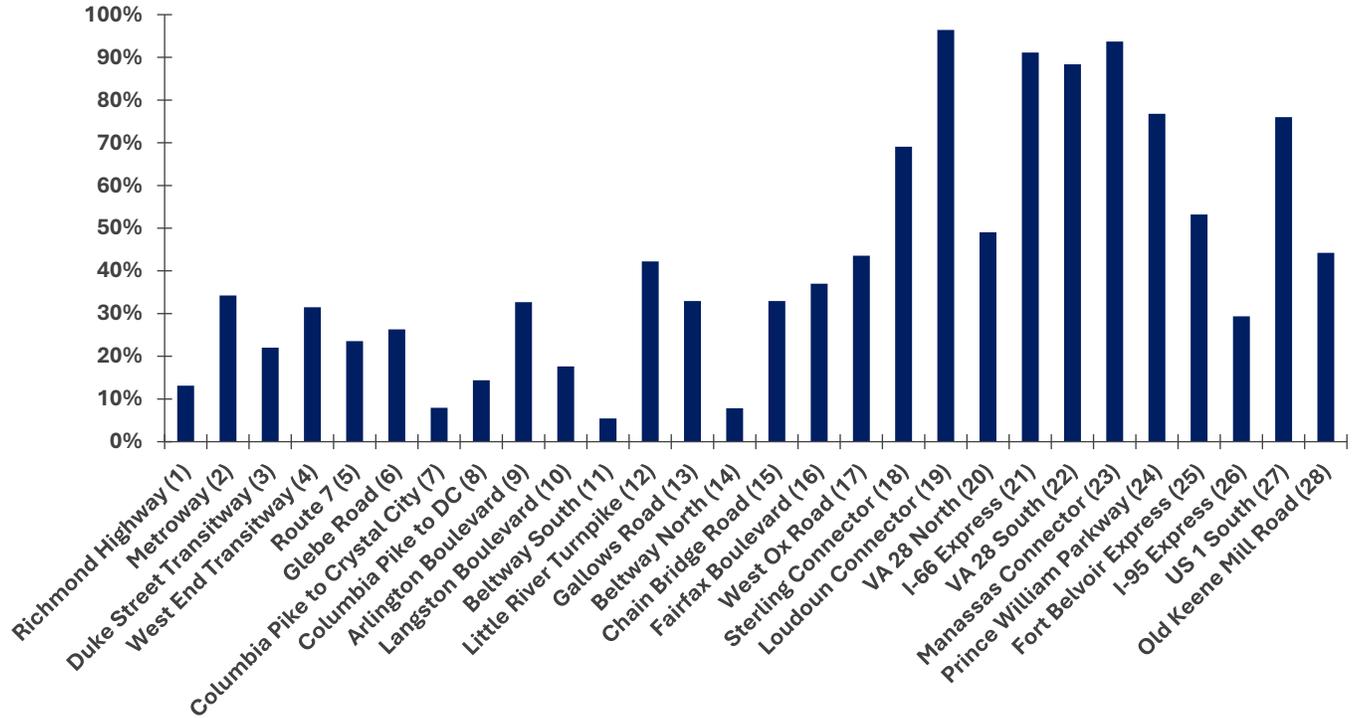


Figure 45 New Transit Trips as a Percentage of Boardings



EEA Mode Shift

Of the 27,000 total daily trips shifted from driving to transit by the BRT system, just over 10,000 or 37% of them are forecast to begin in EEAs. When each route is evaluated separately, mode shift in EEAs is highest for routes that have a high number of new transit trips and primarily serve EEAs. As shown in Figure 46, the Manassas Connector and the Route 7 BRT are forecast to have the highest EEA mode shift, despite the significant disparity in total ridership estimates for these two routes (the Route 7 BRT is forecast to serve more than 18,000 daily boardings, while the Manassas Connector is forecast to serve approximately 2,600). VA 28 South, Richmond Highway, and U.S. 1 South follow as routes that score high on EEA mode shift. Several routes, such as Beltway North, Fort Belvoir Express, and Old Keene Mill Road do not serve EEAs and therefore are not expected to see any EEA mode shift to transit. Figure 47 presents the portion of new transit trips that occur in EEAs for each route. Both the Manassas Connector and U.S. 1 South serve more than 50% new EEA transit trips, further illustrating their potential benefits to improving mobility for residents of EEAs.



Figure 46 2045 EEA Mode Shift

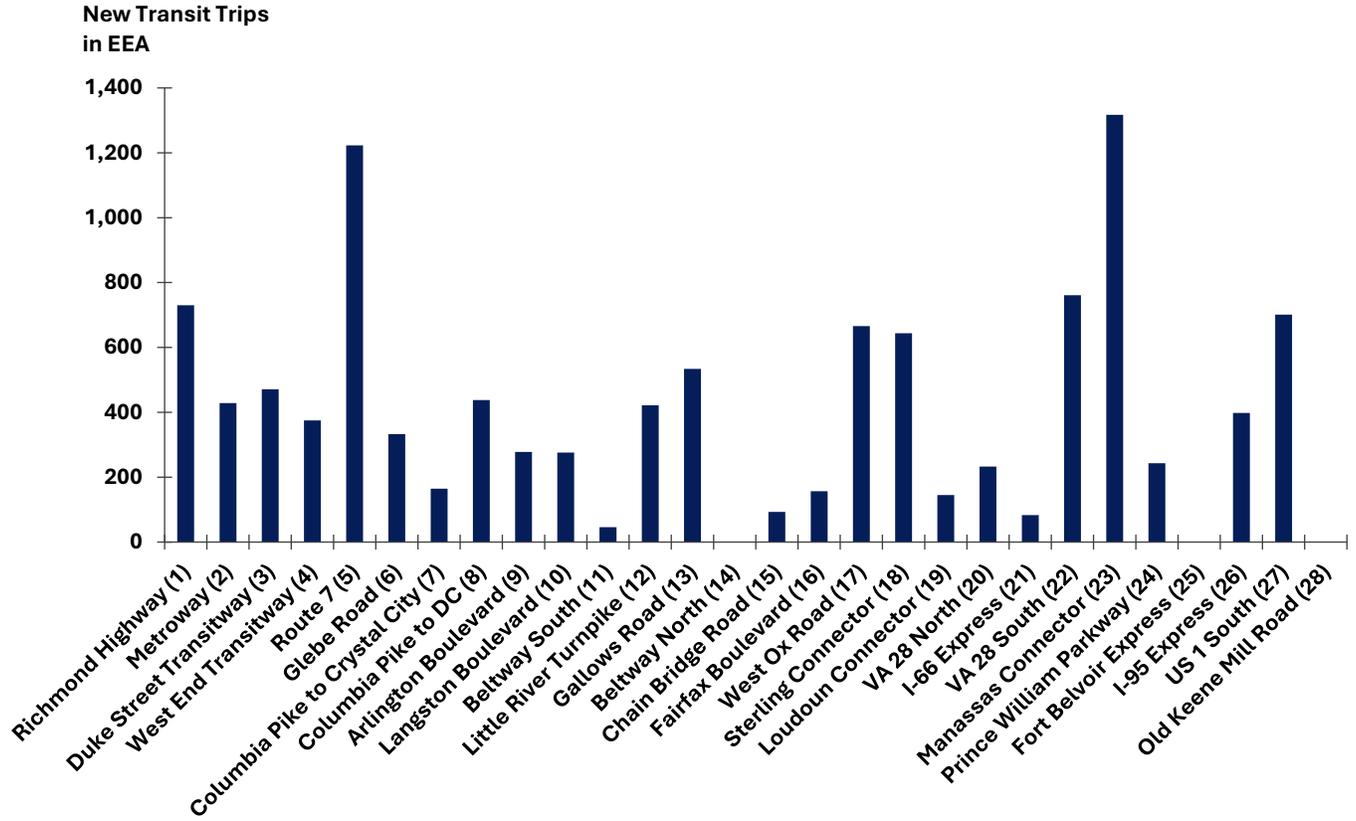
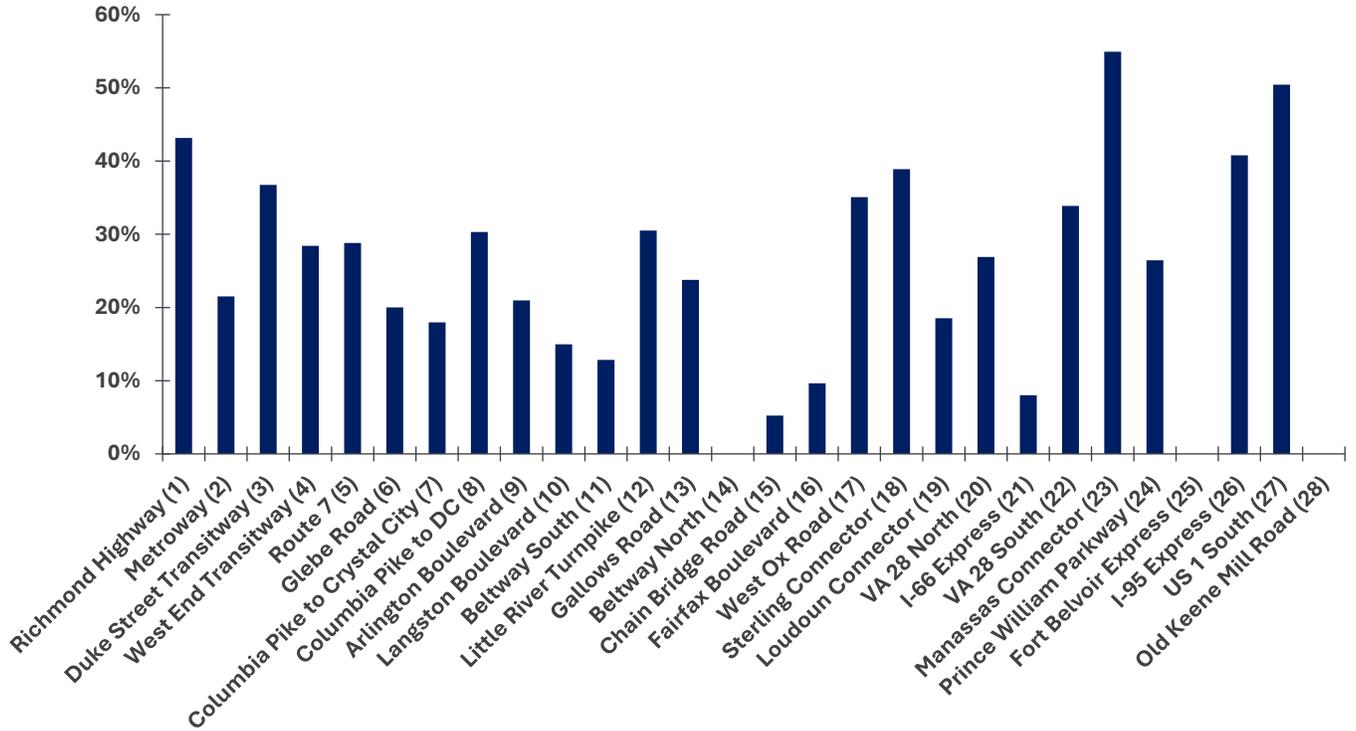


Figure 47 Percentage of New Transit Trips Starting in EEAs

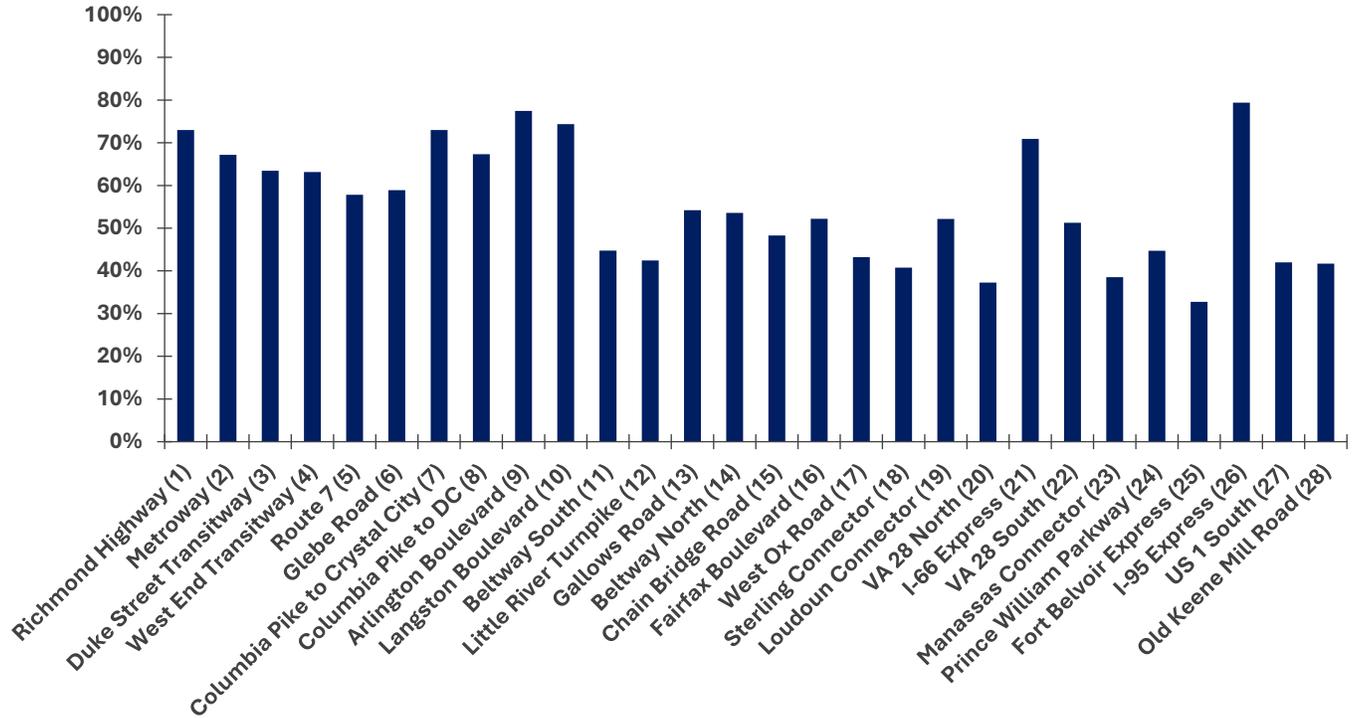


Peak Period Ridership Share

When considering the comprehensive regional BRT system, 61% of BRT boardings are forecast to occur during the morning and evening peak periods. This is generally a good proxy to identify what portion of ridership serves commute trips. Figure 48 highlights the variation in this measure by route. This information has not been used to evaluate the BRT routes, but is provided for informational purposes. This information could be used to fine tune future BRT service plans. Routes with a low portion of ridership during the peak periods are more likely to be used for a range of trip purposes, and may be more resilient to changes in telework and commute patterns than other routes. These routes will want to pay special attention to their off-peak service levels. On the other hand, routes with very high portions of peak period ridership, such as the I-95 Express and Arlington Boulevard routes may want to consider decreasing unused off-peak service to reduce costs.



Figure 48 Portion of BRT Boardings Occurring during Peak Periods



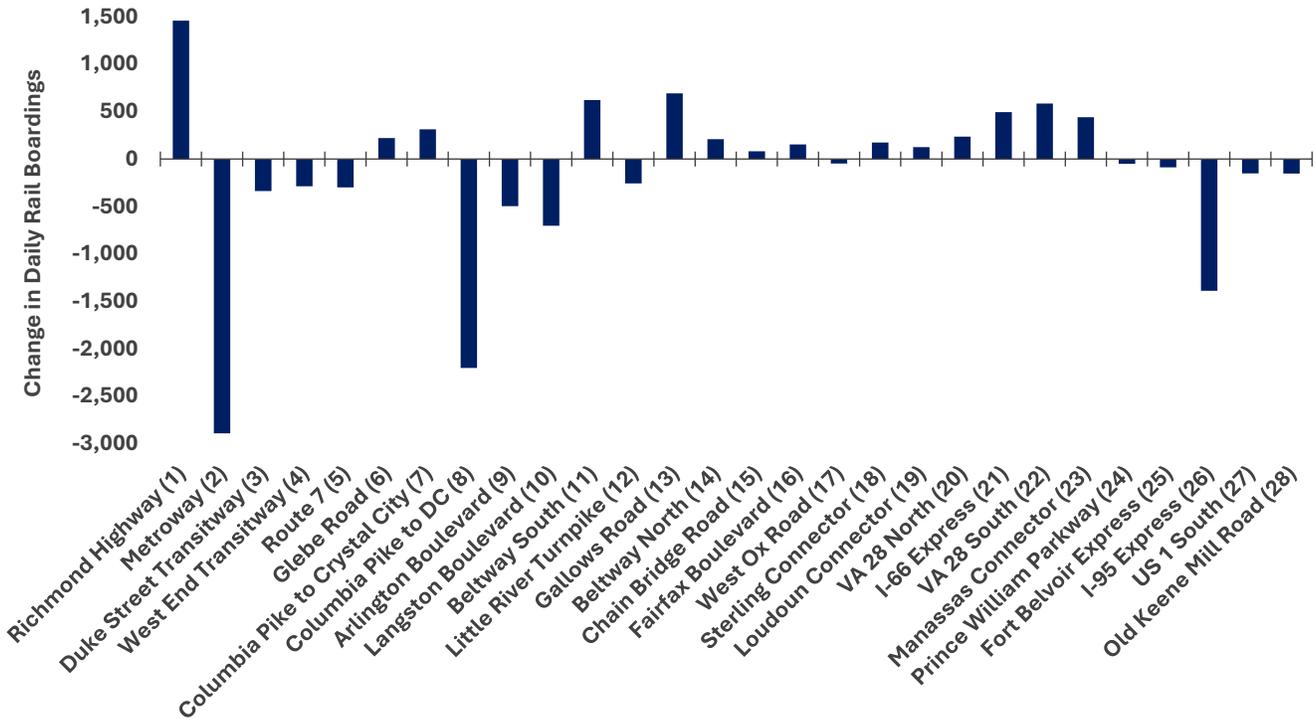
Ridership Impact to Other High Capacity Transit

Implementation of the complete proposed BRT system is forecast to have a small impact on Metrorail and VRE ridership, as some passengers are forecast to shift from rail to the new BRT system. The rail system in Northern Virginia is forecast to see approximately 2,800 fewer daily boardings in 2045 with the BRT system than without it. This could amount to almost 950,000 fewer rail boardings annually. For reference, rail ridership in Northern Virginia is forecast to be around 80 million annually by 2045. This would amount to a decrease of less than 1.2%.

As shown in Figure 49, impacts on rail ridership vary significantly depending on the route being considered. Some routes, such as the Metroway extension and Columbia Pike to DC route, will have a negative impact on rail ridership, as they serve similar markets and would offer a faster and more convenient alternative for some trips. These routes are shown with negative ridership in Figure 49. Other routes, such as Richmond Highway and Gallows Road will have a positive impact on rail ridership, serving as feeders to the rail system and allowing for more connections across the region.



Figure 49 Ridership Impacts to other High-Capacity Transit



4.2.2 Transportation Impacts

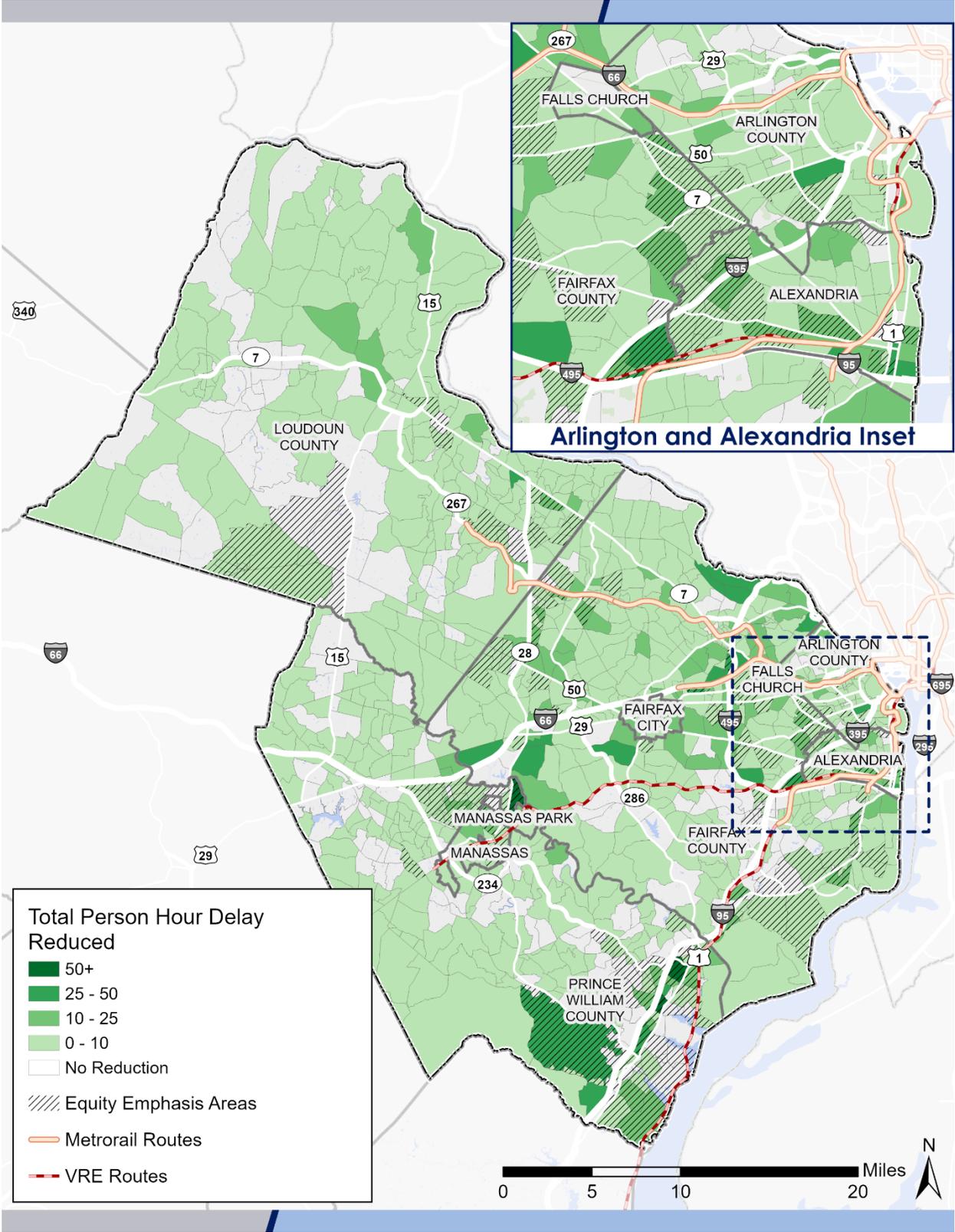
The ridership and mode shift to BRT discussed in the previous section will have significant impacts to the operations of the entire transportation system in Northern Virginia. The measures in the transportation impacts category are designed to capture these impacts, including reductions in congestion and VMT, and improvements to accessibility and safety. Overall, Duke Street Transitway, Route 7, Columbia Pike to Crystal City, Arlington Boulevard, Langston Boulevard, Beltway South, Gallows Road, and Manassas Connector routes scored the highest in the transit impacts category.

Congestion Reduction

The ridership and mode shift to BRT discussed in the previous section is forecast to decrease congestion in Northern Virginia by nearly 12,000 person-hours of delay on an average weekday. This represents a 1.7% decrease in regional congestion in 2045. Figure 50 illustrates the geographic locations of this congestion reduction, shown at the Traffic Analysis Zone (TAZ) level. As shown, some of the areas with the most significant reduction in congestion include the I-95 corridor in Prince William County, the I-66 corridor, and in the Manassas/Manassas Park area.

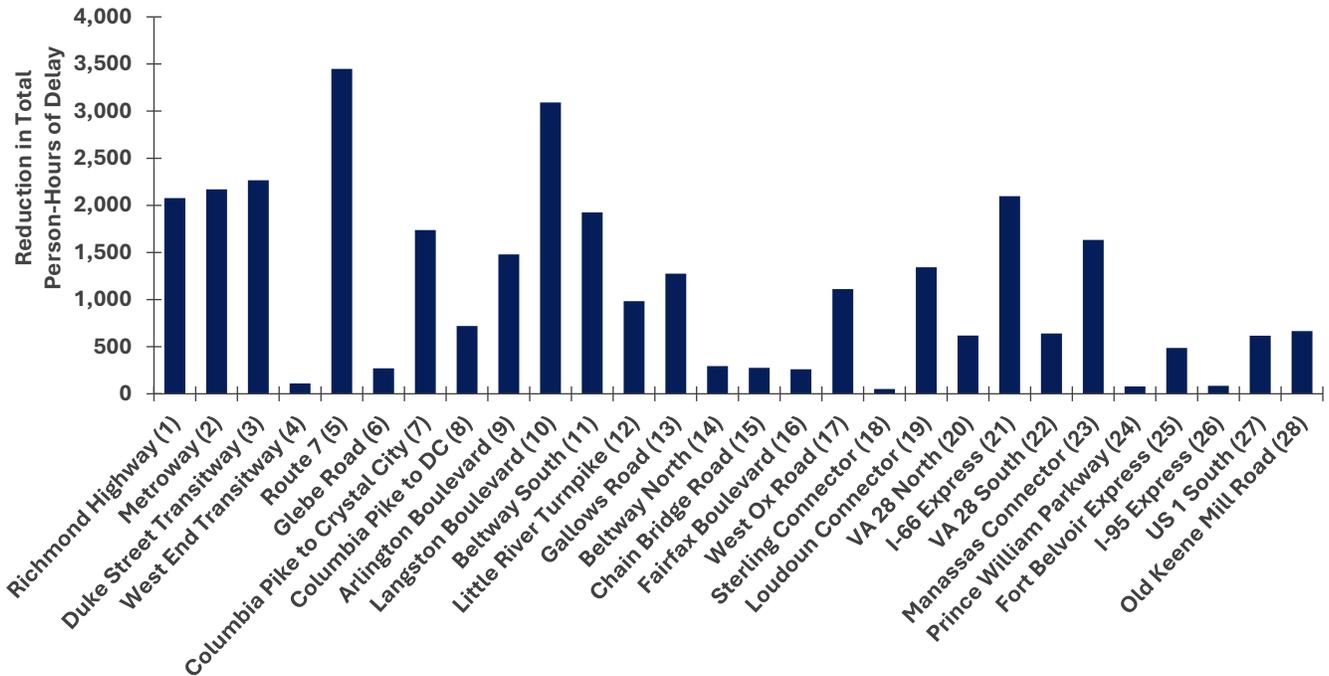


Figure 50 2045 Congestion Reduction caused by the Proposed BRT System



When considered individually, each route contributes to congestion reduction at different scales, as shown in Figure 51. Route 7, Langston Boulevard, Duke Street Transitway, and I-66 Express are expected to reduce congestion the most. For a BRT route to significantly reduce congestion, the route needs to prompt mode shift and have a high level of baseline congestion.

Figure 51 2045 BRT Congestion Reduction

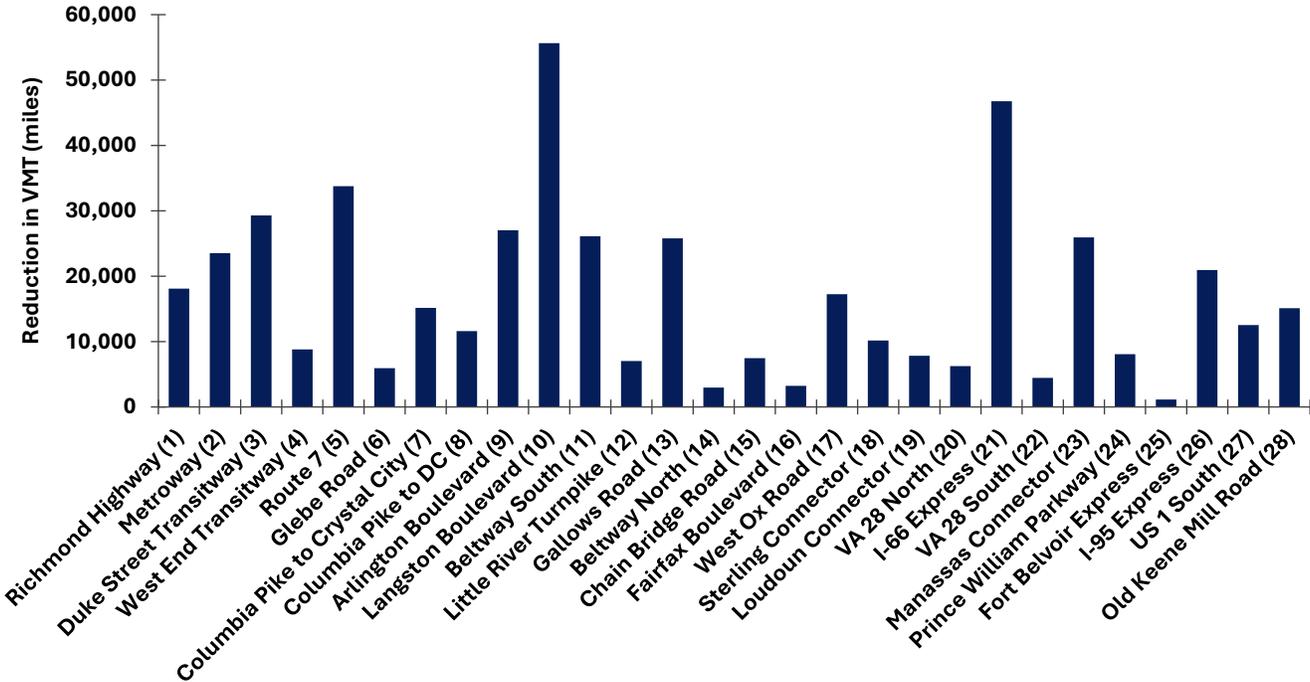


VMT Reduction

The shift in travel mode would be accompanied by a decrease of nearly 138,000 in VMT. This represents a relatively small reduction in regional VMT—approximately 0.2%—but has a larger impact on congestion reduction as noted above. When considered individually, VMT reduction by route is influenced by mode shift and ridership, but also depends on length of trips replaced and the length of the BRT route. Figure 52 shows that Langston Boulevard, I-66 Express, and Route 7 reduce VMT the most. Both Langston Boulevard and the I-66 Express routes have significant impacts on VMT reduction despite not having the highest mode shift results, indicating that they are shifting longer trips than some of the other routes.



Figure 52 2045 BRT VMT Reduction

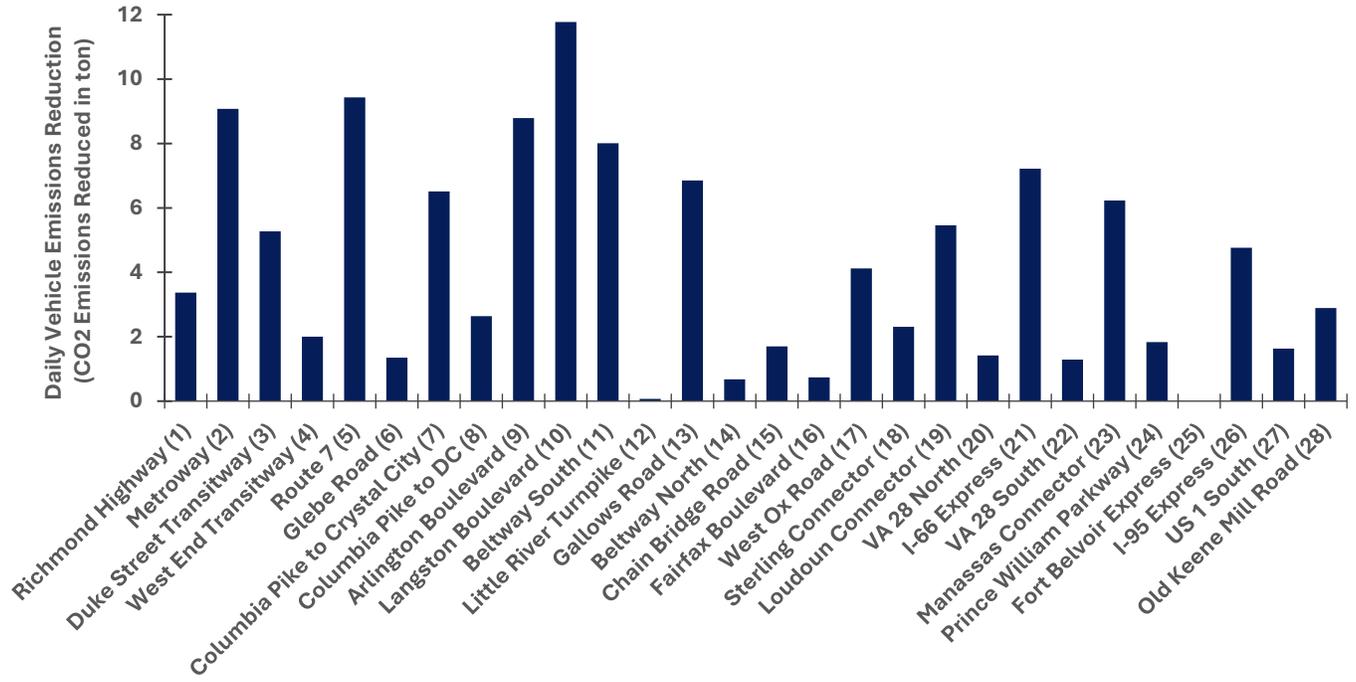


Vehicle Emissions Reduction

Reductions in VMT would be accompanied by reductions in vehicle emissions, and the complete BRT system is forecast to reduce CO2 emissions by 23.3 tons on an average day. Figure 53 shows the levels of vehicle emissions reduction for each BRT route when considered individually. Langston Boulevard, Route 7, and Metroway are expected to result in the highest levels of emissions reduction. The Columbia Pike to Crystal City and Loudoun Connector routes both have significantly higher reductions in emissions than routes with similar levels of VMT reduction.



Figure 53 2045 Daily BRT Vehicle Emissions Reduction

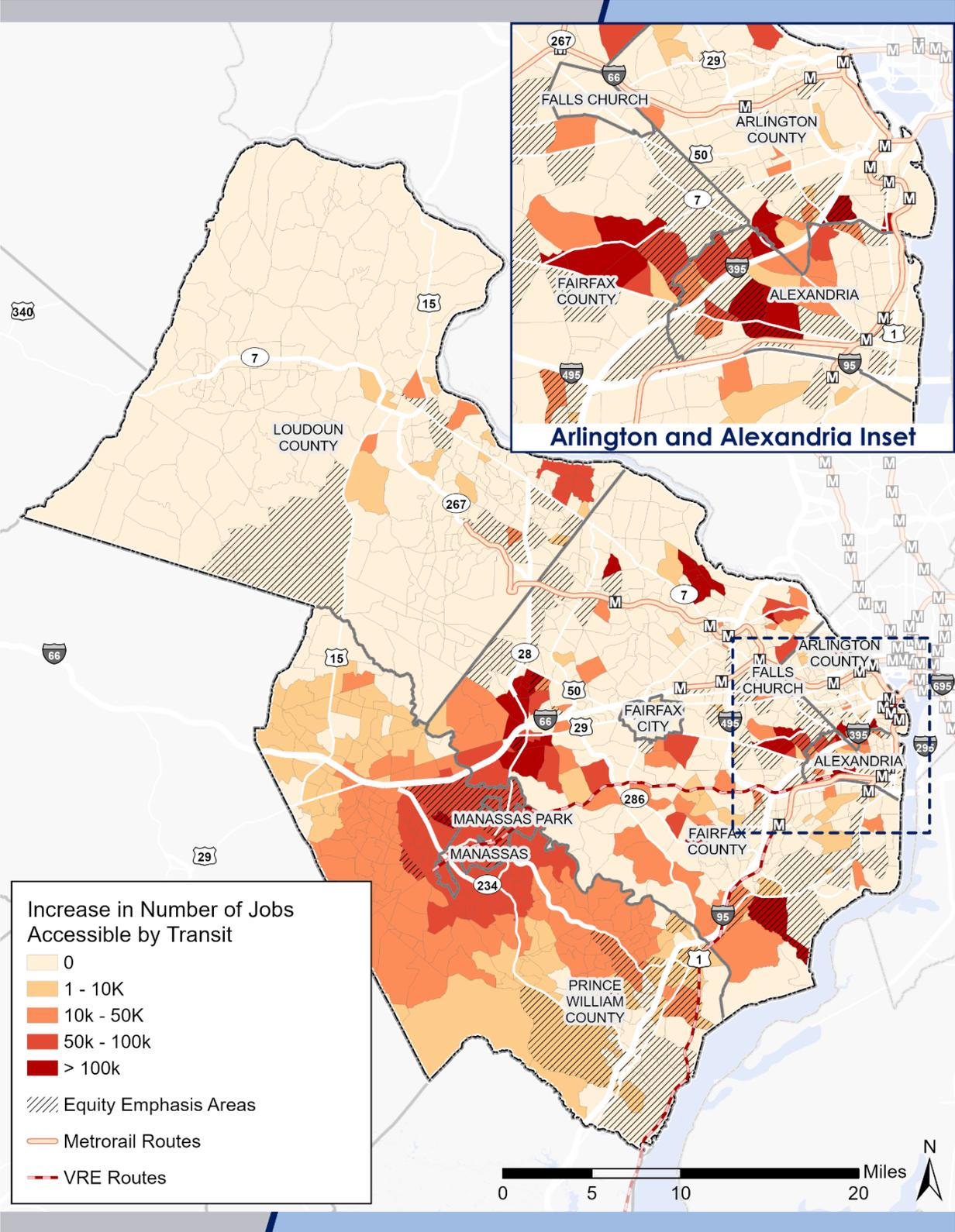


Transit Accessibility Improvement

The proposed BRT system will allow the average resident of Northern Virginia to access 17,400 additional jobs within 60 minutes on transit, an increase of approximately 2.4%. As shown in Figure 54, the BRT system has the biggest impact on accessibility by transit in locations where high-quality transit does not currently exist including large portions of Prince William County. Inside the Beltway, significant improvements are also seen along I-395 and Little River Turnpike.

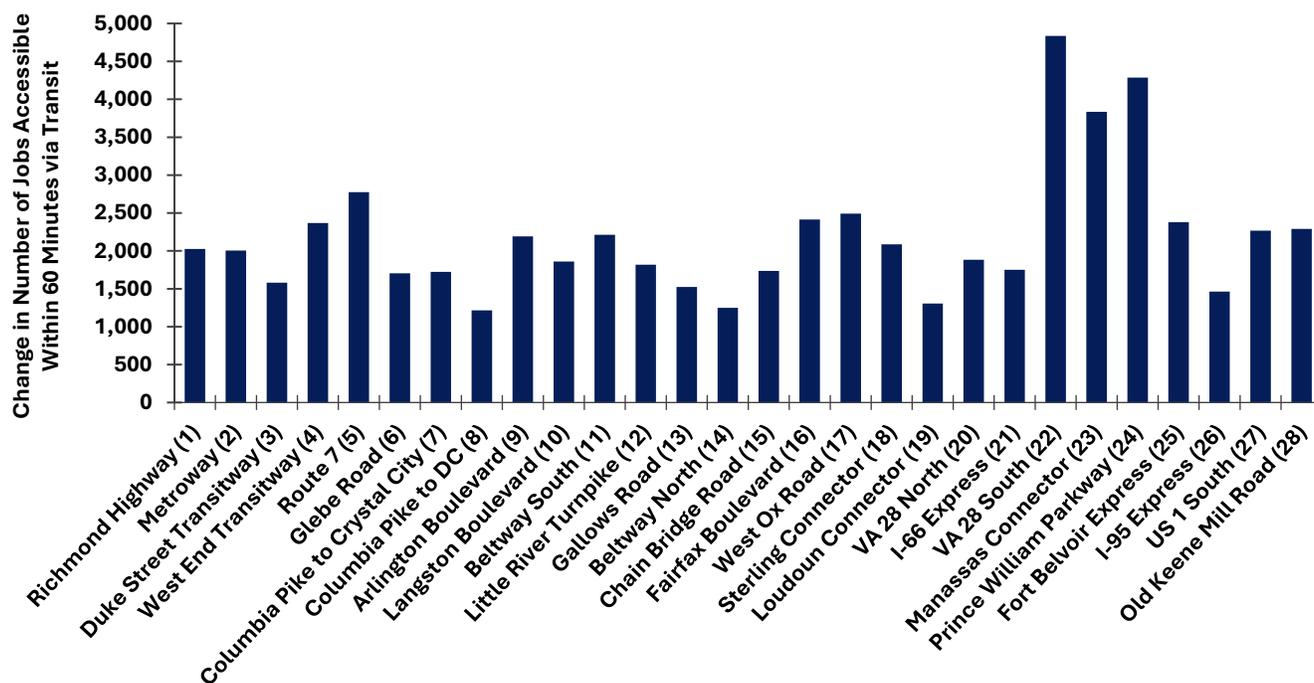


Figure 54 Improvements in Jobs Accessible by Transit



When considered as separate routes, the biggest improvements in average accessibility to jobs occur with the implementation of routes that provide BRT service in and around the Manassas and Manassas Park areas. Figure 55 indicates this is the case for the VA 28 South, Manassas Connector, and Prince William Parkway routes. Routes with the lowest levels of improvement, such as Columbia Pike to DC, currently have several high-quality transit options, and the addition of BRT does not open up significant new markets to residents.

Figure 55 2045 BRT Transit Accessibility Improvement



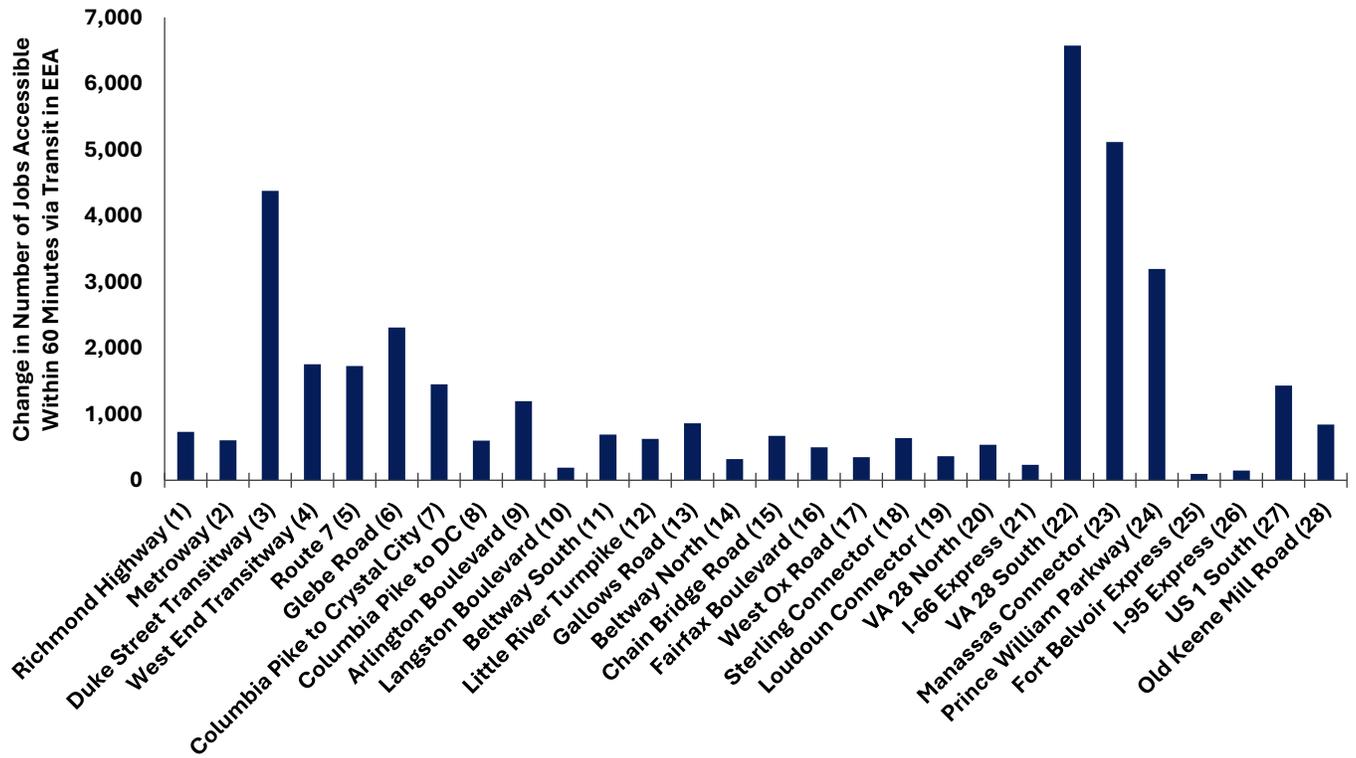
EEA Transit Accessibility Improvement

The proposed BRT system will allow the average resident of an EEA in Northern Virginia to access 23,300 additional jobs within 60 minutes on transit, an increase of more than 3%. This is 34% higher than for the region as a whole, indicating that the BRT system provides more accessibility improvements to EEA residents, helping to improve equity across the region.

When considered individually, the three routes with the highest transit accessibility improvement also show the highest EEA transit accessibility improvement (Figure 56), indicating these routes (VA 28 South, Manassas Connector, and Prince William Parkway) do not currently have high-quality transit and serve many EEAs.



Figure 56 2045 EEA Transit Accessibility Improvement

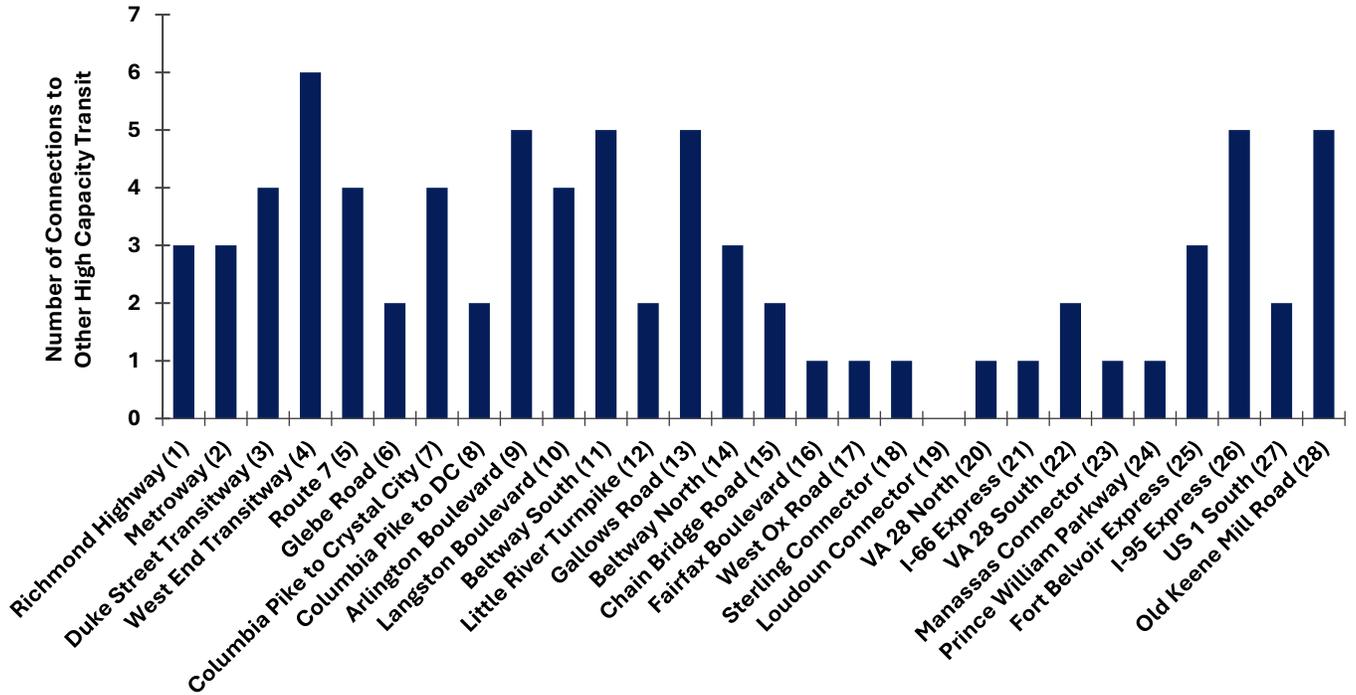


Connections to Other High-Capacity Transit

The proposed BRT system was designed to be a fully integrated system that connects to other high-capacity transit across the region. As such, many routes have multiple connections to Metrorail, VRE, and/or the five BRT corridors that have already been funded by NVTA. As shown in Figure 57, the West End Transitway route has six connections with other high capacity transit lines, with the Arlington Boulevard, Beltway South, Gallows Road, I-95 Express, and Old Keene Mill Road routes connecting to five other high capacity transit routes. As the route furthest west, Loudoun Connector does not connect to any other high capacity transit.



Figure 57 2045 BRT Connections to Other High Capacity Transit



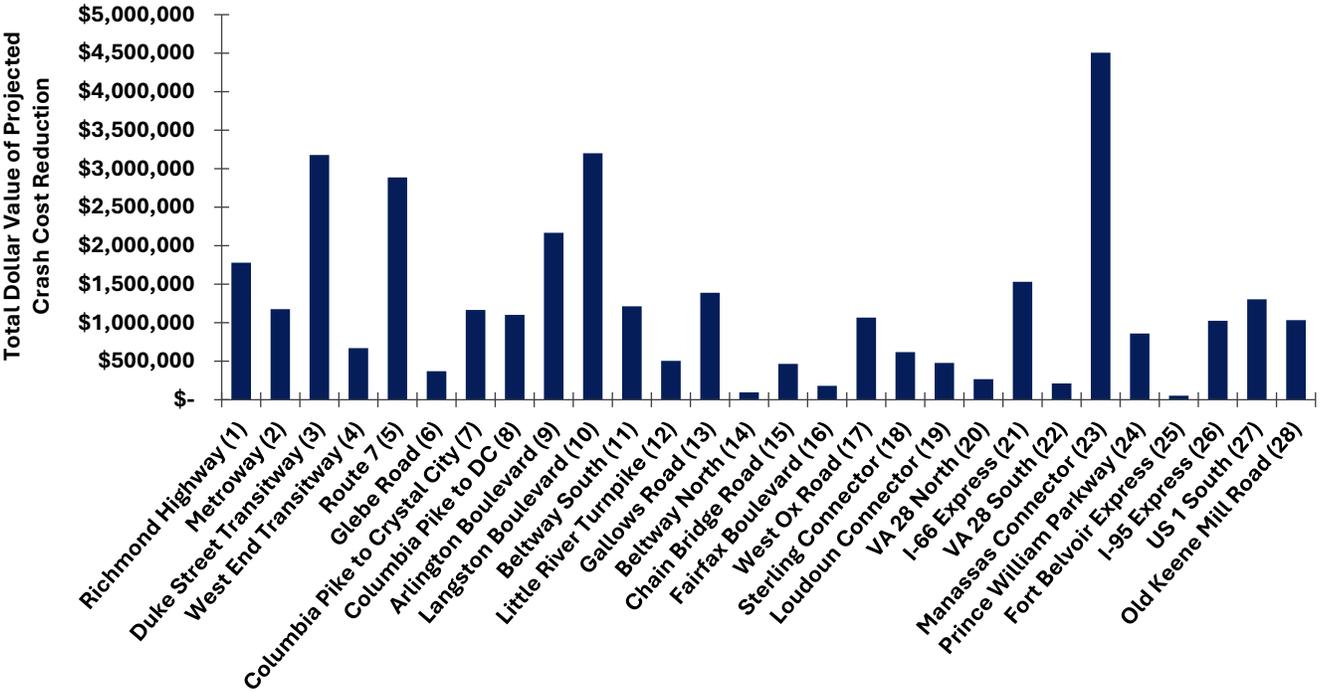
Safety

With the implementation of the proposed BRT system, Northern Virginia could save almost \$10 million annually on damages/injuries from crashes that would be avoided as drivers switch modes to transit. Evaluating each BRT route separately illustrates that the savings associated with each route is related to the amount of VMT removed and the severity/frequency of existing crashes. Figure 58 shows the Manassas Connector with the highest level of cost savings due to avoided crashes. This is because the Manassas Connector has the highest current crash rate of any of the BRT corridors, resulting in the highest potential for improvement. Langston Boulevard, Duke Street Transitway, and Route 7 show high levels of safety improvements as well.

It should be noted that the total crash savings for the sum of the individual routes is significantly higher than the savings when the system is evaluated as a whole. This is due to the fact that summing the route-level analysis may double count crashes that occur in close proximity to multiple routes; the system-level analysis avoids this issue.



Figure 58 2045 BRT Safety

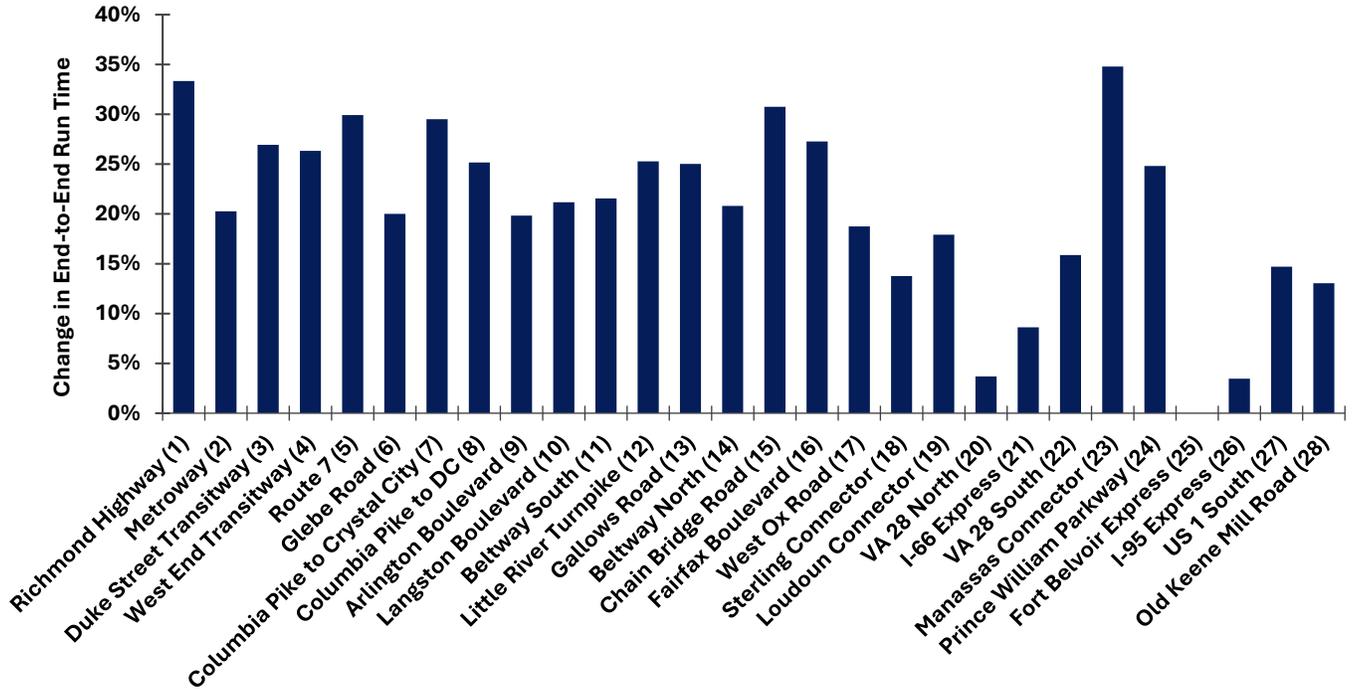


Run Time Improvement

As compared to existing bus service, BRT improves transit travel times by more than 15% for most BRT routes. This is in part due to dedicated running way and other bus priority treatments, and partially due to the addition of new point to point routes that do not require transfers. Run times improved the most for Manassas Connector (35%) and Richmond Highway (33%), as seen in Figure 59.



Figure 59 2045 BRT Run Time Improvement



4.2.3 Land Use

Future Land Use Density

Density around BRT stops is one of the primary factors of determining ridership. On average, the proposed BRT system is forecast to have an average activity density of approximately 15,200 jobs and residents per square mile. This density is spread around the region as shown in Figure 60.



Figure 60 2045 Activity Density

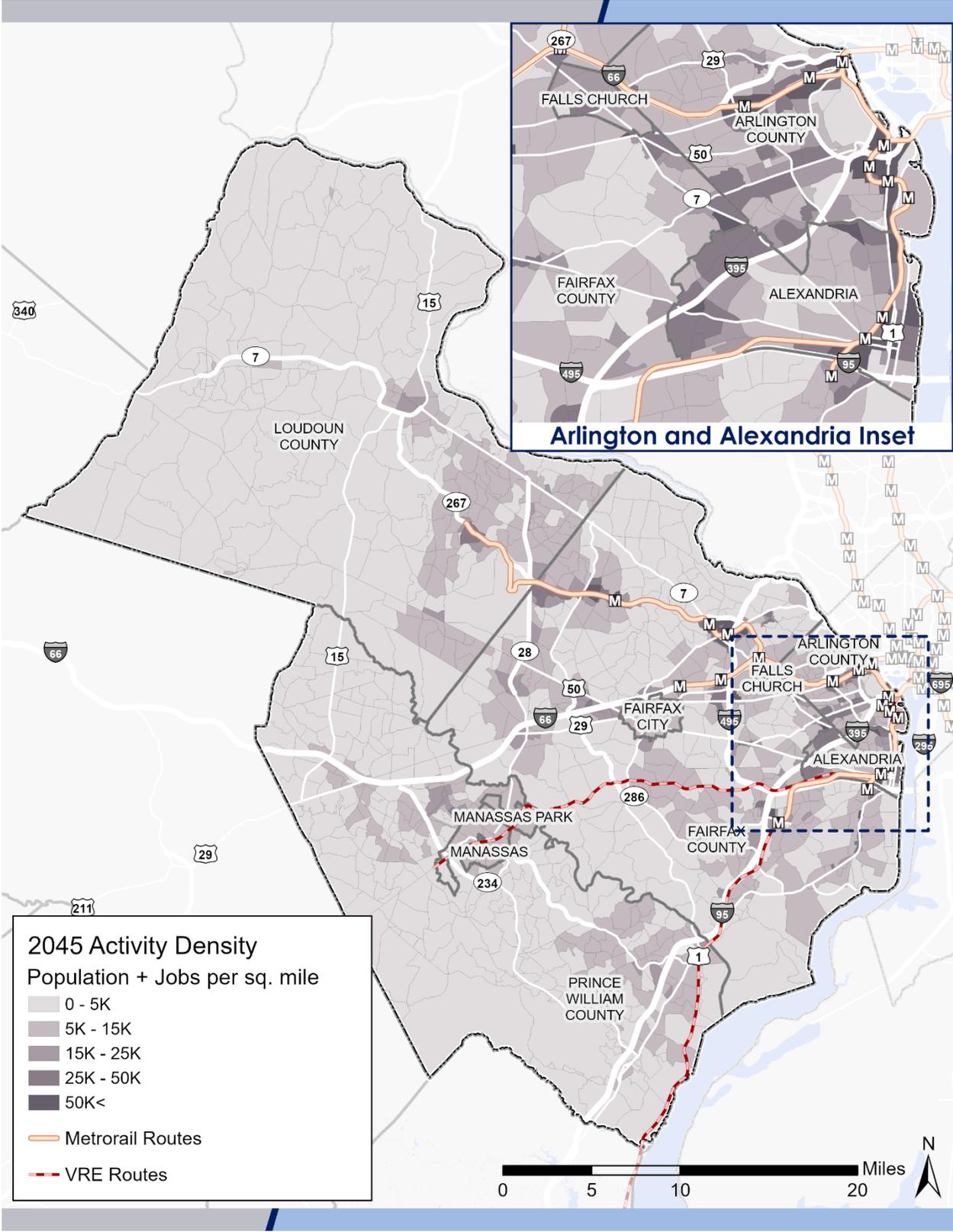
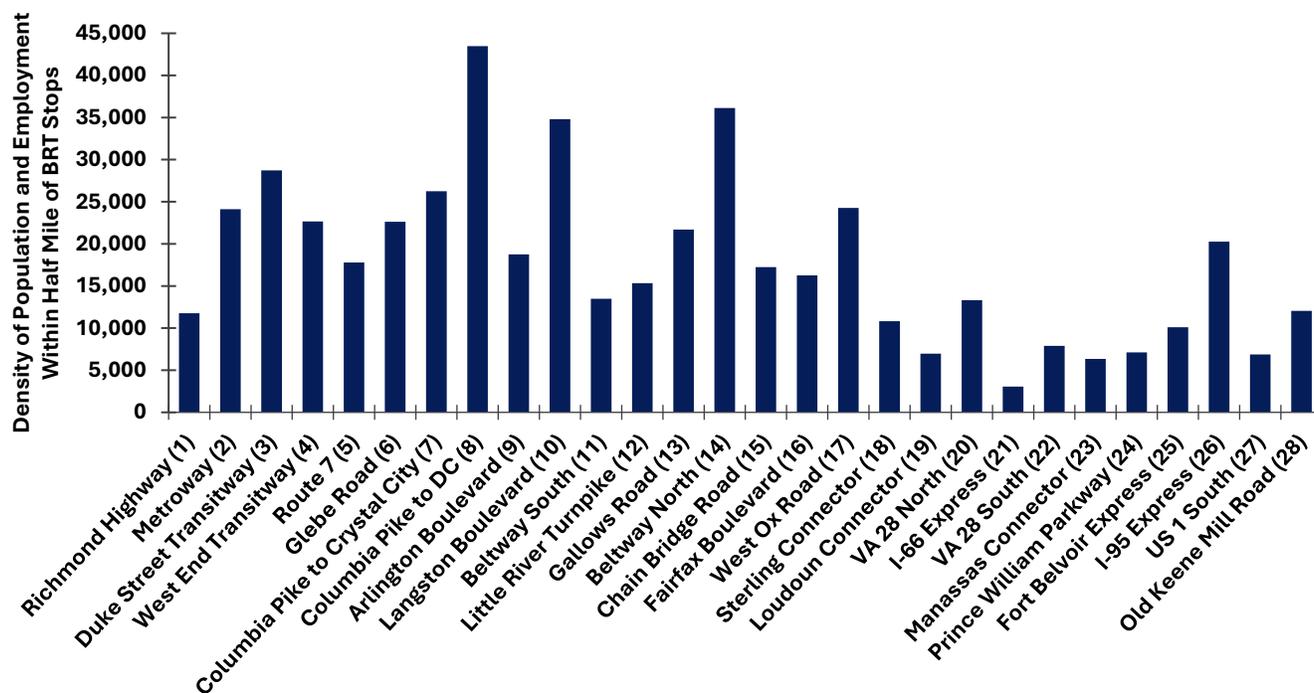


Figure 61 shows the average density of residents and jobs in 2045 within a half-mile of proposed stops for each route. Those densities range from 3,000 (I-66 Express) to over 43,000 (Columbia Pike to DC). The Columbia Pike to DC route includes some of the density of downtown DC, which contributes to its high results.

Figure 61 2045 Future Land Use Density by Route

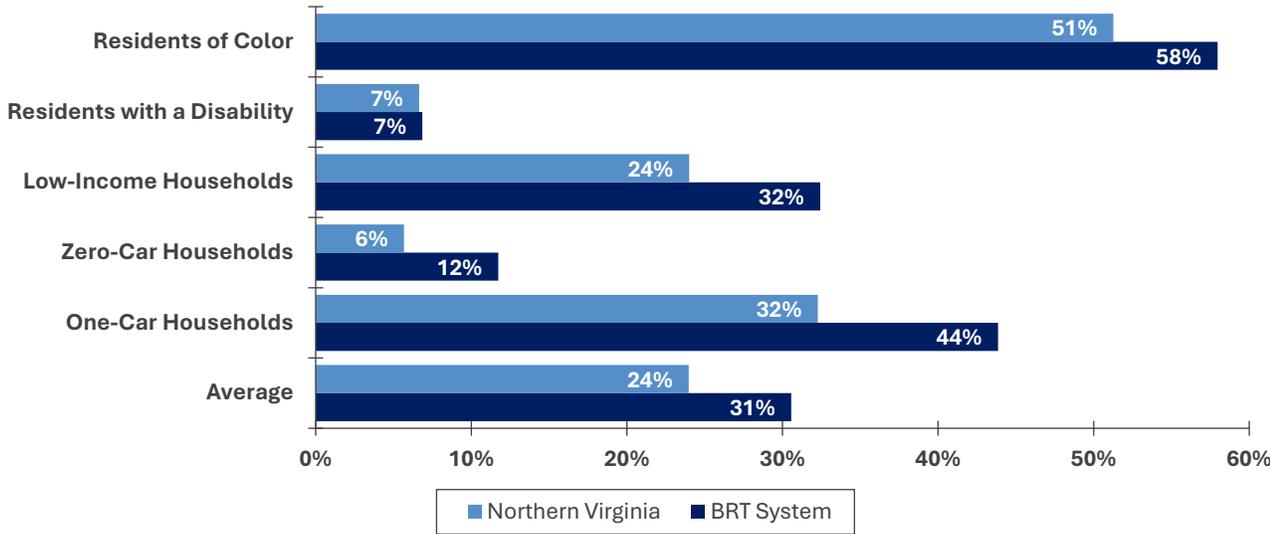


Socioeconomic Characteristics

The proposed BRT system would serve a large number of residents who reflect a variety of socioeconomic groups, including residents of color, residents with a disability, low-income households, zero-car households, and one-car households. Since socioeconomic characteristics are only available for existing conditions, the analysis is based on 2022 data from the American Community Survey (ACS). As shown in Figure 62, more than half of the residents served by the BRT system are people of color, while only 51% of residents of Northern Virginia are people of color. While 24% of Northern Virginia households are low-income, 32% of the households served by the proposed BRT system are low-income households. For purposes of evaluation, an average of these five percentages (residents of color, residents with a disability, low-income households, zero-car households, and one-car households) was calculated to be 31% for the proposed BRT system. In all key socioeconomic groups being considered, the BRT system serves higher proportions than exist in the region as a whole.

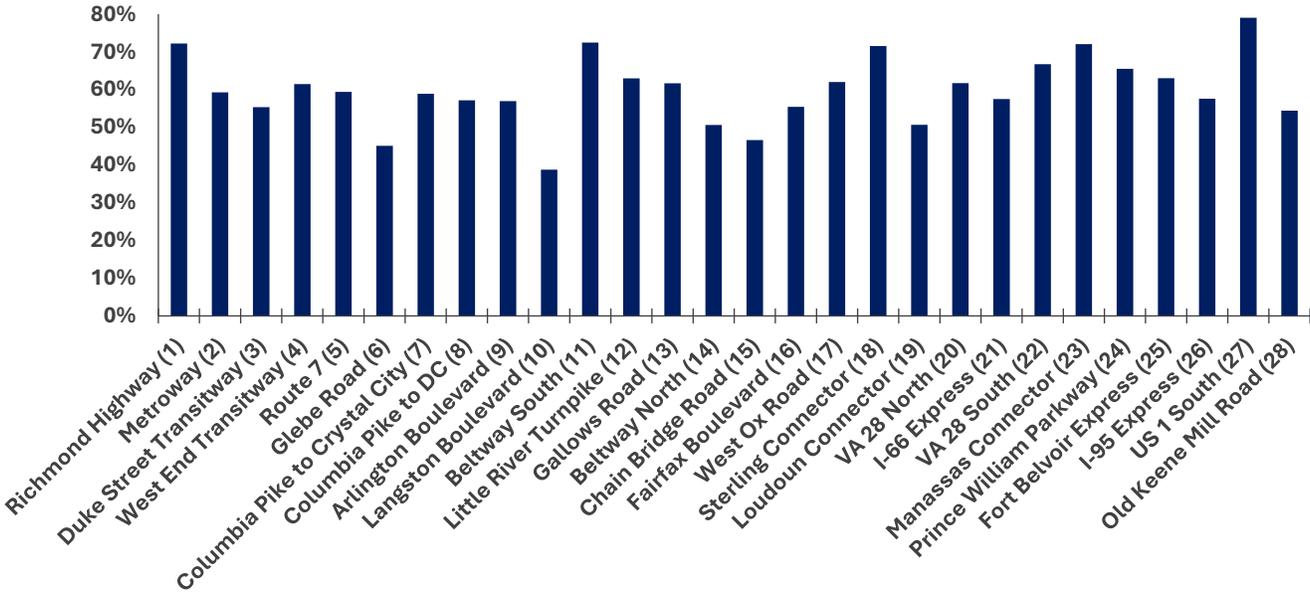


Figure 62 Percentage of Residents in Key Socioeconomic Groups—BRT System



Each of the routes serves more than 35% residents of color, with some routes serving more than 70% residents of color. As shown in Figure 63, the U.S. 1 South route provides service to communities that are 79% residents of color.

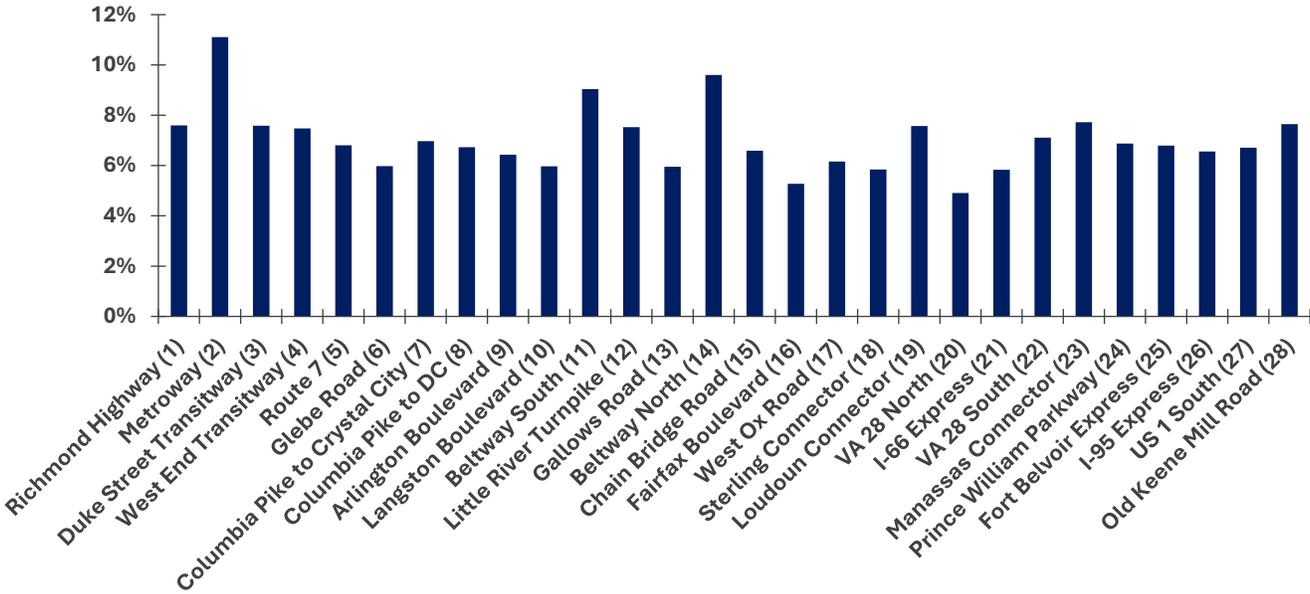
Figure 63 Percentage Residents of Color by BRT Route



As shown in Figure 64, the percentage of residents with a disability within one-half mile of a stop ranges from 5% (VA 28 North) to 11% (Metroway).

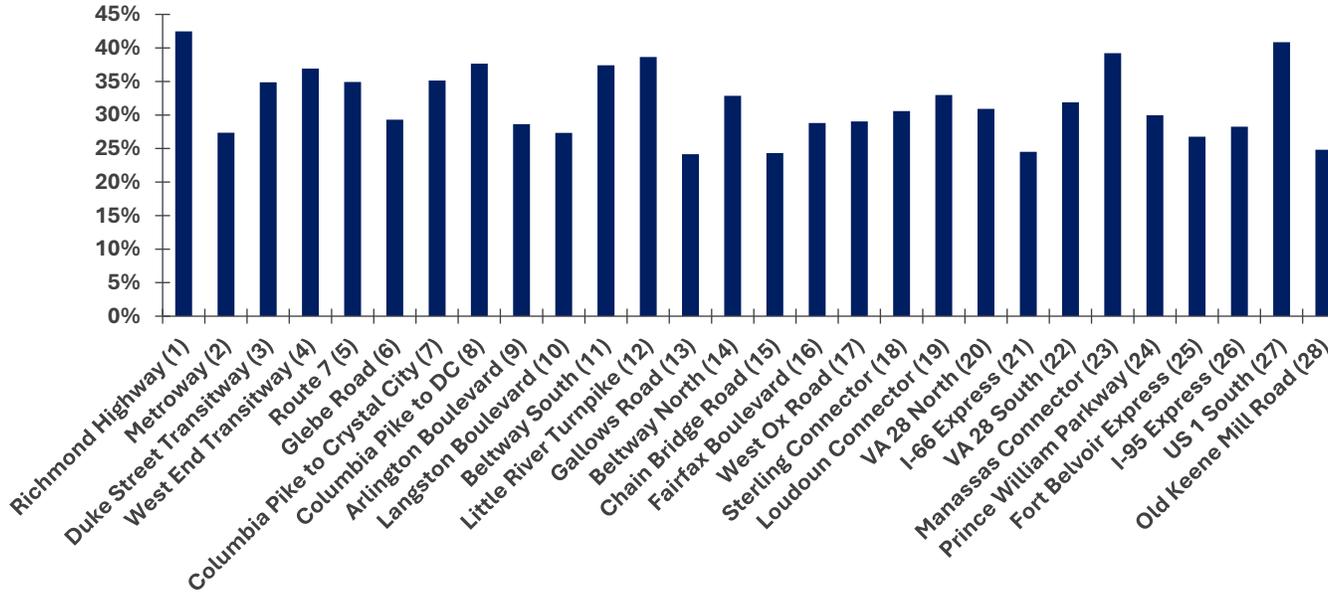


Figure 64 Percentage Residents with a Disability by BRT Route



As illustrated in Figure 65, low-income households range from more than 40% on the Richmond Highway and U.S. 1 South routes, to less than 25% along the Chain Bridge Road, Gallows Road, and I-66 Express routes.

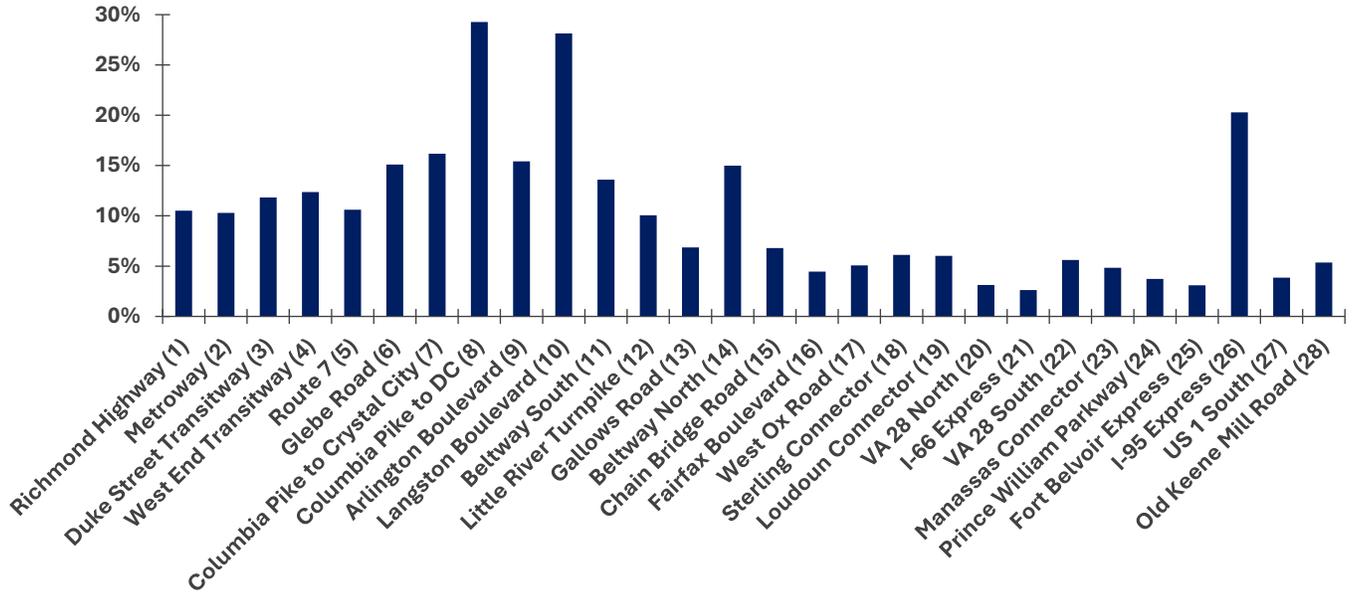
Figure 65 Percentage Low-Income Households by BRT Route



The portion of households without cars served by a BRT route ranges from less than 3% (I-66 Express) to 29% (Columbia Pike to DC). As shown in Figure 66, routes in the more urbanized jurisdictions tend to have a higher percentage of zero-car households, as many of these households rely on transit for most of their mobility needs.



Figure 66 Percentage Zero-Car Households by BRT Route



A much larger portion of households own a single vehicle across the region, ranging from 28% along the Prince William Parkway route, to 56% along the Metroway, Beltway North, and I-95 Express (Figure 67).

Figure 67 Percentage One-Car Households by BRT Route

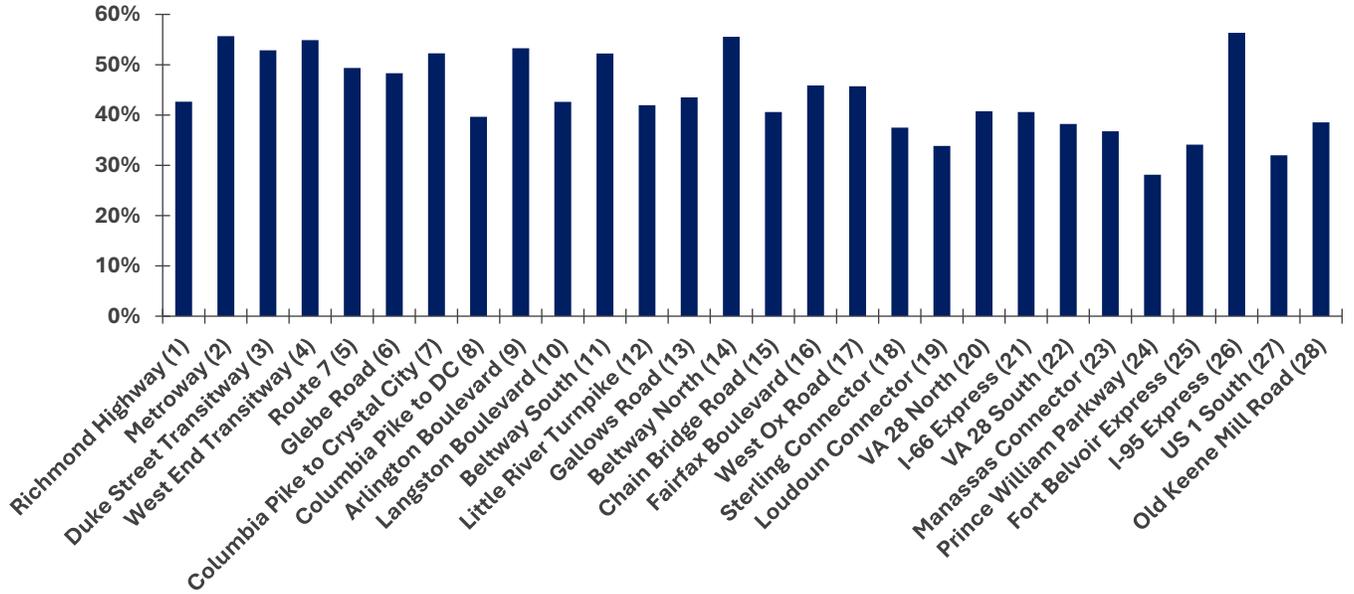
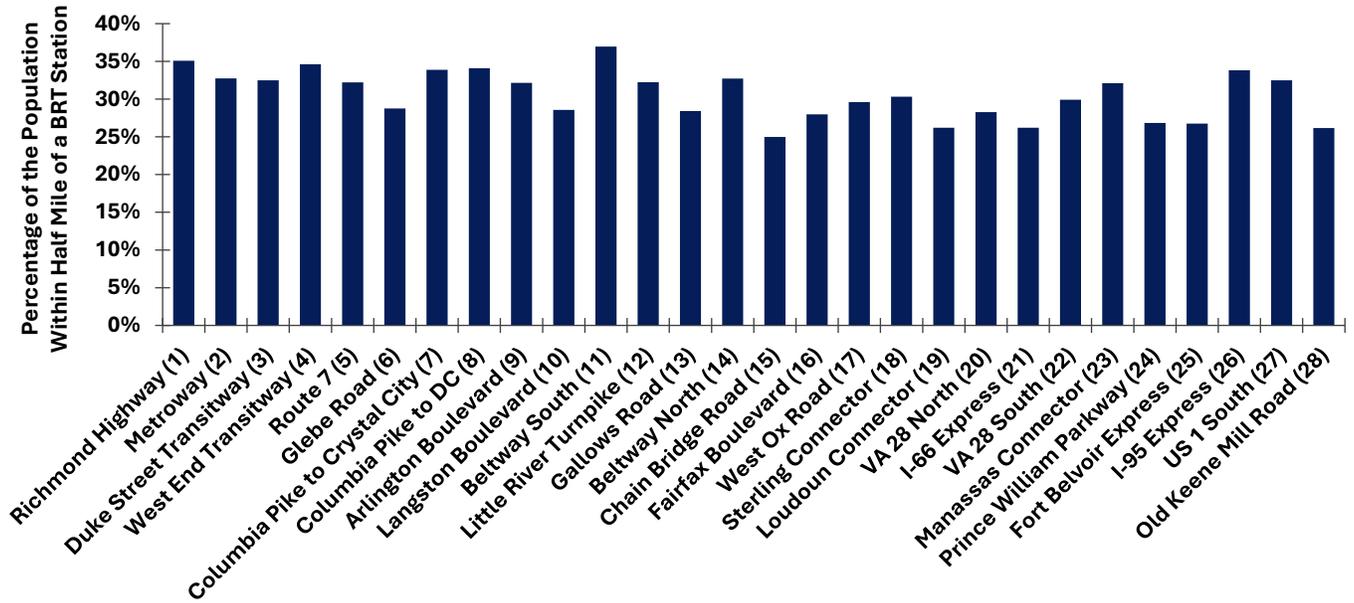


Figure 68 shows the average percentage of the population within one-half mile of BRT stations that are in these five key socioeconomic groups. These averages range from 25% on the Chain Bridge Road route to more than 35% on the Beltway South, West End Transitway, and Richmond Highway routes.



Figure 68 Average Percentage in Key Socioeconomic Groups by Route



4.2.4 Readiness

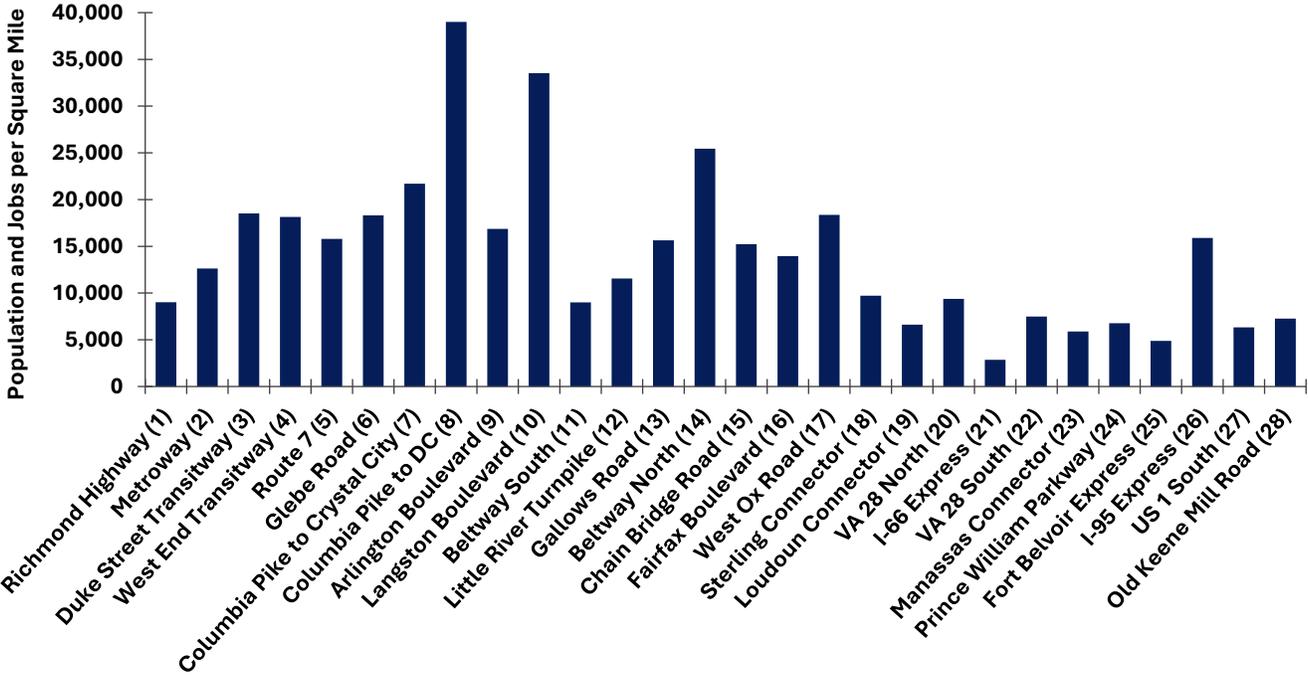
The readiness category encompasses existing land use density, availability of active transportation infrastructure, and transit supportive policy metrics. Routes in the urban core tend to perform well in the readiness category, as they have dense existing land use and higher quality walking and bicycling infrastructure.

Existing Land Use Density

The proposed BRT system has an average density of almost 13,200 jobs and residents per square mile within a half-mile of proposed stops. Densities vary considerably by route, as shown in Figure 69. The two routes with the highest current density—Columbia Pike to DC and Langston Boulevard—both serve downtown DC and therefore, incorporate some of the extremely high density found there. Routes with higher densities tend to be in the inner jurisdictions, although some of the routes that operate mostly as Express BRT (like the I-95 Express route) achieve higher densities by only stopping at the densest points along a given corridor.



Figure 69 Existing Jobs and Population per Square Mile by Route

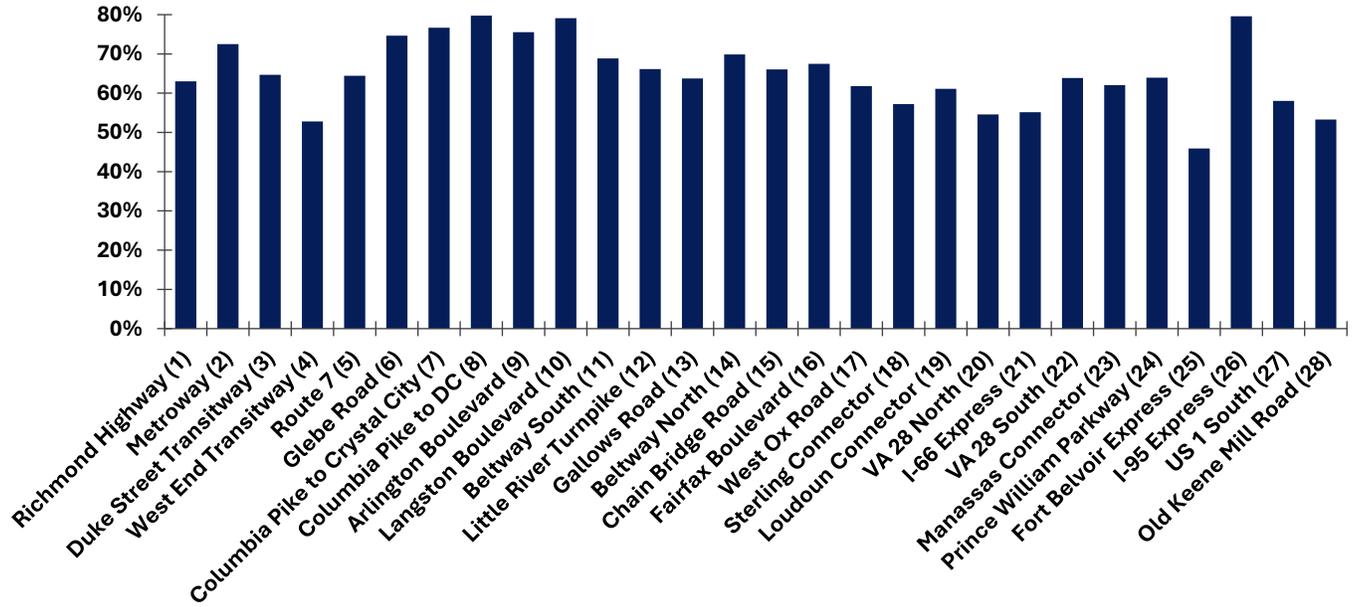


Walking Infrastructure Availability

The densest and most comprehensive network of pedestrian infrastructure around proposed BRT stops is available near routes in the inner jurisdictions. As shown in Figure 70, many of the routes in these jurisdictions have Walking Infrastructure scores of more than 70%. Interestingly, the I-95 Express route which serves the outer jurisdictions as well has one of the highest scores. The is achieved by only serving existing activity centers along the corridor that are already built out.



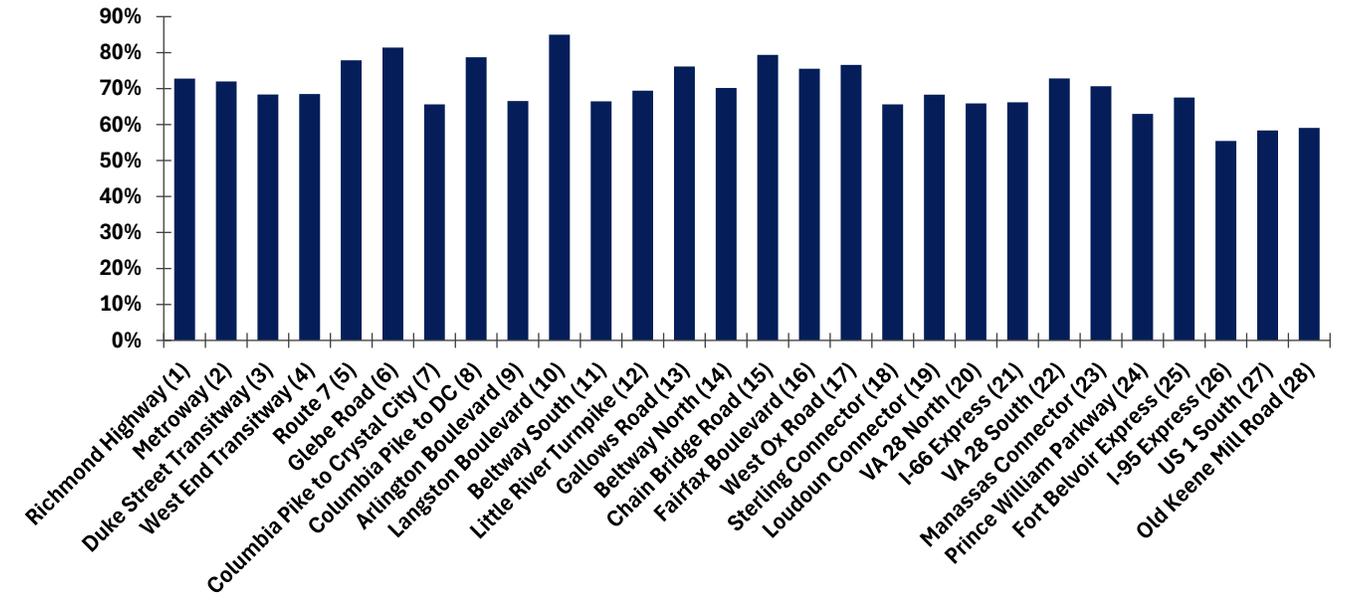
Figure 70 Walking Infrastructure Availability by Route



Bicycle Infrastructure Availability

As shown in Figure 71, bicycle infrastructure availability around BRT stations is also highest in the urban core. The Langston Boulevard and Glebe Road routes have the most available bicycle infrastructure around BRT stations, with scores over 90%.

Figure 71 2045 BRT Bicycle Infrastructure Availability

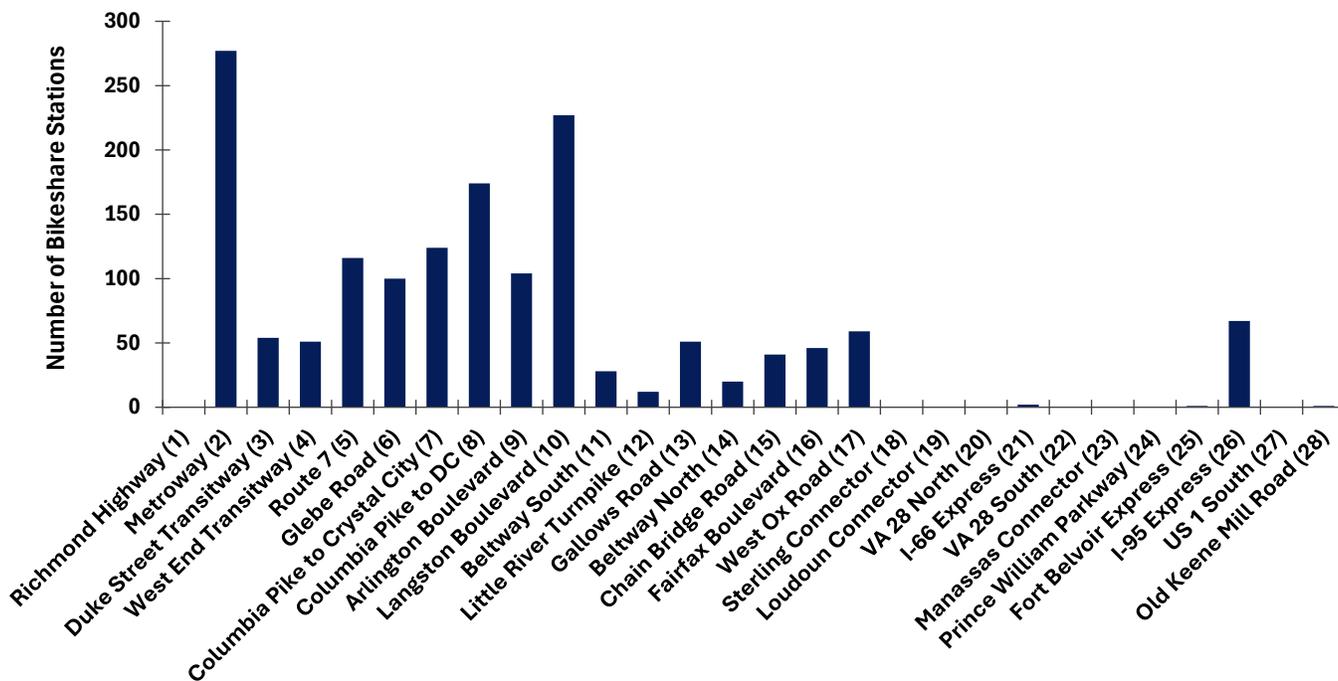


Bikeshare stations are not available within one-half mile of all BRT stations, as the Capital Bikeshare program does not currently serve the entire Northern Virginia region. Bikeshare stations are most likely located inside the Beltway, with



stations in only a few select communities in Fairfax County outside the Beltway. There are currently no bikeshare stations in Loudoun County, Prince William County, Manassas or Manassas Park. Metroway, Langston Boulevard, and Columbia Pike to DC each have over 150 bikeshare stations within one-half mile of their stations (Figure 72).

Figure 72 Bikeshare Stations within One-Half Mile of BRT Stops by Route



Transit Supportive Policies

After a review of NVTAs jurisdictions’ zoning policies, each route was given a score of High, Medium, and Low based on how much of the adjacent land use is governed by transit-supportive zoning policies, such as permitting mixed land uses and higher density development. The scores by route are shown in Figure 73. Corridors with less transit-supportive policies may need to consider policy changes before they will be ready for implementation.



Figure 73 Transit Supportive Policy Score by Route

| High (>50% supportive) | Medium (25-50% supportive) | Low (<25% supportive) |
|--|--|---|
| <ul style="list-style-type: none"> •Metroway (2) •Duke Street Transitway (3) •West End Transitway (4) •Columbia Pike to Crystal City (7) | <ul style="list-style-type: none"> •Richmond Highway (1) •Route 7 (5) •Glebe Road (6) •Columbia Pike to DC (8) •Arlington Boulevard (9) •Langston Boulevard (10) •Beltway South (11) •Little River Turnpike (12) •Gallows Road (13) •Beltway North (14) •Chain Bridge Road (15) •Fairfax Boulevard (16) •West Ox Road (17) •Loudoun Connector (19) •VA 28 North (20) •VA 28 South (22) | <ul style="list-style-type: none"> •Sterling Connector (18) •I-66 Express (21) •Manassas Connector (23) •Prince William Parkway (24) •Fort Belvoir Express (25) •I-95 Express (26) •US 1 South (27) •Old Keene Mill Road (28) |

4.2.5 Costs

Capital Cost Estimate

Implementing a complete, regional BRT system at this visionary scale will require significant investment to build new infrastructure, acquire new vehicles, and operate the service. Construction of the complete system is estimated to cost approximately \$4.2 billion (in 2024 dollars), which includes:

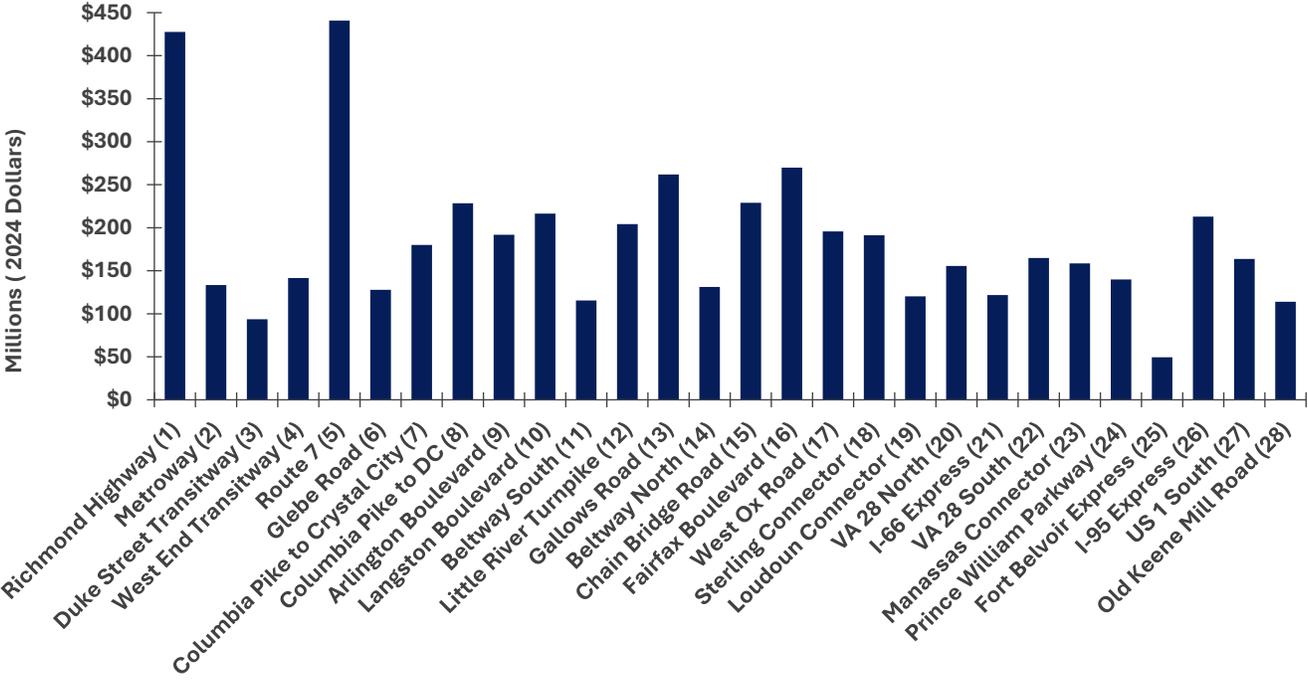
- ◆ More than 170 miles of dedicated bus lanes
- ◆ Upgrades/new constructions of more than 270 stops
- ◆ 550 vehicles (see Section 4.2.9)
- ◆ Two new park-and-ride lots
- ◆ Signal and design improvements to hundreds of intersections to allow buses to travel faster and more reliably

The implementation of this BRT system would also necessitate construction of additional bus storage and maintenance facilities across the region; depending on the specific facilities needed, this could add an additional \$725 million to the total cost. More details about facility needs can be found in Chapter 6.

The type of BRT and length of the route are key drivers of the capital costs of each BRT route. As shown in Figure 74, the Richmond Highway and Route 7 routes have the highest capital cost estimates (more than \$400 million) due to both including some fully dedicated BRT and Route 7's long route length. On the other end of the spectrum, the Fort Belvoir Express and Duke Street Transitway—the shortest routes in the proposed BRT system—are estimated to cost less than \$100 million. Express BRT in particular has a low cost per mile, influencing the capital costs of many routes.



Figure 74 Capital Cost Estimates by Route (2024 dollars)



Annual Operating & Maintenance Cost Estimate

The high-quality service proposed for this regional BRT system—including frequent service that operates all day, seven days per week—would require approximately \$192 million per year to operate (in 2024 dollars). This planning-level estimate does not include potential savings from reducing service levels for the local bus service currently operating on these corridors. The impact on the region’s total operating costs for transit are likely to be lower than this total. On average, the BRT system is estimated to cost approximately \$174 per revenue hour to operate annually.

For individual routes, operating costs are primarily dependent on route length, span of service, and frequency. As shown in Figure 75, annual operating costs range from \$2.5 million (Fort Belvoir Express) to \$11.6 million (Route 7). On an hourly basis, operating costs range between \$161 and \$196 per revenue hour as shown in Figure 76. The I-95 Express route costs the most per revenue hour, followed by Metroway. Langston Boulevard and West End Transitway are the least expensive per revenue hour.



Figure 75 2045 BRT Annual Operating Cost Estimate (2024 dollars)

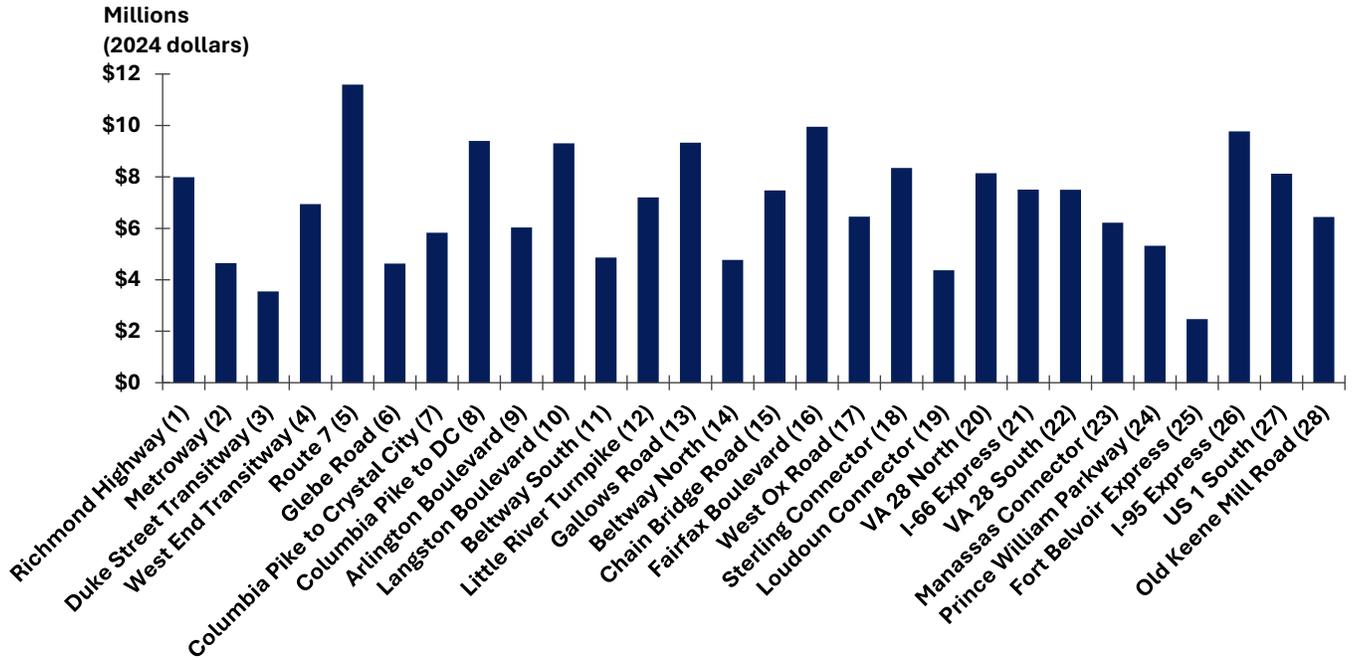
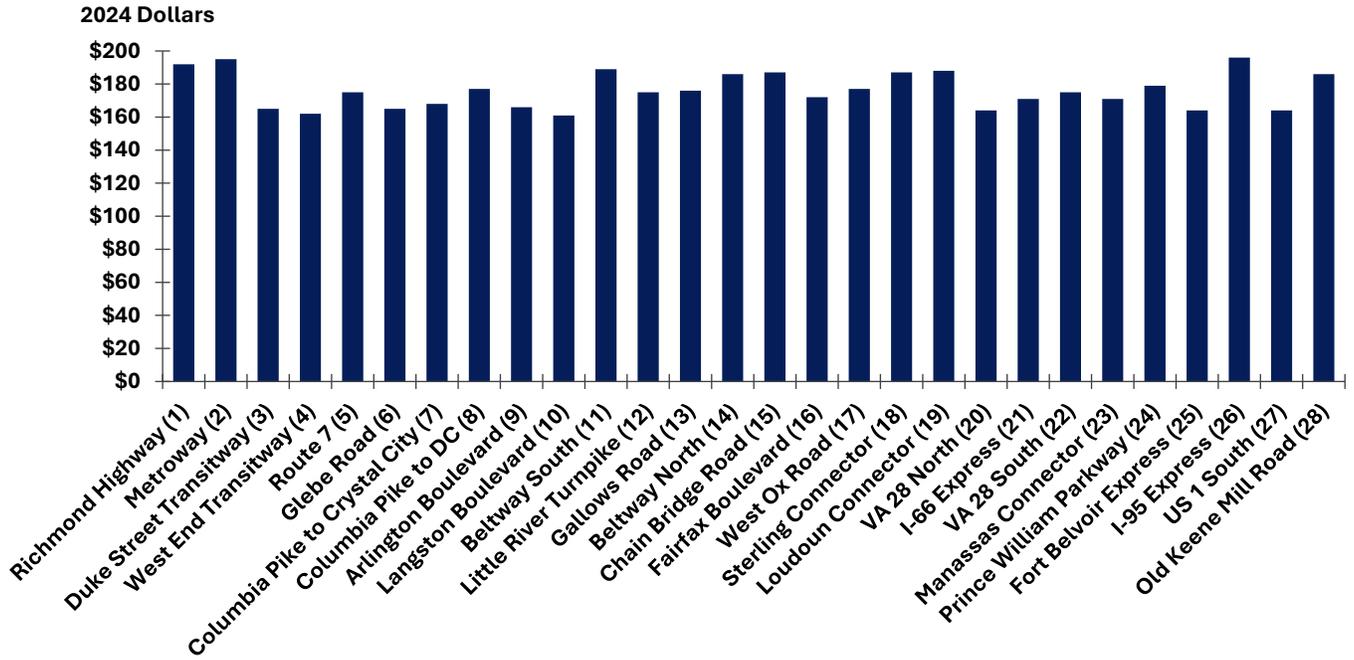


Figure 76 Operating Cost per Revenue Hour by Route (2024 dollars)



4.2.6 Revenue

The revenue category is made up of fare recovery ratio and potential funding opportunity metrics. Generally, routes in the urban core score highly in the revenue category. All of the routes that have already received NVTA funding



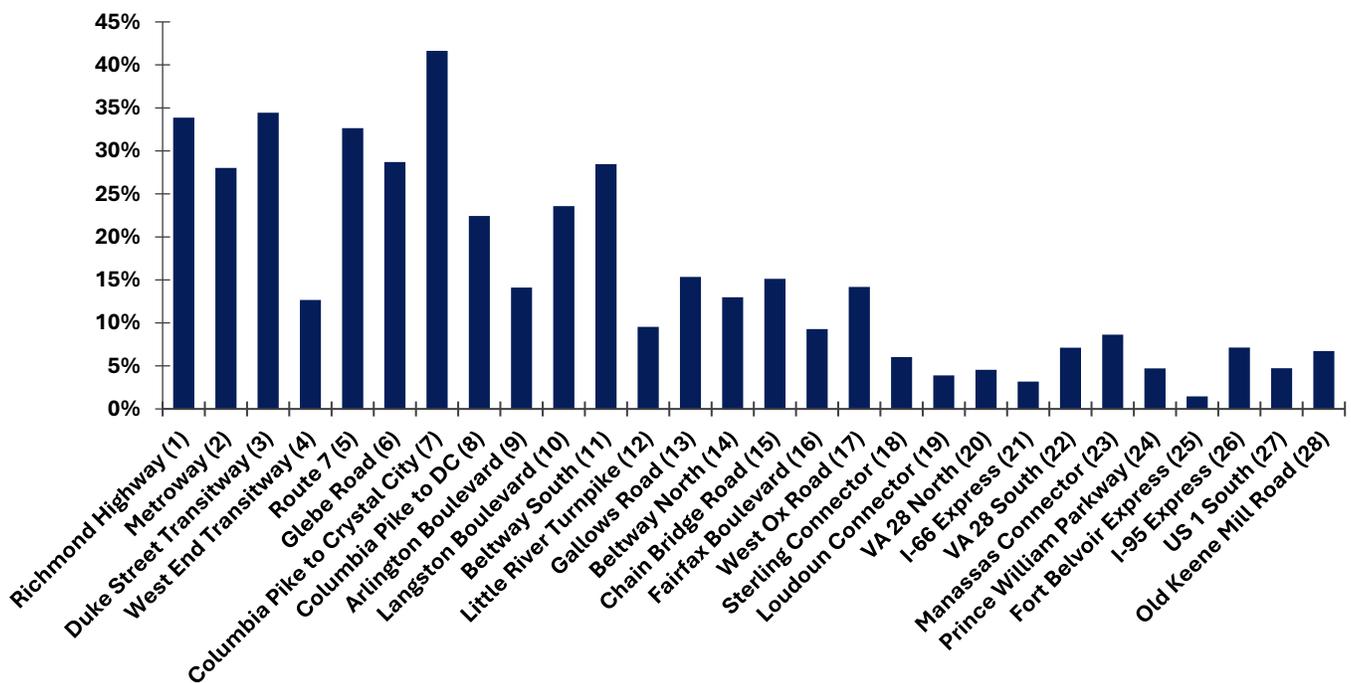
(Metroway, Richmond Highway, Route 7, Duke Street Transitway, West End Transitway) perform well in the revenue category with strong opportunities for funding.

Fare Recovery Ratio

Fare recovery ratio, shown in Figure 77, is the portion of operating costs expected to be covered by fare revenues in 2045. For transit agencies in Northern Virginia that charge a fare, the average fare paid in 2022 was \$0.63, representing approximately 28% of the full price bus fare for ART, Metrobus, and Fairfax Connector. For this analysis, calculations of fare revenues assumed \$0.63 per boarding on all BRT routes and compared to operating costs. The proposed BRT system is expected to have a fare recovery ratio of approximately 15.7%. For reference, Metrobus' fare recovery ratio was 19% in 2019 and only 9% in 2024. In 2022, ART had a fare recovery ratio of 9.3%⁸ while Fairfax Connector had a fare recovery ratio of 4.5%.^{9,10}

The fare recovery ratio for the BRT routes range from more than 40% on the Columbia Pike to Crystal City route to less than 5% for the Fort Belvoir Express, I-66 Express, VA 28 North, and Loudoun Connector routes. Notably, the Duke Street Transitway has a particularly high fare recovery ratio given its ridership, meaning it gathers significant ridership for the amount of service provided. This is likely due to short length of this route.

Figure 77 2045 Fare Recovery Ratio by Route



⁸ Source: <https://www.arlingtonva.us/files/sharedassets/public/v/1/transportation/documents/arlington-transit-fy25-34-tsp-final.pdf>.

⁹ Source: <https://novatransit.org/uploads/studiesarchive/2023AnnualReportonWMATA.pdf>.

¹⁰ Source: https://www.fairfaxcounty.gov/budget/sites/budget/files/Assets/documents/fy2025/adopted/p.m./40000_p.m..pdf.

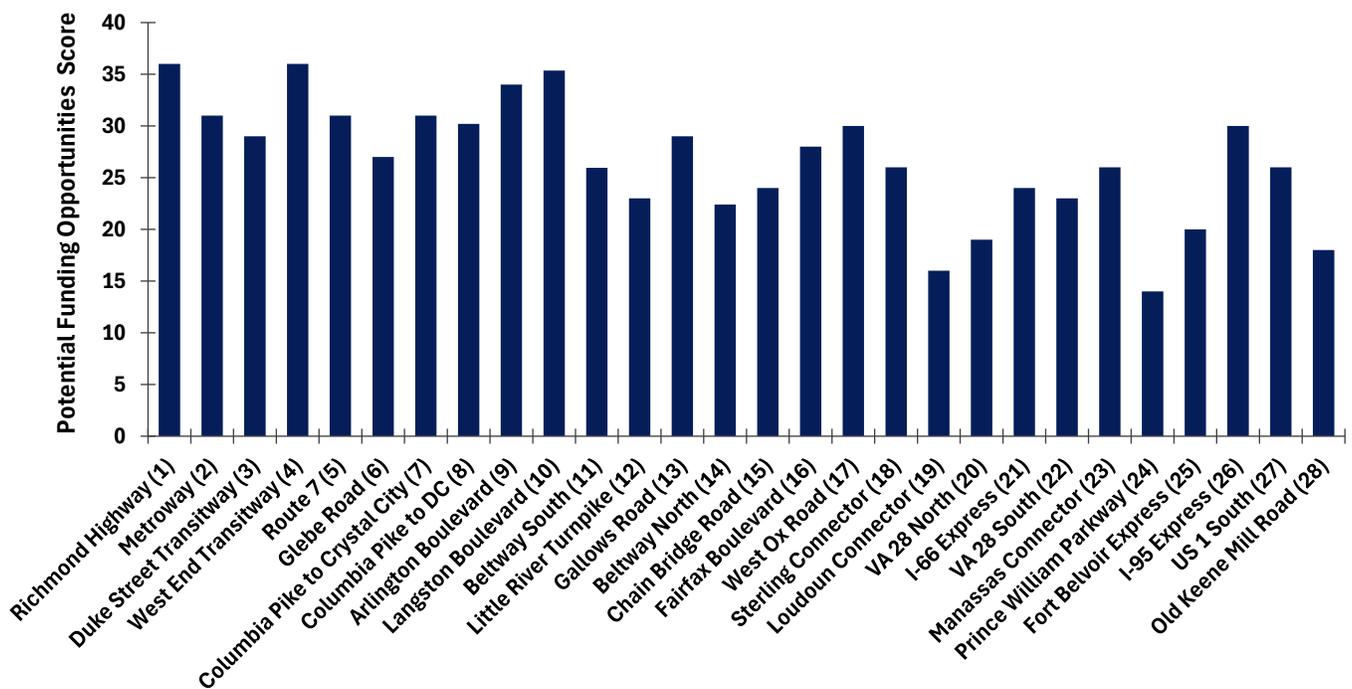


Potential Funding Opportunities

The Potential Funding Opportunity measure was rated according to a qualitative assessment of a BRT route’s likelihood of getting funding from a variety of Federal, State, and local grant programs. Criteria for each of these grant programs vary, but most rely on similar performance measures to those being used in this BRT Action Plan, including ridership, customer base and equity, cost effectiveness, environmental benefits, and density. An additional component of this score focuses on the project’s eligibility for local funding based on its geographic location. Together, these metrics are intended to illustrate the likelihood of a project to be competitive for a discretionary grant program at this preliminary planning stage. The points for each of the metrics are summed up to provide a potential total score out of 40 points (See Appendix K for the breakdown of score).

As shown in Figure 78, the Richmond Highway, West End Transitway, Arlington Boulevard, and Langston Boulevard routes scored the highest on this performance measure. Prince William Parkway, Loudoun Connector, VA 28 South, and Old Keene Mill Road routes scored the lowest.

Figure 78 2045 BRT Potential Funding Opportunities



4.2.7 Cost Effectiveness

The cost effectiveness category is based on three metrics: capital cost per rider, congestion reduction relative to cost, and GHG reduction cost. Long distances covered by some of the outer suburban routes make them more expensive to build and operate. While Route 7 is very expensive to build and operate, due to the high ridership, it is somewhat cost effective. Routes in the urban core tend to perform well due to the shorter route lengths and higher ridership.

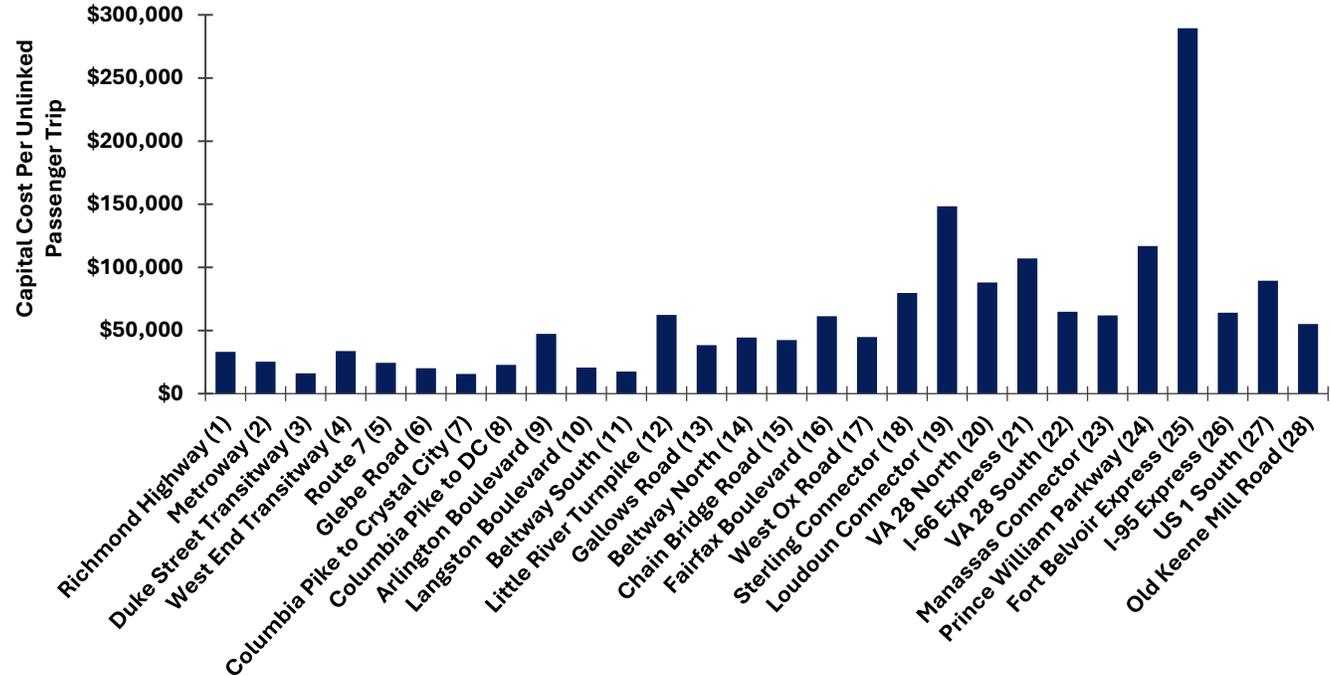
Capital Cost per Rider

At a systemwide level, the proposed BRT system is estimated to have a capital cost of \$29,000 per daily rider. However, this measure varies significantly based on the estimated capital costs and ridership forecasts for each route. Generally, the routes with the highest ridership tend to have the lowest capital cost per rider, as shown in Figure 79. The



Fort Belvoir Express route has the lowest forecast ridership, and the highest capital cost per rider -almost double the capital cost per rider of the next highest route. However, many routes with relatively low ridership do have a reasonable cost per rider, such as the Beltway North, Manassas Connector, Old Keene Mill Road, and VA 28 South routes. The most cost-effective routes include Duke Street Transitway, Columbia Pike to Crystal City, and Beltway South.

Figure 79 Capital Cost per Daily Rider by Route (2024 dollars)

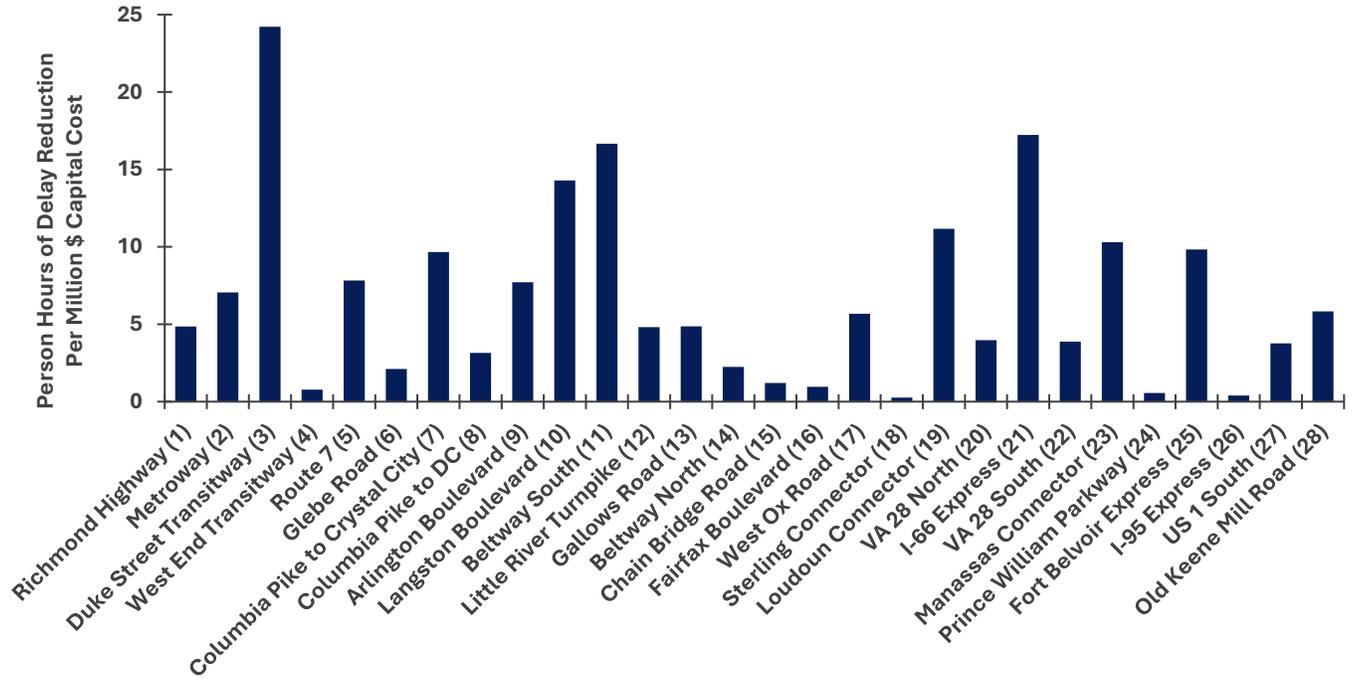


Congestion Reduction Relative to Cost

This measure compares congestion reduction to capital costs, to quantify the reduction in person-hours of delay removed for every million dollars of cost. As a complete network, the proposed BRT system is estimated to remove 2.8 person-hours of delay every day for every million dollars of cost. As shown in Figure 80, routes with higher levels of congestion reduction tend to perform well in this measure. The highest performing route is Duke Street Transitway, which is one of the routes with the highest congestion reduction (third highest) and lowest capital costs (second lowest), followed by I-66 Express, Beltway South, and Langston Boulevard. The lowest performing routes are I-95 Express, Sterling Connector, West End Transitway, and Prince William Parkway.



Figure 80 2045 Congestion Reduction Relative to Cost by Route

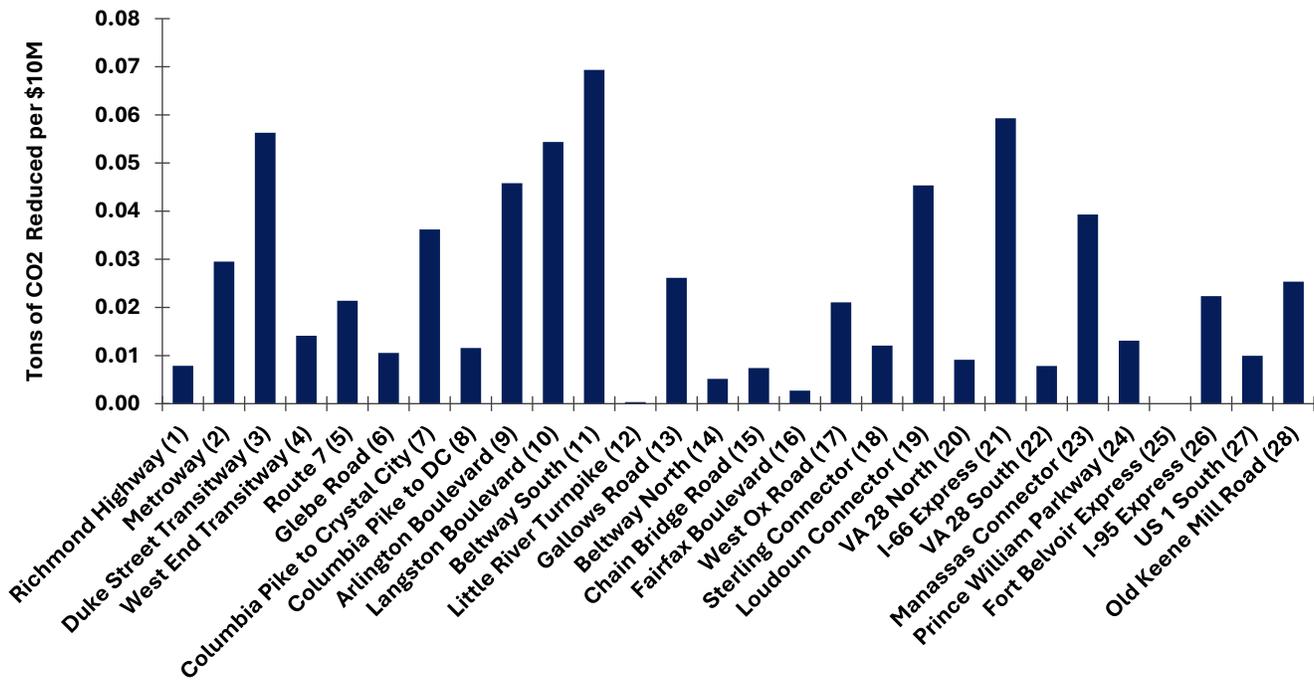


GHG Reduction Cost

This measure compares GHG reduction to capital costs, to quantify the reduction in tons of CO₂ emissions removed for every ten million dollars of cost. As a complete network, the proposed BRT system is estimated to remove 0.06 tons of CO₂ for every ten million dollars of cost. Figure 81 shows the estimated tons of CO₂ removed for each of ten million dollars in capital cost. The Beltway South, Duke Street Transitway, I-66 Express, and Langston Boulevard routes remove the CO₂ at the highest rate per dollar investment, while the Fort Belvoir Express, Little River Turnpike, and Fairfax Boulevard routes have the lowest.



Figure 81 GHG Reduction Cost Effectiveness by Route



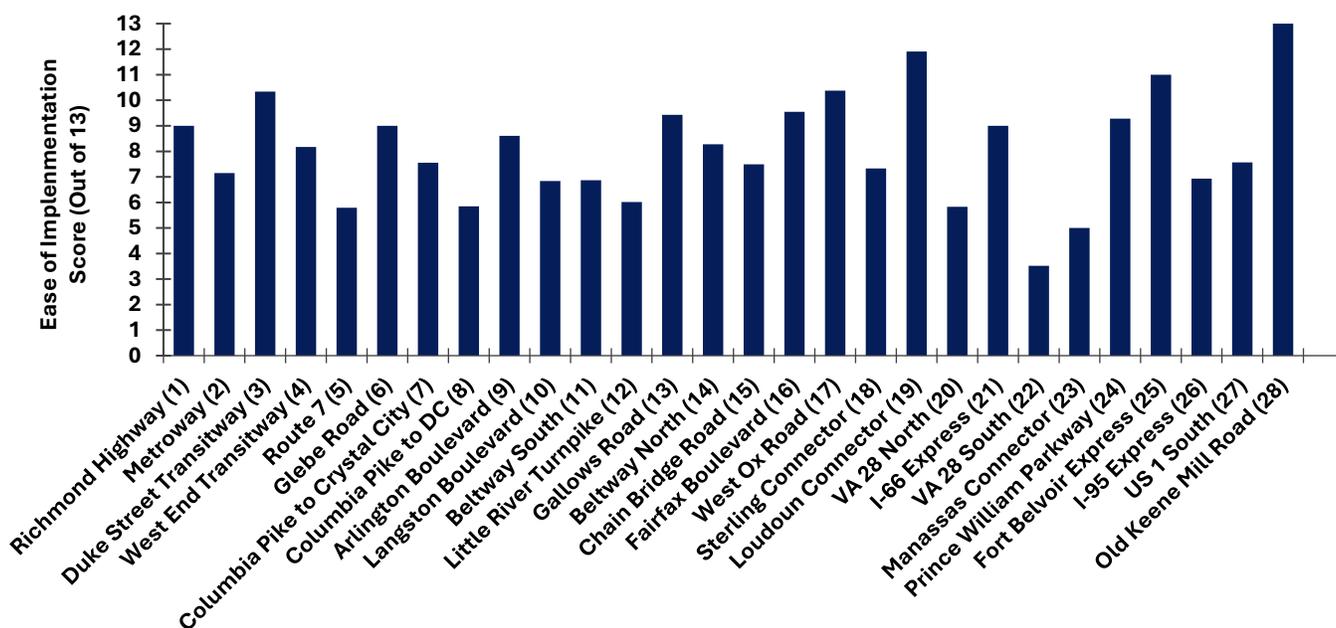
4.2.8 Feasibility

Ease of Implementation

This metric is designed as a score to qualitatively assess the relative ease of implementation based on the number of jurisdictions covered by route, the level of bus priority treatments assumed, and the presence of inter-agency operating agreements (if needed). A higher score indicates easier implementation, and the maximum possible score is 13 (See Appendix K for the breakdown of scores). Figure 82 shows the ease of implementation scores for all BRT routes. The highest scoring routes on this performance measure are Old Keene Mill Road, Loudoun Connector, and Fort Belvoir Express, all of which operate in a single jurisdiction. The hardest routes to implement could include VA 28 South (which touches five jurisdictions) and the Manassas Connector (which is fully Advanced BRT in three separate jurisdictions).



Figure 82 2045 BRT Ease of Implementation



4.2.9 Operating Characteristics

This section includes a number of estimates of how each of the proposed BRT routes, and the complete BRT system, would operate and associated needs. These are not considered as performance measures on their own but were used in many cases as inputs to other performance measures, such as cost estimates.

Hours and Miles of Service

Table 27 lists the approximate numbers of revenue miles and hours provided by each of the proposed BRT routes, based on the service plans assumed for each of them in Chapter 3. Route length, frequency, and span of service all play a major role in the calculation of these statistics.

Table 27 Hours and Miles of Service by Route

| Route | Annual Revenue Miles | Annual Revenue Hours | Annual Platform Miles | Annual Platform Hours |
|-----------------------------------|----------------------|----------------------|-----------------------|-----------------------|
| Richmond Highway (1) | 701,000 | 42,000 | 855,000 | 48,000 |
| Metroway (2) | 463,000 | 23,900 | 564,500 | 27,200 |
| Duke Street Transitway (3) | 249,000 | 21,500 | 304,000 | 24,500 |
| West End Transitway (4) | 590,000 | 42,900 | 719,300 | 49,000 |
| Route 7 (5) | 939,000 | 66,200 | 1,146,000 | 75,500 |
| Glebe Road (6) | 329,000 | 28,000 | 401,100 | 32,000 |
| Columbia Pike to Crystal City (7) | 443,000 | 34,600 | 540,400 | 39,500 |
| Columbia Pike to DC (8) | 761,000 | 53,000 | 928,400 | 60,500 |
| Arlington Boulevard (9) | 547,000 | 36,400 | 666,700 | 41,500 |

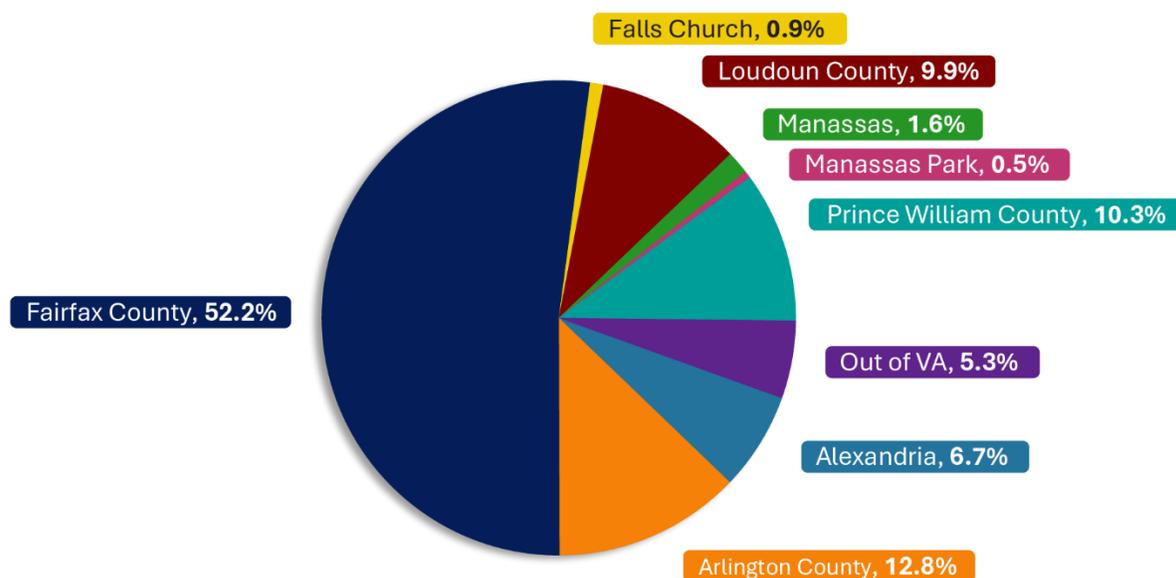


| Route | Annual Revenue Miles | Annual Revenue Hours | Annual Platform Miles | Annual Platform Hours |
|-----------------------------|----------------------|----------------------|-----------------------|-----------------------|
| Langston Boulevard (10) | 779,000 | 57,900 | 950,200 | 66,000 |
| Beltway South (11) | 536,000 | 25,700 | 654,200 | 29,300 |
| Little River Turnpike (12) | 668,000 | 41,200 | 814,500 | 46,900 |
| Gallows Road (13) | 827,000 | 53,000 | 1,009,100 | 60,500 |
| Beltway North (14) | 497,000 | 25,700 | 606,900 | 29,300 |
| Chain Bridge Road (15) | 748,000 | 39,900 | 912,400 | 45,500 |
| Fairfax Boulevard (16) | 890,000 | 57,900 | 1,085,900 | 66,000 |
| West Ox Road (17) | 681,000 | 36,400 | 831,300 | 41,500 |
| Sterling Connector (18) | 1,005,000 | 44,700 | 1,226,300 | 51,000 |
| Loudoun Connector (19) | 591,000 | 23,200 | 721,000 | 26,500 |
| VA 28 North (20) | 930,000 | 49,500 | 1,134,900 | 56,500 |
| I-66 Express (21) | 827,000 | 43,800 | 1,008,500 | 50,000 |
| VA 28 South (22) | 876,000 | 42,900 | 1,069,200 | 49,000 |
| Manassas Connector (23) | 511,000 | 36,400 | 623,300 | 41,500 |
| Prince William Parkway (24) | 643,000 | 29,800 | 783,900 | 34,000 |
| Fort Belvoir Express (25) | 187,000 | 15,100 | 228,700 | 17,200 |
| I-95 Express (26) | 1,204,000 | 49,700 | 1,468,900 | 56,700 |
| U.S. 1 South (27) | 700,000 | 49,500 | 854,300 | 56,500 |
| Old Keene Mill Road (28) | 586,000 | 34,600 | 715,200 | 39,500 |
| Systemwide Total | 18,708,000 | 1,105,000 | 22,824,000 | 1,260,000 |

Figure 83 illustrates how the revenue miles are split across the Northern Virginia jurisdictions—and in neighboring jurisdictions. As shown, more than half the service is proposed in Fairfax County. Just over 5% of the service is proposed outside of Virginia altogether, with two routes serving DC, and two routes connecting to Maryland.



Figure 83 BRT Revenue Miles by Jurisdiction



Vehicle Needs

Table 28 identifies the number of vehicles needed to operate each proposed BRT route and the overall BRT system. Vehicles operated in maximum service (VOMS) is indicative of the number of buses required on the road at maximum service to maintain the scheduled frequency (usually during the peak period); the total fleet need is the number of buses required to maintain the service without exceeding a buses’ indicated lifespan (in mileage). Total fleet need includes spares. It should be noted that the systemwide total fleet need is lower than the sum of the individual routes due to efficiencies in operations that come from operating a larger system.

Table 28 Vehicle Needs by Route

| Route | Vehicles Operated in Maximum Service (VOMS) | Total Fleet Need |
|-----------------------------------|---|------------------|
| Richmond Highway (1) | 10 | 26 |
| Metroway (2) | 6 | 17 |
| Duke Street Transitway (3) | 4 | 10 |
| West End Transitway (4) | 8 | 22 |
| Route 7 (5) | 13 | 34 |
| Glebe Road (6) | 5 | 12 |
| Columbia Pike to Crystal City (7) | 6 | 16 |
| Columbia Pike to DC (8) | 11 | 28 |
| Arlington Boulevard (9) | 7 | 21 |
| Langston Boulevard (10) | 11 | 28 |
| Beltway South (11) | 6 | 20 |
| Little River Turnpike (12) | 7 | 24 |



| Route | Vehicles Operated in Maximum Service (VOMS) | Total Fleet Need |
|-----------------------------|---|------------------|
| Gallows Road (13) | 11 | 30 |
| Beltway North (14) | 6 | 18 |
| Chain Bridge Road (15) | 9 | 27 |
| Fairfax Boulevard (16) | 11 | 33 |
| West Ox Road (17) | 7 | 24 |
| Sterling Connector (18) | 9 | 36 |
| Loudoun Connector (19) | 5 | 22 |
| VA 28 North (20) | 9 | 34 |
| I-66 Express (21) | 10 | 30 |
| VA 28 South (22) | 8 | 32 |
| Manassas Connector (23) | 7 | 18 |
| Prince William Parkway (24) | 6 | 23 |
| Fort Belvoir Express (25) | 4 | 8 |
| I-95 Express (26) | 11 | 36 |
| U.S. 1 South (27) | 9 | 26 |
| Old Keene Mill Road (28) | 6 | 22 |
| Systemwide Total | 222 | 548 |

Staffing Needs

Table 29 quantifies the number of drivers and maintenance employees needed to maintain service according to the operating plan for each route in 2045. It should be noted that the systemwide total fleet need is lower than the sum of the individual routes due to efficiencies in operations that come from operating a larger system.

Table 29 Staffing Needs by Route

| Route | Drivers | Supervisors | Dispatchers | Mechanics |
|-----------------------------------|---------|-------------|-------------|-----------|
| Richmond Highway (1) | 27 | 3 | 2 | 9 |
| Metroway (2) | 15 | 2 | 1 | 6 |
| Duke Street Transitway (3) | 14 | 2 | 1 | 4 |
| West End Transitway (4) | 28 | 3 | 2 | 8 |
| Route 7 (5) | 43 | 5 | 3 | 12 |
| Glebe Road (6) | 18 | 2 | 1 | 5 |
| Columbia Pike to Crystal City (7) | 23 | 3 | 2 | 6 |
| Columbia Pike to DC (8) | 34 | 4 | 2 | 10 |
| Arlington Boulevard (9) | 24 | 3 | 2 | 7 |



| Route | Drivers | Supervisors | Dispatchers | Mechanics |
|-----------------------------|------------|-------------|-------------|------------|
| Langston Boulevard (10) | 37 | 4 | 2 | 10 |
| Beltway South (11) | 17 | 2 | 1 | 7 |
| Little River Turnpike (12) | 27 | 3 | 2 | 9 |
| Gallows Road (13) | 34 | 4 | 2 | 11 |
| Beltway North (14) | 17 | 2 | 1 | 7 |
| Chain Bridge Road (15) | 26 | 3 | 2 | 10 |
| Fairfax Boulevard (16) | 37 | 4 | 2 | 11 |
| West Ox Road (17) | 24 | 3 | 2 | 9 |
| Sterling Connector (18) | 29 | 3 | 2 | 13 |
| Loudoun Connector (19) | 15 | 2 | 1 | 8 |
| VA 28 North (20) | 32 | 4 | 2 | 12 |
| I-66 Express (21) | 28 | 3 | 2 | 11 |
| VA 28 South (22) | 28 | 3 | 2 | 11 |
| Manassas Connector (23) | 24 | 3 | 2 | 7 |
| Prince William Parkway (24) | 20 | 2 | 1 | 8 |
| Fort Belvoir Express (25) | 10 | 1 | 1 | 3 |
| I-95 Express (26) | 32 | 4 | 2 | 15 |
| U.S. 1 South (27) | 32 | 4 | 2 | 9 |
| Old Keene Mill Road (28) | 23 | 3 | 2 | 8 |
| Systemwide Total | 705 | 71 | 36 | 229 |

Crowding

Peak load factors, or the average number of passengers on board a vehicle during the peak hour, were calculated for each route. These load factors were then compared to the capacity of vehicles of various sizes to determine what sized vehicle was appropriate for each route. In a few instances, even switching routes to articulated 60-foot long bus did not provide sufficient peak capacity. Those routes were additionally assigned more frequent peak service to account to avoid overcrowding to the extent possible. The vehicle sizes assumed for each route are shown in Table 30 along with the peak load factor.

The Richmond Highway route still shows a peak load factor greater than 1.0, indicating some level of crowding during the peak hours is likely. Because this corridor is so far along in the planning process, no additional frequency beyond what is currently proposed by Fairfax County was considered. Also important to note are the two routes operating on Columbia Pike; when tested separately both are forecast to experience significant crowding. When both operate together in the complete BRT system, those load factors reduce significantly as some passengers split between the two routes (as demonstrated by lower ridership in the systemwide analysis for these two routes). However, additional consideration may be appropriate to identify the optimal combination of frequencies of these two routes when operating together.



Table 30 Vehicle Size and Peak Load Factor by Route

| Route | Vehicle Size | Peak Load Factor |
|-----------------------------------|--------------|------------------|
| Richmond Highway (1) | 60' | 1.4 |
| Metroway (2) | 60' | 1.0 |
| Duke Street Transitway (3) | 60' | 0.8 |
| West End Transitway (4) | 40' | 0.9 |
| Route 7 (5) | 60' | 1.2 |
| Glebe Road (6) | 60' | 0.7 |
| Columbia Pike to Crystal City (7) | 60' | 2.1 |
| Columbia Pike to DC (8) | 60' | 1.5 |
| Arlington Boulevard (9) | 40' | 1.0 |
| Langston Boulevard (10) | 40' | 0.5 |
| Beltway South (11) | 40' | 0.9 |
| Little River Turnpike (12) | 40' | 0.4 |
| Gallows Road (13) | 40' | 0.6 |
| Beltway North (14) | 40' | 0.8 |
| Chain Bridge Road (15) | 40' | 0.5 |
| Fairfax Boulevard (16) | 40' | 0.7 |
| West Ox Road (17) | 40' | 0.6 |
| Sterling Connector (18) | 40' | 0.3 |
| Loudoun Connector (19) | 40' | 0.2 |
| VA 28 North (20) | 40' | 0.2 |
| I-66 Express (21) | 40' | 0.6 |
| VA 28 South (22) | 40' | 0.5 |
| Manassas Connector (23) | 40' | 0.2 |
| Prince William Parkway (24) | 40' | 0.2 |
| Fort Belvoir Express (25) | 40' | 0.0 |
| I-95 Express (26) | 60' | 0.9 |
| U.S. 1 South (27) | 40' | 0.3 |
| Old Keene Mill Road (28) | 40' | 0.4 |

4.2.10 Supporting Needs

Table 31 shows an estimate of the number of EV chargers required by each proposed BRT route and the complete system if the entire fleet has to be electric. It also quantifies the amount of garage space and maintenance space that will be needed to accommodate the proposed BRT system. It should be noted that the total facility space required for the entire proposed BRT system may vary based on the number and location of facilities. More details on facility needs can be found in Section 6.1.



Table 31 EV Chargers and Facility Needs by Route

| Route | EV Chargers Required | Facility Space Required (acres) |
|-----------------------------------|----------------------|---------------------------------|
| Richmond Highway (1) | 12 | 2.9 |
| Metroway (2) | 15 | 1.9 |
| Duke Street Transitway (3) | 5 | 1.4 |
| West End Transitway (4) | 10 | 2.0 |
| Route 7 (5) | 16 | 3.8 |
| Glebe Road (6) | 6 | 1.5 |
| Columbia Pike to Crystal City (7) | 8 | 2.0 |
| Columbia Pike to DC (8) | 14 | 3.0 |
| Arlington Boulevard (9) | 9 | 1.8 |
| Langston Boulevard (10) | 14 | 2.2 |
| Beltway South (11) | 8 | 1.7 |
| Little River Turnpike (12) | 9 | 2.0 |
| Gallows Road (13) | 14 | 2.4 |
| Beltway North (14) | 8 | 1.5 |
| Chain Bridge Road (15) | 11 | 2.1 |
| Fairfax Boulevard (16) | 14 | 2.6 |
| West Ox Road (17) | 9 | 2.0 |
| Sterling Connector (18) | 11 | 2.7 |
| Loudoun Connector (19) | 6 | 1.8 |
| VA 28 North (20) | 11 | 2.6 |
| I-66 Express (21) | 12 | 2.2 |
| VA 28 South (22) | 10 | 2.4 |
| Manassas Connector (23) | 9 | 1.7 |
| Prince William Parkway (24) | 8 | 1.8 |
| Fort Belvoir Express (25) | 5 | 0.9 |
| I-95 Express (26) | 14 | 3.8 |
| U.S. 1 South (27) | 11 | 2.1 |
| Old Keene Mill Road (28) | 8 | 2.0 |

4.2.11 Ratings by Category

Table 32 shows how each of the BRT routes performed in each evaluation category, considering a combination of the measures in that category. Each route was rated as a high, medium, or low based on how its performance compared to the other 27 routes evaluated. For all categories, high performance is always better than low performance.



Table 32 BRT Route Evaluation Results by Category

| Route | Ridership | Transportation Impacts | Land Use | Readiness | Costs | Revenue | Cost Effectiveness | Feasibility |
|----------------------------------|-----------|------------------------|----------|-----------|-------|---------|--------------------|-------------|
| 1. Richmond Highway | ▲ | - | ▲ | - | ▽ | ▲ | - | ▲ |
| 2. Metroway** | ▲ | - | ▲ | ▲ | ▲ | ▲ | ▲ | ▽ |
| 3. Duke Street Transitway | - | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ | ▲ |
| 4. West End Transitway | - | - | ▲ | - | ▲ | ▲ | ▽ | - |
| 5. Route 7 | ▲ | ▲ | - | ▲ | ▽ | ▲ | ▲ | ▽ |
| 6. Glebe Road | ▲ | ▽ | - | ▲ | ▲ | ▲ | ▽ | ▲ |
| 7. Columbia Pike to Crystal City | - | ▲ | ▲ | ▲ | - | ▲ | ▲ | - |
| 8. Columbia Pike to DC | ▲ | - | ▲ | ▲ | ▽ | ▲ | ▽ | ▽ |
| 9. Arlington Boulevard | - | ▲ | - | ▲ | - | ▲ | ▲ | - |
| 10. Langston Boulevard | ▲ | ▲ | - | ▲ | ▽ | ▲ | ▲ | - |
| 11. Beltway South | ▽ | ▲ | ▲ | - | ▲ | ▲ | ▲ | - |
| 12. Little River Turnpike | - | ▽ | - | - | - | - | ▽ | - |
| 13. Gallows Road | ▲ | ▲ | - | - | ▽ | ▲ | - | ▲ |
| 14. Beltway North | ▽ | ▽ | ▲ | - | ▲ | - | ▽ | - |
| 15. Chain Bridge Road | - | ▽ | ▽ | - | - | - | ▽ | - |
| 16. Fairfax Boulevard | - | ▽ | ▽ | - | ▽ | - | ▽ | ▲ |
| 17. West Ox Road | ▲ | - | ▲ | ▲ | - | ▲ | - | ▲ |
| 18. Sterling Connector | - | ▽ | ▽ | ▽ | ▽ | - | ▽ | - |
| 19. Loudoun Connector | ▽ | ▽ | ▽ | ▽ | ▲ | ▽ | - | ▲ |
| 20. VA 28 North | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▼ | ▼ |
| 21. I-66 Express | ▽ | - | ▽ | ▽ | - | - | - | ▲ |
| 22. VA 28 South | - | - | ▽ | ▽ | ▼ | - | ▽ | ▽ |
| 23. Manassas Connector | - | ▲ | ▽ | ▽ | - | - | ▲ | ▽ |
| 24. Prince William Parkway | ▽ | - | ▽ | ▽ | ▲ | ▽ | ▽ | ▲ |
| 25. Fort Belvoir Express | ▽ | ▽ | ▽ | ▽ | ▲ | ▽ | ▽ | ▲ |
| 26. I-95 Express | ▽ | - | ▲ | - | ▽ | - | ▽ | - |
| 27. U.S. 1 South | ▽ | - | ▽ | ▽ | ▽ | - | ▽ | - |
| 28. Old Keene Mill Road | ▽ | - | ▽ | ▽ | ▲ | ▽ | - | ▲ |

▲ High Performance - Medium Performance ▽ Low Performance



4.3 Public Comments on Proposed BRT System

In addition to the technical evaluation, a survey was conducted as part of the public comment period on the draft version of the final BRT Action Plan during the Spring of 2025. The questions in the survey, and therefore the comments received, centered mainly around three elements of service: coverage, span, and frequency, with additional opportunities for respondents to provide general comments. For each element, the respondents gave a rating on how well the system meets their needs prior to providing their comments.

Regarding span and frequency, riders were first asked to specify the three routes that they would be most likely to consider using of the 28 proposed routes. One of these routes was then randomly selected by the survey program, and the respondents were then asked to rate the span and frequency of that route and provide comments.

Response to the BRT system was very positive, and of the more than 1,500 comments received, more than 30% were positive/supportive while only 5% were negative. As shown in Figure 84, while about two-thirds of respondents (63%) feel that the proposed BRT system goes to all or most places they would want or need to go, more than eight in ten (82%-85%) feel that their selected routes will operate at all or most of the times and will come as frequently or nearly as frequently as they would want or need them to. Most of the respondents felt that the proposed BRT system would meet their needs. Because of this, 72% of respondents indicated that they would be very/extremely likely to use the BRT System if it was available. While we know that the public is likely to overstate their likelihood of changing their behavior in this kind of survey, this still represents a significant interest in the BRT system by riders and non-riders.

Figure 84 Overall BRT System Ratings



4.3.1 Coverage

Overall, 63% of respondents feel that the proposed BRT system goes to all or most places they would want or need it to go. This was consistent across both riders and non-riders. Notably, younger respondents (age 18-34) were more likely to feel the system goes to all or most of the places they want to go (78%, compared to 56% of those 35 or older).



Table 33 How Well Coverage Meets Needs by Rider Type

Q4A. How well would you say this proposed BRT system meets your needs?

| | Total | Riders (B) | Non-Riders (C) |
|---|-------|---------------|-------------------|
| n= | 587 | 247 | 329 |
| Net: Most/All places | 63% | 65% | 61% |
| 5—The BRT system goes to all the places I would want/need it to go | 27% | 32% | 24% |
| 4—The BRT system goes to most of the places I would want/need it to go | 36% | 34% | 37% |
| 3—The BRT system goes to some of the places I would want/need it to go | 21% | 17% | 24% |
| 2—The BRT system goes to a few of the places I want/need it to go | 9% | 12% | 8% |
| 1—The BRT system does not go to any of the places I would want/need it to go | 6% | 6% | 7% |

Base = Those Answering

Note that those who answered “something else” as their primary mode of travel are not classified as Riders or Non-riders.

When asked why they gave the rating they did, three-fourths of all respondents identified specific service requests, including places they want or need to go that they feel are not addressed adequately by the plan. Note that even those who rated the system positively also had the opportunity to make comments about additional service. Two in ten respondents (21%) specifically pointed out areas where they would like service that are in Fairfax County, with 4% overall each identifying Tysons and Burke. This is particularly notable because while Tysons is served by multiple routes in the proposed network, many respondents were seeking more direct connections to Tysons, without the need to transfer. Burke itself is not served by the proposed BRT network. Future studies could consider potential extensions of the routes shown to Burke Center.

Outside of Fairfax County, respondents’ top responses to the system’s coverage involved ensuring the system coverage complements and integrates into existing transit services in the region (18%), and that it provides direct service to specific locations in DC (13%). Less than one in ten requested service to additional locations in Arlington or Alexandria (7% and 6%, respectively).

In addition to specific service requests, about two in ten (19%) had general concerns about the plan’s coverage, including concerns about transfers and connectivity (10%). Specifically, they mentioned more direct connections to specific locations; many of these locations were served by the proposed BRT system, but respondents preferred a direct connection without the need to transfer. Some of the locations mentioned included City of Fairfax, City of Falls Church, Tysons, Great Falls, Burke, Ashburn, Dunn Loring, Van Dorn, Vienna, and various Northern Virginia Community College campuses.

A similar proportion left positive comments about the overall coverage and the plan itself (18%), specifically saying they appreciate the extensive coverage of the proposed plan.



Table 34 Comments on BRT System Coverage

Q4B. Why do you say that? Are there places you would like the BRT to go that are not in the plan?

| | Total |
|--|--------------|
| n= | 405 |
| Net: Service requests | 75% |
| Service/Routing of BRT (general) | 72% |
| Fairfax County | 21% |
| Tysons | 4% |
| Burke | 4% |
| Integration with other transit services | 18% |
| Need connection to Metro stations | 14% |
| Request DC Connections | 13% |
| Request service in Arlington | 7% |
| Request service in Alexandria | 6% |
| Stops not close enough to where I live/go | 6% |
| Request service in Loudoun County | 4% |
| Request service in Prince William County | 4% |
| Feel plan does not go to needed destinations (general) | 3% |
| Request Maryland connections | 2% |
| Service to schools | 2% |
| Request service to additional parks and natural areas | 2% |
| Worry about lack of coverage in general | 2% |
| Request for specific stops | 2% |
| Serve major roads/arteries | 2% |
| Falls Church | 1% |
| Worry plan lacks direct routes | 1% |
| Stafford | 1% |
| Concerned about service hours | 1% |
| Extend routes | 1% |
| Request service in Manassas | 1% |
| Other routing comments/locations | 10% |
| Need direct route from home to work | 5% |
| Concerns about travel times | 1% |
| Improve connections to key locations | 1% |
| Net: Concerns about plan coverage | 19% |
| Concerned about transfers and connectivity | 10% |



| | Total |
|--|------------|
| Concerned about frequency | 6% |
| Desire more cross-connections between routes | 4% |
| Net: Evaluation of proposed BRT plan—Positive | 18% |
| Appreciate extensive coverage of proposed plan | 10% |
| No additional locations | 5% |
| Consider plan a significant improvement | 4% |
| Feel plan complements Metrorail system well | 1% |
| Net: Infrastructure and traffic/congestion concerns | 4% |
| Needs to be competitive with driving | 2% |
| Infrastructure improvements needed | 1% |
| Potential impact of/on traffic congestion | 1% |
| Net: Evaluation of proposed BRT plan—Negative | 4% |
| Requires dedicated lanes | 1% |
| Concerns about dedicated lanes | <1% |
| Other | 9% |

Base = Those Answering

Top Mentions

“I live in Burke There’s a big empty triangle on this map with no bus lines at all.”

- Non-Rider

“First would be a station in Burke Center Shopping Mall, VA, on the Chain Bridge Road Line. It would be nice to connect to VRE in some fashion, going south from GMU, and it would be a great way to go home without a car. Second Old Town Clifton, VA. It was my mom’s favorite place in NOVA. Even if there were no BRT, a VRE station would be nice too.”

- Non-Rider

“It looks like most of the neighborhoods that are hotspots for me (Eden Center, Annandale, Centreville) are served by the proposed plan. A lot of these places are not already covered by Metrorail.”

- Non-Rider

4.3.2 Span of Service

Overall, across all routes selected by respondents, 85% feel that the routes will operate at all or most of the times that they need or want them to. This is consistent across both riders (84%) and non-riders (85%). However, those respondents who identify as White were slightly more likely to feel the system operates at most or all times they need it to (91%) compared to those who are people of color (80%).



Table 35 How Well Span Meets Rider Needs by Rider Types

Q5A. How well would you say the [line] meets your needs?

| | Total | Riders (B) | Non-Riders (C) |
|---|-------|------------|----------------|
| n= | 551 | 237 | 303 |
| Net: Most/all times | 85% | 84% | 85% |
| 5—The BRT system operates at all the times of day when I would want/need it to | 61% | 60% | 62% |
| 4—The BRT system operates at most of the times of day when I would want/need it to | 24% | 24% | 23% |
| 3—The BRT system operates at a some of the times of day when I would want/need it to | 9% | 8% | 10% |
| 2—The BRT system operates at a few of the times of way when I would want/need it to | 3% | 5% | 2% |
| 1—The BRT system does not operate when I would want/need it to | 3% | 3% | 3% |

Base = Those Answering

Note that those who answered “something else” as their primary mode of travel are not classified as Riders or Non-riders.

Four in ten respondents (40%) felt that the operation times presented suited their needs. However, an equal proportion (40%) also requested extensions to the service hours, most notably requesting that service continues later in the evening (25%). One in ten would like to see later service on weekends (13%), later service into the evenings and nights on weekdays (12%), and/or earlier service in the mornings (12%).

For reference, the majority of the proposed routes were assumed to operate between the hours of 6 a.m. and midnight seven days per week with a few exceptions:

- ♦ One route, Route #25: Fort Belvoir Express which was assumed to operate between 5 a.m. and 7 p.m. on weekdays.
- ♦ Five of the proposed routes were assumed to operate between 7 a.m. and 7 p.m. only on weekends.

Table 36 Comments on BRT System Span of Service

Q5B. Why do you say that? What times of day would you want [LINE] BRT service that is not in the plan?

| | Total |
|---|-------|
| n= | 219 |
| Operation time suits needs | 40% |
| Net: Extended service | 40% |
| Need later service | 25% |
| Need later service on weekends | 13% |
| Need later service into evening/night | 12% |
| Start service earlier in the morning | 12% |
| Need service for late night events and activities | 7% |
| Need 24/7 service | 3% |



| | Total |
|---|--------------|
| Need extended service for airports/early/late flights | 3% |
| Net: Greater frequency | 6% |
| Service not frequent enough | 6% |
| Net: Would use it | 4% |
| Would use to/from work | 3% |
| Would use it (general) | 1% |
| Needs to go to different areas | 2% |
| Should work with Metro schedules | 2% |
| Need more/different stops | 1% |
| Greater span (not specific) | 1% |
| Travel time too long | 1% |
| Requires bus lanes | 1% |
| Needs to be cheaper than other modes | 1% |
| Needs to be faster than other modes | 1% |
| Operation time limits connections | <1% |
| Doubts reliability | <1% |
| Helps reduce congestion | <1% |
| Safety concerns | <1% |
| Other | 10% |

Base = Those Answering

Top Mentions

“Maybe extend service a tad bit later in the evening. Six to 12 is generous but perhaps extending it to 1 a.m. because sometimes I do find myself caught out later at night, and it would be better especially for later night service workers.”

- Non-Rider

4.3.3 Frequency

Across all routes selected by respondents, more than eight in ten (82%) felt that the BRT lines will come as frequently or nearly as frequently as they would want or need them to. This is consistent across both riders and non-riders.



Table 37 How Well Frequency Meets Needs by Rider Type

Q6A. How well would you say the [line] meets your needs?

| | Total | Riders (B) | Non-Riders (C) |
|---|-------|------------|----------------|
| n= | 551 | 237 | 303 |
| Net: As frequently/Nearly as frequently | 82% | 82% | 82% |
| 5—The BRT vehicles will come as frequently as I would want/need them to | 58% | 59% | 57% |
| 4—The BRT vehicles will come nearly as frequently as I would want/need them to | 24% | 23% | 25% |
| 3—The BRT vehicles will come somewhat as frequently as I would want/need them to | 9% | 10% | 9% |
| 2—The BRT vehicles will come barely as frequently as I would want/need them to | 4% | 5% | 4% |
| 1—The BRT vehicles will not come frequently enough for me to use them | 4% | 3% | 5% |

Base = Those Answering

Note that those who answered “something else” as their primary mode of travel are not classified as Riders or Non-riders.

Nearly one-half of respondents (46%) felt that the frequency presented to them meets their needs, though an equivalent proportion of respondents indicated that they would like to see better frequencies. Nearly two in ten (19%) would like BRT to operate every 5-10 minutes and similarly, 13% would like more frequent service in general.

For reference, proposed frequencies varied by route, but were generally between 6 minutes and 15 minutes during the peak (with a single route assumed to operate every 20 minutes) and between 12 and 30 minutes during off-peak periods and on the weekends.

Table 38 Comments on BRT System Frequencies

Q6B. Why do you say that? How frequently would you like [PROPOSED ROUTE] to operate?

| | Total |
|--|-------|
| n= | 243 |
| Net: Frequency meets needs | 46% |
| Frequency is good (general) | 22% |
| 15 minute frequency is good | 13% |
| 10 minute frequency is good | 8% |
| Prefer 10-12 minute BRT frequency | 3% |
| 30 minute frequency is good | 1% |
| Faster/Better than current bus frequencies | 1% |
| Headways mean no need for schedule | <1% |
| Net: Better frequencies | 46% |
| Operate BRT every 5-10 minutes | 19% |
| Needs to operate more frequently (general) | 13% |



| | Total |
|---|-------|
| Operate BRT every 15 minutes | 7% |
| Frequent service on weekends | 3% |
| Want better frequency than 20 minutes | 2% |
| Operate BRT every 10-15 minutes | 2% |
| Longer than 15 minute wait is unreliable | 2% |
| Operate BRT every 8 minutes | 1% |
| Operate BRT every 20 minutes | 1% |
| Long waiting time | 1% |
| Net: Service characteristics | 9% |
| Adjust span/hours (general) | 4% |
| Needs to serve other areas/more stops | 2% |
| Align with Metro schedules | 1% |
| Needs to operate later in the evening | 1% |
| Adjust span/hours on weekends | 1% |
| Need to operate earlier in the morning | 1% |
| Bus stops are good (general) | <1% |
| Requires bus lanes | <1% |
| Net: Travel time and reliability | 2% |
| Travel time is important (not specific) | 1% |
| Do not trust it would run this frequently | 1% |
| Net: Would use it | 2% |
| Would use it (general) | 2% |
| Would use it to travel to/from work | <1% |
| Safety concerns | 1% |
| Other | 7% |

Base = Those Answering

Top Mentions

"If it were 10-15 minute intervals instead of 15-20, I would feel less of a need to plan my day/travel around the bus schedule."

-Non-Rider



“Eight to 12 minute headways are amazing IF the buses come on time. Bus bunching is the bane of my existence but in an ideal world, 8-12 minutes is as good as Metrorail, which is a good standard to compare to.”

- Rider

4.3.4 BRT Usage

Overall, 72% of respondents would use their selected routes to commute to work or other job-related business. While riders were more likely to use their selected routes for this purpose (81%, compared to 67% of non-riders), non-riders are more likely than riders to use their selected lines for:

- ♦ Shopping, entertainment, restaurants or bars;
- ♦ Concerts or sporting events;
- ♦ Traveling to or from the airport; or
- ♦ To access other modes of transit.

Table 39 Potential Trip Purpose by Rider Type

Q8B. For what purposes would you use [line]?

| | Total | Riders (B) | Non-Riders (C) |
|--|-------|------------------|------------------|
| n= | 552 | 237 | 304 |
| Travel to or from work/job-related business | 72% | 81% ^C | 67% |
| Shopping, entertainment, restaurants/bars | 65% | 57% | 71% ^B |
| Visiting friends or family | 44% | 42% | 44% |
| Visiting parks, natural areas, fishing, hiking, etc. | 32% | 26% | 35% |
| Medical, bank, post office, Government services | 27% | 29% | 25% |
| Concert or sporting event | 23% | 17% | 27% ^B |
| Travel to or from school (student)/education related | 17% | 16% | 18% |
| Gym/fitness center | 13% | 14% | 12% |
| Church, synagogue, mosque, or other religious venue | 8% | 10% | 7% |
| To travel to/from the airport | 6% | 2% | 8% ^B |
| Parent/guardian picking up child from school | 5% | 5% | 6% |
| To access other modes of transit | 5% | 2% | 7% ^B |
| For some other reason | 15% | 13% | 17% |

Base = Those Answering

Multiple Responses

Note that those who answered “something else” as their primary mode of travel are not classified as Riders or Non-riders.

More than one-third of respondents (37%) indicated they would use their chosen line 5 days or more each week. However, among riders, 59% would use their lines five days or more per week (notably higher than 24% among non-



riders). The same is true for people of color, where one-half would use BRT 5 days or more per week (51%, compared to 21% of White respondents).

Non-riders were far more likely to say they would use their chosen lines one to three days a month or a few times a year (19% and 14%, compared to 10% and 3% among riders).

Table 40 Potential Frequency of Use by Rider Type

Q8C. How often would you use this BRT route?

| | Total | Riders (B) | Non-Riders (C) |
|-------------------------|-------|------------------|-------------------|
| n= | 528 | 230 | 289 |
| Net: 5 days or more | 37% | 59% ^C | 24% |
| More than 5 days a week | 17% | 28% ^C | 10% |
| 5 days a week | 20% | 31% ^C | 14% |
| 3 to 4 days a week | 22% | 18% | 24% |
| 1 to 2 days a week | 14% | 10% | 16% |
| 1 to 3 days a month | 16% | 10% | 19% ^B |
| A few days a year | 10% | 3% | 14% ^B |
| Less than once a year | 2% | - | 3% |

Base = Those Answering

Note that those who answered “something else” as their primary mode of travel are not classified as Riders or Non-riders.

Nine in ten respondents (92%) would ride their chosen lines on weekdays, with riders being slightly more likely to do so than non-riders (95% compared to 90%). About six in ten respondents would use their chosen lines on the weekend (61%), which is consistent across both riders and non-riders.

Table 41 Potential Time of Day of Use by Rider Type

Q8D. For what purposes would you use [line]?

| | Total | Riders (B) | Non-Riders (C) |
|---|-------|------------------|-------------------|
| n= | 513 | 225 | 281 |
| Net: Weekdays | 92% | 95% ^C | 90% |
| Net: Peak times | 78% | 87% ^C | 72% |
| On weekdays in the afternoon peak times (3 p.m. up to 7 p.m.) | 65% | 69% | 62% |
| On weekdays in the morning peak times (before 9 a.m.) | 64% | 75% ^C | 57% |
| On weekdays during the midday (from 9 a.m. up to 3 p.m.) | 42% | 40% | 44% |
| On weekdays in the evening (after 7 p.m.) | 42% | 39% | 43% |
| Net: Weekends | 61% | 56% | 63% |
| On Saturdays | 60% | 55% | 62% |
| On Sundays | 53% | 49% | 55% |

Base = Those Answering

Multiple Responses Accepted

Note that those who answered “something else” as their primary mode of travel are not classified as Riders or Non-riders.



Notably, those who indicated they were not likely to use any of the proposed routes were asked follow-up questions about why they would not use any of the routes and what might convince them to try BRT. Among the 7% overall who did not select any routes they would be likely to use, two-thirds (67%) indicated that none of the proposed lines take them where they want to go, and one-fourth (26%) indicated that it's faster for them to just use a different mode for their trips.

Among those whose reasoning for not using the system was not because it did not take them where they want to go or because it was faster to use other modes, the main way that they could be convinced to use BRT would be if it was faster than driving (38%) or if it was free to use the BRT (21%).

4.3.5 Additional Overall Comments

When providing additional comments, nearly one in five respondents (19%) expressed support or encouragement for the plan and only 3% expressed opposition or felt overall negative about the plan. Other additional comments centered primarily around coverage (18%), mainly that they are happy with the coverage (11%). Connectivity was also a commonly mentioned theme (15%), with 10% requesting that BRT integrate and align with other transit options, including Metro.

Respondents continued to be clear that fast, frequent, and reliable transit are important to them when evaluating the proposed BRT network and plan. One in eight (13%) commented on the travel time of BRT and that it should be fast, direct, and measure up against other modes of travel. A similar proportion of respondents (9%) pointed out that a high-frequency BRT service is important to them and/or that BRT needs to be reliable, particularly as it compares to current service.

"Northern Virginia has needed a large-scale transit expansion for decades now, so this 28-line system is long overdue...This system honestly can't come soon enough, traffic is terrible in NOVA and we need better buses now. Thank You for this proposed system!"

-Non-Rider

"Bus lanes!! Separated traffic and good bus stops with streetcar-like stations."

-Rider

"Reliable time, with good stops that match Metro hot spots, but also that hit places the metro doesn't (Georgetown, Adams morgan, Columbia heights), and a fair price. Waiting for a bus that's not on schedule is very annoying and can mess with the rest of my transportation plans."

-Non-Rider

"There may be places I would go that aren't in the BRT plan, but this system covers uncountably more destinations than simple Metrorail or bus routes. Plus, with higher reliability and dedicated bus lanes it will be faster and more reliable."

-Non-Rider



Table 42 Additional Comment by General Theme

Q16/Q7A/Q19/D16. Additional Comments on Plan/Plan Document/Transportation in Northern Virginia

| Themes | Total |
|--|-------|
| n= | 587 |
| Support for Plan | 19% |
| Theme: Coverage | 18% |
| Happy with coverage | 11% |
| Extend routes | 5% |
| Concern about stop location/accessibility | 5% |
| Requests for specific stops/to add stops | <1% |
| Theme: Connectivity | 15% |
| Integrate/align with Metro and other transit options | 10% |
| Want direct routes | 5% |
| Need to be able to transfer across routes | 3% |
| Theme: Travel Time | 13% |
| BRT needs to be fast/Travel time is important (general) | 6% |
| Provide fast/express/direct routes | 4% |
| Potential impacts to congestion can help travel time | 4% |
| Needs to be faster than/compete with other modes of travel | <1% |
| Theme: Frequency | 9% |
| High frequency service is important | 8% |
| Request/need/prefer higher frequency schedule | 1% |
| Theme: Reliability | 8% |
| Needs to be reliable/consistent/doubts reliability | 7% |
| Offer real-time arrival information and reliable schedules | 1% |
| Needs to improve upon reliability of current service | 1% |
| Theme: Amenities | 7% |
| Passenger experience and accessibility | 4% |
| Bus stop amenities | 3% |
| Clean buses | 1% |
| Provided integrated fare payment with Metro/SmarTrip | 1% |
| Theme: Cost | 6% |
| Affordability/cost of fares | 5% |
| Concerns about cost of BRT system overall | 2% |
| Other fare comments | 1% |
| Theme: Dedicated Lanes | 6% |
| BRT requires dedicated lanes | 6% |



| Themes | Total |
|---|-------|
| Comments about existing transit/other agencies | 5% |
| Theme: Congestion | 5% |
| Reduce dependency on cars | 4% |
| Good for when cars are not an option | 1% |
| Suggestions for improving plan documentation | 4% |
| Negative comments about plan | 3% |
| Theme: Safety | 2% |
| Safe environment | 2% |
| Safety concerns (general) | <1% |
| Prioritize pedestrian and driver safety | <1% |
| Prioritize safety (general) | <1% |
| Theme: Span | <1% |
| Adjust span (general) | <1% |
| Theme: Walkability and Bikeability | 4% |
| Integrate with pedestrian and bike infrastructure | 3% |
| Need more dedicated bike lanes and pedestrian infrastructure | 2% |
| Questions/Concerns about implementation timeline | 2% |
| Other themes/comments | 9% |
| Concerns about toll-roads | 1% |
| Concerns about road widening/capacity | <1% |
| Requests to fix the roads | <1% |
| Concerns about BRT service levels | 2% |
| Consider impact on existing transportation | 1% |
| Impact on community | 1% |
| Equity and accessibility | 1% |
| Enhance bus service quality | 1% |
| Specific route recommendations | <1% |
| Promote sustainable transportation options | 1% |
| Concerns about funding | <1% |
| BRT types are confusing/Want full BRT | 1% |
| Sustainability and environmental considerations | 1% |
| Explore potential for electrification and future conversion to light rail | 2% |
| BRT will compete with/be measured against other modes | 1% |

Base = Those Answering



Route Specific Comments

Respondents had the opportunity to make suggestions about additional routes or changes to the proposed routes that would make the system more useful to them. The most common suggestions about the routes are included in Table 43.

Table 43 Summary of Route Specific Comments

| Route/ Location | Summary of Comments |
|---|---|
| Duke Street Transitway (3) & Little River Turnpike (12) | Suggestion to combine Duke Street Transitway (Route 3) with the proposed Little River Turnpike (Route 12) to eliminate a transfer. |
| Route 7 (5) | Suggested connection to West Falls Church Metro station in addition to, or instead of, connection at East Falls Church. |
| | Multiple comments suggesting extending Route 7 BRT to King St-Old Town. |
| Glebe Road (6) | Suggestion to extend the proposed Route 6 north past Marymount University, or further north to connect to the proposed Route 15's (Chain Bridge Road) terminus in McLean. |
| | Several comments suggested connecting the proposed Route 6 to West End Transitway (Route 4) in Shirlington. |
| | Several comments suggesting routing the portion of the route immediately east of I-395 along W Glebe Road in Alexandria, like the DASH 33. |
| Columbia Pike to D.C. (8) | Suggestion to extend Route 8 south to start near Franconia-Springfield Metro, like the proposed Gallows Road route (Route 13). |
| Arlington Boulevard (9) | Suggestion to have an east-west route (like the proposed Route 9—Arlington Blvd) stop at Inova Fairfax Hospital. |
| Beltway South (11) | Suggestion to add a "commuter hour spur" to allow the proposed Route 11 to reach Joint Base Andrews. |
| Beltway North (14) | Suggestion to end the proposed Route 14 in downtown Bethesda. |
| Chain Bridge Road (15) | Suggestion to have this route leave Chain Bridge Rd and stop at Vienna Metro. |
| | Many suggestions (10+) to connect proposed Route 15 with proposed Route 28 (Old Keene Mille Road) near Fairfax Station or Burke Centre VRE. |
| VA 28 South (22) | Suggestion to run the proposed Route 22 via Mathis Ave/Old Centreville Rd/Ordway Rd/Centrewood Dr rather than the parallel Route 28, to better serve planned mixed used development along Mathis Road |
| Manassas Connector (23) | Suggestion to run the proposed Route 23 via Mathis Ave/Old Centreville Rd/Ordway Rd/Centrewood Dr rather than the parallel Route 28, to better serve planned mixed used development along Mathis Road |
| Prince William Parkway (24) | Suggestion to extend the proposed Route 24 to Dumfries. |
| | Several suggestions to extend the proposed Route 24 to Rippon VRE. |
| U.S. 1 South (27) | Suggestion to extend the proposed Route 27 south to Dumfries. |
| Old Keene Mill Road (28) | Many suggestions (10+) to connect proposed Route 15 (Chain Bridge Road) with proposed Route 28 near Fairfax Station or Burke Centre VRE. |
| Fairfax County/ Arlington County/ Alexandria | Several comments suggesting additional north-south/circumferential routes connecting south Arlington, Alexandria, and eastern Fairfax County to outer stations on Metro's Silver and Orange Lines, avoiding the Rosslyn transfer. |



5.0 PLANNING FOR UNCERTAINTY

The analyses discussed so far are based on forecasts which assume that travel behaviors in the future are similar to travel behaviors prior to 2020. This includes growth assumptions for the region along with some changes to the transportation network but does not fully consider the many ways life and travel could change between now and 2045. What if the future is significantly different in some important ways? Uncertainty is a part of long-range transportation planning; it is impossible to know precisely what the future will look like as transportation technologies, preferences, and options evolve over time. Even over the course of the two-year duration of this project, travel patterns in Northern Virginia shifted dramatically as the region continued to recover from the global pandemic, return-to-work mandates were implemented, and the future of the regional economy was called into question.

Given this uncertainty, NVTA tested the regional BRT system’s robustness and adaptability using a set of sensitivity tests. These sensitivity tests considered three alternative future scenarios, each analyzing the BRT system’s performance under a different set of assumptions about the future. By analyzing multiple potential futures, NVTA can ensure that the routes in the proposed BRT system will be successful across a range of potential futures, marking them as good investments for the region despite uncertainty.

5.1 Scenarios Considered

In addition to a ‘standard’ forecast of the future in 2045, this sensitivity analysis identifies three ‘alternate’ futures that incorporate one or more plausible disruptions/scenarios—behavioral disruptions or policy scenarios that could have significant impacts on individual travel choices and the operation of the BRT network in the future.

The following three scenarios have been identified as plausible alternate futures for analysis:

- ♦ **Telework Evolution** in which long-term travel behaviors evolve to reduce travel across multiple trip purposes, and are replaced by technology-enabled solutions.
- ♦ **BRT-Oriented Land Use** represents more concentrated growth and development along BRT corridors.
- ♦ **Transportation Incentives & Pricing** focusing on policy strategies to manage travel demand and encourage the use of non-SOV modes.

Each of these scenarios represents a plausible set of disruptions by 2045, but as disruptions, these are mostly elements that are out of NVTA’s control. These alternate futures are identified as plausible scenarios—but they are not necessarily preferred visions for the future, nor are they necessarily the most likely scenarios. These three scenarios also do not represent an ‘either-or’ view of the future. An increase in telework (from the Post-Pandemic New Normal scenario) could occur in tandem with densification around BRT stations (from the BRT-Oriented Land Use scenario). Instead, this scenario analysis was an assumption-based approach in which the best available research was used to identify a reasonable and plausible set of assumptions for each of the scenarios.



5.1.1 Telework Evolution

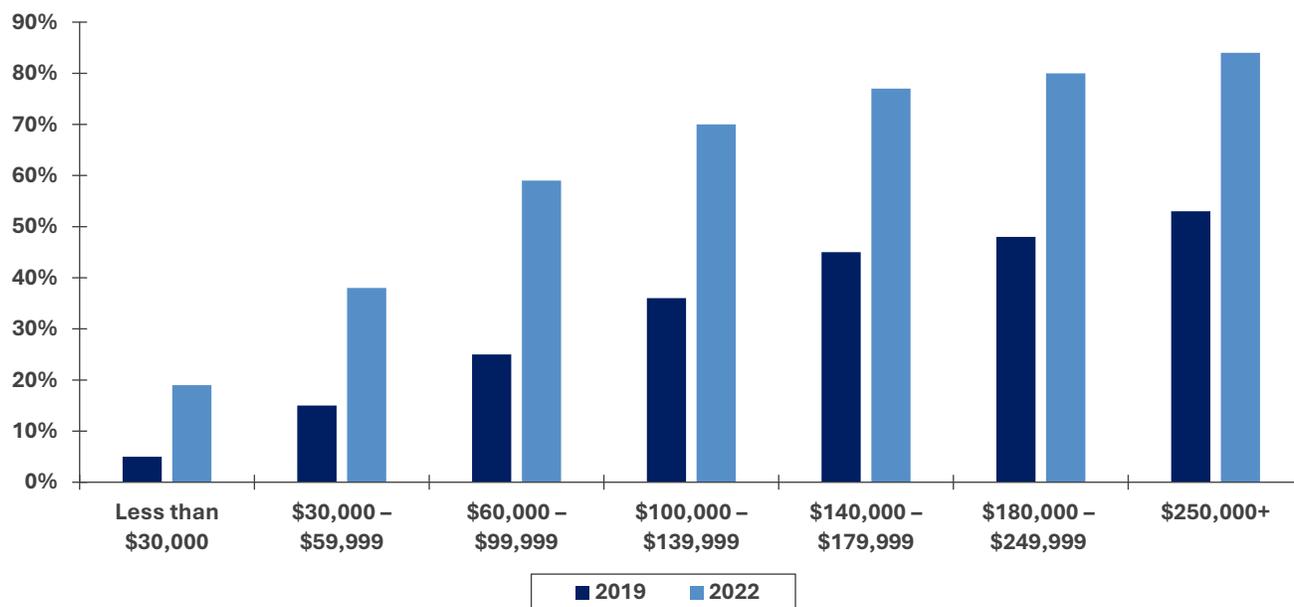
This scenario illustrates a future in which long-term travel behaviors evolve to reduce travel for several purposes, including shopping, commuting, and other work-based trips. In this scenario, some of those trips are assumed to be replaced by technology-enabled solutions such as telework, virtual meetings, and deliveries. Some of the key changes that are assumed for long-term adoption include:



- ◆ Increased telework for workers who are able to telework, especially office workers;
- ◆ Decrease in other work-based trips due to increased telework;
- ◆ Replacement of shopping trips with at-home deliveries;
- ◆ Increases in non-motorized trips.

Telework has been an important part of the commuting landscape in Northern Virginia for many years, and has been growing as technologies have improved. In 2019, 35% of Washington-area workers teleworked regularly or occasionally, up from 19% in 2007.¹¹ On a typical day in 2019, about 8.6% of Washington-area workers teleworked, which is approximately equivalent to one-third of the workforce teleworking 1.1 days per week. Teleworking also increased as household income increased. While only 5% of workers with incomes below \$30,000 teleworked, almost half of workers making over \$140,000 teleworked. This telework income disparity was also salient in 2022, even though telework rates increased for all income groups during and immediately following the global pandemic.

Figure 85 Telework by Household Income



The global pandemic illustrated that many jobs can be done efficiently and effectively without a physical work site, and 60% to 65% of Washington-area workers worked at home on a given day at the height of the pandemic. Even at its peak, telework was not adopted universally across the labor market, as some positions require in-person work. Many of the

¹¹ Metropolitan Washington Council of Governments (2019). <https://www.mwcog.org/documents/2020/06/17/state-of-the-commute-survey-report—carsharing-state-of-the-commute-travel-surveys/>.



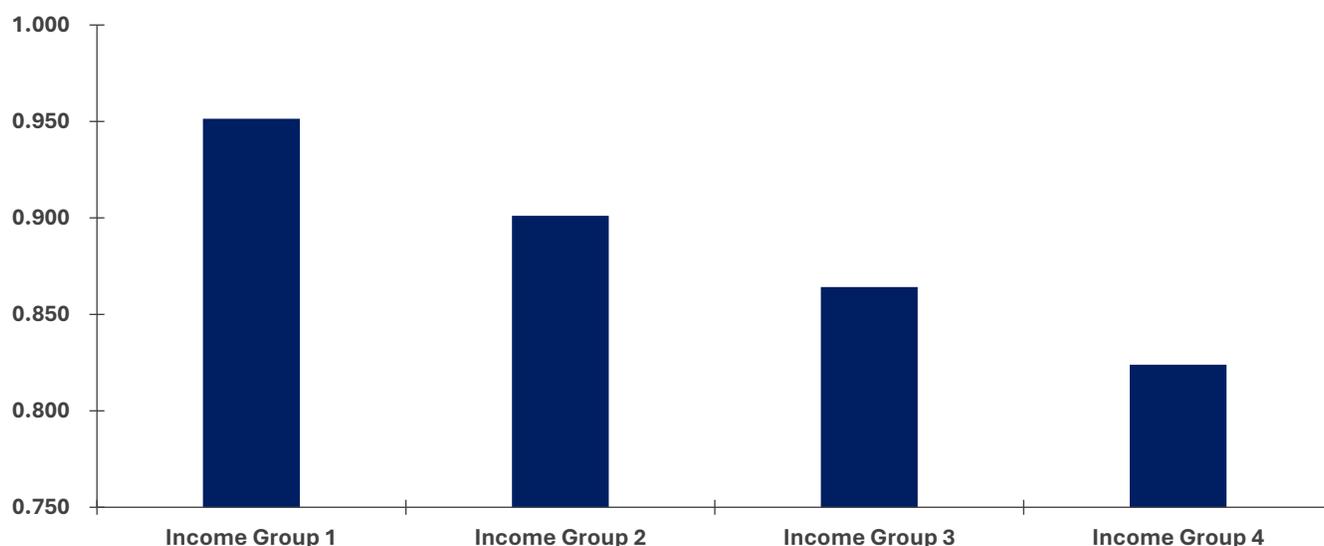
positions that cannot be shifted to telework are also lower-income jobs, such as retail, service industry, hospitality, construction, industrial jobs, and many jobs in the medical industry.

Surveys in the region and across the U.S. have indicated that many would like to continue to work remotely, although some employers, including the Federal Government have recently begun implementing return-to-office requirements for employees. In the long term, preferences of employees and employers, advances in technology, and changes in local and Federal policy will likely balance out to create a new paradigm of work that incorporates some level of telework that is higher than conditions observed in 2019. Therefore, in contrast to the ‘standard forecast’ analyzed in Section 4, this scenario assumes that 55% of workers in the region will telework 1.5 days per week, including private sector and Government employees. These assumptions are higher than current levels, but lower than the social-distancing mandated levels seen at the height of the pandemic.

Changes to telework and other work-related travel are represented by changes to the assumed trip generation rates. As shown in Figure 86, adjustments to trip generation rates vary by income group to account for the differences in ability for different types of workers to telework. For example, home-based work (HBW) or commute trip generation rates will be reduced by 5% for the lowest income group (income group 1), but reduced by 18% for the highest income group (income group 4). Collectively, these assumptions are roughly equivalent to replacing nearly 21% of commute trips with telework.

In addition to this growth in telework impacting commute trips, telework also has a major impact on non-home-based-work (NHW) trips. These NHW trips are workplace-based trips as people travel to meetings at off-site locations, go out to lunch, and/or run errands near their offices. With more telework, many of these trips will no longer occur. NHW trips will therefore also be decreased by 21%.

Figure 86 HBW and NHW Trip Generation Adjustments by Household Income Level



Note: Income Group 1: less than \$50,000 per year; Income Group 2: \$50,000-\$100,000 per year; Income Group 3: \$100,000-\$150,000 per year; Income Group 4: more than \$150,000 per year

Shopping behaviors have also changed, with more and more commerce happening online. Some increases in online retail can be tied to the global pandemic, and the 2021 TransAction Tracking Survey showed significant growth in online shopping, with a 7% increase in households who shop online at least once per week. While the pandemic has eased the requirement for online shopping, the convenience and ease of online shopping and at-home delivery will likely



mean that many people continue to use them long into the future. In this sense, the pandemic can be seen as a force hastening a shift towards e-commerce that has been predicted by the industry for several years.

As of May 2021, travel to all retail establishments was reported to be 5.6% lower than pre-pandemic levels, even as vaccines became widespread and many Americans returned to a ‘new-normal’ in life. This scenario assumes that by 2045, shopping behaviors will demonstrate a similar decrease to the number of shopping trips, with some portion of those trips being replaced by deliveries. There is not a one-to-one replacement between shopping trips and delivery trips, as carriers can group multiple deliveries together to optimize efficiency. Therefore, commercial trips will be increased by one-third of the number of shopping trips that are reduced. It should be noted that NVTAs has minimal influence over this scenario.

Non-motorized travel is also impacted by increases in telework, as when more people staying closer to home (instead of commuting to work) they are more likely to use non-motorized options for short errands, exercise, or recreational trips. A 5% increase in non-motorized trips generated will be assumed as part of this scenario.

5.1.2 BRT-Oriented Land Use

This scenario considers the potential impacts to BRT ridership of additional transit oriented development around BRT stations. To do this, the scenario assumes that some of the land use development planned in Northern Virginia between 2030 and 2045 would be concentrated around the proposed BRT stations. NVTAs does not have authority over land use planning; individual jurisdictions will have the most influence over this scenario.



To develop this scenario, the growth in jobs and population between 2030 and 2045 was identified based on the MWCOG/TPB Round 10.0 Cooperative Land Use Forecasts. The scenario maintained 2045 population and employment totals within each jurisdiction, which requires identifying specific areas to reallocate land use around the region.

- ◆ **“Donor zones”** are identified as areas not within one-half mile from a high-capacity transit station (including Metrorail, VRE, and proposed BRT stations).
- ◆ **“Recipient zones”** are identified as areas within one-half mile of proposed BRT stations. Recipient zones were prioritized based on the density of each of the BRT corridors.

The land use development identified in the donor zones were reallocated to recipient zones, adding land use to recipient zones with the lowest density first. This process tried to bring all corridors up to the level of density identified as supporting BRT service. This threshold was identified in Section 3 as an activity density of 11,000 jobs and population per square mile.

Based on this approach, 31,000 future jobs and 46,000 future residents were reallocated from donor zones to areas within one-quarter miles of proposed BRT stations. These changes are illustrated in Figure 87 and Figure 88. As shown, there are some jurisdictions where very little land use growth was able to be reallocated because all or most of the growth is already planned to be within one-half mile of high-capacity transit stations.



Figure 87 Reallocation of Population Growth

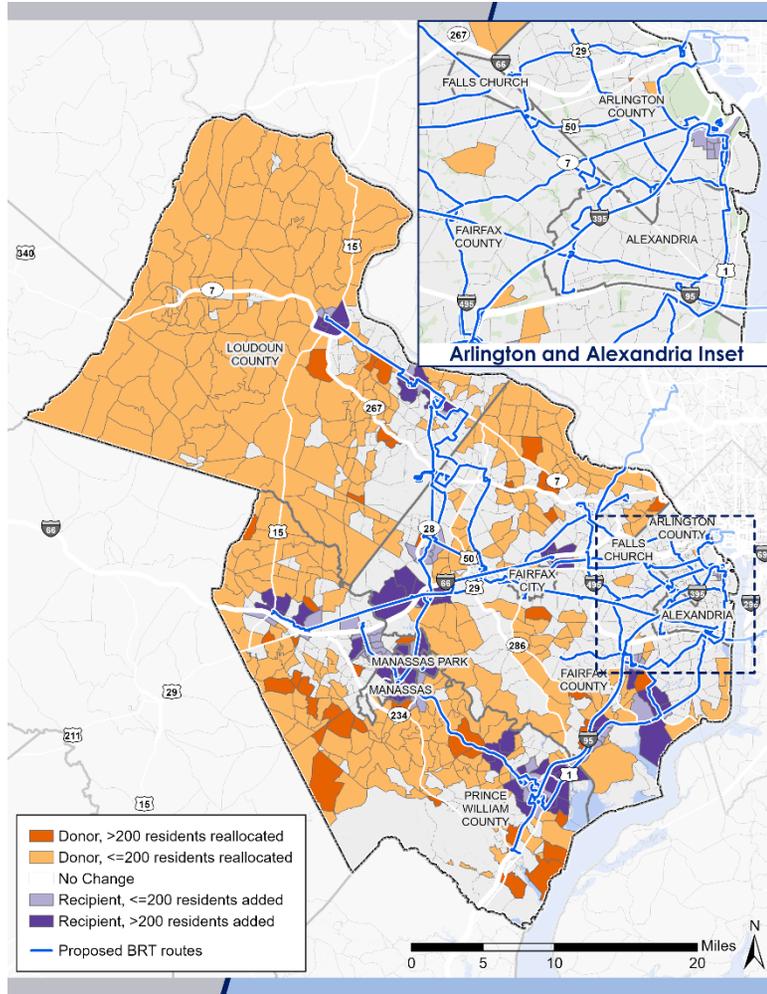
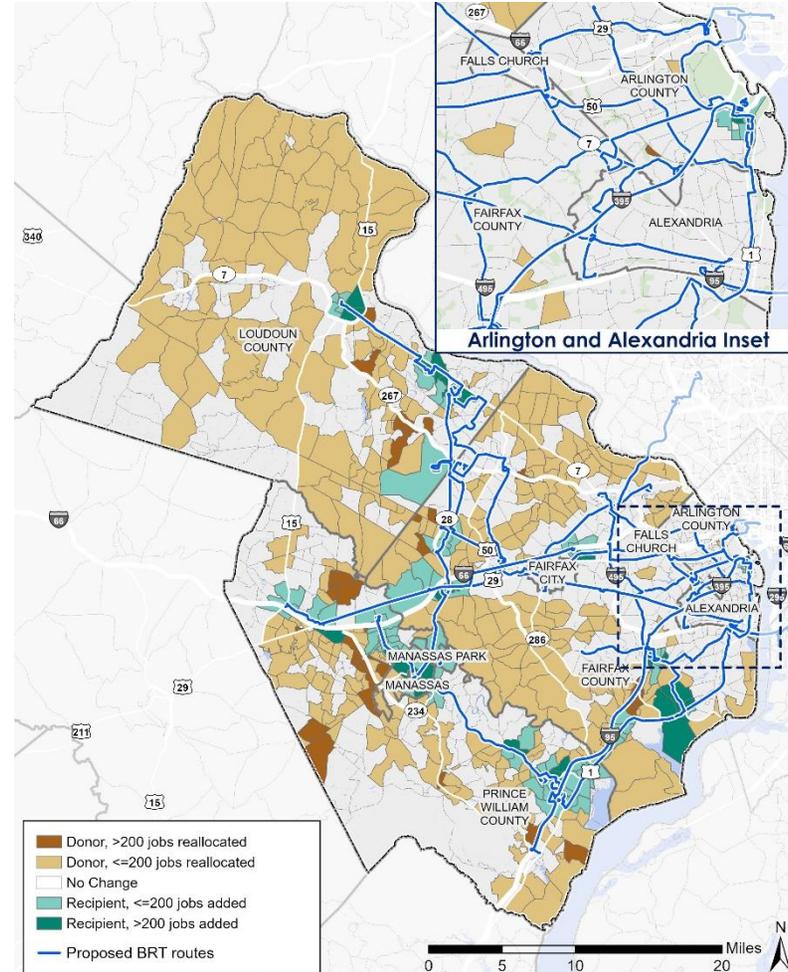


Figure 88 Reallocation of Employment Growth



5.1.3 Incentives & Pricing Scenario

This scenario centers on policy strategies designed to change travel behavior in order to mitigate congestion and its negative impacts. The scenario incorporates a number of monetary inducements designed to discourage driving alone and encourage the use of other modes. These policies are designed to act as a supplement to the proposed BRT system, encouraging the use of transit not only by providing fast, frequent, and reliable service, but also by setting policies that make it even less attractive to drive alone where other options are available. The assumptions incorporated into this scenario include:



- ◆ VMT Pricing;
- ◆ Parking/Curbside Pricing;
- ◆ Free Transit Fares; and
- ◆ Incentives to shift travel times.

If pricing strategies are implemented, they could be used as a revenue stream to fund incentive programs, including making up for lost transit fare revenue.

VMТ Pricing

One of the most commonly considered pricing strategies is implementing a VMT fee that charges users a fee per each vehicle-mile driven. This option has even been discussed at the Federal level as a replacement for gas taxes, which have been in decline due to increases in vehicle fuel efficiency. The purpose of implementing a VMT fee in Northern Virginia would be two-fold: 1) to encourage people to use alternative modes of travel when possible, especially the proposed BRT system and 2) to provide transportation revenues. As such, VMT fees should be set at a level that is high enough to encourage behavioral shifts, but not so high as to stifle mobility and economic activity in the region. The VMT fees used in this scenario are shown in Table 44. Higher fees would be expected to have more significant impacts on travel behavior. The difference in peak and off-peak period fees will also encourage people to shift travel from the peak periods for trips that are not especially time-sensitive.

Table 44 Proposed VMT Fee by Time Period

| Time Period | Fee Per Mile (2007\$) |
|------------------|--------------------------|
| Peak Periods | \$0.25 |
| Off-Peak Periods | \$0.12 |

The scenario envisions these fees being applied to all roadways (public and private) in Northern Virginia, in addition to the District of Columbia and Prince George’s and Montgomery Counties in Maryland. VMT Pricing could be implemented by any number of jurisdictions independently, but it would make the most sense as a coherent method for managing regional travel demand and congestion if implemented in a coordinated way across the entire metropolitan region.

One of the major concerns with any roadway pricing strategy are the equity considerations: a VMT pricing plan that is not thoughtfully designed could place an undue burden on low-income residents, and could limit their mobility and/or their ability to access certain employment, educational, shopping, and recreation opportunities. Such a stratification of the transportation system is not a desired outcome and would need to be addressed to ensure that low-income residents can take advantage of the whole multimodal transportation system as much as their higher-income



neighbors. There are many potential ways to counteract any negative equity issues associated with a VMT pricing system, including a subsidy for low-income households and/or fees that vary by income level. The details of any such policy would need to be studied and fine-tuned before and even during implementation. For the sake of this scenario, it is assumed that the fees will vary based on household income level, as shown in Table 45 below. This variation would be applied to all roadway tolls in the region.

Table 45 VMT Pricing by Household Income Level

| Household Income Group | Percent of VMT Fee Paid |
|------------------------|-------------------------|
| Group 1 (Lowest) | 20% |
| Group 2 | 50% |
| Group 3 | 80% |
| Group 4 (Highest) | 100% |

Parking Pricing

Another way to manage auto demand and encourage the use of transit is to price parking. Many places in the region already charge for parking—for example, the cost of parking is often cited as a major reason for transit usage to downtown D.C. As shown in Figure 89, most of the region provides free (or almost free) short-term parking, typically priced at hourly rates, which would be used by people traveling for shopping or recreation trips. As shown in Figure 90, the cost for daily parking for commuters varies significantly across the region, with the highest costs in major employment centers, most of which are already transit accessible and would be served by multiple proposed BRT routes, including Tysons, Reston, the Rosslyn-Ballston corridor, Alexandria, and Arlington’s National Landing. However, parking remains free or low cost to commuters in much of the region.

To encourage the use of transit for all types of trips in Northern Virginia, this scenario assumes an increase in both short-term and daily parking costs. As shown in Figure 89, short-term parking costs will be assumed to be double their current values in the three densest area types. Further, low parking costs will be added to some of the areas that currently have no short-term parking costs. These costs represent an average parking cost for each zone, and as such are not differentiated by the type of parking facility (e.g., on-street or off-street, public garages or privately provided.) Similarly, the cost of daily parking will be increased across the region, along with an expansion of areas that charge for daily parking, as shown in Figure 91.

Figure 89 Hourly Parking Costs (2007\$)

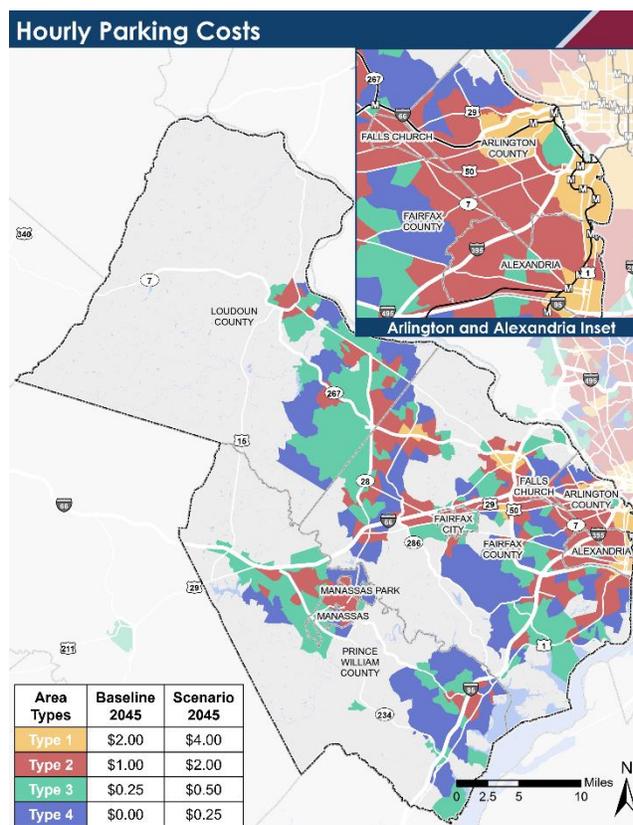


Figure 90 Standard Daily Parking Costs (2045 costs in 2007\$)

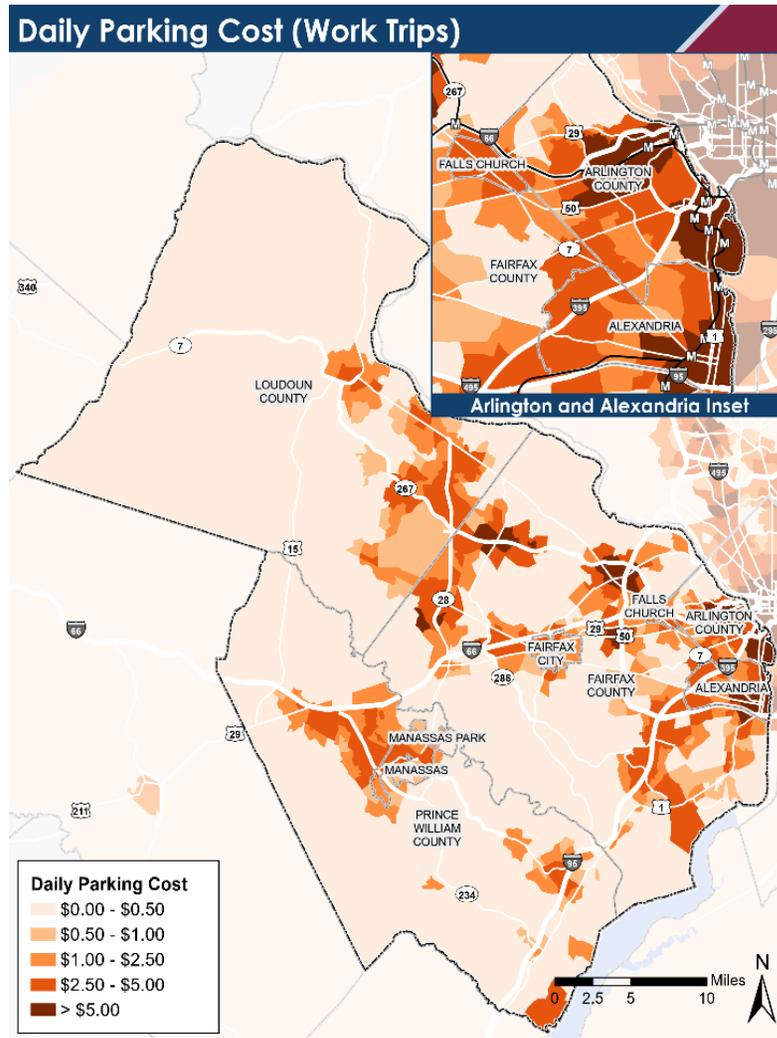
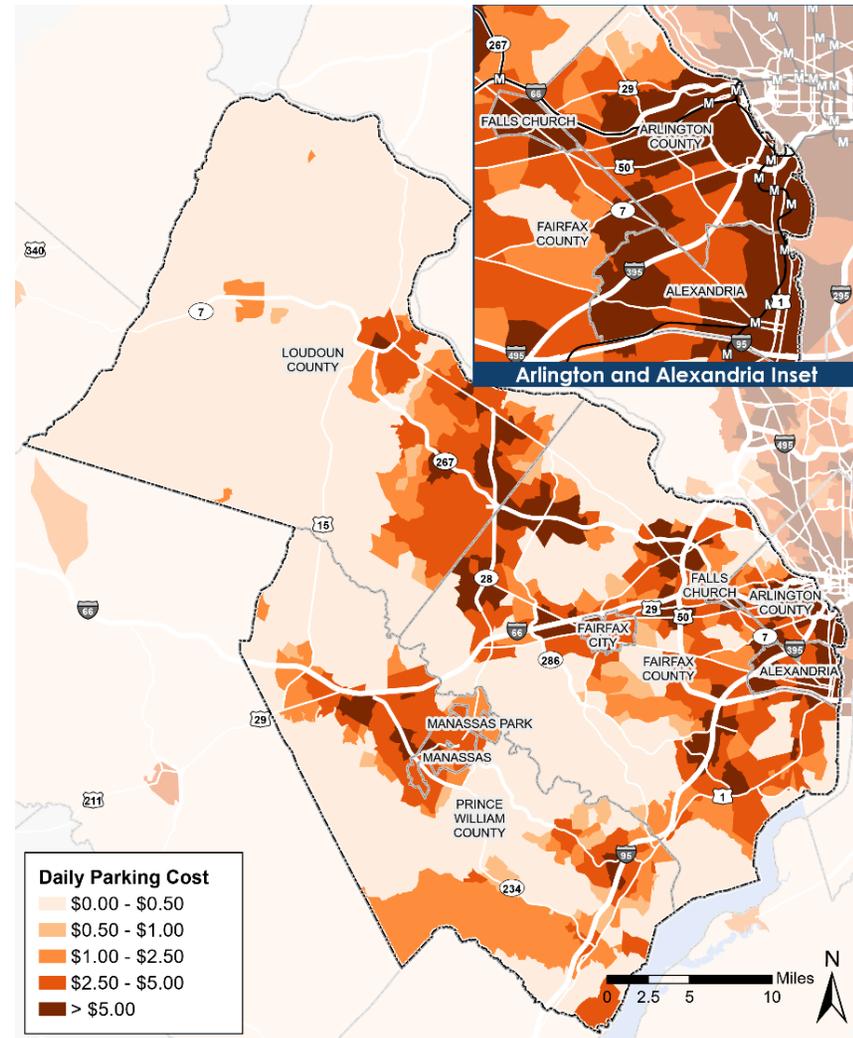


Figure 91 Scenario Daily Parking Costs (2045 costs in 2007\$)



Free Transit Fares

To further incentivize the use of transit, this scenario assumes that all transit in the model region will be fare free, including Metrorail, the proposed BRT system, Metrobus, VRE, and all local bus operators. Parking fees at Metrorail stations will be retained, because parking capacity at most stations is limited.

Incentives to Shift Travel Time

Additional thinking on incentive strategies for travel demand management includes considering ways to encourage people to shift the time of their trip out of the peak periods, or out of the peak-of-the-peak to help alleviate congestion. In addition to the incentive of avoiding congestion itself, experiments with monetary incentives are ongoing. The GoMyWayVA™ app, co-managed by VDOT and DRPT, is currently being tested as a way to encourage a range of travel behavior changes, including changing travel times, to earn rewards. As part of this scenario, it will be assumed that this type of program is in place across the region. When combined with the difference in peak and off-peak VMT fees, the effect will be to spread peak period trips over a wider time period, and even out some of the most extreme peaks in demand.

5.2 Scenario Evaluation Results

Each of these scenarios was analyzed using the NVTA travel demand model to understand how the regional BRT system performance in 2045 might change if these futures came to pass. The results were compared to the systemwide forecasts discussed in Section 4.2.1. to understand how these potential futures might impact performance of the BRT system and the transportation network as a whole, across a range of measures.

These metrics are compared with the standard systemwide BRT results, and some of major findings are as follows:

- ◆ The Telework Evolution Scenario includes assumptions that reduce overall trip-making in the region. This results in significantly lower VMT, congestion, and emissions than in the standard forecasts. This also results in a 10% decrease in transit trips, or the number of end-to-end trips taken using transit regardless of transfers, across all modes as compared to the standard 2045 forecasts. In total, BRT ridership in 2045 is forecast to be 9% lower under this scenario than in the standard forecasts, or about 130,000 boardings on an average weekday. Because commute trips were assumed to be the most impacted in this scenario, there is also a small decrease in the portion of BRT ridership that occurs during the peak periods.
- ◆ The BRT-Oriented Land Use Scenario reallocates about 15% of the population and land use growth expected between 2030 and 2045 into areas that are within walking distance of a proposed BRT station. This amounts to an additional 31,000 jobs and 46,000 residents within walking distance of a BRT station. The impact of this increased densification is moderate, with a small increase in transit usage and a corresponding reduction in VMT and emissions. BRT ridership is forecast to increase by 1.5% as compared to the standard forecasts, or approximately 2,000 average daily boardings.
- ◆ The Incentives & Pricing Scenario has a range of incentives assumed to encourage trip-makers to shift from driving to transit, resulting in shifting approximately 180,000 more driving trips onto transit, including in a 70% increase in BRT ridership and a 39% increase in boardings on other high capacity transit in Northern Virginia (VRE and Metrorail). This shift has significant impacts on the regional transportation system by removing cars from the region's roads. As a result, VMT, congestion, and vehicle emissions are reduced significantly.

Table 46 displays some of the key evaluation measures for each of the scenarios as compared to the standard 2045 forecasts.

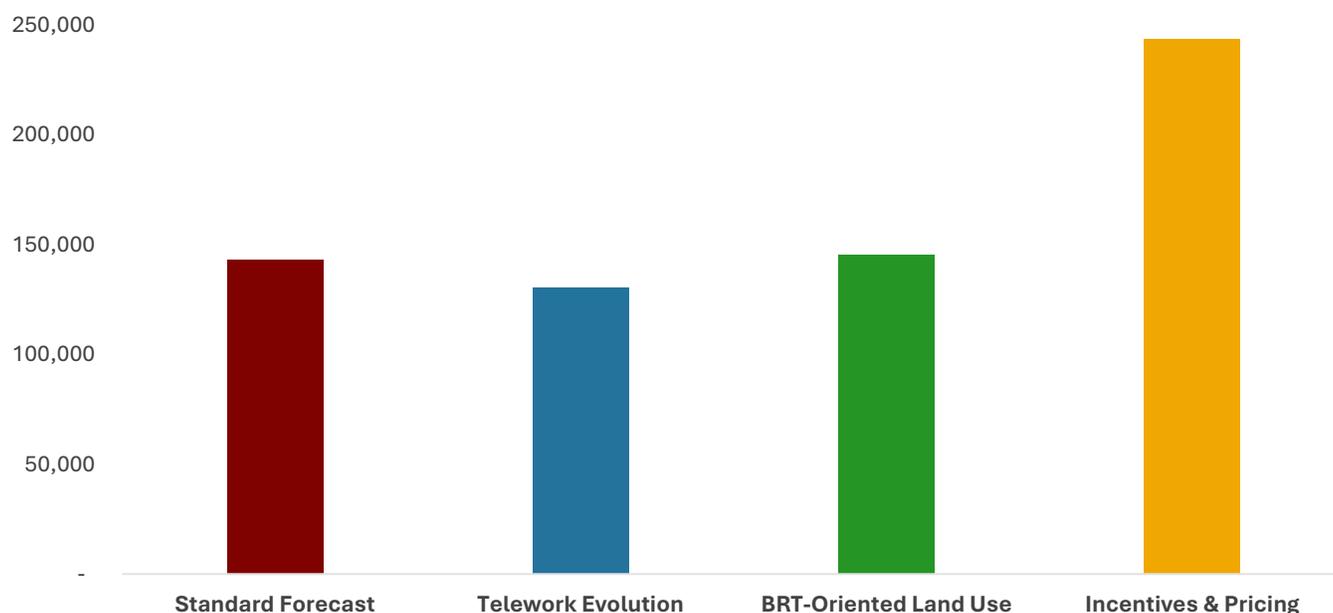


Table 46 Scenario Evaluation Results

| | Standard 2045 Forecast | Telework Evolution | BRT-Oriented Land Use | Incentives & Pricing |
|---|------------------------|--------------------|-----------------------|----------------------|
| BRT Ridership | 143,300 | 130,500 | 145,200 | 243,700 |
| Total Transit Trips | 435,000 | 389,900 | 436,500 | 614,400 |
| BRT Ridership Share During Peak Periods (AM+PM) | 61% | 59% | 61% | 54% |
| Other High Capacity Transit Boardings (VRE+Metrorail) | 241,900 | 214,700 | 241,800 | 337,100 |
| Congestion (person hours of delay for Auto+Transit) | 691,200 | 605,000 | 691,200 | 593,500 |
| Vehicle-Miles Traveled (VMT) (in millions (M)) | 64.92M | 62.56M | 64.79M | 60.47M |
| Vehicle Emissions (CO2 Emissions in tons) | 14,800 | 14,300 | 14,700 | 13,900 |
| Transit Accessibility Improvement (Total) | 732,400 | 752,300 | 733,800 | 741,200 |
| Transit Accessibility Improvement (EEA) | 781,900 | 796,100 | 784,900 | 789,800 |

2045 average daily ridership for the proposed BRT system is illustrated in Figure 8. As shown, the Incentives & Pricing Scenario has the biggest impact on ridership, increasing ridership by 70% by using a range of policies to encourage transit use.

Figure 92 Average Daily BRT Boardings by Scenario



The impacts on ridership vary by route, as shown in Table 47. The Telework Evolution Scenario decreased BRT ridership by 9% overall. Most of the individual routes see a decrease in average daily ridership of 7% to 11%, indicating that routes are impacted similarly across the region. Routes with a higher percentage of ridership that occurs during the peak period saw a larger percent decrease in ridership. For example, 91% of the ridership on the I-66 Express route occurs during the peak periods and this route saw a 16% reduction in ridership under this scenario. The BRT-Oriented



Land Use Scenario results in small changes to BRT ridership for most routes. The biggest increases in ridership occur for routes that saw the biggest increase in density, and are typically located in the outer jurisdictions. The Incentives & Pricing Scenario results in a 70% increase in BRT ridership at a system level, although there is significant variation by route. For example, the Loudoun Connector route which has low ridership under the standard forecasts sees an increase of more than 400% under this scenario. The Route 7 corridor is forecasted to see an increase of more than 11,000 average daily riders.



Table 47 Scenario Ridership by Route

| Corridor | Standard Forecast Boardings | Telework Evolution | | | BRT-Oriented Land Use | | | Incentives & Pricing | | |
|---------------------------------|-----------------------------|--------------------|------------|----------|-----------------------|------------|----------|----------------------|------------|----------|
| | | Boardings | Difference | % Change | Boardings | Difference | % Change | Boardings | Difference | % Change |
| 1 Richmond Highway | 13,500 | 12,200 | -1,300 | -9% | 13,700 | 200 | 2% | 19,200 | 5,700 | 42% |
| 2 Metroway | 11,700 | 10,400 | -1,300 | -11% | 11,700 | — | 0% | 14,600 | 2,900 | 25% |
| 3 Duke Street Transitway | 5,500 | 5,000 | -500 | -9% | 5,500 | — | 0% | 7,700 | 2,200 | 40% |
| 4 West End Transitway | 3,300 | 3,100 | -200 | -8% | 3,300 | — | 0% | 4,900 | 1,600 | 48% |
| 5 Route 7 | 16,000 | 14,800 | -1,200 | -8% | 16,000 | — | 0% | 27,200 | 11,200 | 70% |
| 6 Glebe Road | 5,700 | 5,200 | -500 | -9% | 5,700 | — | 0% | 8,300 | 2,600 | 45% |
| 7 Columbia Pike to Crystal City | 9,600 | 8,800 | -800 | -9% | 9,600 | — | 0% | 12,800 | 3,200 | 33% |
| 8 Columbia Pike to DC | 8,700 | 8,000 | -700 | -9% | 8,800 | 100 | 1% | 10,900 | 2,200 | 25% |
| 9 Arlington Boulevard | 3,800 | 3,400 | -400 | -10% | 3,800 | — | 0% | 5,100 | 1,300 | 35% |
| 10 Langston Boulevard | 9,900 | 8,800 | -1,100 | -11% | 9,900 | — | 0% | 12,700 | 2,800 | 28% |
| 11 Beltway South | 6,800 | 6,300 | -500 | -8% | 6,800 | — | 0% | 11,100 | 4,300 | 64% |
| 12 Little River Turnpike | 2,700 | 2,600 | -100 | -6% | 2,800 | 100 | 0.3% | 5,500 | 2,800 | 101% |
| 13 Gallows Road | 6,800 | 6,300 | -500 | -8% | 6,900 | 100 | 1% | 14,300 | 7,500 | 110% |
| 14 Beltway North | 3,100 | 2,800 | -300 | -10% | 3,100 | — | 0% | 5,600 | 2,500 | 81% |
| 15 Chain Bridge Road | 5,000 | 4,500 | -500 | -9% | 4,900 | -100 | -0.5% | 10,400 | 5,400 | 111% |
| 16 Fairfax Boulevard | 4,600 | 4,200 | -400 | -9% | 4,900 | 300 | 6% | 8,500 | 3,900 | 84% |
| 17 West Ox Road | 4,500 | 4,200 | -300 | -7% | 4,500 | 50 | 1% | 11,700 | 7,200 | 160% |



| Corridor | Standard Forecast Boardings | Telework Evolution | | | BRT-Oriented Land Use | | | Incentives & Pricing | | |
|---------------------------|-----------------------------|--------------------|------------|----------|-----------------------|------------|----------|----------------------|------------|----------|
| | | Boardings | Difference | % Change | Boardings | Difference | % Change | Boardings | Difference | % Change |
| 18 Sterling Connector | 2,800 | 2,600 | -200 | -7% | 2,900 | 100 | 2% | 9,800 | 7,000 | 247% |
| 19 Loudoun Connector | 900 | 800 | -100 | -9% | 1,000 | 100 | 16% | 4,800 | 3,900 | 467% |
| 20 VA 28 North | 1,600 | 1,500 | -100 | -7% | 1,600 | — | 1% | 7,900 | 6,300 | 388% |
| 21 I-66 Express | 1,400 | 1,200 | -200 | -16% | 1,500 | 100 | 9% | 1,900 | 500 | 35% |
| 22 VA 28 South | 2,900 | 2,700 | -200 | -8% | 3,100 | 200 | 7% | 7,400 | 4,500 | 153% |
| 23 Manassas Connector | 2,900 | 2,700 | -200 | -6% | 3,100 | 200 | 7% | 4,800 | 1,900 | 65% |
| 24 Prince William Parkway | 1,300 | 1,200 | -100 | -8% | 1,400 | 100 | 12% | 2,200 | 900 | 72% |
| 25 Fort Belvoir Express | 200 | 200 | — | -2% | 200 | — | 11% | 400 | 200 | 105% |
| 26 I-95 Express | 3,700 | 3,300 | -400 | -12% | 3,700 | — | 1% | 5,700 | 2,000 | 54% |
| 27 U.S. 1 South | 2,200 | 2,000 | -200 | -8% | 2,400 | 200 | 12% | 4,100 | 1,900 | 87% |
| 28 Old Keene Mill Road | 2,200 | 2,000 | -200 | -8% | 2,200 | — | 0% | 4,300 | 2,100 | 92% |



6.0 IMPLEMENTATION CONSIDERATIONS

The implementation of a high-quality, regional BRT system is best done in a coordinated way that maximizes the return on investments and provides a cohesive experience for customers across routes, operators, and modes. Beyond planning the routes themselves, several issues must be considered and incorporated into the overall system development and will need to be addressed collaboratively by a range of stakeholders in Northern Virginia. Issues of governance, funding, facilities, local service planning, and technology are all inherently interrelated. For example, decisions about funding sources will often impact the chosen form of governance for a transit agency, and vice versa. This section provides a high-level overview of these issues individually, but decisions on these subjects cannot be made independently.

6.1 BRT Facilities

A visionary BRT system like the one envisioned by the Action Plan would require the use of facilities around Northern Virginia to support operations and ridership. In particular, two major types of facilities would be needed:

- ♦ **Operations & Maintenance Facilities**—Provide locations for storage and maintenance of transit vehicles
- ♦ **Customer Facilities**—Stations of varying scales providing passenger amenities for BRT customers

The 28 potential BRT routes identified as part of the Action Plan would be integrated into the regional transit system. Future bus facilities in Northern Virginia need to be designed to accommodate not only the BRT, but also any other proposed improvements to support transit service implemented by any of the transit providers in the region. This section provides an overview of existing transit facilities in Northern Virginia, along with the needs of the BRT system.

The implementation of BRT service will likely result in changes to the underlying local bus service. Since this is a visionary plan, it is not possible to know with certainty what space may be available in existing bus facilities, and how much of the identified needs will need to be purpose-built to accommodate the BRT.

6.1.1 Existing Facilities

Between August 2023 and February 2024, an analysis of regional bus transit in Northern Virginia was conducted by the NVTC for the purpose of identifying opportunities for the coordination of transit resources. This review considered seven bus transit providers that operate within the region:

- ◆ Arlington Transit (ART), Arlington County, Virginia
- ◆ CUE Bus, City of Fairfax, Virginia
- ◆ DASH—Alexandria Transit Company, City of Alexandria, Virginia
- ◆ Fairfax Connector, Fairfax County, Virginia
- ◆ Loudoun County Transit, Loudoun County, Virginia
- ◆ Metrobus, WMATA
- ◆ OmniRide, PRTC

A portion of this analysis included an inventory of existing operations & maintenance and customer facilities, which is summarized below.

Existing Operations and Maintenance Facilities

Table 48 provides information on various existing transit facilities in Northern Virginia, including agency name, facility ownership, fueling types, capacity, shared users, and if the facility is located in an EEA. These facilities are owned by agencies and jurisdictions or are leased or rented from private companies. The fueling types for these facilities include diesel, electric, compressed natural gas (CNG), and gas. As shown below, these existing facilities include enough capacity for 1,240 buses. Since the majority of bus service in Northern Virginia operate using standard 40' buses, the majority of these facilities cannot accommodate articulated buses.

Table 48 Summary of Agency Operations and Maintenance Facilities

| Facility Name | Agency Name | Facility Ownership | Bus Storage Capacity | Fueling Types | Any Shared Users? | Within EEA ? |
|--|-------------|---|----------------------|------------------|-------------------|--------------|
| William B. Hurd Transit Facility | DASH | Owned by the City of Alexandria | 115 | Diesel, Electric | No | No |
| ART House Admin Building | ART | Owned by Arlington Water Pollution Control Bureau | 0 | N/A | No | No |
| North Quincy Temp Park and Admin Office | ART | Owned by Arlington County | 27 | N/A | No | No |
| Farrington Heavy Maintenance | ART | Leased from a Private Company | 16 | N/A | No | Yes |
| Light Maintenance Facility | ART | Owned by Arlington County | 35 | CNG | No | No |
| Arlington Operations and Maintenance Facility (Under Construction) | ART | Owned by Arlington County | 59 | N/A | No | Yes |
| Property Yard | CUE | N/A | N/A | N/A | N/A | No |



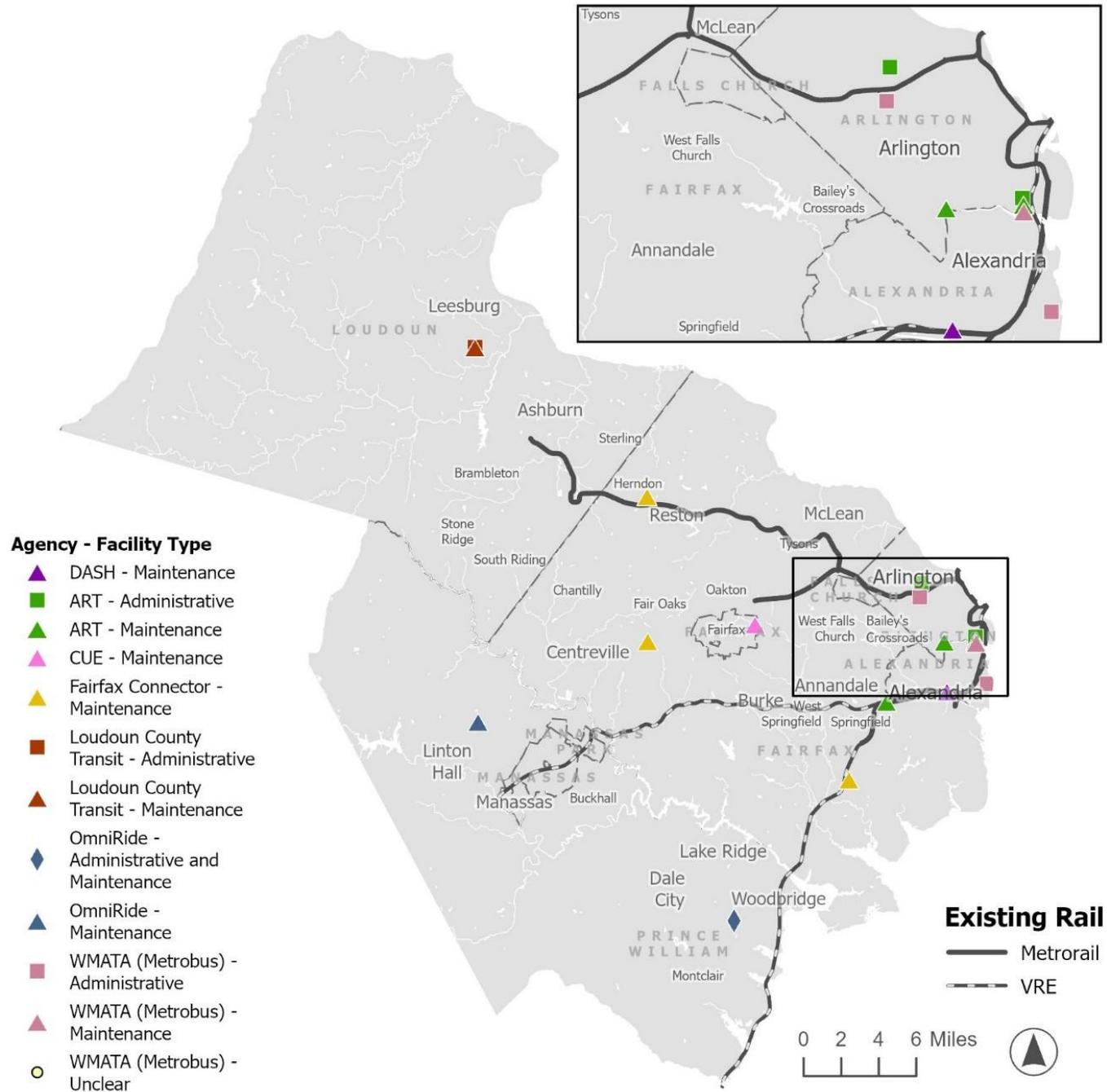
| Facility Name | Agency Name | Facility Ownership | Bus Storage Capacity | Fueling Types | Any Shared Users? | Within EEA ? |
|------------------------|------------------------|-------------------------|----------------------|---------------|------------------------|--------------|
| Herndon | Fairfax Connector | Owned by Fairfax County | 90 | Diesel | No | No |
| Huntington | Fairfax Connector | Owned by Fairfax County | 112 | Diesel | No | No |
| West Ox | Fairfax Connector | Owned by Fairfax County | 143 | Diesel | Metro | No |
| Main Office | Loudoun County Transit | N/A | N/A | N/A | N/A | No |
| Maintenance Office | Loudoun County Transit | Owned by Fairfax County | 113 | Diesel, Gas | No | No |
| Western Facility | OmniRide | Owned by OmniRide | 47 | Diesel | No | Yes |
| Woodbridge | OmniRide | Owned by OmniRide | 105 | Diesel, Gas | No | Yes |
| Cinder Bed Road Garage | Metro | Owned by Metro | 160 | Diesel | Fairfax Connector | No |
| Four Mile Run Garage | Metro | Owned by Metro | 218 | Diesel, CNG | Fairfax Connector, ART | No |

Note: The original NVTC analysis considered MWCOG EEAs. This study used a slightly different definition of EEAs that resulted in four existing facilities being identified as being located inside an EEA.

Figure 93 maps existing operating facilities by type and by agency.



Figure 93 Existing Operating Facilities by Agency



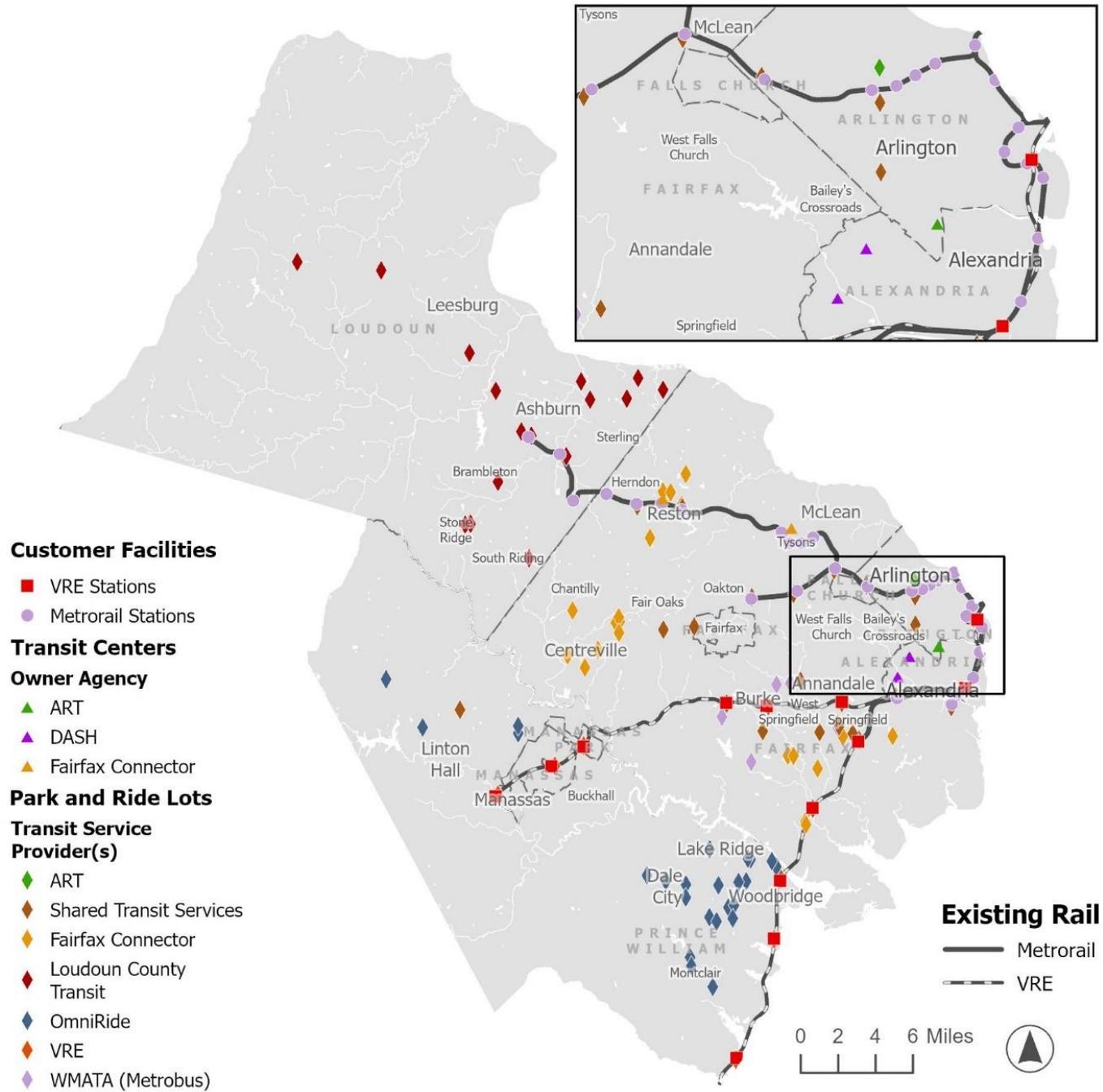
Source: NVTC Regional Bus Transit Analysis

Existing Customer Facilities

Customer facilities provide riders with access to multiple transit resources in one location. Due to the various transit providers that exist in the region, these facilities allow multiple service providers to converge on a single location to facilitate inter-agency transfers. These facilities include VRE stations, Metrorail stations, park-and-ride lots, and transit centers. Figure 94 shows customer facilities across the region.



Figure 94 Existing Customer Facilities



Source: NVTC Regional Bus Transit Analysis

Customer facilities are distributed across the region, with park-and-ride lots being the most numerous. Many of these lots connect riders to multiple transit agency services. Due to their tendency to serve commuters, there is a predictably higher number of park-and-ride lots outside of the Beltway, where riders tend to use services to commute longer distances. Due to the amount of overlapping bus service, most transit centers are located within the Beltway.



6.1.2 BRT Facility Needs

This section quantifies the needs to fulfill the 28-route BRT system envisioned by the Action Plan and considers possible efficiencies when building for a full system. Decisions about phasing and implementation, along with potential changes to the underlying local bus service could impact the scale, location, and timing of the facility needs.

Vehicle Operations & Maintenance Facilities

While many factors are considered when planning for new bus maintenance facilities, fleet size is a key factor in guiding the high-level spatial requirement as well as determining the estimated cost. For any operations and maintenance facility, the size is generally determined primarily based on the number of vehicles of varying sizes that need to be stored, the number of staff working on site, as well as the quantity of specific spaces (e.g., maintenance bays, service lanes, wash bays). Any vehicle operations and maintenance facility will need to consider the following elements:

- ◆ Standard Components:
 - » Bus Parking—Can be interior space, canopy covered, or open to the sky
 - » Staff and Non-Revenue Vehicle (NRV) parking
 - » Main Building(s)—To include Operations, Admin, and Maintenance functions
 - » Service Line Building(s)—To include bus fuel/service lanes, detailing area, bus washers, support spaces for staff and storage, and an overhead canopy
 - » Revenue Service Building—Can be stand alone or part of another building
 - » Service Yard—To include fuel tanks, trash enclosures, recycling containers, used tire storage, transformer, generator, delivery dock
- ◆ Regulatory/Quality-of-Life Additions:
 - » Stormwater management elements
 - » Landscaping
 - » Outdoor break spaces
 - » Battery Electric Bus (BEB) infrastructure

The size of any new facility will vary but is generally related to the number of vehicles that the facility is intended to store and maintain. Some examples of recent bus facilities and their spatial needs are outlined in Table 49.

Table 49 Sample Bus Operations & Maintenance Facility Size Requirements

| Agency/Location | Facility | Fleet Count | Building Area per Bus | Site Area per Bus |
|---|---------------|-------------|-----------------------|-------------------|
| Hampton Roads Transit (HRT) Virginia Beach, VA | Southside | 115 | 1,000 SF | 0.13 Acres |
| North County Transit District (NCTD) Escondido, CA | East Division | 62 | 950 SF | 0.11 Acres |
| Omnitrans San Bernardino, CA | East Valley | 105 | 1,100 SF | 0.11 Acres |



| Agency/Location | Facility | Fleet Count | Building Area per Bus | Site Area per Bus |
|--|--------------------------------|-------------|-----------------------|-------------------|
| Orange County Transportation Authority (OCTA) Irvine, CA | Sand Canyon | 158 | 900 SF | 0.10 Acres |
| San Diego Metropolitan Transit System (MTS) Chula Vista, CA | South Bay Maintenance Facility | 147 | 900 SF | 0.09 Acres |
| Major Tech Company | Option 1 | 235 | 900 SF | 0.11 Acres |
| Major Tech Company | Option 2 | 536 | 850 SF | 0.10 Acres |

Based on these facilities, the average building area supporting a bus fleet was approximately 900 square feet (SF) per bus, and the average site area was approximately 0.105 acres per bus.

The scale of the BRT system envisioned by the BRT Action Plan presented opportunities and challenges related to the development of vehicle facilities. With a fleet of almost 550 vehicles, a service area covering more than 1,300 square miles, and a large number of agencies who could potentially operate BRT service, the facility strategy will need to consider the relative tradeoffs of having a single BRT vehicle facility, or multiple facilities across Northern Virginia. Each approach will have advantages and disadvantages that must be considered as part of this decision-making, such as:

- ◆ As the area served by a facility increases, the amount of deadhead miles required also increases—sometimes very significantly. Deadhead miles are the miles a bus must drive from its facility to the start of each scheduled shift (or schedule block), and back to the facility at the end. Deadhead miles contribute to the operating cost of transit without providing customer-facing service or benefits. Given the extremely large service area of Northern Virginia, a single vehicle facility is likely to significantly increase operating costs over a scenario with multiple smaller facilities distributed across the region.
- ◆ Facilities gain marginal spatial efficiencies as the number of fleet vehicles on site grows. However, operational efficiencies are negatively impacted after the fleet size grows too large. Similar analysis conducted around the country indicates that facilities are efficient when sized for up to 120-150 vehicles. Beyond this, travel time (walking distance)—between staff parking to building, buildings to bus parking, and within buildings between departments—negatively impact operations.
- ◆ Pursuing multiple smaller facilities in lieu of one larger facility enables easier, quicker, cheaper, and less disruptive phased expansion of the BRT system.
- ◆ It is typically easier to find smaller sites (10-15 acres) for sale than a much larger site (50-60 acres).
- ◆ Utilizing several smaller sites enables greater bandwidth, reducing the chance for bottlenecks of buses and staff entering/exiting the site during busy hours.
- ◆ The issue may also be impacted by the number of agencies operating the proposed BRT system.

The following sections consider the size and cost requirements of two potential vehicle facility scenarios: a single vehicle facility serving the entire BRT system, and a scenario that includes five smaller facilities distributed across the region. At the planning process stage, neither of these scenarios is considered to be optimal; they are presented as options for future consideration. It should also be noted that these scenarios assume the need to build new space to house the entire BRT vehicle fleet; this is the most conservative case, as there may be space available at existing facilities due to changes to the facility needs of local bus services. For example, if local bus service were reduced in a specific corridor where BRT is being implemented, the facility space that had previously been allocated to vehicles



providing that local bus service could potentially be used for BRT vehicles instead. A more detailed analysis of these tradeoffs would be needed to develop the optimal facility strategy in collaboration with transit providers in NVTAs member jurisdictions.

Single Facility Scenario

Based on the average space requirements outlined above and service levels proposed in the BRT Action Plan, a single operations and maintenance facility would require a fleet of 548 vehicles. This translates to approximately 493,000 SF of building area and 57.5 acres of property to house the full BRT vehicle fleet.

The estimated cost of a new facility of this size was developed based on the costs of the “Hampton Roads Transit (HRT)—Southside” project included in Table 49, due to its recency and proximity. The costs for this bus facility have been divided into three categories: site development, construction of buildings/structures, and infrastructure needed to serve an electrified fleet. Unit costs on a per vehicle basis were developed as shown below in Table 50, based on the HRT—Southside project costs and the calculated space requirements. Each of the three-unit costs are supplemented by additional soft costs totaling 77%, which include project contingency, bonding & insurance, escalation, design/engineering, construction management, and legal/real estate fees.

The electrification infrastructure includes a variety of necessary elements including:

- ◆ Exterior fleet electrification elements includes a meter, electrical service lines from the street to the switchgear building, manholes, switchgear building, switchgear equipment, electrical distribution lines from the switchgear building to the charging enclosures (at the bus parking lot), pull boxes, charging enclosures, secondary electrical distribution from charging enclosures to pantographs, pantograph equipment, inverters, emergency stops, and an overhead canopy or gantry above the bus parking lot to attach pantographs.
- ◆ Interior fleet electrification elements include chargers at the maintenance bays, associated switchgear, overhead crane, high voltage personal protective equipment (PPE) and high voltage diagnostic tools.

Table 50 Construction Cost Estimates—Single Facility

| Cost Category | Unit Cost (per Vehicle) | Subtotal | Associated Soft Costs | Category Total |
|--------------------------------|-------------------------|---------------|-----------------------|----------------------|
| Site Development | \$180,000 | \$98,640,000 | \$75,952,800 | \$174,592,800 |
| Buildings/Structures | \$300,000 | \$164,400,000 | \$126,588,000 | \$290,988,000 |
| Electrification Infrastructure | \$225,000 | \$123,300,000 | \$94,941,000 | \$218,241,000 |
| Total | | | | \$683,821,800 |

The cost of land acquisition will vary by location, but an estimate based on land real estate sales data is shown in Table 51. Sites in Arlington County and the City of Alexandria are more difficult to find due to the smaller size of these jurisdictions and a lack of undeveloped land, but the cost per acre of any site that was available is expected to be higher than costs in the other jurisdictions.



Table 51 Potential Land Acquisition Costs—Single Facility

| County | Median Price/Acre (2024) | Project Estimated Acres | Estimated Land Cost |
|-----------------------|--------------------------|-------------------------|---------------------|
| Fairfax County | \$728.4k | 57.5 Acres | \$41.9m |
| Loudoun County | \$70.5k | 57.5 Acres | \$4.1m |
| Prince William County | \$82.4K | 57.5 Acres | \$4.7m |

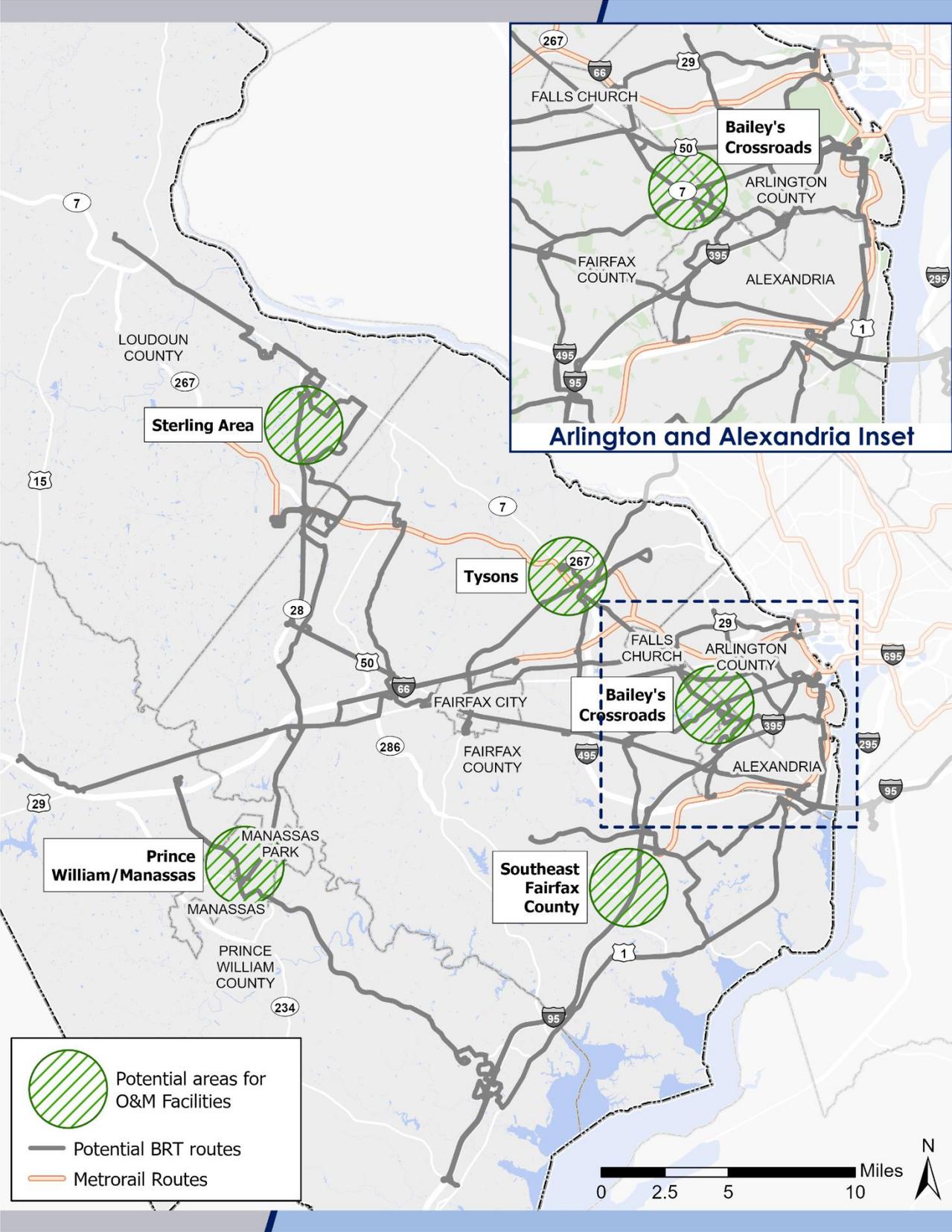
If a single facility is constructed, it would most likely be optimally located in Fairfax County as the geographic center of the region. Based on this analysis, the total cost for a new facility, including real estate acquisition, is estimated at just over \$725 million in 2024 dollars. This is a conservative estimate, as costs would decrease if some vehicles are able to be stored in other existing facilities.

Multiple Facility Scenario

This section considers a scenario in which the BRT system is served by a set of five facilities located around the service area. The general locations of the facilities in this scenario are shown in Figure 95 and were identified based on their ability to serve multiple nearby BRT routes. Specific sites in these locations have not been identified (and may or may not be available), and the locations shown on this map should be considered as general locations.



Figure 95 Potential Operations & Maintenance Facility Locations—Multiple Facilities



In this scenario, each BRT route would be operated out of the nearest facility. Table 52 notes the number of routes, the size of fleet, the estimated building area, and the estimated site area required by each location. These calculations are based on the average space requirements per bus outlined in Section 6.1.1.

It should be noted that the quantity of buses for the multiple facility scenario is slightly greater than for a single facility, and thus translates into marginally greater costs and area needs. This is because fleet needs are calculated (and rounded) at the facility level.

Table 52 Vehicle Facility Spare Requirements—Multiple Facilities

| Location | Quantity of Routes | Vehicle Count | Est. Building Area | Est. Site Area |
|--------------------------|--------------------|---------------|--------------------|-------------------|
| Southeast Fairfax County | 9 | 161 | 145k SF | 16.9 acres |
| Tysons | 4 | 89 | 80k SF | 9.3 acres |
| Bailey's Crossroads | 6 | 104 | 94k SF | 10.9 acres |
| Prince William/ Manassas | 5 | 110 | 99k SF | 11.6 acres |
| Sterling Area | 4 | 94 | 85k SF | 9.9 acres |
| Total | 28 | 558 | 503k SF | 58.6 acres |

Similarly, potential costs were estimated for each facility as shown in Table 53 using the same unit costs as in Table 50. Real estate costs were estimated assuming that the first three facilities would be located in Fairfax County. In total, these five facilities were estimated to cost approximately \$725M to construct, similar to the cost estimate for a single facility.

Table 53 Construction Cost Estimates—Multiple Facilities

| Location | Site Dev. Cost | Building Cost | Electrification Cost | Soft Costs | Real Estate Cost | Total Cost |
|--------------------------|----------------|---------------|----------------------|------------|------------------|------------|
| Southeast Fairfax | \$29M | \$48.3M | \$36.2M | \$87.4M | \$12.3M | \$213.2M |
| Tysons | \$16M | \$26.7M | \$20.0M | \$48.3M | \$6.8M | \$117.8M |
| Bailey's Crossroads | \$18.7M | \$31.2M | \$23.4M | \$56.5M | \$7.9M | \$137.7M |
| Prince William/ Manassas | \$19.8M | \$33M | \$24.8m | \$59.7M | \$1M | \$138.2M |
| Sterling Area | \$16.9M | \$28.2M | \$21.2m | \$51M | \$0.7M | \$118M |

Sample Site Layout

A conceptual site plan for the “HRT–Southside” project is included below to highlight some of the key elements of the design for any bus operations facility. Separate entry and exit points are provided for the buses, and bus traffic is separated from staff vehicles for safety purposes. Buses enter the site from the west side, pause briefly at the Revenue Services building for vaulting of fares, and then continue to the parking lanes. Bus operators exit the buses and service personnel enter the buses to cycle them through the service line functions, before returning them to the parking lanes. Buses in need of maintenance are taken to an open maintenance bay. Left-hand turns are encouraged, and backup maneuvers are discouraged, both to help reduce blind spots and promote safety. Buses exit out of the east side of the site when they head to their routes.



Figure 96 Sample Bus Operations & Maintenance Facility Layout—HRT Southside



Customer Facilities

The proposed regional BRT system will also require significant investments in customer facilities in order to provide the high-quality customer experience envisioned for BRT service. The complete system will require the construction or enhancement of approximately 270 BRT stops across Northern Virginia. The scale of these stops will vary based on the type and number of BRT and other transit routes serving it. Of particular importance will be designing stops to promote a seamless transfer experience, both between BRT routes and between other modes, such as Metrorail or VRE. Table 54 outlines the three types of stops envisioned for the proposed regional BRT system and the associated amenities.

Table 54 BRT Stop Requirements and Amenities

| Stop Type | Amenities | Recommended BRT Types | Number Required |
|-------------------|---|--|-----------------|
| Enhanced BRT Stop | Shelters, lighting, passenger information, trashcans | Basic BRT, Improved BRT | 133 |
| Super BRT Stop | Above plus off-board fare payment, level boarding, real-time arrival information, added safety features | Improved BRT, Advanced BRT, Dedicated BRT, Express BRT | 135 |
| Full BRT Station | Above plus staffing, bathrooms, pick-up/drop-off areas | Advanced BRT, Dedicated BRT | 2 |



The proposed regional BRT system was designed to serve many of the existing park-and-ride facilities in Northern Virginia (see Figure 94). However, in order to provide multimodal access to the Express BRT routes proposed in less dense parts of the region, two additional park-and-ride lots were included as part of the system: one along the Prince William Parkway Route (near Prince William Parkway and Ridgefield Road) and one along the Loudoun Connector Route (at Leesburg Plaza).

6.2 Funding

Implementing a BRT system for Northern Virginia will require significant capital investment to construct stations, bus lanes, and supporting technologies, as well as to purchase buses and build facilities to store and maintain bus fleets. Once constructed, operating the service and maintaining the vehicles and facilities will incur ongoing costs that must be planned for as well. This section identifies some of the options for funding BRT construction and operations in Northern Virginia.

BRT service in Northern Virginia could be funded through Federal, state, and local funding sources. Funding is available for various capital needs including systemwide construction and/or expansion, rolling stock acquisition and/or upgrade, as well as overall technological improvements to meet emissions standards, along with costs for operating the service.

This section describes the funding sources available to BRT in Northern Virginia from Federal, state, local, and regional levels based on the best information available at the time it was written.

6.2.1 Federal Funding Sources

Federal funding for BRT corridors has historically come from formula and discretionary-based programs, although many of these programs face uncertainty in their future funding levels and selection criteria. Formula funding programs are non-discretionary funding sources and follow a defined rubric to allocate money to recipients. Competitive discretionary funding programs offered through the U.S. Department of Transportation (U.S. DOT) follow program-specific evaluation criteria, as funding is awarded selectively. Applicable Federal-formula and discretionary funding sources are explained below.

Federal-Formula Funding Programs

The Federal Highway Administration (FHWA) and the FTA administer common Federal formula-funding programs to fund BRT projects. As formula funding programs, these offerings do not follow discretionary-based evaluation criteria and instead follow statutory-based standards to determine funding recipient as well as amount. Funding amounts follow a specific formula according to state and agency. These programs provide funding for transportation projects that align with specified program requirements.

FTA Section 5339 Grants for Buses and Bus Facilities

Funded by the FTA, the Section 5339 [Bus & Bus Facilities Funding Program](#) gives Federal-formula capital funding to states and transit agencies to build bus and/or BRT facilities and/or replace, rehabilitate, or acquire buses and bus equipment. States and agencies may apply on behalf of public transit operators and/or private nonprofit organizations engaged in public transportation. States and agencies may also apply for direct grants under Section 5307 or Section 5311 if financing operations themselves. Funding may also be used for upgrading technology and/or transitioning facilities or vehicle fleets into low- or no-emission producers.



FTA Section 5307 Urbanized Area Formula Program Funding

The FTA [Urbanized Area Formula Funding Program](#) under Section 5307 administers Federal money to governors and other qualified recipients under a statutory formula to pay for transit capital costs as well as transportation planning in U.S. Census urbanized areas. An urbanized area is defined as a designated area with a population of at least 50,000 people. In urbanized areas with a population over 200,000, the governors, associated local officials and agencies, and public transit providers can choose a designated recipient to accept and administer these funds to qualified projects and recipients. Urbanized areas with over 200,000 residents may not use Section 5307 funds for operations unless eligible as permitted by the FTA under Section 5307.

Section 5307 funds can go to studying, planning, designing, and/or engineering transit projects as well as other technical transportation studies. Funds can also help cover capital costs like building customer and/or maintenance facilities as well as paying for new buses and bus-related activities, including bus rehabilitation and/or overhaul, preventing bus-related crimes, and/or installing security equipment. Capital investments across new and/or existing fixed guideway systems are eligible, which includes associated station infrastructure, track and signals, communications, and computer hardware as well as software. Certain qualified activities advancing workforce development and mobility management programs separate from capital costs are also eligible for Section 5307 funding. Any bus preventive maintenance costs are also considered eligible capital costs. However, it is important to note that in the Washington DC urbanized area, WMATA, Maryland’s Mass Transit Administration (MTA), and PRTC are the designated recipients of all Section 5307 funds by regional agreement.

FTA Section 5310 Enhanced Mobility of Seniors & Individuals with Disabilities

The FTA Section 5310 [Enhanced Mobility of Seniors & Individuals with Disabilities](#) funding program offers formula-based capital funding to states and designated recipients to provide more reliable public transportation services to older adults and people with disabilities if current service is inaccessible, inadequate, or unsuitable. As stated by FTA Section 5310, “Formula funds are apportioned to direct recipients; for rural and small urban areas, this is the state Department of Transportation, while in large urban areas, a designated recipient is chosen by the governor.” In the Washington DC region, [MWCOG](#), the region’s Metropolitan Planning Organization (MPO), directly receives these funds. While most eligible uses for Section 5310 funds cater to transporting individuals with disabilities, BRT projects building access to bus stops with curb-cuts, sidewalks, accessible pedestrian signals, and features for improved signage or wayfinding can also be paid for with these funds.

Recipients can choose to fund subrecipient projects if outlined in a state/program management plan, and projects may be chosen following a formula, competitive, or discretionary process. States or local governments, private non-profits, and/or public transportation operators are qualified subrecipients. Federal funds from other agencies can fund the Section 5310 Program match and fund Section 5302-defined “traditional” capital or “nontraditional” capital and/or operating projects beyond ADA-paratransit. Any Federal share of eligible costs must be under 80% for capital projects and under 50% to assist with operations. Federal funds may fully cover permitted administrative costs across planning and technical aid.

“Traditional” projects pay for buses and vans as well as wheelchair lifts, ramps, and associated straps/hooks. Funds can also be used for transit-related information technology (IT) like scheduling/routing/one-call systems and various mobility management programs in addition to funding contract and/or leased operating services. “Nontraditional” projects like travel training and volunteer driver programs may also receive Section 5310 funding to cover incremental costs to provide same-day or door-to-door service or buy vehicles for accessible taxi, rides sharing, and/or vanpooling programs.



FHWA Congestion Mitigation and Air Quality Improvement Program (CMAQ) Funding

The FHWA funds the [Congestion Mitigation and Air Quality Improvement \(CMAQ\)](#) program to help states and local governments deliver transportation projects and programs following Clean Air Act (CAA) requirements. CMAQ can be used for capital transportation projects reducing emissions across the U.S. Environmental Protection Agency (EPA) nonattainment or maintenance areas like [Northern Virginia](#) to abide by National Ambient Air Quality Standards (NAAQS) for ozone, carbon monoxide, and/or particulate matter (PM). Eligible projects include electric vehicles and charging stations, diesel engine replacements and retrofits, transit improvements, bicycle and pedestrian facilities, shared micromobility projects including shared scooter systems, and more. Funding can also be used to improve equitable access across transportation services, improve safety, and promote using new and emerging technologies. Projects are evaluated on their ability to reduce overall emissions and meet CAA standards in addition to offering other selected benefits. In Northern Virginia, NVTa manages the application and evaluation process to recommend projects to receive CMAQ funding, and final approval is made by the Commonwealth Transportation Board (CTB).

FHWA Surface Transportation Block Groups

The FHWA provides flexible formula-based [Surface Transportation Block Grants \(STBG\)](#) to states and local entities through the Infrastructure Investment and Jobs Act (IIJA) also known as the [Bipartisan Infrastructure Law \(BIL\)](#), building capital projects that preserve or improve any Federal highway, bridge, or tunnel along any public road or pedestrian, bicycle, and/or transit infrastructure including intercity bus terminals. The FHWA awards formula-based grants to states, and the state DOT or MPO chooses which project(s) end up being funded through a competitive evaluation process. In Northern Virginia, NVTa manages the application and evaluation process to recommend projects to receive STBG funding, and final approval is made by the CTB.

FHWA Transportation Alternative (TA) Program Funds

FHWA also provides flexible formula-based [Transportation Alternative \(TA\)](#) funds through the [IIJA](#) to states and local entities building capital projects which can support BRT development by constructing facilities for pedestrians and bicycles, safe routes to school projects, and safety assessments for vulnerable road users. The TA program requires Virginia DOT and MWCOCG to administer funds to projects selected through a competitive process. The selected projects must demonstrate how they achieve program objectives and show impact in high-need areas like low-income, transit-dependent, and rural areas.

Discretionary Federal Funding Programs

The FHWA, FTA, and the U.S. DOT administer common discretionary Federal funding programs that can fund capital BRT projects. As discretionary funding programs, these offerings follow a criteria-based rubric to evaluate awarding funding to proposed projects. Eligibility and competitiveness for these programs depend on the funding program and characteristics of the project. Changing priorities and policies at U.S. DOT may impact these programs, and their long-term viability as funding sources is somewhat uncertain at the current time.

FTA Section 5309 Capital Improvement Grants

Funded through the FTA, [Section 5309 CIG](#) under the IIJA provides discretionary funds for transit capital investments across heavy rail, commuter rail, light rail, streetcars, and bus rapid transit. Eligible CIG projects fall under one of three types: [1\) New Starts](#), [2\) Small Starts](#), and [3\) Core Capacity](#), each with unique requirements. State governments, local governments, and transit agencies may apply for CIG funding upon completing a series of multi-year steps for each project. The FTA analyzes the justification and financial commitment alongside requirements according to statutory criteria.



- ◆ Projects seeking Small Starts Grants must cost less than \$400 million to build, seek under \$150 million, and complete Project Development before receiving any CIG funds.
- ◆ New Starts Grants can fund projects exceeding \$400 million and provide over \$150 million of CIG funds.
- ◆ Projects along existing fixed guideways can apply for Core Capacity Grants to increase corridor capacity by at least 10% if the corridor is currently at capacity or will reach capacity in 10 years.

New Starts and Core Capacity Projects must complete Project Development and Engineering before receiving any CIG funds.

To be awarded a CIG grant, a project must get a “Medium” or better rating in both Project Justification and Local Financial Commitment categories. The Project Justification rating consists of measures for mobility improvements, cost effectiveness, congestion relief, environmental benefits, land use, and economic development. The Local Financial Commitment rating is based on the project sponsor’s current financial condition, the commitment of capital and operating funds, and the reasonableness of the financial plan.

U.S. DOT Better Utilizing Investments to Leverage Development (BUILD) Grants

The U.S. DOT [Better Utilizing Investments to Leverage Development \(BUILD\)](#) discretionary grant program provides money for investments across road, rail, transit, and port projects with goals aligned with national objectives. Surface transportation, intermodal, and/or stormwater runoff projects are also eligible. Transportation planning projects may seek funding for planning, preparation, or design across environmental and/or equity analyses, community engagement, feasibility studies, benefit-cost analysis (BCA), and other pre-construction activities.

Certain public entities may apply for [BUILD funding](#), including municipalities, counties, port authorities, Tribal governments, or MPOs owning and/or operating transportation infrastructure. Federally owned facilities cannot seek BUILD funding, but funds can be used for non-Federal capital and/or planning projects across roads, bridges, and public transit. Amounts differ depending on whether funding capital or planning projects and whether projects are in urban or rural areas.

BUILD is a more flexible discretionary grant program as funds can be used towards multimodal and multi-jurisdictional projects. It relies on strict merit-based evaluation criteria and projects must demonstrate superior local and regional benefits. Application requirements and processes vary between BUILD Planning or Capital grants. The Merit Criteria are used to evaluate projects which include assessing a project’s impact on safety, environmental sustainability, quality of life, mobility and community connectivity, economic competitiveness and opportunity, state of good repair, innovation, and partnership and collaboration. Project benefits are rated “High,” “Medium,” “Low,” or “Non-Responsive” depending on data-driven responses.

U.S. DOT also evaluates certain projects through an Economic Analysis and Project Readiness assessment to evaluate each project, which includes:

- ◆ Economic Analysis, which assesses the estimated benefit-cost ratio (BCR) and net quantifiable benefits for each project.
- ◆ Environmental Risk Assessment, which analyzes the likelihood of environmental approvals affecting project obligation.
- ◆ Financial Completeness Assessment, which reviews the full funding package for a project to make sure money outside of the BUILD program is committed.



- ◆ Technical Capacity Assessment, which evaluates whether applicable Federal requirements will be satisfied when the project is being implemented.

FHWA Carbon Reduction Program (CRP) Funding

FHWA provides discretionary funding to states through the [Carbon Reduction Program \(CRP\)](#) under the IIJA through 2026 to fund projects aimed at reducing transportation emissions including to build BRT or dedicated bus lanes and to help states follow Carbon Reduction Strategies. States work with MPOs and may apply for CRP funds once Carbon Reduction Strategies are in place. Strategies must be updated every four years and should be developed in tandem with the state Long Range Transportation Plan (LRTP) and MPO Metropolitan Transportation Plan (MTP). Changes in Federal policy could impact funding availability and evaluation criteria.

In general, eligible projects include those enhancing safety and complete streets, transit flex, ADA accessibility, equity, climate response and readiness, as well as labor and workforce programs. Projects should reduce emissions and work towards zero fatalities to prioritize the safety of all road users with total multimodal and micromobility. Projects are also accepted that reduce greenhouse gases (GHGs), bolster climate resilience, and honor environmental justice commitments while strengthening ADA services and access to support workforce development programs. Additionally, projects addressing racial equity, economic development, and lessening barriers to opportunity like automobile dependence across rural and urban communities are eligible to apply.

Other eligible uses for CRP funds include TA projects if projects plan and build on- or off-road pedestrian, bicycle, and other nonmotorized transportation that uses trails. Projects can receive CRP funding if they advance transportation and congestion management technologies, roll out intelligent transportation systems (ITS), and/or install vehicle-to-infrastructure (V2I) communications equipment. Street lighting and traffic control projects can also be funded through the CRP if the project uses energy-efficient alternatives and supports congestion pricing to shift transportation demand to nonpeak hours or other transportation modes. Projects delivering electronic tolling, travel demand management (TDM), and alternative fuel vehicles may all receive CRP funding. Importantly, other projects may be considered for CRP funds if demonstrating reducing transportation emissions over the project's lifecycle.

Carbon Reduction Strategies support efforts to reduce transportation emissions as well as identify projects and strategies to cut transportation emissions like projects bringing safe, reliable, and cost-effective options to lessen traffic congestion through public transportation, pedestrian access, bicycle services, and shared or pooled vehicle trips and collectively drop single-occupant vehicle (SOV) travel. Strategies should achieve lower transportation emissions per person-mile traveled compared to existing vehicles and modes. Strategies can also focus on building transportation assets that produce fewer emissions compared to existing systems.

FTA Section 5339 Discretionary Grant Programs

In addition to Section 5339 formula-based funding, the FTA also allows agencies and states to compete for funding from the discretionary-based [Bus and Bus Facilities Competitive Program](#), and the [Low or No Emissions Bus Vehicle Program](#).^{12,13} Changes in Federal policy can pause Federal funding programs, and project eligibility is subject to change. These competitive grant programs give capital funds to states, transit agencies, nonprofits, and other direct recipients operating fixed-route services to replace, repair, and buy new buses or equipment as well as build bus-related facilities. Grants can also be used for IT upgrades or transitions to low- or no-emission vehicles and facilities. Funding is awarded to projects on a competitive basis from.

¹² [FTA Section 5339 Bus and Bus Facilities Program Fact Sheet](#).

¹³ [FTA Section 5339 Low or No Emissions Bus Vehicle Program Fact Sheet](#).



One-half percent of funds may fund workforce development training, and one-half percent of funds can cover National Transit Institute courses. Applicants seeking funds for projects deploying zero-emission vehicles must also spend 5% of funds on workforce development and training following the Zero-Emission Transition Plan unless able to prove a smaller financial need for training. Once awarded, funds are available for four fiscal years, including the year funds are first received in addition to the following three years.

Funds may cover no more than 80% of the project’s net capital project cost, unless requesting a lower percentage or related to the ADA and/or CAA. For low- or no-emissions projects, the Federal share of leasing or purchasing costs for a low- or no-emission transit bus cannot exceed 85% of the total transit bus cost and must comply with the ADA as well as the CAA. The Federal share of leasing or acquisition costs for a low- or no-emission bus or equipment and facilities is 90% of the net project cost, and applicants must identify these specific activities when applying.

6.2.2 State Funding Sources

In Virginia, all state transportation revenues are deposited in the Commonwealth Transportation Fund (CTF). The CTF funds projects in the state’s Six-Year Improvement Plan (SYIP) which is maintained by the CTB. Specific funds are also designated to specific entities across the Commonwealth, including the NVTA and WMATA. Virginia also receives other funds from Federal programs passed down as specific “matching funds” depending on the grant program and/or capital project. A portion of the CTF is allocated each year to the Commonwealth Mass Transit Fund (CMTF), which is administered by Virginia DRPT and provides operating and capital support to transit operating agencies across Virginia.

VDOT SMART SCALE

The CTB funds capital transportation projects using the [SMART SCALE](#) prioritization program to evaluate potential transportation improvements based on how projects improve safety, reduce congestion, enhance access, foster economic development, support efficient land use, and impact the environment. The CTB uses SMART SCALE’s [technical guide](#) to calculate anticipated benefits to score and rank projects across five steps, outlined in Figure 97. The Office of Intermodal Planning and Investment (OIPI), VDOT, and DRPT oversee project sponsors to determine eligible projects. Transit agencies and other qualified entities apply for projects, which VDOT, DRPT, and OIPI screen, evaluate, and score before being recommended to CTB for funding.

Figure 97 SMART SCALE Process



Source: SMART SCALE.

Statutory funding for SMART SCALE comes from two of the state’s core transportation funding programs: the Highway Construction District Grants Program (DGP) and the High-Priority Projects Program (HPPP). Project applicants may request funding under both programs. DGP and HPPP are two of Virginia’s five core programs to fund new transportation assets and services across the state and each receive 20% of state revenues earmarked for



transportation through statutory formula.¹⁴ The DGP is open only to localities, and projects applying for DGP funds compete with other projects from the same construction district while projects applying for HPP funds compete with projects from across Virginia. The One (Richmond Highway BRT) in Fairfax County, VA, is being funded partially through SMART SCALE as well as other local, state, regional, and Federal sources.

Table 55 Project Eligibility for SMART SCALE

| | High Priority Projects Program (HPPP) | Construction District Grant Program (DGP) |
|---|---------------------------------------|---|
| Improvement Addresses Need on Corridors of Statewide Significance | Yes | Yes |
| Capacity Need on Regional Networks | Yes | Yes |
| Improvement to Support Urban Development Areas | No | Yes |
| Improvement Addresses VTrans Specified Safety Need | No | Yes |

Source: SMART SCALE.

Making Efficient and Responsible Investments in Transit (MERIT)

The [Making Efficient and Responsible Investments in Transit \(MERIT\)](#) program is a state grant program providing financial assistance to support public transportation throughout Virginia, which can be used to develop BRT systems. DRPT uses a prioritization process to allocate resources to capital projects and investments, scoring and prioritizing capital projects across State of Good Repair, Minor Enhancement, or Major Expansion projects. State of Good Repair and Minor Enhancement projects can receive a state match up to 68% while Major Expansion projects can receive a state match up to 50%. Applicants already eligible for Federal public transportation grant programs may combine Federal and state capital assistance grant funds to decrease the local match needed for each project. However, a minimum 4% local match is necessary for all projects.

State of Good Repair projects are capital projects or programs over \$3 million to replace or rehabilitate an existing asset, excluding major capital construction projects. Minor Enhancement projects are capital projects or programs under \$3 million adding capacity or purchasing new assets, vehicle expansion projects up to five vehicles or 5% of the existing fleet size, whichever is greater, and all projects for engineering and design. Major Expansion projects are capital projects or programs over \$3 million adding, expanding, or improving transit services or facilities, covering vehicle expansion projects expanding fleets over five vehicles or 5% of fleet size, whichever is greater, and all projects replacing an entire existing facility.

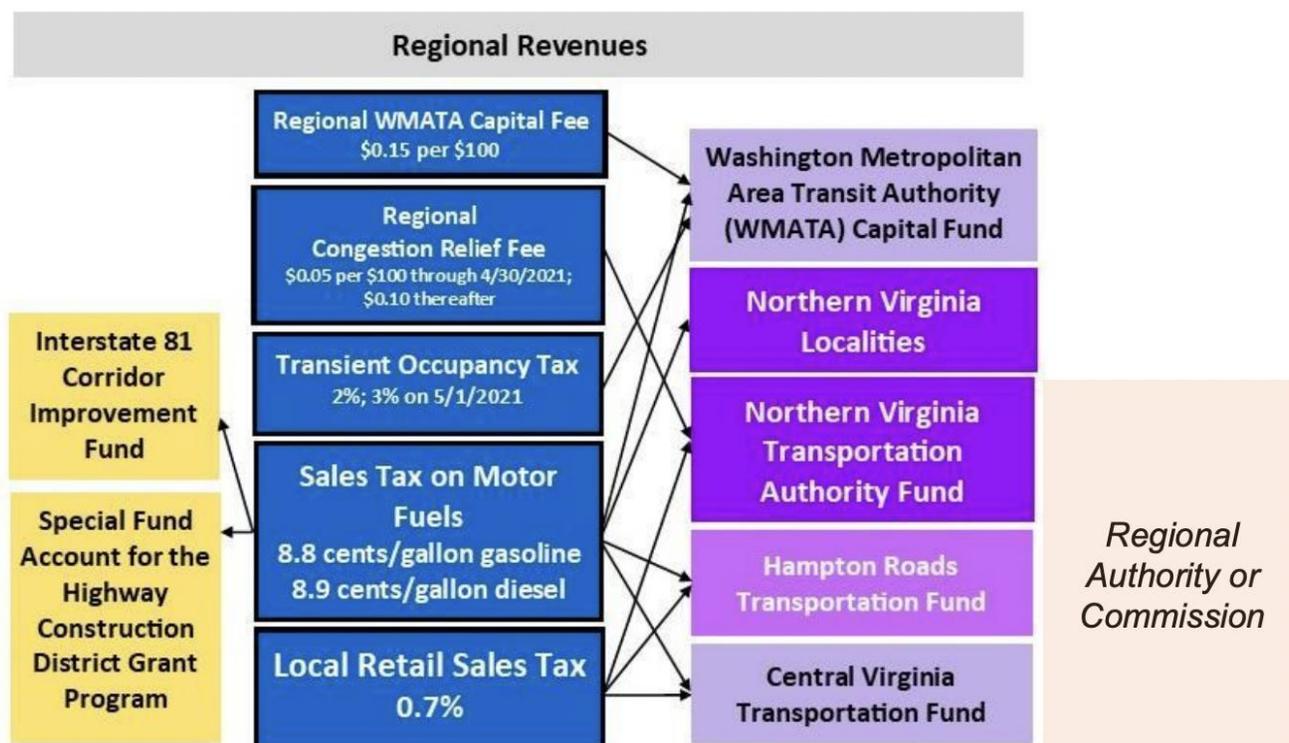
¹⁴ The remaining three core programs for funding new roadway construction in Virginia are State of Good Repair (SOG) for structures and pavement, Interstate Operations and Enhancement Program, and the Virginia Highway Safety Improvement Program which statutorily each receive 30%, 20%, and 10%, respectively. Virginia's Highway Maintenance and Operating Fund maintains existing roadway infrastructure.



6.2.3 Local and Regional Funding Sources

A number of local and regional funding options, including NVTA, are available for BRT projects in Northern Virginia. A summary of regional revenue sources supporting transportation in Virginia is shown in Figure 98. Local funds for BRT operations and construction can come directly from jurisdictional governments through a range of mechanisms. Many BRT projects around the country use a mix of regional and local funding sources to meet their operational and capital needs.

Figure 98 Commonwealth of Virginia Funds Dedicated to Regional Transportation Efforts

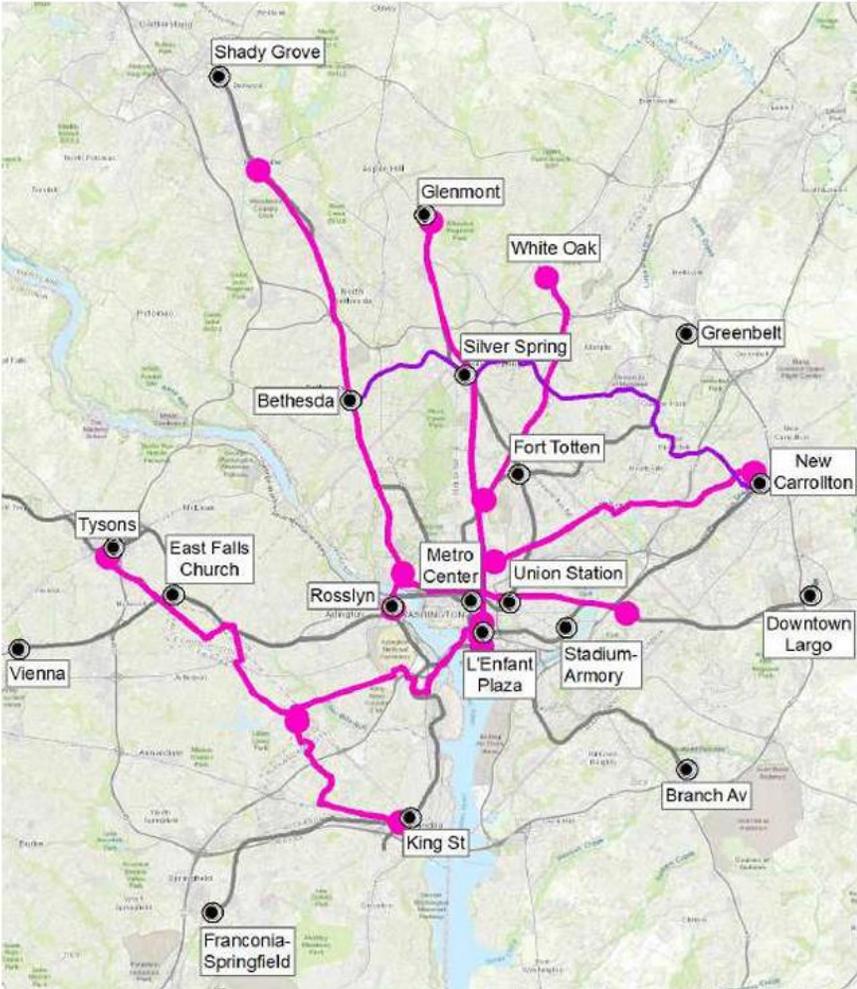


Source: [Transportation Funding in Virginia, November 2023 Panel.](#)

[DMVMoves](#), a joint initiative of the Metropolitan Washington Council of Governments and WMATA established in 2024, worked to bring together leaders across the DC region to develop a shared vision and path forward for transit. This included identifying a sustainable and dedicated funding model for transit. “[DMVMoves: Seamless, Integrated, World-Class Transit for the National Capital Region](#)” was [adopted](#) by the MWCOG and WMATA Boards of Directors November 17, 2025. One of the recommendations related to BRT is to implement bus priority projects along high-priority corridors to improve bus speeds and reliability for riders and lower long-term operating costs, which creates a strong foundation for future investments in BRT in Northern Virginia. The DMVMoves Task Force identified an initial set of bus priority corridors, as seen in Figure 99, and recommends that the region commit to working with Metro to advance these investments. The corridors identified in Northern Virginia are Columbia Pike & 14th St Bridge and Virginia Route 7, which were included in the proposed BRT network.



Figure 99 DMVMoves Initial Bus Priority Network



Source: DMVMoves.

Northern Virginia Transportation Authority (NVTA)

NVTA receives revenues from Virginia Sales Tax Receipts, Grantors Tax Receipts, Regional Congestion Relief Fees, the Northern Virginia Transportation District (NVTB) Fund, and the Interstate Operations & Enhancement Program (IEOP) with FY2024 amounts shown in Table 56.

Table 56 FY2024 NVTA Funding Estimate

| | \$ Millions |
|---|----------------|
| Sales and Use Tax | \$357.4 |
| Regional Congestion Relief Fee | \$34.1 |
| Northern Virginia Transportation District (NVTB) Fund | \$20.0 |
| Interstate Operations and Enhancement Program (IEOP) | \$17.3 |
| TOTAL | \$428.8 |

Source: [Transportation Funding in Virginia, November 2023 Panel.](#)



The [NVTA](#) fund is a potential source of capital funding to construct new BRT corridors and pay for new buses and facilities. Every second year, NVTA develops a Six Year Program (SYP), which funds capital projects across transportation modes. Projects are submitted by jurisdictions and transportation agencies in a biannual call for projects, and are evaluated using ten performance measures across three goals of Mobility, Accessibility, and Resiliency as shown in Table 57. As per statutes, NVTA must give priority to projects that provide greatest congestion reduction relative to cost.

Table 57 NVTA Goals, Objectives, and Performance Measures

| Goal | Objective | Performance Measure |
|---|---|--|
| Mobility: Enhance quality of life of Northern Virginians by improving performance of the multimodal transportation system | A. Reduce congestion and delay ¹ | A1. Total Person-Hours of Delay in autos A2. Total Person-Hours of Delay on transit |
| | B. Improve travel time reliability ¹ | B1. Duration of severe congestion B2. Transit person-miles in dedicated/priority ROW |
| | C. Improve access to jobs ¹ | C1. Access to jobs by car, transit, and bike C2. Access to jobs by car, transit, and bike for EEA populations ¹⁵ |
| | | D. Reduce dependence on driving alone by improving conditions for people accessing transit and using other modes |
| Resiliency: Improve the transportation system's ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions | E. Improve safety and security of the multimodal transportation system | E1. Potential for safety and security improvements |
| | F. Reduce transportation related emissions | F1. Vehicle emissions |
| | G. Maintain operations of the regional transportation system during extreme conditions* | G1. Transportation system redundancy |

¹ Objectives align with HB599 requirements: Transit may include High Occupancy Vehicles (HOV).

Source: [NVTA TransAction Performance Measures, February 2022](#).

The Six Year Program is funded by regional revenues, which account for 70% of NVTA's revenues. The remaining 30% comprise NVTA's Local Distribution Fund which are distributed pro rata to NVTA's member jurisdictions for additional highway construction, capital improvements reducing congestion, projects approved through the recent long range transportation plan, or towards public transportation. The 30% Funds can be used for operations and maintenance as well and many jurisdictions are already using it that way.

NVTA has already allocated more than \$850 million in five BRT lines, including extensions of Metroway (in operation), The One, the West End Transitway, Duke Street Transitway, and Route 7 BRT.

Toll Road Revenue-Sharing

Certain BRT projects in Virginia may also be eligible for funding from neighboring toll roads depending on BRT corridor and/or service area. These BRT projects can be eligible for funding from toll revenues if projects meet certain criteria

¹⁵ Equity Emphasis Area (EEA) is defined as any traffic analysis zone (TAZ) that is defined as either a MWCOG EEA or as a Northern Virginia EEA. The MWCOG EEAs were defined using average low-income and minority concentrations for the whole metropolitan region, while the Northern Virginia EEAs were identified using Northern Virginia specific averages.



and are within a buffer around the [I-395](#) or [I-66](#) toll road corridors. I-66 is operated through [VDOT](#) while I-395 is operated by [TransUrban](#), and these toll roads charge motorists usage fees (tolls) to cover roadway operating costs and capital repairs. Money left over can fund other projects like regional BRT lines and can be used for capital or operating costs.

NVTC funds select projects through the I66 toll road Outside the Beltway (OTB) [Concession Payment Account](#) if projects benefit the toll facility users, are federally eligible, meet one of the project improvement goals to maximize person throughput, improve mobility, support new transit service, as well as enhance safety and reliability. Projects must be selected and recommended by NVTC as well as be approved by CTB. While no BRT projects have been funded by these revenues to date, recently funded transit projects include: the Commuter Parking Garage and Transit Station at Fairfax Corner, the East Falls Church Metrorail Station Bus Bay Expansion, the PRTC Western Bus Maintenance and Storage Facility, and the VRE Manassas Line Capacity Expansion.

NVTC also periodically receives funds through the I395 toll road's [Annual Transit Investment \(ATI\)](#) of which at least 50% must be used for capital projects. Here, VDOT receives the funds to distribute to DRPT who then transfers funds to NVTC, who serves as recipient and administrator of the ATI funds on behalf of PRTC as well. Once received by NVTC, funds can be used for transit and BRT projects designed to accomplish improvement goals like increasing throughput of persons along the corridor, implementing multimodal enhancements, advancing corridor mobility, backing new and varied travel choices, and/or supporting transportation safety as well as reliability. NVTC annually issues a "[call for projects](#)" to solicit projects from eligible jurisdictions and transit service providers for projects achieving improvement goals and benefiting toll road users. The Richmond Highway BRT from Fort Belvoir to Huntington Station is one of the approved projects with the last project Open House in [January 2025](#), and has received \$10 million from this program.

Local Funding Sources

An individual jurisdiction can generate funds directly for BRT depending on local legislation. Local funds might be available from bond proceeds, city or county general or special tax or fee revenues, capital improvement program (CIP) funds, leveraging value capture strategies, creating a public-private-partnership (P3), or even funding from a foundation or private company. A local entity already operating transit might be able to allocate some general funds, bond proceeds, capital tax revenues, and/or unrestricted funds towards building and/or operating a new BRT line. For example, local funding for the City of Madison, Wisconsin's North-South BRT project came from City of Madison General Obligation Bonds, Tax Increment Financing (TIF) district funds, and City of Fitchburg (WI) local funds. All of these sources were made possible through local legislation.¹⁶ Local transit operators in Northern Virginia currently fund approximately 15% of their capital costs and almost 50% of their operating costs using money from some of these types of sources.¹⁷

Municipal bonds can be sold to raise money to build new BRT infrastructure or buy related equipment like buses. Borrowed funds are paid back over time with interest at market interest rates. Tax revenues can also be used to fund BRT, as in Chapel Hill, NC, where Orange County Transit Plan dedicated tax revenues were used to fund their North-South BRT project.¹⁸ Special purchase-based fee revenues from a vehicle registration surcharge fee were used to

¹⁶ Depending on legislation and project funding requirements, a defined local match might be necessary to receive state and/or Federal funds.

¹⁷ NVTC Regional Bus Transit Analysis.

¹⁸ [North-South BRT Project, Chapel Hill, NC.](#)



partially fund the SURF! Busway and BRT project in Monterrey, CA.¹⁹ Agencies can program CIP funds to provide multiple years of dedicated funding, as was done to complete the West Broad Street BRT project in Columbus, OH.²⁰

Value capture strategies include TIF to fund BRT through the projected increases in tax revenue that would result from higher property values following infrastructure improvements. Payments in lieu of Taxes (PILOTs) are payments made to governments to offset property tax losses from tax-exempt properties. Tax Assessment Districts (TADs) empower a municipality to charge a tax or surcharge in a specific area to improve infrastructure bringing new development. Tax Development Districts (TDDs) raise funds for specific costs of a BRT project like improving service. With accompanying legislation, a public agency with revenue power can set up a Transport/Mobility Special Revenue Fund (SRF) or establish one of these special taxing districts and use money collected to fund new BRT.

If legislation allows, a municipality can form a P3 contract with a private company to finance, build, operate, and/or maintain a new or existing BRT system with user fees to compensate the private entity, but terms vary by project. The U.S. 36 Managed-Lanes P3 and BRT Project in Denver, CO, established both a DB (design-build) agreement and a DBFOM (design, build, finance, operate, and maintain) agreement to deliver phase 1 and phase 2.²¹ A local foundation can also form a partnership with an existing transit agency to provide oversight and financial support towards new BRT as was the case in Chicago with the Chicago Transit Authority to construct the LOOP Link.²²

Additionally, Virginia’s proffer system (codified as “conditional zoning” in the Code of Virginia) offers an opportunity for local jurisdictions to collect additional revenue—or in-kind contributions—that support BRT as part of the redevelopment and rezoning process. Under this system, developers are able to make voluntary contributions to improve transportation infrastructure that would be impacted by the development. These contributions (“proffers”) can include financial support for BRT infrastructure or operations, or construction of improvements like bus stops or pedestrian infrastructure. “Proffers” occur between land developers and the jurisdiction in which they are located and only occur when zoning is being changed to accommodate new development.

¹⁹ [SURF! Busway and BRT Project, Monterrey, CA.](#)

²⁰ [West Broad Street BRT Project, Columbus, OH.](#)

²¹ [U.S. 36 Managed Lanes BRT Project, Denver, CO.](#)

²² [Bus Rapid Transit: Why the Trust got involved. May 18, 2015.](#)



6.2.4 Summary

BRT service in Northern Virginia can be funded through Federal, state, regional, and local funding sources, and most are likely to use a combination of sources. Each source can be used for various capital BRT needs including systemwide construction and/or expansion, rolling stock acquisition and/upgrade, as well as overall technological improvements to meet emissions standards.

Federal funding for capital needs across BRT corridors comes from formula and discretionary-based programs. The FHWA and FTA administer common Federal formula funding programs which follow statutory standards to determine funding recipient and amount. The FHWA, FTA, and U.S. DOT administer competitive discretionary Federal funding programs following a criteria-based rubric to evaluate awarding funding to proposed BRT projects. Eligibility and competitiveness for these programs depends on the funding program and nature of the project and may be subject to changes in Federal policy.

The Commonwealth of Virginia provides funding for capital BRT projects using [SMART SCALE](#) and MERIT to prioritize funds. Local funding for new BRT in Northern Virginia is available from NVTA, which is helping fund several BRT lines in Northern Virginia. Certain BRT projects in Virginia may also be eligible for funding from neighboring toll roads depending on BRT corridor and/or service area. These BRT projects can be eligible for funding from toll revenues if projects meet certain criteria and benefit the toll facility users of the [I395](#) or [I66](#) toll road corridors.

Additionally, depending on the project and level of interest from local jurisdictions, local funds might be available from city or county tax revenues or other local sources. Ongoing work by the DMVMoves task force in support of creating a sustainable funding model for transit in the greater DC region may provide additional funding source opportunities for BRT in Northern Virginia.

While requirements and evaluation factors vary across these funding programs, there are several common themes. For a BRT project to be best positioned for discretionary grant programs, it should be able to demonstrate expected benefits including strong ridership, serving equity goals, cost-effectiveness, environmental benefits, and supportive land use. Eligibility, criteria, and funding levels of all of these programs may be reconsidered under the new Federal administration and may necessitate a reevaluation of options in the future.

Capital costs are significantly easier to fund through grants at all levels of Government and fewer programs offer the opportunity to cover annual operating costs. Maintaining operating funding in the long-term will be essential in successfully operating a BRT system.

Each BRT project will need to assemble its own customized mix of funding sources to create a successful project. For example, Figure 100 shows the proposed financial plan for construction of The One developed by Fairfax County (as of May 2024) as part of the application for FTA Capital Investment Grant funding. This funding plan does not cover pre-construction phases of the work, many of which have been funded through local and regional sources, including NVTA.



Figure 100 Locally Proposed Financial Plan—The One

| Locally Proposed Financial Plan | | |
|--|-------------------------|------------------|
| Source of Funds | Total Funds (\$million) | Percent of Total |
| Federal: | | |
| Section 5309 CIG Funds | \$459.15 | 49.0% |
| FHWA Flexible Funds (Surface Transportation Block Grant) | \$40.58 | 4.3% |
| FHWA Flexible Funds (Congestion, Mitigation, and Air Quality Program) | \$22.78 | 2.4% |
| State: | | |
| Virginia Department of Transportation (VDOT) Smart Scale Funds | \$50.00 | 5.3% |
| VDOT Six-Year Improvement Program (State RSTP Match Funds) | \$10.14 | 1.1% |
| VDOT Six-Year Improvement Program (State CMAQ Match Funds) | \$5.35 | 0.6% |
| Local: | | |
| Northern Virginia Transportation Authority (NVTA) - Regional 70% 2018-2023 Program | \$242.10 | 25.8% |
| NVTA - Regional 70% 2022-2027 Program | \$80.00 | 8.5% |
| NVTA - Regional 30% tax | \$26.95 | 2.9% |
| Total: | \$937.05 | 100.0% |

Source: <https://www.transit.dot.gov/sites/fta.dot.gov/files/2024-07/VA-Fairfax-Richmond-Highwy-BRT-Engineering-PROFILE.pdf>

The City of Alexandria is pursuing two BRT projects through a more incremental approach, which have opted (so far) not to apply for CIG funding. The Duke Street Transitway and West End Transitway have so far utilized a mix of local, regional, and state funding. NVTA has allocated \$87 million for the planning, design and construction of the Duke Street Transitway and supported construction of the West End Transitway through allocation of \$4.6 million for corridor feasibility and initial design and \$15 million for the South Van Dorn Street Bridge project.

6.3 Governance

Building a high-quality regional BRT system is best done in a coordinated way that maximizes the return on investments. This process will require coordinated efforts from a range of entities in the region, including NVTA, NVTC, VDOT, local jurisdictions, MWCOG, Virginia DRPT, OmniRide, VRE, and WMATA. Coordination with neighboring jurisdictions and agencies in D.C. and Maryland will also be necessary to integrate a Northern Virginia BRT network into the larger metro Washington D.C. regional transit network. With so many collaborators, each entity will have important and unique roles to play in the process.

When it is adopted, the BRT Action Plan will serve as an important tool to catalyze BRT planning and implementation efforts by the jurisdictions and other entities in Northern Virginia and across the larger metro Washington D.C. region.

The section provides an overview of transit governance, a review of transit governance in the region today, and examples of transit governance as it has been applied to BRT projects.



6.3.1 Overview of Transit Governance

Public transportation governance refers to the processes, structures, and practices through which decisions are made and implemented regarding public transit systems. It involves the coordination and management of various organizations, including Government bodies, transit agencies, and sometimes private operators, to develop, manage, operate, and finance public transportation services and facilities. Elements of governance include all the key roles in developing and operating public transportation:

- ◆ Who sets the vision and goals for transit service and decides what type of service to provide?
- ◆ Who funds and pays for the service?
- ◆ Who develops capital projects, including planning, design, and construction?
- ◆ Who operates the transit service?
- ◆ Who owns and maintains the assets?

Other transportation entities, besides the agency operating transit service, play a critical role in the provision of transit service. Examples include state and local departments of transportation that maintain roadway ROW and operate traffic signals, counties and cities that build and maintain sidewalks providing access to bus stops, and police departments that support enforcement of bus lanes.

Ultimately, the form of transit governance can affect how effectively the transit system meets the needs of the community. As noted in a recent [Baltimore regional transit governance study](#), the reasons to consider the type of governance for public transportation include:

- ◆ Increasing regional and local participation in decision-making
- ◆ The potential of a new governance structure to increase investment in public transportation
- ◆ Strengthening the quality of transit services, including coordination across services and among partner jurisdictions

Types of Transit Governance

In conducting an initial screening of 20+ BRT corridors across the U.S., four key governance-related questions were examined: decision-making, funding, project development, and asset ownership. This review revealed significant patterns in how these elements are managed across multiple BRT systems, providing insight into their overall governance structures.

Decision-making and Policy-making: Across most BRT corridors, a Board of Directors plays a central role in decision-making. These boards typically consist of appointees from regional transit agencies, city governments, and occasionally state representatives. This governance structure ensures that decision-making is rooted in regional priorities, allowing for a balance between local needs and overarching regional objectives. The Board of Directors for these agencies often establishes policy frameworks, approves budgets, and provides oversight on planning and operations.

Funding Sources: Funding for BRT systems usually comes from a mix of Federal, state, regional, and local sources. The Federal Government often contributes through the FTA's Small Starts or New Starts programs, while state funding typically supports infrastructure investments. Local governments or regional transit agencies contribute by securing sales tax revenues, general funds, or bonds. This layered funding approach enables agencies to finance the capital-



intensive components of BRT, such as bus lanes and stations, while also supporting ongoing operational costs. A more comprehensive overview of funding options can be found in Section 6.2 above.

Project Development: The development of BRT projects is typically managed by transit operating agencies, in partnership with local Government entities. During the planning phase, these agencies lead coordination efforts, gathering input from stakeholders and managing community outreach. Consulting firms often handle the design work, translating planning concepts into detailed engineering plans. The construction phase is usually contracted out to private construction firms, with oversight from the transit agency.

Asset Ownership: In many BRT systems, the operating agency owns the operational assets, such as the BRT vehicles and service equipment, while local or state entities own the infrastructure, including the dedicated lanes, stations, and bus stops. This bifurcated ownership structure allows transit agencies to focus on the operational side of the system, while local or state governments manage infrastructure maintenance and improvements.

Models for Transit Governance Structure

Transit governance models can vary widely, including:

- ◆ **Integrated Regional Authorities:** Single agencies operating multiple transit modes across multi-county areas (ex. WMATA, PRTC).
- ◆ **Local Government Service Providers:** County and city agencies that both provide transit services and other governance functions (ex. Arlington Transit, Alexandria DASH, Fairfax County Connector, Loudoun County Transit, and City of Fairfax CUE). Note that not all transit operations are provided directly by county/city employees—for example, Fairfax Connector contracts with Transdev North America to operate the Connector service.
- ◆ **Public-Private Partnerships:** Involve collaboration between public agencies and private operators. In some European examples in London and Germany, transit agencies are network managers that issue contracts with private companies to operate the services and coordinate services without operating them.
- ◆ **Intergovernmental Agreements:** Special agreements that allow for coordinated service to be provided across multiple jurisdictions, without the addition of a special regional authority.

The type of governance structure appropriate for transit service depends on multiple factors such as efficiency, accountability, and funding. Regional authorities may be seen to have complex decision-making processes, but this complexity is warranted for regional services that require decision-making and operational coordination across multiple jurisdictions.

6.3.2 Transit Governance in Northern Virginia Today

Bus service is provided across Northern Virginia (Figure) by a variety of regional and local bus systems that collectively operate fixed routes, commuter buses, on-demand, and accessible transit. Except for WMATA and OmniRide, all bus operators in the NVTA area are operated by a local county or city Government. These systems and their respective governance structures are described below.



County/City Bus Providers

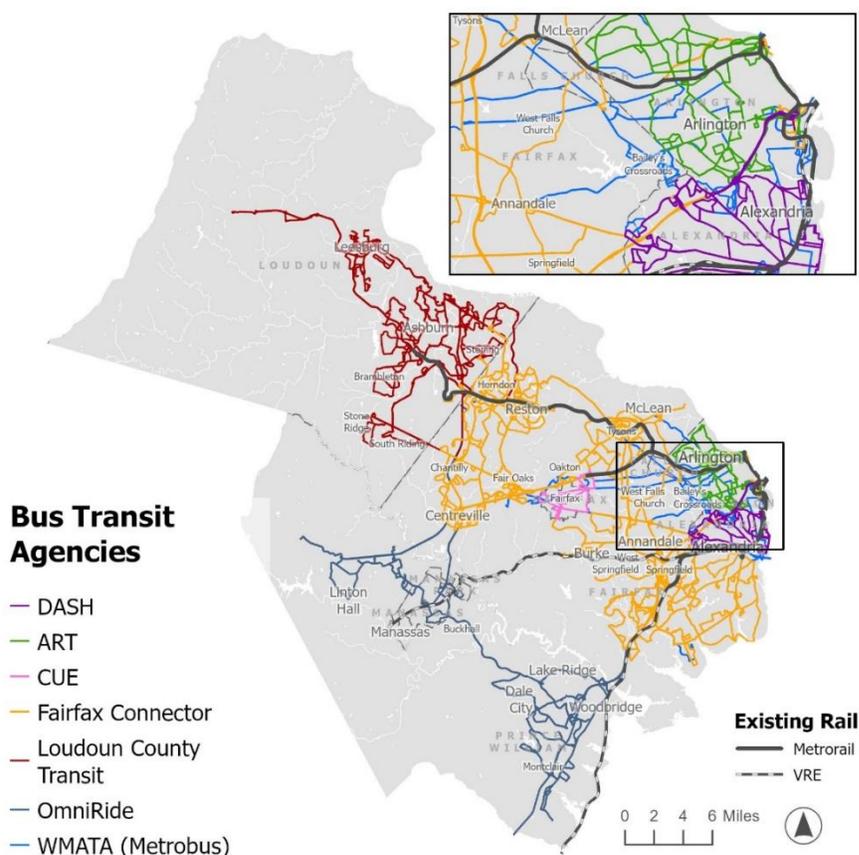
Five of the local bus transit providers in Northern Virginia are operated by county or city governments:

1. Arlington Transit (ART), Arlington County, Virginia
2. CUE, City of Fairfax, Virginia
3. Driving Alexandria Safely Home (DASH)—Alexandria Transit Company, City of Alexandria, Virginia
4. Fairfax Connector, Fairfax County, Virginia
5. Loudoun County Transit, Loudoun County, Virginia

Each of these local bus systems provides fixed-route transit service to their respective county or city, often with some service extending into adjoining municipalities.

Governance and funding of these local bus systems is accomplished through the local Government structure and budgets as summarized in Table 58.

Figure 101 Existing Bus Service in Northern Virginia



Source: NVTC Regional Bus Analysis.

Table 58 Local Bus Systems

| Local Bus Agency Name | Governance Body | 2025 Operating Cost Forecast |
|------------------------|-------------------------------------|------------------------------|
| DASH | City of Alexandria City Council | \$37.8 million |
| ART | Arlington County Board | \$ 26.9 million |
| CUE | City of Fairfax Council | \$5.9 million |
| Fairfax Connector | Fairfax County Board of Supervisors | \$137.7 million |
| Loudoun County Transit | Loudoun County Board of Supervisors | \$24.9 million |

Source: NVTC Regional Bus Analysis

Regional Bus Providers

WMATA (Metrobus)

WMATA provides Metrorail and Metrobus transit services, and MetroAccess paratransit service, in its compact area jurisdictions, which include the counties of Fairfax, Arlington, and Loudoun (Metrorail only) and the cities of Alexandria, Fairfax, and Falls Church, as well as Washington, D.C. and parts of Maryland. WMATA’s Metrorail stations and transit centers (including the Pentagon Transit Center) are major destinations and transit hubs for bus agencies in the region.



The Metrobus fleet consists of over 1,500 buses covering an area of 1,500 square miles in Washington, D.C., Maryland, and Virginia. There are roughly 270 bus routes serving over 10,000 stops. In 2024, the system provided 38.1 million scheduled revenue miles of bus service and carried 111.4 million trips.

WMATA was created in the late 1960s by the United States Congress as an interstate compact between Washington, D.C., Maryland, and Virginia. The authority's board of directors consists of two voting representatives each from the District of Columbia, Maryland, Virginia, and the U.S. Federal Government. Each jurisdiction also appoints two alternate representatives. WMATA has no independent taxation authority and depends on its member jurisdictions for capital investments and operating funding.

WMATA's Role in BRT

WMATA has been directly involved in planning, project development, and operation of bus rapid transit in the region. The 1999 Transit Service Expansion Plan identified an expanded network of premium transit services that would increase the region's fixed-guideway miles by 50% and called for improving bus service in areas with high demand or anticipated future high demand. The 2009 Metrobus Priority Corridor Network (PCN) Plan identified 24 regional corridors that were the best candidates for service and facility improvements. Five of the corridors were located in Virginia:

1. Columbia Pike
2. Richmond Highway
3. Crystal City-Potomac Yard
4. Leesburg Pike
5. Duke Street/Little River Turnpike

All five have seen elements of BRT implemented or advanced through planning and project development studies. Metroway (route A1X) is currently operated by Metrobus in the Crystal City-Potomac Yard corridor.

At the time that the WMATA Board approved the Service Expansion Plan in the late 1990s, they also developed a policy that the capital costs associated with system expansion would be the responsibility of the jurisdiction(s) in which the project is located. For example, the financial plan for developing the Silver Line (Dulles Corridor) extension was developed by the Commonwealth of Virginia in close association with Fairfax County and Loudoun County. Similarly, project development for Crystal City-Potomac Yard was led by Arlington County and the City of Alexandria, even though the service was ultimately operated by Metrobus.

Cost Allocation

The method for financing the operation and maintenance costs for Metrobus service has recently been updated in a new cost allocation policy. Cost allocation formulas are used to distribute the operating and maintenance costs of Metrobus service that are not covered by passenger fares. As shown in Figure 102, the prior regional service formula allocated operating subsidy costs based on ridership, density-weighted population, revenue hours, and revenue miles. The previous approach to Metrobus cost allocation had divided bus routes into two categories: regional and non-regional routes. Regional service was defined by routes that either operate interjurisdictionally (crossing jurisdictional boundaries) or meet two out of three criteria: serving a Regional Activity Center, traveling a considerable distance on arterial streets, or serving a majority of riders on arterial streets.

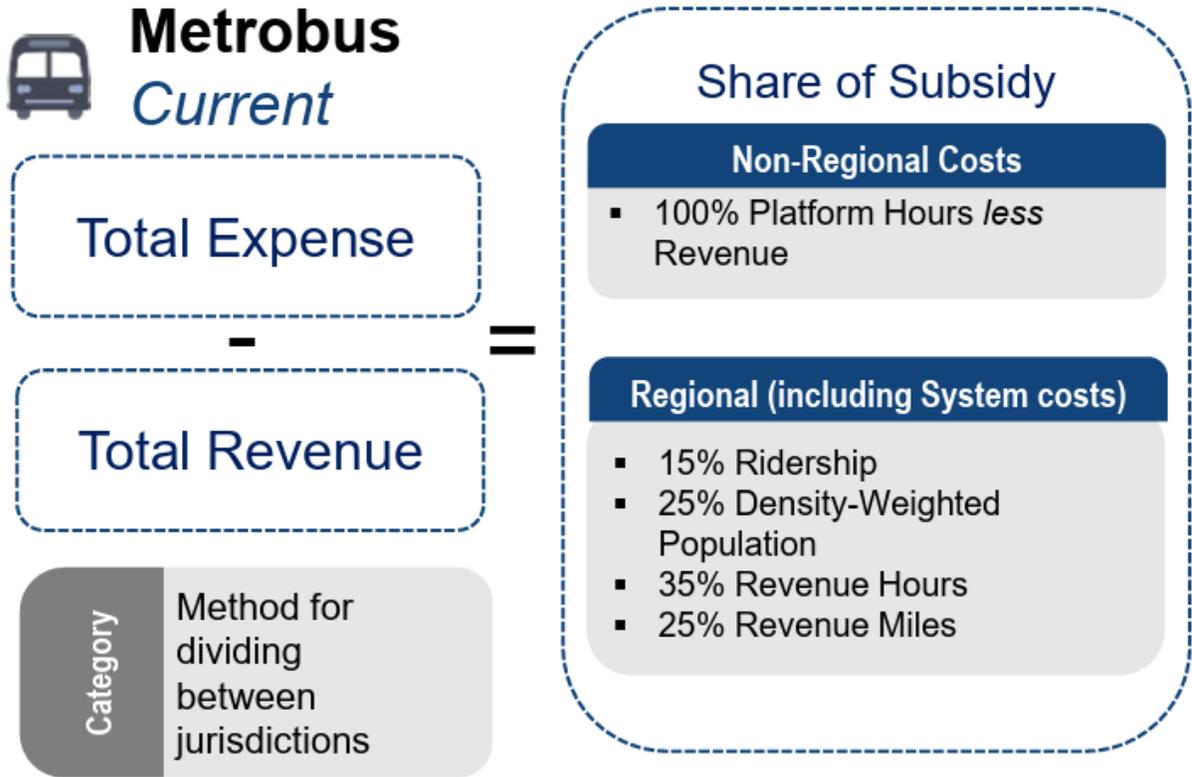
The new restructured cost allocation formulas, shown in Figure 103, break out costs into two categories: system costs (essentially administrative) and service costs (which include operating and maintenance costs). System costs are



allocated based on the ridership and population served by Metrobus. Service costs are allocated based on where the bus routes are located, with operating costs based on revenue hours and vehicle maintenance costs based on the maximum number of vehicles required to operate service. The costs for each Metrobus route are divided based on the distribution of bus revenue miles by jurisdiction. The new formulas also include cost sharing for the cities of Fairfax and Falls Church with their neighboring counties.

Estimates for 2025 indicated that under the current subsidy formula, Virginia was projected to support 22.1% of the overall WMATA bus operating subsidy;²³ with the new restructured formula that share is expected to change to 20.2%.

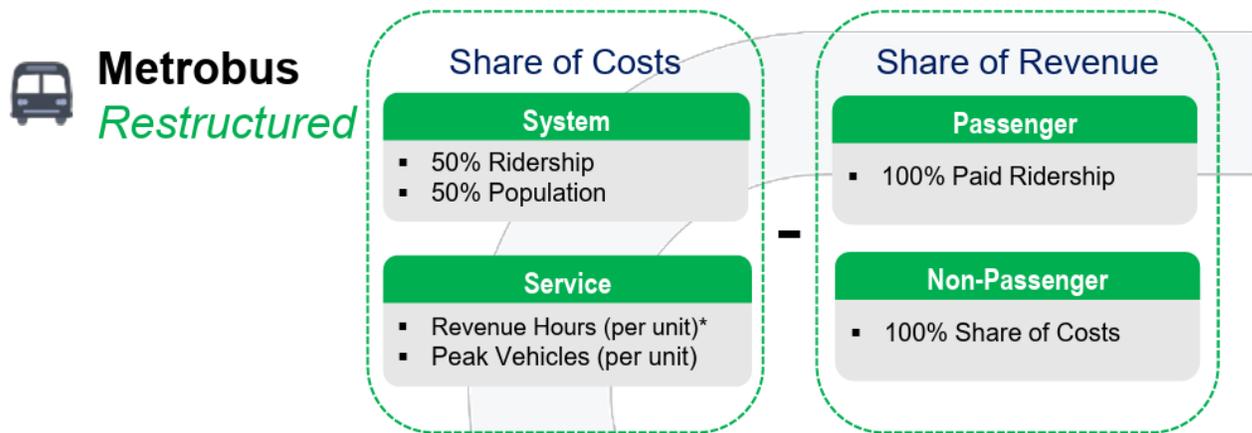
Figure 102 Current Metrobus Cost Allocation Formula



²³ Source: <https://www.wmata.com/about/board/meetings/board-pdfs/upload/3A-Approval-of-Restructuring-Metrobus-and-Metrorail-Operating-Subsidy-Allocation-Formulas.pdf>.



Figure 103 Restructured Metrobus Cost Allocation Formula



*Notes on approach to further allocate Virginia subsidy:

- National and Dulles Airport station costs are sub-allocated to each Virginia jurisdiction at a 1/6th share.
- Metrorail non-passenger revenues are suballocated to each Virginia jurisdiction based on share of track miles
- City of Fairfax Metrobus service costs shared between the City and Fairfax County 20%/80%, respectively
- City of Falls Church Metrobus service costs shared by the City, Arlington County, and Fairfax County 50%/25%/ 25%, respectively

18 of 52

Shared Facility—West Ox Maintenance Facility

Notably, the West Ox Maintenance Facility is a bus maintenance facility shared in partnership between WMATA and Fairfax County. Located at 4970 Alliance Drive in Fairfax, Virginia, the facility is owned and managed by Fairfax County for maintenance and operations of its Fairfax Connector bus service, and portions of the facility are leased out to WMATA for maintenance and operations of their Metrobus bus service.

The shared usage of the facility is governed by two primary documents: a Joint Use Agreement and an Operating Agreement. The former document permits WMATA to operate out of the facility as a lessee to Fairfax County, and the latter document regulates the delegation of operating responsibilities between the two agencies. While the joint use agreement remains static, the operating agreement is reviewed yearly and is frequently updated to reflect changing facility uses and needs. The operating agreement also contains clauses to allow for either default or early termination of WMATA’s occupancy of the facility.

Functionally, the facility operates as two separate, co-located, near-identical facilities. Each agency has its own space for most facility functions, such as vehicle maintenance, parts storage, vaults, and administrative areas. The agencies share driver rest areas, locker rooms, site security, and fuel storage. As WMATA performs a greater diversity of maintenance functions than Fairfax County, they use some equipment exclusively, such as a full paint bay and fall protection equipment.

Potomac and Rappahannock Transportation Commission (PRTC)

PRTC is the public transportation agency that operates OmniRide in the Prince William County area. PRTC also administers VRE, commuter rail service operated in cooperation with the NVTC. PRTC has members from six jurisdictions—the first three members financially support bus and rail services, while the remaining three support rail services only:

- ◆ Prince William County
- ◆ Manassas City
- ◆ Manassas Park City



- ◆ Stafford County
- ◆ Spotsylvania County
- ◆ Fredericksburg City

OmniRide provides multimodal transportation options including commuter, Metrorail connection, and local bus services as well as paratransit and ridesharing services. OmniRide Express routes provide commuter bus service between Prince William County, City of Manassas and Manassas Park, Stafford, Falmouth, Spotsylvania, Front Royal, and Warrenton to major employment centers in Northern Virginia and Washington, D.C., while OmniRide Metro Express provides all-day weekday feeder connections to and from Metrorail stations. OmniRide Local and OmniRide East-West Express bus services are focused on travel within Prince William County, Manassas, and Manassas Park. OmniRide Express and Metro Express buses travel outside of the PRTC jurisdictional boundaries, but are focused on serving employment centers in Northern Virginia and Washington, D.C. rather than serving residents of non-PRTC jurisdictions. In FY2023, OmniRide had more than 150 buses in its active fleet and made more than 1.5 million passenger trips.

PRTC was established as a regional transportation district in 1986 to help create and oversee VRE service. OmniRide assumed responsibility for area bus services in 1991. The PRTC Board of Commissioners has 17 members: 13 are locally elected officials from its six member jurisdictions, three commissioners are appointed to represent the Virginia General Assembly (one from the Senate and two commissioners appointed by the Speaker of the House), and the Chairman of the Commonwealth Transportation Board (ex officio with voting privileges)—whose designee is the Director of the Virginia DRPT.

PRTC funding comes from a combination of local, state, and Federal dollars, along with passenger fares. Each member jurisdiction collects a 2.1% motor fuels tax used to meet their respective subsidy obligations as well as other transportation improvements. State dollars primarily come from the DRPT. Federal dollars primarily come from the FTA.

Regional Agencies

Northern Virginia Transportation Commission (NVTC)

Although not an operator, NVTC plays a critical role in the provision of transit service in Northern Virginia. Founded in 1964, in part to represent the interests of the Commonwealth during the establishment of WMATA, NVTC is charged with the funding and stewardship of WMATA and VRE, which it co-owns with PRTC. NVTC's governing body consists of 21 commissioners and five alternates. Fourteen commissioners are locally elected officials from NVTC's six jurisdictions: Arlington County (three members), Fairfax County (five members), Loudoun County (two members), City of Alexandria (two members), City of Fairfax (one member), and the City of Falls Church (one member). The General Assembly appoints six commissioners and Virginia's Secretary of Transportation appoints one commissioner.

NVTC's role includes:

- ◆ Managing state and regional funding for six bus systems, Metrorail, and VRE
- ◆ Administering the Commuter Choice program, which designates a portion of highway toll revenue to support transit capital and operations
- ◆ Directing joint procurement efforts for new fare box technologies
- ◆ Analyzing regional transit ridership to identify trends and opportunities



- ◆ Providing Northern Virginia-focused transit research and technical expertise

NVTC also appoints Virginia’s two principal and two alternate members to the WMATA Board of Directors.

Unlike D.C. or Maryland, which each pays one bill to Metro, Virginia's Metro bill is split among the six jurisdictions in the NVTC area. Funding to pay that bill comes from statewide, regional, and local sources. These are managed by DRPT, NVTC, and the local jurisdictions. Given the complexity of how transit service is funded in Northern Virginia, NVTC recently released a Story Map [Northern Virginia Transit Funding Guide](#) that walks through the components of transit funding.

Current Governance and Funding Initiatives

There are two major initiatives underway in Northern Virginia that will shape the future of transit governance in the region. These are briefly described below but are being closely monitored to review implications for BRT.

DMVMoves

The [DMVMoves](#) initiative, established in 2024, is led by MWCOG and WMATA to develop a unified vision and sustainable funding model for public transit across the metropolitan Washington, D.C. region. DMVMoves recognizes the vital role that transit plays in the region and that a long-term regional solution is needed to address funding shortfalls for WMATA and the other transit providers in the region.

The DMVMoves Task Force is made up of 23 elected and appointed officials from the District of Columbia, Maryland, Virginia, and the Federal Government. The group held its first meeting in June 2024 and adopted a [final plan](#) in November 2025. The Task Force looked at the transit network holistically to decide “what our region wants and needs, how much it will cost, how we’ll pay for it, and how to best manage and govern it.”²⁴ More details on the final plan are in section 6.2.3.

Virginia Joint Subcommittee (SJ28)

Senate Joint Resolution 28, passed by the General Assembly in March 2024, established the *Northern Virginia Growing Needs of Public Transit* Joint Subcommittee to “study long-term, sustainable, dedicated operations and capital funding as well as cost-containment controls and strategies to ensure the Washington Metropolitan Area Transit Authority, the Virginia Railway Express, and the public transit systems that serve the Northern Virginia Transportation Commission and Potomac and Rappahannock Transportation Commission transportation districts meet the growing needs of public transit in the region.”

The SJ28 resolution noted “[t]o the extent feasible, the joint subcommittee shall incorporate in its study an evaluation of future land use plans for high-capacity transit corridors in Northern Virginia to support continued transit ridership growth, telework impacts on regional transit ridership, appropriate use of local bus services, WMATA's long-term capital funding needs, WMATA's capital funding prioritization process, Virginia's appropriate share of the jurisdictional subsidy based on existing Metrorail stations and Metrobus routes, WMATA's governance and structural issues that contribute to current funding instability, the technical work completed as part of NVTC's Metro Operating Funding and Reform Working Group effort, and the WMATA Funding, Accountability, and Reform Recommendations from NVTC's 2023 Annual Report on the Performance and Condition of WMATA.”

The SJ28 subcommittee reviewed existing and potential transit funding sources, including additional sources not considered by DMVMoves, such as a regional highway use fee, regional income tax, retail delivery fees, I-66 Inside the

²⁴ <https://dmvmoves.org/about-us/>.



Beltway tolling (outside of peak-period and peak direction), and regional motor vehicle rental tax. The subcommittee [adopted](#) eleven recommendations outlined in the [proposed resolution document](#) at their November 5, 2025 meeting:

- ◆ Prioritize sustainable and growing revenues to immediately meet Virginia’s \$153 million WMATA operating subsidy need starting in FY2027
- ◆ Establish regional surcharges on the highway use fee and mileage-based user fee for the NVTC and PRTC Districts
- ◆ Fund the proposed \$400 million/year and growing FY2028 need for WMATA, VRE, and the NVTC and PRTC bus systems using existing state transit funding structures and create new NVTC and PRTC regional funds
- ◆ Establish a new regional fund at NVTC derived from new or additional revenue sources
- ◆ Establish a new regional fund at PRTC
- ◆ Consider the impact of any major tax policy reforms on the overall transit funding need
- ◆ Consider revenues that:
 - » Are provided through net new revenues;
 - » Do not reduce funding to or uses of existing sources of transportation;
 - » Include a combination of sustainable, broad-based revenue sources;
 - » Capture revenues from visitors and non-residents of the area;
 - » Encourage transit use;
 - » Minimize impacts on low-income individuals; and
 - » Combine statewide and regional revenue sources.
- ◆ Support the WMATA accountability and transparency measures adopted by DMVMoves
- ◆ Reform Virginia’s legislated 3% operating assistance growth cap to encourage WMATA to continue cost containment efforts
- ◆ Require DRPT to report the total of all revenues generated and interest earned in the WMATA Capital Fund (§ 33.2-3401)
- ◆ May wish to fund and direct state and/or regional agencies to study:
 - » Bus service efficiency, including comparisons of Metrobus and local bus costs
 - » Development of accountability metrics for VRE and/or local bus systems
 - » Opportunities for expanded I66 Inside the Beltway tolling
 - » Opportunities to develop revenue from other sources, including off-street parking
 - » Infrastructure and policy needs for bidirectional commuter rail between Northern Virginia and Maryland

6.3.3 Examples of Transit Governance for BRT

Transit governance considerations for BRT routes are similar to those faced by existing bus and rail operations. BRT projects usually result from a comprehensive planning process that includes feasibility studies, route alignment design, and station location planning. This process often involves collaboration between transit agencies, local jurisdictions, and other stakeholders.



The governance model for BRT can vary depending on the region. In some areas, a single agency may be responsible for all aspects of BRT planning, implementation, and operation. In others, responsibilities may be divided among multiple agencies or boards.

Virginia BRT Corridors in Operations

Metroway (Crystal City–Potomac Yard)

The governance of the Metroway BRT involved strategic coordination between local jurisdictions (City of Alexandria and Arlington County), WMATA, and developers, with a focus on aligning the transit line with economic development plans for Potomac Yard. This project was part of a broader effort to improve public transportation options along the Route 1 corridor, with Alexandria and Arlington playing key roles in constructing the infrastructure, while WMATA managed operations. VDOT is responsible for roadway maintenance and signage along U.S. Route 1 (Richmond Highway). Both Arlington County and the City of Alexandria are planning to extend the existing Metroway transitway, including dedicated lanes, stations, and other multimodal improvements. Each jurisdiction is taking the leading role in developing the extension within their boundaries. NVTA has provided \$36 million in funding to support these planning efforts.

Governance Structure

Alexandria and Arlington shared responsibility for infrastructure development, coordinating design elements such as the transitway's exclusive bus lanes and right-boarding stations. Each jurisdiction managed sections of the route within their boundaries, while WMATA handled operations and integration with regional bus and rail services. This approach highlighted the importance of WMATA's participation as the eventual operating entity, as it was pivotal to solidifying operating plans and reimbursable agreements before procurement.

Alexandria completed its segment first in 2014, allowing early operations to begin, with buses running partially in mixed traffic. Arlington's portion followed in 2015, which shifted more of the service into dedicated lanes for improved speed and reliability. This phased implementation approach allowed Metroway to begin operations sooner, even though the infrastructure was still under construction in some areas.

A critical consideration of the governance approach was ensuring that the new transit infrastructure could accommodate the anticipated redevelopment at Potomac Yard with features such as median bus-only lanes and wide, pedestrian-friendly station areas.

Policy Implementation and Funding

Both Alexandria and Arlington leveraged land use policies that supported transit-oriented development (TOD) along the Metroway corridor. Rezoning efforts encouraged higher densities and mixed-used developments around key station areas, helping boost ridership and promote walkability. The Metroway BRT was the first corridor in the D.C. metropolitan region to feature dedicated bus lanes.

Metroway's infrastructure was partly funded through a combination of local, state, and Federal grants. Federal grant funds through the TIGER program were used to construct dedicated bus lanes and enhanced stations, with local governments contributing matching funds. The phased approach to implementation allowed both jurisdictions to adapt to evolving financial conditions and secure additional funding as needed. With a final cost of under \$8 million per mile, this governance structure demonstrates how transit investments, when aligned with economic development goals and supported by multi-agency cooperation, can deliver long-term benefits.



The Pulse

Greater Richmond Transit Company's (GRTC) Pulse BRT system operates under a governance structure involving partnerships at the local, state, and Federal levels. Key stakeholders include GRTC, the City of Richmond, Henrico County, the Virginia DRPT, VDOT, and the U.S. DOT. This collaborative effort allowed for the system's launch in 2018. Federal TIGER grant funds were essential in financing the \$65 million capital project.

The governance structure is overseen by GRTC's Board of Directors, who make major decisions, including expansions and strategic planning. The GRTC Board of Directors, in coordination with state agencies, oversees the process of seeking Federal funds and maintaining accountability for the project's financial and operational aspects. This creates a tiered governance system where local, state, and Federal agencies are involved in oversight and funding decisions.

Transit governance for the Pulse integrates land use considerations from the City of Richmond's and Henrico County's comprehensive plans, which focus on mixed-use and TOD in the BRT corridor. This underscores the importance of governance structures that incorporate urban planning, transit service design, and infrastructure development.

Additionally, private sector partnerships have played a role in funding and operational support. Health systems like the Virginia Commonwealth University (VCU) Health and Bon Secours have sponsored the Pulse, ensuring that it continues to serve the health and mobility needs of the community.

The governance structure of GRTC's Pulse BRT system exemplifies a successful collaboration among local, state, and Federal stakeholders, enabling effective transit planning and implementation. With strong oversight from the GRTC Board of Directors and partnerships with private sector entities, the Pulse not only meets community mobility needs but also aligns with broader land use and economic development goals. The integration of financial, operational, and land use considerations highlights the importance of comprehensive governance in enhancing public transit systems.

The governance of the Pulse BRT offers several key lessons, especially related to facilitating planning, design and operations between multiple jurisdictions and agencies (e.g., City of Richmond, Henrico County, VDOT, DRPT):

- ◆ **Effective Multi-Jurisdictional Coordination:** Richmond and Henrico County had to align their goals to create a seamless transit service across boundaries. Regular coordination with agencies like VDOT and DRPT ensured that transit goals aligned with broader regional transportation and economic development objectives.
- ◆ **Clear Role Definition and Governance Structures:** A defined governance structure helped clarify the roles and responsibilities of each stakeholder. GRTC, as the transit operator, was responsible for day-to-day management, while other agencies, such as Richmond's City Council and Henrico's Board of Supervisors, provided oversight and policy guidance
- ◆ **Leveraging Regional Growth and Development Goals:** Both Richmond and Henrico County used the Pulse as a tool to support economic development along the corridor. Governance frameworks that link transportation investments to broader regional economic development initiatives can ensure that all stakeholders see long-term value in the project.

Virginia BRT Corridors in Development

Richmond Highway BRT/The One

Fairfax County is developing a BRT system on Richmond Highway between Huntington Metrorail Station and Ft. Belvoir (branded as "the One"). Richmond Highway is a dynamic corridor characterized by diverse land uses and significant transportation demands. The comprehensive approach to improvements in the Richmond Highway corridor is commonly referred to as Embark Richmond Highway, and has three elements: road widening (including



bicycle/pedestrian improvements), land use changes, and planning and design of the BRT system. Embark aims to enhance mobility, promote mixed-use development, and improve safety within the area. Given the complexity of the BRT project, which involves extensive planning, design, ROW acquisition, utility relocation, and construction over more than a decade, effective governance is crucial.

Richmond Highway BRT is being implemented by the Fairfax County Department of Transportation (FCDOT) with support from other county, state, regional, and Federal agencies. Fairfax County will be responsible for BRT operations and maintenance and a combination of county, regional, state, and Federal funds supports construction. By 2025, NVTA has invested approximately \$640 million in this project, including road widening. To ensure effective management and coordination, a fully integrated team comprising FCDOT staff and program management consultants has been established.

To facilitate successful project management, FCDOT established a project-specific governance structure. The Board of Supervisors holds the ultimate decision-making authority regarding the program's scope, budget, and delivery method, including property acquisition. A BRT Executive Subcommittee comprising representatives from key state agencies and heads of relevant county agencies was formed to enhance the Board's decision-making process. Matters to be brought to the BRT Executive Committee include significant milestone schedule changes; financial plans, including source and uses of funding; alternatives under consideration in the environmental planning process; recommended project delivery methods and contract packaging plans; ROW acquisition needs; policy issues regarding coordination of the program with other county initiatives; and constituent issues of concern to the elected officials.

The technical aspects of the Richmond Highway BRT are under the purview of the BRT Technical Committee. This committee manages day-to-day operations and ensures effective staff support for the governance structure while overseeing planning, engineering, and environmental reviews, complemented by community involvement initiatives. By clearly defining roles and responsibilities among elected officials, technical committees, and community stakeholders, this governance framework ensures efficient decision-making and resource allocation and facilitates collaboration across agencies.

Envision Route 7

NVTC has been leading a multi-phased transportation planning process for Envision Route 7, a BRT system designed to connect Alexandria to Tysons via Bailey's Crossroads, Seven Corners and Falls Church along the Route 7 corridor. The first phase was initiated over ten years ago, while Phase 4 activities are ongoing. Project partners include Arlington County, Fairfax County, City of Alexandria, City of Falls Church, NVTA, DRPT, WMATA, and VDOT. To date, NVTA has provided \$102 million in funding to support planning efforts for this BRT corridor. Because this BRT operates in so many jurisdictions and the eventual operating entity has not yet been determined, NVTC's role has proven essential in continuing to move this project forward. To date, planning for this service has consisted of the following phases:

Phase 1: Existing Conditions and Opportunities

Phase 2: Termini, Alignment and Mode

Phase 3: Conceptual Design

Phase 4: Mobility Studies considering alignment, running way, roadway cross section, and station locations.

Phase 4 has included several studies led by NVTC and one study led by Fairfax County to study the portion of the corridor between Tysons and Falls Church. Envision Route 7 will continue to evolve with input from local jurisdictions regarding responsibilities for construction, operation, and maintenance. NVTC's ultimate strategy is to have BRT



operational on the corridor, with bus priority treatments constructed on the route on an independent timeline. This will be achieved by identifying near-term targeted enhancements to existing bus service on Route 7 and detailing opportunities for funding those improvements, while continuing to lay the groundwork for the more capital-intensive work to implement true BRT service on Route 7 in the future. This plan recognizes that it will be challenging to coordinate design, procurement, and construction across the region as one project. The plan allows for flexibility by respecting each jurisdiction’s competing needs and priorities with an overall goal of improving bus service in the corridor.

High-Capacity Transit Corridors in Alexandria

The Alexandria Mobility Plan (2021) prioritizes investments in high-capacity transit to improve mobility and reduce congestion. Two key projects—the Duke Street Transitway and the West End Transitway—are advancing this effort, with the goal of better connecting residents to key destinations.

Duke Street Transitway

The Duke Street Transitway focuses on establishing BRT service along the 4.5-mile stretch of Duke Street between Landmark Mall and the King Street Metro Station. Duke Street is a critical east-west route through Alexandria, serving local communities, retail centers, and major employment hubs. The project seeks to deliver reliable transit service, reduce travel times, and promote multimodal accessibility along Duke Street.

By 2025, NVTA has allocated \$87 million to the City of Alexandria for the full implementation of a transitway along the Duke Street Corridor. Additionally, *Duke Street in Motion* was established to gather public feedback on transit priorities. As of late 2023, conceptual designs were refined, narrowing options based on technical analysis and community input via *Duke Street in Motion*. Next steps for the project involve environmental review and more detailed design work. Construction is tentatively scheduled to begin as early as 2026.

West End Transitway

The West End Transitway seeks to improve north-south connectivity between the Van Dorn Metro Station, the Landmark Mall redevelopment (West End), and the Pentagon via high-frequency BRT service. This corridor will link Alexandria’s rapidly growing neighborhoods and key job centers. North of Mark Center, the transitway will follow two separate routes. One route will continue northward along Beauregard into Arlington County to the Shirlington Transit Center and then onto the I395 Express lanes to the Pentagon. The second route will proceed eastbound on Seminary Road and then onto the I395 Express lanes to the Pentagon.

In 2016, planning and preliminary engineering were completed. By 2025, NVTA has allocated \$20 million to the project. Alexandria formed partnerships with private developers in the Landmark area to coordinate construction with the ongoing West End redevelopment. In 2023, the city received Federal funding for a key phase of the project, enabling advances in project design and early construction. The first phase of service is expected to operate between Landmark Mall and the Pentagon by 2027.

Coordinating Planning and Phased Implementation

As the City of Alexandria is currently advancing two major high-capacity transit projects, managing these projects simultaneously requires strategic coordination of resources, funding, and public engagement. To manage both the Duke Street and West End projects effectively, Alexandria has employed a phased approach. Rather than advancing both projects fully at the same time, the city has focused on organizing each corridor into manageable phases. This allows for focused efforts on design and construction while keeping future phases flexible to adapt to evolving conditions, funding availability, and community priorities. City staff are working with WMATA and DASH to finalize the



specific operating plans for the two projects. VDOT will be responsible for the West End Transitway infrastructure along the I-395 Express lanes.

Examples of Governance Models from Other Parts of the U.S.

This initial review of other BRT programs from across the U.S. revealed commonalities in governance, particularly in the alignment of decision-making and asset ownership, which often depends on the specific roles of transit operators and local governments. BRT governance models in the U.S. vary by region, and their structures depend on local context, such as the number of transit operators, jurisdictional boundaries, and partnerships between public and private entities. General lessons learned through a review of multiple BRT programs include:

- ◆ **Strong Multi-Jurisdictional Coordination:** Successful BRT corridors require early and ongoing collaboration between cities, counties, state DOTs, and other regional partners.
- ◆ **Clear Role Definition and Governance Structures:** Clearly define who owns and maintains infrastructure, who operates service, and who provides planning and management oversight. Formal agreements prevent gaps in funding, operations, and maintenance.
- ◆ **Linking BRT to Broader Regional Goals:** Governance (and transportation implementation in general) works best when tied to economic development initiatives and multimodal transportation strategies.
- ◆ **Adaptability to Local Context:** Jurisdictions may have different priorities. Flexible governance structures allow BRT design to cater/respect/honor local political and physical constraints while maintaining efficiency.
- ◆ **Early Coordination with State/Federal Agencies:** This is essential in building champions, securing funding, and building support with agency staff and decision-makers.

The following BRT systems particularly stand out as useful examples relevant to the NVTA for how they implemented these governance frameworks within their respective regions.

Los Angeles, CA: Metro's Orange Line

The Los Angeles County Metropolitan Transportation Authority (Metro) oversees the Orange Line, an 18-mile BRT route. Metro functions as both a transit operator and a regional planning authority for all of Los Angeles County. It manages the Orange Line and coordinates with city governments, such as the City of Los Angeles, to integrate transit services with land use and local infrastructure projects.

Cleveland, OH: The HealthLine

The HealthLine BRT in Cleveland operates through a strong public-private partnership between the Greater Cleveland Regional Transit Authority (RTA) and private entities like Cleveland Clinic and University Hospitals, which were major contributors to its development. The RTA acts as a regional authority, responsible for both transit operators and infrastructure. While RTA operates the BRT system, its partnerships with private stakeholders reflect a governance structure where funding and planning benefit from private sector input and financial support.

Seattle, WA: RapidRide

King County Metro operates RapidRide, a BRT system that integrates transit with land use planning and traffic management across multiple municipalities within King County. This governance structure involves King County Metro as the transit operator and affected local governments that help with planning and infrastructure coordination.



Minneapolis–St. Paul, MN: A Line & C Line BRT

The A Line and C Line BRT services in Minneapolis and St. Paul are managed by Metro Transit, part of the Metropolitan Council, a regional planning organization that governs public transportation in the Twin Cities. As the regional authority, the Metropolitan Council coordinates transit services across multiple jurisdictions, providing a central governance framework that involves local governments and transit agencies.

6.4 Technology

BRT service is often differentiated from traditional bus service by the technologies it uses to augment service and operations. These features comprise a variety of technologies, treatments, and strategies that result in improvements to the operations of transit systems and customer experience. This section provides a high-level overview of various technologies that may be incorporated in BRT service, and their benefits to the system.

6.4.1 Transit Technology for the System Operator

The technologies outlined in this section are controlled by, or most benefit, the transit service provider and have benefits for the operations of BRT.

Automatic Vehicle Location

Automatic vehicle location (AVL) technology monitors the location of transit vehicles in real time using GPS devices or other location-monitoring methods. Information about the vehicle location is transmitted to a centralized control center as either raw data or processed data. AVL devices can improve bus safety by relaying vehicle locations to emergency response services immediately, as well as system control, integration, and quality of service by allowing agencies to track and communicate vehicle locations to customers in real time. In a multi-operator transit system, AVL participation from all operators creates a more seamless customer experience, as customers may expect a consistent level of real-time information from all services.

Transit Signal Priority

Transit signal priority (TSP) is the process of altering traffic signal timing at intersections to give priority to transit vehicles. TSP can be triggered by BRT vehicles operating in their own ROW or in mixed traffic along a street (known as “mainline” priority) or operating in an auxiliary lane at an intersection (known as a “queue jump”). To implement TSP, there must be an emitter-type device to interact with a wayside reader or receiver at the intersection tied to the signal controller. Different TSP detection systems include optical, GPS, wayside reader, “smart” inductive loops, and Wi-Fi. The signal controller must also have appropriate software to interpret and process a signal priority call. With AVL integration, TSP can be implemented so that it is activated only if the BRT vehicle is behind schedule. TSP can reduce bus travel time and increase service reliability, thereby also potentially reducing bus operating costs. Areas where multiple transit agencies operate will require collaboration from transit operators to determine TSP protocols for all relevant transit vehicles.

Automatic Passenger Counters

Automatic passenger counters (APC) are devices onboard transit vehicles used to record boardings and alightings at each stop and keep a running total of passengers onboard the vehicle. The APC units include sensors (typically infrared but more recently optical) at doorways to monitor passenger movements on and off a vehicle. An APC system creates an electronic record at each bus stop, typically including stop location, stop date and time, time of door opening and closing, and number of passengers boarding and alighting. An APC system provides a continual record of ridership onboard a transit route and eliminates much of the labor of conducting ridership surveys.



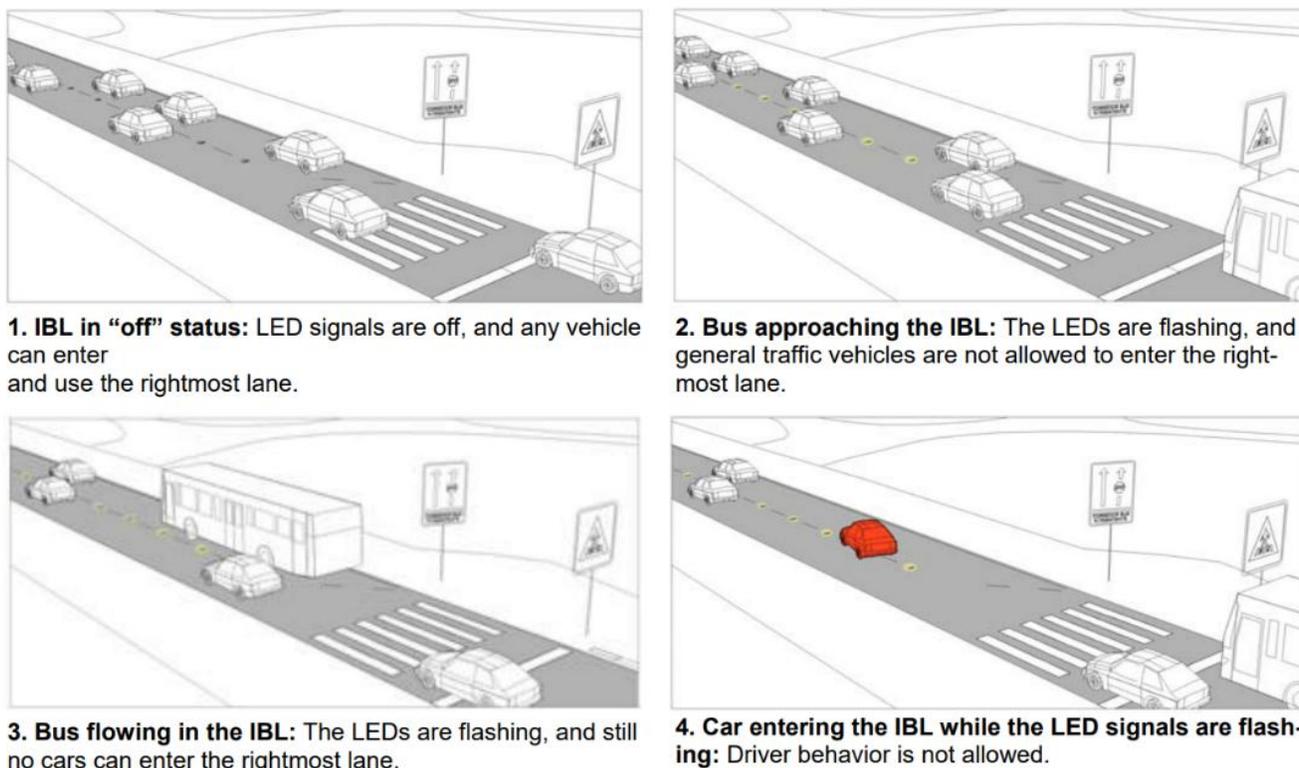
Computer-Aided Dispatch

Computer-aided dispatch (CAD) is often used by operators of demand-responsive transit services, which typically provide passengers with door-to-door services, and often only serve specific populations (such as residents with a disability) on an as-needed basis. CAD software can improve the efficiency of operations by providing dispatchers with easily-viewable data on the status of vehicles and calls. The software can be used in tandem with AVL to determine schedule compliance and send priority requests to traffic signals.

Lane Control Technology

Lane control technology can be used to create intermittent bus lanes, which restrict general-purpose lanes for the short time that a bus is using a particular lane. This technology is intended to be used when the speed of general traffic is low enough to inhibit bus transit speeds. Lane control technology can improve bus speeds and reliability without the cost of building exclusive bus lanes but must be integrated with AVL technology to establish the bus location and timing of lane restriction.

Figure 104 Example Implementation of Intermittent Bus Lanes



Source: APTA “Implementing BRT Intelligent Transportation Systems.”

Fleet Management Systems

A fleet management system records key performance indicators defined by the fleet manager. Once the data is retrieved, it can be compared to other buses and routes. Data analysis software can be used to correlate indicators. Most commercial fleet management software has pre-defined reports. Analysis of fleet management system data can be used to answer questions about costs, fuel usage, idling time, and more.



Automated Bus Lane Enforcement

Automated bus lane enforcement technology provides a means of enforcing BRT-related regulations, particularly those prohibiting general traffic vehicles from parking at bus stops and driving or parking in bus lanes. Enforcement cameras can also be used to enforce prohibitions against entering and/or crossing busways. With such a system, cameras capture still pictures or videos of violations and automatically create an enforcement action against the violator (although some level of human review is usually required to ensure that proper procedures are followed and to reduce spurious violations). The violations are issued to the drivers or car owners by mail with the same penalties that would be imposed if the violation had been issued directly by a police officer. Bus lane enforcement can improve the integrity of bus lanes and bus stops, thereby improving the speed and reliability of bus service and ensuring that bus stops are kept clear. For more information refer to the National Capital Regional Transportation Planning Board (TPB) Bus Lane Enforcement Study and the WMATA Clear Lanes initiative.^{25,26}

6.4.2 Transit Technology for the Customer

This section highlights technologies that enhance the customer's experience.

Fare Payment Technologies

The fare payment experience for customers can be improved by using various fare collection technologies in tandem with policy. Some key fare collection technologies include improvements in fare media, including magnetic stripe passes, stored value cards, as well as smartphone integration and sales and vending technology, including fare machines at BRT stations. Improving fare collection reduces dwell time at stations and can improve average travel speed and reliability, while also providing a high-quality, customer-friendly experience. Fare payment at stops shared by multiple transit operators may require collaboration between operators to create a more seamless customer experience.

BRT systems function well with off-board, automatic fare collection systems, which reduce vehicle boarding and dwell times, allow the rapid introduction of new fares and services, reduce revenue leakage, provide data to support system optimization, and support integrated ticketing across multiple modes. Passengers can use smart cards or other payment media to pay in advance of boarding. These devices read the payment medium, determine if the medium has sufficient value, and then deduct the appropriate fare.

Onboard Wi-Fi

Passenger Wi-Fi allows transit customers to connect to the Internet using enabled mobile devices. At stations and on board, Wi-Fi is a high-quality customer amenity, but not a critical transit component. However, it does improve customer experience and may encourage more people to use transit, as they are able to work or view entertainment during their time on transit. In an area with multiple transit operators, customers may expect that an amenity like Wi-Fi in vehicles from one operator should be available from all. For the most user-friendly customer experience, transit operators should coordinate to provide this amenity.

Onboard charging outlets allow passengers to charge their mobile devices. This amenity is not a critical transit component but may improve the customer experience and increase perception of the system as high-quality.

²⁵ <https://www.mwcog.org/documents/2017/06/30/bus-lane-enforcement-study/>.

²⁶ <https://www.wmata.com/initiatives/plans/bus-priority/clear-lanes.cfm>.



Security Systems

Security systems, including surveillance closed-circuit television (CCTV) and alarms, can be implemented onboard vehicles, off-board in stations, or along guideways. Integration of security systems with CAD/AVL communications means that central dispatch can track the exact location and direction of travel of a bus requiring assistance and can identify what resources are accessible to the bus. Security systems reduce the need for staffed security and may contribute to passengers' and operators' sense of safety. They also can improve assistance and emergency response to both the operator and the public. Similarly, panic buttons for operators can be incorporated into security systems to improve response times from local authorities and can be integrated with CCTV systems and AVL to increase safety.

Commercial Passenger Information Panels

Commercial passenger information and advertising (aka Transit TV) consists of one or more LCD information panels at stations or onboard vehicles that display images or videos. The digital media can be static or dynamically updated and transmit real-time information to customers. Transit TV improves the customer experience, as displays can provide customer information and alerts. It may also increase customer perception of a premium level of service, and thus appeal to new transit market segments. However, Transit TV also carries a substantial risk of visual clutter that competes with branding, wayfinding, and customer information. In addition, persistent advertisements could be seen as intrusive by some passengers and could degrade their perception of the transit service. Transit TV can be integrated with communication systems and AVL to update content remotely and dynamically for time-sensitive information.

Mobile Applications

A customer-facing mobile application for systemwide updates, bus tracking, and trip planning can improve the customer experience by providing critical information and increasing customers' perception of the service as reliable. At its most basic level, such an application can provide static information such as system maps, timetables, fare payment instructions, and answers to frequently asked questions. In conjunction with AVL, such an application can provide real-time bus locations, trip planning capabilities, and accurate travel time information. In an area with multiple transit operators, trip planning may involve routes from different agencies. For this reason, any mobile application with trip planning capabilities must be a collaboration between all transit operators.

6.4.3 Transit Technology for the Vehicle

This section highlights technologies that can help improve the operations of transit vehicles.

Collision Avoidance Systems

Collision avoidance systems (CAS) range in intrusiveness from driver alerts based on sensors inside or outside the vehicle to automatic safety adjustments and partial or full control of the vehicle. These systems can potentially increase safety, although the infrequency of bus collisions makes it difficult to accurately assess the true benefits and costs associated with CAS.

Lane Guidance

Lane guidance, also called lane assist, is a system that provides feedback to the bus operator for more precise steering. These systems can also provide the ability for a bus to steer itself through computerized or mechanical means. The bus driver still operates the throttle and brake, much like the operator on a train, but is hands-free on the steering wheel except in emergency situations.



Figure 105 Two Types of Lane Guidance



Source: San Diego Metropolitan Transit System

Lane guidance allows for reduced lane width requirements and potentially reduced ROW acquisition costs. It also can provide a high level of safety due to stress relief and to the fact that the system more reliably stays on track compared with the typical performance of a human operator.

Precision Docking

Precision docking is the ability for a bus to approach and depart a station platform through optical, mechanical or other guided means, to get as close to the platform as possible and to provide as small a gap as practical between the platform and the bus chassis/doors. This also involves the ability for the bus to dock in the same location reliably every time the bus services the station. Precision docking allows for faster and safer boarding and alighting by reducing potentially hazardous gaps at the curb and eliminating the need for extension and retraction of a bridge plate for passengers in a wheelchair or other mobility device, which consumes time at each station.

6.4.4 Transit Technology at Stations

This section outlines other technologies that would be deployed at BRT stations to enhance the transit system for users and staff alike.

Emergency Call Phones

Emergency call phones may be installed at BRT stations to increase the real and perceived safety of transit users, and potentially increase the speed of emergency responses. Likewise, public address (PA) systems can increase safety by enabling flexible and quick communication of information. PA systems also increase accessibility for riders by diversifying the methods of communication available and allowing those who rely on auditory communication to receive real-time information about the BRT service.

Real-Time Electronic Signs

Real-time arrival signage at BRT stations can be implemented in conjunction with AVL technology to provide accurate information to customers. This technology can increase the perception of reliability for the system overall.

Lighting

Lighting at BRT stations can improve real and perceived safety for passengers who wait at those stations. Implementing adequate lighting at stations systemwide can also increase the quality of the whole transit system.

Climate Control

Climate control, in the form of heaters and fans, can be implemented at transit stations to create a more comfortable customer experience. In harsh weather, a lack of climate control measures can be prohibitive to many passengers, especially those with greater sensitivities, such as children or older adult passengers. Implementing climate control measures systemwide can increase the quality of the system.



APPENDIX A. BEST PRACTICES SPREADSHEETS

Table A-1 Peer BRT System Metrics

| System Name | City/County | State | Key Peer for Study | Potential Reference for Study | Operating Transit Agency | Status | # of BRT Routes (Total In Operation and Proposed) | % Dedicated Lane/ Guideway | Monthly Revenue Miles (August 2023) | Monthly Ridership (August 2023, unless noted otherwise) | Monthly Revenue Hours (August 2023) | Size of Region (sq. miles, 2020) | Population of Region (2020) | Pop. Density-Region | Population Density within 1/2 mile of BRT Stations (per square mile) | Job Density within 1/2 mile of BRT Stations (per square mile) | Total Activity Density (Job + Population) within 1/2 mile of BRT Stations (per square mile) |
|-----------------------|----------------------|-------|---|-------------------------------|-----------------------------------|------------------------------|---|----------------------------|---|---|--|----------------------------------|-----------------------------|---------------------|--|---|---|
| | | | RELEVANCE FOR STUDY | | | | | | | | | | | | | | |
| Envision Route 7 | Alexandria-Arlington | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | | Proposed | 1 | N/A (not designed) | N/A | N/A | N/A | 24 | 234,379 | 9,766 | 9,389 | 10,704 | 20,093 |
| Metroway | Alexandria-Arlington | VA | As the region's first BRT line, Metroway is a prime candidate for use as a benchmark to develop density thresholds. | | WMATA | In Operation | 1 | 52% | 19,627 (Estimated based off of FY23 annual miles) | 20,108 | 2,254 (Estimated based off of FY23 annual hours) | 41 | 398,110 | 9,710 | 12,310 | 11,687 | 23,997 |
| West End Transitway | Alexandria | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | | Proposed | 1 | 29% | N/A | N/A | N/A | 15 | 159,467 | 10,674 | 14,726 | 4,281 | 19,007 |
| Duke Street in Motion | Alexandria | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | WMATA, Alexandria Transit Company | Proposed | 1 | 29% | N/A | N/A | N/A | 15 | 159,467 | 10,674 | 10,292 | 7,617 | 17,909 |
| The Pulse | Richmond | VA | This BRT line should be considered as a candidate for developing thresholds due to its relative success (around 41 passengers per revenue hour) and for the involvement of DRPT, which will be a key player in future BRT work. | | GRTC | In Operation | 1 | 100% | 34,401 | 155,893 | 3,814 | 60 | 226,610 | 3,781 | 6,704 | 15,324 | 22,028 |
| The One | Fairfax County | VA | As one of the region's first BRT lines, REX/The One BRT is a prime candidate for use as a benchmark to develop density thresholds. | | FCDOT | Proposed | 1 | 91% | N/A | N/A | N/A | 24 | 73,195 | 3,103 | 8,306 | 1,443 | 9,749 |
| Flash | Montgomery County | MD | A network of BRT routes now 10 years into planning; the Flash system represents a local example of phased implementation of a BRT system with different approaches to each corridor. | | MCDOT | In Operation / More Proposed | 5 | 78% | N/A | N/A | N/A | 493 | 1,062,061 | 2,154 | 9,337 | 4,995 | 14,332 |
| Veloci | Aspen | CO | A long-distance commuter BRT that may provide insights for BRT routes that uses freeways or expressways. | | RFTA | In Operation | 1 | | | | | | | | | | |



| System Name | City/County | State | Key Peer for Study | Potential Reference for Study | Operating Transit Agency | Status | # of BRT Routes (Total In Operation and Proposed) | % Dedicated Lane/ Guideway | Monthly Revenue Miles (August 2023) | Monthly Ridership (August 2023, unless noted otherwise) | Monthly Revenue Hours (August 2023) | Size of Region (sq. miles, 2020) | Population of Region (2020) | Pop. Density-Region | Population Density within 1/2 mile of BRT Stations (per square mile) | Job Density within 1/2 mile of BRT Stations (per square mile) | Total Activity Density (Job + Population) within 1/2 mile of BRT Stations (per square mile) |
|------------------------------------|--------------|-------|---|-------------------------------|--------------------------|------------------------------|---|--|-------------------------------------|---|-------------------------------------|----------------------------------|-----------------------------|---------------------|--|---|---|
| | | | RELEVANCE FOR STUDY | | | | | | | | | | | | | | |
| Pace Pulse | Chicagoland | IL | Good example of a planned network (two lines in service) of BRT in a suburban environment. | | Pace | In Operation / More Proposed | 10 | 0% | N/A | 2,552 (Average daily weekday ridership, October 2023) | N/A | 278 | 3,048,798 | 10,973 | 7,981 | 2,346 | 10,327 |
| Red Line (Blue Line & Purple Line) | Indianapolis | IN | This line's overlap with existing high-ridership routes make it an ideal peer, given the multiple overlapping transit agencies in Northern Virginia. | | IndyGo | In Operation / More Proposed | 3 | Red Line-60% Purple Line (proposed)-90% | 59,203 | 96,613 | 4,860 | 362 | 887,642 | 2,454 | 5,289 | 13,281 | 18,570 |
| Silver Line & Laker Line | Grand Rapids | MI | The inter-jurisdictional alignment of these routes and larger variation in density along the alignments make them a valuable peer given the large variations in the built-environment in Northern Virginia. | | The Rapid | In Operation | 2 | Silver Line-65% | 29,147 | 33,039 | 2,364 | 125 | 382,308 | 3,054 | 4,284 | 6,832 | 11,116 |
| MAX | Kansas City | MO | The overall lower-density of this region may make this BRT line a valuable addition as setting the minimum density threshold. | | KCATA | In Operation | 3 | 0% | 29,798 | 87,377 | 3,221 | 315 | 507,971 | 1,614 | 4,250 | 1,753 | 6,002 |
| ART | Albuquerque | NM | The overall lower-density of this region may make this BRT line a valuable addition as setting the minimum density threshold. | | ABQ Ride | In Operation | 2 | 58% | 62,910 | 216,056 | 5,152 | 187 | 564,559 | 3,015 | 4,893 | 6,226 | 11,119 |
| CapMetro Rapid | Austin | TX | The large campus and state capital make this peer a bit of an outlier but the relatively lower densities mean it's still a valuable reference. | | CapMetro | In Operation / More Proposed | 6 | 7% | N/A | 263,544 | 23,718 | 320 | 961,900 | 3,007 | 6,444 | 3,524 | 9,968 |
| VIVA | York | ON | This line may have applicability as its centered in a suburban area of a larger city, a similar condition to Northern Virginia. However, the differences in data collection and policy between the United States and Canada may limit this line's potential for comparison. | | YRT | In Operation | 4 | 40% | N/A | 16,557 (Average weekday ridership, 2021) | N/A | 679 | 1,173,334 | 1,728 | 6,207 | 3,751-9,943 | 9,958-16,150 |



Table A-2 Peer BRT System Operating Characteristics and Best Practices

| System Name | City/County | State | Key Peer for Study | Potential Reference for Study | Frequency | Span of Service | Best Practices | | | | | |
|-----------------------|----------------------|-------|--|-------------------------------|---|---|--|------------------------------|--|--|--|--|
| | | | | | | | RELEVANCE FOR STUDY | Planning | Service and Operations | Urban, Station, and/or Vehicle Design | Economic Development | Access |
| Envision Route 7 | Alexandria-Arlington | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | Peak: 10 minutes Off-peak: 15 minutes (proposed) | N/A | Route and station selection criteria are based on prior studies, research, data analyses, team observations, and stakeholder and public feedback; Chosen alignment is part of the existing long-range transportation plan, transportation master plan, and part of a multi-modal transit network | | | | | |
| Metroway | Alexandria-Arlington | VA | As the region's first BRT line, Metroway is a prime candidate for use as a benchmark to develop density thresholds. | | Peak: 12 minutes Off-peak: 15 minutes Weekends: 20 minutes | Mon-Thurs: 5:30 a.m.-10:00 p.m. Fri: 5:30 a.m.-12:00 a.m. Sa: 6:30 a.m.-12:00 a.m. Sun: 7:30 a.m.-10:00 p.m. | Have a specific access policy to lay out which services will have access to transit lanes/transitway. Include in implementation plan and cost estimate; Determine alignment, frequency, etc. through a mix of traffic analysis/modeling and stakeholder input | | | | | Include ongoing evaluation of the service as part of the implementation plan and cost estimate |
| West End Transitway | Alexandria | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | Peak: 10 minutes Midday: 15 minutes Evening: 30 minutes (proposed) | N/A | Coordination between city-wide transportation plan, corridor plan, and Small Area Plan; During planning phase, worked with businesses along corridor to discuss future growth in corridor | | Enhanced pedestrian safety and accommodation; Addition of multi-use paths and bike facilities along corridor; Accessible stations/stops (Build alternative only) | Facilitate economic development by providing further connectivity between major employment centers | | |
| Duke Street in Motion | Alexandria | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | N/A | N/A | Coordination with city-wide transportation plan | Stations every 1/4-1/2 miles | Continuous 10'-0" sidewalks, buffered from traffic and other uses; Narrow road widths and pedestrian-friendly intersection improvements; Accommodations for micro-mobility; Green space and tree canopy should be included in roadway design; Enhanced station design with added passenger amenities | | Focus on improving access to jobs, especially for minority populations | Speed limit reduction on roadways |



| System Name | City/County | State | Key Peer for Study | Potential Reference for Study | Frequency | Span of Service | Best Practices | | | | | |
|------------------------------------|-------------------|-------|---|-------------------------------|--|--|---|----------------------------|--|----------------------|--------|----------------|
| | | | RELEVANCE FOR STUDY | | | | Planning | Service and Operations | Urban, Station, and/or Vehicle Design | Economic Development | Access | Implementation |
| The Pulse | Richmond | VA | This BRT line should be considered as a candidate for developing thresholds due to its relative success (around 41 passengers per revenue hour) and for the involvement of DRPT, which will be a key player in future BRT work. | | Weekdays: 10-30 minutes; varies by time of day Weekends: 15 minutes daytime, 30 minutes evening | Weekdays: 5:00 a.m.-1:00 a.m. Weekends: 6:00 a.m.-1:00 a.m. | Incorporate plan into city master plan, city multi-modal plan; Considering and incorporating the roles of technologies into the implementation of a BRT system; Generate in-depth responses to comments and concerns that arise from stakeholder engagement; Write-up a "problem statement" which includes the transit needs in a designated area, goals and objectives | | Special consideration for urban design and station design in neighborhood context; Design feature (pylons) which light up to let riders know when the bus is close | | | |
| The One | Fairfax County | VA | As one of the region's first BRT lines, REX/The One BRT is a prime candidate for use as a benchmark to develop density thresholds. | | Weekdays: 6 and 20 minutes; varies by time of day Weekends: 20 minutes (proposed) | N/A | Impacts of BRT, such as increased demand for development near stations, is consistent with the regional growth strategy | | Consider bike-ped safety as part of overall BRT plan (e.g., Addition of two-way bike lanes and sidewalks on both sides of the road, as well as intersection improvements with signalized crosswalks, as part of overall corridor improvement plan) | | | |
| Flash | Montgomery County | MD | A network of BRT routes now 10 years into planning; the Flash system represents a local example of phased implementation of a BRT system with different approaches to each corridor. | | 15 minutes | Weekdays: 5:15 a.m.-1:00 a.m. Weekends: 5:30 a.m.-1:00 a.m. | Designate ridership benchmarks for certain BRT priorities based on industry standards and local relevance | | Designation of bike and pedestrian improvements, including safe ROWs, and priority areas along BRT corridors | | | |
| Veloci | Aspen | CO | A long-distance commuter BRT that may provide insights for BRT routes that uses freeways or expressways. | | Peak: 10-15 minutes Off-Peak: Up to 30 minutes | 4:30 a.m.-1:30 a.m. | | | | | | |
| Pace Pulse | Chicagoland | IL | Good example of a planned network (two lines in service) of BRT in a suburban environment. | | Peak: 15 minutes Off-peak: 20 minutes | Varies by route and day; 5:00 a.m.-1:00 a.m. | | | Stations are branded with heated shelters and real-time bus trackers | | | |
| Red Line (Blue Line & Purple Line) | Indianapolis | IN | This line's overlap with existing high-ridership routes make it an ideal peer, given the multiple overlapping transit agencies in Northern Virginia. | | 15 minutes | Weekdays: 5:00 a.m.-1:00 a.m. Saturdays: 6:00 a.m.-1:00 a.m. Sundays: 7:00 a.m.-10:00 p.m. | Work with local businesses and residents to ensure minimal construction impacts | 1/2-1/3 mile between stops | Infrastructure improvements, such as ADA curb ramps, tree planting, street resurfacing, and crosswalks, part of BRT construction; Sensitivity to neighborhood context | | | |



| System Name | City/County | State | Key Peer for Study | Potential Reference for Study | Frequency | Span of Service | Best Practices | | | | | |
|--------------------------|--------------|-------|---|-------------------------------|---|---|--|--|--|---|--|----------------|
| | | | RELEVANCE FOR STUDY | | | | Planning | Service and Operations | Urban, Station, and/or Vehicle Design | Economic Development | Access | Implementation |
| Silver Line & Laker Line | Grand Rapids | MI | The inter-jurisdictional alignment of these routes and larger variation in density along the alignments make them a valuable peer given the large variations in the built-environment in Northern Virginia. | | 10, 20, 30, 45 or 60 minutes; varies by route, day, and time of day (less frequent off-peak and weekends) | Weekdays: 5:30 a.m.-1:00 a.m.; varies by route Saturdays: 5:30 a.m.-2:45 a.m.; varies by route Sundays: 6:00 a.m.-8:00 p.m.; varies by route (Laker Line opens later and closes later; Silver Line opens earlier and closes earlier) | Creating an education plan to demonstrate to the public what BRT is and isn't | | Future-proof platform and shelter designs to account for possible changes (e.g. switching from 40'-0" to 60'-0" bus) | Utilize BRT not only as a transit opportunity, but as an economic development opportunity and opportunity for TOD | | |
| MAX | Kansas City | MO | The overall lower-density of this region may make this BRT line a valuable addition as setting the minimum density threshold. | | Weekdays: 20 minutes Every 20-30 minutes | Varies by route and day; 5:00 a.m.-12:00 a.m. | The City won a \$400,000 grant (with \$100,000 local match) to guide development along the Prospect MAX corridor. | | Stations have Wi-Fi and a built-in snow melt system; buses have USB charging stations and real-time screens onboard. | | Zero fare | |
| ART | Albuquerque | NM | The overall lower-density of this region may make this BRT line a valuable addition as setting the minimum density threshold. | | 8-15 minutes | Weekdays and Saturdays: 5:30 a.m.-10:00 p.m. Sundays: 6:15 a.m.-7:00 p.m. | The city offered short-term loans to businesses who were unable to operate or had difficulty operating due to construction | | Left-side boarding | | Zero fare | |
| CapMetro Rapid | Austin | TX | The large campus and state capital make this peer a bit of an outlier but the relatively lower densities mean it's still a valuable reference. | | Weekdays: 10-15 minutes Weekends: 15-20 minutes | Weekdays: 5:00 a.m.-12:30 a.m. Saturday: 6:00 a.m.-12:00 a.m. Sunday: 6:00 a.m.-11:30 p.m. | | | | | CapMetro originally had a premium price for MetroRapid. Due to criticism, including the fact that lower-income riders had to settle for less frequent local routes, Cap Metro eliminated their premium fare in 2017. | |
| VIVA | York | ON | This line may have applicability as its centered in a suburban area of a larger city, a similar condition to Northern Virginia. However, the differences in data collection and policy between the United States and Canada may limit this line's potential for comparison. | | 15-20 minutes; varies by route | 3:30 a.m.-1:30 a.m.; varies by route | | Each stop has a ticket vending machine and fares are on a proof-of-payment system to speed up boarding times | | | | |



Table A-3 Peer BRT System Best Practices & Other Notes

| System Name | City/County | State | Key Peer for Study | Potential Reference for Study | Maximizing Ridership (Strategies) | Finances | | | Cost-Effective Operations | Governance, Operations, Jurisdiction | BRT Supportive Land Use Mix and/or Zoning, TOD, etc. |
|-----------------------|----------------------|-------|---|-------------------------------|--|--|--|---|--|---|---|
| | | | RELEVANCE FOR STUDY | | | Construction Cost | Annual Operating Cost | Notes/Sources | | | |
| Envision Route 7 | Alexandria-Arlington | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | Significant public buy-in; Connections to significant transit centers and other routes; Analyze potential alignment alternatives based on different termini and connection points, and weigh against multiple quantitative and qualitative criteria; Travel demand forecasting | \$280-\$300 million (forecast) | \$18 million (forecast) | Potential sources of funding: Federal and state grants and programs, Developer contributions, fees, naming rights, Local revenues, TIFs, air rights, and other value capture, Advertising, Fare revenue; Reports note that municipalities may need to consider raising taxes to cover operating costs | Study multiple alternative alignments which may have different costs per mile / total costs | Roles not yet decided, but outlined; Considers regional operators, like WMATA, as options for certain roles, such as NEPA sponsor, because they have significant experience; Roles: Lead NEPA review (sponsor), Operating agency or agencies, Management of project design, Grantee of federal funds; These need not all be the same, nor different, entities | Significant commercial development at termini; Service area includes residential neighborhoods and shopping districts; Areas of dense development throughout the corridor; Diverse land use mix along the corridor generates different types of trips, at different times, of different lengths, etc. |
| Metroway | Alexandria-Arlington | VA | As the region's first BRT line, Metroway is a prime candidate for use as a benchmark to develop density thresholds. | | Connections to other transit options, such as Metrorail and Virginia Railway Express; Offering bikeshare at stops for first- and last-mile connectivity | \$42 million | \$3.5 million from WMATA | Costs split between municipalities (Alexandria and Arlington), TIGER grants, and other FTA funding | Utilize existing assets (e.g. typical 40'-0" buses) to begin, and add new features or assets later (e.g. branded, larger BRT specific buses) when there is momentum and more capital | Operated by WMATA | Significant office, mixed-use (office and residential), and residential uses along corridor |
| West End Transitway | Alexandria | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | Convert an existing high transit ridership corridor with increasing population and economic development to BRT | Transportation Systems Management (TSM) Alternative: \$51-57 million Build alternative: \$122-140 million | Transportation Systems Management Alternative: \$6.0-9.9 million Build alternative: \$6.70-10.2 million | NVTA (feasibility and initial design, Van Dorn bridge construction), State (design and construction of TSM and TSP, urban design improvements) | Provide multiple alternatives with different levels of BRT amenities/service-for example, TSM only or Build-Alternative (with enhanced TSP and some dedicated ROW) | | Connects to two Metrorail stations and two Transit Centers; Increased density and mixed-uses in Small Area Plan |
| Duke Street in Motion | Alexandria | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | Convert existing corridor with rapid transit ridership growth to BRT; Decreasing the amount of time it take to travel the corridor via local bus, and creating a comparable commute to driving | \$97 million | | Anticipated to receive state and federal funding, as well as NVTA grants | Implement ROW changes in phases, using mixed-traffic designs until funds are available for dedicated infrastructure | Operations by both WMATA (Metrobus) and Alexandria Transit Company (DASH)-passengers can take either bus | Connects to key commercial centers at Landmark Mall, Alexandria Commons, and Old Town, and to the King Street Metrorail Station |
| The Pulse | Richmond | VA | This BRT line should be considered as a candidate for developing thresholds due to its relative success (around 41 passengers per revenue hour) and for the involvement of DRPT, which will be a key player in future BRT work. | | Leveraging existing demand by utilizing high transit-use corridors and improving service quality | \$64.9 million | \$5.09 million (2022) | Funding sources (in order of most to least): FTA TIGER grant; Virginia DRPT; City of Richmond; Henrico County | Updating fleet to CNG to save costs on fuel (as opposed to diesel); Reduce service (e.g. longer headways) if practical to reduce fleet size | Planning for BRT was a cooperative effort from local planning commission and GRTC; Small Starts process by GRTC and DRPT; ongoing cooperation between GRTC and Dept. of Historic Resources | Significant commercial/retail, office, industrial, and multi-family residential; some single-family residential; Significant portion of the study area has densities greater than 10,000 people per square mile, with many of these tracts projected to reach greater than 15,000 people per square mile by 2031; Metrics: Number of jobs and |



| System Name | City/County | State | Key Peer for Study | Potential Reference for Study | Maximizing Ridership (Strategies) | Finances | | | Cost-Effective Operations | Governance, Operations, Jurisdiction | BRT Supportive Land Use Mix and/or Zoning, TOD, etc. |
|------------------------------------|-------------------|-------|--|-------------------------------|--|---|---|--|---|--|---|
| | | | RELEVANCE FOR STUDY | Construction Cost | | Annual Operating Cost | Notes/Sources | | | | |
| | | | | | | | | | | | residents within 1/2 mile from potential corridor/stations, Mapping out home origins for jobs within the study area |
| The One | Fairfax County | VA | As one of the region's first BRT lines, REX/The One BRT is a prime candidate for use as a benchmark to develop density thresholds. | | Utilizing existing high-transit corridor and improving service by adding dedicated ROW | \$730 million estimate for system | N/A (not in operation) | Funding sources: DRPT (state), NVTA (regional), CMAQ/RSTP (federal), SMART SCALE (state), FTA interest | Plan for potential future improvements, such as upgrades to light rail or new bike-ped connections, during design and construction of BRT, so these can be implemented more smoothly when new funds are available | Roadway and corridor improvements by VDOT, bus operations by FCDOT, overall vision governed by Fairfax County Comprehensive Plan and DRPT Multimodal Alternatives Analysis | The area immediately adjacent to Richmond Highway has commercial use and some higher density residential, such as garden apartments, condos, and townhouses. The majority of the study area consists of residential uses, and these especially lean single-family further from the highway. The two termini at Huntington and Fort Belvoir have the most dense development of the corridor, with Huntington specifically planned as TOD for the Metrorail station; Metrics: Primarily residential (52%) and institutional (21.2%) land use, 10.5% is open land, Only 9% is commercial |
| Flash | Montgomery County | MD | A network of BRT routes now 10 years into planning; the Flash system represents a local example of phased implementation of a BRT system with different approaches to each corridor. | | Utilize corridors that already have high traffic congestion, commuter patterns and/or all-day transportation patterns, as well as those that already have or are planned to have multiple activity centers | US 29 corridor-\$31.5 million initial cost, plus \$10 million in later improvements MD 355 corridor-\$430 million (forecast) Veirs Mill corridor-\$169 million (forecast) | \$1.1 million per mile for entire proposed system | US 29 corridor-\$10 million from TIGER grant, rest from local funds; improvements from state and local funds MD 355 corridor-\$190 million in state funding, \$158 million in federal funding (expected) Veirs Mill corridor-\$42 million in Small Starts funding (expected) | Implement in phases-including lines, vehicle improvements, station improvements-as funds become available, rather than requiring large up-front costs | Operated by Ride On, transit company serving Montgomery County and part of Prince George's County | Flash routes are planned typically around commuter corridors with one-way traffic directions at peak times, which are anchored by activity centers, Metrorail stations and/or TOD. Most planned corridors have nodes of activity centers with residential centers in between, though one is planned to be a higher-density development corridor. Another is also planned to include a multi-modal, pedestrian-friendly boulevard. |
| Veloci | Aspen | CO | A long-distance commuter BRT that may provide insights for BRT routes that uses freeways or expressways. | | | | | | | | |
| Pace Pulse | Chicagoland | IL | Good example of a planned network (two lines in service) of BRT in a suburban environment. | | | | | | | Service is operated by Pace and acts as a commuter service from the Chicago metropolitan area to Chicago. | Pace created Transit Supportive Guidelines designed to be referenced by elected officials, municipal staff, developers, and others that lists principles for land use and development. |
| Red Line (Blue Line & Purple Line) | Indianapolis | IN | This line's overlap with existing high-ridership routes make it an ideal peer, given the multiple overlapping transit agencies in Northern Virginia. | | Overlap with existing local routes that already maintain high ridership | Red line-\$96.3 million Blue Line-\$370-390 million | \$9.63 million (2022) | FTA grants, approved transit income tax, Indianapolis Public Works, FHWA, farebox revenue | Utilize existing infrastructure where possible/practical (e.g., drainage systems) | Transit tax passed in Marion County as a referendum in a general election; Construction approved by City-County | Restructuring of zoning code allows for by-right apartment homes up to fourplexes, introduces TOD overlays, and strongly regulates or |



| System Name | City/County | State | Key Peer for Study | Potential Reference for Study | Maximizing Ridership (Strategies) | Finances | | | Cost-Effective Operations | Governance, Operations, Jurisdiction | BRT Supportive Land Use Mix and/or Zoning, TOD, etc. |
|--------------------------|--------------|-------|---|-------------------------------|--|--|-----------------------|---|---|---|---|
| | | | RELEVANCE FOR STUDY | | | Construction Cost | Annual Operating Cost | Notes/Sources | | | |
| | | | | | | Purple Line-\$188 million | | | | Council; System operated by Indianapolis Public Transportation Corporation | prohibits car-oriented land uses (e.g., gas stations) |
| Silver Line & Laker Line | Grand Rapids | MI | The inter-jurisdictional alignment of these routes and larger variation in density along the alignments make them a valuable peer given the large variations in the built-environment in Northern Virginia. | | Despite the Silver Line sharing a route with local bus service, ridership is higher than local routes due to the increased convenience and reliability | Silver Line-\$40 million Laker Line-\$73.7 million | \$2.46 million (2022) | Majority of construction costs for both lines funded by federal grants with MDOT covering the rest; Operating costs for both lines are covered by property tax revenue from the 6 municipalities they serve | Use the same manufacturer as current bus fleets to make maintenance more efficient | Operated by The Rapid (transit agency operating in several adjacent cities); Intergovernmental agreement prior to construction to allow the project to run smoothly and coordinate between local jurisdictions, and give it a consistent design. Decides how much cost each municipality is responsible for, and what revenue they will get, and sets up similar ordinances in each municipality for fare evasion | The Silver Line serves Downtown Grand Rapids, the Medical Mile, several universities, and the Division Avenue Corridor. This corridor is primarily mixed-use zoned within Grand Rapids, and is marked as having several village centers, a sub-regional activity center, and a traditional business district. However, the corridor is also described as having a number of vacant or declining properties; The Laker Line connects Grand Valley State University to Downtown Grand Rapids via Route 50, through the commercial corridor of Walker (including the mixed-use Standale Downtown zone), as well as a large swath of rural land between Walker and the university |
| MAX | Kansas City | MO | The overall lower-density of this region may make this BRT line a valuable addition as setting the minimum density threshold. | | Construction of Prospect MAX included new and repaired sidewalks, improved intersections, and improved pedestrian access. | Troost MAX: \$30.6 million Prospect MAX: \$54 million | \$4.68 million | Prospect MAX: Mix of federal (FTA Small Starts Program, Surface Transportation Program) and local (City of Kansas City) | KCATA is fare-free; it would have cost \$100,000 per station to install ticket machines at Prospect MAX stations. | Operated by KCATA | Kansas City has a TOD policy that specifies "TOD polices should be applied to all transit station areas and corridors served by some form of fixed guideway or rapid transit including streetcar, commuter rail, MAX bus service, and other bus rapid transit." The City won a \$400,000 grant (with \$100,000 local match) to guide development along the Prospect MAX corridor. |
| ART | Albuquerque | NM | The overall lower-density of this region may make this BRT line a valuable addition as setting the minimum density threshold. | | Focus on addressing extended bus delays and slow service with dedicated ROWs; Utilizing a high-traffic corridor | \$133.7 million | \$6.54 million (2022) | \$75 million Small Starts and \$31.4 million from other federal sources; Rest from local taxes and bonds | LESSON LEARNED: Implementing projects in phases (i.e., starting with diesel and moving to electric later, or starting with "light" BRT and moving to "heavy" later) can insulate against financial setbacks | Operated by city of ABQ | The Central Business District has higher density compared to the rest of the city, mixed-use, multi-story developments, and pedestrian-supportive street design |



| System Name | City/County | State | Key Peer for Study | Potential Reference for Study | Maximizing Ridership (Strategies) | Finances | | | Cost-Effective Operations | Governance, Operations, Jurisdiction | BRT Supportive Land Use Mix and/or Zoning, TOD, etc. |
|----------------|-------------|-------|---|-------------------------------|--|--------------------------------------|----------------|--|---|--|--|
| | | | RELEVANCE FOR STUDY | Construction Cost | | Annual Operating Cost | Notes/Sources | | | | |
| CapMetro Rapid | Austin | TX | The large campus and state capital make this peer a bit of an outlier but the relatively lower densities mean it's still a valuable reference. | | MetroRapid implemented on the corridor with the highest ridership. | | \$4.09 million | | | Project Connect is a partnership between the City of Austin, CapMetro, and Austin Transit Partnership. With the approval of Proposition A, approved by voters in November 2020, 8.75 cents of the City's property tax rate revenue is dedicated to the Austin Transit Partnership to fund implementation of Project Connect, which includes the planned MetroRapid routes. Service is operated by CapMetro. | The City of Austin has an Equitable TOD Policy Plan that includes detailed typologies and priorities for future MetroRapid bus stations. |
| VIVA | York | ON | This line may have applicability as its centered in a suburban area of a larger city, a similar condition to Northern Virginia. However, the differences in data collection and policy between the United States and Canada may limit this line's potential for comparison. | | Strategic connections between York VIVA lines, Toronto Transit Commission subway stations, and Metrolinx regional rail stations. | \$1.4 billion in province investment | | Federal government grants and province funding | Buses make use of existing or specially lengthened queue jumps at intersections and existing bus lanes. | Designed with a public-private partnership: York Region Transit partnered with York Consortium (seven private sector firms): public sector established fare policies and service levels, ownership of all assets, and control of revenues and funding while private sector provided professional staffing and procurement report, assumed risk on budgets and schedules, and assisted in funding requirements; York Region Transit contracts some operations to Tok Transit. | The York Region Official Plan outlines Regional Centers, areas with major growth and complete communities; Regional Corridors, major roads connecting Regional Centers via transit; and Major Transit Station Areas, areas surrounding rapid transit stations, GO stations, and subway stations, to focus development around. The Regional Corridors are served with BRT, and York Region Transit has implemented rapidway projects (bus lanes) along these corridors. |



Table A-4 Peer BRT System Best Practices & Other Notes (Continued)

| System Name | City/County | State | Key Peer for Study | Potential Reference for Study | Types of Priority Used | | | | | | BRT Features | | | | | | |
|------------------------------------|----------------------|-------|---|-------------------------------|------------------------|-----------------|-----------------------------|-----------------|---------------------|-------------------------|----------------------|------------------|-------------------|----------------|----------------|----------------------------|---------------|
| | | | | | Dedicated ROW | Exclusive Lanes | Exclusive Lanes (Part-Time) | Bypass Shoulder | Limited Stop Routes | Traffic Signal Priority | Significant Stations | Branded Vehicles | Off-Board Payment | Center-Running | Median-Running | Bi-Directional Center Lane | Mobility Hubs |
| Envision Route 7 | Alexandria-Arlington | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | N/A (not designed) | | | | | | | | | | | | |
| Metroway | Alexandria-Arlington | VA | As the region's first BRT line, Metroway is a prime candidate for use as a benchmark to develop density thresholds. | | | | | | | | | | | | | | |
| West End Transitway | Alexandria | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | | | | | | | | | | | | | |
| Duke Street in Motion | Alexandria | VA | This BRT line is still in planning stages, no data is available to use it as a benchmark in terms of ridership and productivity. It could be used to set a minimal threshold for overall activity. | | | | | | | | | | | | | | |
| The Pulse | Richmond | VA | This BRT line should be considered as a candidate for developing thresholds due to its relative success (around 41 passengers per revenue hour) and for the involvement of DRPT, which will be a key player in future BRT work. | | | | | | | | | | | | | | |
| The One | Fairfax County | VA | As one of the region's first BRT lines, REX/The One BRT is a prime candidate for use as a benchmark to develop density thresholds. | | | | | | | | | | | | | | |
| Flash | Montgomery County | MD | A network of BRT routes now 10 years into planning; the Flash system represents a local example of phased implementation of a BRT system with different approaches to each corridor. | | | | | | | | | | | | | | |
| Veloci | Aspen | CO | A long-distance commuter BRT that may provide insights for BRT routes that uses freeways or expressways. | | | | | | | | | | | | | | |
| Pace Pulse | Chicagoland | IL | Good example of a planned network (two lines in service) of BRT in a suburban environment. | | | | | | | | | | | | | | |
| Red Line (Blue Line & Purple Line) | Indianapolis | IN | This line's overlap with existing high-ridership routes make it an ideal peer, given the multiple overlapping transit agencies in Northern Virginia. | | | | | | | | | | | | | | |
| Silver Line & Laker Line | Grand Rapids | MI | The inter-jurisdictional alignment of these routes and larger variation in density along the alignments make them a valuable peer given the large variations in the built-environment in Northern Virginia. | | | | | | | | | | | | | | |
| MAX | Kansas City | MO | The overall lower-density of this region may make this BRT line a valuable addition as setting the minimum density threshold. | | | | | | | | | | | | | | |
| ART | Albuquerque | NM | The overall lower-density of this region may make this BRT line a valuable addition as setting the minimum density threshold. | | | | | | | | | | | | | | |
| CapMetro Rapid | Austin | TX | The large campus and state capital make this peer a bit of an outlier but the relatively lower densities mean it's still a valuable reference. | | | | | | | | | | | | | | |
| VIVA | York | ON | This line may have applicability as its centered in a suburban area of a larger city, a similar condition to Northern Virginia. However, the differences in data collection and policy between the United States and Canada may limit this line's potential for comparison. | | | | | | | | | | | | | | |



APPENDIX B. 2024 PERCEPTION SURVEY



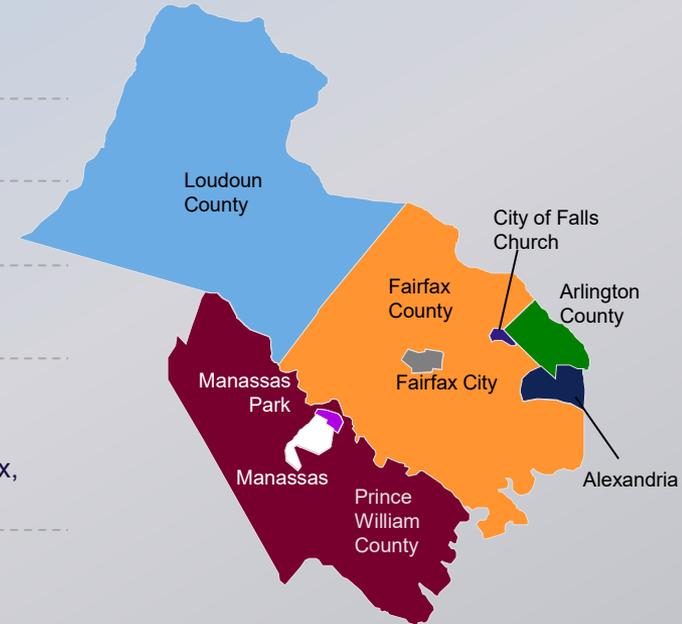


Tracking Changes in Transportation Attitudes and Priorities

2024 Perception Survey

Methodology

| | | |
|---|-----------------------|--|
|  | PARTICIPANTS | n=606 Residents 18 years or older within jurisdiction of Northern Virginia Transportation Authority |
|  | FIELD DATES | November 28 – December 14, 2023 |
|  | MODE | Online Survey |
|  | LENGTH | 14 minutes |
|  | GEOGRAPHY | Northern Virginia Arlington County, Fairfax County, Loudoun County, Prince William County and the Cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park |
|  | DATA WEIGHTING | 2023 No weighting required 2021 data weighted by ethnicity 2019 data weighted by ethnicity 2016 data weighted by gender and ethnicity 2015 data weighted by ethnicity |



Methodology: Reporting Notes - 2023 Survey

Survey Respondent Selection

- Scientific study using an opt-in online panel.
- Respondents must be age 18+ and residents of Northern Virginia, more specifically, residents of Arlington County, Fairfax County, Loudoun County, Prince William County, Alexandria, Fairfax City, City of Falls Church, Manassas, and Manassas Park.
- We aim for an overall representation of regional demographics based on age, gender, and race according to the US Census. We also aim for a proportionate sample that represents each county/city by population size according to the US Census. For the most part we use sample quotas to hit these demographic targets. Weighting was not needed for the 2023 wave.

Confidence Interval and Margin of Error

- All sample surveys and polls, whether or not they use probability sampling, are subject to multiple sources of error which are most often not possible to quantify or estimate. Online opt-in panels such as the one used for this study do not use probability sampling and accordingly the strict calculation of sampling error is not typically done. In the hypothetical case of a perfectly random sample and no response or measurement errors, a sample of this size (n=606) would produce a margin of error of $\pm 3.98\%$ at a 95% confidence interval. Margins of error for subgroups would be higher.

Ethnicity clarification

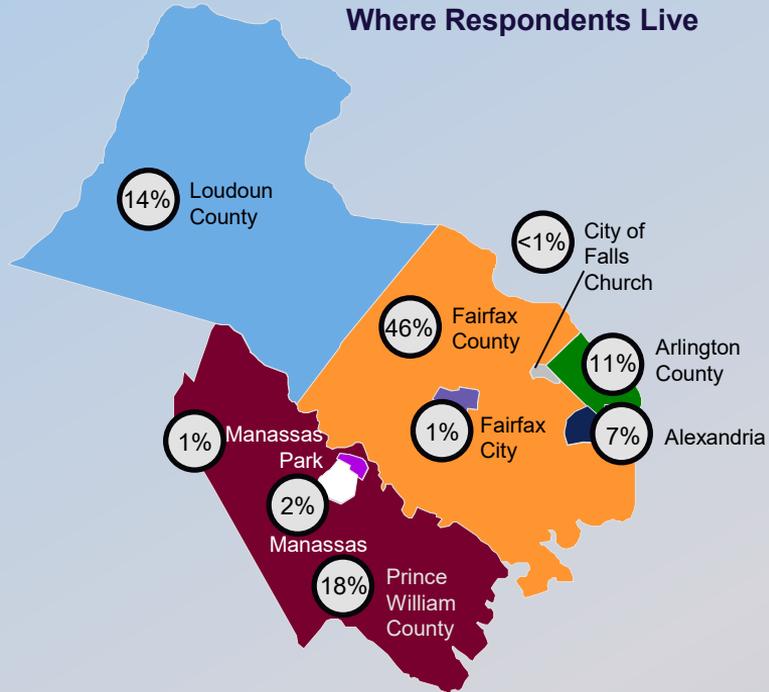
- Black, White, Asian refer to Non-Hispanic Black/White/Asians.

Statistical Testing Notations



- Indicates statistically significant differences between 2021 and 2023 ($p < .05$). When appropriate, the report indicates these differences using green, red, and blue color coding wherein **green = an increase or positive change**; **red = decrease or negative change**; **blue = may be construed as either positive or negative/or just a change that might be of interest**.
- () Numbers in parenthesis are of interest but are not statistically significant at $p < .05$ level. When shown these numbers are color coded in the same way as described in prior bullet.
- Some totals may not add to 100% and aggregation of the data may vary slightly due to rounding error.
- Abbreviations: T3B = Top 3 Box Score (rated 8-10 on a 10-point scale)

Resident Profile



| County/City of Employment | 2015 | 2016 | 2019 | 2021 | 2023 |
|---------------------------|------|------|------|------|------|
| Fairfax County | 37% | 36% | 35% | 38% | 40% |
| District of Columbia | 18% | 12% | 11% | 6% | 9% |
| Arlington County | 11% | 11% | 12% | 14% | 9% |
| Loudoun County | 8% | 13% | 12% | 13% | 13% |
| Alexandria | 7% | 9% | 9% | 8% | 8% |
| Prince William County | 6% | 8% | 12% | 11% | 11% |
| Manassas | 4% | 2% | 2% | 2% | 2% |
| Fairfax City | 2% | 2% | 2% | 3% | 2% |
| City of Falls Church | 1% | 1% | 1% | 1% | <1% |
| Manassas Park | <1% | <1% | 1% | <1% | 1% |
| Other county in Virginia | 1% | 1% | 2% | 1% | 1% |
| Other county in Maryland | 3% | 2% | 1% | 1% | 1% |
| Other | 1% | 3% | 2% | 2% | 1% |

Years of Residency

| | | | | | |
|--------------------|-----|-----|-----|-----|-----|
| Less than 1 year | 3% | 2% | 3% | 5% | 2% |
| 1 to 5 years | 19% | 16% | 17% | 22% | 16% |
| 6 to 10 years | 14% | 12% | 14% | 12% | 12% |
| 11 to 15 years | 12% | 14% | 11% | 9% | 9% |
| More than 15 years | 51% | 56% | 55% | 52% | 60% |

Own/Rent Home

| | | | | | |
|---------|-----|-----|-----|-----|-----|
| Own | 65% | 70% | 64% | 63% | 61% |
| Rent | 32% | 26% | 31% | 31% | 33% |
| Neither | 2% | 3% | 3% | 3% | 5% |
| Decline | 1% | 1% | 2% | 3% | 1% |

KEY FINDINGS

Key Findings



Investing in regional transportation remains a priority. Traffic and congestion have the second highest impact on the quality of life in the region (trailing only affordability of housing).



Commuting habits are still impacted by the post-pandemic shift to work from home, but most residents are commuting to work at least a few days a week and are on the road even more for non-work purposes.



Safety is always a priority when it comes to transportation. Crime is on the rise and personal security is playing an increasingly important role in quality of life in the region. The increased attention on crime increases focus on safety (in general).



Opportunity for BRT - Despite limited familiarity with Bus Rapid Transit, residents have a favorable outlook, seeing many more benefits than drawbacks.



Transportation issues are a bit less top of mind. Recall of transportation issues in the news and awareness of NVTA have softened compared to the last wave. Perceptions of the region's performance in planning and implementing transportation solutions remains positive, but intensity has softened.

Executive Summary:

- **Regional transportation remains a priority and is a leading factor in influencing quality of life.**
 - Nine-out-of-ten agree that *Investing in the regional transportation* is a top priority in 2023. This is consistent with 2021 data and signals the continued importance of investing in our region's transportation system and infrastructure.
 - *Improving affordability of housing* and *Reducing traffic congestion & Improving transportation options* remain the top two factors that contribute to quality of life in the Northern Virginia region.
 - *Traffic flow and congestion* remains the biggest transportation factor impacting quality of life. Perceptions of how well the region addresses these concerns have improved, but there is still work to be done. The top priorities for future improvements include leveraging technology, expanding metro, improving roadways and offering Bus Rapid Transit (BRT) options.

Executive Summary:

- **A recent Washington Post article¹ noted how remote work continues to thrive in the region. This continues to shape commuting habits.**
 - The article does point out that the DC area may see more employees returning to office and shows evidence of decreases in work from home. Remote work is likely to remain part of the post-pandemic reality, but we can expect a continued shift to a hybrid that has a mix of work from home and work from the office.
- **Despite changing work habits, most residents are on the road on a weekly basis. Most are commuting at least a couple days a week and driving even more frequently for non-work purposes.**
 - Most residents use public transit, but daily usage has softened.

¹ <https://www.washingtonpost.com/dc-md-va/2023/09/14/dc-remote-work-jobs-data-census-bureau/#>

Executive Summary:

- **Safety remains an important part of the story as it is playing an increasing role in affecting quality of life.**
 - *Reducing crime and making neighborhoods safer* has increased 7 points to replace *Increasing access to high quality, affordable healthcare* as the third biggest factor impacting quality of life.
 - Safety improvements serve as an influential topic to engage and motivate regional residents. When looking at specific language, calling out benefits and how they connect to the individual hold the strongest equity (i.e., *Get you quickly and safely where you need to be*).
 - When looking specifically at transportation priorities, *Making our transportation system safe* remains the top priority and has increased in importance since 2021. It is the strongest performing attribute (80%) but continues to show a large gap when compared to importance (45%).

Executive Summary:

- **Bus Rapid Transit (BRT) offers the region an opportunity to further improve transportation options. Initial reactions are positive, but familiarity is lacking. Leveraging key benefits will help further strengthen interest.**
 - Most (69%) are *Not too or not at all familiar* with BRT, but views are *Favorable* (51%) or *Neutral* (41%).
 - More than half would consider using BRT (54% for commuting and 63% for recreational/personal travel).
 - The strong majority (84%) feel the positives associated with BRT outweigh any negatives and the most influential benefits are *Convenience* (15%); *Time savings compared to driving* (12%); *Faster and more reliable trips* (10%).

Executive Summary:

- **Awareness of regional transportation news, NVTA and TransAction have softened since 2021.**
 - Overall, respondents are less likely to recall hearing, reading or seeing news about transportation issues in the region and awareness of both NVTA and TransAction have both softened in 2023 (after seeing a steady growth trend from 2016-2021).
 - For those who do recall hearing, reading or seeing news about transportation issues in the region, it tends to be more of a balance of positives (39%) and negatives (40%) whereas 2021 data was more positive (57%) than negative (27%).
- **The region and NVTA both continue to maintain positive perceptions of their performance in planning and implementing transportation solutions in the region.**
 - Intensity of scores have softened - increase in GOOD scores while the EXCELLENT scores show a decline.

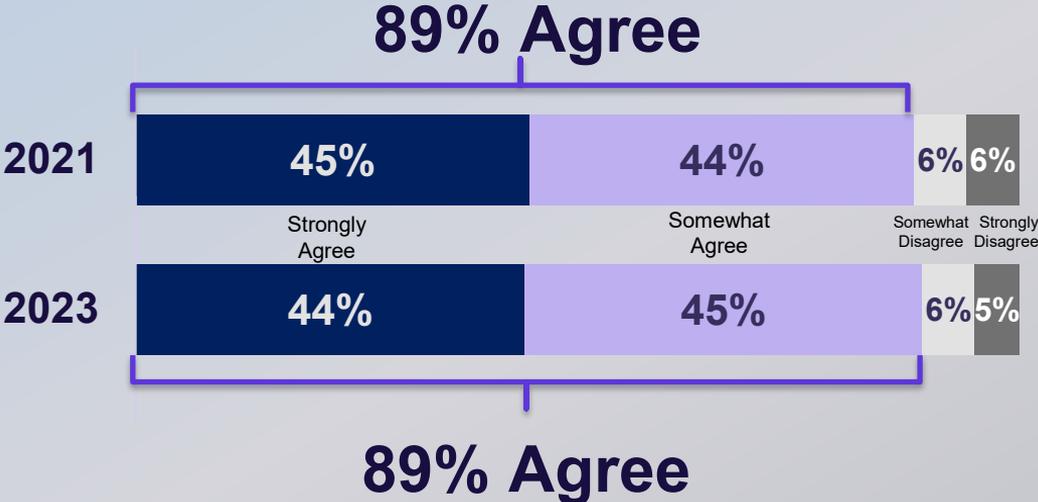
Transportation

REGIONAL TRANSPORTATION PERCEPTIONS AND EXPERIENCES

Investing in regional transportation remains an important priority.

To what extent do you agree with the statement:

Investing in the regional transportation system is an important priority

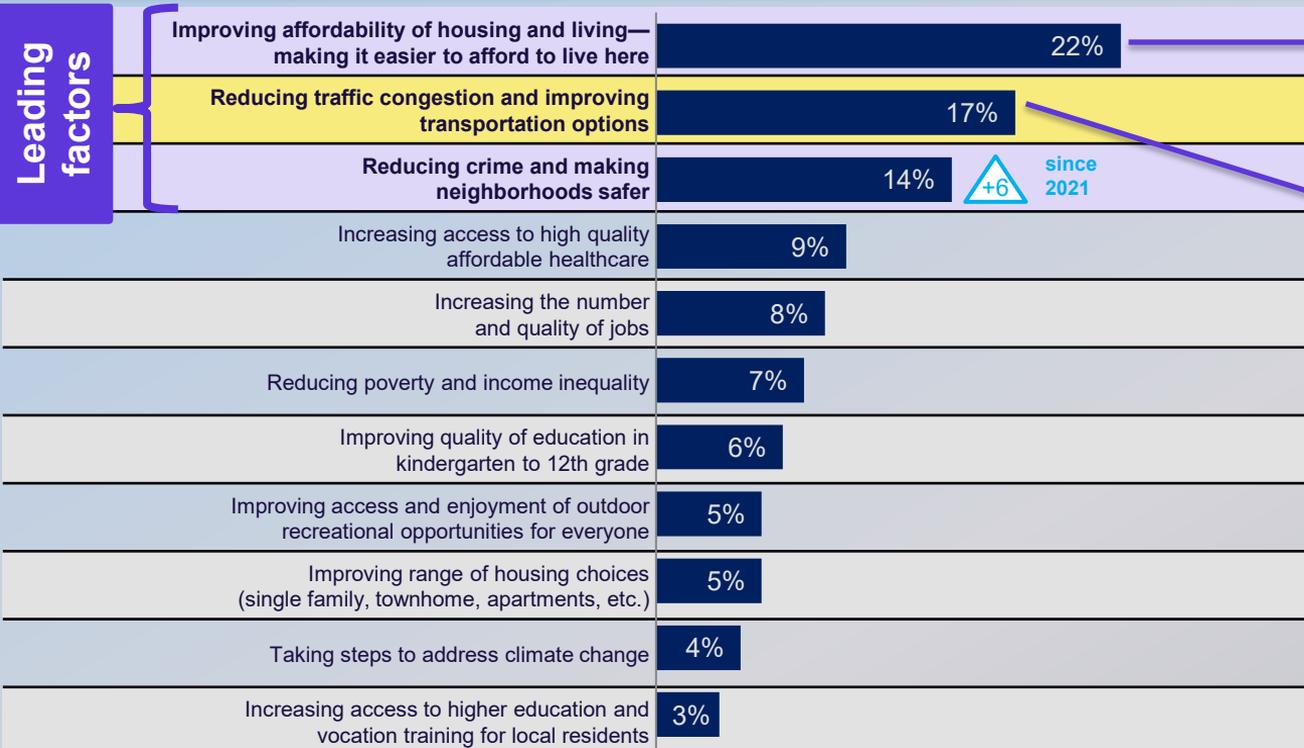


BASE: ALL RESPONDENTS (2021 n=611, 2023 n=606)
Q310. To what extent do you agree with the statement: Investing in the regional transportation system is an important priority?

Transportation factors have a significant impact on quality of life.

Significant Impact on Quality of Life

2023 Total



Improving housing affordability is more imp. to (2023):

- Renters (32%)
- Females (29%)
- Single (29%)
- Divorced/Separated/Widow (29%)
- Never use public transit (28%)

When looking across groups, reducing traffic congestion is more important to (2023):

- Work in DC (36%)
- Ages 55+ (23%)
- Asian (23%)
- HHI \$100K (22%)
- Homeowners (22%)

BASE: ALL RESPONDENTS (2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606)
 Q156. People in different regions of the country mention many factors that contribute to their quality of life. Thinking about the quality of life specifically in the Northern Virginia region, please identify which one of the following factors has the most significant impact on the overall quality of life for you personally.

Denotes statistically significant differences between 2021 and 2023 (p<.05)

After a steady decline, impact of transportation factors has stabilized. The impact of crime, however, has seen a notable increase.

| Significant Impact on Quality of Life | 2016 | 2019 | 2021 | 2023 |
|---|------------|------------|------------|------------|
| Improving affordability of housing and living—making it easier to afford to live here | 18% | 24% | 21% | 22% |
| Reducing traffic congestion and improving transportation options | 33% | 26% | 16% | 17% |
| Reducing crime and making neighborhoods safer | 8% | 7% | 8% | 14% |
| Increasing access to high quality affordable healthcare | 6% | 8% | 10% | 9% |
| Increasing the number and quality of jobs | 12% | 10% | 9% | 8% |
| Reducing poverty and income inequality | 6% | 7% | 7% | 7% |
| Improving quality of education in kindergarten to 12th grade | 6% | 4% | 6% | 6% |
| Improving access and enjoyment of outdoor recreational opportunities for everyone | 4% | 4% | 7% | 5% |
| Improving range of housing choices (single family, townhome, apartments, etc.) | 4% | 7% | 6% | 5% |
| Taking steps to address climate change | | | 5% | 4% |
| Increasing access to higher education and vocation training for local residents | 4% | 3% | 6% | 3% |

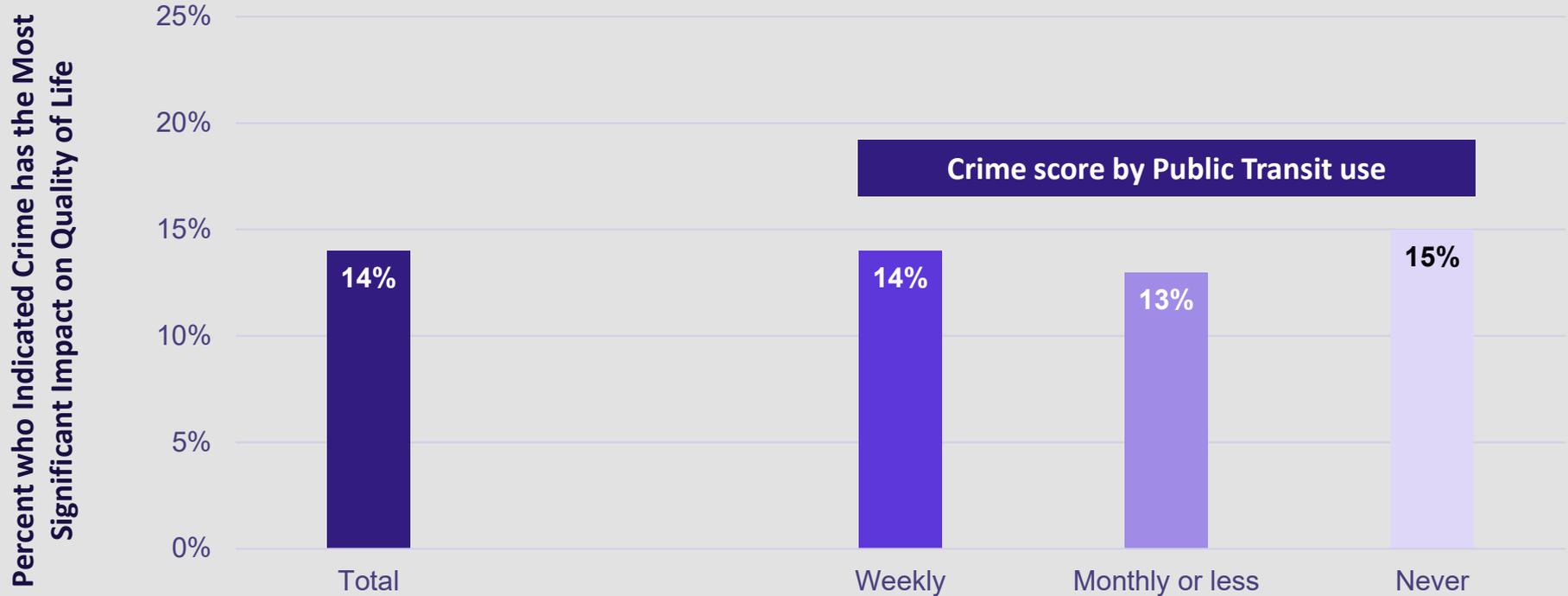
Affordability and transportation have always been the top two factors impacting quality of life. They are inter-related. Affordability has become the leading factor impacting quality of life as traffic/congestion have improved and are less of a priority.

+6
since 2021

BASE: ALL RESPONDENTS (2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606)
Q156. People in different regions of the country mention many factors that contribute to their quality of life. Thinking about the quality of life specifically in the Northern Virginia region, please identify which one of the following factors has the most significant impact on the overall quality of life for you personally.

Denotes statistically significant differences between 2021 and 2023 (p<.05)

Public transit users are no more or less concerned with crime. This suggests crime is NOT linked to transportation but is a reflection of a broader regional issue.

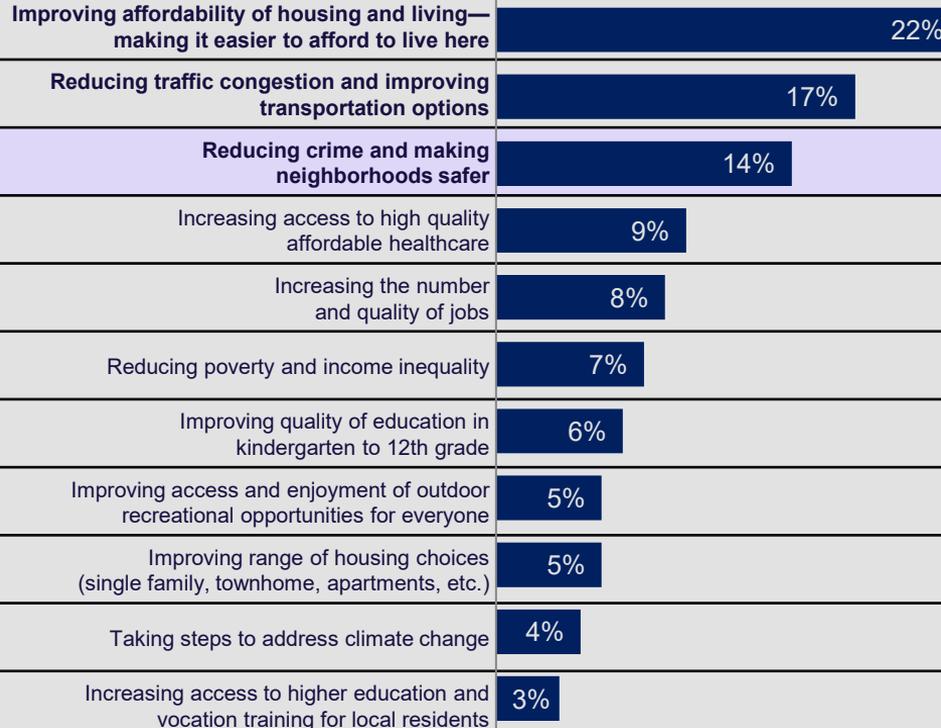


BASE: ALL RESPONDENTS (2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606)
Q156. People in different regions of the country mention many factors that contribute to their quality of life. Thinking about the quality of life specifically in the Northern Virginia region, please identify which one of the following factors has the most significant impact on the overall quality of life for you personally.

Transportation factors have a significant impact on quality of life.

Significant Impact on Quality of Life

2023 Total

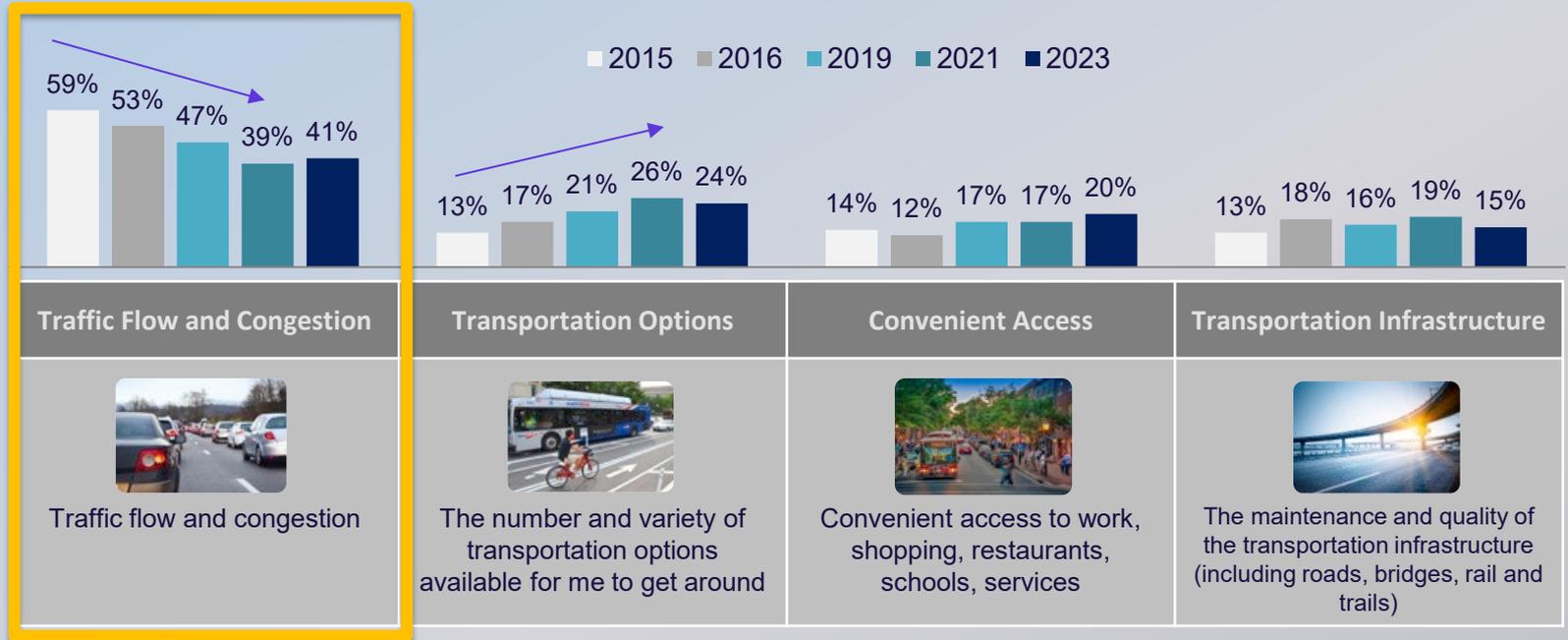


Reducing crime is more imp. to (2023):

- Works in Maryland (33%)
- Manassas Park (24%)
- Alexandria (19%)
- Some college/no degree (18%)
- Unemployed/retired (17%)
- Age 55+ (17%)
- Lived 5 Years or less in region (17%)
- Black (17%)
- Has not lived in the region the majority of their life (16%)

Looking specifically at transportation factors, *Traffic flow and congestion* continues to have the biggest impact followed by *Transportation options*.

Which Transportation Factor has the Biggest Impact on Quality of Life?



BASE: ALL RESPONDENTS (2015 n=610, 2016 n=606, 2019 n=616), 2021 n=611, 2023 n=606)

Q520. Northern Virginia residents and workers have mentioned different factors relating to transportation—both positive and negative—that contribute to or detract from their quality of life. Thinking about transportation here in this region and your personal quality of life, please identify which one of the following you feel has the biggest impact on you and your family personally?

 Denotes statistically significant differences between 2021 and 2023 (p<.05)


When looking at which transportation factor has the biggest impact on quality of life, some unique demographic and behavioral profiles emerge.

Biggest Impact on Your Quality of Life – Subgroup Analysis



Traffic Flow and Congestion (41%)

- 54% Ages 55+
- 52% Never uses public transit
- 48% Unemployed
- 47% White
- 47% Prince William County
- 47% Occasionally uses public transit
- 46% Have not lived in region majority of life



Traffic plays a bigger role among older, white, non-public transportation users.

Transportation Options (24%)

- 39% Uses public transit daily/weekly
- 35% HHI <\$50K
- 29% Arlington County
- 29% Ages 35-54



Transportation options have a bigger impact on middle aged commuters who use public transportation.

Convenient Access (20%)

- 31% Black
- 28% Lived in region less than 5yrs
- 27% Ages 18-34
- 26% Asian
- 26% Single
- 26% Renter



Convenient access is important for younger, single, minorities.

Transportation Infrastructure (15%)

- 26% Aware of TransAction
- 20% Aware of NVTA



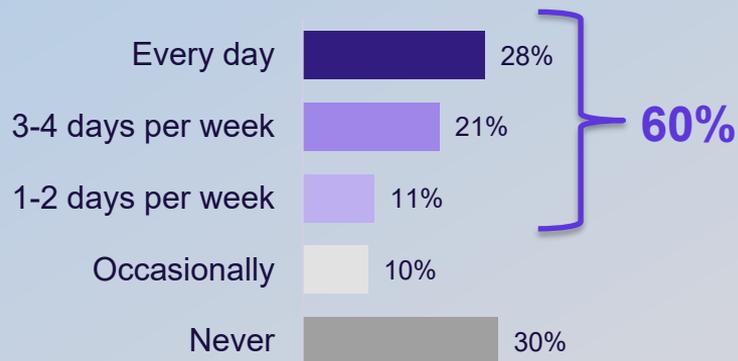
Infrastructure has a bigger impact among those who follow developments related to regional transportation.

BASE: ALL RESPONDENTS (2021 n=611, 2023 n=606)

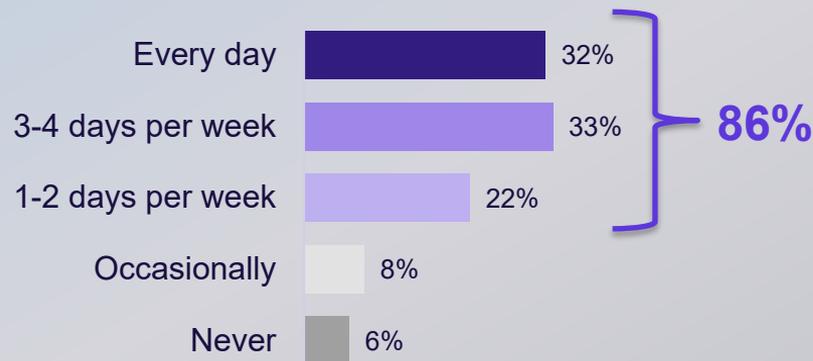
Q520. Northern Virginia residents and workers have mentioned different factors relating to transportation—both positive and negative—that contribute to or detract from their quality of life. Thinking about transportation here in this region and your personal quality of life, please identify which one of the following you feel has the biggest impact on you and your family personally?

Traffic impacts quality of life because most participants are driving on a regular basis. While driving to work is common, driving is more frequent for non-work purposes.

How often do you drive to work?



How often do you drive for non-work purposes?

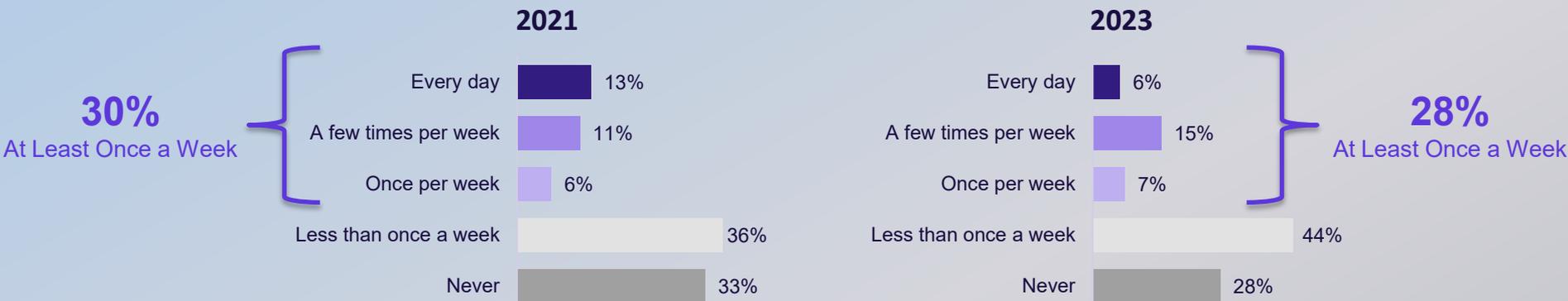


Drives to work regularly/at least once a week

2023: 60%
2021: NA
2019: 59%
2016: 62%

Most residents use public transportation, but daily usage has softened (which may be a function of a post pandemic shift to working from home/hybrid schedules).

How Often do you Use Public Transit?



D.C. and the Washington metro area showed some of the highest rates in the nation. Just over a third of the District's residents (33.8 percent) worked from home in 2022, down from 48.3 percent the year before, when the city topped the list, according to the American Community Survey, conducted annually by the Census Bureau. Only Seattle had a higher share of remote workers last year among cities, at 36 percent.

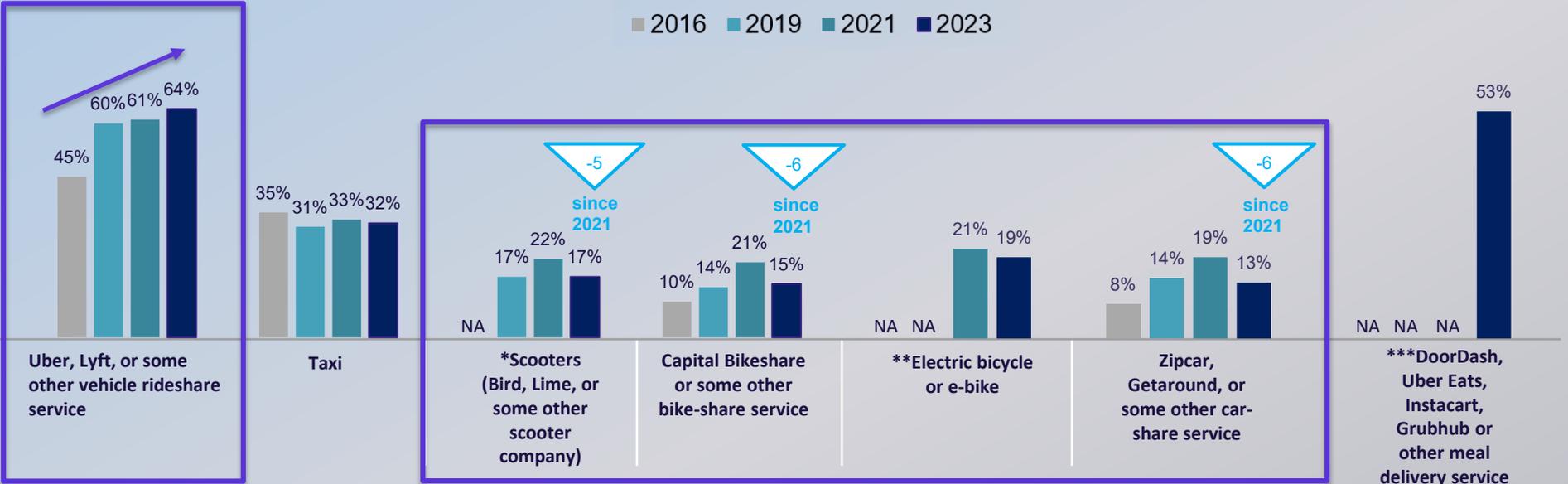
Transportation

CAR OWNERSHIP ALTERNATIVES
AND PERCEPTIONS OF
SELF-DRIVING VEHICLES

Rideshare services remain the dominant alternative to car ownership and continue to show a growth trend. Declines are observed in scooters, bikes and car share services.

Usage of Car Ownership Alternatives

■ 2016 ■ 2019 ■ 2021 ■ 2023



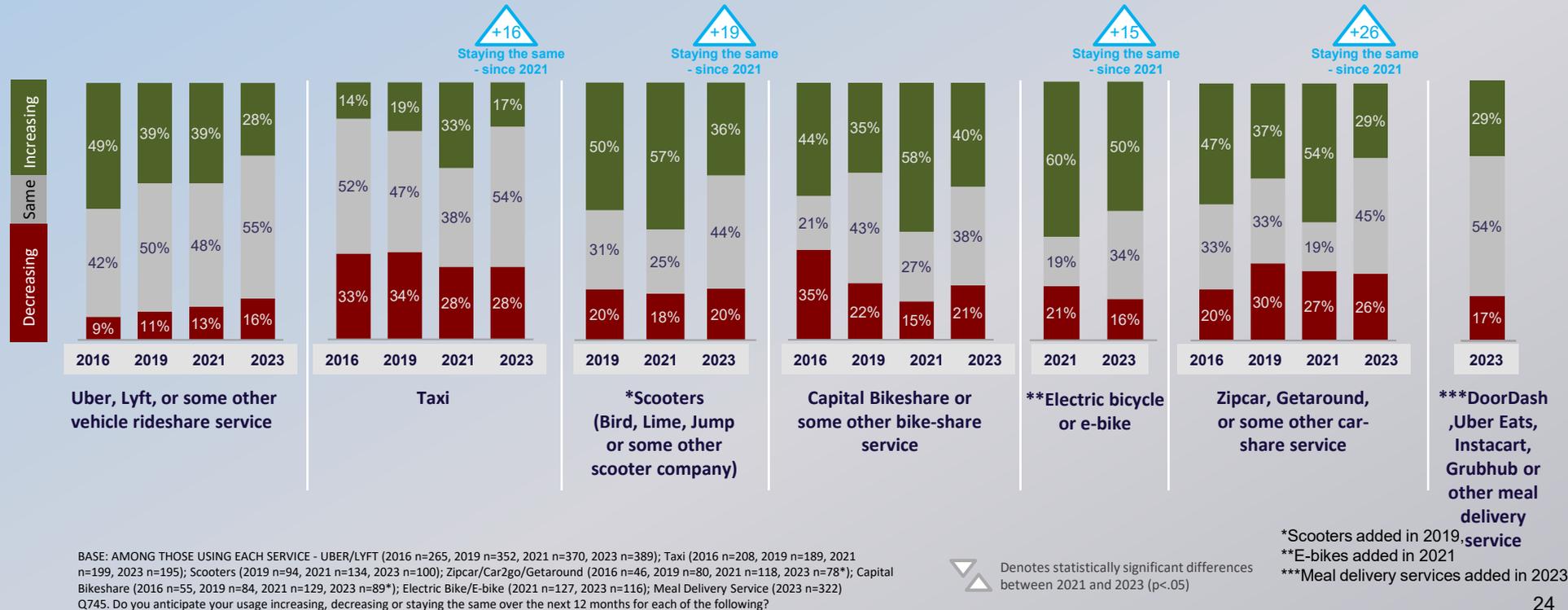
BASE: ALL RESPONDENTS (2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606).
 Q740. There are a number of alternatives to owning a car that are being used by people living in the region. Which of the following do you currently use?

⚠ Denotes statistically significant differences between 2021 and 2023 (p<.05)

*Scooters added in 2019,
 **E-bikes added in 2021
 ***Meal delivery services added in 2023

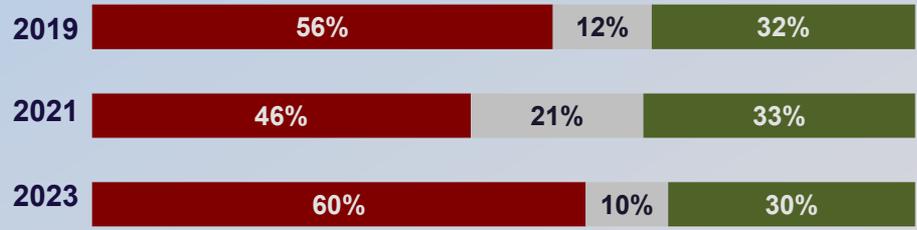
Reported changes in usage show growth rates tapering off. The most commonly used alternatives (rideshare and taxi) are the most stable.

Reported Change in Usage of Car Ownership Alternatives



Opinions on self-driving vehicles have grown increasingly more negative with concerns about safety and how well the technology can be trusted.

Opinions on Self-Driving Cars



Negative

Neutral/
Unsure

Positive

+14
since 2021

- Dangerous/unsafe (17%)
- Scary/frightening/terrifying (11%)
- Skeptical/Distrust/Unpredictable (8%)
- Concerns/Concerns with technology (7%)
- Nervous/Apprehensive (6%)
- No/No Thanks/Not needed (5%)
- Bad idea (3%)
- Traffic/Congestion (2%)
- Other negative mentions (7%)

- Depends/Conditional (4%)
- Cautious (3%)
- Questionable (2%)
- Future mentions (2%)
- Other/NA/DK (5%)

- Good/Great idea (7%)
- Hopeful/Optimistic (4%)
- Exciting (4%)
- Safe (3%)
- Innovative (3%)
- Cool/Interesting (2%)
- Fine/Ok/Accepting (2%)
- Hopeful (2%)
- Other positive mentions (6%)

BUSINESS

California orders Cruise driverless cars off the roads because of safety concerns

OCTOBER 24, 2023 - 4:34 PM ET

10/23 NPR Article

BASE: ALL RESPONDENTS (2019 n=616; 2021 n=611, 2023 n=606)

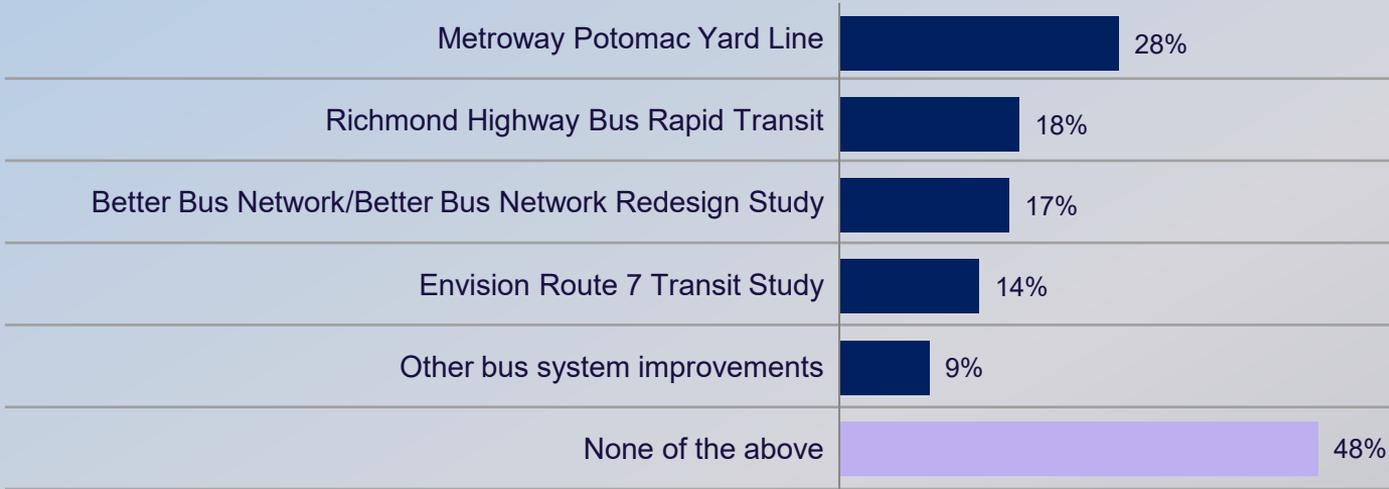
Q725. What one word or phrase would you use to describe your overall feelings of self-driving cars being on the road in Northern Virginia in the near future?

Transportation

REGIONAL BUS SYSTEMS

There is limited awareness of bus system initiatives.

Which of the Following Initiatives are you Aware of...



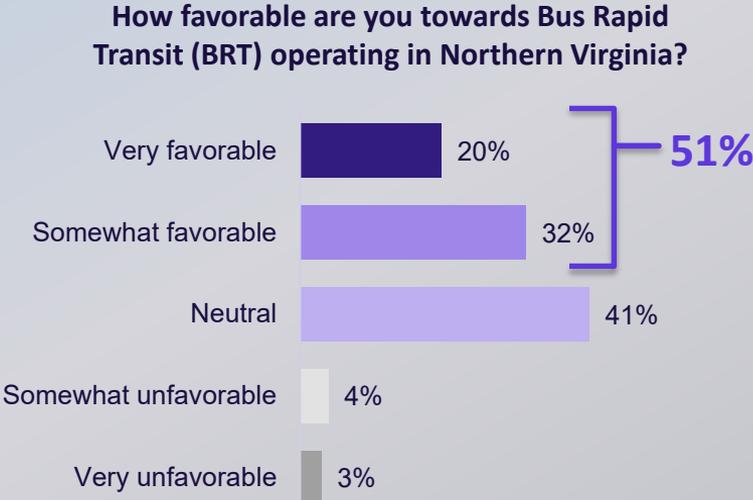
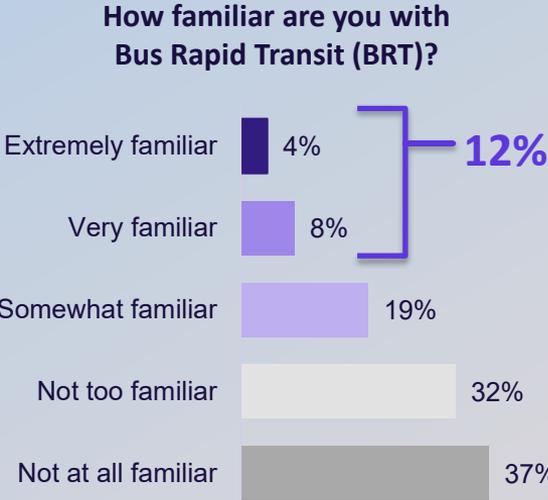
BASE: ALL RESPONDENTS (2023 n=606)

Q422. Are you aware of any of the following initiatives to improve the bus system either in your home jurisdiction or in Northern Virginia?

Familiarity is limited and respondents tend to have either neutral or positive views toward BRT.

BRT – Bus Rapid Transit

Bus Rapid Transit (BRT) is a high-quality bus-based transit system that delivers fast, frequent and reliable service that may include dedicated lanes, busways, transit signal priority, off-board fare collection, elevated platforms and enhanced stations.



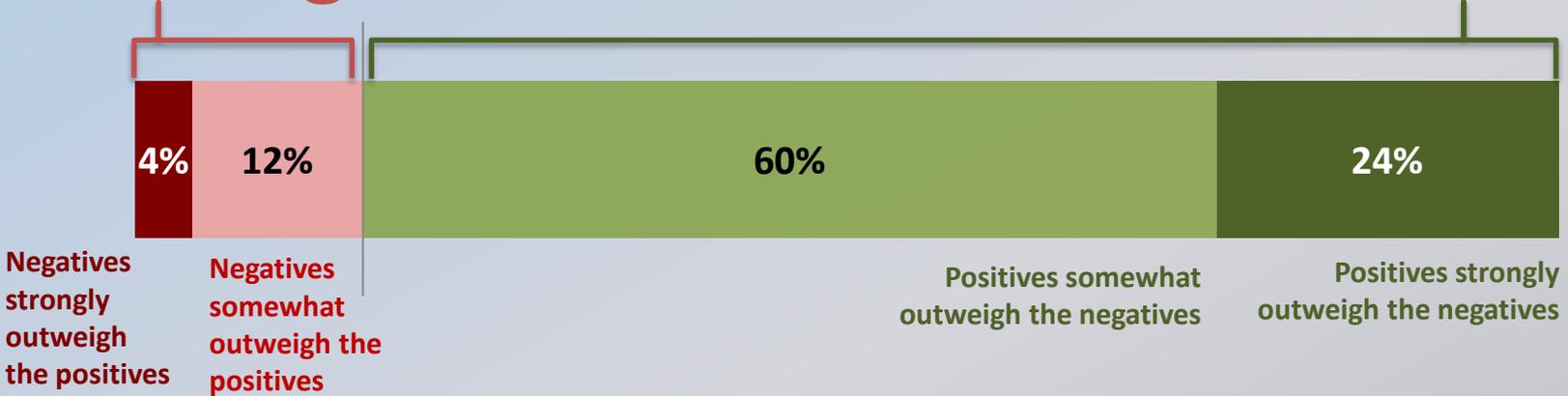
BASE: ALL RESPONDENTS (2023 n=606)
Q450. Bus Rapid Transit (BRT) is a high-quality bus-based transit system that delivers fast, frequent and reliable service that may include dedicated lanes, busways, transit signal priority, off-board fare collection, elevated platforms and enhanced stations. How familiar are you with Bus Rapid Transit (BRT)?
Q455. How favorable are you towards Bus Rapid Transit (BRT) operating in Northern Virginia?

Residents are much more likely to see positive benefits of BRT than negatives.

Positives vs. Negatives Associated with BRT

16% Negative

84% Positive



BASE: ALL RESPONDENTS (2023 n=606)
Q470. Thinking of all positives and negatives associated with Bus Rapid Transit (BRT), would you say the positives outweigh the negatives? Or the negatives outweigh the positives?

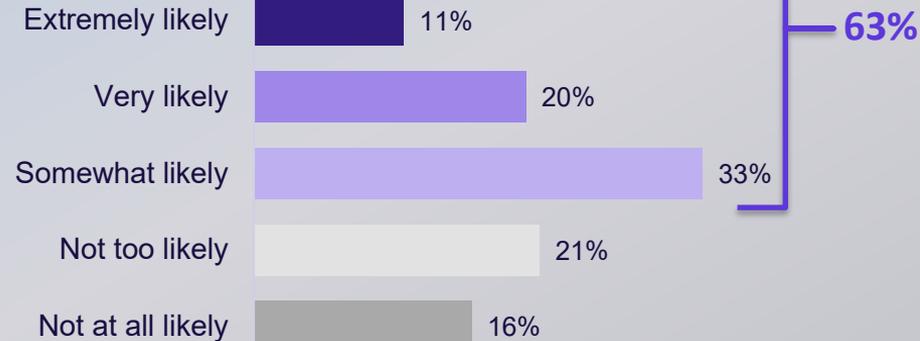
Residents are more likely to use BRT for personal purposes (about two thirds). Half are likely to use BRT for commuting purposes.

Likelihood to Consider Using BRT....

For Commuting Purposes

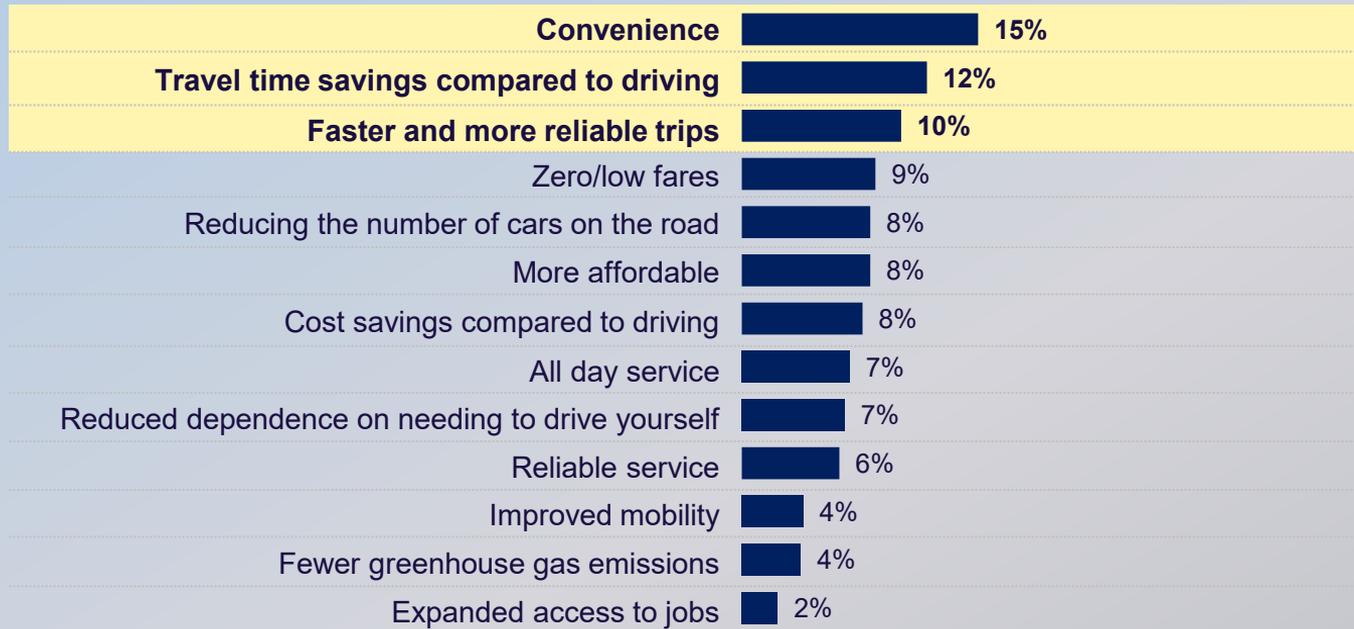


For Recreational/Personal Travel Purposes



Convenience, Saving time, and Reliability are the top influential benefits of using BRT.

Top Influential Benefits of Using BRT....

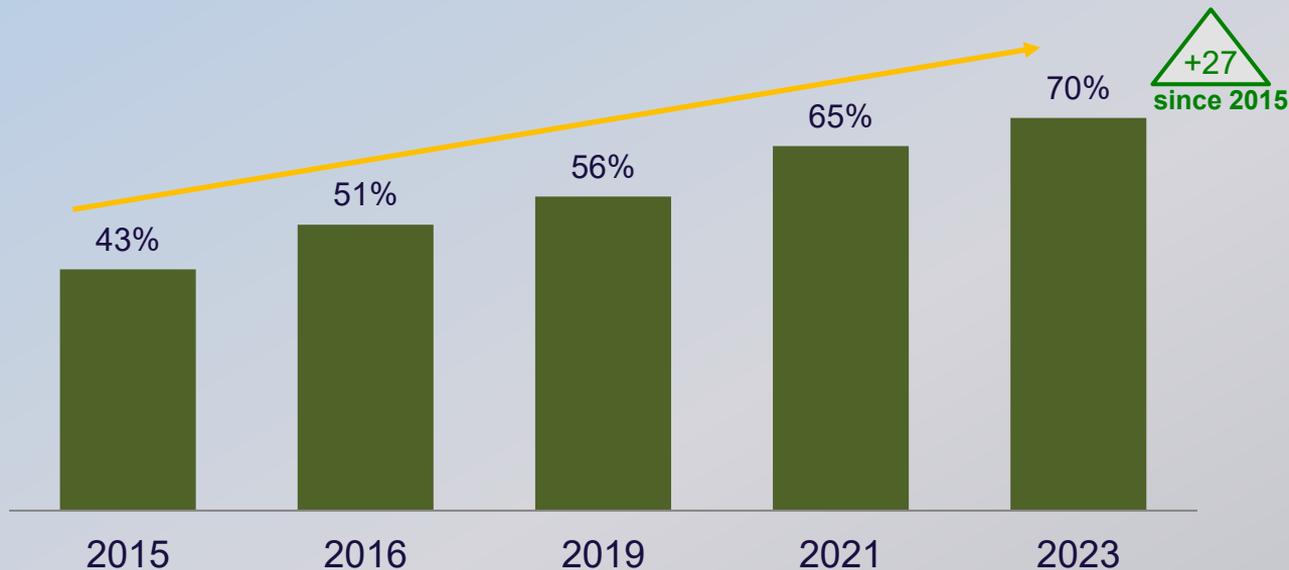


Transportation

REGIONAL PRIORITIES AND VALUES

The region continues to show increased perceptions of doing a good job on addressing top priorities.

Region is Doing a *Mostly Good Job* on Top Priorities
(Total Respondents)



BASE: ALL RESPONDENTS (2015 n=610, 2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606)

Q530. Currently, when it comes to the number and variety of transportation options, do you feel that the region is doing a good job or a bad job?

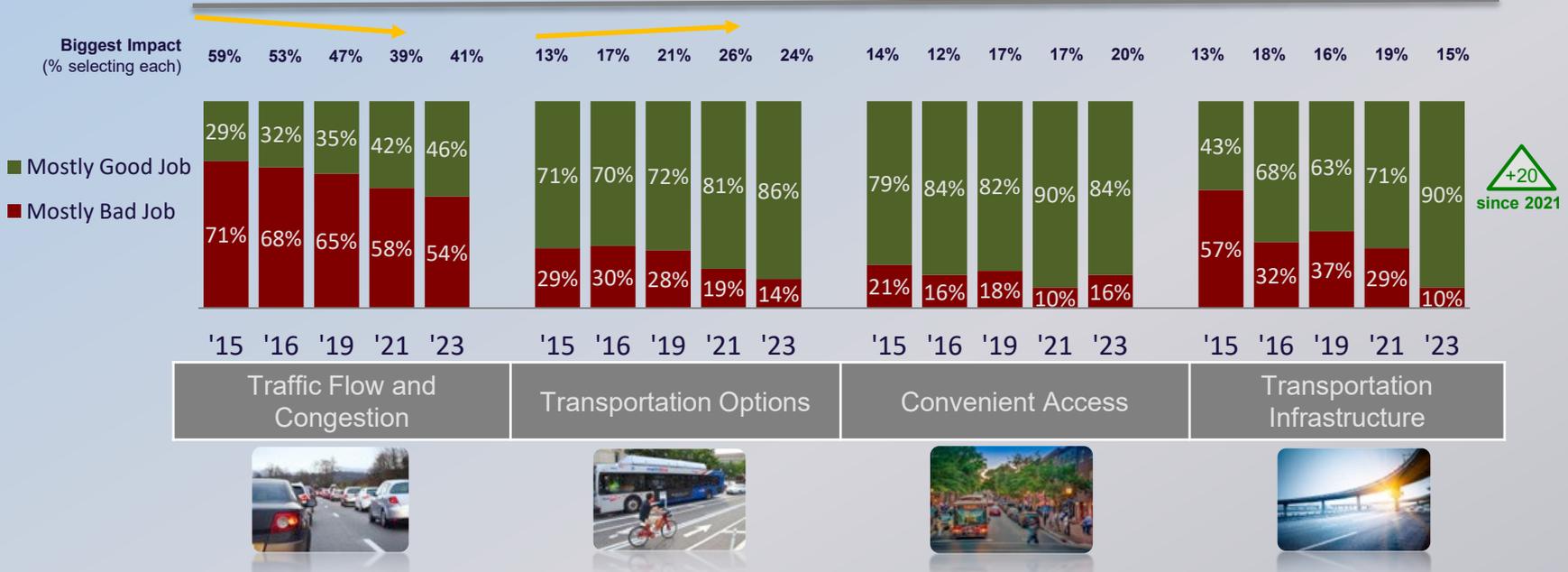
Q540. Currently, when it comes to the maintenance and quality of the transportation infrastructure do you feel that the region is doing a good job or a bad job?

Q550. Currently, when it comes to convenient access to work, shopping, restaurants, schools and services, do you think that the region is doing a good job or a bad job?

Q560. Currently, when it comes to improving traffic flow and reducing congestion, do you feel that the region is doing a good job or a bad job?

The region continues to improve in terms of addressing *Traffic and congestion* while maintaining strong scores for other transportation priorities.

Which transportation factor has the biggest impact and how well is the region performing in that area?



BASE: ALL RESPONDENTS (2015 n=610, 2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606). Q520. Northern Virginia residents and workers have mentioned different factors relating to transportation—both positive and negative—that contribute to or detract from their quality of life. Thinking about transportation here in this region and your personal quality of life, please identify which one of the following you feel has the biggest impact on you and your family personally? BASE: AMONG THOSE SELECTING EACH - TRANSPORTATION OPTIONS (2015 n=76, 2016 n=97, 2019 n=122, 2021 n=152, 2023 n=145); TRANSPORTATION INFRASTRUCTURE (2015 n=85, 2016 n=101, 2019 n=97, 2021 n=113, 2023 n=93*) CONVENIENT ACCESS (2015 n=84, 2016 n=71, 2019 n=97, 2021 n=105, 2023 n=122) TRAFFIC CONGESTION (2015 n=365, 2016 n=337, 2019 n=300, 2021 n=241, 2023 n=246). Q530-Q560. Currently, when it comes to [ANSWER FROM Q520], do you feel that the region is doing a good job or a bad job?

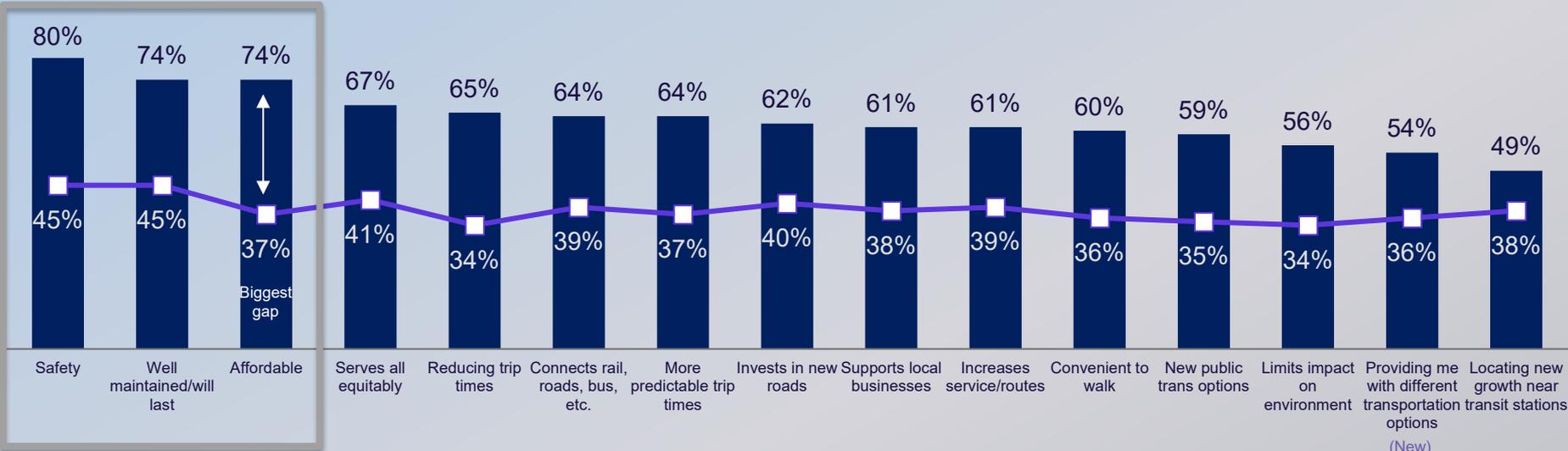
▽ Denotes statistically significant differences between 2021 and 2023 (p<.05)

What priorities are most important and how well does the region perform?

| Short Label | Full Label |
|---|--|
| Connects rail, roads, bus, etc. | <i>Providing a transportation system that connects rail, roads, bus, biking and pedestrians</i> |
| Affordable | <i>Making sure that our transportation system is affordable</i> |
| Supports local businesses | <i>Building a transportation system that supports local businesses and the regional economy</i> |
| Reducing trip times | <i>Reducing trip times</i> |
| More predictable trip times | <i>More predictable trip times</i> |
| New public trans options | <i>Providing new public transportation options</i> |
| Invests in new roads | <i>Investing in new highways and road improvements</i> |
| Locating new growth near transit stations | <i>Locating new growth in the region near transit stations</i> |
| Increases service/routes | <i>Increasing existing service and routes of public transit systems</i> |
| Convenient to walk | <i>Making it convenient to walk or bike to neighborhood stores, businesses, and schools</i> |
| Safety | <i>NEW WORDING for 2021: Making sure our transportation system is safe</i> <i>OLD WORDING: Making sure our transportation system takes advantage of the latest technologies to make it more efficient and safer</i> |
| Well maintained/Will last | <i>Building a transportation system that is well maintained and will be around for a long time (added in 2021)</i> |
| Limits impact on environment | <i>Limiting the transportation system's impact on the environment (added in 2021)</i> |
| Serves all equitably | <i>Building a transportation system that serves all members of the community equitably (added in 2021)</i> |
| Provides different transportation options | <i>Providing me with different transportation options that reduce the need for me to drive alone (added in 2023)</i> |

Safety, Maintenance, and Affordability are the three most important transportation priorities. Largest gap is with *Affordability*, but there is room for improved performance across the board.

2023: Importance & Performance of Regional Transportation Priorities – TOP 3 BOX SCORE*



Note – Shortened labels shown for priorities

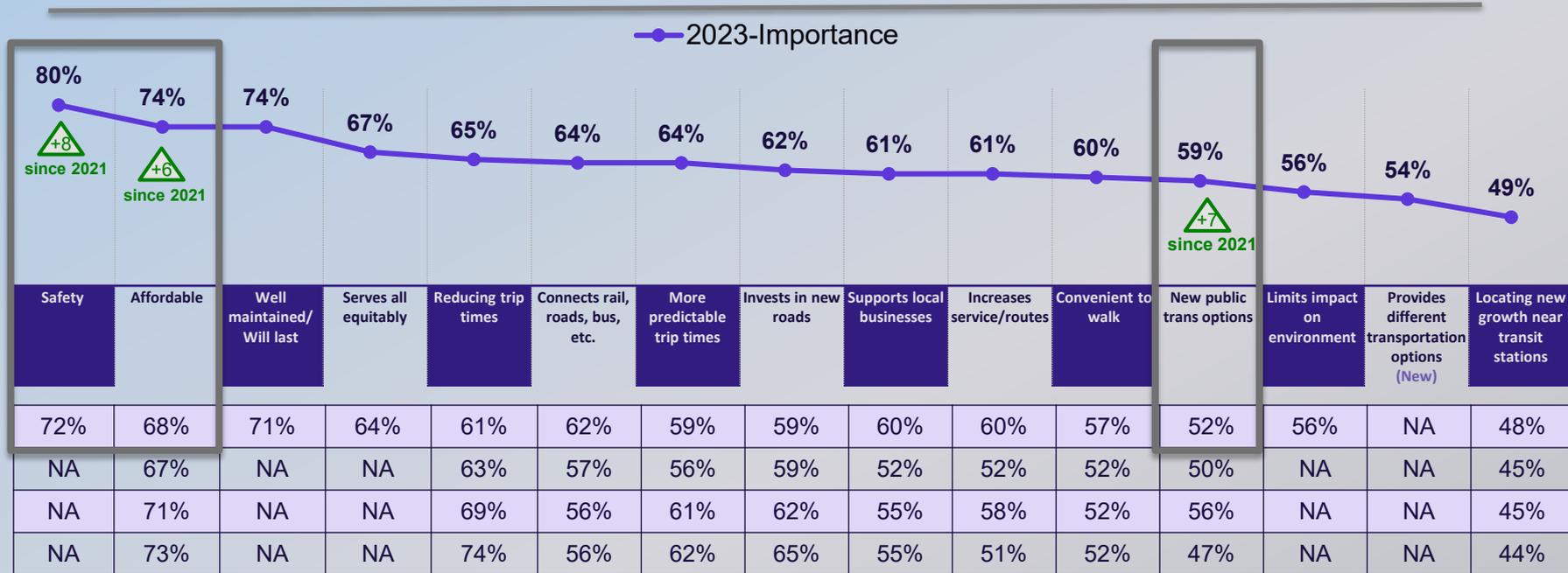
■ 2023 - Importance —□— 2023-Performance

* % rating each 8-10 on 10-pt scale

BASE: ALL RESPONDENTS (2021 n=611, 2023 n=606)
 Q600. Thinking specifically about transportation issues and priorities, please rate each of the following where 1 means 'Not at all important to the future of the region' and 10 means 'Extremely important priority for the future of the region.'
 Q605. Please indicate how well you think Northern Virginia is performing on each of these priorities using the scale where 1 means the region is not performing well at all and 10 means the region is performing extremely well.

Safety, Affordability, and New public transit options have significantly grown in their importance since 2021. Other priorities remain comparable to 2021.

Importance Over Time in Regional Transportation Priorities - TOP 3 BOX SCORE*



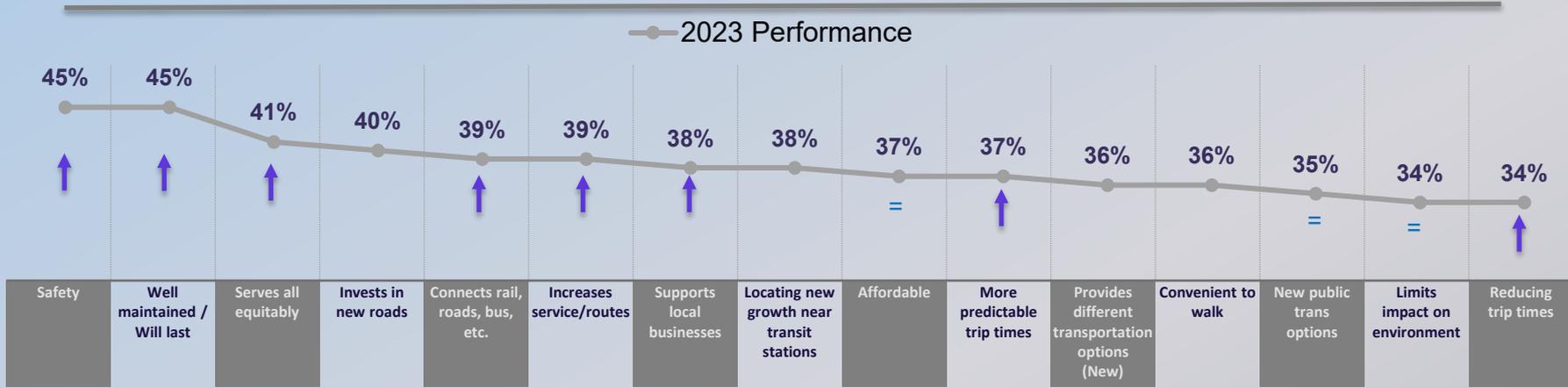
*% rating each 8-10 on 10-pt scale

BASE: ALL RESPONDENTS (2015 n=610, 2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606)
 Q600. Thinking specifically about transportation issues and priorities, please rate each of the following where 1 means "Not at all important to the future of the region" and 10 means "Extremely important priority for the future of the region."

Denotes statistically significant differences between 2021 and 2023 (p<.05)

Performance ratings tend to be as good or better to 2021 for most priorities.

Performance Over Time in Regional Transportation Priorities - TOP 3 BOX SCORE*



| | Safety | Well maintained / Will last | Serves all equitably | Invests in new roads | Connects rail, roads, bus, etc. | Increases service/routes | Supports local businesses | Locating new growth near transit stations | Affordable | More predictable trip times | Provides different transportation options (New) | Convenient to walk | New public trans options | Limits impact on environment | Reducing trip times |
|-------------|--------|-----------------------------|----------------------|----------------------|---------------------------------|--------------------------|---------------------------|---|------------|-----------------------------|---|--------------------|--------------------------|------------------------------|---------------------|
| 2021 | 43% | 39% | 40% | 41% | 37% | 36% | 37% | 41% | 37% | 35% | NA | 37% | 35% | 34% | 31% |
| 2019 | NA | NA | NA | 32% | 29% | 26% | 28% | 31% | 31% | 27% | NA | 29% | 29% | NA | 28% |
| 2016 | NA | NA | NA | 26% | 25% | 24% | 27% | 27% | 23% | 23% | NA | 25% | 22% | NA | 24% |
| 2015 | NA | NA | NA | 25% | 23% | 21% | 22% | 26% | 20% | 18% | NA | 22% | 20% | NA | 21% |

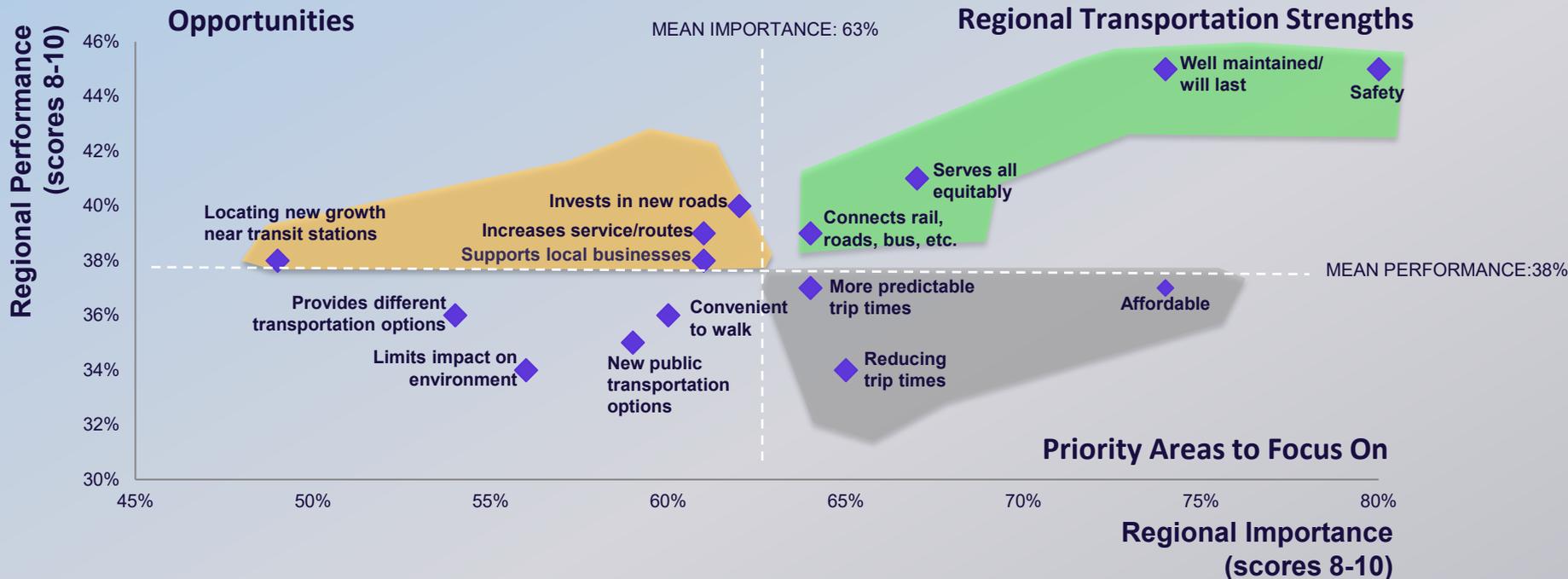
* % rating each 8-10 on 10-pt scale

BASE: ALL RESPONDENTS (2015 n=610, 2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606)
 Q605. Please indicate how well you think Northern Virginia is performing on each of these priorities using the scale where 1 means the region is not performing well at all and 10 means the region is performing extremely well.

▽ Denotes statistically significant differences between 2021 and 2023 (p<.05)
 ↑ Arrows show directional increases

Safety, Equitable access, Connection, and Longevity remain current regional transportation strengths. The priority areas to strengthen performance relate to *Affordability, Reducing trip times* and making them more *Predictable*.

2023: Importance vs. Performance



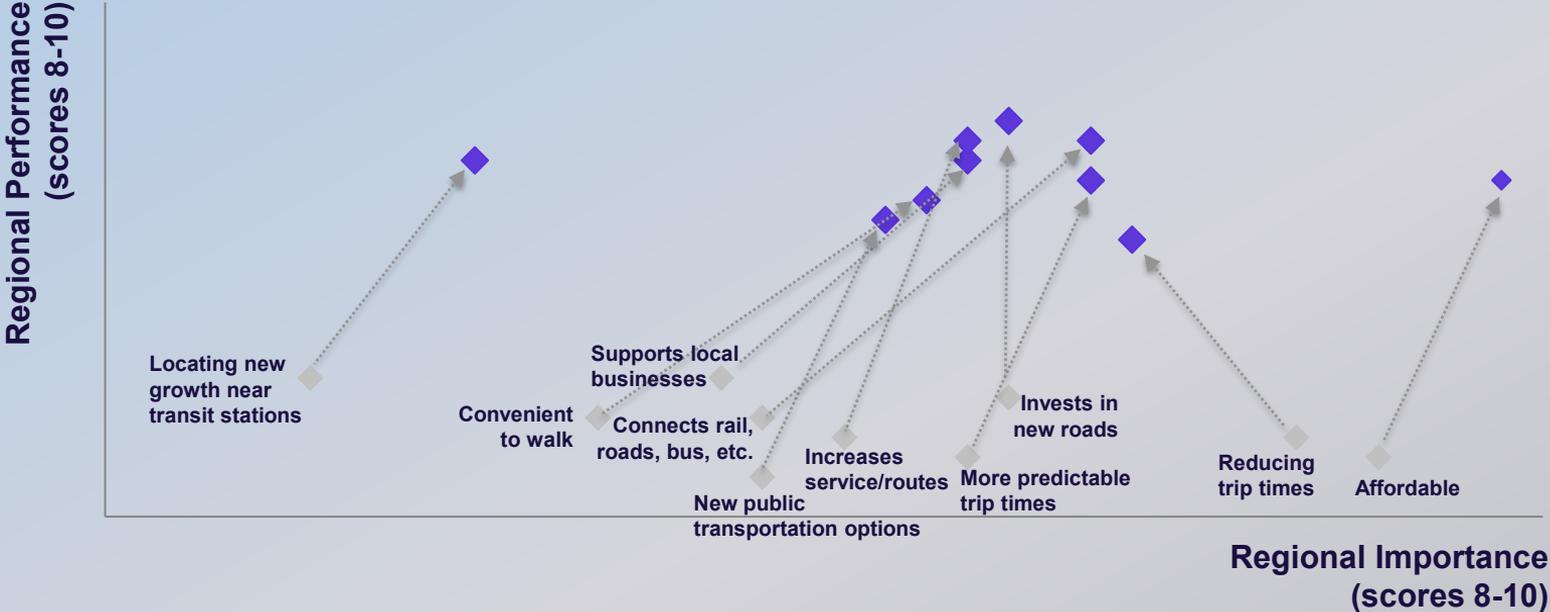
BASE: ALL RESPONDENTS (2021 n=611, 2023 n=606)

Q600. Thinking specifically about transportation issues and priorities, please rate each of the following where 1 means "Not at all important to the future of the region" and 10 means "Extremely important priority for the future of the region."

Q605 Please indicate how well you think Northern Virginia is performing on each of these priorities using the scale where 1 means the region is not performing well at all and 10 means the region is performing extremely well.

Most of the movement in priorities comes from shifts in improved performance (items are moving higher on chart) as compared to the 2015 benchmark. Affordability shows a noticeable jump in performance, while reduced trip times shows the only decline.

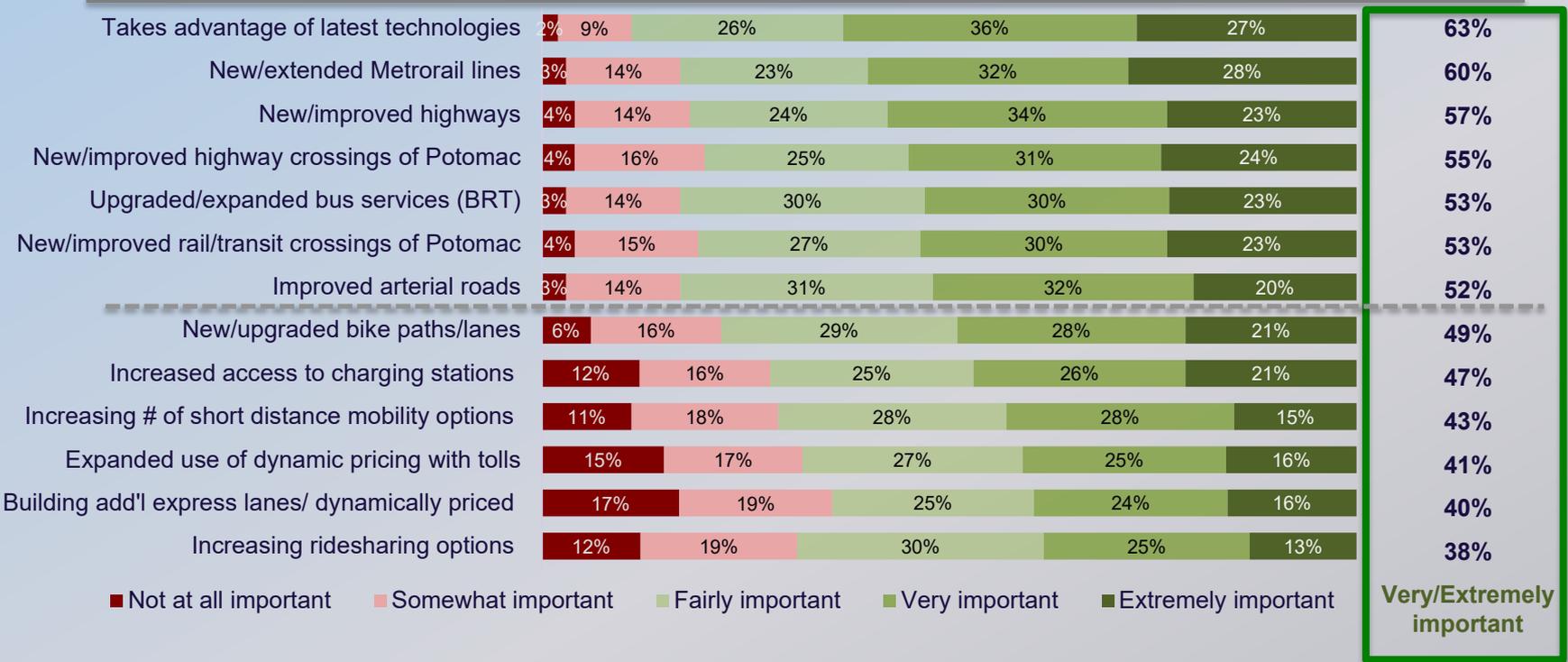
2015 vs. 2023: Importance vs. Performance



BASE: ALL RESPONDENTS (2021 n=611, 2023 n=606)
 Q600. Thinking specifically about transportation issues and priorities, please rate each of the following where 1 means "Not at all important to the future of the region" and 10 means "Extremely important priority for the future of the region."
 Q605 Please indicate how well you think Northern Virginia is performing on each of these priorities using the scale where 1 means the region is not performing well at all and 10 means the region is performing extremely well.

The most important potential improvements include leveraging technology, while making improvements to Metro & highways as well as offering expanded BRT.

2023: Importance of Potential Improvements to Region (sorted by T2B score)



BASE: ALL RESPONDENTS (2023 n=606)
 Q620B. Now, thinking about potential projects and improvements in the region, please indicate how important you think each one is.

Denotes statistically significant differences between 2021 and 2023 (p<.05)

The most important potential improvements since previous year include leveraging technology, and improved highway crossings of Potomac.

| Historical Comparison of Potential Improvements to Region <i>Rated Very/Extremely Important</i> | | | |
|--|------|------|------|
| | 2019 | 2021 | 2023 |
| Takes advantage of latest technologies | NA | 58% | 63% |
| New/extended Metrorail lines | 61% | 59% | 60% |
| New/improved highways | 55% | 55% | 57% |
| New/improved highway crossings of Potomac | 51% | 50% | 55% |
| Upgraded/expanded bus services (BRT) | 53% | 57% | 53% |
| New/improved rail/transit crossings of Potomac | 51% | 53% | 53% |
| Improved arterial roads | 51% | 53% | 52% |
| New/upgraded bike paths/lanes | 34% | 50% | 49% |
| Increased access to charging stations | NA | 48% | 47% |
| Increasing # of short distance mobility options | NA | 41% | 43% |
| Expanded use of dynamic pricing with tolls | 32% | 39% | 41% |
| Building add'l express lanes/ dynamically priced | NA | 38% | 40% |
| Increasing ridesharing options | NA | 39% | 38% |

BASE: ALL RESPONDENTS (2023 n=606)

Q620B. Now, thinking about potential projects and improvements in the region, please indicate how important you think each one is.



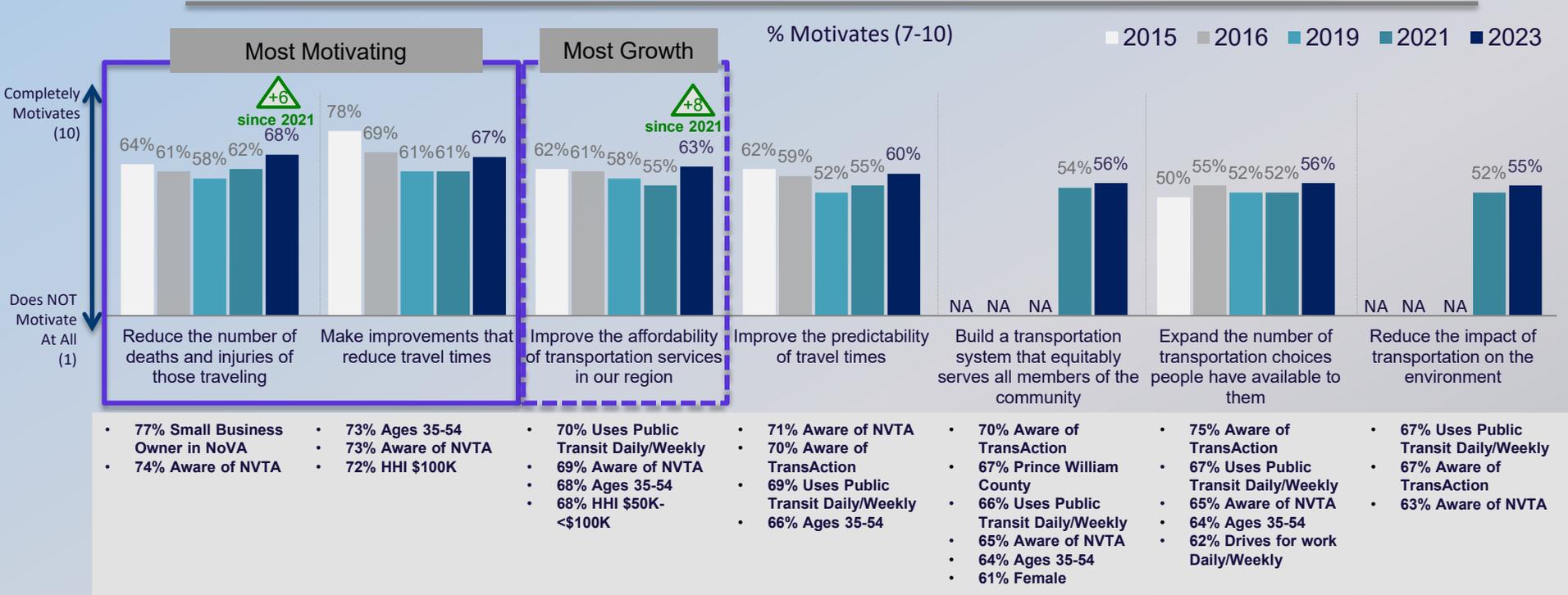
Denotes statistically significant differences between 2021 and 2023 (p<.05)

Transportation

MESSAGING

Messaging should center on benefits tied to safety and reduced travel times. Affordability concerns has grown in more than any other theme and should also be considered.

Motivates Interest and Support



BASE: ALL RESPONDENTS (2015 n=610, 2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606) Q705. The following are strategies to help fulfill the regional values and priorities we have been talking about. There are different ways to talk about these priorities and goals. Please indicate the degree to which the goal captures and motivates your interest and support by rating the statements from 1 to 10 where 1 means "does not motivate your interest and support at all" and 10 means "completely motivates your interest and support".

Denotes statistically significant differences between 2021 and 2023 (p<.05)

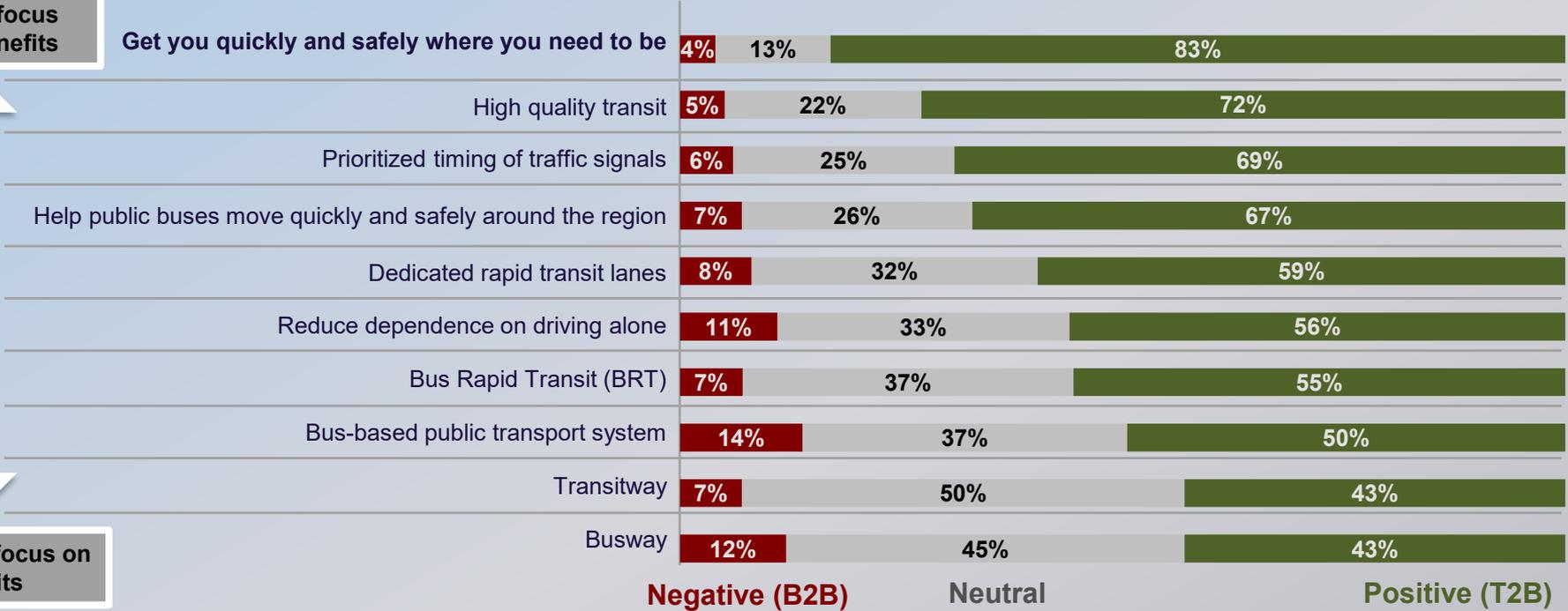
Word choice matters when talking about transportation solutions. When transportation words/phrases are connected to personal benefits, they are much more positively received.

Reaction to Words/Phrases

More focus on benefits



Less focus on benefits



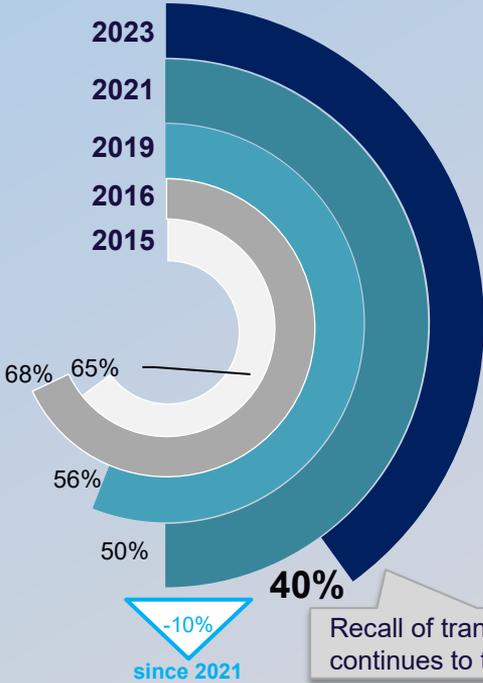
BASE: ALL RESPONDENTS (2023 n=606)
 Q730. There are lots of different words and phrases that are used when discussing transportation options, their features and benefits. For each of the following words or phrases, please indicate if you have a positive, negative, or neutral feeling.

Transportation

NEWS RECALL

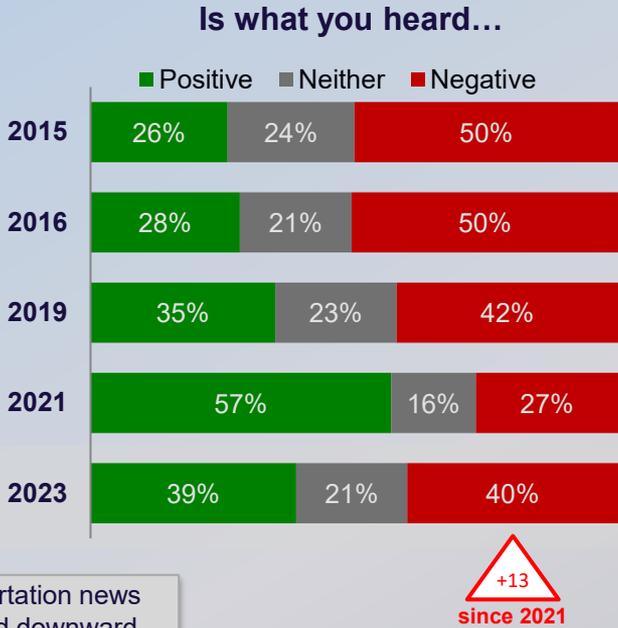
Recall of transportation related news continues to decrease. The ratio of positive to negative news falls back to 2019 levels.

Heard Something Recently



Recall of transportation news continues to trend downward

Top-of-Mind Transportation Issues



Most Likely to Hear Something Positive in 2023: 39% TOTAL

- 64% Aware of TransAction
- 56% High School degree or less
- 56% Loudoun County
- 48% Ages 35-54
- 48% Aware of NVTA
- 46% Male
- 46% Married/Living with partner

Most Likely to Hear Something Negative in 2023: 40% TOTAL

- 62% Work in DC
- 51% Ages 18-34
- 47% Not aware of NVTA
- 45% Prince William County

BASE: : ALL RESPONDENTS (2015 n=610, 2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606)
 Q400. What, if anything, have you heard, read or seen recently regarding transportation issues, actions or news in the Northern Virginia region?
 BASE: HEARD, READ, SEEN TRANSPORTATION ISSUES (2023 n=245); Consider it Positive 2023 (n=96), Consider it Negative 2023 (n=97)
 Q405. Would you consider what you have heard, read, or seen positive or negative?

Denotes statistically significant differences between 2021 and 2023 (p<.05)

Transportation news most commonly recalled relates to Metro/Wmata, but also includes news about congestion, roadways, tolls and buses.

Positive

30% Metro/Wmata Expansion

- Expansion of the metro/stations (Ashburn, Potomac Yard, Tysons Corner, etc.)
- Opening of the Silver Line

20% Improved roads

- The expansion of roads to reduce congestion
- Widening the roads that are heavily populated (Route 28, I-64, I-66, Route 15N)
- Reopening of roads (US 340)
- Reconstruction for increased accessibility for pedestrians/bike lanes
- Increased funding for road improvements (I-95 corridor, US Highway 1, Route 28, bridges, rotaries, etc.)

14% Reduced congestion

- Reduced congestion by added express lanes/widened roads/tolls during rush hour (Centreville Road, I-95, DC Metroplex, and DMV area in general)
- Saturday service of VRE to ease traffic
- People working remote results in reduced traffic

10% Bus Expansion

- Expansion of bus lines
- Fairfax Connector adding electric busses

8% I-66 Improvements

- Extension of express lanes
- Completion of I-66 projects

Negative

55% Metro/Wmata Issues

- Funding for the metro system
- Reduced metro service (service hours, scheduling, reduced routes, delays, etc.)
- Increased crime at stations/stops
- Metro repairs/broken trains (derailment)
- Increased fee/fare
- Decreased ridership
- Metro rail expansion delays
- Transit worker strikes

31% Traffic Congestion

- Heavy traffic/Rush hour/Traffic jams
- Accidents
- Congestion due to drivers trying to avoid toll lanes
- Number one worst traffic in the country

15% Road closures/Construction delays

- Construction causing accidents and delays/congestion
- Road closures (roads not finished in Arlington)

10% Increased tolls

- Toll fees/EZ pass increasing
- Overpriced express lanes

The decline in recall is further reflected in specific channels. TV/News remains the dominant source followed by social media and print sources.

Most Recent Information Sources for Transportation Issues

| | 2015 (n=400) | 2016 (n=411) | 2019 (n=363) | 2021 (n=311) | 2023 (n=245) | | Source | 2021 | 2023 |
|--|-----------------|-----------------|-----------------|-----------------|-----------------|--|--|------|------|
|  Television/News story | 54% | 57% | 49% | 58% | 46% |  -12 since 2021 |  Facebook | 32% | 22% |
|  Social Media | 24% | 31% | 38% | 49% | 36% |  -13 since 2021 |  X (Twitter) | 24% | 14% |
|  Print article or ad In newspaper, magazine, flyer or information packet | 46% | 45% | 36% | 34% | 28% | |  Instagram | 24% | NA |
|  Radio ad/news/discussion | 41% | 38% | 32% | 36% | 27% |  -9 since 2021 |  LinkedIn | NA | 4% |
|  Community Meeting | 7% | 9% | 10% | 21% | 11% |  -10 since 2021 |  Other social media | 8% | 11% |
|  Website | 5% | 2% | 4% | 7% | 9% | | Other Sources Mentioned in 2023 | | |
| | | | | | | | <ul style="list-style-type: none"> • Personal experience 5% • Word of mouth 3% | | |
| | | | | | | | Websites Mentioned in 2023 | | |
| | | | | | | | <ul style="list-style-type: none"> • ArlNow.com • WashingtonPost.com | | |

BASE: HEARD, READ, SEEN TRANSPORTATION ISSUES (2015 n=400, 2016 n=411, 2019 n=363, 2021 n=311, 2023 n=245)
Q410. Where did you hear or see this information? Choose all that apply.

 Denotes statistically significant differences between 2021 and 2023 (p<.05)

Social media is an effective channel to reach younger residents along with people who are more engaged with public transportation.

More Likely to Use Social Media



36% TOTAL

- 59% Lived in region 5 years or less
- 58% Ages 18-34
- 57% Aware of TransAction
- 54% Uses public transport weekly/daily
- 51% HHI \$50-\$100K
- 48% Hispanic
- 48% Lived in region 6-10 years
- 46% HHI <\$50K
- 46% Renter
- 45% Single
- 45% Children at home
- 44% Drives for work weekly/daily
- 44% Live and work in same region
- 41% Employed/Student

Transportation

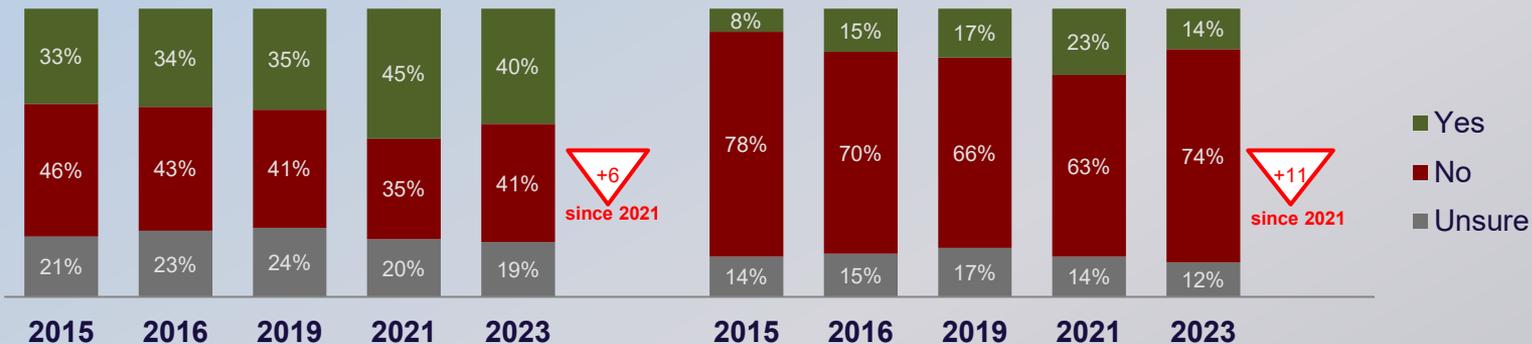
**AWARENESS LEVELS AND
PERFORMANCE RATINGS FOR THE
REGION AND REGIONAL AGENCIES**

Awareness of NVTA and TransAction has softened after seeing a steady increase from 2016-2021.

Have you Ever Heard of...

...an organization called the **Northern Virginia Transportation Authority**, also known as NVTA?

...the **TransAction** long range transportation plan?



% Most Likely to Have Heard of NVTA (2023)

- 75% Aware of TransAction
- 57% Loudoun County
- 47% Drives for work weekly/daily
- 46% Uses public transit weekly/daily
- 46% HHI \$100K+
- 46% Homeowner
- 45% NoVA performance – excellent/good

% Most Likely to Have Heard of TransAction (2023)

- 35% NVTA performance – excellent/good
- 29% Uses public transit weekly/daily
- 26% Aware of NVTA
- 24% Top Transport Factor – Quality of Infrastructure
- 20% Children at home
- 20% Drives for work weekly/daily
- 20% NoVA performance – excellent/good
- 19% Asian

BASE: ALL RESPONDENTS (2015 n=610, 2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606)

Q417. Have you ever heard of an organization called the Northern Virginia Transportation Authority also known as NVTA?

Q420. Have you ever heard of the TransAction long range transportation plan?

Denotes statistically significant differences between 2021 and 2023 (p<.05)

Levels of familiarity with NVTA (among those who are aware) are fairly stable and tend to be limited to name recognition.

Have you Ever Heard of...



Familiarity with NVTA
(among those who are aware)



...an organization called the **Northern Virginia Transportation Authority**, also known as NVTA?

BASE: ALL RESPONDENTS (2015 n=610, 2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606)
 Q417. Have you ever heard of an organization called the Northern Virginia Transportation Authority also known as NVTA?
 BASE: AWARE OF NVTA (2021 n=283, 2023 n=243)
 Q417b. How familiar are you with the Northern Virginia Transportation Authority?

While *Excellent* scores declined, the region and NVTA are both historically highest for *Good/Excellent* for performance in planning and implementing transportation solutions. Scores are highest among residents using public transit frequently (81%).

Performance on Planning and Implementing Transportation Solutions



Northern VA region



NVTA
(Among those aware of NVTA)

| | Poor/Fair | ■ Poor | ■ Fair | ■ Good | ■ Excellent | Good/Excellent |
|-------------|------------|--------|--------|--------|-------------|----------------|
| 2015 | 73% | 22% | 51% | 25% | 2% | 27% |
| 2016 | 70% | 15% | 55% | 26% | 4% | 30% |
| 2019 | 61% | 13% | 48% | 34% | 5% | 39% |
| 2021 | 52% | 12% | 40% | 35% | 12% | 48% |
| 2023 | 49% | 8% | 41% | 44% | 7% | 51% |
| 2015 | 65% | 17% | 48% | 32% | 3% | 35% |
| 2016 | 66% | 17% | 49% | 28% | 6% | 34% |
| 2019 | 53% | 9% | 44% | 31% | 16% | 47% |
| 2021 | 42% | 12% | 31% | 35% | 23% | 58% |
| 2023 | 41% | 7% | 34% | 47% | 12% | 59% |

NOVA Region Performance, those rating it higher (as good/excellent) (2023):
51% - Total

- 74% Aware of TransAction
- 72% Uses Public Transit weekly/daily
- 69% Never drives for work
- 64% Loudoun County
- 58% Ages 35-54
- 58% Aware of NVTA
- 57% Alexandria
- 57% Live and work in same region
- 57% Uses public transit (NET Yes)

NVTA Performance, those rating it higher (as good/excellent) (2023):
59% - Total

- 81% Uses public transit weekly/daily
- 80% Asian
- 80% Alexandria
- 79% Aware of TransAction
- 72% Ages 35-54
- 70% High School degree or less
- 69% Arlington County
- 65% Married/Living with partner
- 65% Live and work in same region
- 64% Loudoun County

* Small base sizes less than 30/50. Data are directional only.

BASE: ALL RESPONDENTS (2015 n=610, 2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606)

Q630. How would you rate the performance of Northern Virginia region when it comes to planning and implementing transportation solutions in the region?

BASE: HAVE HEARD OF NVTA (2015 n=207, 2016 n=212, 2019 n=222, 2021 n=276, 2023 n=243)

Q645. How would you rate the performance of Northern Virginia Transportation Authority (NVTA) when it comes to planning and implementing transportation solutions in the region?



Denotes statistically significant differences between 2021 and 2023 (p<.05)

Conclusions + Opportunities

Conclusions + Opportunities

Transportation is an important factor shaping quality of life and most believe investing in regional transportation is a priority. Recall of transportation content in the news has declined and awareness of NVTA and TransAction have softened (after seeing a sustained growth trend over several years).

Consider additional opportunities to partner with other agencies to help promote progress on on-going transportation initiatives (and the role NVTA plays). One potential strategy is to enhance communications to embrace how transportation is linked to other regional priorities - affordability, safety, access to healthcare.

Conclusions + Opportunities

Safety and well being are foundational to having a thriving region. Crime is featured prominently in the media and is a growing concern in the region and impacts quality of life. This increased attention on personal security elevates focus on safety more broadly. Safety has always been and continues to be a top priority for transportation.

Reinforce existing commitment to safety when creating new transportation solutions. When updating the public on transportation projects, highlight the specific ways new offerings will make our region a safer place to travel.

Conclusions + Opportunities

Work and commuting habits remain impacted by the post-pandemic shift to working from home. Most residents are back in the office and traveling for work at least a few times a week. Travel for non-work purposes is even more common.

Residents are still driving frequently. Decreases in work related driving may be offset to some extent by increased driving for non-work-related purposes. This means traffic is still a concern and the region needs to continue to find ways to ease congestion.

Conclusions + Opportunities

Despite low levels of familiarity with BRT –residents have more favorable than negative views. There is evidence of interest in having access to expanded BRT transportation options. Highlighting specific benefits will be helpful to influence usage.

Promote the benefits of BRT as a transportation option in the region. The most influential benefits found in the survey are convenience (it is accessible and easy to use); efficient (fast – speed comparable to driving, more frequent service), and reliable (this can be helpful in offsetting the variable of time in traffic). Also consider including any relevant safety benefits.

Appendix

DEMOGRPAHICS AND ADDITIONAL SLIDES

Demographics

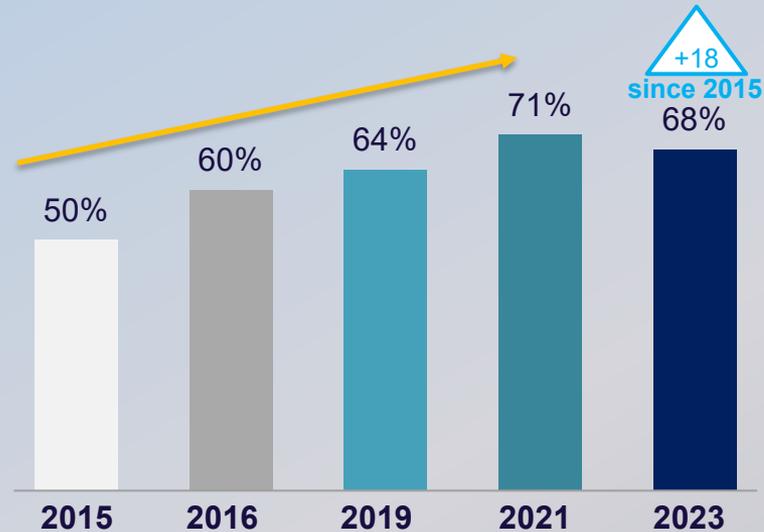
| | | 2015 | 2016 | 2019 | 2021 | 2023 |
|--------------------------------|----------------------------|-------|------|------|------|------|
| Gender | Male | 48% | 48% | 47% | 48% | 49% |
| | Female | 52% | 52% | 53% | 52% | 51% |
| Age | 18-24 | 7% | 11% | 15% | 13% | 12% |
| | 25-34 | 22% | 22% | 22% | 21% | 22% |
| | 35-44 | 24% | 21% | 21% | 25% | 21% |
| | 45-54 | 20% | 21% | 15% | 12% | 18% |
| | 55-64 | 15% | 14% | 15% | 15% | 14% |
| | 65+ | 12% | 11% | 13% | 14% | 13% |
| | Ethnicity | White | 58% | 58% | 52% | 52% |
| Hispanic | | 15% | 15% | 17% | 17% | 17% |
| Black | | 11% | 11% | 12% | 12% | 12% |
| Asian | | 14% | 14% | 15% | 15% | 15% |
| Hawaiian/Pacific Islander | | <1% | <1% | <1% | <1% | <1% |
| Native American/Alaskan native | | <1% | <1% | <1% | <1% | <1% |
| Multi-race | | 2% | 2% | 4% | 4% | 3% |
| Other | | <1% | <1% | <1% | <1% | <1% |
| Marital | Married/Civil Union | 60% | 56% | 51% | 52% | 48% |
| | Single, never married | 24% | 32% | 31% | 29% | 32% |
| | Divorced/Separated/Widowed | 11% | 14% | 12% | 10% | 11% |
| | Living with Partner | 5% | 3% | 6% | 5% | 7% |
| | Decline to answer | <1% | <1% | <1% | <1% | 1% |

| | | 2015 | 2016 | 2019 | 2021 | 2023 |
|--------------------------|---------------------------|------|------|------|------|------|
| Education | HS or less | 5% | 7% | 13% | 15% | 11% |
| | Some college | 15% | 14% | 16% | 14% | 14% |
| | Associates Degree | 6% | 6% | 7% | 7% | 9% |
| | Bachelor's Degree | 35% | 37% | 31% | 30% | 35% |
| | Master's Degree | 28% | 27% | 25% | 24% | 23% |
| | Professional Degree | 7% | 5% | 4% | 6% | 5% |
| | Doctorate Degree | 4% | 4% | 4% | 4% | 3% |
| | Decline to answer | <1% | <1% | <1% | 1% | <1% |
| Employment | Employed (NET) | 73% | 72% | 71% | 71% | 70% |
| | Full-time | 64% | 58% | 55% | 59% | 55% |
| | Part-time | 5% | 9% | 11% | 8% | 8% |
| | Self-employed | 4% | 5% | 6% | 4% | 6% |
| | Not employed (NET) | 15% | 16% | 20% | 18% | 21% |
| | Not employed, looking | 2% | 1% | 3% | 3% | 5% |
| | Not employed, not looking | <1% | 1% | 1% | 1% | 1% |
| | Not employed, unable | <1% | 1% | 2% | 2% | 2% |
| | Retired | 13% | 13% | 14% | 12% | 14% |
| | Student | 3% | 7% | 4% | 5% | 4% |
| Stay home spouse/partner | 8% | 5% | 4% | 5% | 4% | |
| Decline to answer | <1% | 1% | <1% | 1% | - | |
| Household Income | <\$50,000 | 13% | 16% | 24% | 21% | 19% |
| | \$35,000-\$74,999 | 22% | 22% | 20% | 23% | 21% |
| | \$75,000-\$99,999 | 17% | 18% | 14% | 14% | 16% |
| | \$100,000-\$149,999 | 25% | 21% | 19% | 18% | 21% |
| | \$150,000-\$199,999 | 11% | 11% | 13% | 11% | 12% |
| | \$200,000+ | 11% | 10% | 13% | 19% | 13% |
| | Decline | 9% | 8% | 6% | 4% | 5% |

Slight decrease in the percentage of residents who live/work in the same area post-pandemic.

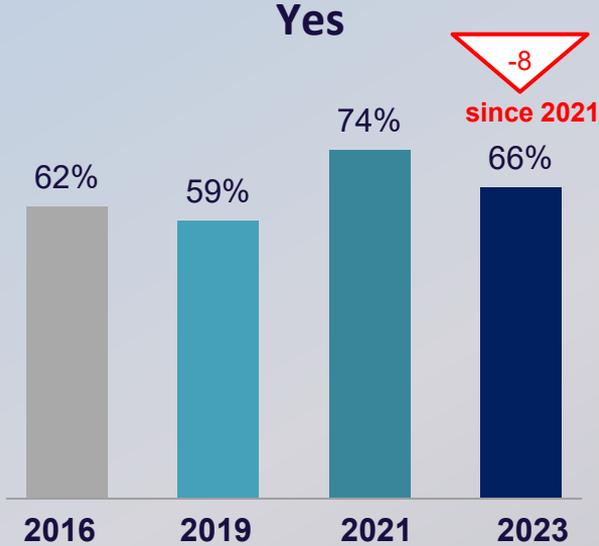
Live and Work in Same City/County

(Among those Employed or Students)



Most respondents drive to work (when going to a non-home worksite), but the proportion has softened after peaking in 2021.

When you go to a Non-Home Worksite, do you Drive to Work?



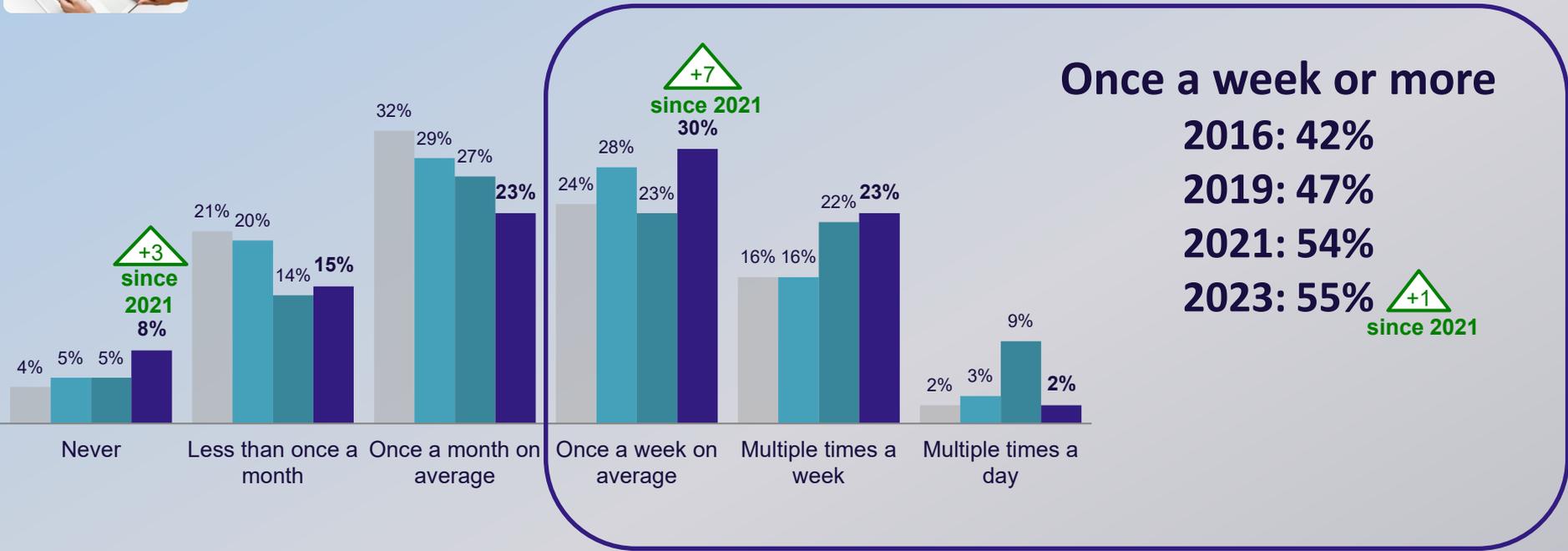
BASE: ALL RESPONDENTS, (2023 n=606)
Q580. When you go to a non-home worksite, do you drive to work?

Denotes statistically significant differences between 2021 and 2023 (p<.05)

Over half (55%) of residents continue to shop online at least once a week.



Frequency of Online Shopping



BASE: ALL RESPONDENTS (2016 n=606, 2019 n=616, 2021 n=611, 2023 n=606)
 Q750. Many people are taking advantage of online shopping today. Over the past year, how many times have you placed an online order for food or goods to be delivered to your home?

▲ Denotes statistically significant differences between 2021 and 2023 (p<.05)

APPENDIX C. PHASE 1 FOCUS GROUP REPORT

C.1 Approach and Methodology

A total of four online discussion groups were held on Tuesday March 5th and Wednesday March 6th, 2024. In order to qualify, residents needed to be 18 years of age or older and live in one of the nine cities or counties that make up Northern Virginia.

The research team used a series of screening questions to identify participants. Participants were chosen to provide a mix of demographics, transit ridership, and location of residence. The research team chose 42 participants total (9-12 participants per group). Responses to the screening questions were used to place participants into one of two segments:

- ♦ **Riders:** Those who have used public transit in Northern Virginia in the past 6 months.
- ♦ **Non-Riders** (includes Lapsed Riders): Those who have either not ridden transit in Northern Virginia in the past 6 months, or have never ridden public transit in Northern Virginia. Note that only those who indicated at least any likelihood to consider using transit were included.

The participants were invited to the group discussion that fit their segment (with two group discussions available for each segment). The focus groups were conducted in two parts: the day prior to their scheduled group session/interview, activities were made available to participants through an online platform to complete “assignments.” The following day, the research team hosted online discussion groups.

Table C-1 Segmentation of Groups

| | Participants |
|------------|-----------------|
| Riders | 15 |
| Non-Riders | 14 |
| Total | 29 ¹ |

¹ Note that this is the total number of participants that attended the groups. There were some participants that filled out the activities prior to the groups but did not attend their assigned group.

Table C-2 Schedule of Groups

| Group | Recruited Participants | Assigned Discussion Group Time |
|--------------|------------------------|---------------------------------|
| Non-Riders | 8 | March 5 th , 5:30 PM |
| Riders | 7 | March 5 th , 8:00 PM |
| Riders | 8 | March 6 th , 5:30 PM |
| Non-Riders | 6 | March 6 th , 8:00 PM |
| Total | 29 | |



C.2 Research Caveats and Limitations

Typically, qualitative research is used to provide answers to attitudinal questions, as well as to provide insight and in-depth understanding of consumer perceptions and opinions.

By nature, this research method does not usually allow for statistical analysis and interpretation. Rather, it is a tool for decision-making purposes. The findings from this type of research should be used to provide insight and direction into decision-making rather than as a sole basis for decision-making.

Qualitative research tends to provide answers to questions like “Why?” and “How?,” whereas quantitative research tends to provide answers to questions such as “How many?” or “How much?” The statements made in this report, including the conclusions and implications or any recommendations, are based upon the attitudes and opinions of the participants and are not necessarily projectable or generalizable to the population at large. Please note that the number of respondents answering a certain way has been cited in various instances only for the purpose of adding perspective to a statement, NOT for the purpose of quantitative analysis.

C.3 Key Findings

C.3.1 Executive Summary

Unsurprisingly, Non-Riders were far more dependent on their personal vehicles to get around, with only the (very) occasional trip into Washington, DC using the Metro. On the other hand, while many Riders did actually have their own personal vehicle, they would more often opt for transit when available, with the most common mode of transportation for them being Metrorail. Aside from Metrorail, most Riders did have experience riding buses, though to varying degrees.

Safety was a large deterrent to public transit use and more specifically, bus usage in the region, especially among Non-Riders. They noted stories of crime or harassment that they had heard about from the news, family, or friends.

Riders pointed to the easy accessibility of Metrorail or other systems as their reason for choosing public transportation. These systems were near them and therefore easy to use. The disconnect between using Metrorail and using bus services in the region was often because participants had an easier time reading and understanding Metrorail schedules, understanding the locations of Metrorail stations, and ultimately understanding how they can get where they need to go. A handful of participants did say that they used buses to fill in the gaps of Metro service, whether that is geographically, or because they were traveling at a time of day when there was little to no service on Metrorail.

Some of the key findings from this set of focus groups related specifically to BRT in Northern Virginia are highlighted below.



Reducing congestion in Northern Virginia needs to be at the forefront of BRT development.

The first priority that all participants could agree on was that reducing congestion in Northern Virginia needs to be at the forefront of BRT development. This means that the areas in the region with the worst congestion should be the areas where a BRT line is first implemented.





Creating lines and networks that connect areas in Northern Virginia rather than feeding directly to DC should be a priority.

On top of relieving congestion, one other key priority was identified: creating lines and a network that connects areas in Northern Virginia and does not just feed directly to DC. As a few participants pointed out, there are enough ways for them to go into DC. A new network can avoid redundancies by connecting them across the Northern Virginia region, perpendicular to Metrorail. This can also allow BRT to connect commercial and employment hubs across the region.



People are not familiar with the terms “Bus Rapid Transit” or “BRT”

When participants were first asked about BRT and what they think it is, it was clear that both Riders and Non-Riders had little or no prior knowledge of BRT. Guesses as to what it could refer to mostly centered around “a faster bus service,” express bus, or another type of limited stop service.

After defining BRT for participants, they tended to lean into the express bus comparisons, citing other express bus services they had seen in places like New York City or San Francisco. It should be noted that participants latched onto the word “Bus” in “Bus Rapid Transit.” In their mind this meant that BRT was more similar to traditional bus service than anything else. They had a hard time imagining how it would be different from the current local bus system.

As participants further explored the definition of BRT, some felt that assertions that the service would be “faster” were difficult to believe. They pointed out that ultimately it was very difficult to make anything in Northern Virginia “fast” given the current high level of congestion in the region.



There is an appetite for a more efficient system like BRT, even among Non-Riders

Notably, prior to talking about and introducing BRT, a handful of participants commented that they would love it if bus service was made more like rail service, with direct lines, more noticeable stations, and designated bus lanes. These comments exhibited that there was an appetite for a more efficient system like BRT, even among Non-Riders. Participants were clear that there were specific aspects of BRT service that they would like to see:

- ♦ All day service—commuting hours have changed greatly with the advent of remote work and many people who rely on the transit system most worked in service jobs or other professions that were not on a typical 9-5 schedule. Therefore, service needs to be all day with an adequate level of frequency to serve everyone.
- ♦ A new BRT system must be integrated with and connected to other regional transit systems—not only to avoid redundant service, but also to foster communications between jurisdictions on building and maintaining a new BRT network. Participants across all groups feel that the local jurisdictions in Northern Virginia did not currently communicate and work together enough.
- ♦ Similarly, a new BRT network needed to be integrated with Metrorail—while it should not be treated as solely a feeder system into the Metrorail network, it should connect people to Metrorail stations in Northern Virginia.



- ♦ A new BRT network should use fare media supported by the larger regional network. It is important that riders can, for example, transfer between BRT and other regional systems using simply their SmarTrip card or other fare media supported regionally.
- ♦ BRT should be built to accommodate the growth of the region. During discussions of sustainability, participants seemed wary of the ability of a BRT system to keep up with the growth of the region without needing an upgrade. Building a BRT network that supports and accommodates regional growth was very important. Additionally, ensuring that there is long-term funding to keep these projects and services in place while the region continues to grow was equally important.

C.4 Detailed Findings

C.4.1 Getting Around in Northern Virginia

Participants were asked about their current travel in Northern Virginia. The following section provides information from participants as they explained how they tend to travel in the area, which modes they use, where they travel to, and their common trip purposes.

Mode Choice

| How do you typically get around Northern Virginia? | Riders | Non-Riders/ Lapsed Riders |
|--|--------|------------------------------|
| Metrorail | 17 | 5 |
| Bus | 13 | 2 |
| Drive | 13 | 15 |
| Walk | 13 | 6 |
| Taxi, Uber, or Lyft | 10 | 9 |
| Bicycle or scooter | 4 | 3 |
| VRE | 1 | 0 |
| Other | 0 | 1 |

Overall, while most Non-Riders and Riders alike have access to and use a car to get around, Non-Riders are much more reliant on their personal vehicle. Some Non-Riders may occasionally take Metrorail to travel into Washington, DC to attend an event (such as a concert or sporting event); however, they tend to do this rarely. By the nature of the screening criteria, Non-Riders have not used public transit in Northern Virginia in at least six months. Those that have ridden public transportation at some point in their life but have not done so in the past 6 months are considered Lapsed Riders, a subset of Non-Riders.

There were a handful of Lapsed Riders among the Non-Riders. Often, these participants explained that they were more regular riders of public transportation in the past but have since moved or experienced other life changes that made them shift their mode choice away from public transportation.



“I've been in Northern Virginia for about eight years and when I first came out here I moved to Loudoun County and the Metro has grown. The Silver Line I believe goes to Ashburn now and I use the Metro and the bus when I first moved here and I drive now. But I do take the Metro sometimes and the bus when I need to go to certain places.”

-Non-Rider

“Transit system is like does all that service and you don't need to transfer and then you don't explain to me what that means. You know, if I hear no need to transfer, that means I can get on one place and then it will take me exactly where I need to go.”

-Rider

Riders, on the other hand, represented a greater mix of mode use. While most do drive, they are far less dependent on their cars to get around. Riders use a number of other modes of travel, including Metrorail, buses, and taxis/Uber/Lyft. In a few cases, they had the opposite trajectory of Non-Riders, where some moved to the Northern Virginia or DC region and found that they could get where they needed to go without owning a personal vehicle. Others use the bus or Metro out of a need for a more affordable mode of transportation.

Focusing specifically on buses and their barriers to use first helped frame the conversations about BRT. For many participants, BRT seemed similar to typical local buses. Non-Riders pointed to a few key barriers for typical use of buses, the first of which is their **comfort and safety** onboard buses. They pointed out that while they have not experienced crime or harassment themselves on the bus, they have seen stories on the news or had friends or family members who have encountered safety issues. They wanted a visible police/security presence onboard public transportation.

- ♦ It is worth noting that, among a few participants, there was a stigma associated with public transportation and those who ride it, so some of the concerns about safety may have been more related to class than to any actual incident these participants were aware of.

“So, we'll drive up to the closest Metro and then from there take the Metro into DC. And I know that my wife would never take it alone just like the other (participant) said. She would be scared of public transportation. I've read a lot of articles here. You now listen to the news and a lot of things happened here and in my comments I wrote that I think they need more transit security. That way they take the fear away from passengers, especially women and children and elders...I think, you know, it's rarely you see a transit personnel. There should be a uniform (that says) 'transit security' and people will feel more comfortable...”

-Non-Rider

Additionally, Non-Riders pointed out that, in order to get them to choose buses as a mode of transportation over their car, there would need to be improvements to the reliability, accessibility, and timeliness of the bus system. They feel that their car is the quickest and most efficient way for them to get somewhere, and the bus simply cannot measure up to their personal vehicles. Some pointed out that after living in other cities where they could rely on the public transportation system, the Northern Virginia regional public transportation system does not compare.



Some other common criticisms of buses from the Non-Rider camp include concerns that buses are too slow, have to deal with the same traffic as cars, and potentially make congestion worse by sharing lanes with cars. They felt that congestion is made worse by buses because the buses move in and out of already congested lanes, thereby affecting the travel time for cars, and also the travel time for the buses. Issues surrounding pedestrian safety getting to and from bus stops can also make it difficult to choose riding the bus in areas that are not walkable.

“It’s kind of an aberration for the system here. They’re slow and they take forever to get into the lane. They back up traffic and cause more congestion. It takes forever to merge out of the lane. You missed your stop lights.”

-Non-Rider

“I mean here in Reston, if you’re crossing over 267 (to get to a bus stop), you know you’re out of luck. And I mean I live close enough to Reston Town Center that I could walk in terms of distance.”

-Non-Rider

“Access time, access and convenience, basically. Is it how, how easy is it to get to the bus and how close to my destination does the bus take me and how quick is it? Is it? Is it quicker?”

-Non-Rider

Riders generally had slightly different concerns than their Non-Rider counterparts. Riders indicated that their reasons for using public transit in general are often related to accessibility – for example, their home is near a Metro station or a confluence of multiple lines. Additionally, they choose public transit because parking at home is very congested, making it difficult to keep a personal vehicle around..

“I’m from Fairfax City. I’ve been here for two years now and most of my time when I spend travelling (I ride) the Metrobus. But previously I used private transport.”

-Rider

With most Riders being most familiar with Metrorail, when thinking about why they do not take the bus, a handful pointed out that they find the bus system more difficult to understand, compared to Metrorail. For them, buses are more complicated, requiring more planning and preparation to make sure that when they ride a bus they won’t get lost. This turns many off to riding buses in Northern Virginia.

“If there was a simple way to know how...I don’t even know where the bus stops are, it’s not visible or noticeable...In other cities or countries it’s obvious where the bus stops are... Metro has Green Line, Yellow Line, etc. I don’t see that for buses. How do you know that bus will take you where you need to go?”

-Rider



“And if I may add, I just think the bus, I’ve looked into it in the past, I just think it’s hard to navigate to the bus system to be honest. For me at least the website is just not as friendly. But I’ve gone up to check timetables as backup options just in case and it’s just not as friendly like the Metro.”

-Rider

Those Riders that do take the bus said that, sometimes, the bus helps to fill gaps in Metrorail service, either by providing service during late nights or early mornings when the Metro is closed or operating less frequently. A handful also pointed out that their bus ridership is not limited to only Metrobus or any other single service, rather using multiple services to get around the region.

“For me, it would be convenient. The last time I used the bus I was downtown. I was leaving work, going to a part of town where the Metro is not convenient and I could take a bus there pretty easily to do an errand in that particular case.”

-Rider

“In the last six months I have used (the bus), I use OmniRide the most. The Prince William County bus I’ve used. I’ve used the Kiwi when Fairfax. I’ve used Dash in Alexandria. I’ve used Fairfax Connector as well as Metrobus. So I’ve used quite a few.”

-Rider

C.5 Bus Rapid Transit (BRT)

The next focus of the conversation was specific to BRT. The moderator probed and asked questions to gauge awareness and understanding of BRT, without showing a definition or visual representation of what BRT might look like. Prior to this part of the focus groups, BRT had not been mentioned to any participants.

C.5.1 Before Defining BRT

Notably, prior to being introduced to BRT and particularly while voicing concerns and barriers to use for regular buses, a few Non-Riders specifically pointed out that buses could be made more attractive by making it more like a rail service. What they meant by this was stations that can serve as hubs for multiple lines and a simplification of routes so that they can go more easily from Point A to Point B.

“I think one of the things that may make a bus more attractive is if it copied a little bit more of the system for the rail base(d) transport. The reason people ride that is because it’s fairly linear. You get here, you get on here if you want to go over there.”

-Non-Rider



“I think one of the things that may make a bus more attractive is if it copied a little bit more of the system for the rail base(d) transport. The reason people ride that is because it's fairly linear. You get here, you get on here if you want to go over there.”

-Non-Rider

These comments were made during a session that was largely critical of new bus lanes, voicing concerns that bus lanes could contribute to more congestion in the region. Despite their critiques of dedicated bus lanes, **even among Non-Riders there is an appetite for a more efficient bus system like BRT.** This shows that there may be a need to explain BRT, particularly to Non-Riders, in a manner that emphasizes its similarity or common traits with a rail system. It became clear that a misunderstanding can arise if it is not clear to the public how a BRT system will be distinguishable from a typical local bus route. Many are not willing to entertain the possibility of using a bus system but are more open to a system similar to rail.

After being asked what they think “Bus Rapid Transit or BRT” means (though still without having seen a definition or example), **nearly all participants had not heard the term before.** They did latch onto the word “Bus” and surmised that it could be a form of express bus or bus with dedicated lanes. Riders were more likely to believe that it could be like an express bus, pulling from their experiences riding express buses or seeing express bus services around the region, specifically referencing the REX (Richmond Highway Express) service offered by WMATA. This emphasizes the need for educating the public about what BRT is and means for them. Many feel that there is not a need for new (i.e., additional) bus service in the area, so showing them how BRT is not the same as local bus service is critical.

“Like an express bus maybe or bus, you know that dedicated bus lanes, things of that sort maybe?”

-Rider

“It just sounds honestly like a fast, faster bus...”

-Rider



C.5.2 After Defining BRT

Next, participants were shown the following definition of BRT and images as examples.

Bus Rapid Transit (BRT) is a bus-based transit system built on existing roadways that delivers fast, frequent, and reliable service that may include dedicated lanes, busways, transit signal priority, off-board fare collection, elevated platforms, and enhanced stations. It can also include all day service, and no need to transfer.

Figure C-1 Examples of Bus Rapid Transit Systems



Again, participants, particularly Riders, wondered if this was similar to systems they have seen in other cities, such as San Francisco. Express buses arose again as a comparable, this time with Riders equating it to the (New York) MTA, where they have seen express buses that utilize off-board fare collection.

There was some confusion about what it means to have traffic signal priority, though in one case a participant was able to explain it by comparing directly to the bus lanes in Crystal City, VA, where the buses have a separate light allowing them to pass by some red lights or get longer green lights.

Among Non-Riders, there was a general lack of understanding as to what makes BRT different from a traditional bus, particularly among Non-Riders. A few Riders pointed out that they feel that this is just how a bus system should work by default.

“This sounds like how a bus system should work, with a little more supporting infrastructure.”

-Rider

The part of the definition of BRT that drew the most skepticism was the description of a BRT system as having dedicated lanes. Non-Riders latched onto this immediately as an issue, with one of the groups explaining their dismay with dedicated bus lanes in reference to an ongoing hot-button project in Alexandria. Outside of this group, however, Riders also raised some concerns. A cyclist voiced worry that it can be difficult to fight for a little road space for bicycles, and that there just isn't space on the road for a bus lane as well. Others were skeptical whether bus lanes would work as intended. They were curious, would those lanes be for the entire route? Would the bus lanes be enforced to the point that they would serve their purpose? A few cited that often

“There is not space on the road, as an advocate it is tough to get even a little narrow bike lane.”

-Rider



drivers will improperly park or drive in the bus lanes, holding up the buses and otherwise treating it like a regular driving lane.

One additional point of skepticism was that it is actually going to be quite difficult to make anything in Northern Virginia “faster.” A number of participants agreed that there is “no such thing as ‘faster’ in Northern Virginia.”

“There's actually no such thing as faster in Northern Virginia because if there's a tiny bit of traffic... There's no such thing really as fast.”

-Rider

However, if BRT were actually faster than regular traffic, that would appeal to many participants.

“If you're really trying to push actual drivers into taking transportation, I want to know that one day when I'm stuck in traffic, I look over to one lane, I see a bus just flying through, getting to where they (they are going). I see that bus can get me from DC, Maryland...I'm about to start taking that bus now. I'm not trying to get stuck in traffic, no more things like that because I know people would rather take the fastest way to get anywhere.”

-Non-Rider

Potential Uses and Span

When participants were asked how they might use BRT, they were unsure. Most spoke in general terms, assuming that if BRT makes fewer stops it may not be as useful for local trips in their area, but instead they could use it for trips to or from major hubs or commercial areas. They were quite clear, however, that BRT service would need to cover the entire day, not just peak times in the morning or afternoon.

The participants pointed out that **work hours, and more specifically commuting hours, are not the same as they were before COVID**. Prior to COVID, they recognized there were more distinct rush hours in the morning or evening. Now, the peak hours are longer and spread throughout the day. Additionally, there was concern for those who work atypical schedules, such as service workers who get off work late at night.

“Well, also that goes to the equity too, because if it's just catering to the 9:00 to 5:00 or whatever hours they are. But you know what's what, what about the service workers that that get off at 11:00?”

-Non-Rider

“With COVID, like everybody working at home, just the need in general. We are a big area where a lot of people are working from home, so it's hard to really decide (to emphasize peak or full day service). Nothing ever fits the same everyday.”

-Non-Rider



Riders' chief concern is whether BRT takes them where they want to go. It was hard for them to imagine what they might use BRT for without having that network information first. Though they were told to imagine a BRT line traveling from their home to where they want to go, this was a challenging task for them. Additionally, a number of Riders and Non-Riders think that they would not use a BRT service to do grocery or other shopping, or really anything that would result in them needing to carry unwieldy bags on the bus.

“Like what everyone was saying. It sounds like this would be something that like how (another respondent) was saying how this doesn't sound like it would necessarily stop at every corner. This sounds more like connecting major locations as opposed to the small town errand running.

So, when I picture this, I picture it connecting major locations, like if I wanted to go from like visit the different historic downtowns or something like that. Like go from like go visit downtown Manassas or something like that just for a weekend that I could.”

-Rider

For those with cars especially, usage became a calculation – how much time or money will I spend using the BRT versus how much time and money will I save if I use my own car?

“I agree with (another participant). If it's something that's convenient for me, yes, then I'll be up for it. For if it depends on where it's going, how frequent, how convenient is it for me? Can I just walk to a bus station or do I need to drive and park to get into the bus? Like all of those factors are going to matter and how much time is it going to, you know, save me, if any, versus me driving somewhere using a different mode of transportation. All of those might factor into me using it.”

-Rider

Connectivity and Integration with Other Regional Systems

Among all groups, it is clear that the public will require BRT to provide connectivity and integration with other regional systems.

There were a number of key tenets to this connectivity and integration from participants.

A new BRT system must be integrated into already existing regional systems to avoid redundant service.

Participants recognize that there are numerous public transportation services in the area already, to the point that some even asked, “why do we need another?” They feel that, if a new bus system is added, it cannot simply create more service in areas that already have satisfactory service or too many mostly empty buses already on the road. This means that all regional transit systems and jurisdictions should be a part of planning and implementing new services. Participants expressed concerns that the different jurisdictions in Northern Virginia have not adequately coordinated on projects in the past.

A new BRT system should be integrated with Metrorail. Participants are more likely to ride or use a new BRT system if it connects them to Metrorail. For many, Metrorail is the public transportation that first comes to mind in the region and the public transportation they are most likely to ride overall. Positioning BRT as an entryway to the Metro system or as a connector between metro stations could bring new potential riders.



“I think that's one of the important things too, is the connectivity wherever. It's all if basically your if you buy something to get onto a BRT and then it takes you to a subway station, a metro station, the ease of transfer.”

-Non-Rider

A new BRT system should use fares and fare media supported by the larger regional network. It's important for riders to be able to transfer between systems in Northern Virginia using one fare payment system.

“Whether accepted normal bus passes maybe, or whether you have to have an upgrade. I want to say Convenient to pay for but that's not really it per se. Such as because I have a health issue, I get on to 80 or 90% of the local buses for free. I have all those on Metro Access passes. But it will not let me on to all the buses, for example some of the express buses I can't use without paying an up charge or like some of the airport buses I can't use.

So rapid transit, I could use my regular pass. I mean, yes. But whereas if I could not use it, if it would cost me more, no. And that's not all you pay is just the fee, it's how much the fee.”

-Rider

Amenities

After discussing their likelihood to use and the circumstances under which they would use BRT, participants were asked to turn their attention to amenities at stations and on buses.

The most common requests for these stops were amenities such as public bathrooms, shelter from the sun or rain, and charging outlets on buses. Digital signs that show bus arrival times and other real-time information are another popular amenity.

A number of Riders and Non-Riders pointed out that they want the stations to resemble or remind them of Metrorail stations. They pointed out that those stations are recognizable and clear in their purpose. BRT stations should be more visible than regular bus stations, like Metrorail, so there is no guessing as to where exactly a bus stop is located. Station design can reinforce that the system is not a traditional local bus system, nor is it an express bus.

“I'd say make it as similar to a rail station and as different from the traditional bus stop as possible. Basically have it where, like I said, rails on wheels. It's just like a train station. Very similar, except it's a bus that's picking you up, not a train.”

-Non-Rider

“I would hate to beat a dead horse here people, but I know where the Metro stops are. I mean, like the Metro station. Like it is...it's a station. Yeah, like it's visible. Whereas again with the bus stop, it looks like a stop sign like a tiny little, I don't even know. I don't know what (or) where bus stops are.”

-Rider



C.5.3 Prioritization

Building a BRT system with multiple lines in Northern Virginia may be a long process. The NVTA was interested in finding out from participants how they would choose to prioritize which routes and lines to build first. The key question focused on asking participants how NVTA should decide which routes to implement first.

In the pre-group activities, participants picked from a short list the most important metrics by which they believe new public transportation projects should be measured against and selected. Note that this question, in the pre-group activities, did not mention BRT specifically. Then, during the groups and after BRT was explained, there was further discussion as to what should be prioritized.

In this activity, Riders were much more likely than Non-Riders to choose **shorter travel times** compared to driving as an important priority for new transit projects. Other clear priorities among Riders were to **reduce congestion, reduce people's dependence on needing to drive themselves, increase reliability of public transportation, and increase frequency of public transportation.**

- ◆ Non-Riders view of priorities for transit projects was much more one-dimensional, with the majority of focus going to improving the reliability of public transportation.

Table C-3 Measuring Success of Transportation Improvements

| What are the most important ways of measuring success? | Riders | Non-Riders |
|--|--------|------------|
| Expanded access to jobs | 7 | 1 |
| Shorter travel times compared to driving | 12 | 5 |
| Reduced congestion | 9 | 6 |
| Reduced dependence on people needing to drive themselves | 9 | 7 |
| Better access to common destinations in Northern Virginia | 6 | 6 |
| Reliability of public transportation | 11 | 10 |
| Frequency of public transportation | 9 | 4 |
| All day/24 hour service | 7 | 2 |
| Total riders of public transportation | 6 | 1 |
| Low or no fares on public transportation | 6 | 3 |
| Cost savings compared to driving | 8 | 6 |
| Safety and comfort for riders at and on their way to public transportation | 6 | 5 |
| Reduced greenhouse gas emissions | 4 | 1 |

Both Riders and Non-Riders agreed that reducing congestion needs to be at the forefront of BRT planning and development. They pointed to this as something that ends up helping everyone. Improving congestion would get cars off the road, thereby improving travel times in general, and improving safety from accidents with pedestrians or other vehicles.



Due to this concern over congestion, participants pointed out that the areas in the region where congestion is the worst would be where they would prioritize implementing a BRT line. While this research was not focused on designating specific corridors, participants naturally began discussing areas, such as Tysons Corner, where they feel that congestion is worse than in any other part of Northern Virginia.

“Anything that gets cars off the road is a good thing.”

-Rider

“If you solve the commuter congestion it will help everyone.”

-Non-Rider

In addition to relieving congestion in the busiest areas of the region, priorities should also be centered around **providing access to suburban commercial or employment hubs** first, as one participant said, “to max out the system.” They indicated that prioritizing lines that “max out the system” BRT can build a foundation for more branches and lines.

Lines that connect these employment and commercial hubs by cutting across the Metrorail system are also preferred. Participants think that there are more than enough ways for them to go into Washington, DC (i.e., “all roads and infrastructure feed into DC...There are not enough ways to cut across the system”), but what they lack is a reliable way to move across Northern Virginia without going into the Metrorail system and taking a more circuitous route.

“Getting out to do those things that you'd want to do, yeah, especially the exurbs like Loudoun or Woodbridge, 'cause there's not just not as many options. We've got plenty of stuff going into DC already.”

-Rider

Participants also made requests to avoid service redundancy. Having more ways of traveling into DC is not needed, according to participants. A BRT system that would cross perpendicular to the Northern Virginia Metro system would allow people to go to more places without creating a redundant service.

“I think I'll agree just because I feel like we kind of have a lot. I mean not to say that you know the Metro or the local buses that we currently...addresses all the areas, but I think they do touch a lot of the important (areas) like the DC areas and things like that. Unless this, the bus rapid transit, is going to touch something or be different and avoid the redundancy that we already have with the public transportation system.”

-Rider

Earlier in the discussion participants were generally in agreement that all-day service is needed and that focusing on peak service should not be a priority. Even those that originally said service is needed during rush hour quickly realized that what constitutes rush hour has changed considerably, and the definition of commute times needs to be expanded. Current Riders pointed out that there are aspects of the current bus system or Metro that do not serve riders all day or night. This can be frustrating for people that work outside of normal Monday to Friday office hours.

“With remote work and 24 hour jobs, there are no cookie cutter job cycles.”

-Rider



“I have definitely noticed that because I live in Alexandria and so the further I get out down the Silver Line where I work, the harder it is to find a bus during not peak hours. Because, God forbid, I have to work on a weekend.”

-Rider

“So when I picture this, I picture it connecting major locations. Like if I wanted to go from...like visit the different historic downtowns or something like that. Like go visit downtown Manassas or something like that just for a weekend that I could picture happening because there's, you know, no Metro line or anything connecting anything outside of DC, which I've already said Metro is my preferred public transit method. So, if it could weave a better web, that would be nice, but I don't picture it being helpful to the everyday person just living their life.”

-Rider

C.6 Elevator Pitch and “Slogans”

The moderator presented the below elevator pitch to participants and asked them how well it described BRT and its potential impact on the region.

“Bus Rapid Transit (BRT) is a bus-based transit system that delivers fast, reliable, and frequent service. This type of service may include unique features that makes it easier and more comfortable to ride and that makes it possible to provide this fast service: dedicated lanes, busways, traffic signal priority, off-board fare collection, elevated platforms, and enhanced stations. It can also include all day service, and no need to transfer.”

The Northern Virginia Transportation Authority (NVTA) is already investing in roads, transit, transit stations, bike paths and sidewalks. It is already investing in 5 BRT lines and is looking to develop a system of additional rapid transit bus lines that connect people to Metro, to places within the region that they want to go, and to parts of DC and Maryland. Investing in BRT means getting more out of existing investments, for example by having BRT travel in existing roadways.”

C.6.1 Reactions to Elevator Pitch

Overall, both Riders and Non-Riders agreed that the elevator pitch should be clear, concise, and focused on conveying essential information about the system’s benefits and features. They appreciated certain aspects of BRT but felt that the pitch needed improvement in terms of clarity, messaging, and format to be more impactful and understandable.

Riders and Non-Riders expressed confusion about the messaging in the elevator pitch. They questioned whether BRT is providing a no-need-to transfer service or if the pitch is emphasizing interconnectivity between different modes of transit. **They perceived a contradiction in promoting no-need to transfer while also highlighting connectivity.**



“What are they after? Are they after ‘no need to transfer’ services? Or are they looking for interconnectivity? Because a big chunk of that second paragraph is it's kind of networking itself from one thing to another to justify itself through interconnectivity. If they want, if the public wants, no need to transfer service.”

-Non-Rider

“Transit system is like does all that service and you don't need to transfer and then you don't explain to me what that means. You know, if I hear no need to transfer, that means I can get on one place and then it will take me exactly where I need to go.”

-Rider

Some participants sought clarification on specific BRT features such as elevated platforms and direct routes, indicating that these explanations would enhance their understanding and acceptance of the system.

“I would go when you have the elevated platform. I would put a dash there and say level so that people really understand what the significance of it is, which is that you don't have to walk up steps.”

-Non-Rider

It should also be noted that participants **reacted more positively toward the images of BRT than they did to text descriptions**. This indicates that promotion of the system should rely heavily on imagery rather than demanding that people read lengthy text, which they are unlikely to do.

C.6.2 Reactions to “Slogans”

Next, the participants were shown three slogans that NVTVA could use to communicate this ongoing bus rapid transit planning to the public. They were asked to express their thoughts and initial reactions to these slogans.

Slogan #1:

NVTVA is Connecting Rapid Transit

Creating an Action Plan for a Regional Bus Rapid Transit System

Slogan #2:

NVTVA is Connecting Rapid Transit

Creating a Blueprint for a Regional Bus Rapid Transit System

Slogan #3:

NVTVA is Connecting Rapid Transit

Creating a Blueprint for faster and more frequent transit throughout Northern Virginia

For the purpose of this research report, we will refer to these as “slogans,” however **it is important to note that participants did not feel that “slogan” was the correct word to refer to these. Care should be taken when deciding how to brand these statements.**

Overall, both Riders and Non-Riders agreed that slogans should be clear, concise, and attention-grabbing to effectively communicate the purpose, scope, and benefits of the transit system improvements. **They favored slogan #3 for its**



clarity but preferred the term “Action Plan” over “Blueprint,” and also provided feedback on areas for improvement in the language and messaging.

Both Riders and Non-Riders agreed that the first two slogans were somewhat vague and did not provide new or clear information. They believed that the third slogan offered more explanation and clarity about BRT improvements. The majority appreciated the straightforwardness of slogan #3 in conveying the goal of faster and more frequent transit without specifying only buses. Some participants expressed that slogan #3 clarifies what the system delivers and is self-explanatory, making it more appealing to a wider audience.

“So, like that first line is consistent across the three, it's those second lines that vary, #3 makes no mention of using a bus to do it, all the others do. The first two both mentioned that you're going by bus. So, everyone I would say I would pick #3 because it gives the illusion I won't be doing it on a bus.”

-Non-Rider

“I think the third one's best because the first two are just double speak. They're not really saying anything new. The third one's actually explaining a little bit, what rapid transit is.”

-Rider

Participants from both groups questioned the effectiveness of the term “Blueprint” in the slogans, feeling that they were somewhat vague and lacked attention-grabbing qualities. Some **participants suggested replacing “Blueprint” with “Action Plan” in slogan #3, as they felt “Action Plan” sounded more effective and practical.**

“Yeah, I would say creating an action plan for faster and more and more frequent transit... just replace blueprint with action plan on the third one.”

-Non-Rider

“Blueprint makes this sound like its super-duper far in the future. Like they're only just drafting this up now, but the alternative of Action Plan just sounds very buzzworthy and vague, so I don't really like the phrase Action Plan or Blueprint. I don't have a good alternative, but I feel like both of them are just kind of wishy washy.”

-Rider

They preferred concise, clear language that avoids sounding too conceptual, ensuring that the message is easily understood and relatable. Participants raised concerns about the term “Bus Rapid Transit System” in the slogans, suggesting that it might confuse people or raise questions about the need for such a system.

“In the first two sentences for a regional bus rapid transit system is meaningless. Most people won't know what that means, whereas this kind of I feel like the third one like you said it, it clarifies.”

-Non-Rider



Participants suggested considering how the slogans would translate into other languages and ensuring that they are simplified and understandable to a diverse audience.

“I would also like to say that if they were all about equity like, they should also consider how this translates in other languages because who is using this? And do people even know what a blueprint for regional buses looks like? I feel like in some ways it should be a little simplified for what it is. It could get lost in translation for sure.”

-Rider

C.7 Core Values

NVTA has defined three core values that serve as the guiding principles to their planning and investment in BRT for Northern Virginia. Participants in this research were presented these three core values, and asked to think about how BRT in Northern Virginia can address and fulfill these goals. These three core values are:

- ◆ Safety;
- ◆ Equity; and
- ◆ Sustainability.

C.7.1 Safety

The most direct connection that participants saw between BRT and improving safety was related to an earlier point – that **BRT can help take cars off of the road**, and therefore can improve safety for other drivers and pedestrians.

That said, safety was a big point of concern from the start of the groups. **Participants are very concerned about crime and harassment onboard public transportation in general.** A few cited specific incidents encountered by either themselves, or by friends and family. Notably however, Riders often indicated that they feel safer on the bus than they do on a Metrorail train. On a bus, it is brightly lit, there is an operator right at the front, and the bus can be stopped in the case of an incident. On a train, they said, there is no operator around (only at the very front of the train) and you are far underground, preventing the train from being stopped or exited in case of an emergency.

“I feel safer on the bus. If something happens, they can stop the bus. You can’t stop a train if something happens – [friend had experience where they were assaulted on the train].”

-Rider

“(Buses are) more brightly lit, have cell service, and other people in the world can see you and what happens on a bus.”

-Rider

Participants did concede that this is not something that BRT would specifically address, since these are characteristics of buses more generally.



Other comments around safety tended to center around training of bus operators, with participants expecting them to be versed in dealing with emergencies (e.g., CPR training or other first aid) or trained to step in and de-escalate crime or harassment on the bus.

“Officers on there all the time could be a deterrent for other people from riding it too but there has, I mean there has, I don't think that we can give the kind of safety people have been talking about.

...Oh yeah, even a bus driver like they want to feel safe too.

So, I agree with what (another participant) said earlier about having the bus drivers even going through some training, not just the CPR but even self-defense, some basic self-defense. It doesn't have to be intense, but something where they can at least, you know, do something.”

-Non-Rider

C.7.2 Equity

Participants' comments related to equity, for both Riders and Non-Riders, centered around where the BRT lines would be built and prioritized. Participants felt that often transit projects get built in areas that are wealthier and where residents do not rely on it as heavily because there is money to support it in those areas. They pointed out that projects like BRT are most needed in lower income areas where people rely on transit the most, and if placed incorrectly would actually make equity worse.

“Serving those areas... that they actually provide service to... They don't just go to rich, wealthy areas, they go to areas that (need it).”

-Non-Rider

“I doubt anyone would be racing to put a rapid transit in like, let's say Southeast DC. It would probably be in the wealthier ends of Tysons or Loudoun. People have the money to pay for it. And because of that, I think you actually might make equity worse.”

-Rider

Even when those lower income areas are prioritized, participants think that there is the possibility that with BRT and more reliable transit service, the cost of living in those areas that used to be low-income will increase and price out the original residents that the BRT line was meant to serve, pushing them farther from transit.

“Prices in the area will soar up. So even if they go to a low-income area it will get gentrified because there's a strong demand for that. And so that's kind of the catch-22. It brings it to those areas, but then it makes those areas less needy of it, and more attractive to young people who can then maybe afford housing where they can't buy it in other parts.”

-Non-Rider



C.7.3 Sustainability

Sustainability naturally progresses from concepts of equity that emphasize providing service to lower-income areas without pushing current residents out. **Most participants discussed sustainability within the realm of BRT as centered around supporting growth for all Northern Virginians** regardless of income.

A few cited specifically that sustainability to them means that a BRT system needs to be built not just to support the region now, but to also accommodate the growth of the region in the years and decades to come. With Northern Virginia experiencing fast growth, planning needs to account for how that growth will look in the near (and far) future.

On top of accommodating future growth, the BRT system should pay for itself, according to participants. They have seen recent news about WMATA's budget shortfall and seeing how transit systems need to receive funding from the jurisdictions they serve. They see that while everyone's tax dollars contribute to the transit systems, not everyone actually uses the transit system. For these reasons, it seems more sustainable to them to create a funding mechanism that can be permanent and not subject to the ups and downs of securing temporary or limited time funding from jurisdictions in its service area.

“But the transportation systems are standing in line with all the other people that are looking for money from the locals and the states and the feds. I mean, you’ve got a situation now where in in in this area, in the Washington metropolitan area, Metro has already come out and said that they’ve got a \$750 million shortfall for this year and they’re looking for more money from Maryland, Virginia, and Washington, DC.

And in all those cases, it becomes a political issue. You know, yeah, I'm willing to give you more money, but the people in the other part of the state are not. It's only going to go to certain areas. What's in it for me to put more money in if I don't really use it that much?

So, sustainability is a great word but it's an ongoing not just a financial concern but a political fight in in most jurisdictions to keep these things going.”

-Rider

Of course, environmental sustainability also was salient for a few participants – noting that if NVTA will be investing in a BRT system, it should be standard that they will not use “gas guzzling vehicles.”

“That’s one of the key ways that can be sustainable is kind of attracting growth that consumes less resources, particularly land.

Well, my question would be about the environment. I mean you know what kind of exhaust systems are on these? Is there going to be a plan to go electric and how quickly will they get there? If it’s just a gas guzzling vehicle with huge amounts of exhaust, we’re not talking environmentally sound.”

-Non-Rider



Table C-4 Demographic Profile

| | Riders | Non-Riders | | Riders | Non-Riders |
|---------------------------------|--------|------------|------------------------------------|--------|------------|
| Gender | | | Primary Residence | | |
| Male | 6 | 6 | Arlington County | 3 | - |
| Female | 8 | 8 | Fairfax County | 3 | 4 |
| Other | 1 | - | Loudoun County | 2 | 2 |
| | | | Prince William's County | 2 | 4 |
| | | | City of Alexandria | 3 | 4 |
| Age | | | Fairfax City | 1 | - |
| 18-24 | 3 | 1 | City of Falls Church | 1 | - |
| 25-34 | 3 | 2 | Manassas | - | - |
| 35-44 | 4 | 4 | Manassas Park | - | - |
| 45-54 | 3 | 2 | | | |
| 55-64 | - | 4 | | | |
| 65 or older | 2 | 1 | Access to a Vehicle | | |
| | | | Yes | 11 | 14 |
| | | | No | 4 | - |
| Income | | | Modes Used in Last 6 Months | | |
| Less than \$20K | - | 4 | Metrorail | 13 | - |
| \$20K to less than \$40K | 4 | 1 | Metrobus | 9 | - |
| \$40K to less than \$75K | 4 | 4 | Loudoun County Transit | 1 | - |
| \$75K to less than \$100K | 4 | 1 | Fairfax Connector | 7 | - |
| \$100K to less than \$150K | 2 | 1 | Arlington Regional Transit (ART) | 3 | - |
| More than \$150K | 1 | 2 | VRE | 1 | - |
| Race/Ethnicity | | | Alexandria DASH | 6 | - |
| African American/Black | 4 | 4 | OmniRide | 2 | - |
| Asian-American/Pacific Islander | - | - | Carpool/Vanpool | 3 | - |
| White (Caucasian) | 8 | 7 | Slugging | - | - |
| American Indian | 1 | - | Some other system | - | - |
| Hispanic or Latino | 1 | 5 | | | |
| Mixed/Other | 2 | | | | |
| Employment | | | | | |
| Employed full-time | 10 | 7 | | | |
| Employed part-time | 4 | 4 | | | |
| Retired | - | 1 | | | |
| Not employed | | | | | |
| Full-time student | 1 | - | | | |
| Homemaker | - | 1 | | | |
| Other | - | 1 | | | |
| Disability Status | | | | | |
| Yes | 3 | 2 | | | |
| No | 12 | 12 | | | |

Note that this reflects only those who participated in their assigned focus group.



APPENDIX D. PHASE 1 ONLINE SURVEY INSTRUMENT



WBA Research
Job #23-151
April 2024

NORTHERN VIRGINIA TRANSPORTATION AUTHORITY BUS RAPID TRANSIT PUBLIC ENGAGEMENT SURVEY

Thank you for taking the time to complete this survey. This survey will help identify ways to improve the transportation network in the Northern Virginia region.

Please share your thoughts!

This survey is for research purposes only. All individual responses will remain confidential and will not be shared or sold.

ASK EVERYONE:

S1. What is your home ZIP code?

98 Prefer not to answer



THOSE WHO DO NOT PROVIDE HOME ZIP CODE [S1(98)], ASK:

S2. In which of the following areas is your current, primary residence?

- 01 Arlington County
- 02 Fairfax City, VA
- 03 City of Alexandria, VA
- 04 City of Falls Church, VA
- 05 Manassas, VA
- 06 Manassas Park, VA

- 07 Herndon, VA
- 08 Vienna, VA
- 09 Somewhere else in Fairfax County

- 10 Leesburg, VA
- 11 Purcellville, VA
- 12 Somewhere else in Loudoun County

- 13 Dumfries, VA
- 14 Somewhere else in Prince William County

- 95 Or somewhere else (**specify**)
- 98 Prefer not to answer



ASK EVERYONE:

S3. Thinking transportation in Northern Virginia, what three words best describe what you think transportation in Northern Virginia should look like **in the future?**

WORD 1: _____

WORD 2: _____

WORD 3: _____

99 Don't know/Prefer not to answer

ASK EVERYONE:

Q1. What is your **primary** mode of transportation? **(ACCEPT ONE RESPONSE ONLY.)**

01 Walk

02 Walk or travel using a mobility aid (cane, walker, wheelchair, etc.)

03 Personal bicycle

11 Use a shared service for bikes, e-bikes, or scooters such as Lime or Bird

12 Ride a personal e-bike or scooter

04 Drive a car, truck, SUV, or motorcycle

05 Ride in a car, truck, SUV, or motorcycle driven by a friend or family

06 Take a taxi or app-based transportation service such as Uber or Lyft

07 Take a local or commuter bus (e.g. DASH, ART, Metrobus, etc.)

08 Metrorail

09 Commuter rail (i.e., VRE or MARC)

10 Use a carpool or vanpool

13 Metroway

95 Use another form of transportation **(specify)**

THOSE WHOSE PRIMARY MODE OF TRANSPORTATION IS NOT PUBLIC TRANSPORTATION Q1(01-06,10-12), ASK:

Q2. How likely would you be to consider taking public transportation if it served your home or places you go to most frequently?

05 Extremely likely

04 Very likely

03 Somewhat likely

02 Not very likely

01 Not at all likely



ASK EVERYONE:

Imagine there was a new public transportation system in the area that serves both the area where you live and the areas to which you frequently travel. Please answer the following questions whether or not you currently use public transportation.

Q3. Which of the following would be the **three most important features** you would like a **new public transportation system to have** for you to consider using it? *Please select up to three responses.* **(RANDOMIZE. ACCEPT UP TO 3 RESPONSES.)**

- 01 Features that improve my comfort at stations and stops
- 02 Features that improve my safety and security
- 03 Features that make it a fast travel option
- 04 Features that make the bus show up on time every time
- 05 Features that improve my experience on the bus (e.g. WiFi, charging outlets, etc.)
- 06 Features that make paying for the bus easier
- 07 Service that ran all day/all week and late into the night
- 08 Features that make it a low cost travel option
- 95 Something else (**specify**)
- 97 Nothing would make me consider using public transportation

Q4A. How familiar are you with “BRT (Bus Rapid Transit)”?

- 04 Very familiar
- 03 Somewhat familiar
- 02 Have heard of, but don’t know much about it
- 01 Have never heard of it

THOSE WHO SAY THEY ARE FAMILIAR WITH BRT Q4A(03-04), ASK:

Q4B. Which of the following do you think best describes BRT (Bus Rapid Transit)? **(RANDOMIZE. ACCEPT ONE RESPONSE ONLY.)**

- 01 A local bus service that operates within mixed traffic and stops along its routes.
- 02 A transit system that utilizes electrically powered trains running on tracks, typically in urban areas.
- 03 A system of public transportation that uses dedicated lanes, priority signaling, and other features to provide fast, efficient service.
- 04 A limited stop commuter bus service.



ASK EVERYONE:

Q5A. Now imagine there was a new public transportation system that would connect you from your home to your most common destinations.

Here are some features that this new public transportation system would have:

SHOW BRT II

SHOW LIST OF FEATURES AS BULLETED LIST ALONG WITH ISOMETRIC. SEE LIST AT END OF DOCUMENT FOR IMAGES AND FEATURES BY BRT TYPE.

Based on these images and features, how would you be most likely to make this type of trip? **(RANDOMIZE RESPONSES 01-02.)**

- 01 You would strongly consider this new public transportation system
- 02 You would likely (use a¹/use²) **[INSERT Q1 RESPONSE. ¹INSERT FOR RESPONSES 02-03/²INSERT FOR RESPONSES 08-09,13.]**
- 03 You would use some other means of transportation **(specify)**
- 99 Not sure

Q5B. Now, imagine the same public transportation system that would connect you from your home to your most common destinations.

Here are some features that this new public transportation system would have:

IF Q5A(01), SHOW BRT I.

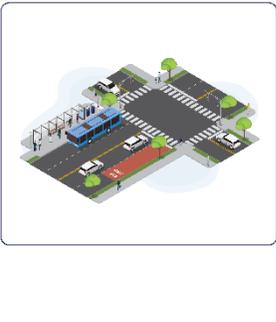
IF Q5A(02-99), SHOW BRT III

SHOW LIST OF FEATURES AS BULLETED LIST ALONG WITH ISOMETRIC. SEE LIST AT END OF DOCUMENT FOR IMAGES AND FEATURES BY BRT TYPE.

Based on these images and features, how would you be most likely to make this type of trip? **(SHOW RESPONSES 01-02 IN SAME ORDER AS Q5A.)**

- 01 You would strongly consider using this new public transportation system
- 02 You would likely (use a¹/use²) **[INSERT Q1 RESPONSE. ¹INSERT FOR RESPONSES 02-03/²INSERT FOR RESPONSES 08-09,13.]**
- 03 You would use some other means of transportation **(specify)**
- 99 Not sure



| TYPE | IMAGE | DESCRIPTION |
|---------|--|--|
| BRT I |  | <p>The bus travels at the speed of traffic.</p> <p>Stations and stops would include good shelters, lighting, trash bins/trash collection, and passenger information.</p> |
| BRT II |  | <p>The bus goes faster than traffic.</p> <p>Stations and stops would include shelters, lighting, trash bins/trash collection, passenger information and amenities that make it faster to board such as level boarding and off-board fare payment.</p> |
| BRT III |  | <p>The bus does not get stuck in traffic, it has its own lane.</p> <p>Stations and stops that include high quality and large shelters, lighting, trash bins/trash collection, passenger information and amenities that make it faster to board such as level boarding and off-board fare payment.</p> <p>Stations will also have additional security features.</p> |



THOSE WHO ARE NOT FAMILIAR WITH BRT [Q4A(01-02) OR Q4B(01-02,04)], SHOW:

Bus Rapid Transit (BRT) is a bus-based transit system that uses new or existing roadways to deliver fast, frequent, and reliable service that may include dedicated lanes, busways, transit signal priority, off-board fare collection, elevated platforms, and enhanced stations. **(INCLUDE IMAGES.)**



ASK EVERYONE:

Q6A. Whether or not you would use a BRT system, which of the following are the three most important ways for local governments to prioritize routes when planning the development of BRT systems in this area? *Please select up to three responses.*

(RANDOMIZE 01-09. ALLOW UP TO THREE RESPONSES.)

A BRT system that...

- 01 Has a lot of riders
- 02 Provides improved mobility and access to work, residential areas, entertainment, etc. for people that don't have other travel options
- 03 Relieves congestion the most
- 04 Is the most cost effective for taxpayers
- 05 Helps reduce greenhouse gases/Fights climate change
- 06 Makes it easier for people to get to more places by transit
- 07 Saves time for transit riders
- 08 Is a safe and secure mode of travel
- 09 Provides an alternative to driving
- 95 Something else is important (**specify**)
- 97 None of these, you do not support further development of BRT in this area

THOSE WHO CHOSE PRIORITIES [Q6A(01-95)], ASK:

Q6B. Of those three ways that local governments should prioritize planning BRT systems, which of these in your opinion is the most important? *Please select just one response.*

(ONLY SHOW THREE SELECTIONS FROM Q6A. RANDOMIZE ORDER SHOWN.)

A BRT system that...

- 01 **[IF Q6A(01)]:** Has a lot of riders
- 02 **[IF Q6A(02)]:** Provides better mobility and access to opportunity for people that don't have other travel options
- 03 **[IF Q6A(03)]:** Relieves congestion the most
- 04 **[IF Q6A(04)]:** Is the cheapest to implement
- 05 **[IF Q6A(05)]:** Helps reduce greenhouse gases/Fights climate change
- 06 **[IF Q6A(06)]:** Makes it easier for people to get to more places by transit
- 07 **[IF Q6A(07)]:** Saves time for transit riders
- 08 **[IF Q6A(08)]:** Is a safe and secure mode of travel
- 09 **[IF Q6A(09)]:** Provides an alternative to driving
- 95 **[IF Q6A(95)]:** Something else is important (**specify**)

ASK EVERYONE:

Q7. If BRT (Bus Rapid Transit) was available in your area, how likely would you be to consider using it?

- 05 Extremely likely



- 04 Very likely
- 03 Somewhat likely
- 02 Not very likely
- 01 Not at all likely

THOSE WITH AT LEAST LIMITED LIKELIHOOD TO CONSIDER RIDING BRT [Q7(02-05)], ASK:

Q8A. If you could get quickly from near your home to your most common destinations on BRT (Bus Rapid Transit), **what type of places** would you primarily want it to take you to? **(RANDOMIZE.)**

- 01 Metrorail or other public transportation stations
- 02 Commercial centers (i.e. dining, entertainment, or shopping)
- 03 Job centers and offices
- 04 Residential communities
- 95 Some other type of place **(specify)**

Q8B. **What time** would you want to use BRT to travel to **[INSERT Q8A]**?

- 01 During peak periods (e.g. rush hour in the morning or evening)
- 02 Throughout the entire day on weekdays
- 03 On weekends
- 95 Some other time **(specify)**

Q9. If you could get quickly from near your home to your most common destinations on BRT (Bus Rapid Transit), what would be the primary purposes of the trips you take on BRT? **(RANDOMIZE. ACCEPT MULTIPLE RESPONSES.)**

- 01 Travel to or from work/job-related business
- 02 Travel to or from school (student)/education related
- 04 Shopping, entertainment, restaurants/bars
- 05 Medical, bank, post office, government services
- 07 Concert or sporting event
- 08 Visiting friends or family
- 10 Gym/Fitness center
- 11 Church, synagogue, mosque, other religious venue
- 13 Visiting parks, natural areas, fishing, hiking, etc.
- 14 Parent/Guardian picking up child from school
- 95 For some other reason **(specify)**



ASK EVERYONE:

Q10. How likely would you be to support areas in Northern Virginia removing traffic lanes or reducing on-street parking to support BRT in some cases?

- 05 Extremely likely
- 04 Very likely
- 03 Somewhat likely
- 02 Not very likely
- 01 Not at all likely

DEMOGRAPHICS

D1. Do you have a driver's license?

- 01 Yes
- 02 No

D2. How many vehicles do you have in your household?

- 00 None
- 01 1
- 02 2
- 03 3 or more

D3. Which of the following best describes your age?

- 01 18-24
- 02 25-34
- 03 35-44
- 04 45-54
- 05 55-64
- 06 65-74
- 07 75 or older
- 98 Prefer not to answer

D4. What is your racial or ethnic identity? Select all that apply. **(MULTIPLE RESPONSES ACCEPTED.)**

- 01 American Indian or Alaska native
- 02 Asian
- 03 Black or African American
- 04 Hispanic or Latino
- 05 Native Hawaiian or other Pacific Islander
- 06 White or Caucasian
- 95 Other (**specify**)
- 98 Prefer not to answer

D5. Which of the following ranges contains your annual household income before taxes?

- 01 Less than \$30,000
- 02 \$30,000 to less than \$49,999
- 03 \$50,000 to less than \$74,999
- 04 \$75,000 to less than \$149,999



- 05 \$150,000 or higher
- 99 Don't know/Prefer not to answer

D6. What is your gender identity?

- 01 Female
- 02 Male
- 03 Non-binary, or
- 95 I use a different term (**specify**)
- 98 Prefer not to answer

D7. Is English your primary language?

- 01 Yes
- 02 No
- 98 Prefer not to answer

THOSE WHOSE PRIMARY LANGUAGE IS NOT ENGLISH [D7(02)], ASK:

D8. How well do you speak English? (**IF D7(01), FORCE IN 03.**)

- 03 Very well
- 02 Well
- 01 Not well
- 98 Prefer not to answer

ASK EVERYONE:

D9. Do you identify as having a disability?

- 01 Yes
- 02 No
- 98 Prefer not to answer



THOSE WHO HAVE A DISABILITY [D9(01)], ASK:

D10. Do you use any of the following mobility aids when riding transit? If so, please select them from the following list. **(MULTIPLE RESPONSES ACCEPTED.)**

- 01 Manual wheelchair
- 02 Motorized wheelchair
- 03 Scooter
- 04 Leg braces
- 05 Prosthesis
- 06 Service/Guide animal
- 07 Support cane
- 08 Long cane (for the blind)
- 09 Crutches
- 10 Walker
- 11 Respirator/Oxygen tank
- 12 Travel with a companion
- 13 Rollator
- 95 Other **(specify)**
- 97 I do not use mobility devices
- 98 Prefer not to answer

ASK EVERYONE

D11. What is your current employment status? Are you...? **(ACCEPT MULTIPLE RESPONSES. DON'T ALLOW 97 WITH 01 OR 02.)**

- 01 A full-time worker
- 02 A part-time worker
- 03 A homemaker
- 04 A student
- 05 Active military
- 06 Retired
- 97 Not currently employed
- 98 Prefer not to answer

D12. Including yourself, how many people live in your household? **(RANGE=1-50.)**

- ___ number of people in household
- 98 Prefer not to answer

Q16. Do you have any additional comments you would like to make regarding public transportation in Northern Virginia? **(OPEN-ENDED.)**



D13. To be entered into the drawing for a chance to win a \$50 gift card, please provide either your email address and/or phone number.

- A. **EMAIL:** _____
- B. **TELEPHONE NUMBER:** _____
- 97 Do not wish to enter into drawing



APPENDIX E. PHASE 3 FOCUS GROUP REPORT

E.1 Approach and Methodology

Building on previous public engagement in Phase 1, this phase of community research was focused on learning more about how likely people are to use the proposed BRT system and their priorities for implementation. Additionally, NVTVA wanted to gather public feedback on the best ways to communicate the proposed BRT system and its benefits to the public. NVTVA commissioned a research team to recruit, conduct, and analyze online discussion groups to provide insight into these questions. Due to the nature of the questions under consideration, these focus group discussions were held before the full draft BRT Action Plan was available; participants reacted to draft versions of various materials.

A total of four online discussion groups were held on Tuesday March 11th and Wednesday March 12th, 2025. In order to qualify, residents needed to be 18 years of age or older and live in one of the nine cities or counties that make up Northern Virginia.

The research team used a series of screening questions to identify participants (see Appendix E). Responses to the screening questions were used to place participants into one of two segments: current transit riders and non-riders. Participants were chosen to provide a mix of demographics, transit ridership, and location of residence (see Demographic Profile in Appendix D). The research team recruited and invited 41 participants in total (9-12 participants per group). In total, 34 of those invited actually participated in the groups. The rider and non-rider segments were defined as:

- ♦ **Riders:** Those who have used public transit in Northern Virginia in the past 6 months. To ensure the rider group reflected a mix of usage patterns, a limit was placed on those who only use Metrorail and do so with low frequency. This was done to avoid over-representation of occasional event-based riders (e.g., someone who rode Metrorail once in the past six months for a special outing).
- ♦ **Non-riders** (includes lapsed riders): Those who have either not ridden transit in Northern Virginia in the past 6 months, or have never ridden public transit in Northern Virginia. Note that only those who indicated at least any likelihood to consider using transit were included.

Participants were invited to the group discussion that fit their segment (with two group discussions available for each segment). Participants were also asked to join the Quallie online bulletin board to participate in individual activities the day prior to their group discussion.

Table E-1 Segmentation of Groups

| | Participants |
|--------------|--------------|
| Riders | 17 |
| Non-Riders | 17 |
| Total | 34 |

Note that this is the total number of participants that attended the groups. There were some participants that filled out the activities prior to the groups but did not attend their assigned group.



Table E-2 Schedule of Discussions

| Group | Recruited Participants | Assigned Discussion Group Time |
|--------------|------------------------|----------------------------------|
| Non-Riders | 11 | March 11 th , 5:30 PM |
| Riders | 8 | March 11 th , 8:00 PM |
| Riders | 9 | March 12 th , 5:30 PM |
| Non-Riders | 6 | March 12 th , 8:00 PM |
| Total | 34 | |

Note that this is the total number of participants that attended the groups. There were some participants that filled out the activities prior to the groups but did not attend their assigned group.

The discussion and activity guides used during the Focus Groups can be found in Appendix F.

E.1.1 Research Caveats and Limitations

Typically, qualitative research is used to provide answers to attitudinal questions, as well as to provide insight and in-depth understanding of consumer perceptions and opinions.

By nature, this research method does not usually allow for statistical analysis and interpretation. Rather, it is a tool for decision-making purposes. The findings from this type of research should be used to provide insight and direction into decision-making rather than as a sole basis for decision-making.

Qualitative research tends to provide answers to questions like “Why?” and “How?”, whereas quantitative research tends to provide answers to questions such as “How many?” or “How much?” The statements made in this report, including the conclusions and implications or any recommendations, are based upon the attitudes and opinions of the participants and are not necessarily projectable or generalizable to the population at large.

Please note that the number of respondents answering a certain way has been cited in various instances only for the purpose of adding perspective to a statement, NOT for the purpose of quantitative analysis.

E.2 Key Findings

E.2.1 Executive Summary

Key Takeaways

- ◆ **General Support for BRT:**

Both groups expressed general support for BRT, especially for its potential to **reduce traffic congestion, improve transit reliability, and save time**. Non-riders particularly emphasized the importance of direct routes and more frequent, reliable services, while riders valued time savings and reduced congestion most highly.

- ◆ **Benefits and Priorities:**

More frequent and more reliable services: Both groups preferred the benefit of better transit services, specifically more frequent and reliable options to key destinations.

» **Reduced traffic congestion:** Both groups agreed that one of the primary benefits of BRT would be the alleviation of congestion, benefiting both public transit riders and drivers.



- » **Direct routes & efficiency:** Non-riders and riders alike favored the potential for BRT to offer direct routes, eliminating transfers and reducing overall travel time.
- » **Cost-effectiveness & affordability:** Non-riders highlighted the financial benefits of BRT, particularly as a more affordable alternative to personal vehicles. Riders also noted the importance of affordability but were more focused on service quality and frequency.
- » **Environmental sustainability:** Both groups expressed interest in BRT's potential to reduce emissions and contribute to environmental sustainability, though it was a secondary concern compared to time savings and cost-effectiveness.

◆ **Map and Route Clarity:**

Both groups expressed confusion regarding the BRT route map, citing issues with understanding the proposed routes, stops, and connections. Suggestions included **clearer labeling**, the inclusion of **recognizable landmarks** allowing people to orient themselves, and **better integration with existing transit systems** such as Metrorail and VRE. Riders were specifically concerned about the color coding of lanes and the relationship between overlapping routes, finding the map more difficult to interpret than it would need to be in order to be useful.

◆ **Route Prioritization:**

Both groups emphasized the importance of prioritizing routes that would address **high traffic areas** and **connect underserved regions**. Non-riders stressed equity, highlighting the need for routes that enhance mobility for low-income populations and people with disabilities. Riders supported these priorities but also emphasized the importance of routes that would attract high ridership, particularly in suburban areas with limited public transit options.

◆ **Level of Service and Operational Details:**

Both riders and non-riders appreciated the frequency information provided in the Level of Service section, with riders particularly valuing the inclusion of weekday and weekend schedules. However, there was a call for more context, including average travel times and a clearer understanding of how the BRT system would compare to existing transit services in terms of convenience, pricing, and service quality. Non-riders specifically questioned the sufficiency of service frequency and raised concerns about whether the system could meet actual demand, particularly during peak hours.

◆ **Key Metrics and Performance:**

Both groups had mixed reactions to the Key Metrics and Overall Performance sections. While some found the information on operating costs and potential ridership helpful, most felt the metrics were too abstract or difficult to relate to their own experiences. A desire for more tangible, user-centric data was evident, such as clearer comparisons to existing transportation options, statistics related to reductions in travel time and the environmental impact of BRT. On the whole, participants thought these measures were more useful for planners and stakeholders than for the general public.

◆ **Branding and Messaging:**

- » **Key Qualities:** Both riders and non-riders emphasized the importance of highlighting qualities like speed, reliability, and convenience in the BRT name. Words such as "efficient," "affordable," "energy-efficient," and "equitable" were also suggested.



- » **Initial Impression:** The proposed name was generally understood but considered too generic. Terms like "fast," "frequent," and "reliable" were clear, but "Action Plan" felt abstract, making it seem more like a concept than an actual service.
- » **Desire for Simplicity:** Many participants felt the name was too long and recommended something more direct and memorable.
- » **Distinguishing BRT from Regular Buses:** Another concern was that the proposed name didn't clearly differentiate BRT from regular bus services. Suggestions included using terms like "Express" or "Plus" to emphasize the enhanced service level.
- » **Perception of "Action Plan":** The term "Action Plan" was seen by some as making the BRT feel temporary, which could affect perceptions of its long-term viability. A more concrete and finalized name was suggested to establish a stronger identity.
- » **"Connecting" vs. Other Terms:** The term "connecting" received mixed reactions. While it reflected the BRT's goal of linking destinations, some felt it was redundant and suggested alternatives like "expanding" or "linking."
- » **Local vs. Regional Focus:** There was strong support for the BRT system serving both local and regional areas. Some participants felt that the primary focus should be on improving local transit within Northern Virginia, while others emphasized the need for comprehensive regional connectivity, including connections to DC, to ensure access to key destinations.

E.3 Non-Riders

E.3.1 Current State of Bus Service in Northern Virginia

Participants were asked about bus services in Northern Virginia. Among non-riders, there was a consensus that current bus services were underused and often seen as inefficient. Some non-riders specifically highlighted the sparsity of bus services outside the Beltway, with limited schedules and coverage, particularly during off-peak hours or weekends.

"I almost never take the bus. I mean, occasionally if I'm going to Kennedy Center and I get off the metro and I don't want to walk, I might take the bus. I just feel like it's so slow. It's great inside the Beltway. Outside of the Beltway, you don't have many options as far as buses. I think it's the reason because it's not really high demand yet for the bus transportation. That's why maybe there is not available more often schedules for the buses."

-Non-Rider

A significant concern among non-riders was the lack of reliable bus service; they pointed out that the current bus system often lacks real-time updates, such as notifications about delays or schedule changes, making it difficult for riders to plan effectively. Additionally, some expressed frustration with the infrequency of buses, chiefly outside of peak hours and on weekends, leading to long wait times. One participant compared the local bus system to the 24/7 subway system in New York City, pointing out the disparity in service availability. This perceived lack of reliability further discourages the use of public buses, particularly in suburban areas where public transportation options are minimal.



E.3.2 Understanding of Bus Rapid Transit (BRT)

Before the focus group discussion, most participants were unfamiliar with the term "Bus Rapid Transit." Only a few had vague associations with the concept, such as the idea of faster bus routes or dedicated bus lanes. Upon introducing the BRT system, non-riders expressed a strong interest in its potential to address the main issues of traffic congestion and the reliability of existing transit options.

After learning about the key features of BRT, including dedicated bus lanes, faster travel times, and frequent service, participants from both non-rider groups were often intrigued by its potential. Some initially struggled to differentiate BRT from traditional buses but soon recognized it as a more **efficient** and **reliable** system with **dedicated lanes** that would **bypass traffic congestion**. Some other non-rider participants expressed enthusiasm for an "express" system that could **shorten their daily commutes** and **enhance the predictability of their travel times**.

"It's faster and like different that the bus has their own lane rather than sitting in traffic with like the rest of the cars. Like they have their own section. So, it's faster. So, I think they're different than a regular bus because the bus sits with the other cars."

-Non-Rider

"It's going to be its own dedicated lane. So, they serve different. They have different routes so it would make sense that then it would be fast. When I think of a bus as not being fast, I think of that for two reasons. You know, how long do I have to wait for it to show up? And then, you know, if it's just going through the regular traffic like everybody else. And it's making all the stops that it's got to make. It's really slow."

-Non-Rider

E.3.3 Understanding of Benefits of BRT

Participants were shown a list of benefits that BRT could bring to Northern Virginia. The most important benefits identified by non-rider groups include **reduced traffic congestion, more direct and frequent transit routes, cost-effectiveness, and more frequent and more reliable service**. While some benefits, such as the reduced need to build more roads and free time for people to do other things while they commute were viewed as less significant, the potential for **improving the overall efficiency and accessibility of public transportation** in Northern Virginia generated strong support for BRT. Nonetheless, concerns about the practicalities of implementing these changes, particularly the required construction, does lead to trepidation for some.



Table E-3 Important BRT Benefits Among Non-riders

| | Total | G1 Non-Rider | G4 Non-Rider |
|--|-------|-----------------|-----------------|
| Reduces traffic congestion on roadways | 6 | 2 | 4 |
| Provides direct routes to destinations without needing to transfer between BRT lines, regular buses, or rail (Metrorail/VRE) | 6 | 5 | 1 |
| Is cost-effective | 6 | 3 | 3 |
| Provides better transit service to destinations – more frequent and more reliable | 5 | 5 | - |
| Improves travel times for all, that is transit passengers and motorists due to less single occupancy vehicles on the road | 3 | 2 | 1 |
| Makes it easier for people to get around without a car | 3 | 2 | 1 |
| Reduces vehicle emissions | 2 | - | 2 |
| Provides more travel options | 3 | 2 | 1 |
| Frees people up to do other things while they commute (e.g., read, work, etc.) – instead of driving | - | - | - |
| Reduces need to build more road or rail lines | - | - | - |

Note that totals may not add up to the total in each group, as some participants did not answer or had multiple responses.

There was a consensus among non-riders that the opportunity to **reduce traffic congestion** and **improve travel times** for all—both transit passengers and motorists—is a significant benefit. Many participants believe that less single-occupancy vehicle use would alleviate road congestion, benefiting everyone.

Providing direct routes without the need for transfers was also frequently highlighted as crucial, with several participants expressing frustration with the current (perceived) complexity of public transportation systems. This preference for direct routes, along with more frequent and reliable transit services, reflects a desire for efficiency and simplicity, particularly for those who currently would have to rely on multiple transfers to reach their destinations.

“Well, one of them would be for sure to well, hopefully it would reduce the vehicles. I mean the, the congestion in the traffic, because even now with its many lanes, is there. You still have certain points that you're driving and you're bottlenecked for possibly up to 30 minutes, maybe close to an hour. So, if it would reduce some of that, that certainly would be helpful.”

-Non-Rider

Cost-effectiveness is yet another significant factor leading to support, with several individuals noting that financial considerations play a large role in their positive reactions to BRT. This includes both the affordability of using public transportation and the cost of maintaining personal vehicles, which can be burdensome, especially given rising gas prices. For some, the idea of a more affordable alternative to driving is appealing, particularly when coupled with the potential for reduced traffic congestion.



“For me as well, it's cost effective and it reduces traffic congestion on roadways, especially right now everybody going back to work from the office and we see more traffic congestion and it takes longer to get places. And it depends on your vehicle size. For instance, I have a big SUV so I spend a lot a week, maybe \$80.00 for the gas so I would prefer maybe to take a bus.”

-Non-Rider

Safety and **access to job opportunities** were additional benefits mentioned by some participants. The prospect of fewer accidents and an increase in local job opportunities, particularly for bus drivers, were seen as potential positives, though these points were raised less frequently compared to others. A few participants also suggested that the presence of BRT routes could lead to increased property values in areas with convenient access to transit, further influencing neighborhood dynamics.

However, not all participants were equally convinced of the benefits. A few expressed skepticism regarding the effectiveness of BRT in reducing vehicle emissions, particularly in Northern Virginia, where emissions are already tightly regulated. Some participants viewed the reduction of vehicle emissions as less pressing in this context. Similarly, while a few participants mentioned that BRT could help make it easier for people to get around without a car, there was less enthusiasm for this benefit. For some, this seemed less relevant as they could not see themselves using anything but their car—either because they weren't sure BRT would accommodate trips before or after work, or due to a general perception that public transit does not go everywhere they need it to. This perception was shared before participants saw the proposed BRT maps and reflects broader concerns about the reach of transit overall, rather than BRT specifically.

The construction phase of BRT also raised concerns for some participants. There were worries about the duration and impact of construction on the community, with many referencing the disruptions caused by past transportation projects. This concern was particularly relevant for those who anticipated lengthy construction periods without immediate benefits.

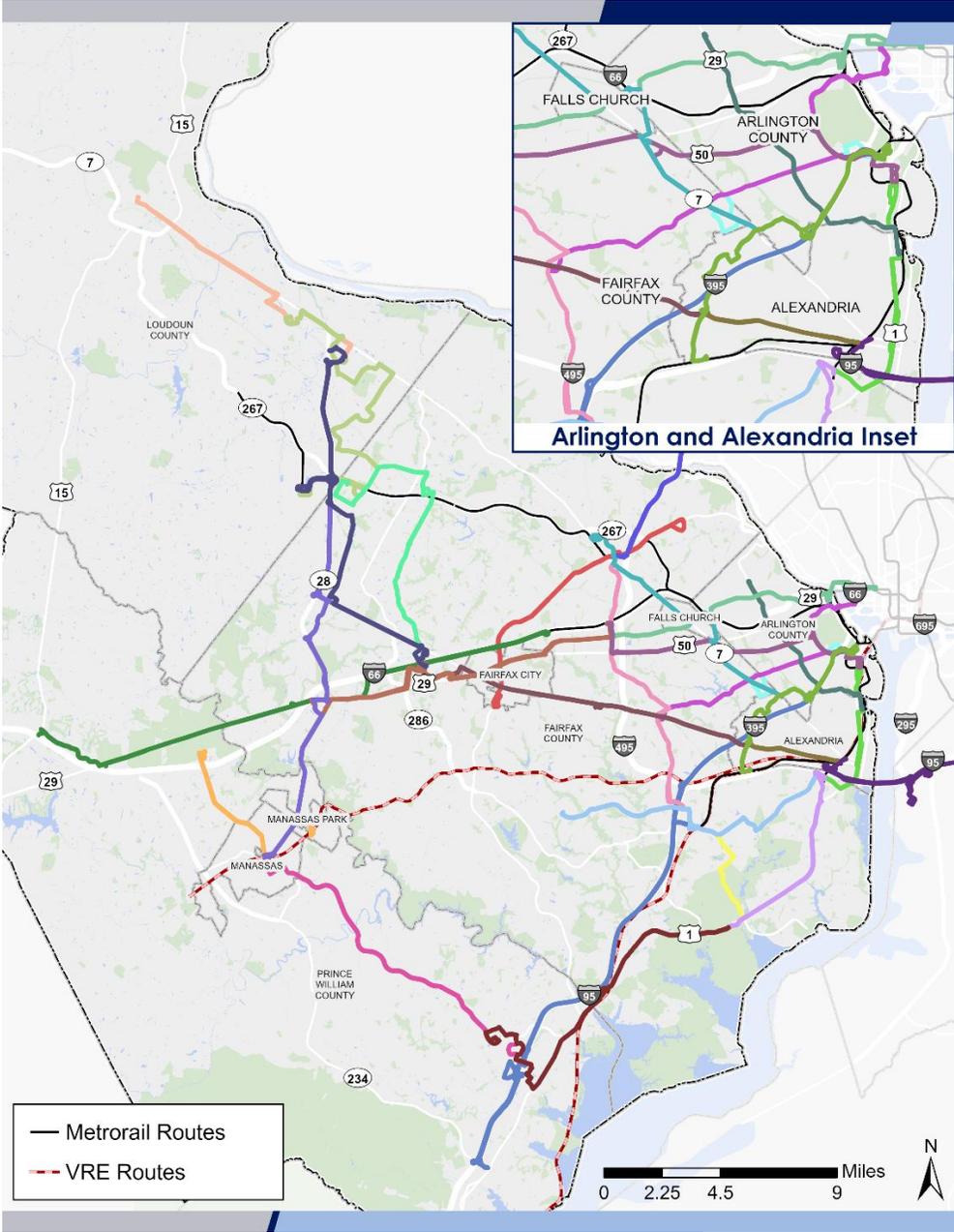
E.3.4 Response to the Draft BRT Action Plan

BRT System Map

The moderator presented an overall map of where the BRT lines could go.



Figure E-1 Proposed BRT System Map used with Focus Groups



- | | | |
|-------------------------------|-------------------------------|---------------------|
| 95 Express | I-495 North | Richmond Hwy BRT |
| A1X (Metroway) | I-495 South | US 1 South |
| Chain Bridge | I-66 | US 29 East |
| Columbia Pike to Crystal City | Leesburg - Dulles Town Center | US 29 West |
| Columbia Pike to DC | Little River Turnpike | US 50 East |
| Duke Street | Manassas Line | VA 28 South |
| Franconia - Fort Belvoir | Northwest BRT | VA 7 |
| Gallows Road | Old Keene Mill | VA28 North |
| Glebe Road | Prince William Parkway | West End Transitway |
| | Reston-Fair Oaks | |



Non-riders expressed a mixed reaction to whether the proposed BRT routes align with the places they typically visit. Some individuals found that the routes shown on the map did connect to key destinations such as the City of Fairfax, the City of Alexandria, and the City of Manassas Park, which are where many commonly travel to for events or leisure activities like festivals and shopping. Others, however, were unsure about the practicality of certain routes, citing the map's lack of clarity or difficulty visualizing how specific routes would integrate with other public transportation options such as Metrorail or VRE. Some participants suggested that **clearer labels** or **integration with the Metrorail system map** could improve understanding.

While some individuals saw the potential of BRT routes to complement existing transportation systems, particularly for leisure activities and avoiding the challenges of driving and parking, others expressed skepticism. The key issue seemed to be whether the routes would truly save time compared to existing alternatives like driving or taking Metrorail. A number of participants noted that, for them, time was the most critical factor when considering whether to use public transportation, and many emphasized the importance of faster, more frequent service. The current bus schedules, they felt, were insufficiently frequent and involved too many stops, which made driving a more appealing option.

“Even though it's already buses there, if it does increase, there's a lot more frequency of the buses and it's a lot quicker than I would. It's an easier choice between that and driving versus now there's pretty much no choice between buses and driving, right. I'll just drive. But if this is and time is the biggest measurement for you. If I saw that it takes 30 minutes on the bus, 20 minutes driving, I can consider that.”

-Non-Rider

There was also a shared concern about the need for more explicit information regarding how transfers would work, particularly when BRT lines intersect with other public transportation networks. The possibility of additional transfers made some participants hesitant, especially among non-riders and when BRT routes did not provide a direct or streamlined connection to their destinations. Some participants were looking for BRT to offer a faster, more direct route to areas like DC, Tysons, or Arlington, places they felt could benefit from better public transit options.

“I'll be willing to use it if it reduces my travel time and my cost remains similar, and if it's not going to add an extra leg to my commute, meaning sometimes it's a pain to find parking and get to just that if I have to drive to go there then. If it's not, I wouldn't take an extra drive just to get there. Real simple for me to get from my home so. Sometimes that makes it difficult in this area, just going to a parking lot in the morning.”

-Non-Rider

Route Prioritization

When participants were asked how to prioritize which BRT routes should be implemented first, non-riders highlighted two key criteria: **routes that are the most cost-effective to build and operate** and **routes that are evenly distributed across Northern Virginia**. Both factors received significant attention, with participants emphasizing the need to balance affordability and equitable access across the region. Participants suggested that the initial BRT routes should focus on these two priorities to ensure a successful and sustainable system.



Table E-4 Route Prioritization Among Non-riders

| | Total | G1 Non-Rider | G4 Non-Rider |
|---|-------|-----------------|-----------------|
| Routes that will be the most cost-effective to build and operate | 4 | 1 | 3 |
| Routes that are evenly distributed across Northern Virginia | 3 | 1 | 2 |
| BRT lines in corridors that have walkable commercial and residential centers that don't require the use of a car | 2 | - | 2 |
| Routes that will reduce congestion the most, assuming some drivers switch to BRT | 1 | - | 1 |
| Routes that make it easier for people to access other destinations in the region by transit (e.g. shopping, recreation, etc.) | 1 | 1 | - |
| Routes that will improve safety and security for passengers, both at stations and on the vehicles themselves | 1 | - | 1 |
| Routes that will improve the travel experience for transit passengers by improving travel times and reliability | - | - | - |
| Routes that connect to Metrorail/VRE | - | - | - |
| Routes that will have the most ridership | - | - | - |
| Routes that make it easier for people to get to work by transit | - | - | - |
| Routes that are easy to build (let's get this moving quickly!) | - | - | - |
| Routes that will build equity by improving mobility for low-income residents and/or people of color | - | - | - |
| Routes that reduce emissions the most | - | - | - |

Note that totals may not add up to the total in each group, as some participants did not answer or had multiple responses.

Additionally, participants expressed support for prioritizing BRT **routes that connect to walkable commercial and residential centers**, enabling people to access essential destinations without relying on cars. This priority supports the broader goal of creating accessible, sustainable transit options that reduce car dependency. As one participant noted, addressing one priority often helps achieve others. For instance, reducing congestion by definition leads to fewer cars on the road, which in turn lowers emissions. This **interconnectedness** underscores the broader impact of the BRT system—by addressing one issue, multiple goals can be advanced simultaneously, contributing to a more efficient and sustainable transportation network across Northern Virginia.

“There should definitely be, you know, some consideration of where housing is being developed, affordable housing is being developed and connecting that to the places where the jobs are. If you can't afford to build another metro line, I think BRT is a very good alternative. I think it's useful for the community as a whole.”

-Non-Rider



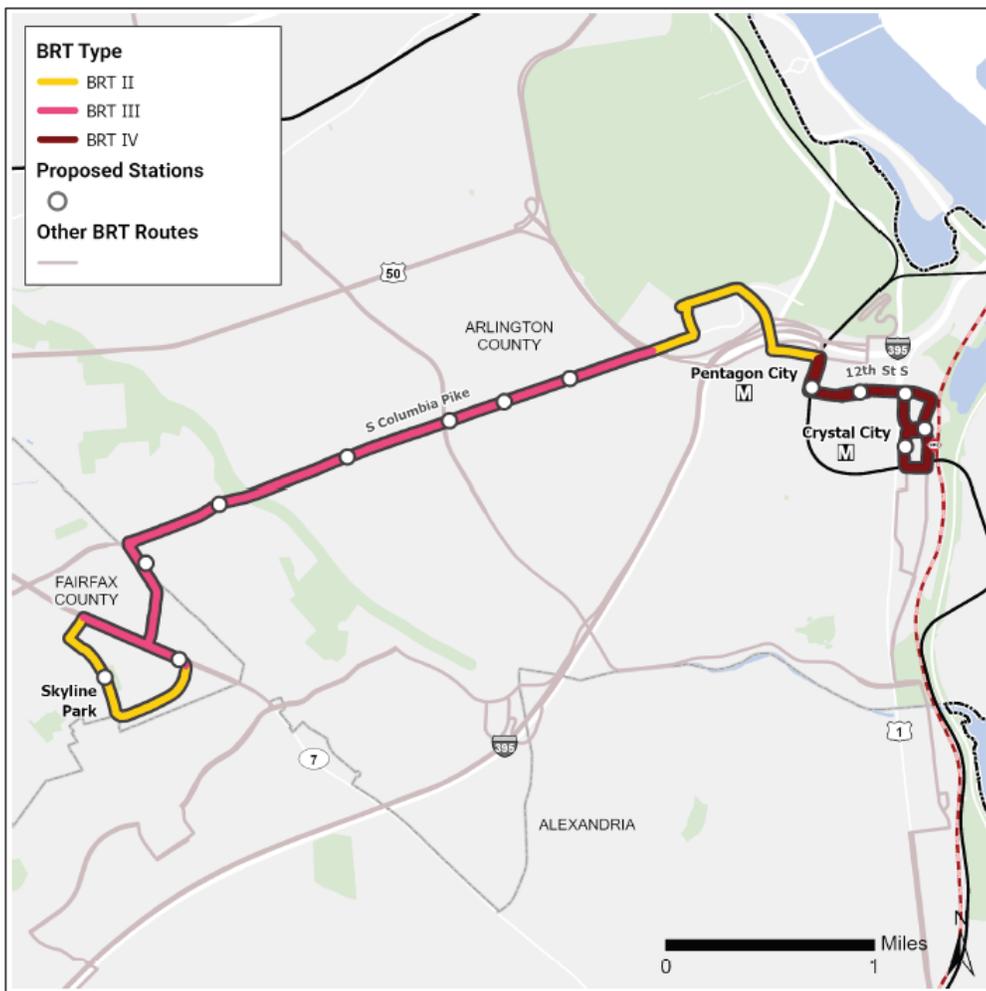
“I think for me it will be a cost effectiveness. Well, and I think some of these. Like if you if you really alleviate a lot of the congestion, then you're automatically reducing emission rates. So, if you're getting cars off the road, you're reducing emission rates. So, you know, it's just one is just an outcome of the other.”

-Non-Rider

Proposed Route Map

When the proposed BRT route map and an example profile were presented, non-riders had mixed reactions. Many participants were uncertain about how the route would serve them, having trouble understanding specific stations and locations. For example, one participant questioned whether the bubbles on the map represented actual stops or just markers. This confusion was compounded by the **absence of station names or landmarks**, which would have made the map more intuitive. Participants also expressed a need to understand **how the BRT would connect with existing transit systems**, such as bus routes or Metrorail stations, and **how it would integrate with other transportation options**. They suggested that **comparing the proposed route to existing ones** would help them better understand which areas would be served or bypassed.

Figure E-2 Proposed Route Map—Columbia Pike to Crystal City



Additionally, the **lack of clear stop names and station locations** made it difficult for participants to visualize the system's potential impact on their specific travel needs. They were also interested in **knowing how BRT stations would be designed**—whether they would be simple bus stops or full transit stations—and **how many stops would coexist** with existing bus routes. This information would help them assess whether the new system would better meet their needs.

Moreover, some participants also **struggled to understand the color coding** on the map, particularly the red and yellow lines, and whether these corresponded to traffic congestion, route importance, or other key metrics. It seemed that participants either did not pay attention to or did not understand the colors as they were denoted in the legend. In general, participants suggested that adding more landmarks or station names on the map would help make it more comprehensible.

"I'm not sure if the bubbles were stops or if that was just markers, but if that's its own lane, it just looked like a smooth transit time."

-Non-Rider

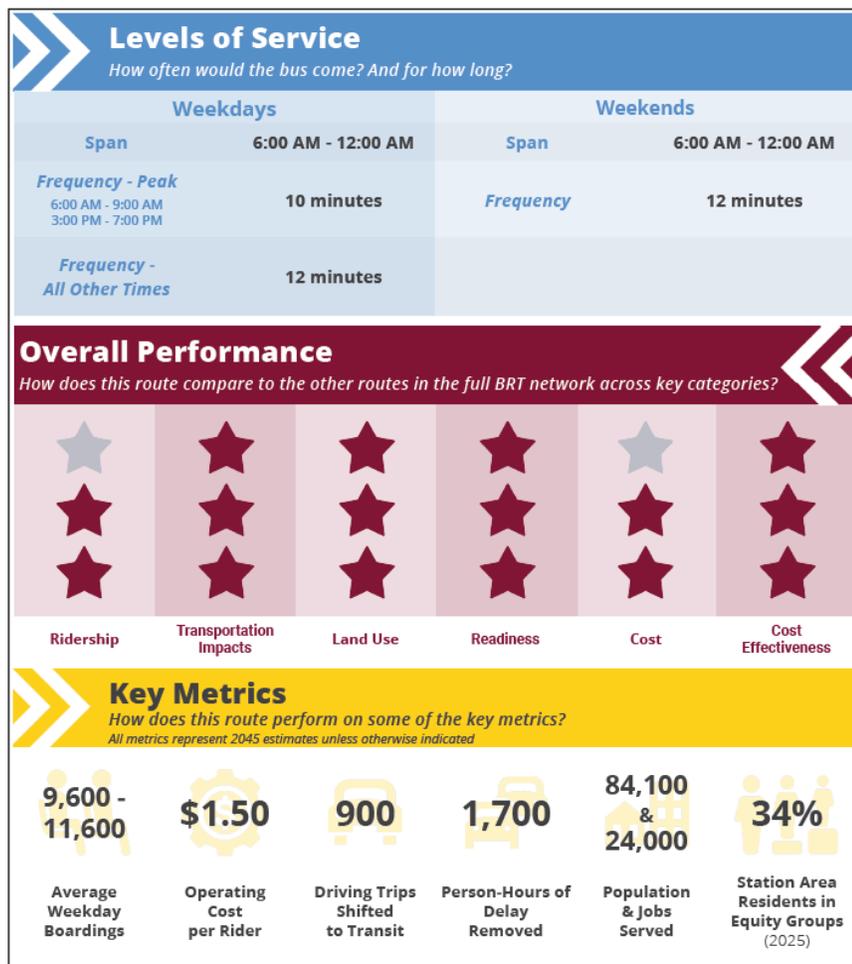
"Just to see how many bus stops are there now and then how many stops there will be with BRT to see how to shows it will reduce travel time."

-Non-Rider



Proposed Route Profile

Figure E-3 Proposed Route Profile—Columbia Pike to Crystal City



Level of Service

The Levels of Service section of the route profile, which provides information about the frequency and span of BRT buses during weekdays and weekends, garnered both positive and critical feedback among non-riders.

Notably, the Levels of Service section of the route profile was the most well received portion of the route profile compared to Overall Performance and Key Metrics. They viewed this section as **the most relevant to them as potential riders**. Several participants appreciated the inclusion of frequency information, noting that the 10-12 minute bus frequency during non-peak times seemed reasonable compared to their experiences with other public transit systems.

However, there was some skepticism regarding the comparison of service frequency to current bus services. One participant commented that, without a frame of reference for typical bus schedules, it was difficult to judge how the BRT’s frequency would compare to regular buses. In addition, concerns were raised about whether the level of service would be sufficient in the context of actual demand. They also suggested that the profile should include more details about how many stops exist on the current route versus how many would exist on the BRT route to demonstrate how the system could reduce travel time.



“I don't know what a difference that is. So that doesn't mean anything really. That's not too far away from the normal bus service. 10-minute and 12-minute frequency.”

-Non-Rider

Overall Performance

The Overall Performance section, which includes ratings for ridership, cost, land use, transportation impacts, and cost-effectiveness, confused many non-riders. Some participants were uncertain about how the rating levels were defined and measured. A few puzzled over the basis of the performance comparisons, despite the explanation provided regarding how the route was being assessed in relation to other routes within the broader BRT network. They were unsure whether the performance metrics were being compared to other BRT routes or to different forms of transportation.

This uncertainty led to further confusion regarding how the overall performance metrics translated into tangible benefits for users. There was a sense that these metrics, while useful for the project planning process or for decision makers, did not speak to customers and how it would impact them. Participants felt that the performance levels lacked clear explanation or justification. For instance, some questioned the star ratings, finding it unclear how the ratings were derived and whether they reflected actual demand or planning assumptions. Additionally, participants were uncertain about how these ratings compared to existing transit systems.

“I don't know if cost is really well explained. Cost and cost effectiveness. What cost? Also, how do you make a comparison? Like how do we know how this compares to just the regular bus lines in terms of all that?”

-Non-Rider

Key Metrics

The key metrics section, which included figures such as average weekday boardings, operating cost per rider, and estimated shifts in driving trips to transit, was also met with mixed reactions among non-riders. Only a small handful of non-riders found the metrics to be helpful for understanding the operational potential of the BRT route. However, others found certain metrics either overly abstract or difficult to interpret. For example, the figure of "900 driving trips shifted to transit" seemed like a large number but lacked context—participants wanted to know whether this was out of 1,000 trips, 10,000 trips, or more. Additionally, the "Operating Cost per Rider" metric caused confusion, with some participants mistakenly interpreting it as the actual fare. This was partly due to the cost figure of \$1.50, which is close to the price of a typical transit fare, leading to further misunderstanding.

“I actually read the operating cost as the cost to like BRT and not to the individual using it. I don't know if I misinterpreted that, but so I didn't interpret that as I didn't really get anything out of like whether this is cost effective to the rider or not.”

-Non-Rider



“So, it says 900 driving trips shifted to transit. Kind of sounds like a high number, but I don't really know that it is. You know, so I mean, 900 out of what? Out of a million?”

-Non-Rider

Participants also noted that certain key metrics, such as "person-hours of delay removed," were difficult to relate to their own experiences. They suggested that these numbers could be made more digestible by breaking them down into more relatable, daily figures, such as how much time an average user might save per trip. Additionally, there was a sense that some of the metrics, such as the projected number of jobs or population served, felt too abstract to influence an individual's decision-making process about using the BRT system.

While the overall numbers in the key metrics section did provide some insight, many felt that they did not connect well to what would actually influence a commuter's choice to use the system. A few participants mentioned that while the cost-effectiveness metric was useful, it would be more helpful to see a clearer breakdown of how the BRT compares to other modes of transportation—like Metrorail or driving—in terms of cost savings and convenience.

“These are just statistics basically. And not everybody would pay attention to statistics. The most important things people want to see is what's the cost, how often the bus goes and how long do I need to wait, how many people the bus can take per one ride.”

-Non-Rider

E.3.5 Messaging

The moderator presented the below proposed name of BRT plan:

“Bus Rapid Transit (BRT) Action Plan—Connecting fast, frequent and reliable transit across Northern Virginia and beyond.”

Non-riders generally agreed that the name of the BRT plan should convey certain key qualities that would make it stand out. Many emphasized the importance of highlighting **speed** and **reliability**, as these are central to the appeal of the BRT system. There was also a consensus around the need for the name to be **straightforward** and **easily understood**, without feeling too corporate or generic. The idea of making the name feel localized and personal to Northern Virginia was also frequently mentioned, suggesting the inclusion of “NoVa” in the name.

However, some mentioned that the name should not solely focus on Northern Virginia but should also convey broader regional connections. Participants wanted a name that would clearly indicate the BRT system's service area extends beyond just Northern Virginia, connecting to places like Washington, D.C., and Maryland. This regional connection was considered important to highlight, as many felt that such a system should be marketed as part of a larger, integrated transportation network rather than a local-only service.

Initial Impressions of the Proposed Name

When presented with the proposed name, some felt the name was clear in its messaging, particularly with terms like “fast,” “frequent,” and “reliable” highlighting the system's key features. Others, however, found it somewhat generic, and a few participants noted that the name didn't seem to distinguish the BRT system from existing bus services, like Metrobus.



Effectiveness in Conveying Differentiation from Regular Buses

One of the most significant concerns raised was whether the proposed name and description made the BRT system sound distinct from regular buses. While the inclusion of “rapid” seemed to suggest a faster, more efficient service, participants felt that the name did not clearly communicate how the BRT system would differ from traditional bus routes. The use of terms like “fast” and “reliable” were already associated with regular bus services in the region (i.e., how all systems try to describe themselves), which led some participants to feel that the name didn’t sufficiently highlight the unique advantages of BRT, such as dedicated lanes or faster travel times.

“I guess my first thought is, you know, how does it differ from Metro and Metrobus? Or support? Is that important to you? How does IT support them? When I look at this, I think, isn't that what the bus system already advertises itself as? As fast, frequent, and reliable?”

-Non-Rider

Desire for More Information on BRT

The question of whether the proposed name sparked curiosity about BRT was also addressed. For some, the name did pique interest due to the promise of a faster, more efficient transit system, especially if the BRT were to feature dedicated lanes or other improvements. Others, however, felt the name did not create a strong desire to learn more, particularly if they already perceived the existing public transportation system as insufficient or unreliable. This highlights a broader challenge in differentiating BRT from existing services and building public interest: that current negative views of public transportation can stand in the way of non-riders adopting the BRT system.

The Role of “Connecting” in the Name

The word “connecting” in the proposed name elicited mixed reactions. On one hand, some felt it appropriately reflected the system’s goal of linking local and regional destinations, including areas beyond Northern Virginia. However, others were skeptical, as they felt that “connecting” did not accurately reflect the current state of the project, particularly since it was still in the planning phase. There was a suggestion to replace “connecting” with terms like “building” to reflect the ongoing development of the BRT system. Others, who are already put off by the idea of transfers, thought the term “connecting” emphasized the fact that BRT would be part of the type of multi-modal trip that leads them to avoid using transit.

“I would like the word building fast because it's not built yet. So, I think it's, you got an action plan, but you're not connecting yet. So, you're building fast and frequent and I think that's better.”

-Non-Rider

Emphasizing Travel Options Beyond Northern Virginia

Participants were generally excited by the idea that the BRT system would extend beyond Northern Virginia. Many felt that regional connections were important, citing examples such as trips to Maryland, D.C., and the National Harbor. However, there was also a sense that the primary focus should be on getting the local Northern Virginia connections right first. Several participants emphasized that, while regional connections were valuable, they should not overshadow the need for effective service within the core area.



“Rapid transit. That's what we got. We got slow transit here and beyond. The buses don't necessarily go beyond this point, right? If that will be implemented next week, I will try it. I will take a bus.”

-Non-Rider

E.4 Riders

E.4.1 Current State of Bus Service in Northern Virginia

Riders expressed a general sense of frustration with the current bus service, mainly due to issues surrounding speed and reliability. Many said that buses tend to be slower than other forms of public transportation, such as trains and Metrorail, which makes them less appealing for customers who need to get to their destinations quickly and reliably. Additionally, participants frequently mentioned that the buses often get stuck in traffic, contributing to delays and longer commute times. The buses' lack of efficiency compared to other available options was a significant barrier to greater use.

A common sentiment among riders was that they would be more likely to use public transportation if it were **faster** and **more reliable**. While some participants noted that buses are a convenient option for short trips, the overall perception is that current public transportation options do not meet the needs of commuters who are looking for quicker travel times, particularly for longer trips or during rush hour.

“What I notice is sometimes they have limited hours, especially on weekends. I don't know how much has changed since COVID, but I know when I used to live in Crystal City, that special bus was only during the week. Limited hours really. I think so, yeah, limited hours. And it was kind of difficult to figure out it was coming or not.”

-Rider

E.4.2 Understanding of Bus Rapid Transit (BRT)

Awareness of Bus Rapid Transit (BRT) was relatively low among riders prior to the focus group discussions, though a small number of riders in the group were already familiar with the term “BRT.” Once the concept of BRT was explained, they grasped the idea of a dedicated, faster, and more efficient bus service.

Participants speculated that BRT could involve limited stops, dedicated bus lanes, and a more streamlined, express route. They also mentioned that it would likely be targeted toward commuters rather than everyday bus users, with more routes that connect key locations, such as business districts. BRT could be seen as a premium service, potentially requiring extra payment, much like toll roads, for faster and more direct routes. They also discussed the idea of BRT being more frequent and not requiring as much wait time compared to traditional buses.



“I took one in Cartagena, and it was very cool because you like, tapped on and you get on the platform and it had like glass doors and it was completely separate from the road. So it wasn't just like it had its own lane. Because I know in DC there's some like dedicated bus lanes and you still got all these Uber drivers and people just parking in the middle of it. So it doesn't really do anything. So it's like a fully blocked off dedicated lane, which is really nice. And it moved quickly.”

-Rider

When BRT was introduced, riders had largely positive initial impressions, particularly regarding its potential to improve the speed and efficiency of bus travel. Riders were particularly excited by the prospect of BRT buses having dedicated lanes, which they believed would help avoid traffic and reduce travel time significantly. They emphasized that the ability to avoid congestion would be a key feature that could make BRT more attractive compared to conventional buses.

Participants expressed some curiosity about the potential differences between BRT and regular buses, with some participants wondering whether BRT would operate during off-peak hours or whether it would be primarily a commuter service. This thought likely stemmed from their initial association of BRT with an express bus, where limited stops and faster service during business hours are typical. They also pointed out the need for more clarity on the specifics of BRT's operational details, such as scheduling and the frequency of service. Some participants speculated that BRT buses might be nicer and more comfortable than regular buses, which added to their positive perception of the system.

Participants raised questions about how the service would be integrated into the existing transportation network. They inquired about whether BRT would use regular highways or have completely dedicated lanes, and how the service would address issues related to congestion in certain areas. They also expressed interest in the frequency of buses and whether BRT would run consistently or only during peak commuting hours.

“It brings up a little question. How does it work? I mean, are we using smaller buses, so we run them more frequently? Are we skipping stops? Is it during like rush hour? Or is it in certain neighborhoods because of the neighborhood design, you know? I don't know. What I feel about that statement is like they move like a train, meaning they are so fast.”

-Rider

E.4.3 Understanding of BRT Benefits

When participants were asked about the benefits of BRT in Northern Virginia, riders emphasized the importance of **time savings**, **reduced congestion**, and the **frequency and reliability of transit services**. They ranked "more frequent and reliable transit service" as the most important benefit, highlighting that reliable transit options could save valuable time and provide convenience. They also found **reducing traffic congestion** to be important, noting that less congestion would lead to faster travel times, benefiting both drivers and public transit users.



Table E-5 Important BRT Benefits Among Riders

| | Total | G2 Rider | G3 Rider |
|--|-------|----------|----------|
| Provides better transit service to destinations – more frequent and more reliable | 7 | 4 | 3 |
| Reduces traffic congestion on roadways | 5 | 3 | 2 |
| Improves travel times for all, that is transit passengers and motorists due to less single occupancy vehicles on the road | 4 | 4 | - |
| Provides direct routes to destinations without needing to transfer between BRT lines, regular buses, or rail (Metrorail/VRE) | 2 | 1 | 1 |
| Frees people up to do other things while they commute (e.g., read, work, etc.) – instead of driving | 2 | 2 | - |
| Makes it easier for people to get around without a car | 1 | - | 1 |
| Reduces vehicle emissions | 1 | - | 1 |
| Provides more travel options | - | - | - |
| Is cost-effective | - | - | - |
| Reduces need to build more road or rail lines | - | - | - |

Note that totals may not add up to the total in each group, as some participants did not answer or had multiple responses.

Both groups of riders deemed certain benefits less important. They felt that reducing the need for more roads or rail lines was not particularly relevant to commuters, as the focus should be on improving the existing infrastructure.

“Hearing rapid transit, bus rapid transit, it implies it's like an express thing. So it doesn't make me think it goes to all sorts of destinations. I feel like I would have to transfer to get to my final destination.”

-Rider

“I think in a larger sense, I agree that reducing the traffic congestion is number one for me. But if you think more globally, I have to think reducing vehicle emissions would be something that's important to me as well.”

-Rider

Regarding the impact on neighborhoods, riders expressed concerns about potential disruptions caused by construction, particularly in areas where dedicated bus lanes would need to be built. Some highlighted the potential congestion from additional traffic or parking issues, while others noted that the introduction of BRT could improve access to neighborhoods by making travel easier and more efficient.

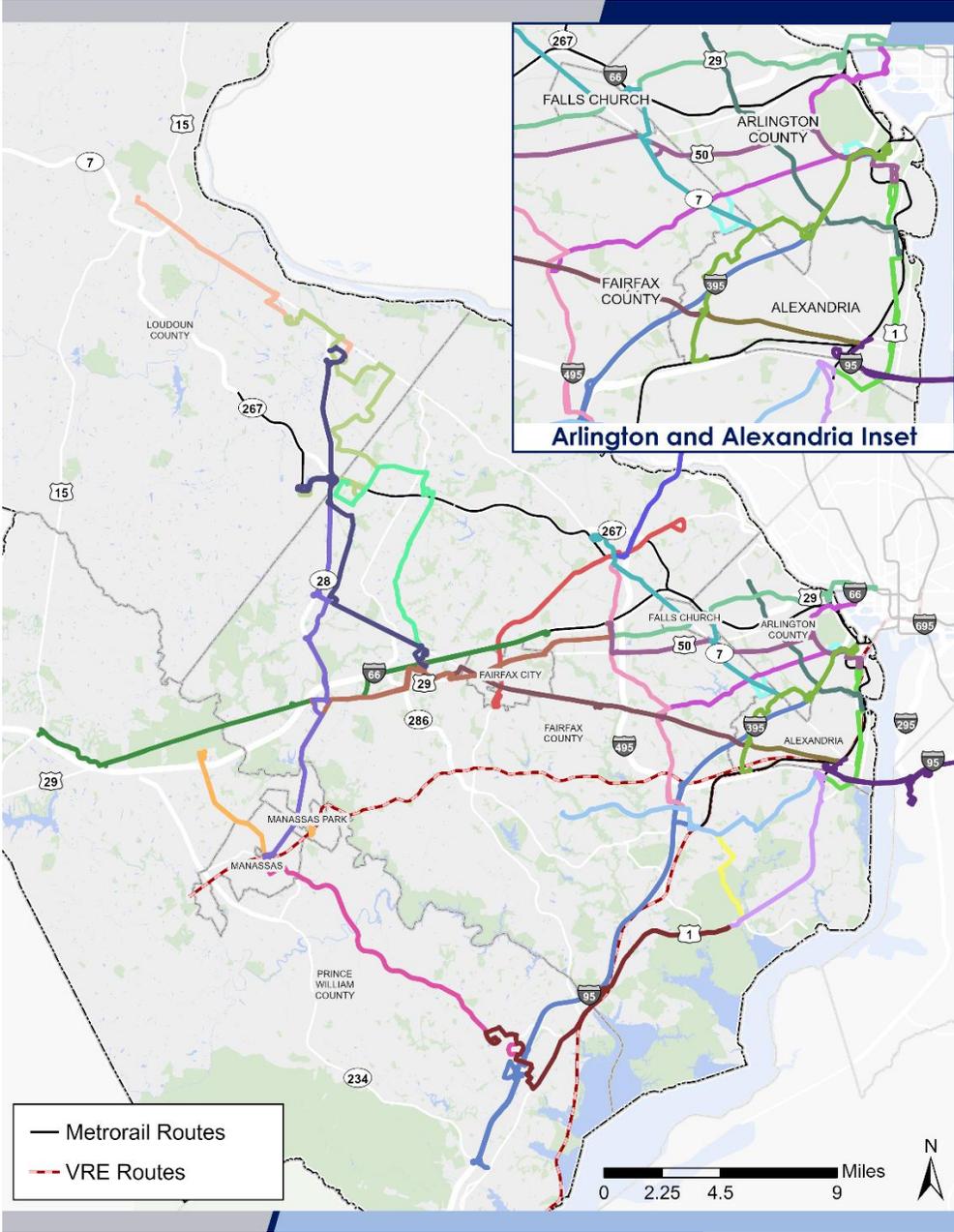
E.4.4 Response to the Draft BRT Action Plan

BRT System Map

Riders had a mix of positive reactions and concerns regarding the proposed BRT system map. They appreciated the broad coverage of the routes, particularly to areas like Manassas, Arlington, and Alexandria. However, riders expressed concerns about the clarity of the map, with participants finding it difficult to understand the routes and connections, especially in areas like McLean, Tyson’s Corner, and Springfield. **Clearer labeling, more recognizable landmarks,** and **better differentiation of routes** were suggested to make the map more user-friendly.



Figure E-4 Proposed BRT System Map



- | | | |
|-------------------------------|-------------------------------|---------------------|
| — Metrorail Routes | — VRE Routes | |
| 95 Express | I-495 North | Richmond Hwy BRT |
| A1X (Metroway) | I-495 South | US 29 East |
| Chain Bridge | I-66 | US 29 West |
| Columbia Pike to Crystal City | Leesburg - Dulles Town Center | US 50 East |
| Columbia Pike to DC | Little River Turnpike | VA 28 South |
| Duke Street | Manassas Line | VA 7 |
| Franconia - Fort Belvoir | Northwest BRT | VA28 North |
| Gallows Road | Old Keene Mill | West End Transitway |
| Glebe Road | Prince William Parkway | |
| | Reston-Fair Oaks | |



A significant concern was the ease of transfers between the BRT and other public transit systems like Metrorail and local buses. Both groups emphasized the **need for seamless connections** and **clear transfer points**. Additionally, **parking at key stations** was highlighted as crucial for users who would drive to BRT stops, especially for those commuting from suburban areas. Some participants also questioned the practicality of dedicated lanes on congested roads and whether the system could operate during off-hours, particularly late evenings or weekends. The concern about off-hours operation seemed to stem from a belief that the system might struggle with demand during less busy times, meeting the needs of those who work very late or on weekends. Participants referenced experiences with other transit systems, like VRE, which operate on limited schedules during late nights or weekends, if at all, making it inconvenient for users who rely on these systems outside of regular commuting hours. This limitation could discourage riders who need flexibility.

When it came to using the system, riders showed general interest, particularly for its potential to **save time, bypass traffic**, and **reduce the hassle of parking** during peak times. However, concerns about competitive pricing compared to other transit options, like Metrorail or commuter buses, remained. If the system offered reliable service, time savings, easy access to key destinations, affordable fares, and clear operational details, participants indicated they would be more likely to use it.

“Was a little confused. Can't speak for everyone, but I think a lot of trying to figure out like the different routes, but just being a little bit maybe more details in it could be a little bit more helpful. Just knowing if it's going directly to your destination or close to where you need to go would be helpful.”

-Rider

“I think also you were asking about like what would help. I mean, this is the planners, but for the customers, I mean, we want to know that we're still being able to view this on our regular app and the cost is similar to what we have, unless there is more cost, I don't know. And you're utilizing your current routes. It's just you're making it may be faster and more frequent because people also don't want to freak out and say, Oh my God, my bus route changed completely. I can't take my regular bus. Like, no, you can. There's this additional service.”

-Rider

“For these special buses, do they connect to these same special buses in different places? Are there connections within the system, which I'm assuming they are, but it doesn't really point it out? Also like there's a huge military community around the area in Alexandria and I see only one line going there. I feel like if there are transfer points, like having it much clearer like a symbol or something like that, like Metro does a good job with that.”

-Rider

Route Prioritization

Both rider groups emphasized the importance of addressing **high-ridership routes**, **reducing congestion** and **faster, more reliable service**. They agreed that routes should serve regions far from existing public transit, such as Metro stations, and **connect to popular destinations**.



Table E-6 Important BRT Benefits Among Riders

| | Total | G2 Rider | G3 Rider |
|---|-------|----------|----------|
| Routes that will have the most ridership | 6 | 4 | 2 |
| Routes that will reduce congestion the most, assuming some drivers switch to BRT | 5 | - | 5 |
| Routes that will improve the travel experience for transit passengers by improving travel times and reliability | 3 | 2 | 1 |
| Routes that are evenly distributed across Northern Virginia | 2 | 1 | 1 |
| Routes that connect to Metrorail/VRE | 2 | - | 2 |
| Routes that make it easier for people to access other destinations in the region by transit (e.g. shopping, recreation, etc.) | 1 | 1 | - |
| Routes that will improve safety and security for passengers, both at stations and on the vehicles themselves | 1 | 1 | - |
| Routes that make it easier for people to get to work by transit | 1 | - | 1 |
| BRT lines in corridors that have walkable commercial and residential centers that don't require the use of a car | - | - | - |
| Routes that will be the most cost-effective to build and operate | - | - | - |
| Routes that are easy to build (let's get this moving quickly!) | - | - | - |
| Routes that will build equity by improving mobility for low-income residents and/or people of color | - | - | - |
| Routes that reduce emissions the most | - | - | - |

Note that totals may not add up to the total in each group, as some participants did not answer or had multiple responses.

They highlighted the need for routes that would attract high ridership, especially in areas with existing bus service that could be upgraded to BRT. Both groups agreed that safety features would encourage more people to use the BRT system. Another shared priority was connecting BRT routes to existing transit systems, such as Metrorail and VRE, for **smoother transfers** and **easier access to key destinations**. Additionally, they raised **equity** concerns, advocating for routes that improve mobility for low-income communities and people with disabilities.

"I'd say where is the most traffic congestion, the farthest from existing public transit options like Metro rail, Metro bus, and like the most potential commuters, where is not served at all by any kind of reaching underserved populations."

-Rider

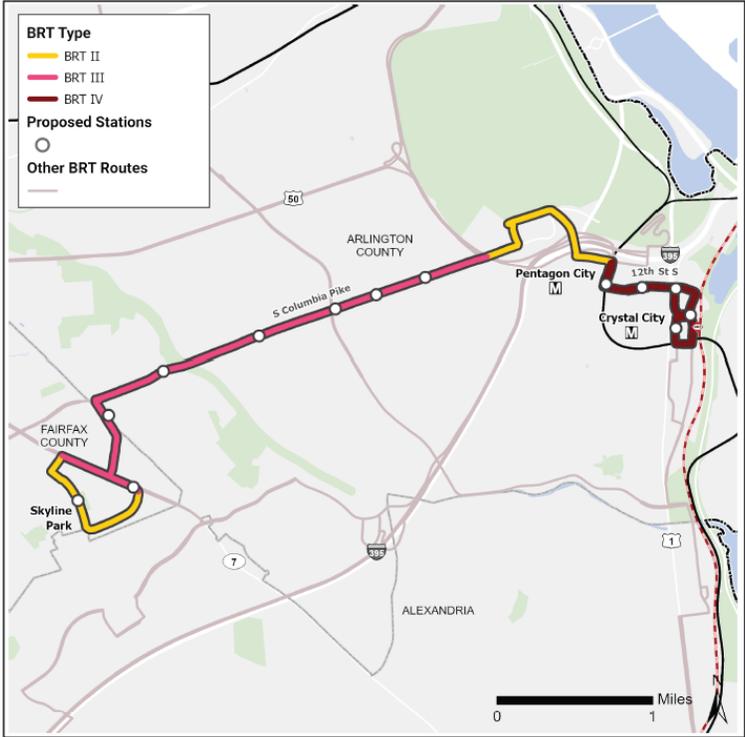
"Sometimes at night if you're the only person standing there at the bus stop, it may be more isolated area. It would make me more nervous. So to see if they would improve safety and security for passengers because I've seen things happen on the bus."

-Rider



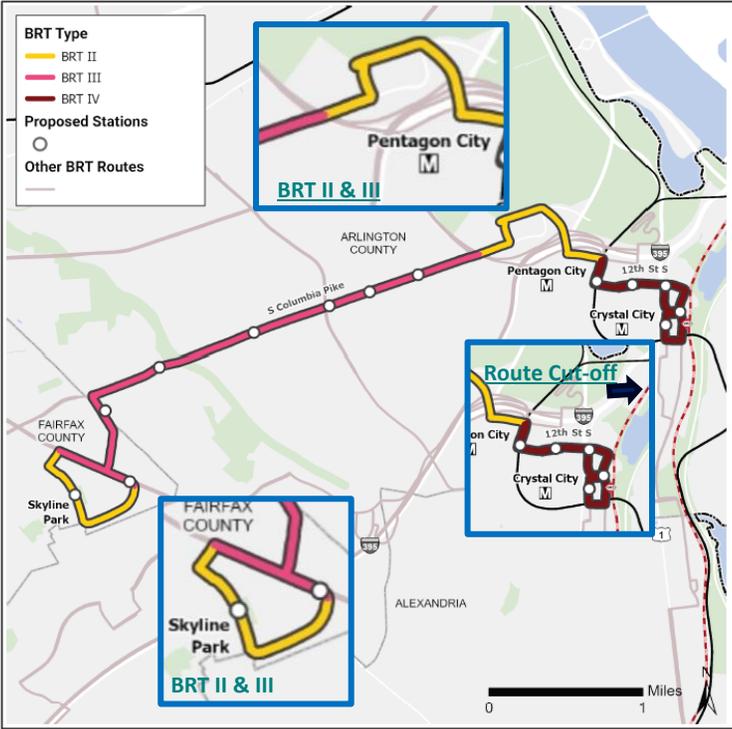
Proposed Route Map

Figure E-5 Proposed Route Map—Columbia Pike to Crystal City



Both groups of riders found the route map and its depiction of the BRT lanes somewhat unclear. They expressed confusion about the lane types, noting that the color coding for different lane types (e.g., Type III and Type IV lanes) felt unnecessary and potentially confusing for the general public. They suggested **removing this color coding**, as most riders likely would not focus on the specific lane types. Riders had difficulty understanding some of the map elements, especially the overlap between BRT II (yellow) and BRT III (pink) near Pentagon City and Skyline Park. They were unsure whether there were overlapping routes or connector services. Confusion was also noted in the areas near the map edges, where routes like BRT IV appear to be cut off (see figure below for a closer look). Some participants were also unsure about the specific locations of certain proposed stations. Despite this, they acknowledged that the route itself was clearly marked, and both groups appreciated the visibility of the stops and the simplicity of the map.

Figure E-6 Confusion with Proposed Route Map (from the Participants' Perspective)



“We see the different colors that we think that means different buses and I don't know that the average ride is going to care about whether it's a type 3 lane versus the type 4 lane. So I guess I would remove that color coding.”

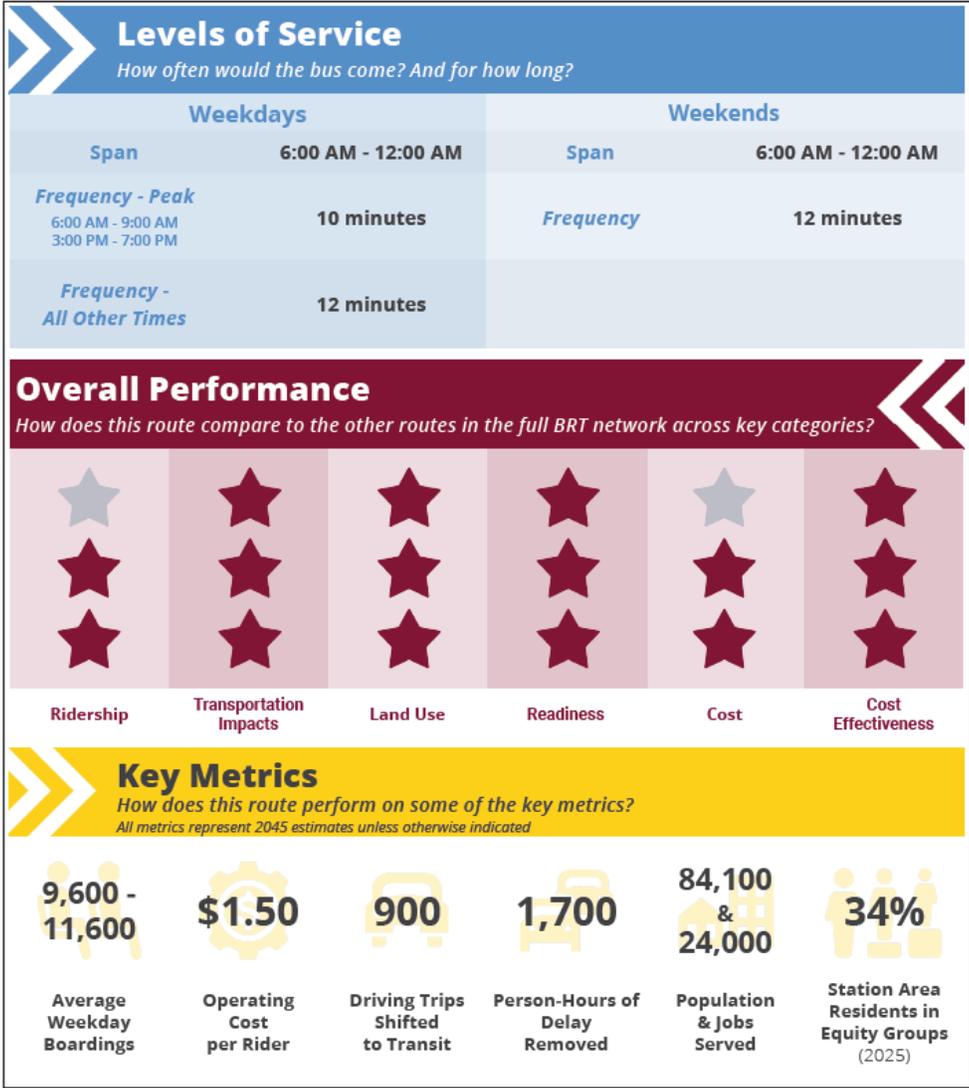
-Rider

“I'm not sure what color this is. Is dark reddish color as the route IV? I'm not sure what yellow is. Is there a BRT II route? what's cut off the top of that image? I'm not sure if the pink root BRT 3 and BRT 2 overlap each other or it's a connector route, it goes further.”

-Rider

Proposed Route Profile

Figure E-7 Proposed Route Profile–Columbia Pike to Crystal City



Level of Service

The Level of Service section, which highlighted the frequency and span of BRT buses, was generally well-received, especially in terms of understanding the basic operational details like weekday and weekend schedules. Riders appreciated the inclusion of frequency information, as it made the service seem more predictable. However, they pointed out a lack of additional details, such as average travel time from end to end, which they felt would help prospective riders better understand the convenience of the service. They required more context regarding the potential impact of the proposed route on existing services, as some were **unclear whether this service would replace or supplement the current bus services** in the region. They also questioned whether the schedule, particularly on weekends, could be adjusted to accommodate late-night and early-morning travelers.

“I like the frequency and stuff, that's nice, that has frequency in minutes, but like putting the route time like end to end on average or something and showing how its faster...”

-Rider

Overall Performance

Riders had mixed feelings about the Overall Performance section. They expressed dissatisfaction with the star ratings, finding them unclear and not very meaningful to a general audience. They struggled with interpreting what each rating level actually meant, particularly in relation to cost-effectiveness, and felt that more straightforward explanations were needed. Some participants felt that certain categories, such as "land use" and "readiness," were not clearly explained and might not be relevant to the average person.

Key Metrics

The Key Metrics section was met with varying levels of understanding among riders. They found the metrics, particularly the operating cost per rider, somewhat confusing. They were unsure of the fare structure and **thought the operating cost shown was the actual fare**. They questioned how these figures would translate to the actual cost for passengers and suggested including more relevant information, such as reliability statistics or the number of cars expected to be taken off the road. They felt that more context was needed to make these figures more relatable and understandable. Additionally, both groups agreed that including metrics like the environmental impact or the potential for increased property values around stations could add usefulness to the profile.

“The way it's configured was weird. It goes up, they go vertical. I think most people need left or right. I don't, I don't know, it just looked odd to me. It's just kind of hard to look at but I like the levels of service.”

-Rider

“I didn't really like the overall performance and key metrics part. I feel like that's good for transportation planners, but not for me. And like the stars are kind of meaningless. Like what does 2 stars mean for cost? How much is that? And the ridership numbers like I don't really care about any of that.”

-Rider



E.4.5 Messaging

Riders were asked for their first impressions to the name suggested for the BRT plan “**Bus Rapid Transit (BRT) Action Plan**—Connecting fast, frequent and reliable transit across Northern Virginia and beyond.” Participants in both groups had generally positive reactions, though they expressed some concerns about the *name’s length* and its *ability to stand out in the minds* of potential users.

When asked about what qualities should be highlighted in the name, participants emphasized qualities like **speed**, **reliability**, and **convenience**. Words like “**efficient**,” “**reliable**,” and “**affordable**” were mentioned repeatedly, with participants indicating that the name should reflect these key aspects of the service. Additionally, terms such as “**easy**,” “**friendly**,” and “**energy-efficient**” were also seen as valuable additions. A few participants also pointed out the importance of the system being “equitable” and “connected” to address a wider range of commuter needs, including those from underserved areas.

Initial Impressions of the Proposed Name

The inclusion of terms like “fast” and “reliable” were well-received, as these qualities align with participants' expectations for public transportation. Reliability stood out as particularly important, especially for those using public transit for commuting, as they need to trust that buses will run on time so they can get to work on time. Several participants mentioned that “fast” is a major selling point, with some indicating that they would prioritize speed over frequency, assuming the system is designed to beat the traffic and avoid delays.

However, a few participants wondered whether the name could be more concise. The name was considered somewhat long, and some suggested that a shorter version might be more memorable. For example, shortening the name to “Northern Virginia BRT: Fast, Frequent, Reliable” could keep the focus on the most important attributes while still conveying the message effectively.

The term “Action Plan” received mixed reactions. Some felt it made the plan seem too abstract or experimental, implying that it might never be fully operational or permanent. Others were fine with it, viewing it as a step in the right direction to formalize the transition to a new service.

“Because it's an action plan, it doesn't seem like finalized or anything. It kind of makes it seem like more experimental maybe? I think that that's good and bad. It's good because it seems like, I think it's good to try like new options and stuff, but I think maybe bad because you don't know if it's going to be like permanent or if it's like here to stay.”

-Rider

Effectiveness in Conveying Differentiation from Regular Buses

There was also discussion about whether the name made BRT sound significantly different or better than regular bus services. Some felt it succeeded in conveying an improved experience, highlighting qualities that set it apart from traditional buses. Others, however, felt that the name, while including desirable attributes, did not feel distinct enough to stand out from other bus services. A few participants suggested using terms like “Express” or “Plus” to indicate an elevated level of service, similar to how hotels market upgraded offerings, though it should be noted that the term “Express” could cause confusion with actual express bus service.



The Role of “Connecting” in the Name

The use of the word “connecting” in the name was generally well-received, with most participants agreeing that it made sense for a system that serves both local and regional routes. However, some participants felt that the term did not add much to the name, as it was already implied by the nature of public transit, which inherently connects people to destinations. A few suggested that the term could be replaced with something that emphasizes the expansion of the service, such as “expanding” or “linking.” Additionally, some wanted to see a greater focus on the system’s ability to bridge gaps to and between underserved areas.

Importance of Connecting to Areas Beyond Northern Virginia

Some participants felt that the proposed BRT system should prioritize connections to nearby areas like Washington D.C. and Maryland, valuing regional access for commuting and leisure. However, others believed the focus should remain on improving local transit within Northern Virginia. This divide was reflected in opinions supporting the inclusion of “beyond” to emphasize regional connections, while others felt it was unnecessary.



Table E-7 Demographic Profile

| | Riders | Non-Riders | | Riders | Non-Riders |
|----------------------------------|--------|------------|------------------------------------|--------|------------|
| Gender | | | Primary Residence | | |
| Male | 9 | 6 | Arlington County | 7 | 2 |
| Female | 8 | 11 | Fairfax County | 4 | 11 |
| Other | - | - | Loudoun County | 1 | - |
| | | | Prince William's County | 1 | 2 |
| Age | | | City of Alexandria | 2 | - |
| 18-24 | 2 | - | Fairfax City | - | - |
| 25-34 | 6 | 3 | City of Falls Church | 1 | - |
| 35-44 | 4 | 3 | Manassas | - | 1 |
| 45-54 | 3 | 2 | Manassas Park | 1 | 1 |
| 55-64 | 2 | 5 | | | |
| 65 or older | - | 4 | Access to a Vehicle | | |
| | | | Yes | 16 | 16 |
| Income | | | No | 1 | 1 |
| Less than \$15,000 | 2 | - | Modes Used in Last 6 Months | | |
| \$15,000 to less than \$20,000 | - | - | Metrorail | 17 | n/a |
| \$20,000 to less than \$25,000 | - | - | Metrobus | 11 | n/a |
| \$25,000 to less than \$30,000 | - | 2 | Loudoun County Transit | 3 | n/a |
| \$30,000 to less than \$35,000 | - | - | Fairfax Connector | 8 | n/a |
| \$35,000 to less than \$40,000 | - | - | Arlington Regional Transit (ART) | 7 | n/a |
| \$40,000 to less than \$45,000 | 1 | 1 | VRE | 5 | n/a |
| \$45,000 to less than \$50,000 | - | - | Alexandria DASH | 5 | n/a |
| \$50,000 to less than \$75,000 | 6 | 4 | OmniRide | 4 | n/a |
| \$75,000 to less than \$100,000 | 1 | 1 | CUE | 1 | n/a |
| \$100,000 to less than \$150,000 | 5 | 4 | MARC | 1 | n/a |
| \$150,000 to less than \$200,000 | - | 2 | Carpool/Vanpool | 2 | n/a |
| \$200,000 or more | 2 | 1 | Slugging | - | n/a |
| Don't know/Refused | - | 2 | Some other system | - | n/a |
| Race/Ethnicity | | | Employment | | |
| African American/Black | 4 | 3 | Employed full-time | 12 | 11 |
| Asian-American/Pacific Islander | 2 | 1 | Employed part-time | 3 | 3 |
| White (Caucasian) | 9 | 12 | Retired | - | 2 |
| American Indian | - | - | Not employed | 2 | 1 |
| Hispanic or Latino | 3 | 1 | Full-time student | - | - |
| Other | - | - | Part-time student | - | - |
| Disability Status | | | Homemaker | - | - |
| Yes | - | - | | | |
| No | 17 | 17 | | | |

Note that this reflects only those who participated in their assigned focus group.



APPENDIX F. PHASE 3 FOCUS GROUP RECRUITMENT SCREENER



NVTA BRT

-Focus Group Recruitment Screener-

ASK FOR NAME ON SAMPLE. IF NO NAME AVAILABLE, ASK FOR MALE/FEMALE HEAD OF HOUSEHOLD.

Hello, my name is _____ from _____. We're conducting a short survey regarding transportation in Northern Virginia and we'd like to include your opinions. This is not a sales call. **This call may be monitored or recorded for quality control purposes.**

- S1A. In which of the following areas is your current, primary residence? Would you say... (READ LIST. SEE "FOCUS GROUP BREAKDOWN" FOR PARTICIPANT MIX.)

NOTE: IF RESPONDENT INDICATES THEY LIVE IN A TOWN SUCH AS DUMFRIES, HERNDON, LEESBURG, PURCELLVILLE, VIENNA, ETC. CONFIRM THE COUNTY THAT TOWN IS WITHIN. ONLY TERMINATE IF NOT WITHIN ONE OF COUNTIES OR INDEPENDENT CITIES LISTED BELOW.

- | | | |
|----|-----------------------------|---------------------|
| 01 | Arlington County | → CONTINUE TO S2 |
| 02 | Fairfax County | → CONTINUE TO S2 |
| 03 | Loudoun County | → CONTINUE TO S2 |
| 04 | Prince William County | → CONTINUE TO S2 |
| 05 | City of Alexandria | → CONTINUE TO S2 |
| 06 | Fairfax City | → CONTINUE TO S2 |
| 07 | City of Falls Church | → CONTINUE TO S2 |
| 08 | Manassas | → CONTINUE TO S2 |
| 09 | Manassas Park | → CONTINUE TO S2 |
| 96 | Or somewhere else | → THANK & TERMINATE |
| 98 | DO NOT READ: Refused | → THANK & TERMINATE |

- S1B. What is the ZIP code of your current, primary residence?

_____ → THANK & TERMINATE
99998 Refused

- S2. Do you currently own or lease a car, truck, van or motorcycle?

- | | | |
|----|--|------------------|
| 01 | Yes | → SKIP TO S4 |
| 02 | No | → CONTINUE TO S3 |
| 99 | DO NOT READ: Don't know/Refused | → CONTINUE TO S3 |



THOSE WHO DO NOT OWN OR LEASE A CAR, TRUCK, VAN OR MOTORCYCLE [S2(02-99)], ASK:

S3. Do you **regularly** have access to a car, truck, van or motorcycle?

- 01 Yes
- 02 No
- 99 **DO NOT READ:** Don't know/Refused

ASK EVERYONE:

S4. Please stop me when I reach the category that includes your age. (**READ LIST. GET A MIX.**)

- 01 Under 18 → **THANK & TERMINATE**
- 02 18 - 24
- 03 25 - 34
- 04 35 - 44
- 05 45 - 54
- 06 55 - 64
- 07 65 or older
- 98 **DO NOT READ:** Refused → **THANK & TERMINATE**

S5. Have you ever used public transportation in Northern Virginia?

- 01 Yes
- 02 No
- 99 **DO NOT READ:** Don't know/Refused

THOSE WHO HAVE USED PUBLIC TRANSPORTATION AT ANY POINT [S5(01)], ASK:

S6. Have you used public transportation in Northern Virginia in the last 6 months? This can include local buses, express buses, Metrorail, and VRE.

- 01 Yes
- 02 No
- 99 **DO NOT READ:** Don't know/Refused

THOSE WHO HAVE USED PUBLIC TRANSPORTATION IN THE LAST 6 MONTHS [S6(01)], ASK:

S7. How often do you typically use public transportation in Northern Virginia?

- 01 Less than once a week
- 02 1-3 days per week
- 03 4 days per week
- 04 5 days per week
- 05 More than 5 days per week
- 98 **DO NOT READ:** Refused
- 99 **DO NOT READ:** Don't know/Not sure



S8. Which of the following systems in Northern Virginia have you used in the last 6 months? **(READ LIST. ACCEPT MULTIPLE RESPONSES.)**

- 01 Metrorail
- 02 Metrobus
- 03 Loudoun County Transit
- 04 Fairfax Connector
- 05 Arlington Regional Transit (ART)
- 06 VRE
- 07 Alexandria DASH
- 08 OMNIRide
- 11 CUE
- 12 MARC
- 09 Carpool/Vanpool
- 10 Slugging
- 95 Some other system (specify: _____)
- 98 **DO NOT READ:** Refused

THOSE WHO HAVE NOT USED PUBLIC TRANSPORTATION IN THE LAST 6 MONTHS [S5(02-99 OR S6(02-99))], ASK:

S9. How likely would you be to at least consider using public transportation in Northern Virginia in the future? Would you be...? **(READ LIST.)**

- 05 Extremely likely
- 04 Very likely
- 03 Somewhat likely
- 02 Not very likely, or **→ THANK & TERMINATE**
- 01 Not at all likely **→ THANK & TERMINATE**
- 98 **DO NOT READ:** Refused **→ THANK & TERMINATE**
- 99 **DO NOT READ:** Don't know/Not sure

ASK EVERYONE:

S10. Are you currently...? **(READ LIST. ACCEPT ONE RESPONSE ONLY.)**

- 01 Employed full-time,
- 02 Employed part-time,
- 03 A full-time student,
- 04 A part-time student,
- 05 Retired,
- 06 A homemaker, or
- 07 Not employed
- 99 **DO NOT READ:** Refused



THOSE WHO ARE EMPLOYED OR IN SCHOOL [S10(01-04)], ASK:

- S11. Which of following best describes the industry you work in? **(READ LIST. ACCEPT ONE RESPONSE ONLY.)**
- 01 Education
 - 02 Food service (including restaurants, bars, and caterers)
 - 03 Healthcare
 - 04 Industrial, such as agriculture, mining, utilities, construction, manufacturing, transportation, warehousing, or wholesale trade
 - 05 Office, such as information, finance and insurance, real estate or rental and leasing, management, or public administration
 - 06 Retail
 - 95 Other Services (except Public Administration) (specify: _____)
 - 98 **DO NOT READ:** Refused
 - 99 **DO NOT READ:** Don't know/Not sure
- S12. Do you commute to work or school?
- 01 Yes
 - 02 No
 - 98 **DO NOT READ:** Refused

THOSE WHO ARE EMPLOYED OR IN SCHOOL AND COMMUTE [S10(01-04) AND S12(01)], ASK:

- S13. How many days per week do you commute to work or school? Your best guess is fine. **(READ LIST.)**
- 01 Less than once a week
 - 02 1-3 days per week
 - 03 4 days per week
 - 04 5 days per week
 - 05 More than 5 days per week
 - 98 **DO NOT READ:** Refused
 - 99 **DO NOT READ:** Don't know/Not sure
- S14. In which of the following areas do you primarily work or go to school? **(READ LIST. ACCEPT ONE RESPONSE ONLY.)**
- 01 Arlington County
 - 02 Fairfax County
 - 03 Loudoun County
 - 04 Prince William County
 - 05 City of Alexandria
 - 06 Fairfax City
 - 07 City of Falls Church
 - 08 Manassas
 - 09 Manassas Park
 - 10 Washington, DC
 - 95 Or somewhere else (specify: _____)
 - 99 **DO NOT READ:** Don't know/Refused



S15. How do you typically travel to work or school? **(READ LIST. ACCEPT MULTIPLE RESPONSES.)**

- 01 Drive
- 02 Metrorail
- 03 Bus (specify provider: _____)
- 04 VRE
- 05 Walk for all or more than half the trip
- 06 Bicycle
- 07 Taxi/Rideshare (Lyft, Uber etc.)
- 08 E-scooter
- 95 Other (specify: _____)
- 98 **DO NOT READ:** Refused
- 99 **DO NOT READ:** Don't know/Not sure

ASK EVERYONE:

S16. Do you speak a language other than English at home?

- 01 Yes
- 02 No
- 98 **DO NOT READ:** Refused

THOSE WHO SPEAK ANOTHER LANGUAGE AT HOME [S16(01)], ASK:

S17. Which language? (DO NOT READ LIST. ACCEPT ALL THAT APPLY.)

- 01 Amharic
- 02 Arabic
- 03 Korean
- 04 Spanish
- 05 Vietnamese
- 95 Other (specify_____)
- 98 **DO NOT READ:** Refused

S18. How well do you speak English?

- 01 Very well → CONTINUE
- 02 Well → CONTINUE
- 03 Less than very well → THANK & TERMINATE
- 98 **DO NOT READ:** Refused → CONTINUE

ASK EVERYONE:

S19. Are you of Spanish, Hispanic or Latino origin?

- 01 Yes
- 02 No
- 98 **DO NOT READ:** Refused



S20. What is your race? Would you say... **(READ LIST. ACCEPT MULTIPLE RESPONSES. GET A MIX)**

- 01 African American or Black
- 02 American Indian or Alaska Native
- 03 Asian, Hawaiian, or Pacific Islander
- 05 White
- 95 Or another ethnic origin (specify _____)
- 98 **DO NOT READ:** Refused

S21. Please stop me when I reach the category which includes your total annual household income. **(READ LIST. GET A MIX.)**

- 01 Less than \$15,000
- 02 \$15,000 to less than \$20,000
- 03 \$20,000 to less than \$25,000
- 04 \$25,000 to less than \$30,000
- 05 \$30,000 to less than \$35,000
- 06 \$35,000 to less than \$40,000
- 07 \$40,000 to less than \$45,000
- 08 \$45,000 to less than \$50,000
- 09 \$50,000 to less than \$75,000
- 10 \$75,000 to less than \$100,000
- 11 \$100,000 to less than \$150,000
- 12 \$150,000 to less than \$200,000
- 13 \$200,000 or more
- 98 **DO NOT READ:** Refused
- 99 **DO NOT READ:** Don't know/Not sure

S22. Including yourself, how many people live in your household? **(RANGE=1-7.)**

___ ___ number of people in household

- 08 8 or more people
- 98 **DO NOT READ:** Refused

S23. What gender do you identify as? (READ LIST IF NECESSARY. ACCEPT MULTIPLE RESPONSES. GET A MIX OF AT LEAST MALE/FEMALE.)

- 01 Male
- 02 Female
- 03 Non-binary
- 04 Or do you use a different term
- 98 **DO NOT READ:** Refused



S24. If you have a disability, please indicate what kind. **(READ ENTIRE LIST. ACCEPT ALL THAT APPLY. RANDOMIZE 01-05.)**

- 01 A condition that substantially limits one or more basic physical activities such as walking, climbing stairs, reaching, lifting, or carrying
- 02 Blindness or have serious difficulty seeing when wearing glasses
- 03 Deafness or have a serious hearing difficulty
- 04 Limited ability to care for yourself
- 05 Physical, mental, or emotional condition that limits learning, remembering, or concentrating
- 97 Or none of these
- 98 **DO NOT READ:** Refused

S25. When was the last time you participated in a market research group discussion or focus group? **(READ LIST.)**

- 01 Within the past 6 months, → **THANK & TERMINATE**
- 02 More than 6 months ago, or → **CONTINUE**
- 03 Never → **CONTINUE**
- 99 **DO NOT READ:** Don't know/Refused → **THANK & TERMINATE**

S28. Have you or has any member of your immediate family ever worked for any of the following types of companies or in the following fields?

| | | Yes | No | Don't know |
|---|--|-----|----|------------|
| A | An advertising, public relations, or market research company | 01 | 02 | 99 |
| B | A public transportation or transportation planning company | 01 | 02 | 99 |

IF [S28A(01) OR S28B(01)], THANK AND TERMINATE.

READ: Thank you for your responses! You meet the criteria for our online discussion group.

| | GROUP ASSIGNMENT | |
|--|-----------------------------|-----------------------------|
| | March 11 th 2025 | March 12 th 2025 |
| Non-Riders/Lapsed Riders [(S5(02,99)) OR (S5(01) AND S6(02,99))] | 5:30 PM | 8:00 PM |
| Riders [S6(01)]* | 8:00 PM | 5:30 PM |

***IN RIDER GROUP, LIMIT THOSE WHO USE METRORAIL ONLY AND RIDE LESS THAN ONCE A WEEK [S7(01) AND S8(01)] TO 4 OR LESS**



Here's the invitation: Please join our small online research community to participate in a discussion group about some possible transportation options in Northern Virginia.

Here's more: If selected, you will be sent an email with instructions on **[INSERT DATE TWO DAYS BEFORE GROUP]**. You will be asked to complete a few activities at your convenience **[INSERT DATE ONE DAY BEFORE GROUP]** (these should only take about 20 minutes of your time) and will participate in a two-hour group discussion on **[INSERT DATE AND TIME OF GROUP]**. After you have participated, you will earn a [check] for \$100.

Please note: you will need access to a computer, smartphone, or tablet with internet and a webcam for this discussion group. You will be able to complete the activities at your convenience the day before the online discussion.

S26. Can we count on you to participate on **[INSERT DATE AND TIME]** if selected?

- | | | | |
|----|--|---|----------------------------|
| 01 | Yes | | |
| 02 | No | → | THANK AND TERMINATE |
| 99 | DO NOT READ: Don't know/Refused | → | THANK AND TERMINATE |

THOSE WHO ARE ABLE TO PARTICIPATE IN THE ONLINE DISCUSSION [S26(01)], ASK:

S27. Do you own or have access to a computer or smartphone with a webcam? **(READ LIST IF NECESSARY. ACCEPT ONE RESPONSE ONLY.)**

- | | |
|----|--|
| 01 | Yes; a computer with a webcam |
| 02 | Yes; smartphone with a webcam |
| 03 | Yes; both |
| 04 | No |
| 99 | DO NOT READ: Don't know/Refused |

READ TO EVERYONE:

So that we may call you to confirm your participation, please tell us your full name and the best telephone number at which to reach you.

Name: _____

99 **DO NOT READ:** Don't know/Refused

Telephone number: _____

99 **DO NOT READ:** Don't know/Refused

Also, so that we may send you an e-mail with instructions, please tell us your email address.

Email address: _____

99 **DO NOT READ:** Don't know/Refused

Since we are only inviting a limited number of study participants, if for some reason you cannot participate, please call our office at XXX-XXX-XXXX so that we can schedule another participant. Thank you for your time and we look forward to speaking with you on [ASSIGNED DATE AND TIME].



GROUP DETAILS

Rider Groups [S6(01)]:

- Have ridden public transportation in Northern Virginia in the last 6 months
- Mix of Race/Ethnicity, Age, Language Spoken at Home, Vehicle Ownership, Area of Residence (mix of ZIP codes)
- In rider group, limit those who use Metrorail only and ride less than once a week [s7(01) and s8(01)] to 4 or less.

Lapsed and Non-Rider Groups [(S5(02,99)) OR (S5(01) AND S6(02,99))]:

- Have not ridden public transportation in Northern Virginia in the last 6 months
Mix of Race/Ethnicity, Age, Language Spoken at Home, Vehicle Ownership, Area of Residence



APPENDIX G. PHASE 3 FOCUS GROUP DISCUSSION GUIDE AND ACTIVITY GUIDE

I. INTRODUCTION (15 minutes)

- a) Purpose of meeting: This discussion will focus specifically on a new transportation idea called Bus Rapid Transit (or BRT) for Northern Virginia. Even if you are someone who does not typically ride public transportation, we still want to hear from you. Let me assure you once again that this is not a sales meeting of any kind. I don't have anything to sell you. This is a form of research conducted with area residents, and we're interested in your thoughts and opinions.
- b) About this focus group session
 - i) Form of market research, not selling anything
 - ii) Discussion will last about 2 hours
 - iii) Recording
 - iv) Colleagues viewing
 - v) All comments will be kept anonymous and confidential
 - vi) Have courage of convictions; don't let group sway you
 - vii) No right or wrong answers, only your opinion
 - viii) Please try to speak one at a time; as online meetings don't handle people talking over each other well. Raising hands to stop someone from ranting works well if you have something you'd like to interject with.
 - ix) Work for independent market research company, not NVTA
 - x) Turn off/silent cell phones
- c) Respondent introduction
 - i) Name
 - ii) Where do you live? (Note: don't need your full address – City, and/or zip code work)
 - iii) How long have you lived in the area?
 - iv) Where do you work?
 - (a) How do you typically get to work (if work in person or on a hybrid schedule)?
 - v) How do you usually get around the area? Where are the most common places you go?
 - vi) Something about self



II. Overview/Understanding of BRT Benefits (20 minutes)

- a) Let's talk about bus service in Northern Virginia today. What do you think about it? Is there anything you like or dislike about the buses currently running in the region?
- b) Have you ever heard the term "Bus Rapid Transit"? What do you think it means?
 - i) What do you think is the difference between this type of bus and conventional buses? Do you think they are the same? Please explain.
 - ii) **MODERATOR NOTE:** LIMIT TIME SPENT ON UNDERSTANDING OF THE TERM "BUS RAPID TRANSIT" ITSELF. WE KNOW FROM PREVIOUS GROUPS THAT UNDERSTANDING AND AWARENESS IS VERY LIMITED.
- c) Now let's discuss how we can explain BRT to the public. I'm going to read you a simple description of BRT.
 - i) **BRT Description:** "Bus Rapid Transit (BRT) is a type of bus service that works like a train system. It uses special lanes for buses, which helps them move faster and more reliably. BRT may also have things like faster ticket payment, improved stations, and buses that run more frequently."
- d) How well does this description help you understand BRT? Why do you say that?
 - i) **PROBE:** What don't you understand in this explanation of BRT? Do you understand how this is different from a regular bus? Are there any elements that should be further explained or simplified?
 - ii) **PROBE:** What elements sound particularly interesting/exciting? What elements sound negative?
- e) Have you ever seen BRT in person, on tv, or the internet or used a BRT system? (MODERATOR NOTE: Some may have used a BRT system in the past but did not realize it was called "BRT".)
 - i) **PROBE IF HAVE USED BRT:** In what city did you ride it?
 - ii) **PROBE IF HAVE SEEN IN PERSON, ON TV, OR INTERNET:** Where did you see or hear about BRT?
 - ii) **PROBE IF HAVE SEEN OR USED BRT:** What is your overall impression of BRT? What did you like or dislike about it?
- f) Now, let's talk about the benefits of Bus Rapid Transit (BRT).
 - i) **REMINDER IF NEEDED:** BRT is a system of buses that operates like a train, offering faster and more reliable service. It's a way to get people around efficiently, reduce traffic, and help the environment.
- g) We will go through a list of benefits that BRT could bring to Northern Virginia. After hearing these, I want you to tell us which benefits are the most important to you and why.
 - i) Here are some of the main benefits of BRT. Which of these would be the most important reasons for you to support BRT in Northern Virginia? Why?
 - a. Improves travel times for all, that is transit passengers and motorists due to less single occupancy vehicles on the road
 - b. Reduces traffic congestion on roadways
 - c. Reduces vehicle emissions
 - d. Provides better transit service to destinations – more frequent and more reliable
 - e. Is cost-effective
 - f. Makes it easier for people to get around without a car
 - g. Provides more travel options
 - h. Reduces need to build more road or rail lines
 - i. Frees people up to do other things while they commute (e.g. read, work, etc.) – instead of driving
 - j. Provides direct routes to destinations without needing to transfer between BRT lines, regular buses, or rail (Metrorail/VRE).



- ii) Which of these do you think is **least important**, and why?
 - a. Why do you feel that one benefit is less important than others? Does it have to do with your personal experience or how you see public transportation affecting your life?
- iii) Are there any of these benefits that don't seem credible to you?
- iv) Do you think there are other benefits of BRT that could or should be highlighted? Anything we missed?
 - a. **PROBE IF MENTIONED OTHER BENEFITS:** Can you explain why that's important to you? What would make this more relevant to the people in your community?
- v) How do you think BRT could impact the neighborhood where you live?

III. Response to the Draft PDP-BRT Plan (55 minutes)

- a) Next, we'll talk about the proposed BRT routes for Northern Virginia. I will show you a map of where the BRT lines **could** go. It's important to note that no final decisions have been made about the routes, stops, frequency, or any other details at this stage. Our goal is to understand whether these proposed routes connect to the places you typically go to and whether they make sense based on your needs and priorities. **[SHOW OVERALL MAP].**
 - i) Does the system shown on this map connect you to the places you typically go? What places are those?
 - ii) What places or types of places does this system not cover for you? Can those places be accessed using other transit in the area? Could you use this BRT system and easily transfer to transit that will get you the rest of the way to your destination?
 - iii) What stands out to you on this map? Is there anything about the map that you find unclear or that you'd want more information on?
 - iv) Are there any key details you feel are missing from the map that would help you decide whether to support or use BRT?
 - v) Does this make you want to learn more about BRT? Where would you go to learn more?
- b) If this system serves the areas where you live or places you regularly go, would you be willing to use it? Why or why not?
 - i) **PROBE IF NOT INTERESTED:** what would make you change your mind? Are there specific features or improvements that could influence your decision?
- c) NVTA and other agencies in the area will need to prioritize which BRT routes to implement first.
 - i) **PROBE:** What are the most important ways to identify which BRT routes should be implemented first? For example: "I support NVTA using my tax dollars to build BRT routes that achieve **[blank]**."
 - ii) **IF NECESSARY:** You say many of these things are important, but what is *most important*?
 - iii) Possible Considerations:
 - a. Routes that are easy to build (let's get this moving quickly!)
 - b. Routes that will have the most ridership
 - c. Routes that will be the most cost-effective to build and operate
 - d. Routes that will reduce congestion the most, assuming some drivers switch to BRT.
 - e. Routes that will build equity by improving mobility for low-income residents and/or people of color
 - f. Routes that make it easier for people to get to work by transit
 - g. Routes that make it easier for people to access other destinations in the region by transit (e.g. shopping, recreation, etc.)
 - h. Routes that will improve the travel experience for transit passengers by improving travel times and reliability
 - i. Routes that reduce emissions the most



- j. Routes that will improve safety and security for passengers, both at stations and on the vehicles themselves.
- k. Routes that are evenly distributed across Northern Virginia
- l. Routes that connect to Metrorail/VRE
- m. BRT lines in corridors that have walkable commercial and residential centers that don't require the use of a car
- iv) **PROBE IF EQUITY:** Why is it important that BRT benefits people in low-income communities or communities of color?
- v) **PROBE IF REDUCE CONGESTION:** What do you think would encourage drivers to switch to BRT?
- vi) **PROBE IF SAFETY AND SECURITY:** What's important to you in terms of safety and security on BRT? Are you more concerned with personal safety at the stations (like lighting or cameras), when you're on the buses themselves (like security or emergency buttons), or safety from injury or accidents?
 - a. **PROBE:** Which specific safety features do you think would make a difference in how safe you feel using BRT? What would make you feel more comfortable using it regularly?
 - b. **PROBE:** Is there anything that would make you feel safer using the BRT system? What could be done to improve safety?
- d) What additional features would influence your decision on which BRT routes should be prioritized?
- e) We're now going to take a closer look at some information about one of the proposed BRT routes. **[SHOW ROUTE PROFILE (IMAGE #2)].** Along with the map you've already seen, this profile provides additional information about the route's metrics. I will show you this profile, which includes the Level of Service, Overall Performance, and other Key Metrics. This will give you an idea of how the route could potentially perform and how it aligns with the overall goals of the BRT Plan. **[SHOW ROUTE PROFILE (IMAGE #3)].**
 - i) What are your first impressions of this route profile?
 - ii) **PROBE:** Is there anything in this profile that stood out to you (positive or negative)?
 - iii) How do you feel about the ratings for this route in each of the performance categories?
 - iv) **PROBE:** Do the performance levels for categories like Ridership, Cost, Transportation Impacts, etc. help you understand the potential of the route?
 - v) **PROBE:** Are there any performance levels that you find surprising or confusing?
 - vi) How do you feel about the key metrics included in this profile (e.g., Average Weekday Boardings, Operating Cost Per Rider, etc.)?
 - vii) **PROBE:** Do these metrics make sense to you? Why or why not?
 - viii) **PROBE:** Are there any metrics that you feel are particularly important or helpful in understanding how well this BRT route will work?
 - ix) **PROBE:** Do you think there are any metrics missing that would help you assess the success of the BRT route?
 - x) Is there any other information you would want to see included in this route profile?



IV. Branding/Messaging (25 minutes)

- a) NVTA would like to hear your thoughts on the name for this BRT plan. Before I show you the proposed name, let's think about what kinds of qualities you would want a name to convey. What do you think are important qualities to highlight in the name of this plan?
- b) Here is the name suggested for BRT plan:
 - i) **Bus Rapid Transit (BRT) Action Plan** - *Connecting fast, frequent and reliable transit across Northern Virginia and beyond.*
 - (1) What comes to mind when you hear it? Is it positive? Does it sound credible?

FOR EACH OF THE FOLLOWING PROBES, FOLLOW UP ON WHY NAME AND TAGLINE DO OR DON'T ACCOPLISH EACH GOAL.

 - a. **PROBE:** Does it make BRT sound different/better from *regular* buses?
 - b. **PROBE:** Does it make you want to learn more about BRT?
 - c. **PROBE:** Do you think this name conveys the key qualities that are important to you?
 - d. **PROBE:** What do you think of the word "Connecting"? Does it reflect what you would want from a transit system? Does it make sense for a system that serves both local and regional connections?
 - e. **PROBE:** Does the name resonate with your experience or expectations of public transportation?
 - f. **PROBE:** How do you feel about the idea of providing new travel options to reduce dependency on driving alone? Do you think that should be emphasized more in the tagline?
 - g. **PROBE:** How important is it to you that the BRT system connects people to places outside of Northern Virginia, rather than just Northern Virginia?
 - (2) What would make a name more appealing to you? Should it focus more on speed, reliability, or something else?

V. CLOSING COMMENTS (5 minutes)

- a) Closing comments



| Question | Activities | Question or Instructions | Question Type | Image Files | Programming Notes |
|----------|--------------|---|---------------|-----------------|--|
| 1 | Introduction | <p>Welcome!</p> <p>The Northern Virginia Transportation Authority (NVTA) has a vision for the future of transportation in Northern Virginia and sets objectives, goals, and strategies for getting there. NVTA is a regional organization that develops the long-range transportation plan for Northern Virginia. With a priority to reduce congestion, NVTA uses performance-based criteria to evaluate and fund regionally significant multimodal transportation projects. In the past decade, NVTA has invested \$3.8 billion toward advancing 139 regional transportation projects located throughout the Northern Virginia region. NVTA focuses on the long-term improvements and markers for success within Northern Virginia’s transportation landscape and keeping the region moving. As NVTA engages in the planning process, they want to hear from you as a resident of Northern Virginia and find out how to best encourage growth and success in the region. Your input is a critical part of the planning process.</p> <p>The primary objective of this focus group is to learn about your thoughts regarding transportation in Northern Virginia. We want to hear from you, so this means just be yourself and tell it like it is for you. Please know that we are not looking for a <i>right</i> answer but responses that explain what is <i>right for you</i>.</p> <p>We will be checking with you over the course of these next two days, but please feel free to send a message to me for help if you need it.</p> <p>We are available to answer your questions and help you troubleshoot any issues that might arise. Just click on your notifications at the top right of your screen. Thanks again for joining!</p> <p>Joanne (your friendly moderator)</p> | Group | Moderator photo | <p>Segmented by tags so the focus group time is correct for each recruit segment.</p> <p>No masking.</p> |



| Question | Activities | Question or Instructions | Question Type | Image Files | Programming Notes |
|----------|-----------------------|---|---------------|-------------|---|
| 2 | Welcome | Today’s exercises are ready for you to complete but for now, let’s just start with the basics. We would love to learn a little bit about you first! | Individual | Start image | Merged with next question |
| 3 | Welcome | <p>I’d love for you all to introduce yourselves here and have a little show and tell with your fellow participants.</p> <p>A question I’d like to pose: Getting outside of the house for leisure activities or just some quiet time is so important to all of us.</p> <p>As an icebreaker, please tell us a little bit about these places you like to go outside of your home, and how you typically travel to get there. Take a moment, and either share photos or upload a short video to tell us about the some of the places you like to go to outside your home where you can take some time to unwind or get active.</p> | Group | Intro image | No masking, these responses are viewable to all participants once complete for warm-up discussions. |
| 4 | Public Transportation | <p>How do you typically get around Northern Virginia? <i>Select all that apply.</i></p> <p>a) Metrorail b) VRE c) Bus d) Drive yourself e) Walk f) Bicycle or scooter g) Taxi, Uber, or Lyft h) Some other means (specify:_____)</p> | Individual | None | Partially Masked. |
| 5 | Public Transportation | <p>FOR THOSE WHO DO NOT TYPICALLY USE PUBLIC TRANSPORTATION [Q4 NOT (a-c)], ASK: Why don’t you use public transportation or use it more often? What might make you consider using public transportation more often?</p> | Individual | None | Partially Masked. |



| Question | Activities | Question or Instructions | Question Type | Image Files | Programming Notes |
|----------|-----------------|--|---------------|-------------|-------------------|
| 6 | Introducing BRT | <p>Imagine that there was a new public transportation system in Northern Virginia designed to make your travel faster, closer, and more reliable. We'd like to hear your thoughts on such an idea.</p> <p>What would make you more likely to use a new form of public transportation in your area? <i>Select all that apply</i></p> <ul style="list-style-type: none"> a) Faster travel times b) More frequent service c) Special lanes or routes that avoid traffic d) Stops or stations that are closer (e.g., near home or work) e) Lower cost than current options f) Reliable (on-time or predictable) service g) Other (specify: _____) | Individual | None | Masked. |
| 7 | Introducing BRT | <p>Have you heard of a type of system called Bus Rapid Transit (BRT) that operates with special lanes to avoid traffic and run more quickly?</p> <ul style="list-style-type: none"> a) Yes, I've heard of it b) No, but it sounds interesting c) No, I haven't heard of it | Individual | None | Masked. |
| 8 | Introducing BRT | If yes, where have you seen or heard about this type of bus system? | Individual | None | Masked. |
| 9 | Introducing BRT | <p>What do you think about this type of bus system (BRT) that uses special lanes to improve speed and avoid traffic?</p> <ul style="list-style-type: none"> a) Sounds like a great idea! b) I'm not sure how it would work, but I'm open to learning more. c) I don't think this would work in Northern Virginia. d) Other (please specify: _____) <p>FOLLOW UP: Please explain why you made this selection.</p> <p>_____</p> | Individual | None | Masked. |



| Question | Activities | Question or Instructions | Question Type | Image Files | Programming notes |
|----------|-------------------------------|---|---------------|---|--|
| 10 | Reaction to the Route Profile | Now, you'll see a map showing just one proposed BRT route in Northern Virginia, along with key stations and network information. In addition, you'll also view the Route Profile which includes the Level of Service, Overall Performance, and Key Metrics. | Group | Map and Route Profile Images (Image #1, Image #2, and Image #3) | Masked. |
| 11 | Reaction to the Route Profile | Which aspects of this map stand out to you as most important or beneficial for your understanding? You can select anywhere on the page to tag and show what is (or is not) important to you. | Individual | Map Image (Image #2) | Heatmap, allowing participants to mark up the page |
| 12 | Reaction to the Route Profile | Which aspects of this page stand out to you as most important or beneficial for your understanding? You can select anywhere on the page to tag and show what is (or is not) important to you. | Individual | Route Profile Image (Image #3) | Heatmap, allowing participants to mark up the page |
| 13 | Reaction to the Route Profile | Is there anything in the route profile that you find confusing or unclear? If so, please mark up the areas that you have difficulty understanding. | Individual | Route Profile Image (Image #3) | Heatmap, allowing participants to mark up the page |
| 14 | Reaction to the Route Profile | <p>Do you feel the Level of Service information is clear and helpful for understanding how the BRT service would function?</p> <p>a) Yes, it provides the information I need.</p> <p>b) Somewhat, but I need more details to fully understand.</p> <p>c) No, I'm unclear about the frequency and duration of the service.</p> <p>FOLLOW UP: Please explain why you made this selection.</p> <p>_____</p> | Individual | None | Masked. |



| Question | Activities | Question or Instructions | Question Type | Image Files | Programming notes |
|----------|-------------------------------|---|---------------|-------------|-------------------|
| 15 | Reaction to the Route Profile | Which Key Metrics do you find most useful for your understanding of the route shown? <i>Select all that apply.</i> 1. Average weekday boardings 2. Operating cost per rider 3. Driving trips shifted to transit 4. Hours of traffic delay reduced for individuals 5. Walking infrastructure available 6. Station area residents in equity groups 9. None of the above IF MORE THAN ONE RESPONSE SELECTED (1-6), ASK: Of the options you selected, please prioritize which ones are most important to you. Why did you prioritize them in this way? _____ | Individual | None | Masked. |
| 16 | Reaction to the Route Profile | Do you find these metrics useful for assessing the value of the BRT service? a) Yes, they provide a comprehensive view of the route's impact. b) Somewhat, but I would like to see more details or other types of metrics. c) No, I think the metrics are unclear or irrelevant to me. FOLLOW UP: Please explain why you made this selection. _____ | Individual | None | Masked. |
| 17 | Reaction to the Route Profile | Would you like to see additional metrics or a more detailed explanation for any of the current ones? If so, which ones? | Individual | None | Masked. |
| 18 | Reaction to the Route Profile | Which of the current metrics, if any, do you find unnecessary, unclear, or think should be removed? Please explain why you feel this way. | Individual | None | Masked. |

| POST AFTER CONCLUSION OF DISCUSSION GROUPS | | | | | |
|--|----------------|---|------------|------|-------------|
| 19 | Final Feedback | Thanks again for the great answers and participation in our community—we'd love to hear any feedback from your experience! These questions aren't mandatory but will help us to design better communities in the future. Also make sure to answer any follow-up questions we might have asked on previous responses before leaving us! | Individual | None | No masking. |
| 20 | Final Feedback | Is there anything we should have asked but forgot? If so, let us know below! | Individual | None | No masking. |



IMAGE #1

Introduction

28 potential BRT routes were developed for detailed analysis as part of development of the BRT Plan. This Route Profile packet summarizes the results of the evaluation and performance of each route. Each Route Profile presents a map of the route for orientation, information on its span and frequency, overall performance in relation to the other routes in the system, and key performance metrics.

Overall Performance

These profiles include performance metrics across six¹ categories, each of which includes multiple variables:

- » **Ridership:** Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.
- » **Transportation Impacts:** Congestion Reduction, Vehicle Miles Traveled Reduction, Vehicle Emissions Reduction, Transit Accessibility Improvement, Connections to other High Capacity Transit, Safety, and Run Time Improvement.
- » **Land Use:** Future Land Use Density and Socioeconomic Characteristics.
- » **Readiness:** Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.
- » **Cost:** Capital Cost Estimate and Annual Operating Cost Estimate.
- » **Cost Effectiveness:** Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

In addition to the overall performance metrics, these profiles highlight six key individual metrics for each route. All of these metrics are estimated for 2045 unless otherwise noted:

- » **Average Weekday Boardings:** Presented as a range based on if the route was implemented independently or part of a full network.
- » **Operating Cost per Rider:** The cost to operate the service divided by the anticipated number of riders - this is not the fare.
- » **Driving Trips Shifted to Transit:** The estimated number of trips that would shift from driving to the region's transit network.
- » **Person-Hours of Delay Removed:** The total number of hours Northern Virginia residents spend in delay removed due to reductions in congestion.
- » **Population & Jobs Served:** The total number of people and jobs within a half-mile of the BRT stations.
- » **Station Area Residents in Equity Groups:** An average of the percentage of equity-focused groups of the overall population. The groups include residents of color, residents with disabilities, low-income households, zero-car households, and one-car households.



¹ Two additional categories, Feasibility and Revenue, were also analyzed but omitted from the route profiles for brevity.

BRT Types

Five potential BRT types that would be suitable for operations in Northern Virginia have been identified: BRT I, BRT II, BRT III, BRT IV, and BRT Express. These BRT types were developed to provide a framework for conceptual planning as part of this process. They are not meant as a new definition of BRT for this project or the region. The passenger amenities and bus priority treatments expand from BRT I (least amenities) to BRT IV (most amenities), but with all routes having all-day, frequent service. The key differences between these BRT Types include:

BRT I

Enhanced facilities and buses operating in mixed traffic

BRT II

Super stops and additional amenities, as well as queue jumps at traffic bottlenecks

BRT III²

Full transit stations and dedicated bus lanes

BRT IV²

Full transit stations and fully dedicated/separated bus lanes

Express BRT

Includes close-door express service that utilizes limited-access roadways



IMAGE #2

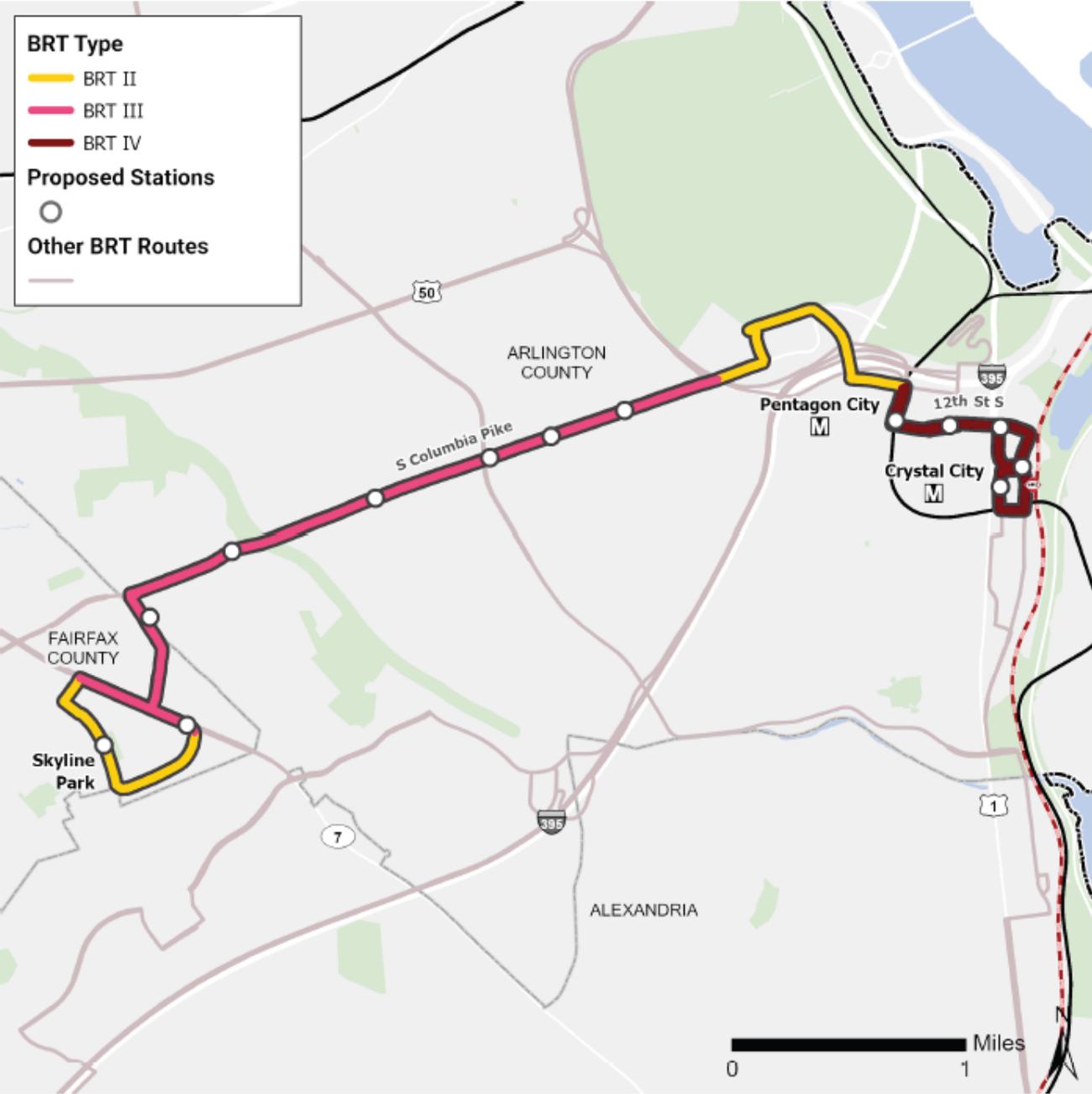


IMAGE #3

Levels of Service

How often would the bus come? And for how long?

| Weekdays | | Weekends | |
|---|--------------------|------------------|--------------------|
| Span | 6:00 AM - 12:00 AM | Span | 6:00 AM - 12:00 AM |
| Frequency - Peak 6:00 AM - 9:00 AM 3:00 PM - 7:00 PM | 10 minutes | Frequency | 12 minutes |
| Frequency - All Other Times | 12 minutes | | |

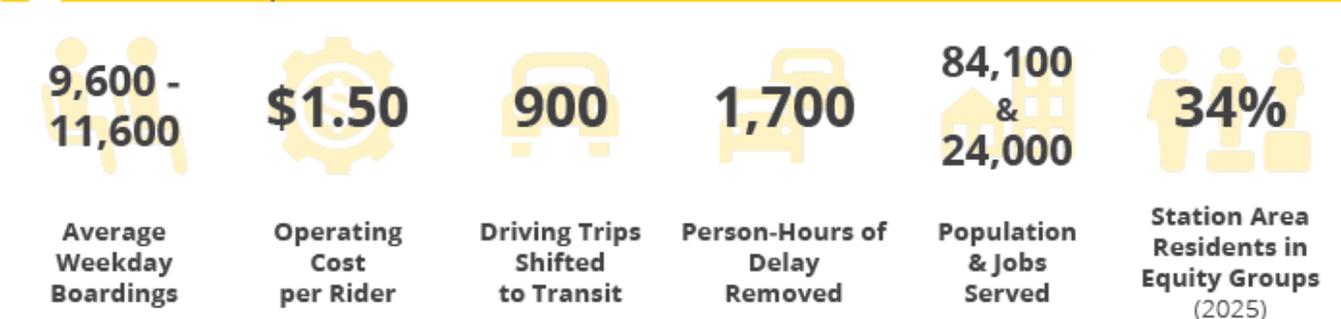
Overall Performance

How does this route compare to the other routes in the full BRT network across key categories?



Key Metrics

How does this route perform on some of the key metrics?
All metrics represent 2045 estimates unless otherwise indicated



APPENDIX H. PHASE 3 ONLINE SURVEY INSTRUMENT



NORTHERN VIRGINIA TRANSPORTATION AUTHORITY
BRT-PDP
PHASE 3 PUBLIC ENGAGEMENT COMMENT FORM

Main Link: <https://selfserve.decipherinc.com/survey/selfserve/225e/250305>

Engagement Link: <https://selfserve.decipherinc.com/survey/selfserve/225e/250305?list=1>

Shortlink (Main): gowba.info/BRTActionPlan



QR Code:

Northern Virginia is a rapidly growing region, attracting new residents and businesses. As population and employment continue to rise, so does the demand for efficient, flexible transportation options. To keep pace with this growth, innovative mobility solutions are necessary to enhance access to jobs, entertainment hubs and other key destinations across the region.

The Northern Virginia Transportation Authority (NVTA) is committed to improving daily travel by advancing transportation solutions.

As part of this effort, NVTA is developing an Action Plan for a regionally connected Bus Rapid Transit (BRT) system—designed to provide fast, frequent and reliable transit service.

The proposed BRT network includes up to 28 potential routes that will expand connectivity across the Washington-Metropolitan Area. This network will complement and extend existing transit options, including Metro, VRE and local commuter bus systems to create connections to the places where people live, work and shop. It will serve multiple areas in Northern Virginia while also providing connections to Maryland and Washington, D.C.

We want to hear from you! Your input is valuable as it will help shape the future of transit plans across our region. Thank you for sharing your feedback!

This survey is for research purposes only. All individual responses will remain confidential and will not be shared or sold. This survey will take around 10 minutes to complete, based on your answers.



ASK EVERYONE:

- Q1. What is your **primary** way of traveling? **(ACCEPT ONE RESPONSE ONLY.)**
- 04 Walk
 - 05 Walk or travel using a mobility aid (cane, walker, wheelchair, etc.)
 - 06 Personal bicycle
 - 11 Use a shared service for bikes, e-bikes, or scooters such as Lime or Bird
 - 12 Ride a personal e-bike or scooter
 - 04 Drive a car, truck, SUV, or motorcycle
 - 05 Ride in a car, truck, SUV, or motorcycle driven by a friend or family
 - 06 Take a taxi or app-based transportation service such as Uber or Lyft
 - 07 Take a local or commuter bus (e.g. DASH, ART, Metrobus, etc.)
 - 13 Metroway
 - 08 Metrorail
 - 09 Commuter rail (i.e., VRE or MARC)
 - 10 Use a carpool or vanpool
 - 95 Use another form of transportation **(specify)**

ASK EVERYONE:

- Q11A. Which of the following would be the **three most important characteristics of a BRT system** for you to consider using it? *Please select up to three responses.* **(RANDOMIZE 01-07. ACCEPT UP TO 3 RESPONSES.)**
- 01 Ability to get to my destination without transferring
 - 02 Simple connections between other BRT lines or other transit systems
 - 03 Service that reliably shows up on time
 - 04 Service that is cheap to use
 - 05 Dedicated lanes and other features that allow for BRT to travel quickly and reliably
 - 06 Features that make stops/stations nicer (e.g. Shelter, bathrooms, trash/recycling cans, real-time information about when the next bus arrives)
 - 07 Features that improve your experience while onboard the bus (e.g. real-time information about the next stop, Wi-Fi, USB/power outlets, level boarding, accessibility for differently abled riders)
 - 95 Something else **(specify)**
 - 97 Nothing would make me consider using BRT

THOSE WHO CHOSE AT LEAST TWO FEATURES [Q11A(01-95)], ASK:

- Q11B. Of those features that you selected, which of these, in your opinion, is the most important? *Please select just one response.*

(ONLY SHOW SELECTIONS FROM Q11A. RANDOMIZE ORDER SHOWN.)

- 01 **[IF Q11A(01)]:** Ability to get to my destination without transferring
- 02 **[IF Q11A(02)]:** Simple connections between other BRT lines or other transit systems
- 03 **[IF Q11A(03)]:** Service that reliably showed up on time
- 04 **[IF Q11A(04)]:** Service that is cheap to use
- 05 **[IF Q11A(05)]:** Dedicated lanes and other features that allow for BRT to travel quickly and reliably
- 06 **[IF Q11A(06)]:** Features that improve your experience while onboard the bus (e.g. real-time information about the next stop, Wi-Fi, USB/power outlets, level boarding, accessibility for differently abled riders)
- 07 **[IF Q11A(07)]:** Features that improve your experience while onboard the bus (e.g. real-time information about the next stop, Wi-Fi, USB/power outlets, level boarding, accessibility for differently abled riders)
- 95 **[IF Q11A(95)]: [Q11A(95)]**
- 97 Nothing would make me consider using BRT



Q4A. How well would you say this **proposed BRT system** meets your needs?

[SHOW PICTURE OF SYSTEM MAP]

To view the system map in a new tab, click here: [LINK TO SYSTEM MAP]

- 05 The BRT system goes to **all** the places I would want/need it to go
- 04 The BRT system goes to **most** of the places I would want/need it to go
- 03 The BRT system goes to **some** of the places I would want/need it to go
- 02 The BRT system goes to **a few** of the places I would want/need it to go
- 01 The BRT system **doesn't go to any** of the places I would want/need it to go

Q4B. Why do you say that? Are there places you would like the BRT to go that aren't in the plan? **(OPEN END. DO NOT REQUIRE RESPONSE.)**

Q8A. There are currently 28 potential BRT lines under consideration. Based on the proposed map, which three BRT lines would you be most likely to use? *Please select up to three.* **(SHOW SYSTEMWIDE MAP. ACCEPT UP TO 3 RESPONSES. SHOW DROPDOWN MENU.)**

[SHOW PICTURE OF SYSTEM MAP]

To view the system map in a new tab, click here: [LINK TO SYSTEM MAP]

- 01 LINE 1
- 02 LINE 2
- 03 LINE 3
- 04 ...
- 28 LINE 28
- 97 Would not be likely to use any of these

IF CHOSE AT LEAST ONE ROUTE AT Q8A [Q8A(01-28)], ASK Q8B-D ABOUT EACH ROUTE SELECTED IN Q8A:

Q8B. For what purposes would you use [INSERT LINE FROM Q8A]? *Please select all that apply.* **(RANDOMIZE. ACCEPT MULTIPLE RESPONSES.)**

- 01 Travel to or from work/job-related business
- 02 Travel to or from school (student)/education related
- 04 Shopping, entertainment, restaurants/bars
- 05 Medical, bank, post office, government services
- 07 Concert or sporting event
- 08 Visiting friends or family
- 10 Gym/Fitness center
- 11 Church, synagogue, mosque, other religious venue
- 13 Visiting parks, natural areas, fishing, hiking, etc.
- 14 Parent/Guardian picking up child from school
- 95 For some other reason **(specify)**



Q8C. How often would you use this BRT route?

- 01 More than 5 days a week
- 02 5 days a week
- 03 3 to 4 days a week
- 04 1 to 2 days a week
- 05 1 to 3 days a month
- 06 A few days a year
- 07 Less than once a year
- 99 Don't know/Not sure

Q8D. On what days of the week and at what times of day are you likely to use this BRT route? *Please select all that apply.*
(MULTIPLE RESPONSES ACCEPTED.)

- 01 On weekdays in the morning peak times (before 9AM)
- 02 On weekdays during the midday (from 9AM up to 3PM)
- 03 On weekdays in the afternoon peak times (3PM up to 7PM)
- 04 On weekdays in the evening (after 7PM)
- 05 On Saturdays
- 06 On Sundays
- 99 Don't know/Not sure

IF WOULD NOT USE ANY BRT ROUTES Q8A(97)], ASK:

Q9A. Why wouldn't you use any of the BRT routes? *Please select all that apply.* **(RANDOMIZE. ACCEPT ALL THAT APPLY.)**

- 01 None of them take me where I need to go
- 02 It's faster to use another mode for my trips (e.g. drive, walk, bike)
- 03 It's cheaper to use another mode for my trips (e.g. drive, walk, bike)
- 04 The BRT service doesn't operate when I need to travel
- 05 I don't feel safe on transit
- 06 I don't feel comfortable using transit
- 07 I prefer another mode
- 95 Other **(specify)**

IF [Q9A(02-03,05-95)], ASK:

Q9B. What could convince you to use BRT? *Please select all that apply.* **(ACCEPT ALL THAT APPLY.)**

- 01 If it was free to use the BRT
- 02 If it was free to park at BRT stations
- 03 If stops and vehicles were more comfortable
- 04 If gas was much more expensive
- 05 If parking was much more expensive
- 06 If parking was not available at my destination
- 07 If the BRT was faster than driving
- 08 If I didn't have to transfer to get to my final destination
- 95 Other **(specify)**
- 97 Nothing could convince me to use BRT.



IF CHOSE TWO OR MORE ROUTES AT Q8A [Q8A(01-28)], RANDOMLY SELECT ONE ROUTE TO ASK Q5A-Q6B:

Q5A. How well would you say the [PROPOSED ROUTE] meets your needs?

[PROPOSED ROUTE] will operate from [INSERT SPAN] on weekdays.

[PROPOSED ROUTE] will operate from [INSERT SPAN] on weekends.

[SHOW PICTURE OF ROUTE PROFILE]

Additionally, the proposed hours of operation can also be found here: [LINK TO ROUTE PROFILE FOR ROUTE SELECTED AT Q8A]

05 The BRT system operates at **all** the times of day when I would want/need it to

04 The BRT system operates at **most** of the times of day when I would want/need it to

03 The BRT system operates at **some** of the times of day when I would want/need it to

02 The BRT system operates at **a few** of the times of day when I would want/need it to

01 The BRT system **does not operate** when I would want/need it to

Q5B. Why do you say that? What times of day would you want [PROPOSED ROUTE] BRT service that isn't in the plan? **(OPEN END. DO NOT REQUIRE RESPONSE.)**

Q6A. How well would you say the [PROPOSED ROUTE] meets your needs?

[PROPOSED ROUTE] will operate every:

[INSERT FREQUENCIES].

[SHOW PICTURE OF ROUTE PROFILE]

Additionally, the proposed frequencies can also be found here: [LINK TO ROUTE PROFILE FOR ROUTE SELECTED AT Q8A]

05 The BRT vehicles will come **as frequently** as I would want/need them to

04 The BRT vehicles will come **nearly** as frequently as I would want/need them to

03 The BRT vehicles will come **somewhat** as frequently as I would want/need them to

02 The BRT vehicles will come **barely** as frequently as I would want/need them to

01 The BRT vehicles **will not come frequently enough** for me to use them

Q6B. Why do you say that? How frequently would you like [PROPOSED ROUTE] to operate? **(OPEN END. DO NOT REQUIRE RESPONSE.)**

ASK EVERYONE:

Q16. Please share any additional comments you have on what is most important to you in a new BRT system. **(OPEN END. DO NOT REQUIRE A RESPONSE.)**

Q17. If BRT was available in your area, overall how likely would you be to consider using it?

05 Extremely likely

04 Very likely

03 Somewhat likely

02 Not very likely

01 Not at all likely

Q7A. Do you have any comments on anything you would like to see in the BRT Action Plan that was not included? If so, tell us below. **(OPEN END. DO NOT REQUIRE RESPONSE.)**



Q19. Do you have any additional comments regarding the proposed BRT Action Plan document? [LINK TO PLAN DOCUMENT] If so, please tell us below. (OPEN END. DO NOT REQUIRE RESPONSE.)

DEMOGRAPHICS

ASK EVERYONE:

S1. What is your home ZIP code?

98 Prefer not to answer

THOSE WHO DO NOT PROVIDE HOME ZIP CODE [S1(98)], ASK:

S2. In which of the following areas is your current, primary residence?

- 01 Arlington County
- 02 Fairfax City, VA
- 03 City of Alexandria, VA
- 04 City of Falls Church, VA
- 05 Manassas, VA
- 06 Manassas Park, VA

- 07 Herndon, VA
- 08 Vienna, VA
- 09 Somewhere else in Fairfax County

- 10 Leesburg, VA
- 11 Purcellville, VA
- 12 Somewhere else in Loudoun County

- 13 Dumfries, VA
- 14 Somewhere else in Prince William County

- 97 Or somewhere else (**specify**)
- 98 Prefer not to answer

ASK EVERYONE:

D3. Which of the following best describes your age?

- 01 18-24
- 02 25-34
- 03 35-44
- 04 45-54
- 05 55-64
- 06 65-74
- 07 75 or older
- 98 Prefer not to answer



D4. What is your racial or ethnic identity? *Please select all that apply.* **(MULTIPLE RESPONSES ACCEPTED.)**

- 01 American Indian or Alaska native
- 02 Asian
- 03 Black or African American
- 04 Hispanic or Latino
- 05 Native Hawaiian or other Pacific Islander
- 06 White or Caucasian
- 95 Other **(specify)**
- 98 Prefer not to answer

D5. Which of the following ranges contains your annual household income before taxes?

- 01 Less than \$30,000
- 02 \$30,000 to \$49,999
- 03 \$50,000 to \$74,999
- 04 \$75,000 to \$149,999
- 05 \$150,000 or higher
- 99 Don't know/Prefer not to answer

D6. What is your gender identity?

- 01 Female
- 02 Male
- 03 Non-binary, or
- 95 I use a different term **(specify)**
- 98 Prefer not to answer

D7. Is English your primary language?

- 01 Yes
- 02 No
- 98 Prefer not to answer

THOSE WHOSE PRIMARY LANGUAGE IS NOT ENGLISH [D7(02)], ASK:

D8. How well do you speak English? **(IF D7(01), FORCE IN 03.)**

- 03 Very well
- 02 Well
- 01 Not well
- 98 Prefer not to answer

ASK EVERYONE:

D9. Do you identify as having a disability?

- 01 Yes
- 02 No
- 98 Prefer not to answer



THOSE WHO HAVE A DISABILITY [D9(01)], ASK:

D10. Do you use any of the following mobility aids when riding transit? If so, please select them from the following list. *Please select all that apply. (MULTIPLE RESPONSES ACCEPTED.)*

- 01 Manual wheelchair
- 02 Motorized wheelchair
- 03 Scooter
- 04 Leg braces
- 05 Prosthesis
- 06 Service/Guide animal
- 07 Support cane
- 08 Long cane (for the blind)
- 09 Crutches
- 10 Walker
- 11 Respirator/Oxygen tank
- 12 Travel with a companion
- 13 Rollator
- 95 Other (**specify**)
- 97 I do not use mobility devices
- 98 Prefer not to answer

ASK EVERYONE

D11. What is your current employment status? Are you...? (**ACCEPT MULTIPLE RESPONSES. DON'T ALLOW 97 WITH 01 OR 02.**)

- 06 A full-time worker
- 07 A part-time worker
- 08 A homemaker
- 09 A student
- 10 Active military
- 06 Retired
- 97 Not currently employed
- 98 Prefer not to answer

D12. Including yourself, how many people live in your household? (**RANGE=1-50.**)

- _____ number of people in household
- 98 Prefer not to answer

Q16. Do you have any additional comments you would like to make regarding transportation in Northern Virginia? (**OPEN-ENDED. DO NOT REQUIRE AN ANSWER.**)

D13. To be entered into the drawing for a chance to win a \$50 gift card, please provide either your email address and/or phone number.

- A. **EMAIL:** _____
- B. **TELEPHONE NUMBER:** _____
- 97 Do not wish to enter into drawing



APPENDIX I. PHASE 3 ONLINE SURVEY WEIGHTING

NVTA Survey Responses - As of 5/19/2025 - cleaned

| Jurisdiction of Residence | Responses | % Responses Overall | % Responses within the region | Population in 2025 <small>Source: COG cooperative forecasts</small> | % Population in 2025 (Target) | Weighted Response Target | Weight | Check |
|---------------------------|------------|---------------------|-------------------------------|--|-------------------------------|--------------------------|-------------|-------------|
| Arlington County | 118 | 20.1% | 22.2% | 245,773 | 9.1% | 48.22429789 | 0.408680491 | 48.22429789 |
| Fairfax County | 136 | 23.2% | 25.6% | 1,202,436 | 44.4% | 235.9357288 | 1.734821535 | 235.9357288 |
| Loudoun County | 39 | 6.6% | 7.3% | 456,238 | 16.9% | 89.52064394 | 2.295401127 | 89.52064394 |
| Prince William County | 44 | 7.5% | 8.3% | 515,200 | 19.0% | 101.0898605 | 2.297496829 | 101.0898605 |
| City of Alexandria | 117 | 19.9% | 22.0% | 180,528 | 6.7% | 35.42226384 | 0.302754392 | 35.42226384 |
| City of Fairfax | 24 | 4.1% | 4.5% | 27,813 | 1.0% | 5.45732199 | 0.227388416 | 5.45732199 |
| City of Falls Church | 29 | 4.9% | 5.5% | 15,479 | 0.6% | 3.037208754 | 0.104731336 | 3.037208754 |
| City of Manassas | 19 | 3.2% | 3.6% | 43,740 | 1.6% | 8.58243497 | 0.451707104 | 8.58243497 |
| City of Manassas Park | 5 | 0.9% | 0.9% | 19,011 | 0.7% | 3.730239397 | 0.746047879 | 3.730239397 |
| Outside of Northern VA | 42 | 7.2% | - | - | - | 42 | 1 | 42 |
| Prefer not to answer | 14 | 2.4% | - | - | - | 14 | 1 | 14 |
| Total | 587 | 100.0% | 100.0% | 2,706,218 | 100.00% | 587 | | 587 |
| NoVA Region Total | 531 | | | | | | | |



APPENDIX J. INDIVIDUAL ROUTE PROFILES



Route Profile Overview

Introduction

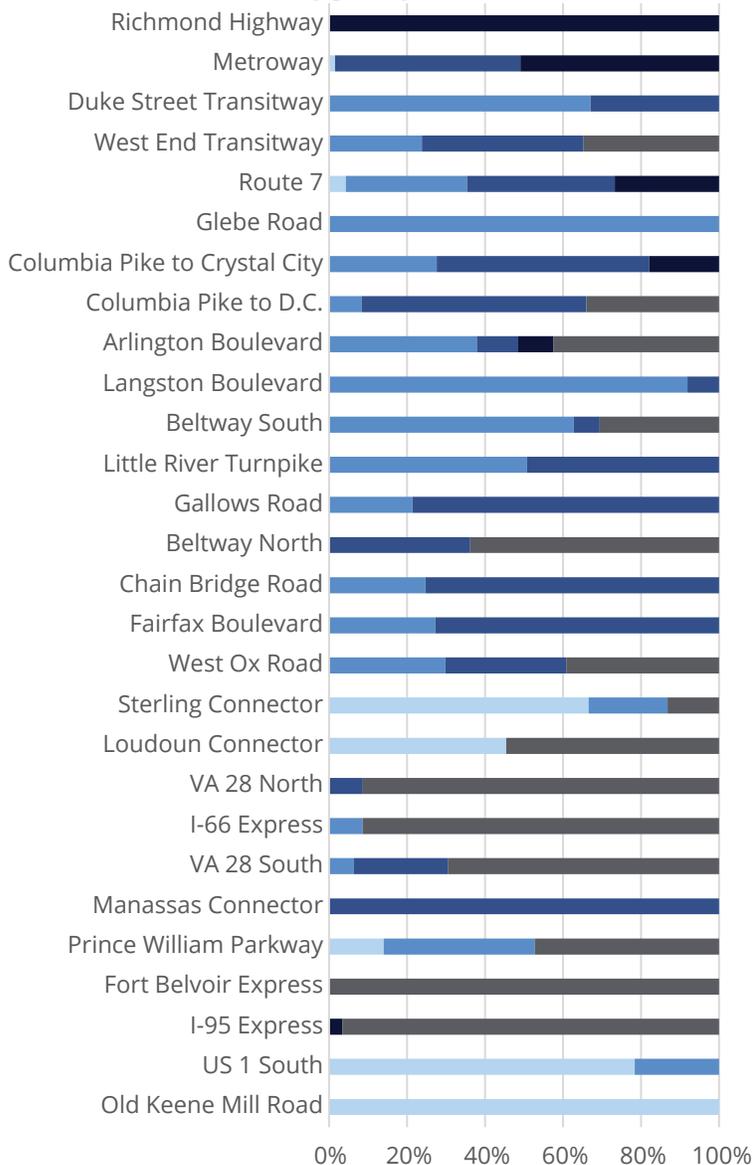
NVTA evaluated potential Bus Rapid Transit (BRT) routes to complement and extend existing transit options (Metro, VRE, local commuter bus systems) and improve connections to the places where people live, work and shop. 28 routes were identified, building on NVTA's investments in five BRT segments, totaling more than \$880 million. While the routes keep a focus in Northern Virginia, several routes branch into highly frequented areas in Maryland and Washington D.C.

Each Route Profile presents the individual route location, service and frequency information, overall performance in relation to the other routes in the system, and key performance metrics.

BRT Types

Five potential BRT types have been identified: Basic BRT, Improved BRT, Advanced BRT, Dedicated BRT, and Express BRT. The passenger amenities and bus priority treatments expand from Basic BRT (least amenities) to Dedicated BRT (most amenities), but with all routes having all-day, frequent service. The following graphics show (on the left) the extent of BRT type for each of the potential routes and (on the right) a summary of key features for each BRT type.

BRT Type by Route



Basic BRT

Shares the road with regular traffic, with some intersection priority and enhanced passenger amenities at popular locations.



Improved BRT

Provides faster service with level boarding, off-board fare payment, priority at most intersections, and some dedicated lanes, along with significant passenger amenities.



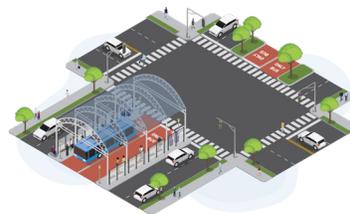
Advanced BRT

Operates in dedicated lanes that are not fully separated from traffic, with high-quality stops and stations, advanced technology, and passenger amenities.



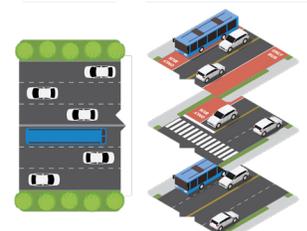
Dedicated BRT

Runs in fully dedicated, bus-only lanes separated from traffic, ensuring the highest level of service reliability, with premium stops, stations, and passenger amenities.



Express BRT

Provides point-to-point express service that often uses limited access roadways.



Potential Route 1 Richmond Highway



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | | Weekend Service | |
|--------------------------|---------------------|----------------------|--------------------------|----------------------|
| Span: 6:00 AM - 12:00 AM | | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 6 minutes | Frequency - Off-Peak | 12 minutes | Frequency - All Day |
| | | | | 12 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

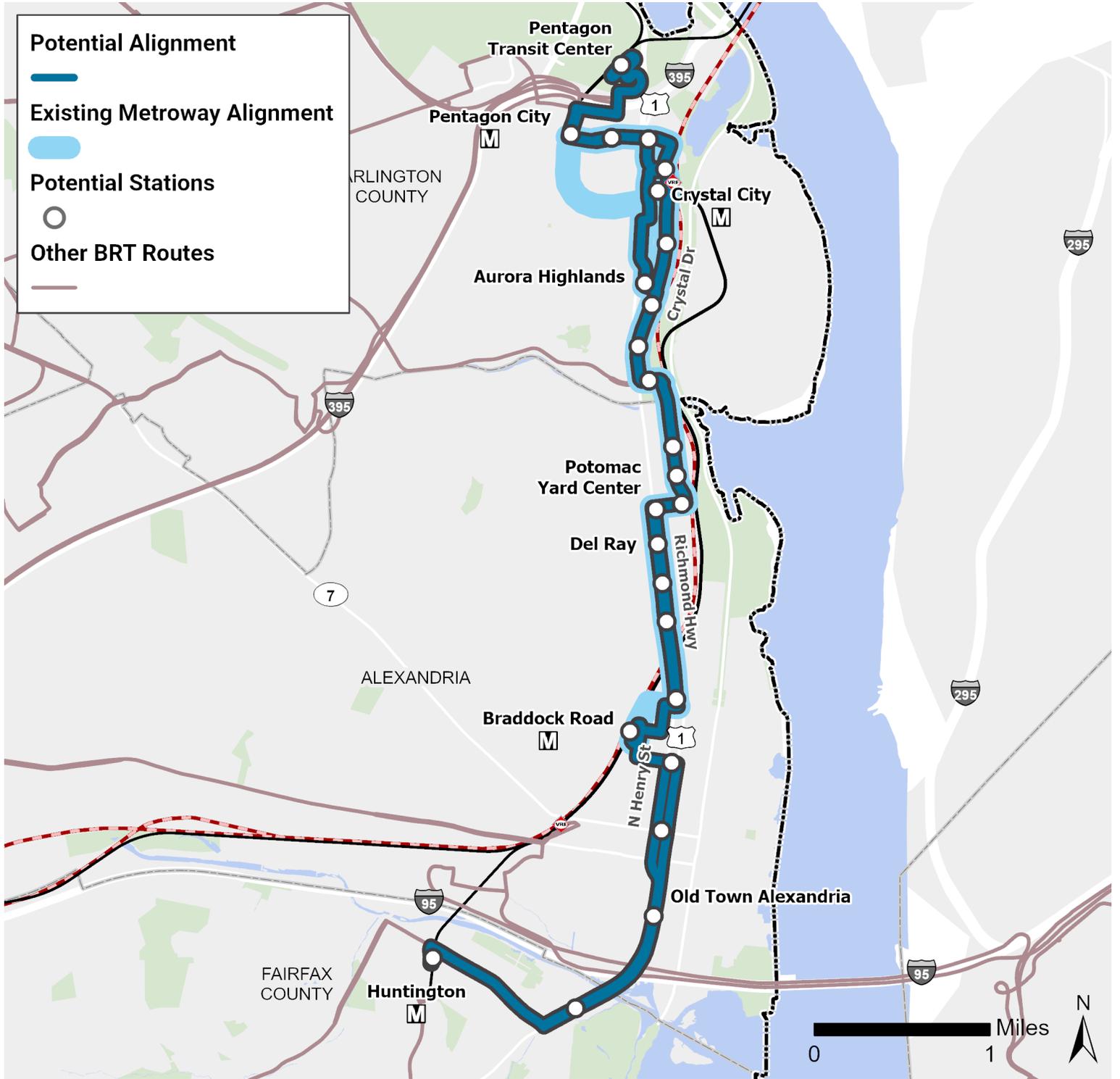
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 2 Metroway



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 6 minutes | Frequency - Off-Peak | 12 minutes |
| | | Frequency - All Day | 12 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?

11,700 -
12,200

**Average
 Weekday
 Boardings**
 (2045)

Presented as a range based on if the route was implemented independently or part of a full network.

28%

**Fare
 Recovery**
 (2045)

The percentage of the route's operating cost that would be paid for by fares collected.

2,000

**Driving Trips
 Shifted
 to Transit**
 (2045)

The estimated number of trips that would shift from driving to the region's transit network.

2,200

**Person-Hours of
 Delay
 Removed**
 (2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.

36,800
&
33,000

**Population
 & Jobs
 Served**
 (2045)

The total number of people and jobs within a half-mile of the BRT stations.

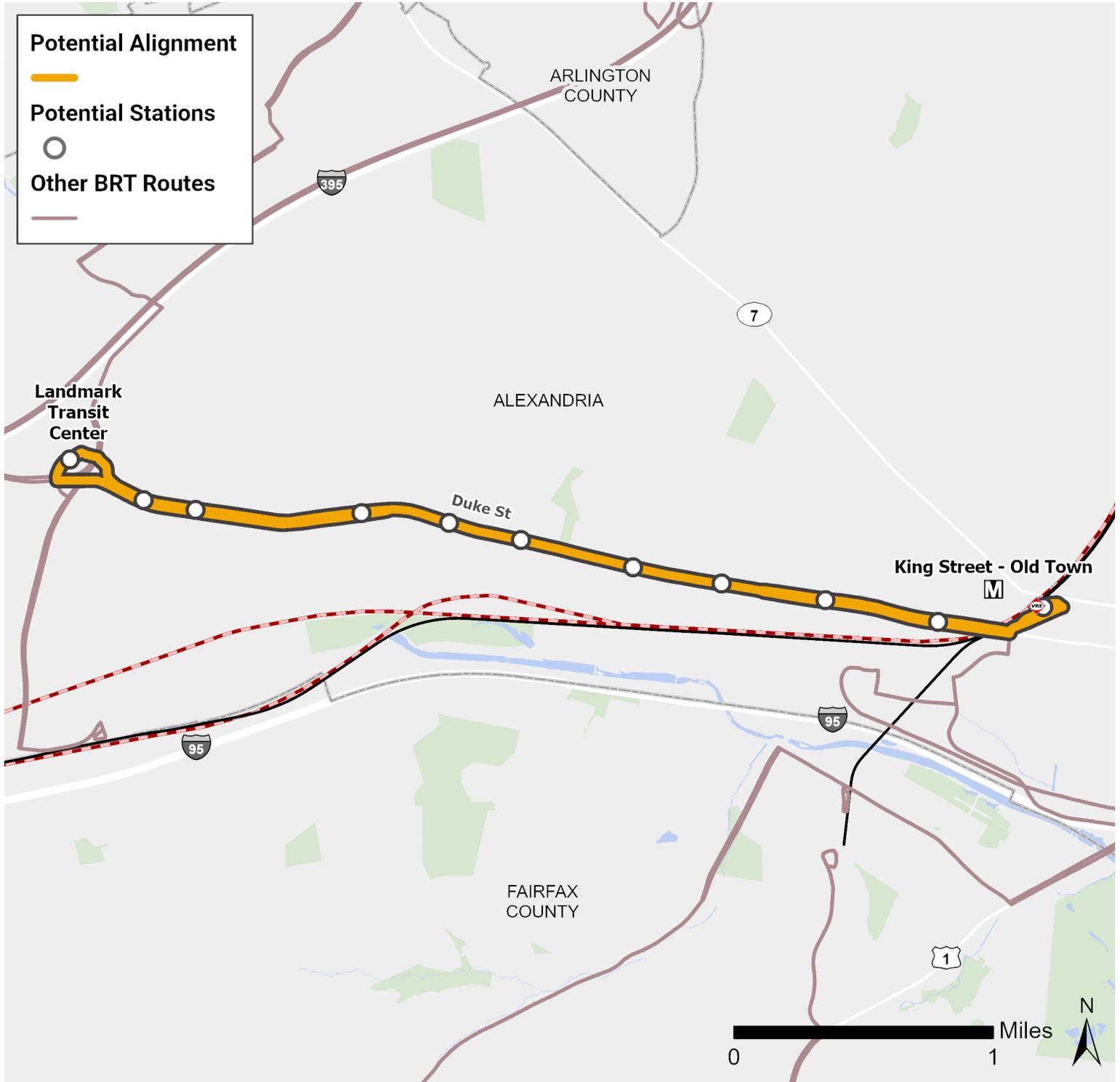
29%

**Station Area
 Residents in
 Equity Groups**
 (2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 3

Duke Street Transitway



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 10 minutes | Frequency - Off-Peak | 15 minutes |
| | | Frequency - All Day | 15 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

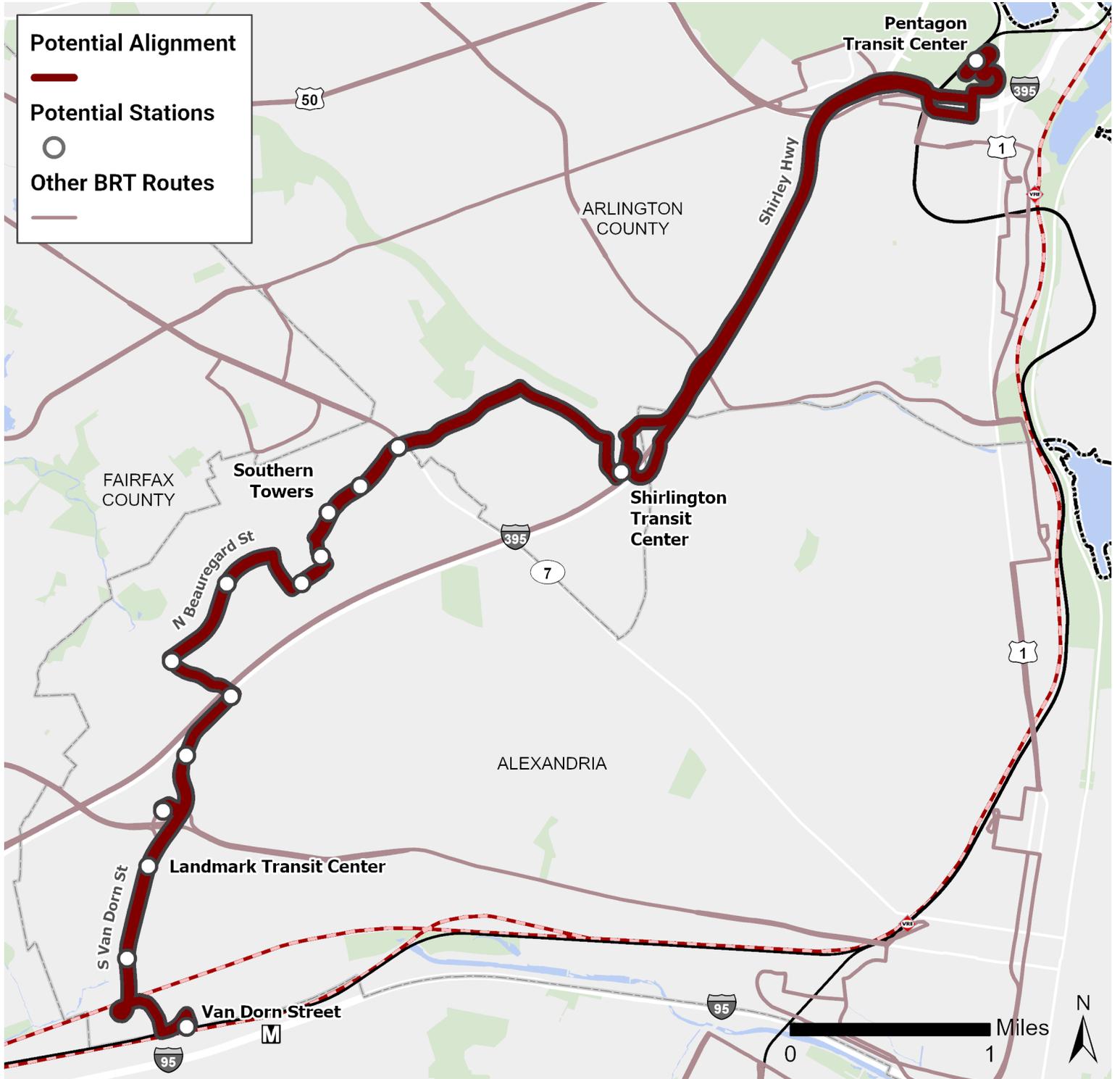
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 4 West End Transitway



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 10 minutes | Frequency - Off-Peak | 15 minutes |
| | | Frequency - All Day | 15 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
 (2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
 (2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
 (2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
 (2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
 (2045)

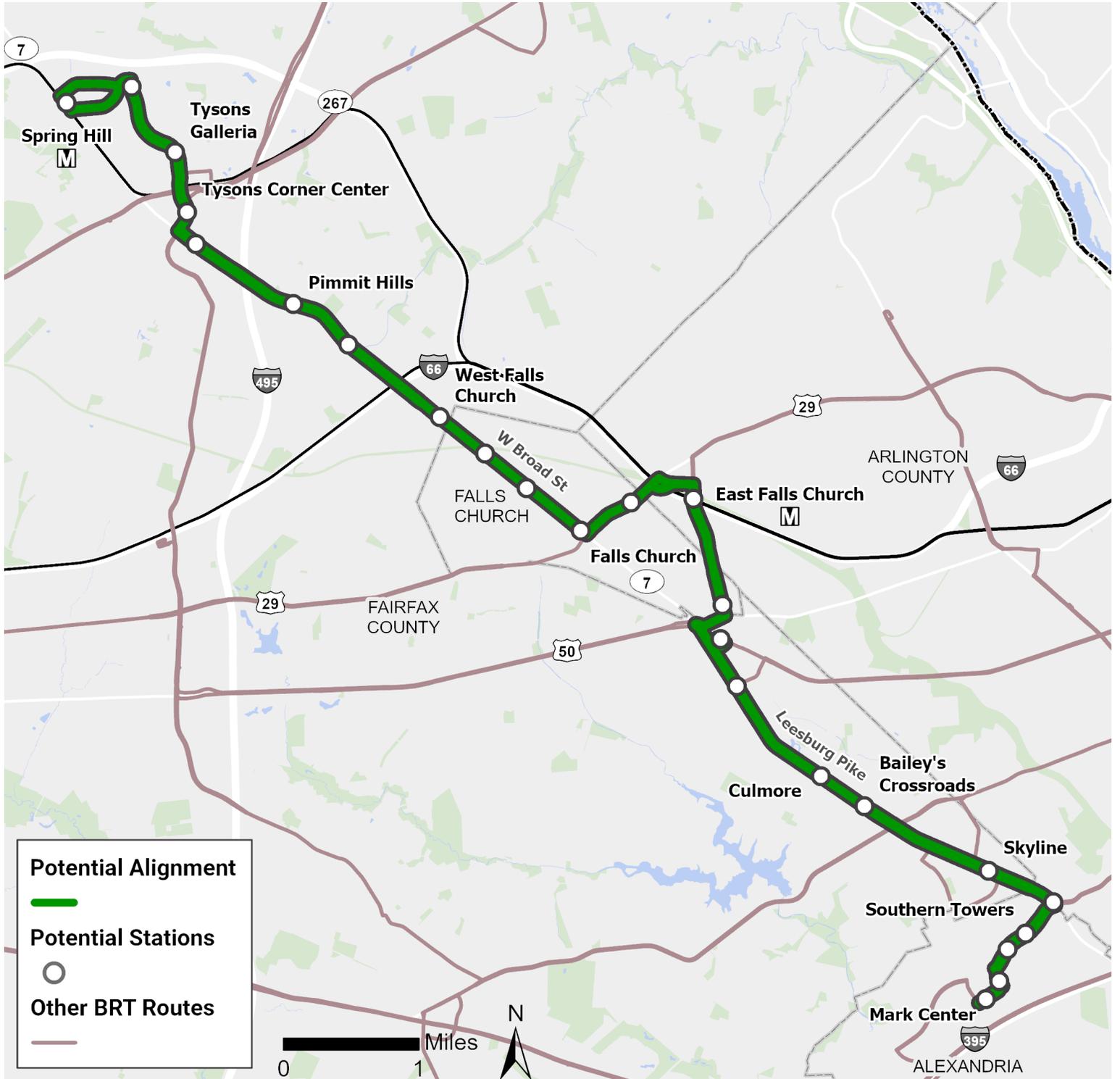
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
 (2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 5 Route 7



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 8 minutes | Frequency - Off-Peak | 12 minutes |
| | | Frequency - All Day | 12 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?

16,000 -
18,000

**Average
 Weekday
 Boardings**
 (2045)

Presented as a range based on if the route was implemented independently or part of a full network.

33%

**Fare
 Recovery**
 (2045)

The percentage of the route's operating cost that would be paid for by fares collected.

4,200

**Driving Trips
 Shifted
 to Transit**
 (2045)

The estimated number of trips that would shift from driving to the region's transit network.

3,400

**Person-Hours of
 Delay
 Removed**
 (2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.

164,200
&
168,300

**Population
 & Jobs
 Served**
 (2045)

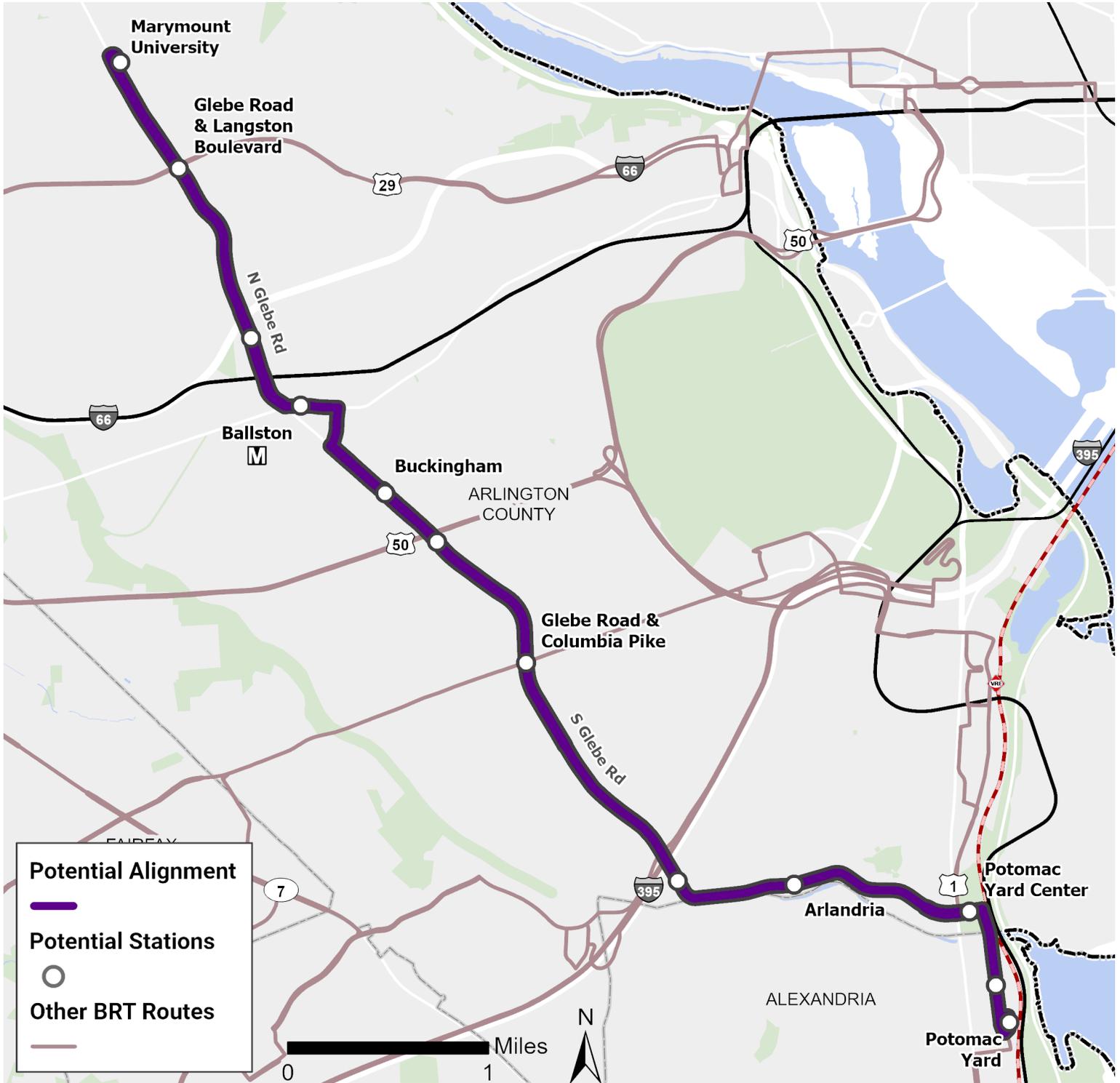
The total number of people and jobs within a half-mile of the BRT stations.

32%

**Station Area
 Residents in
 Equity Groups**
 (2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 6 Glebe Road



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 20 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
 (2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
 (2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
 (2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
 (2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
 (2045)

The total number of people and jobs within a half-mile of the BRT stations.

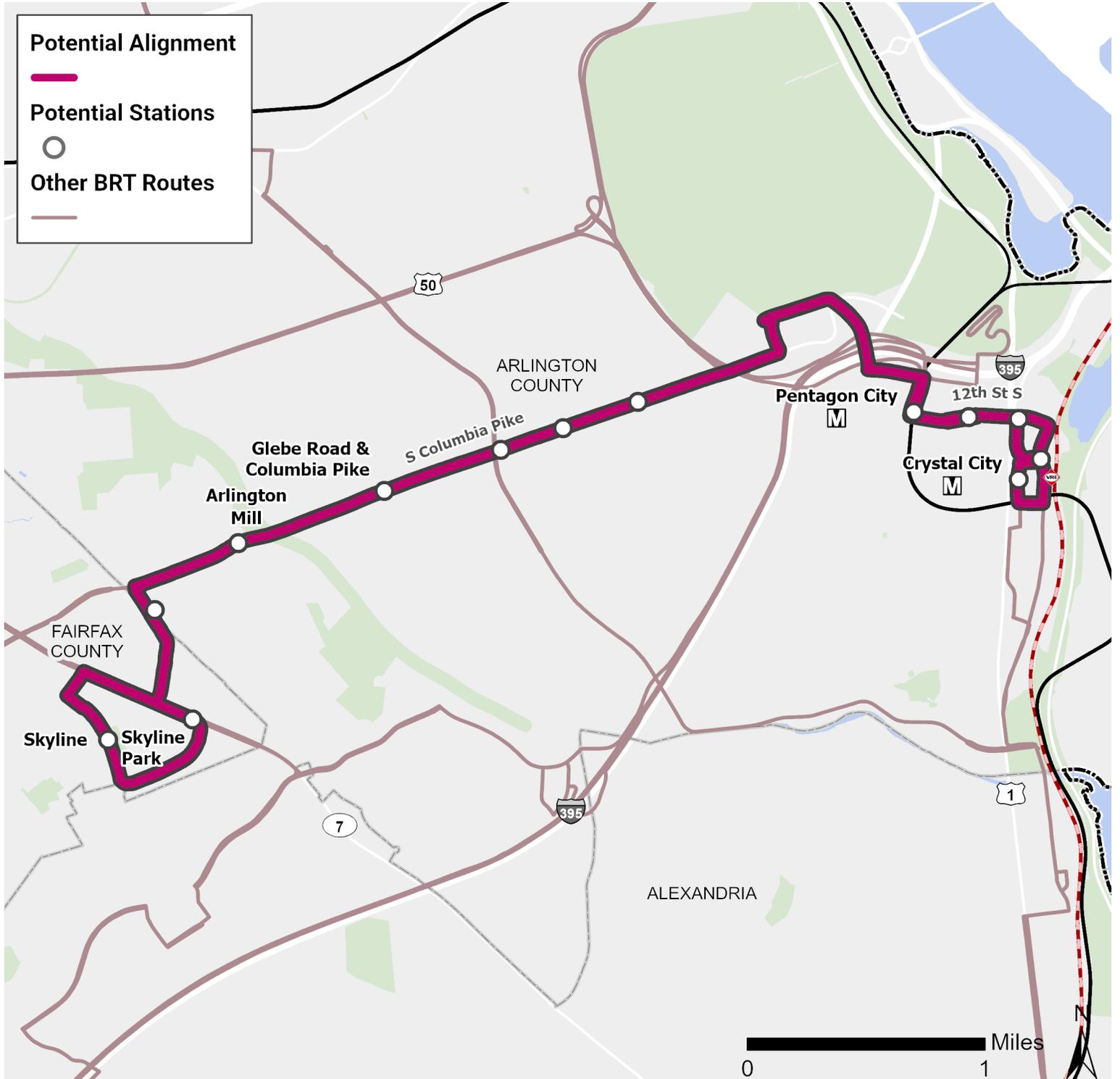


Station Area Residents in Equity Groups
 (2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 7

Columbia Pike to Crystal City



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | | | Weekend Service | |
|--------------------------|----------------------|----------------------|----------------------|--------------------------|----------------------|
| Span: 6:00 AM - 12:00 AM | | | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 10 minutes | Frequency - Off-Peak | 12 minutes | Frequency - All Day | 12 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

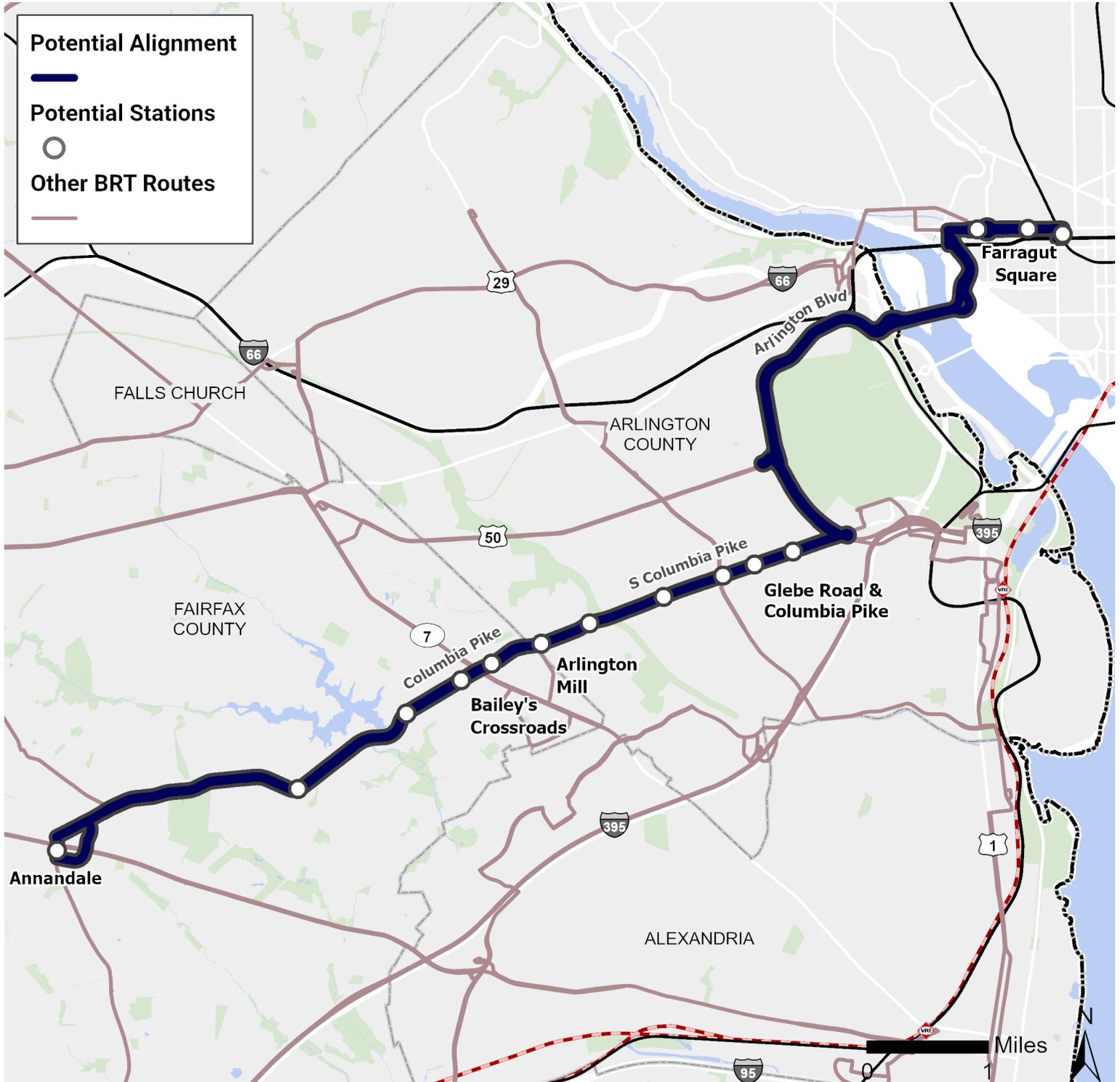
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 8 Columbia Pike to D.C.



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 10 minutes | Frequency - Off-Peak | 15 minutes |
| | | Frequency - All Day | 15 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
 (2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
 (2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
 (2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
 (2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
 (2045)

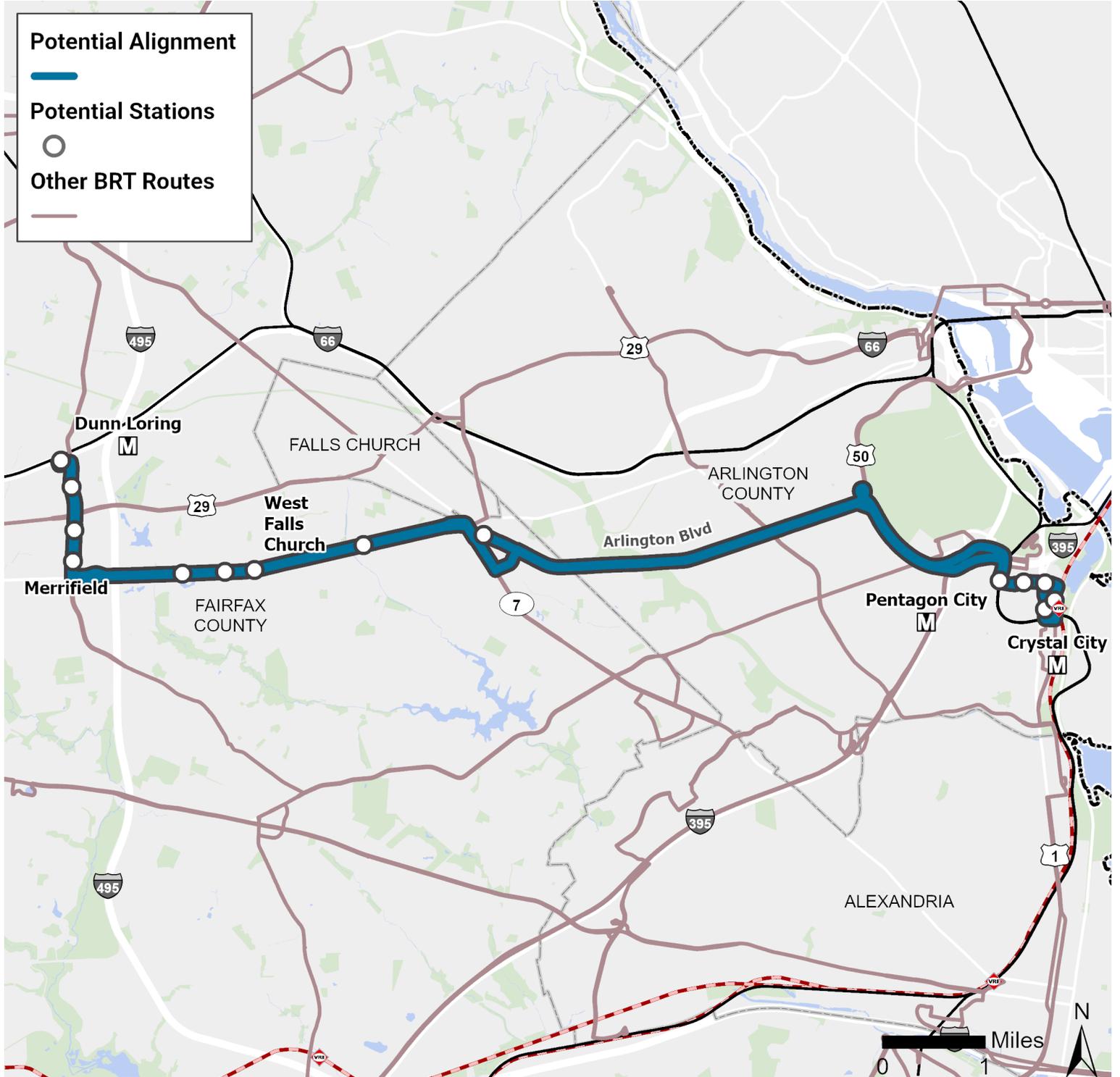
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
 (2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 9 Arlington Boulevard



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 20 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

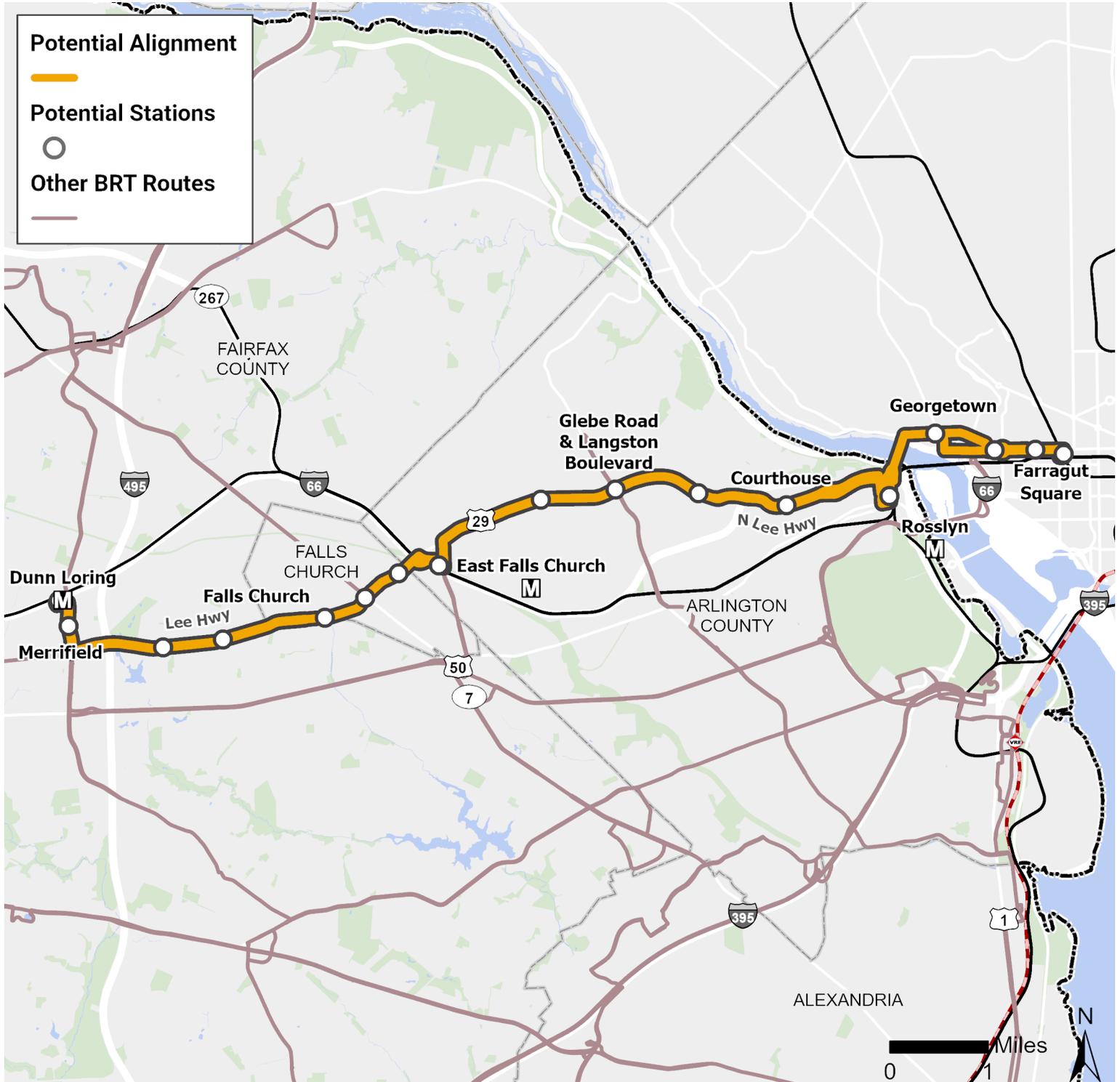
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 10 Langston Boulevard



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 10 minutes | Frequency - Off-Peak | 15 minutes |
| | | Frequency - All Day | 15 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?

9,900 -
10,400

**Average
Weekday
Boardings**
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.

24%

**Fare
Recovery**
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.

1,800

**Driving Trips
Shifted
to Transit**
(2045)

The estimated number of trips that would shift from driving to the region's transit network.

3,100

**Person-Hours of
Delay
Removed**
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.

100,400
&
90,900

**Population
& Jobs
Served**
(2045)

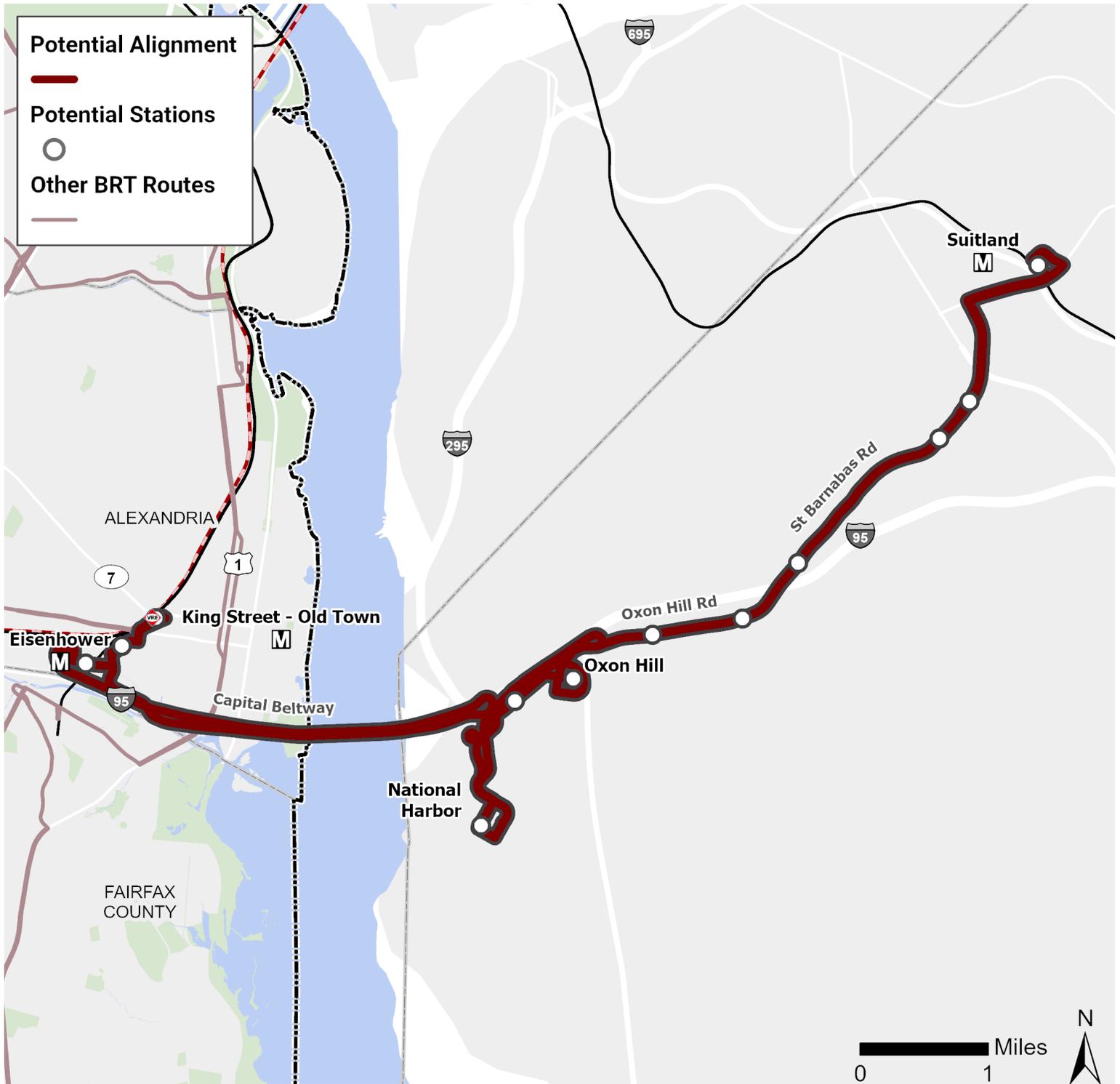
The total number of people and jobs within a half-mile of the BRT stations.

29%

**Station Area
Residents in
Equity Groups**
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 11 Beltway South



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|-------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 7:00 AM - 7:00 PM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 30 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

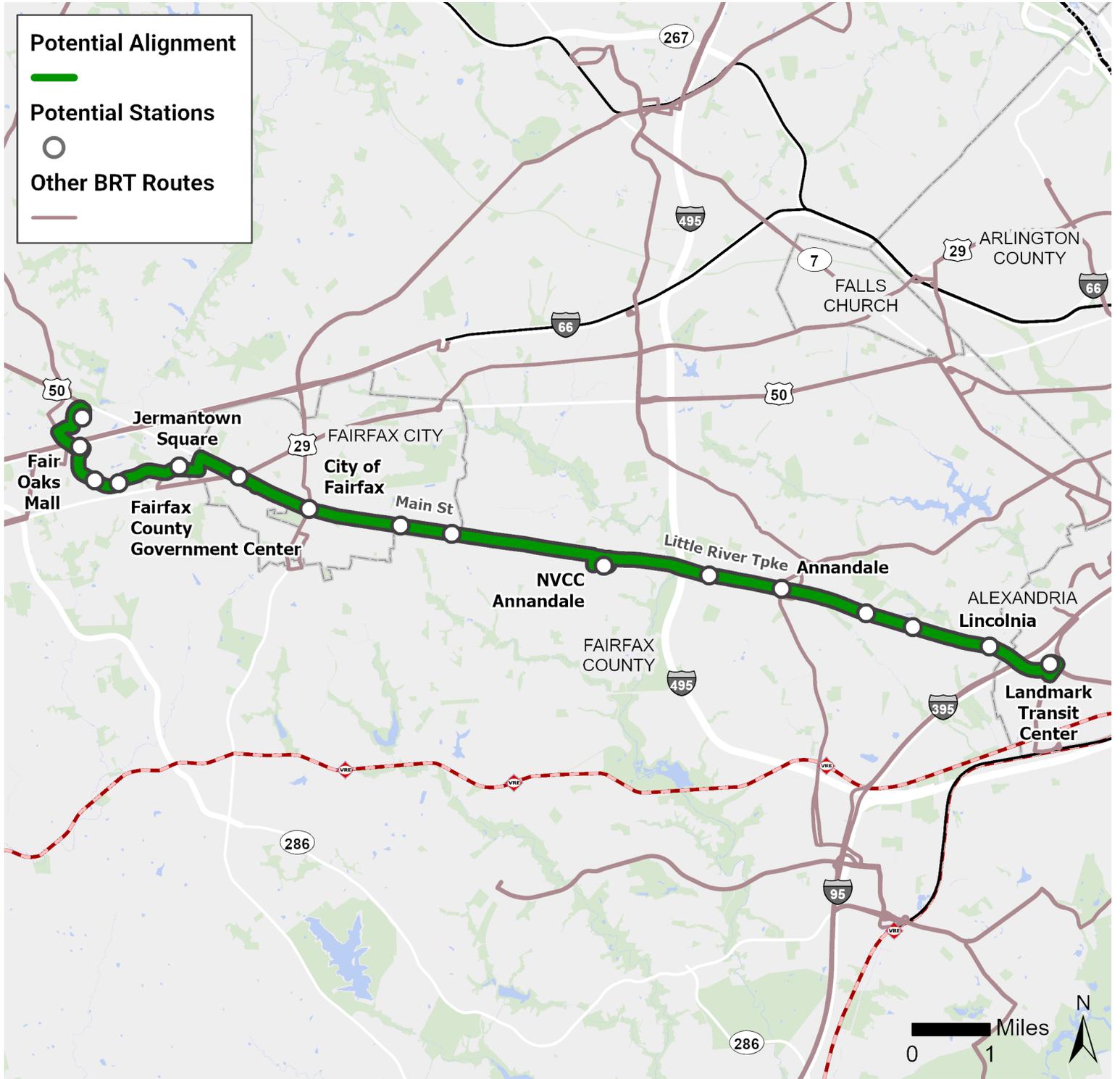
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 12 Little River Turnpike



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 20 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

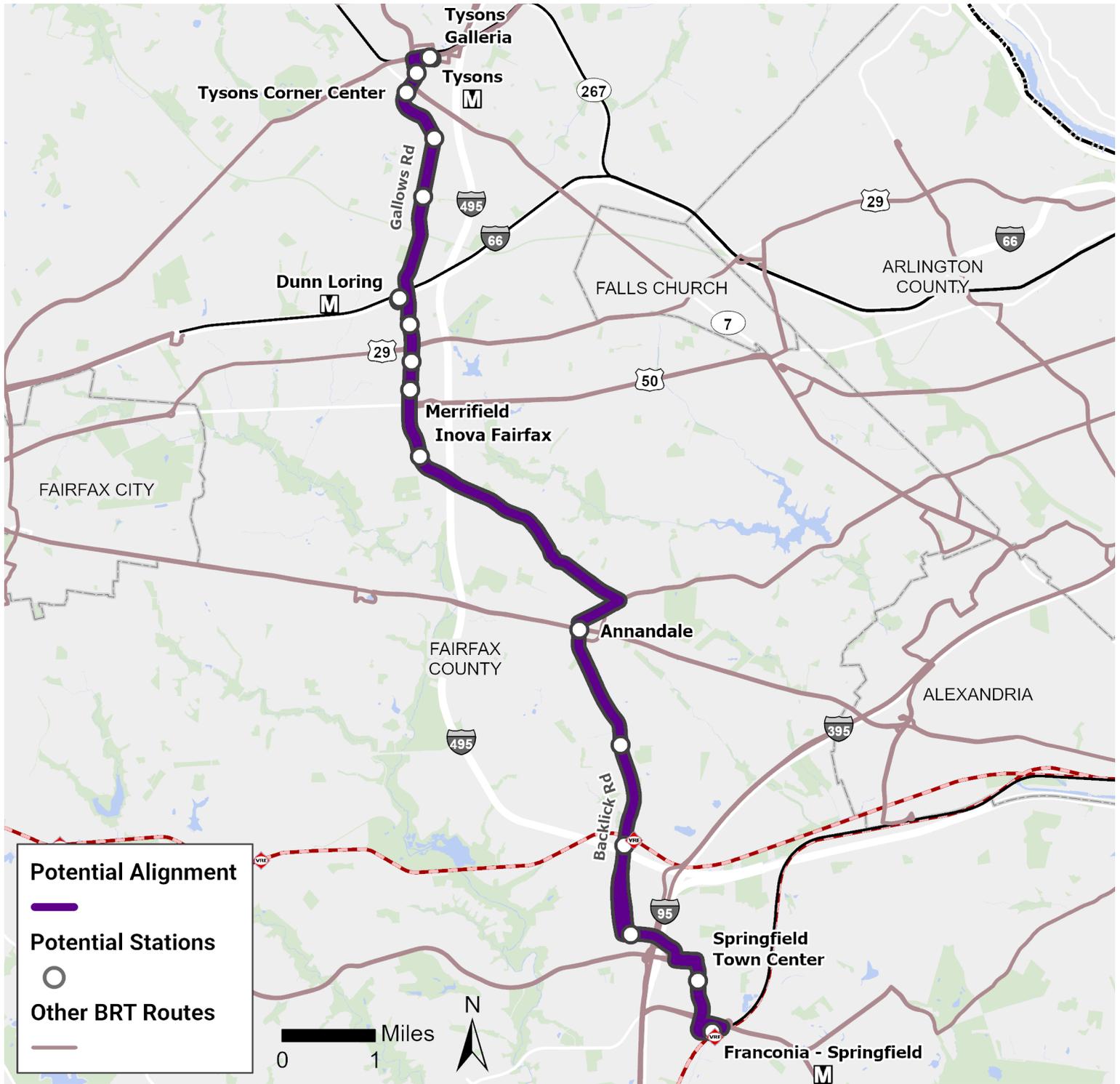
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 13 Gallows Road



Potential Alignment

Potential Stations

Other BRT Routes



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 10 minutes | Frequency - Off-Peak | 15 minutes |
| | | Frequency - All Day | 15 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

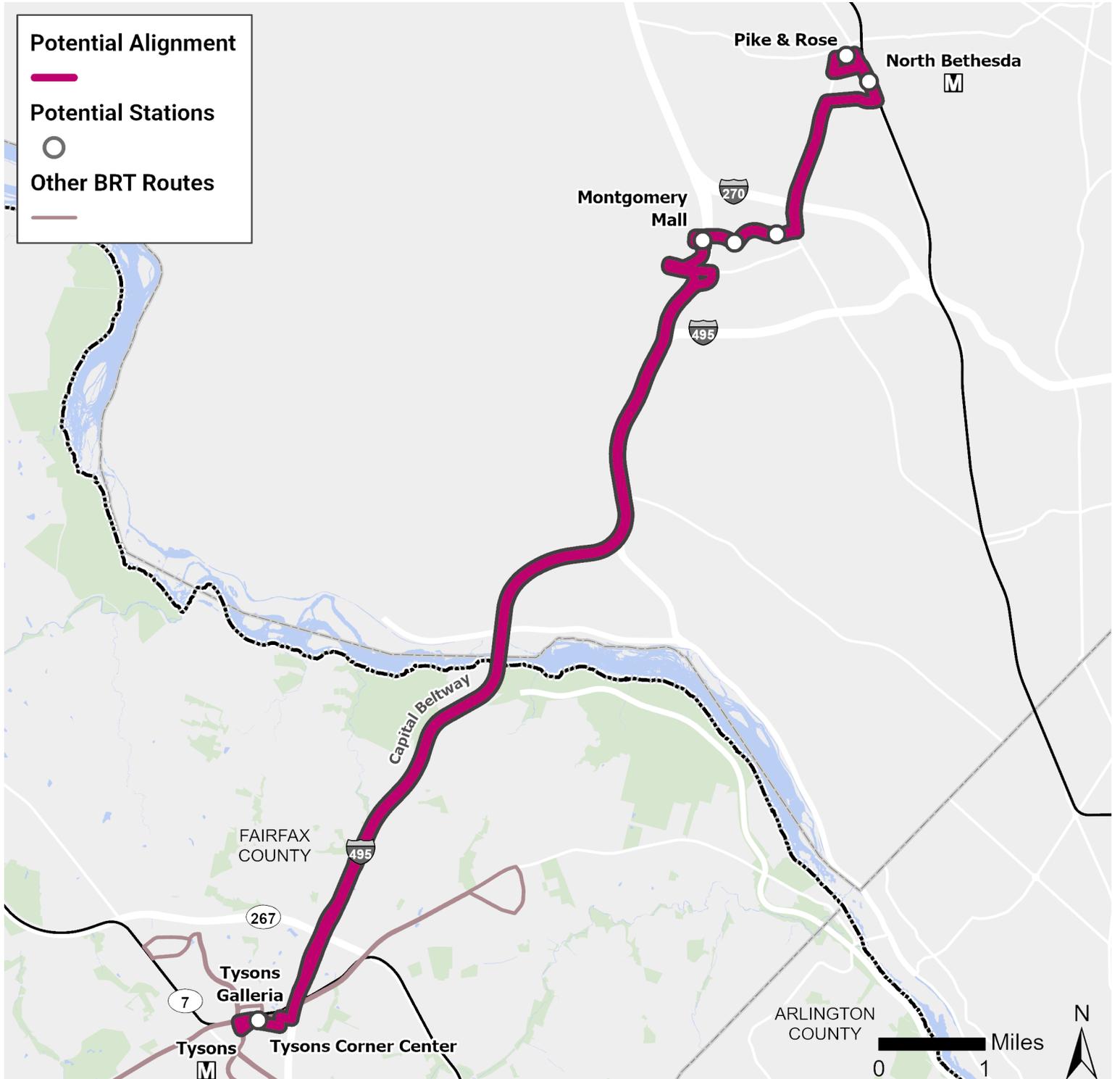
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 14 Beltway North



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|-------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 7:00 AM - 7:00 PM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 30 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

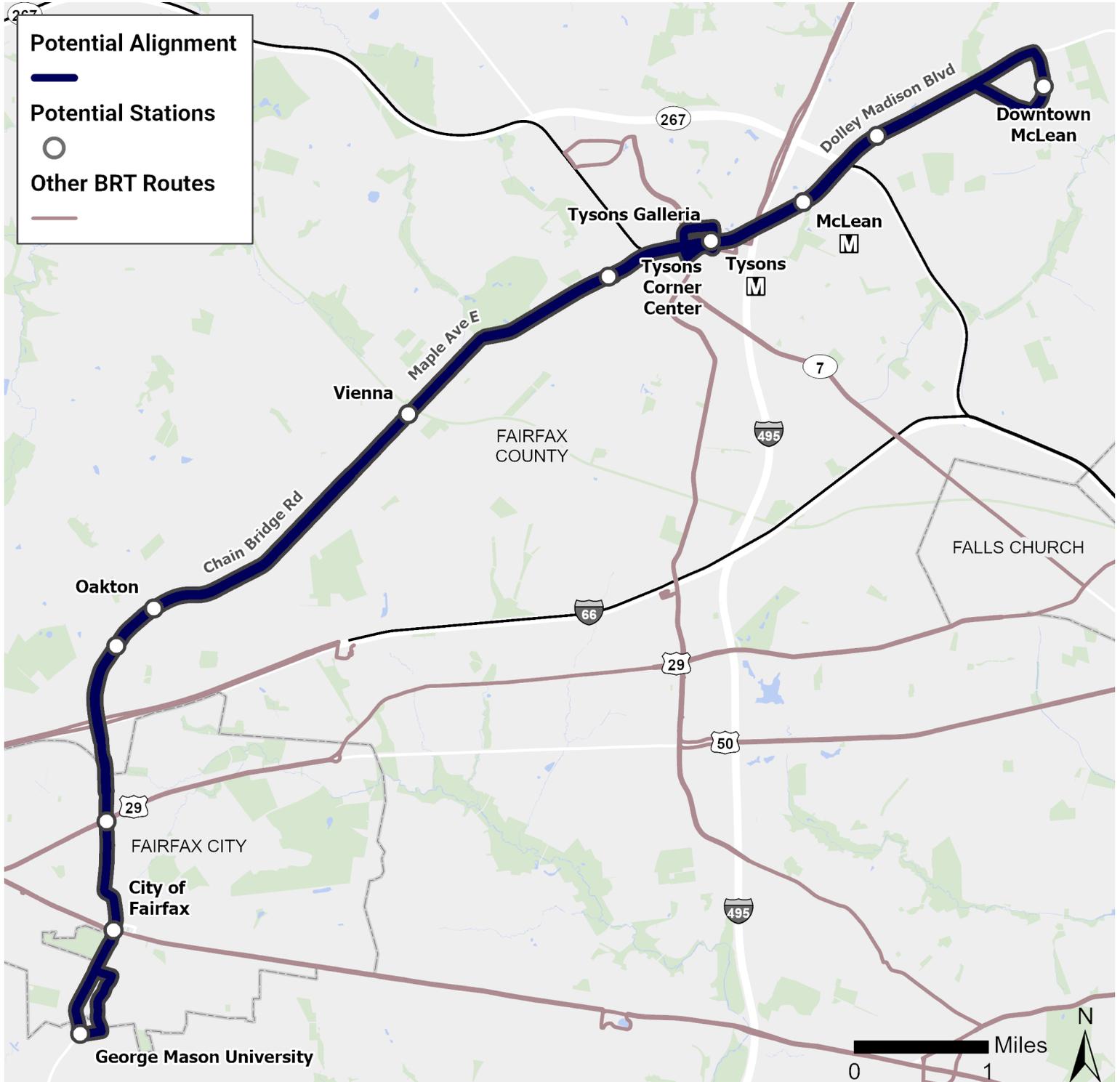
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 15 Chain Bridge Road



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | | Weekend Service | |
|--------------------------|-------------------|----------------------|--------------------------|---------------------|
| Span: 6:00 AM - 12:00 AM | | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 10 minutes | Frequency - Off-Peak | 15 minutes | Frequency - All Day |
| | | | | 15 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

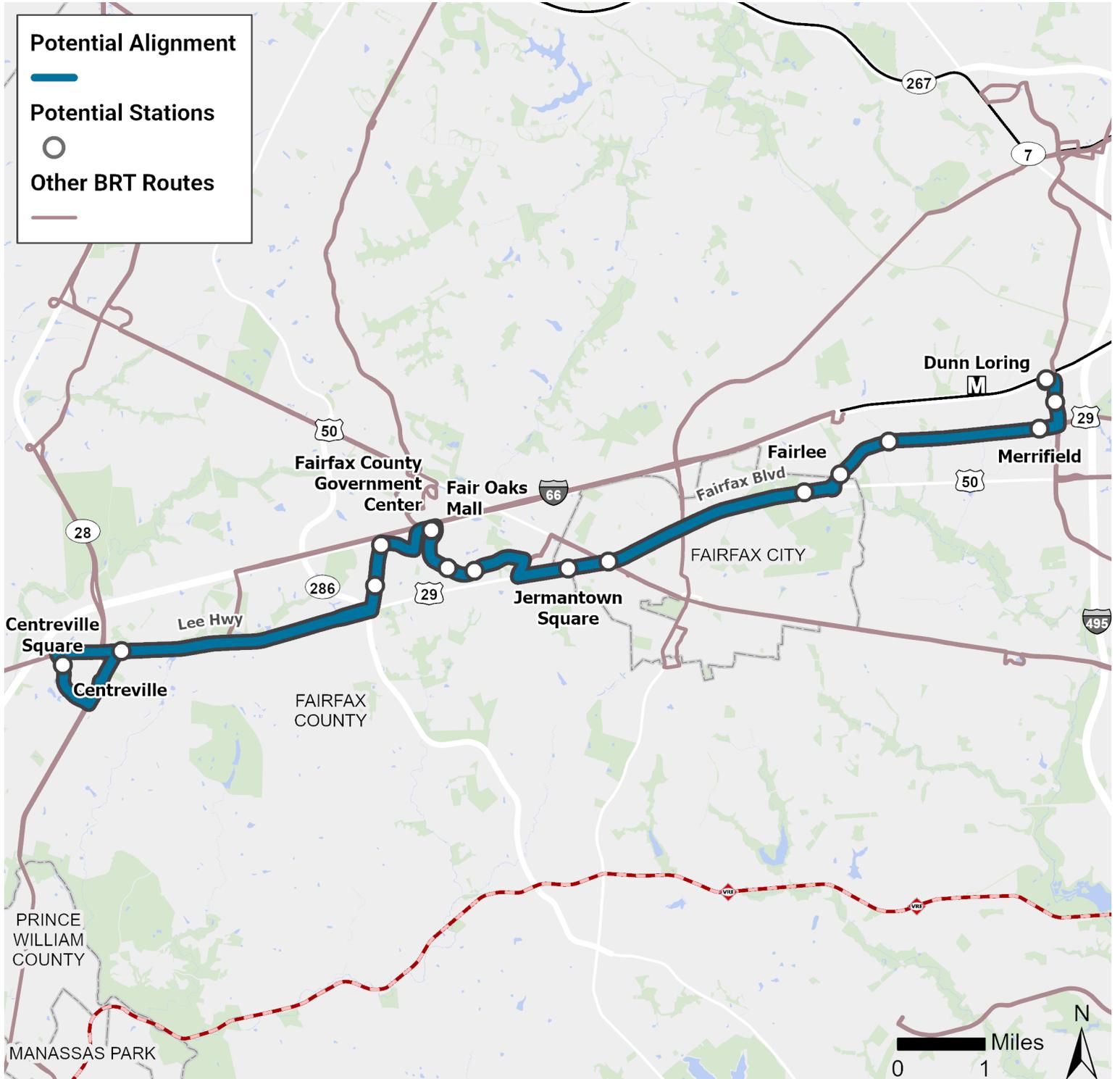
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 16 Fairfax Boulevard



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 10 minutes | Frequency - Off-Peak | 15 minutes |
| | | Frequency - All Day | 15 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
 (2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
 (2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
 (2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
 (2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
 (2045)

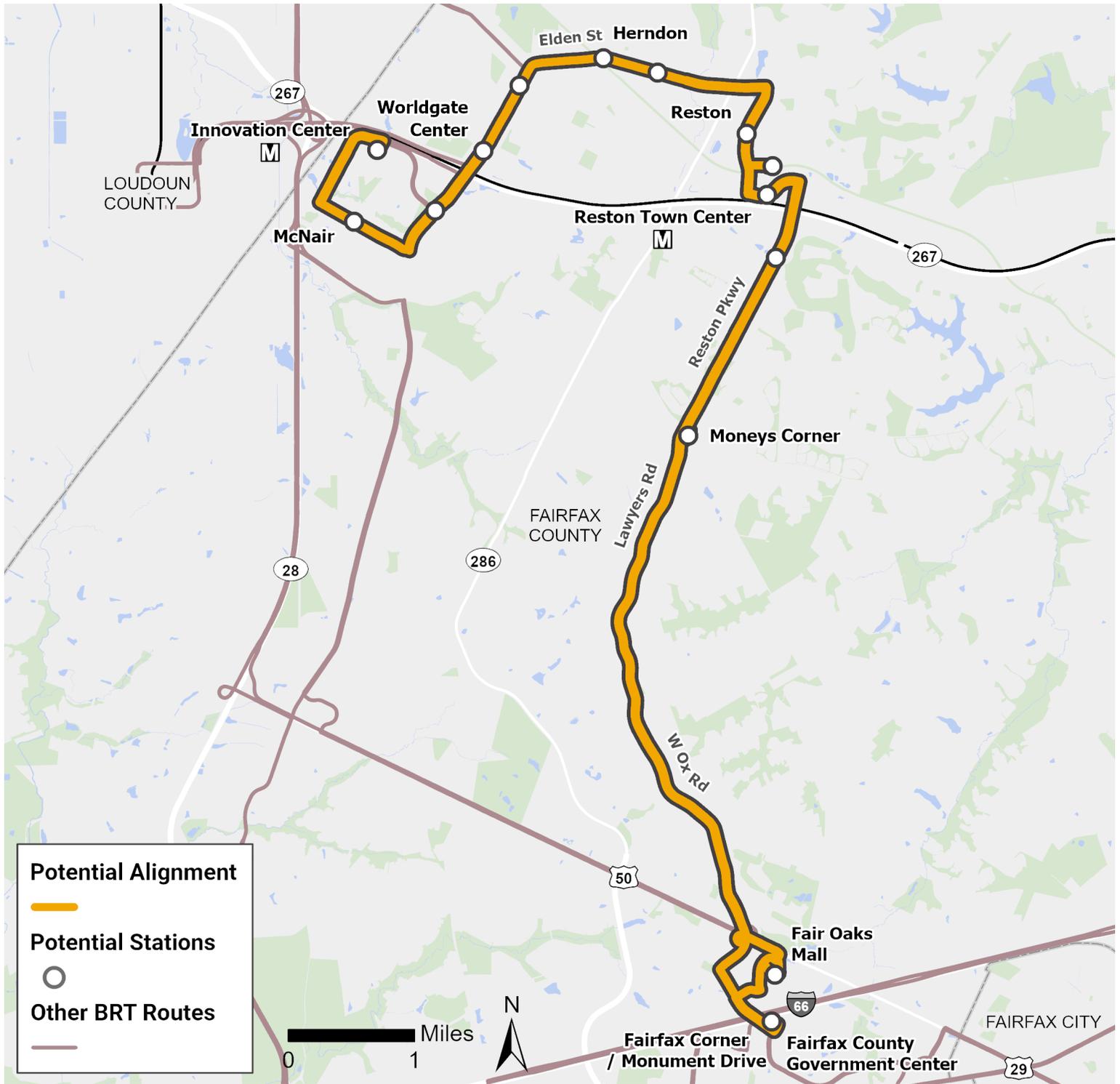
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
 (2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 17 West Ox Road



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 20 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
 (2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
 (2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
 (2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
 (2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
 (2045)

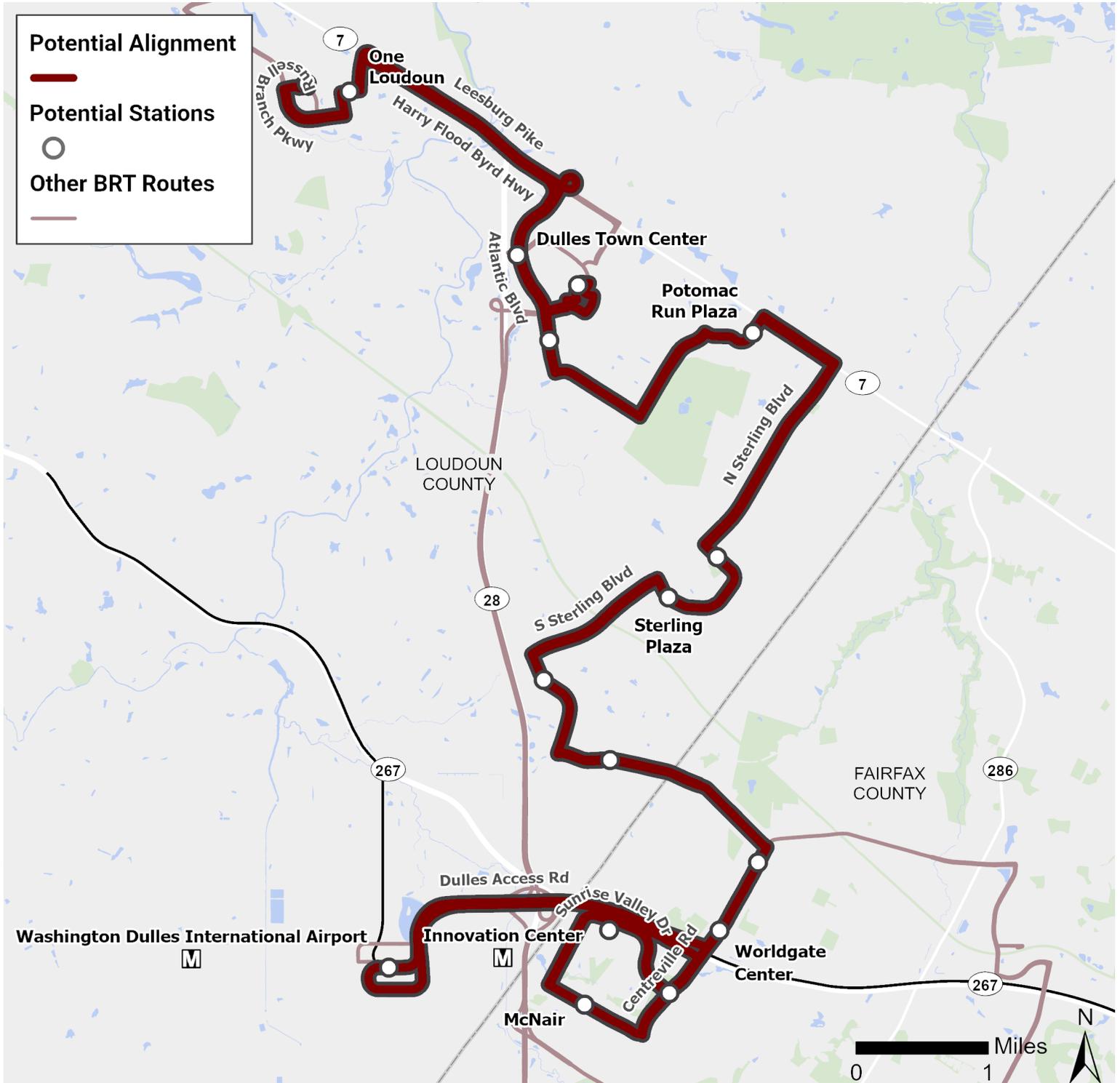
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
 (2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 18 Sterling Connector



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 20 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

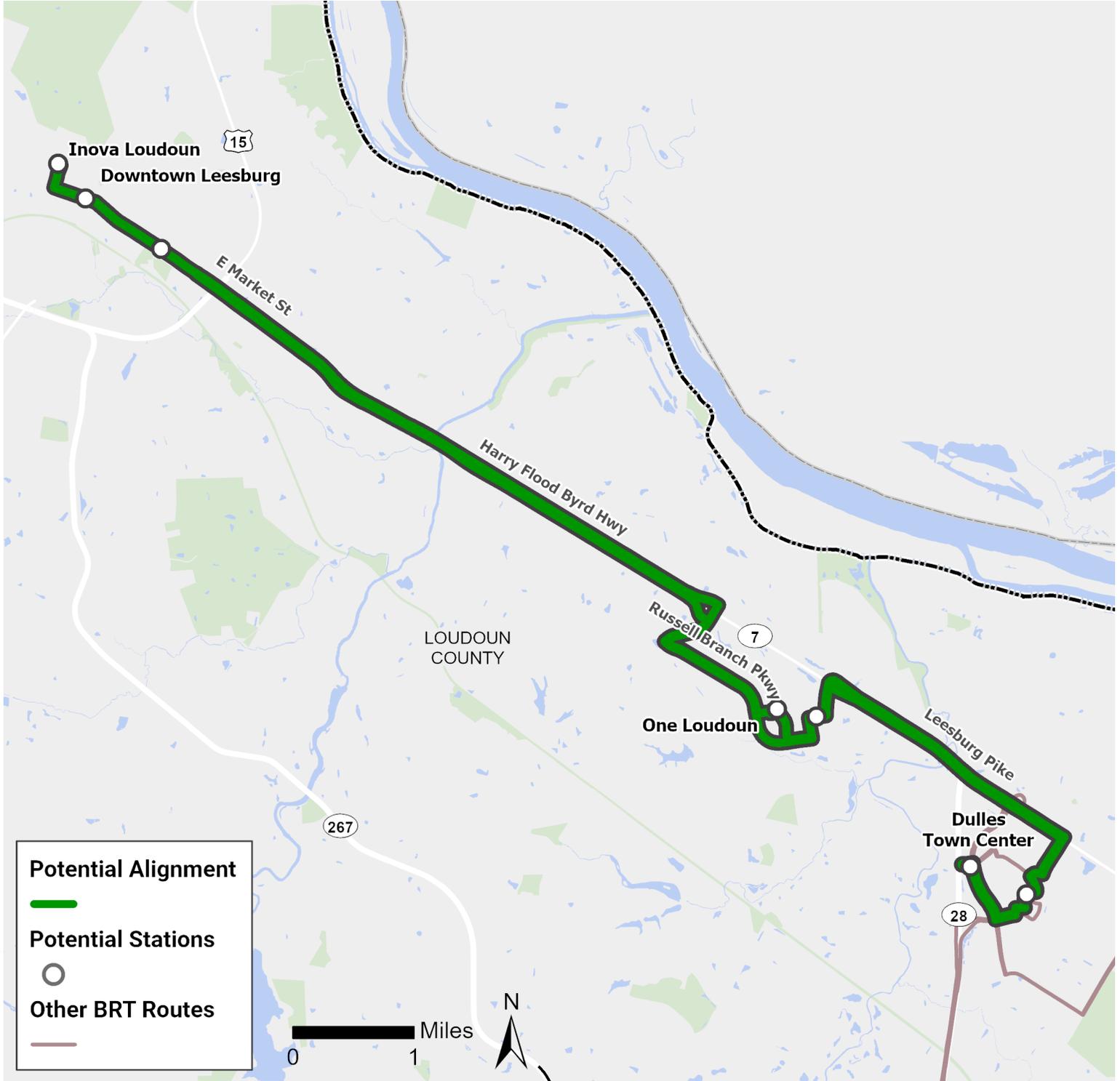
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 19 Loudoun Connector



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 20 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

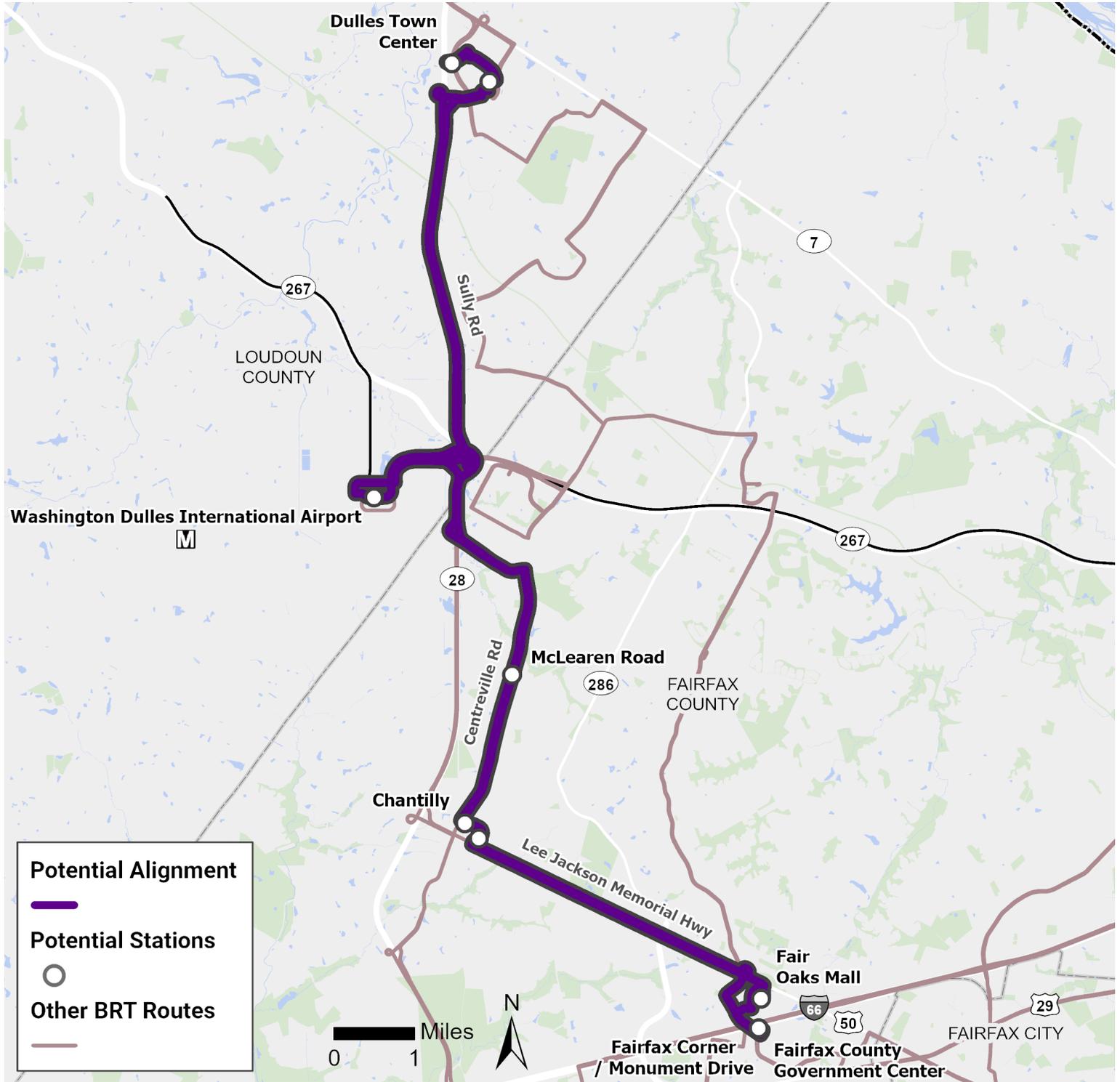
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 20 VA 28 North



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 20 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

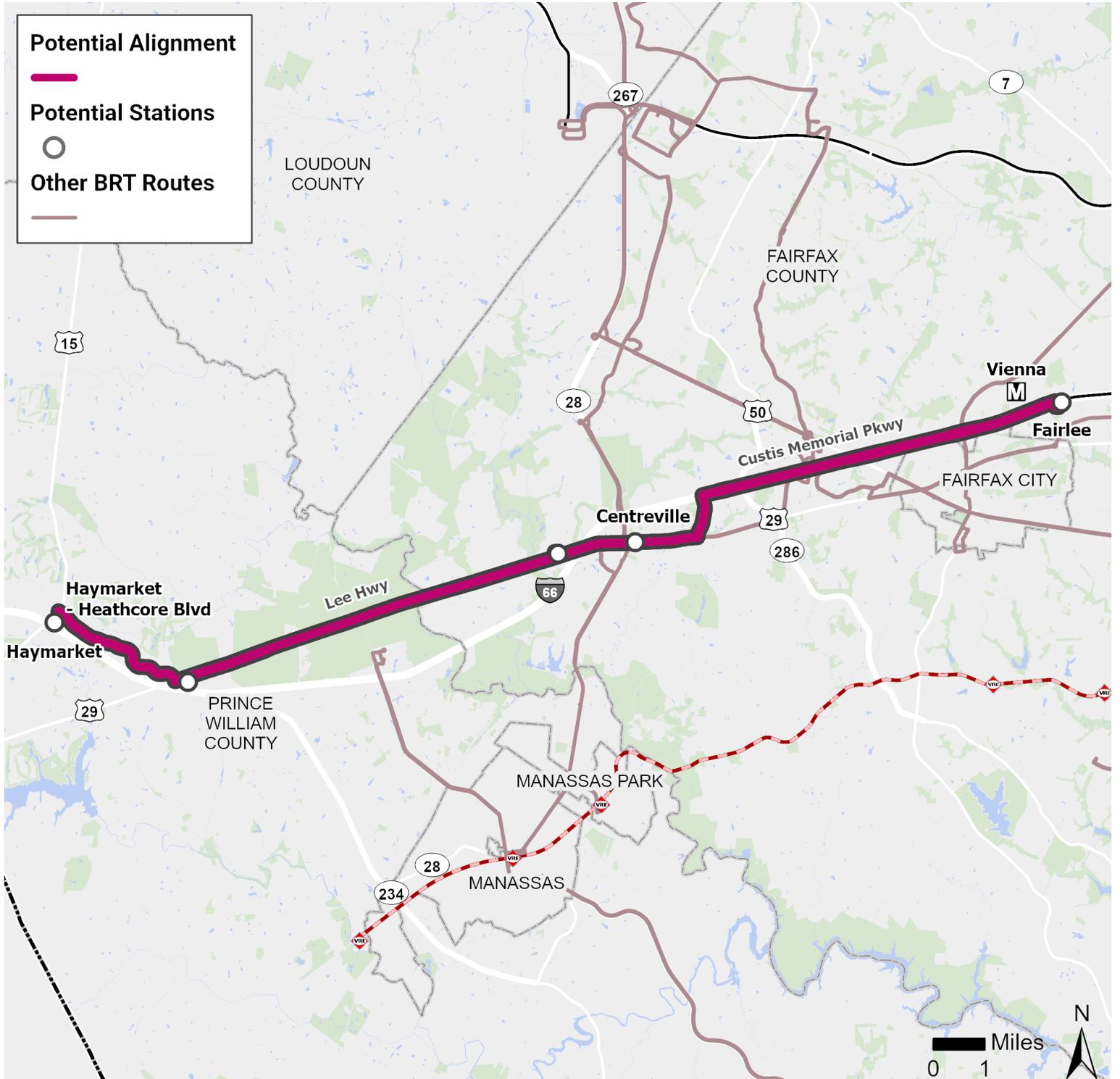
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 21 I-66 Express



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|-------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 7:00 AM - 7:00 PM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 30 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

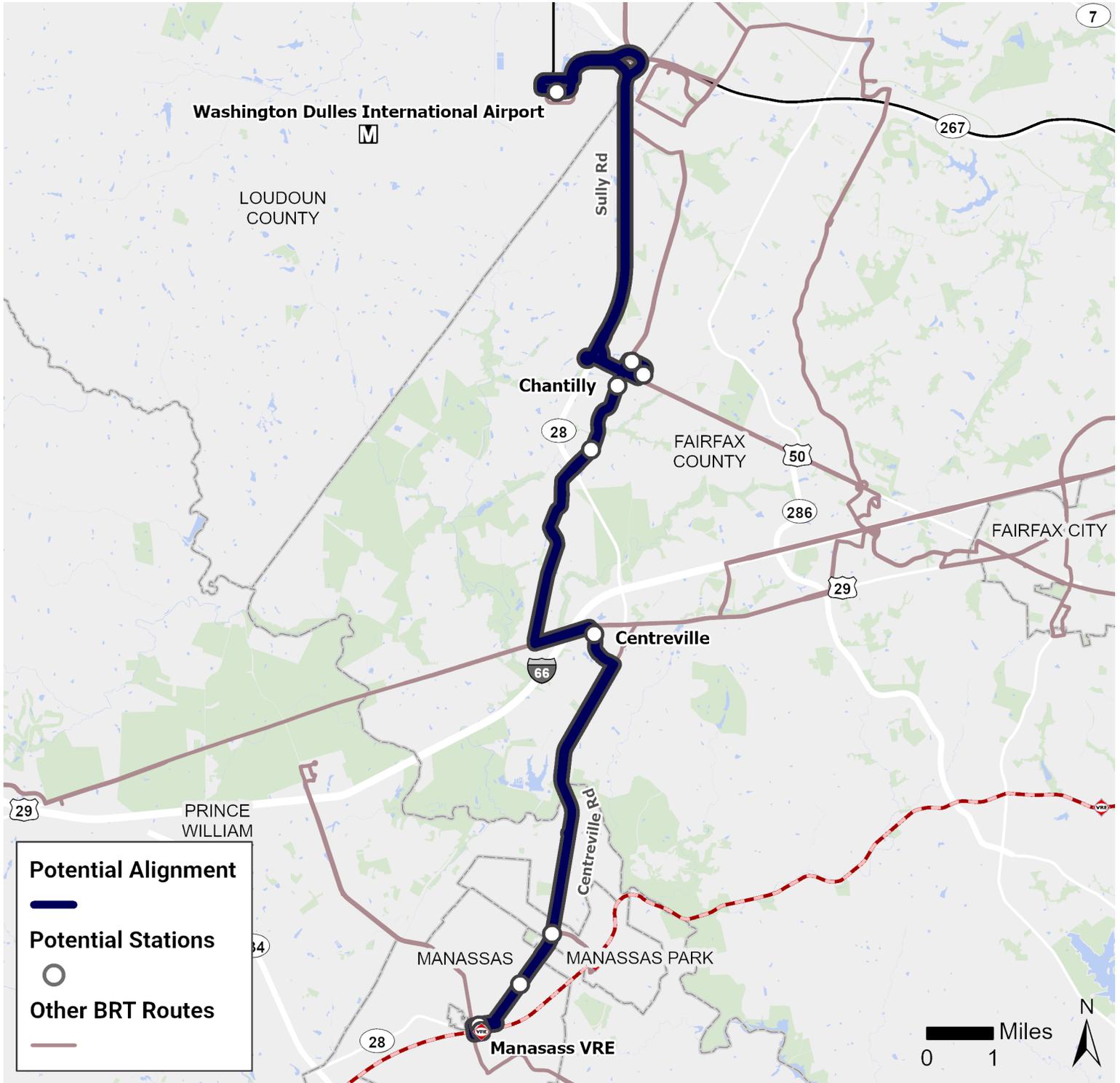
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 22 VA 28 South



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 20 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

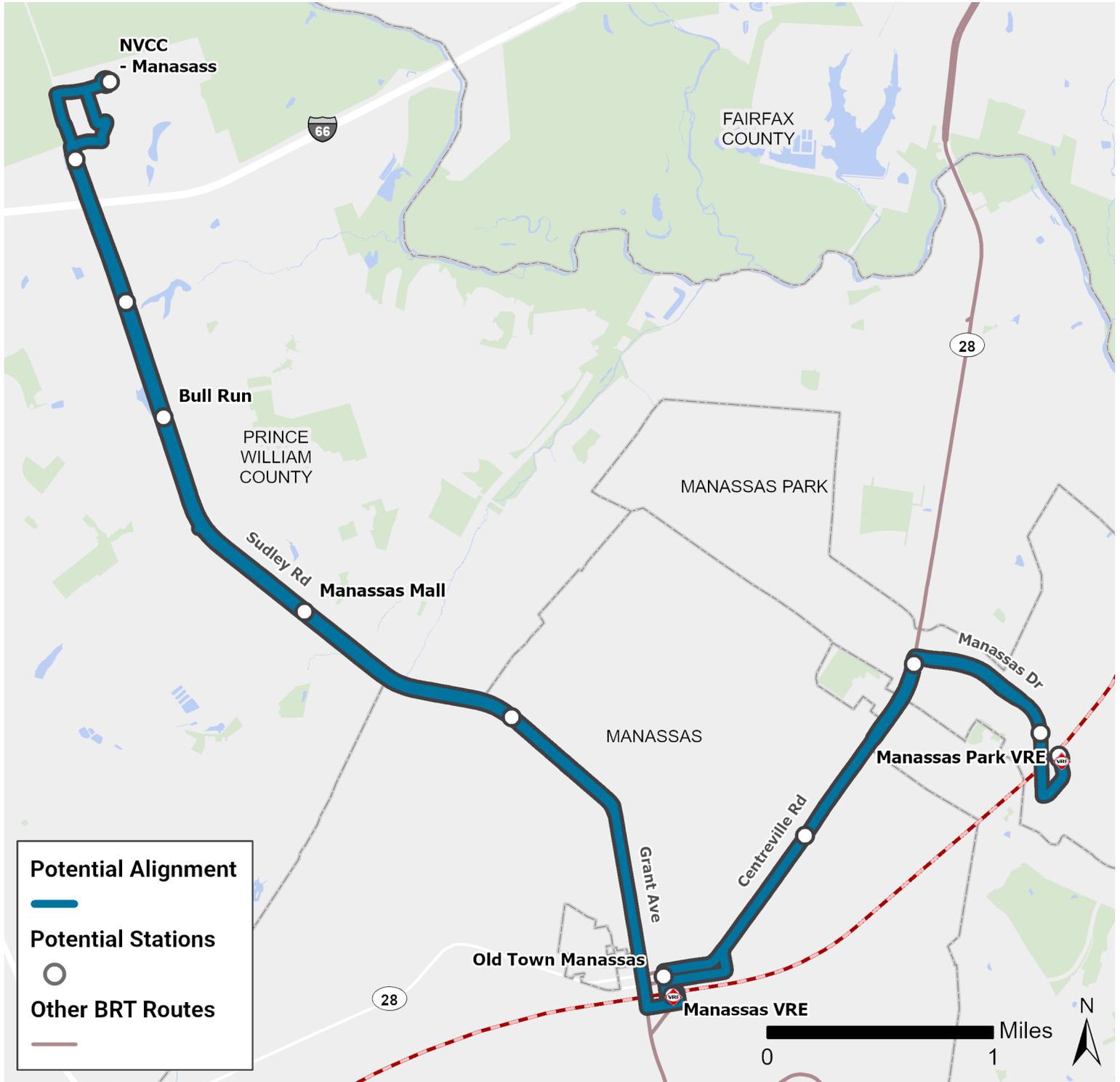
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 23 Manassas Connector



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 10 minutes | Frequency - Off-Peak | 15 minutes |
| | | Frequency - All Day | 15 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

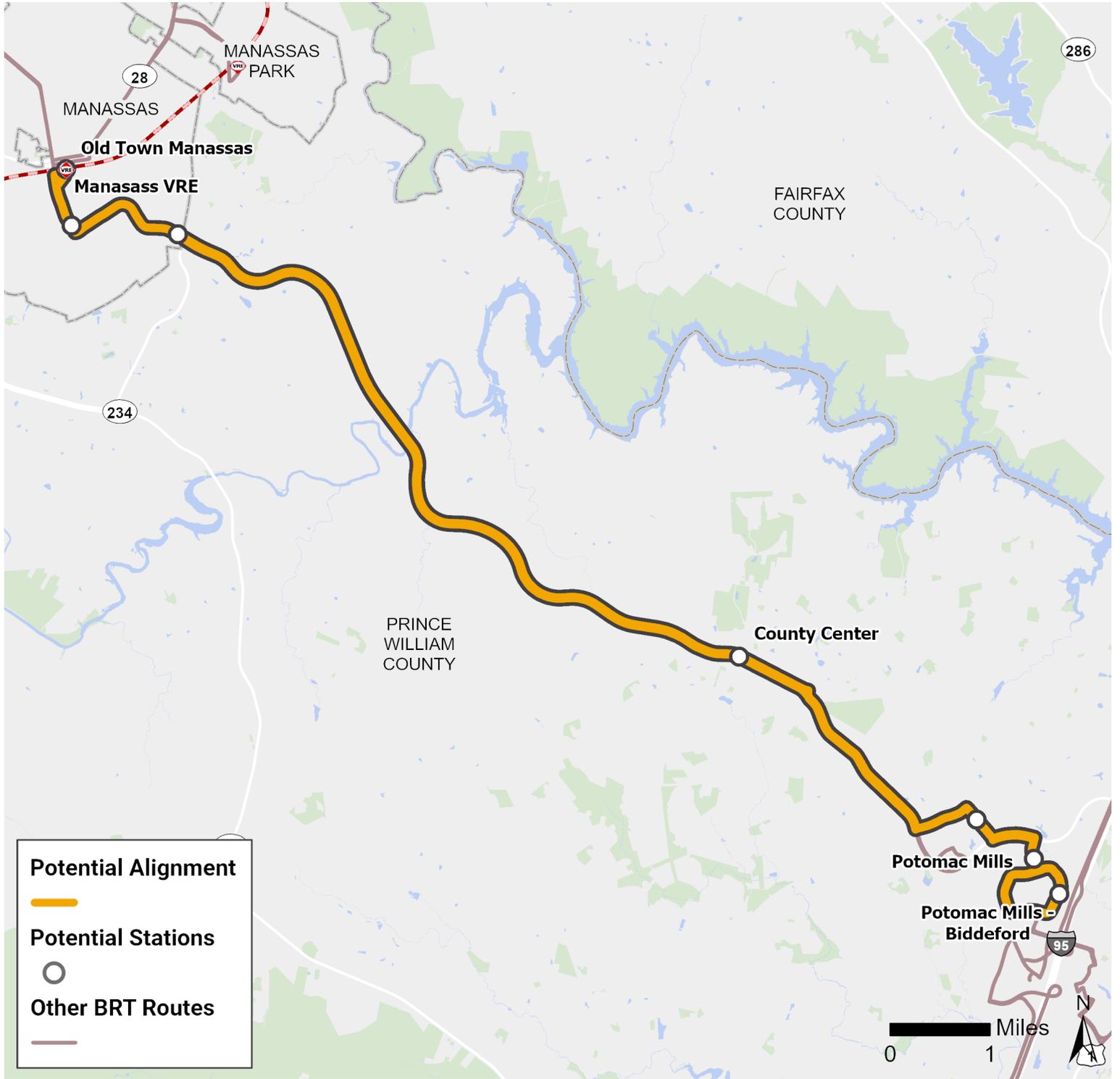
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 24 Prince William Parkway



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 20 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

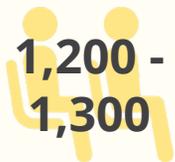
Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

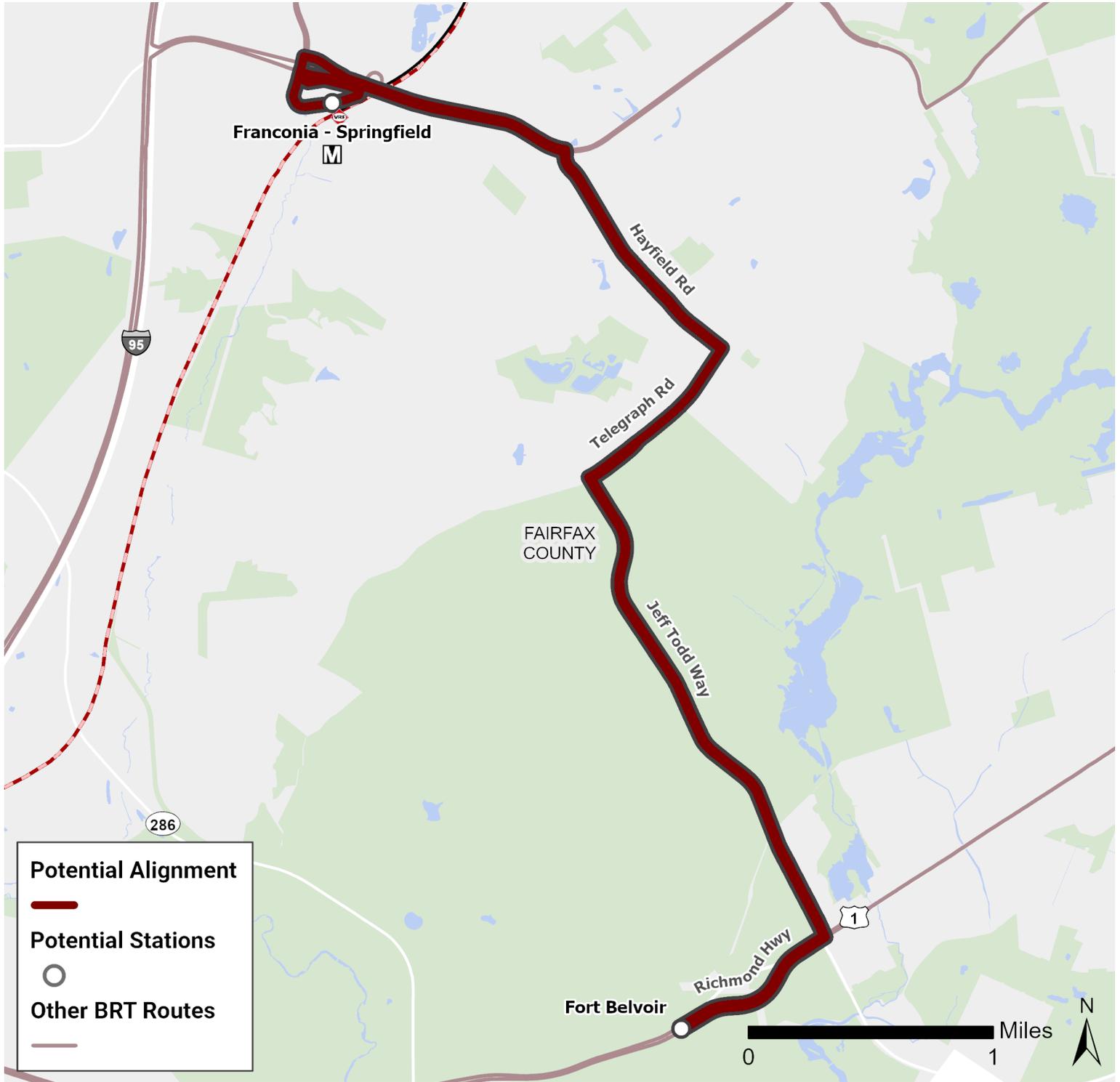
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 25 Fort Belvoir Express



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|-------------------------|-------------------|-------------------------|-------------------|
| Span: 5:00 AM - 7:00 PM | | Span: 7:00 AM - 7:00 PM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 30 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

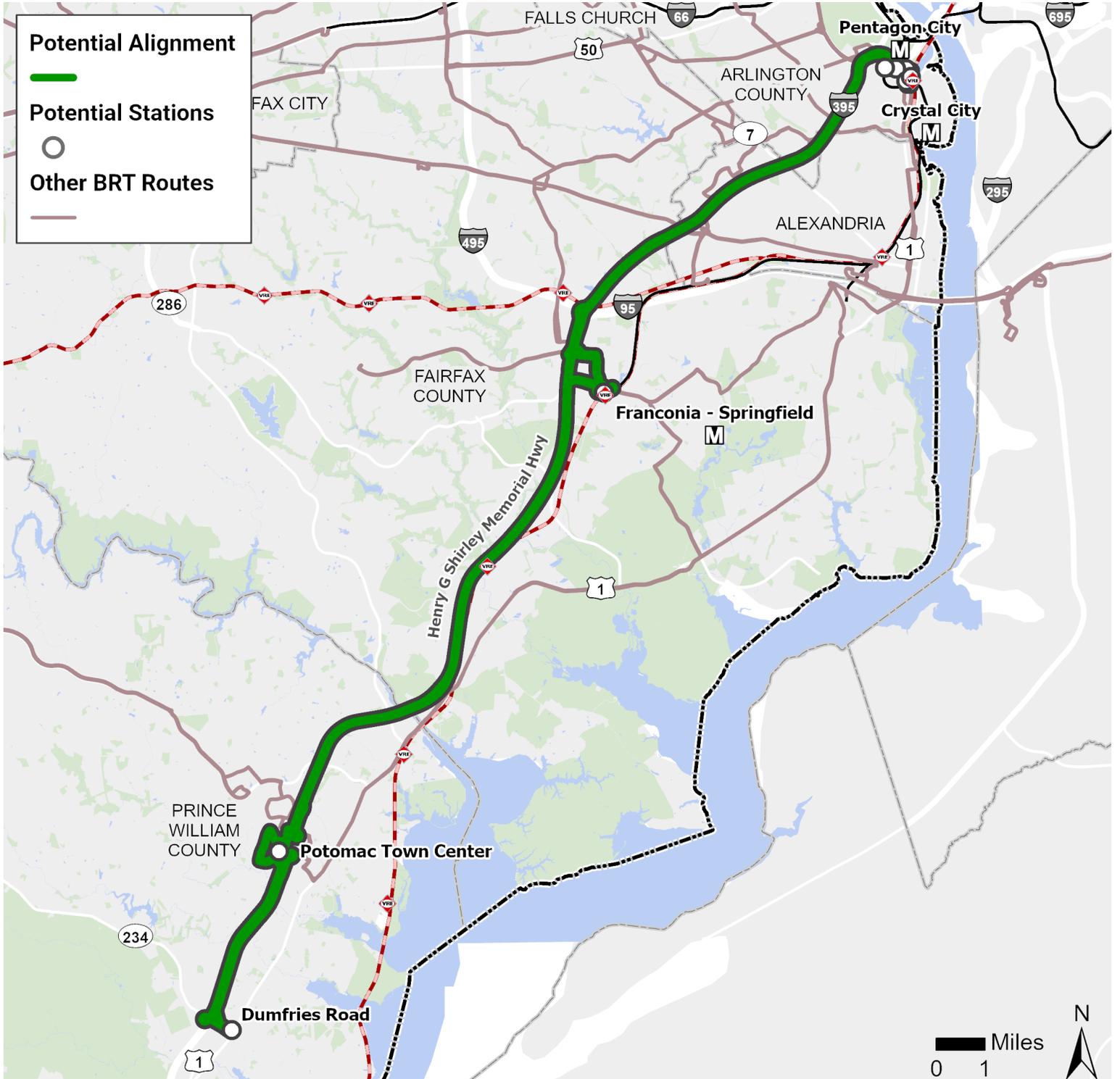
The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 26 I-95 Express



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|-------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 7:00 AM - 7:00 PM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 30 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



3,300 -
3,700

**Average
Weekday
Boardings**
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



7%

**Fare
Recovery**
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



1,000

**Driving Trips
Shifted
to Transit**
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



100

**Person-Hours of
Delay
Removed**
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



9,800
&
11,600

**Population
& Jobs
Served**
(2045)

The total number of people and jobs within a half-mile of the BRT stations.

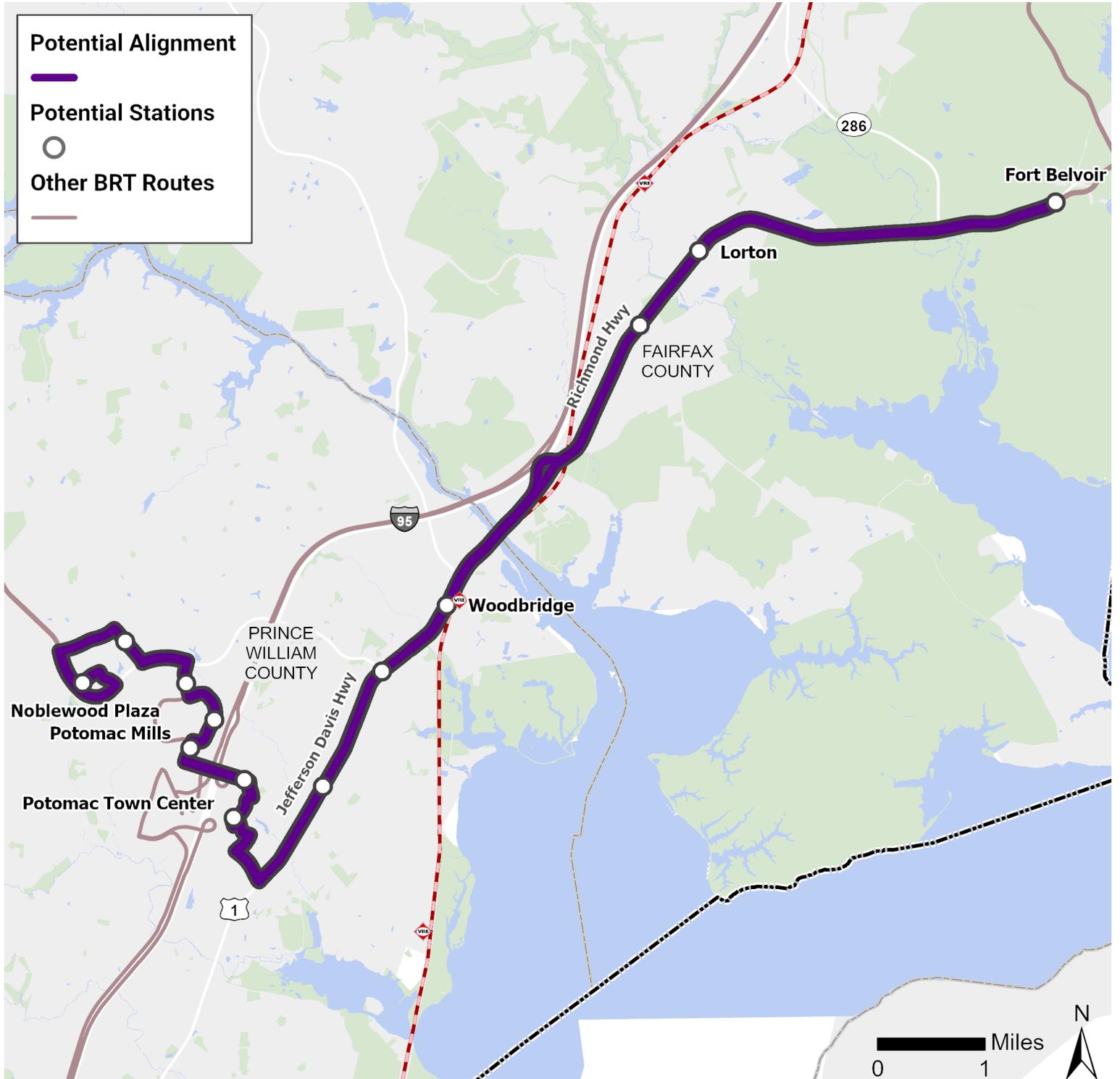


34%

**Station Area
Residents in
Equity Groups**
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 27 US 1 South



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 20 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

The total number of people and jobs within a half-mile of the BRT stations.

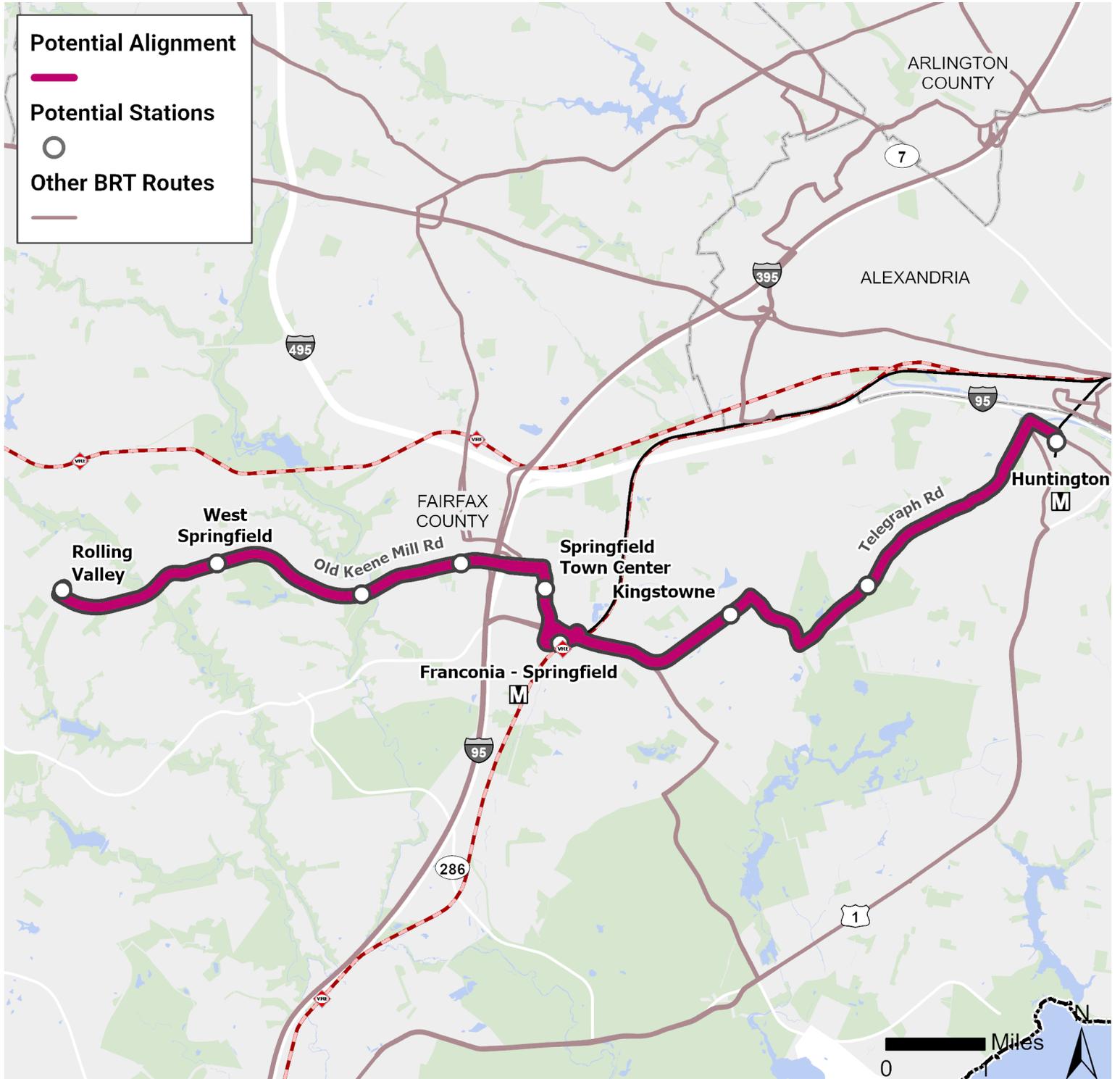


Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

Potential Route 28

Old Keene Mill Road



*Peak Frequency is typically 6:00 AM - 9:00 AM and 3:00 PM - 7:00 PM

| Weekday Service | | Weekend Service | |
|--------------------------|-------------------|--------------------------|-------------------|
| Span: 6:00 AM - 12:00 AM | | Span: 6:00 AM - 12:00 AM | |
| Frequency - Peak* | 15 minutes | Frequency - Off-Peak | 20 minutes |
| | | Frequency - All Day | 20 minutes |

Overall Performance

How does this route compare to the other routes in the full BRT network across key categories? High performance is always better than low performance.

Ridership



Includes Boardings, Service Efficiency, Mode Shift, and Mode Shift in Equity Emphasis Areas.

Transportation Impacts



Includes many metrics such as Congestion Reduction, Vehicle Emissions Reduction, and Run Time Improvement.

Land Use



Includes Existing Land Use Density, Walking Infrastructure Available, Bikeshare Stations, and Transit Supportive Policies.

Readiness



Includes Future Land Use Density and Socioeconomic Characteristics.

Cost



Includes Capital Cost Estimate and Annual Operating Cost Estimate.

Cost Effectiveness



Includes Capital Cost per Rider, Congestion Reduction Relative to Cost, and Greenhouse Gas Reduction Cost.

Key Metrics

How does this route perform on some of the key metrics?



Average Weekday Boardings
(2045)

Presented as a range based on if the route was implemented independently or part of a full network.



Fare Recovery
(2045)

The percentage of the route's operating cost that would be paid for by fares collected.



Driving Trips Shifted to Transit
(2045)

The estimated number of trips that would shift from driving to the region's transit network.



Person-Hours of Delay Removed
(2045)

The reduction in the total number of hours Northern Virginia residents spend in congestion delay.



Population & Jobs Served
(2045)

The total number of people and jobs within a half-mile of the BRT stations.



Station Area Residents in Equity Groups
(2025)

The average percentage of residents within a half-mile of BRT stations that are part of equity-focused groups.

APPENDIX K. DETAILED EVALUATION METHODOLOGY

K.1 Evaluation of Potential BRT Routes

The objective of this Evaluation Measures Memorandum is to establish a transparent methodology that will be used to support the various analyses that will be conducted in Phase 2 of the BRT-PDP. This work will provide an objective method for prioritizing the implementation of individual BRT routes and evaluate the potential impacts of a regional BRT system.

This document defines that evaluation methodology, which includes analyses that will be used to prioritize BRT routes and analyses that will provide additional context and information for regional agencies, decision-makers, potential operators, and jurisdictional partners. This memo identifies where the evaluation process is aligned with metrics used in the processes used to evaluate projects for key potential funding streams, including FTA's Capital Improvement Grants (New Starts/Small Starts) and NVTA's own TransAction.

For each measure, this memo highlights the data sources, assumptions, and calculation methodology that will be used. Throughout, this methodology takes a conservative approach to calculating the measures to highlight the a reasonable outer limit of possible outcomes; better performance on many measures could be possible. For example, the calculation of the amount of facility space required to operate the BRT system assumes that the system level need is equal to the sum of all the needs of each route. In reality, some amount of efficiency could be achieved by garaging multiple BRT routes at the same facility, reducing the total amount of facility space that would ultimately be required.

The process that will be used to prioritize the individual BRT routes is outlined in Section 3 of this document; this memo highlights which measures will be used to prioritize routes, and which will be only provided for informational purposes or as inputs to other measures.

K.2 Performance Measures

The measures to be used in evaluating the performance of each potential BRT route and the overall BRT system are shown in Table K-1. These measures represent a comprehensive high-level overview of the potential benefits, tradeoffs, opportunities, and challenges associated with implementing BRT across Northern Virginia. These measures incorporate input from the general public through the Phase 1 Engagement, and from NVTA's partner jurisdictions via the BRT Planning Working Group.

The majority of these measures will be used to prioritize BRT routes for implementation except as noted in the table below. Some of these measures will be used to provide a more nuanced understanding of the impacts of a BRT route and not for prioritization; for example, a route that has a higher percentage of ridership during the off-peak period is neither better nor worse than a route that has more ridership during the peak periods – the information is interesting nonetheless. A small set of measures can also be calculated at a system level and not at a route level. These measures will provide useful information about the needs of a complete BRT system, but are not used in prioritizing routes.



K.2.1 Data Sources

Sources of data for each measure is included in the individual sections on each measure, along with key assumptions, and generally include the Census, MWCOG Cooperative Land Use Forecasts, and the results of the travel demand model.

The most recent version of the NVTA model will be used to forecast ridership and other impacts out to 2045. This model set incorporates the MWCOG Round 10.0 Cooperative Land Use Forecasts. The background transportation network includes all projects used as part of the Air Quality Conformity (AQC) Analysis of the 2022 Update to Visualize 2045, a Long-Range Transportation Plan (LRTP) for the National Capital Region, and the FY 2023-2026 Transportation Improvement Program (TIP), in addition to projects that have been fully funded by NVTA. A model network that includes these projects and the BRT service are compared in order to calculate the measure results.



Table K-1 List of Performance Measures

| Category | Scale | Measure | Used for Prioritization | Notes |
|------------------------|------------------|--|-------------------------|--|
| Ridership | Route and System | BRT Ridership | ✓ | Aligns with CIG Criteria: Mobility Improvements |
| | | Service Efficiency | ✓ | |
| | | Mode Shift | ✓ | Aligns with CIG Criteria: Congestion Relief; includes Equity Lens |
| | | Percent BRT Ridership During Peak Periods | | Informational Only |
| | | Impacts to other High Capacity Transit Ridership | | Informational Only |
| Transportation Impacts | Route and System | Congestion Reduction | ✓ | Identical to TransAction Measure A1+A2; Aligns with CIG Criteria: Congestion Relief |
| | | VMT Reduction | ✓ | Aligns with CIG Criteria: Environmental Benefits |
| | | Vehicle Emission Reductions | ✓ | Identical to TransAction Measure F1; Aligns with CIG Criteria: Environmental Benefits |
| | | Transit Accessibility Improvement | ✓ | Identical to the transit portion of TransAction measures C1& C2 (which includes equity lens) |
| | Route | Connections to other high capacity transit | ✓ | |
| | | Safety | ✓ | Conceptually aligned with TransAction Safety measures and SmartScale Safety metrics |
| | | Run Time Improvement | ✓ | |
| Land Use | Route and System | Future Land Use Density | ✓ | |
| | | Socioeconomic characteristics | ✓ | Includes equity lens |
| Readiness | Route | Existing Land Use | ✓ | |
| | | Active Transportation Infrastructure Available | ✓ | Aligns with CIG Criteria: Land Use |
| | | Transit Supportive Policies | ✓ | Aligns with CIG Criteria: Economic Development |



| Category | Scale | Measure | Used for Prioritization | Notes |
|---------------------------|------------------|--|-------------------------|--|
| Costs | Route and System | Capital Cost Estimate | ✓ | |
| | | Annual Operating Cost Estimate | ✓ | |
| Revenue | Route and System | Fare Recovery Ratio | ✓ | |
| | Route | Potential Funding Opportunities | ✓ | Qualitative in nature |
| Cost Effectiveness | Route and System | Cost per Rider | ✓ | Aligns with CIG Criteria: Cost Effectiveness |
| | | Cost Reduction Relative to Cost (CRRC) | ✓ | Identical to measure used in NVTA’s Six Year Program Evaluation |
| | | GHG Reduction Cost | ✓ | |
| Feasibility | Route | Ease of Implementation | ✓ | Qualitative in nature |
| Operating Characteristics | Route and System | Revenue Miles & hours | | |
| | | Vehicles Needed | | |
| | | Staffing Needs | | |
| | Route | Platform Miles & hours | | |
| | | Crowding | | Serves as a check to identify all route that warrant larger vehicles or higher frequencies |
| | System | Geographic Distribution | | |
| Supporting Needs | Route | EV/Charging Infrastructure Needs | | Needed for capital cost estimates |
| | System | Facility Requirements | | Not incorporated into capital costs since facility needs are not at a route level |



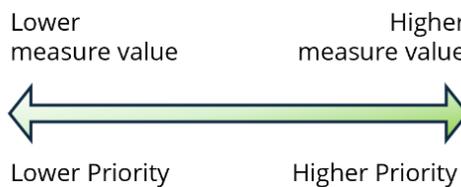
K.3 Calculation Methodology

Each of the following sections describes the methodology, data sources, and assumptions for each of the evaluation measures.

K.3.1 Ridership

BRT Boardings

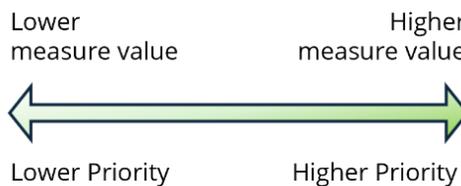
BRT Ridership will be quantified as the number of daily boardings, i.e., unlinked trips, on a BRT route forecast for 2045. Ridership on each route will be evaluated individually (assuming no other proposed BRT routes exist) to prioritize routes, and also at the system level (assuming a system of BRT routes is in place) in order to capture the network effects and potential of transfers. This measure aligns with FTA Capital Investment Grant (CIG) programs’ Mobility Improvements justification, which considers ridership as an evaluation metric for grant funding.



Service Efficiency

Service Efficiency is calculated as BRT ridership per revenue hour, and helps to identify routes that are more efficiently attracting riders. BRT Ridership is calculated from the travel demand model (see section 1.2.1), and revenue hours are calculated based on operating characteristics (see section 2.9.1). This measure will be used to compare potential routes for efficiency, and will also be calculated at the network level.

$$Service\ Efficiency = \frac{BRT\ Ridership}{Revenue\ Hours}$$



Mode Shift

Mode Shift captures the change in overall transit usage with and without implementation of BRT. It will be quantified as new transit trips as forecast by the Travel Demand Model. These new transit trips are captured in two ways: as a total of



all new transit trips, and identifying the subset that start in one of NVTA’s Equity Emphasis Areas (EEA), which are shown in Figure K-2. These two measures quantify not only how many trips will be shifted onto transit due to the BRT, but uses an equity lens to identify where those trips are being made in EEAs. The total number of new transit trips and the number of new EEA transit trips will be used to prioritize potential BRT routes, as routes that shift more people out of driving represent a positive benefit to the region. Prioritizing routes that attract a larger number of new EEA transit trips will help ensure that the ridership benefits of BRT are distributed to the communities that need them the most. These measures will also be calculated at the network level to account for the network effects of transfer opportunities. The measure aligns with the FTA CIG Congestion Relief justification, which looks at new weekday linked transit trips.

$$\text{Mode Shift} = \text{Transit trips}_{\text{with BRT implementation}} - \text{Transit trips}_{\text{without BRT implementation}}$$

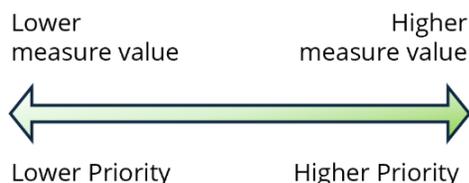
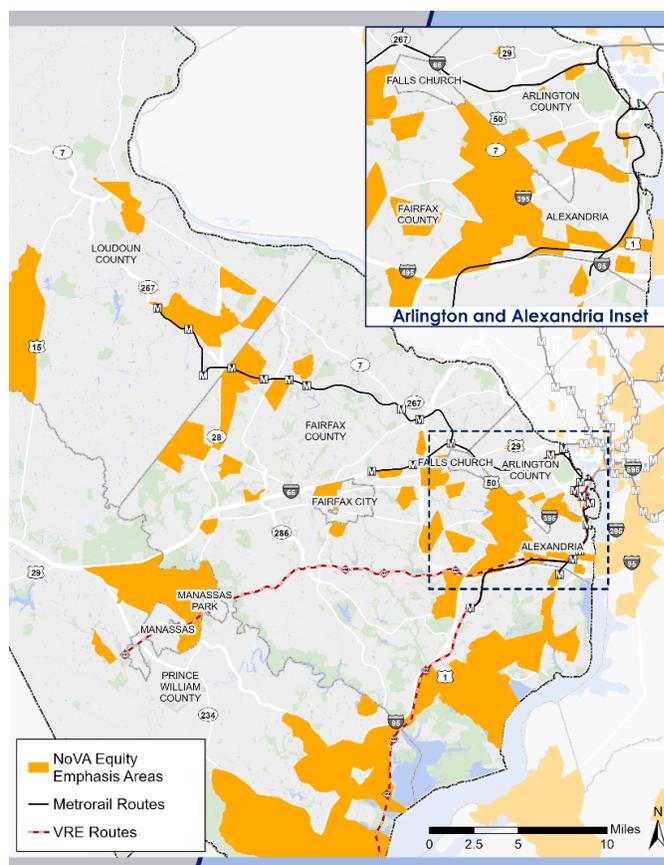


Figure K-1 NVTA Equity Emphasis Areas



BRT Ridership Share During Peak Periods

BRT Ridership Share During Peak Periods captures the share of a route’s ridership that occurs during the morning and evening peaks. It is calculated from weekday boardings between 6 a.m.—9 a.m. and 4 p.m.—7 p.m. using the Travel Demand Model. This measure can be calculated for individual routes and the complete system. Because peak ridership is not inherently better or worse than off-peak ridership, this measure will be used for informational purposes only, and will not be used for prioritization.

$$\text{BRT Ridership Share During Peak Periods} = \frac{\text{BRT Ridership}_{\text{peak periods}}}{\text{BRT Ridership}_{\text{all day}}}$$

Ridership Impact to Other High Capacity Transit

A potential impact of implementing BRT service could be attracting riders away from other existing high capacity transit in the region, including VRE and Metrorail. It is also possible that more BRT could increase boardings on other transit systems as the network builds the possibility of more transfers. These impacts are considered in the Mode Shift measure (see section 2.1.3), which accounts for only new transit trips and therefore does not account for trips switching between one type of transit and another. However, to provide additional detailed context, this measure will quantify impacts to forecast boardings for VRE and Metrorail stations in Northern Virginia. In order to avoid double counting these impacts, this measure will not be used in prioritizing routes. This measure can be quantified for both individual routes and for potential networks.



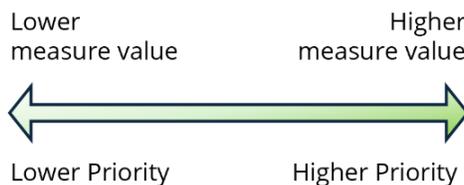
K.3.2 Transportation Impacts

Congestion Reduction

Congestion Reduction will be evaluated by the reduction in total person-hours of delay (PHD) caused by BRT, as calculated in the Travel Demand Model. Person-hours of delay are measured as the difference between the forecasted person-hours spent traveling and the hypothetical number of person-hours spent travelling were all roads operating at free-flow speed. Congestion reduction will be quantified for both auto users and transit passengers based on average vehicle occupancy and transit ridership levels.

$$Person\ Hours\ Delay = (Travel\ Time - Travel\ Time_{free\ flow}) * Vehicle\ Volume * Vehicle\ Occupancy$$

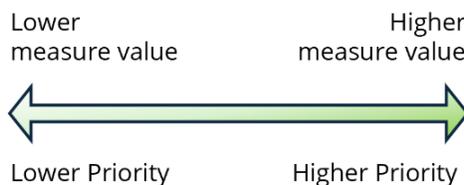
This measure can be quantified for both individual routes and for potential networks, and will be used for route prioritization. It aligns with the FTA CIG program’s Congestion Relief justification; although the CIG uses new weekday linked transit trips as a proxy for congestion reduction since the process does not require the same level of detailed modeling being undertaken as part of this project. This measure is also identical to the congestion reduction measures used in TransAction and as part of NVTAs Six Year Program evaluation process.



VMT Reduction

Vehicle-Miles Traveled (VMT) Reduction captures the impact of BRT on the usage of private vehicles. Changes to VMT will be calculated by the Travel Demand Model. This measure can be quantified for both individual routes and for potential networks, and will be used for route prioritization. VMT Reduction aligns with the FTA CIG program’s Environmental Benefits project justification, which also evaluates VMT reduction to reflect the fact that reducing VMT also proportionally reduces associated externalities related to human health, safety, energy, and the air quality environment.

$$VMT\ Reduction = Total\ VMT_{without\ BRT} - Total\ VMT_{with\ BRT}$$



Vehicle Emissions Reduction

Vehicle Emissions Reduction captures effects of BRT on the environment and air quality. The change in emissions will be approximated using VMT Reduction as a proxy, with an assumed emissions rate depending upon a vehicle’s size and speed. By 2045, some portion of the private vehicle fleet is expected to be comprised of Zero Emissions Vehicles (ZEV), meaning that shifting from a private vehicle to a transit vehicle could have no discernible impact of emissions. Various



predictions about ZEV market penetration in the vehicle fleet exist based on potential policies and technology costs; two of the most often cited are shown in the table below.

Table K-2 ZEV Fleet Estimates

| | AEO | MOVES | Average |
|---------------------|-------|-------|---------|
| Light Duty Vehicles | 10.9% | 31.3% | 21.1% |
| Heavy Duty Trucks | 0.05% | 3.5% | 1.8% |

Sources: AEO estimates are based on the latest estimates from the US EIA Annual Energy Outlook Reference Case (2023); MOVES estimates are based on the assumptions included in the latest EPA MOVES4 software update.

To account for this variation, the average of these estimates will be used for light and heavy duty vehicles. All buses will be assumed to be ZEV to comply with local and regional goals and mandates. The following will be assumed about the vehicle fleet in 2045:

- ◆ 21 percent of light-duty vehicles will be ZEV
- ◆ 100 percent of buses will be ZEV, including BRT vehicles
- ◆ 2 percent of heavy trucks will be ZEV

For the purpose of this measure, the change in CO₂ emissions will be calculated by multiplying the change in non-ZEV VMT by the appropriate emissions rate, as shown in Table K-3.

$$\text{Vehicle Emissions Reduction} = \sum_{\substack{\text{Speed Class} \\ \text{Vehicle Class}}} \text{Non - ZEV VMT Reduction} * \text{Emissions Rate}$$

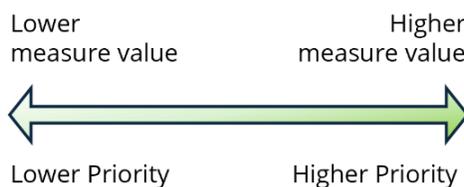


Table K-3 Running CO₂ Emissions Rates (g/mile) by Speed

| Speed (mph) | Light-Duty Vehicles | Buses | Trucks ²⁷ |
|-------------|---------------------|----------|----------------------|
| <2.5 | 1,193.27 | 7,325.32 | 8,160.82 |
| 2.5-5 | 650.44 | 4,011.37 | 4,312.85 |
| 5-10 | 380.17 | 2,590.43 | 2,586.80 |
| 10-15 | 297.07 | 2,142.19 | 2,163.03 |
| 15-20 | 248.23 | 1,885.14 | 1,874.54 |
| 20-25 | 220.00 | 1,727.80 | 1,708.10 |
| 25-30 | 203.51 | 1,681.17 | 1,660.44 |
| 30-35 | 198.06 | 1,434.48 | 1,430.85 |
| 35-40 | 193.92 | 1,390.28 | 1,379.48 |
| 40-45 | 190.17 | 1,354.12 | 1,336.62 |
| 45-50 | 184.58 | 1,325.92 | 1,273.75 |
| 50-55 | 179.37 | 1,302.15 | 1,214.71 |
| 55-60 | 175.76 | 1,286.11 | 1,195.29 |
| 60-65 | 176.88 | 1,355.77 | 1,245.24 |
| 65-70 | 181.83 | 1,421.19 | 1,290.19 |
| >70 | 189.88 | 1,500.28 | 1,362.54 |

Source: MWCOG/TPB Emissions Analysis for Fairfax County

This measure can be quantified for both individual routes and for potential networks. It will be used for route prioritization so as to prioritize implementation of BRT routes that will result in the greatest reduction in vehicle emissions. Vehicle Emissions Reduction aligns with the FTA New Starts’ Environmental Benefits project justification, which evaluates the dollar value of anticipated direct and indirect benefits to human health, safety, energy, and the air quality environment. This measure is also identical to the emissions reduction measure used in TransAction and as part of NVTA’s Six Year Program evaluation process, although some of the assumptions are somewhat different.



Transit Accessibility Improvement

The Transit Accessibility Improvement measure captures the change in access to jobs by transit that is caused by BRT. It is calculated from the change in number of jobs accessible within 60 minutes via transit for residents of Northern Virginia. The jobs accessible from each Traffic Analysis Zone (TAZ) are calculated directly from the travel demand

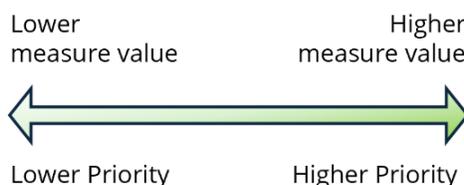
²⁷ Assumes a truck fleet that is evenly split between single unit and combination trucks.



model. A regional value for this measure will be calculated by taking the average of all TAZ values weighted by their total population.

$$\frac{\sum_{TAZ=1}^{3722} \Delta Access_{TAZ} * Pop_{TAZ}}{Regional\ Population}$$

Two averages are computed for this measure: 1) a regional total that includes all TAZs and 2) an average for only TAZs that are located in Equity Emphasis Areas (EEAs). Evaluating Transit Accessibility Improvement separately for residents of EEAs provides an equity lens to the impacts of BRT deployment. These measures can be quantified for both individual routes and for potential networks, and both will be used for route prioritization.



This measure is similar to the accessibility measures used in TransAction and as part of NVTA's Six Year Program evaluation process, although in this analysis only access on transit is considered.

Connections to Other High Capacity Transit

This measure will quantify how well a proposed BRT route is connected to the planned high-capacity transit system by counting the number of connections to the services shown in Figure K-2. These connections will be counted as follows:

- ◆ **Metrorail:** A route that connects to Metrorail at multiple points will be counted multiple times only if it connects to different rail lines
- ◆ **VRE:** A route that connects to VRE at multiple points will be counted twice only if it connects to both VRE lines (not at a shared station)
- ◆ **BRT:** The number of connections to different BRT lines that have already been funded by NVTA. Since some of these BRT lines are included as potential routes in this study, those routes will count as connecting to themselves as well.

$$HCT\ Connections = \#\ Metrorail\ Line\ Connections + \# VRE\ Line\ Connections + \# Funded\ BRT\ Connections$$

This measure can only be used to evaluate potential BRT routes and will be used to prioritize routes that build from the High Capacity Transit system already implemented and planned for the region.



Safety

The Safety Measure captures the effect of crash reduction related to reducing auto travel on BRT corridors due to mode shift. The actual number of crashes that could be avoided by implementing BRT cannot be accurately predicted; without a method for forecasting the change in crash rate over time, this analysis assumes that current and future crash rates (crashes per VMT) are identical. As crash rates do not change in this methodology, reductions in crashes are achieved by reducing VMT; all else being equal, routes with a larger reduction in VMT will have a larger reduction in crashes. This methodology also account for differences in the existing crash rates in different corridors, assuming that there is more potential for reducing crashes where there are more crashes to begin with.

This measure will be quantified using the following process:

1. Calculate existing crash rate with ½ mile of the BRT route by crash type.

$$Crash\ rate_{crash\ type} = \frac{Total\ Crashes_{crash\ type}}{VMT}$$

2. Calculate the expected reduction in crashes based on the VMT reduction measure (see Section 2.2.2).

$$Crashes\ Avoided_{Crash\ Type} = Crash\ Rate_{Crash\ Type} * VMT\ Reduction$$

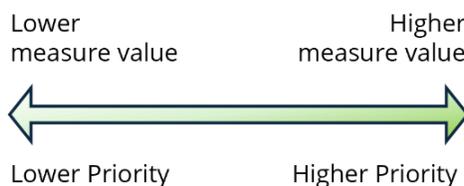
3. Calculate the equivalent property damage only (EPDO) value of the crashes avoided within ½ mile of the route. The EPDO values will be assigned using the values in the SMART SCALE Technical Guide, Table 6.2: EPDO Crash Value Conversion, as shown in Table K-4.²⁸

Table K-4 EPDO Crash Value Conversion

| Crash Type | Rounded Value (\$, 2022) |
|-------------------------------|--------------------------|
| Fatal (F) & Severe Injury (A) | \$2,200,000 |
| Moderate Injury | \$260,000 |
| Minor Injury | \$140,000 |

$$EPDO\ Value\ Reduction = \sum_{Crash\ Type} EPDO * Crashes\ Avoided$$

The result will be a total dollar value of projected crash cost reduction that will be highest for route with the most unsafe base conditions and with the most VMT reduction. Routes with a higher value will be prioritized for their potential to improve safety, This is conceptually aligned with safety measures used in TransAction and SmartScale, although it is quantified differently due to data availability.



²⁸ SMART SCALE Technical Guide. Table 6.2: EPDO Crash Value Conversion.

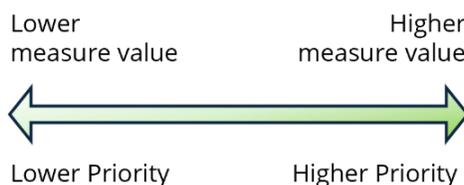


Run Time Improvement

Run Time Improvement will be measured based on the Estimated Change in End-to-End Run Time for each route, comparing the BRT service to local bus service. Run times for the potential BRT routes will be calculated based on the level of priority provided, frequency of stops, and general traffic conditions along each route. These run times will be compared to the time it would take a local bus to traverse the same route with no bus priority. This measure is designed to capture the impacts of priority treatments on bus speeds and to prioritize routes with more and more significant bus priority treatments.

Where local bus service already exists, those run times will be used to inform the analysis of local bus speeds, accounting for the future degradation of bus speeds in mixed traffic due to increased congestion across the region. For routes where bus service does not currently operate, a high-level analysis for a theoretical local bus route will estimate the run time.

$$Run\ Time\ Improvement = \frac{RunTime_{Local} - RunTime_{BRT}}{RunTime_{Local}}$$

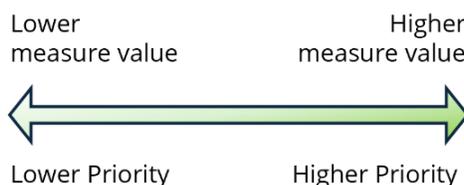


K.3.3 Land Use

Future Land Use Density

Future Land Use Density will be calculated as the density of population and employment within one half mile of each proposed BRT stop in 2045, based on the MWCOG Round 10.0 Cooperative Lane Use Forecasts. These forecasts provide estimated population and job totals in five-year increments for every TAZ in Northern Virginia. the growth rate for each TAZ to 2045 will be calculated then applied to the existing land use in the respective intersecting block groups. This measure can be used to evaluate both potential routes and potential networks and will be used for route prioritization to prioritize routes that have plans for high land use densities.

$$Future\ Land\ Use\ Density = \sum (Population + Employment)_{within\ \frac{1}{2}\ mile\ of\ stops}$$



Socioeconomic Characteristics

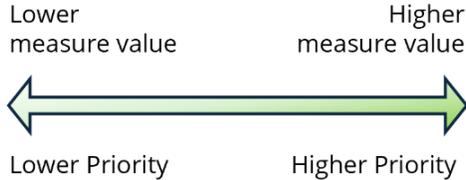
The Socioeconomic Characteristics measure will provide an equity lens to BRT evaluation, quantifying how well a BRT route or network serves specific populations that are more likely to rely on transit for their mobility needs. The measure



will calculate the percentage of the population or households within 1/2 mile of a BRT station that fall into each of the following categories:

- ◆ Residents of Color;
- ◆ Residents with a Disability;
- ◆ Low-income households;
- ◆ No-car households; and
- ◆ One-car households.

A separate percentage will be calculated for each socioeconomic category based on 2022 5-Year ACS data from the Census. The final score for each BRT route will be the average of these four percentages. This measure will be used to evaluate both potential routes and potential networks and will be used for route prioritization.

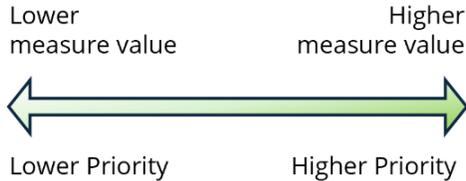


K.3.4 Readiness

Existing Land Use Density

This measure will be calculated based on 2023 land use density within 1/2 mile of proposed stops. The calculation is essentially identical to the Future Land Use Density measure, except this measure considers what is already on the ground so as to help prioritize implementation of BRT routes that already have supportive land use density in place. This measure can be used to evaluate both potential routes and potential networks, and will be used for route prioritization. Higher population and employment densities will result in a higher prioritization rating.

$$Existing\ Land\ Use\ Density = \sum (Population + Employment)_{within\ \frac{1}{2}\ mile\ of\ stops}$$



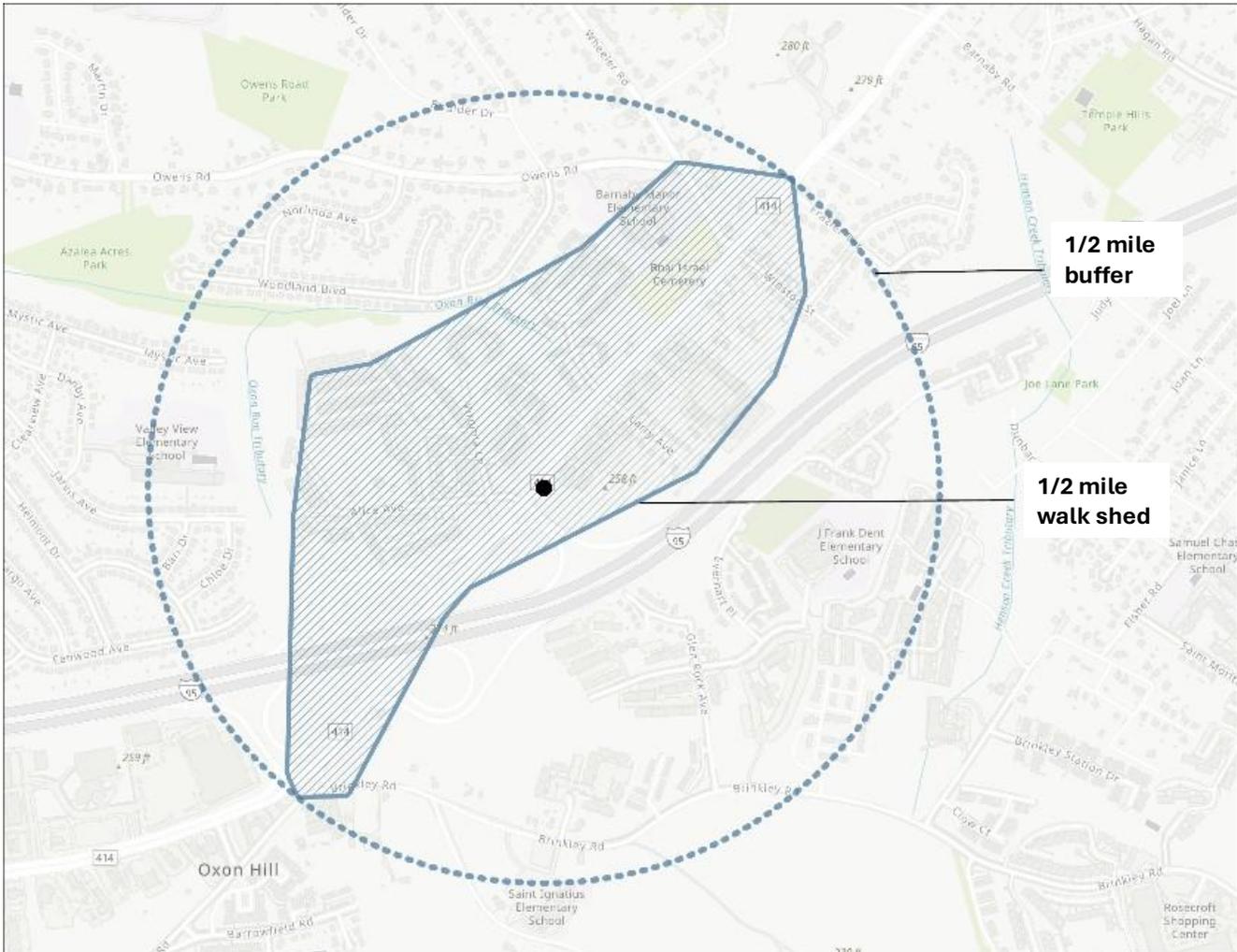
Active Transportation Infrastructure Available

This measure will be used to quantify the availability of active transportation infrastructure near the stops of each proposed BRT route. Separate scores will be calculated for walk infrastructure with an access area of 1/2 mile, and for bike infrastructure with a radius of 2 miles. For each access mode, the analysis will consider how far someone could get using the available contiguous active transportation infrastructure as follows:



- ◆ First, the area within the appropriate access distance as-the-crow-flies will be identified. This will result in a uniform circle around each stop. The population and employment within that circle will be calculated as the theoretical maximum activity with access to that stop.
- ◆ Second, GIS will be used to identify how far a person could get walking ½ mile or biking two miles using the active transportation infrastructure that is actually available on the ground. This will result in a more amorphous shape as shown in Figure 2. The population and employment within that access-shed will also be calculated.

Figure K-3 Example ½ Mile Straight-Line Buffer and Network Based Access Shed Analysis



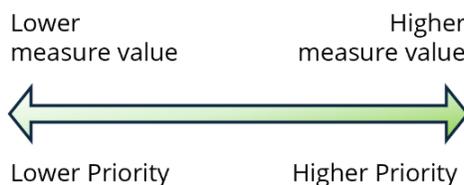
- ◆ The population and employment within the access-shed will be compared to the population and employment within the radius to calculate the percentage of the activity within the access radius actually have non-motorized access to the BRT stops. Scores for each route will be calculated by summing the results for all stops on that route.

$$Active\ Transportation\ Infrastructure\ Availability = \frac{\sum(Pop + Emp)_{Access\ Shed}}{\sum(Pop + Emp)_{Radius}}$$

A separate analysis will quantify the number of transit centers and bikeshare stations are located within ½ mile of the stops on each BRT route. This will identify routes that connect to other active transportation infrastructure.



This analysis aligns with the FTA Capital Investment Grant (CIG) programs’ Land Use justification, which considers existing station area pedestrian facilities as an evaluation metric for grant funding. These measures will be calculated for each individual route, and used to prioritize routes that have more active transportation infrastructure available. This measure will not be calculated for the complete BRT network.

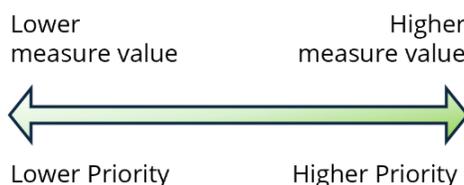


Transit Supportive Policies

The Transit Supportive Policies measure indicates whether routes are in areas with policies conducive to successful higher-capacity transit. This is a qualitative measure and will be assessed at the route level by researching local zoning and transit-supportive policies for each NVTa jurisdiction. To qualitatively assess each proposed BRT route, the routes will be compared to the zoning classifications and policies of directly-adjacent areas and given a rating of low, medium, or high transit supportive policies. Initially, the following percentages will be used as a guide for developing the qualitative ratings. Professional judgement will be applied considering both the types of supportive land use, their proximity to the routes and stops, and their proliferation.

- ◆ Low: Less than 25% of adjacent land use is supportive.
- ◆ Medium: Less than 50% of adjacent land use is supportive.
- ◆ High: More than 50% of adjacent land use is supportive.

Routes with a higher portion of transit supportive land use will be prioritized. This analysis aligns with the FTA Capital Investment Grant (CIG) programs’ Economic Development justification, which considers the presence of transit supportive plans and policies as an evaluation metric for grant funding.



K.3.5 Costs

Capital Cost Estimate

Each route will vary in the type of BRT service and passenger amenities that will be provided, and the number of vehicles that will be required. Capital costs will be estimated at a planning level based on assumed characteristics about each route, including number of station-stops, vehicles, and intersection improvements. Unit costs in 2024 dollars were obtained from the FTA Capital Cost Database for peer BRT systems with similar operating characteristics as those under consideration in this study. The unit costs assumed for each of these elements are shown in Table K-5.

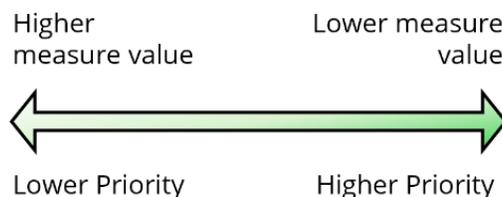


Table K-5 Unit Costs for Capital Cost Estimates (2024\$)

| Element | Unit of Measurement | Unit Cost | Description |
|--------------------------------------|--|--------------|--|
| BRT Guideway, no separation | Lane-miles | \$1,848,000 | No or very limited physical separation from general purpose lanes (flexible post delineators, curb, etc.) (BRT III) |
| BRT Guideway, Separated Running Lane | Lane-miles | \$8,184,000 | Fully separated BRT lane (BRT IV). |
| Enhanced Stop/Shelter | Each (per bi-directional station stop) | \$480,000 | Enhanced shelters with lighting, trash receptacles, and passenger information. These stops are assumed not to include level boarding. |
| Super Stop | Each (per bi-directional station stop) | \$3,110,000 | Larger shelters that include amenities such as level boarding, off-board fare collection, real-time passenger information, and additional safety features. |
| Full BRT Station | Each (per bi-directional station) | \$11,025,000 | Full stations include a staffed, fully enclosed building with bathrooms, on-site parking, pick-up and drop-off areas, and enhanced passenger amenities. |
| TSP Upgrade | Each (per intersection) | \$75,000 | Transit signal priority upgrades at signalized intersection. Assumes entire intersection will be upgraded. |
| Queue Jump Lane | Linear feet | \$2,000 | Queue jump or strategic bypass lane to enable BRT vehicles to pass queues at intersections or other frequently congested areas. |
| 40' Electric BRT Vehicle | Each (per vehicle) | \$1,500,000 | One BRT vehicle |
| 60' Articulated Electric BRT Vehicle | Each (per vehicle) | \$1,900,000 | One BRT vehicle |

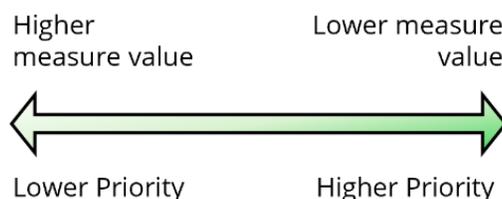
The number of vehicles required to operate each route will be calculated as part of the Vehicles Needed measure; assumptions for those calculations are documented in Section 2.9.3.

To account for costs of project elements that have not been identified or designed, 100% of the sum of the unit costs will be added as a contingency factor. Estimated capital costs will be calculated for each route and used in prioritization, assuming that each route is constructed individually. Routes with lower capital costs will receive higher priority. A total capital cost for the entire system will also be estimated, taking into account any potential savings from multiple routes using the same facilities.



Annual Operating Cost Estimate

An annual operating and maintenance cost will be estimated for each route based on the planned service levels identified in Task 1.4, and quantified in Section 2.9. This estimate will be based on preliminary service planning information and incorporates all elements of operations and maintenance costs. This measure will be calculated for each route and used in prioritization. Lower O&M costs will be prioritized.



The project team developed a four-variable fully allocated O&M cost model, in accordance with FTA guidance. A fully allocated O&M cost model assumes that each sub-category of O&M costs can be estimated in terms of a unit cost and a service quantity, and that O&M costs for each sub-category will grow as service levels grow.

Unit costs were developed from cost data for peer BRT systems available in the National Transit Database (NTD) for FY2022 in 2024 dollars. Service quantities will be calculated based on the proposed operating plan for each route. With each sub-category of costs assigned a unit cost and service variable, the model therefore makes the simplified assumption that costs will increase proportionally with any increase in service.

The four model categories employed reflect the four major cost categories used in NTD reporting and recommended by the FTA for use in O&M cost estimation. These are:

- ◆ **Bus Operations or Vehicle Operations:** All activities associated with vehicle operations, including transportation administration and support, revenue vehicle movement control, scheduling of transportation operations, revenue vehicle operation, ticketing and fare collection, and system security.
- ◆ **Bus Maintenance or Vehicle Maintenance:** All activities associated with revenue and non-revenue (service) vehicle maintenance, including administration; inspection and maintenance; and servicing (cleaning, fueling, etc.) vehicles. In addition, vehicle maintenance includes repairs due to vandalism and accident repairs of revenue vehicles.
- ◆ **Non-Vehicle Maintenance:** All activities associated with facility maintenance, including: administration; repair of buildings, grounds and equipment as a result of accidents or vandalism; operation of electric power facilities; maintenance of: vehicle movement control systems; fare collection and counting equipment; structures, tunnels and subways; roadway and track; passenger stations, operating station buildings, grounds and equipment; communication systems; general administration buildings, grounds and equipment; and electric power facilities.
- ◆ **General Administration:** All activities associated with the general administration of the transit agency including transit service development; injuries and damages; safety; personnel administration; legal services; insurance; data processing; finance and accounting; purchasing and stores; engineering; real estate management; office management and services; customer services; promotion; market research; and planning.

Table K-6 below summarizes the proposed O&M cost categories, service variables, sources of cost data, and peer systems. The list of peer systems, presented in Table K-7, was developed based on an analysis of the NTD data for all “Rapid Bus” (RB) systems. Three systems with very high costs were eliminated as outliers (MBTA Silver Line, NYCT Select Bus Service, LACMTA Orange Line).



Table K-6 O&M Cost Methodology

| Cost Category | Service Variable | Peer Systems | Unit Cost | Data Source |
|-------------------------|-------------------|------------------------------------|-------------------------|--|
| Bus Operations | Revenue Bus Hours | All BRT peers | Ops \$ per Rev Hour | NTD FY2022 |
| Bus Maintenance | Revenue Bus Miles | All BRT peers | Maint \$ per Rev Mile | NTD FY2022 & Industry Research ²⁹ |
| Non-Vehicle Maintenance | Route Length | BRT peers grouped by Corridor type | Maint \$ per Route Mile | NTD FY2022 |
| General Administration | Peak Fleet (VOMS) | All BRT peers | G&A \$ per Peak Vehicle | NTD FY2022 |

Table K-7 Peer BRT Systems

| Peer BRT Systems | |
|------------------------|--------------------------------|
| Eugene Emerald Express | IndyGo Red Line |
| CTfastraks | Houston MetroRapid Silver Line |
| Richmond Pulse | Albuquerque Rapid Transit |
| Orlando BRT | Kansas City MAX BRT |
| Cleveland Healthline | Fort Collins MAX BRT |
| Grand Rapids BRT | AC Transit Tempo |

Unit costs in 2024 dollars are shown in Table K-8 for each BRT Type described in the Task 1.4 Tech Memo, to reflect increasing levels of infrastructure and maintenance requirements. These costs represent a range of unit costs reflecting different levels of investment.

Table K-8 Operations and Maintenance Unit Costs

| Cost Category | Unit Costs (2024\$) | | |
|-------------------------|---------------------|-----------|------------------|
| Bus Operations | | \$93.29 | per Rev Hour |
| Bus Maintenance | 40' ZEB | \$1.57 | per Rev Mile |
| | 60' ZEB | \$2.20 | per Rev Mile |
| Non-Vehicle Maintenance | BRT I-II | \$19,272 | per Route Mile |
| | BRT III-IV | \$37,867 | per Route Mile |
| | BRT-X | \$3,554 | per Route Mile |
| General Administration | | \$150,204 | per Peak Vehicle |

For routes that include more than one BRT Type, the unit costs will be calculated as a weighted average based on the length of each BRT Type designated.

²⁹ Average BRT peer unit costs were adjusted to produce unit costs reflecting both 40-foot and 60-foot ZEB buses, based on industry research on fleet electrification and O&M costs.



K.3.6 Revenue

Fare Recovery Ratio

The Fare Recovery Ratio measure will be used to estimate the portion of each BRT route's operations that is covered by fares. Bus fares across the region vary by service type and operating agency as shown in Table K-9. The only BRT service currently in operation in Northern Virginia (Metroway) charges the regular Metrobus fare; the ridership analysis conducted as part of this analysis assumes a similar fare for other BRT routes in the region.

Table K-9 Published Bus Fares by Operator and Service Type

| Agency | Mode | Service Type | Regular Fare | Discounted Fare |
|-------------------|------|--------------|--------------|-----------------|
| WMATA | Bus | Regular | \$2.25 | \$1.10 |
| WMATA | Bus | Express | \$4.80 | \$2.40 |
| Dash | Bus | All | \$ - | \$ - |
| ART | Bus | All | \$2.25 | \$1.10 |
| Fairfax Connector | Bus | Local | \$2.25 | \$1.10 |
| Fairfax Connector | Bus | Express | \$4.80 | \$2.40 |
| Fairfax Connector | Bus | Circulator | \$0.55 | \$0.55 |
| CUE | Bus | All | \$ - | \$ - |
| LCT | Bus | Commuter | \$10.00 | \$10.00 |
| LCT | Bus | Local | \$1.00 | \$1.00 |
| PRTC | Bus | I-95 Express | \$11.00 | \$5.50 |
| PRTC | Bus | I-66 Express | \$5.50 | \$2.75 |
| PRTC | Bus | Local | \$ - | \$ - |

However, as outlined in Table K-10, not all passengers pay the full fare due to the availability of a range of discounts (e.g. for seniors, students) and passes that make travel cheaper on a per trip basis. Fare evasion also impacts the average fare paid. For agencies that charge a fare, the average fare paid is \$0.63, or only 28% of the full price bus fare for ART, Metrobus, and Fairfax Connector.

Table K-10 Average Fare Collected per Bus Trip by Agency, 2022³⁰

| Agency | Fare Revenues | Annual Unlinked Passenger Trips | Average Fare per Passenger Trip | Percent of Regular Fare Paid |
|-------------------|------------------------|---------------------------------|---------------------------------|------------------------------|
| ART | \$2,271,074.00 | 1,772,823 | \$1.28 | 57% |
| Metrobus | \$47,555,017.00 | 79,512,639 | \$0.60 | 27% |
| Fairfax Connector | \$6,320,755.00 | 7,214,551 | \$0.88 | 39% |
| LCT | \$272,284.00 | 222,053 | \$1.23 | NA |
| PRTC | \$2,596.00 | 601,604 | \$0.00 | NA |
| Total | \$56,421,726.00 | 89,323,670 | \$0.63 | |

³⁰ National Transit Database 2022 Metrics.



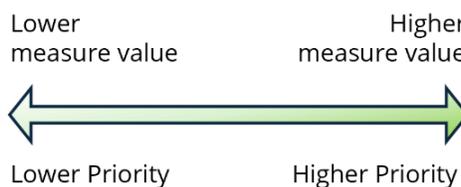
of the other measures included in the PDP evaluation methodology are also used to evaluate projects for Six Year Program funding.

Table K-11 highlights how the rating for this measure will be calculated, by combining the results of several other evaluation measures along with a high-level assessment of eligibility for local funding options. As shown, all of the measures are scored similarly except for the local eligibility component. The points for each component will be summed out of potential total score of 40 points.

Table K-11 Potential Funding Opportunities Scoring

| Measure Component | Metric | Scoring |
|------------------------------|---|-------------------|
| Ridership | Mode Shift—see Section 2.1.3 | |
| Customer Base & Equity | Socioeconomic Characteristics—see Section 2.3.2 | |
| Cost Effectiveness—Capital | Capital Cost per Rider – see Section 2.7.1 | High = 5 points |
| Cost Effectiveness—Operating | Operating & Maintenance Cost per Rider – see Section 2.7.1 | Medium = 3 points |
| Environmental Benefits | Emissions Reduction – see Section 2.2.3 | Low = 1 point |
| Land Use Density | Existing Land Use Density – see Section 2.4.1 | |
| Local Funding Eligibility | Located within boundary for I-66/I-395 toll revenue funding | +5 points |
| | % of Route within Northern Virginia | % * 4 points |
| | Included in most recent TransAction | +1 point |

This measure will only be computed at the route level; routes that score higher on this measure will be prioritized.



K.3.7 Cost Effectiveness

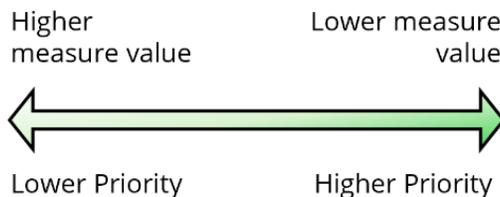
Cost per Rider

A major component to cost-effectiveness for BRT is the cost per rider served. The capital cost per unlinked passenger trip (i.e. boarding) will be evaluated based on results from the costs and ridership measures detailed in Sections 2.1 and 2.5.

$$Capital\ Cost\ per\ Rider = \frac{Total\ Capital\ Cost}{Estimated\ Daily\ Ridership}$$

This measure aligns with FTA Capital Investment Grant (CIG) programs’ Cost Effectiveness justification, which considers cost per rider as an evaluation metric for grant funding. These measures will be calculated at the route and the system level. Routes with lower costs per rider will be prioritized.



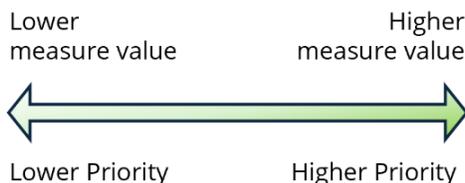


Congestion Reduction Relative to Cost

Virginia House Bill 2313, enacted in 2013, requires NVTA to give priority to projects that achieve the greatest congestion reduction relative to cost (CRRC). This measure is therefore used by NVTA in evaluating projects for inclusion in its Six Year Program. The CRRC measure is calculated based on the reduction in person-hours of delay (See Section 2.2.1) and the total capital cost (See Section 2.5.1) as follows:

$$CRRC = \frac{\text{Person Hours of Delay Reduction}}{\text{Total Capital Cost}}$$

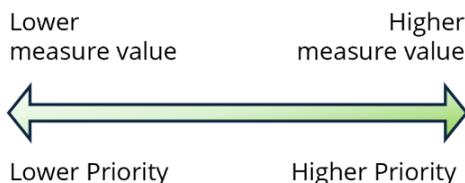
This measure will be calculated at the route and system level. Routes with higher CRRC values will be prioritized.



GHG Reduction Cost

Cost per GHG Reduction will measure the estimated capital cost per GHG removed, based on the estimated Capital Cost (see Section 2.5.1) and Vehicle Emission Reduction (see Section 2.2.3). This measure can be calculated at both the route and system level. Routes for which more Greenhouse Gases are removed per dollar of capital cost will be prioritized.

$$\text{Cost per GHG Reduction} = \frac{\text{Total GHG Reduction}}{\text{Total Capital Cost}}$$



K.3.8 Feasibility

Ease of Implementation

This measure qualitatively rates the overall feasibility of implementing individual BRT routes, considering the difficulty of coordinating between multiple jurisdictions and agencies, the relative difficulty of implementing larger infrastructure projects, and the difficulty of implementing new cross-jurisdictional operating agreements. This is reflected in the following components:



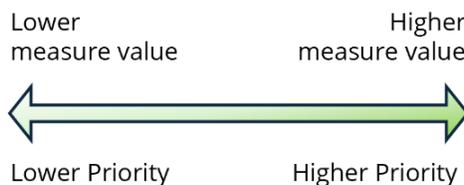
- ♦ **Jurisdictional Coordination:** BRT routes that cross jurisdictional boundaries are likely to encounter more barriers to implementation, including a higher level of inter-agency and inter-jurisdictional coordination on all aspects of the project, including service planning, infrastructure design, branding, integration with existing transit service, enforcement strategy, and implementation of Transit Signal Priority. The number of jurisdictions in which the BRT route operates will be used as a proxy for this component.
- ♦ **BRT Type:** Implementation of more intensive infrastructure projects is generally more difficult to implement than smaller scale changes to infrastructure or operations. The BRT Types associated with each proposed BRT route (detailed in the Task 1.4 Network Definition memo) will be used as a proxy to represent this component of ease of implementation. For example, BRT I service operates in mixed-traffic conditions that will not require securing any right-of-way. This is likely to be easier to implement than BRT IV services, which require significantly more infrastructure including dedicated bus lanes.
- ♦ **Operating Agreements:** Implementation of cross-jurisdictional BRT service will likely require legal agreements between jurisdictions to codify agreements on elements such as sharing operating & maintenance costs, revenue sharing, and decision-making for future service and infrastructure changes. Routes that could be implemented under existing agreements, such as the WMATA Compact, may be easier to implement than where new agreements would be necessary.

Based on these components, a qualitative review will render a prioritization score for BRT implementation feasibility.

Table K-12 Ease of Implementation Scoring

| Implementation Factor | Classification | Score |
|---|--|-------|
| Jurisdictional Coordination | Contained within 1 jurisdiction | 5 |
| | Serving 2 jurisdictions | 3 |
| | Serving 3 or more jurisdictions | 1 |
| BRT Type (Value for a BRT route is the weighted average if multiple BRT types are assigned) | BRT I | 5 |
| | BRT II or BRT Express | 3 |
| | BRT III or BRT IV | 1 |
| Operating Agreements | Covered by existing operating agreements | 3 |
| <i>Max Possible Score</i> | | 13 |

This measure can only be computed for individual routes, and will be used to prioritize routes that are likely to be easier to implement.



K.3.9 Operating Characteristics

Revenue Miles & Hours

Revenue Miles & Hours is a descriptive measure that will be used to compute other prioritization measures. These statistics are ways of quantifying the amount of service being provided to customers on each route and are determined based on the route definition and operating plan. Revenue hours and miles can be impacted by the route’s span, frequency, runtime, and layover requirements. Many of these operating characteristics are assigned to each proposed



BRT route based on their BRT Type as shown in Table K-13. Complete details about the operating assumptions for each route will be detailed in the Route Definition Technical Memo.

This measure will be required for the Operating Cost Estimate and Service Efficiency measures. This measure can be calculated at both for individual routes and for the full network but will not be used for prioritization.

Table K-13 BRT Level of Service by Type

| BRT Type | Level Name | Schedule | Span | Frequency | Average Speed |
|----------|-----------------------|-------------|---------------------|--|---------------|
| BRT I | BRT Lite | 7-days | Minimum of 18 hours | Minimum 15-minute peak, 20 minute off-peak | >10 mph |
| BRT II | Arterial BRT | 7-days | Minimum of 18 hours | Minimum 15-minute peak, 20 minute off-peak | >12 mph |
| BRT III | Corridor BRT Curbside | 7-days | Minimum of 18 hours | Minimum 10-minute peak, 15 minute off-peak | >14 mph |
| BRT IV | Corridor BRT Median | 7-days | Minimum of 18 hours | Minimum 10-minute peak, 15 minute off-peak | >17 mph |
| BRT-X | Express BRT | 5 to 7-days | Minimum of 12 hours | Minimum 15-minute peak, 20 minute off-peak | >20 mph |
| BRT-H | Hybrid BRT | 7-days | Minimum of 18 hours | Minimum 15-minute peak, 20 minute off-peak | >15 mph |

Platform Miles & Hours

Platform Miles and Hours is a descriptive measure that quantifies the amount the number of vehicle miles and hours that are needed to operate a proposed service. This includes both revenue hours (the amount of service provided to customers) and getting between a garage facility and the termini of a route (deadhead). These are descriptive measures that will primarily be used to compute other prioritization measures.

At this level of planning, the PDP will not identify the locations of potential garage facilities for each of the proposed BRT routes. The PDP therefore cannot precisely determine the amount of deadhead that will be associated with each route. For planning purposes, each route will assume an average percentage of deadhead miles and hours based on the average of bus operators currently operating in Northern Virginia, as shown in Table K-14 and Table K-15. Therefore, the platform hours and miles will be calculated as follows:

$$\text{Platform Hours} = \text{Revenue Hours} * 1.14$$

$$\text{Platform Miles} = \text{Revenue Miles} * 1.22$$



Table K-14 Northern Virginia 2022 Deadhead Hours by Agency

| Agency | Platform Vehicle Hours | Revenue Vehicle Hours | Deadhead Hours | Deadhead Percentage (of Revenue Hours) |
|------------------------|------------------------|-----------------------|----------------|--|
| ART | 196,482 | 180,404 | 16,078 | 9% |
| Fairfax Connector | 920,917 | 840,571 | 80,346 | 10% |
| Alexandria (DASH) | 289,939 | 263,566 | 26,373 | 10% |
| Loudoun County Transit | 69,709 | 59,261 | 10,448 | 18% |
| PRTC | 91,755 | 80,517 | 11,238 | 14% |
| Metrobus | 4,112,488 | 3,542,918 | 569,570 | 16% |
| Total | 5,681,290 | 4,967,237 | 714,053 | 14% |

Table K-15 Northern Virginia 2022 Deadhead Miles by Agency

| Agency | Actual Vehicle Miles | Revenue Vehicle Miles | Deadhead Miles | Deadhead Percentage (of Revenue Miles) |
|------------------------|----------------------|-----------------------|-------------------|--|
| ART | 2,025,684 | 1,829,634 | 196,050 | 11% |
| Fairfax Connector | 13,185,923 | 10,863,043 | 2,322,880 | 21% |
| Alexandria (DASH) | 2,707,709 | 2,407,096 | 300,613 | 12% |
| Loudoun County Transit | 1,190,316 | 1,007,681 | 182,635 | 18% |
| PRTC | 1,491,472 | 1,272,683 | 218,789 | 17% |
| Metrobus | 44,081,460 | 35,554,946 | 8,526,514 | 24% |
| Total | 64,682,564 | 52,935,083 | 11,747,481 | 22% |

Vehicles Needed

This measure quantifies the fleet size needed, represented through vehicles operating at maximum service (VOMS) and total fleet need. VOMS is indicative of the number of buses required on the road at maximum service to maintain the scheduled frequency; the total fleet need is the number of buses required to maintain the service without exceeding a buses' indicated lifespan (in mileage). These will include spare vehicles needed, based on a spare ratio of 20 percent. The vehicles needed is based on the length of the route, the operating plan, average speed, and the vehicles maximum lifetime mileage. The vehicle maximum lifetime mileage will impact the maximum number of revenue miles that a vehicle can operate each year to ensure that it lasts its full expected lifespan. This maximum mileage can be impacted by whether the vehicle undergoes a mid-life overhaul, as shown in Table K-16.



Table K-16 Vehicle Operating Assumptions³¹

| | | |
|---|-----------|-------------|
| Bus Size | 40' | Articulated |
| Fuel Type | Electric | |
| Years (No Overhaul) | 12 | |
| Motor Life (No Overhaul) | 500,000 | |
| Annual Mileage (No Overhaul) | 41,667 | |
| Years (Mid Life Overhaul) | 14 | |
| Motor Life (Mid Life Overhaul) | 1,000,000 | |
| Annual Mileage (Mid Life Overhaul) | 71,429 | |
| Usable Vehicle Battery Capacity (kWh) | 400 | 600 |
| kWh Per Mile | 3.5 | |
| Single-Charge Revenue Distance Maximum (Capacity * kWh per mile) | 114.29 | 171.43 |

The number of vehicles required will be calculated as follows:

$$VOMS = \frac{\text{Route Cycle Time}}{\text{Max Frequency}}$$

$$\text{Total Fleet Need} = \frac{\text{Annual Platform Miles}}{\text{Vehicle Annual Mileage}_{\text{NoOverhaul}}}$$

While this calculation – and other measures based on this calculation—will use a conservative estimate of the number of vehicles required by assuming no mid-life overhaul of vehicles, a range will be provided for each route. This measure can be calculated for both individual routes and potential networks but will not be used for route prioritization. This measure will be required for the Operating Cost Estimate and Capital Cost Estimate measures, in addition to quantifying facility needs.

Staffing Needs

The Staffing Needs measure quantifies the number of drivers and maintenance employees needed to maintain service according to the operating plan for each route. The assumptions around staffing needs are shown in Table K-17.

³¹ Operating assumptions based on average of multiple vehicle manufacturers and models.



Table K-17 Staffing Assumptions³²

| Variable | Assumption |
|--|------------|
| Drivers | |
| Weekly hours for revenue service <i>Excluded 8 hours of time for deadhead, meetings, training, administrative</i> | 32 |
| Working Weeks per Year <i>3 weeks removed for PTO, sick time</i> | 49 |
| Annual Available Revenue Hours | 1,568 |
| Mechanics | |
| Platform Miles per Mechanic | 100,000 |
| Supporting Staff | |
| Supervisors <i>Ratio to Operators</i> | 10% |
| Dispatch <i>Ratio to Operators</i> | 5% |

The estimated number of drivers is calculated based on each route's annual revenue hours divided by a driver's available working hours. Supervisors and dispatch staff are related to the number of drivers required. The estimated number of mechanics is related to the number of platform miles for each route (see Section 2.9.2). These measures will be required for the Operating Cost Estimate measure.

$$\text{Drivers} = \frac{\text{Annual Revenue Hours}}{1,568}$$

$$\text{Supervisors} = \text{Drivers} * 0.1$$

$$\text{Dispatch} = \text{Drivers} * 0.05$$

$$\text{Mechanics} = \frac{\text{Platform Miles}}{100,000}$$

This measure can be calculated for both individual routes and complete networks, but will not be used for route prioritization.

Crowding

This measure will quantify the average number of passengers estimated to be on a BRT vehicle at its peak load point. The peak load will be identified by the regional travel demand model and compared to the capacity of a 40-ft BRT vehicle, which is assumed to be 65 passengers³³. This will identify any proposed routes that are likely to experience on-board crowding and are candidates for articulated buses with larger capacities.

$$\text{Peak Load Factor} = \frac{\text{Peak Period Passengers at Peak Load Point} * \text{Peak Hour Factor}}{(\text{Peak Hour Frequency}) * 65}$$

³² Staffing ratios sourced from the Denver Regional Transportation District (RTD) ZEB Transition Plan.

³³ Source: TCRP Transit Capacity and Quality of Service Manual, Part 2: Bus Transit Capacity.



Any routes with a peak load factor great than one will be upgraded to articulated buses for the purposes of cost estimation and other analyses. This measure is only used for informational purposes, and will not be used for prioritization.

Geographic Distribution

To understand the overall provision of service in the region, this measure will quantify the amount of service provided in each jurisdiction. The calculation will assign revenue miles of service to jurisdictions based on the portion of the alignment within each jurisdiction as shown in the formula below.

$$Jurisdiction\ Revenue\ Miles_j = \sum_{R=1}^{28} Revenue\ Miles_R * \frac{Alignment\ Length\ in\ Jur_j}{Total\ Alignment\ Length}$$

This measure will be calculated for the BRT network but is only for informational purposes; it will not be used for prioritization.

K.3.10 Supporting Needs

Facility Requirements

Facility Requirements quantifies the garage space and maintenance capacity required to house and service all the BRT vehicles in the system. The project team will refer to APTA's *Architectural and Engineering Design for a Transit Operating and Maintenance Facility* (BTS-BMF-RP-001-11), which identifies the square footage necessary for different inputs (such as number of operators, mechanics, vehicles, etc.) and uses the estimated staffing and vehicle needs to project the facility requirements for each route. A sample of these inputs is shown in Table K-18. The resulting calculation will be a conservative estimate of the facility needs for the BRT system, as it does not account for potential efficiencies that could be achieved by housing multiple BRT routes at the same facility.

This measure is only for informational purposes and will not be used for prioritization. This analysis will only identify the total facility requirements and should not be taken to mean that this amount of facility space will need to be constructed – some of the necessary space may be available at existing and/or other planned facilities.

Table K-18 Sample of Facility Requirements³⁴

| Parameter | Unit (Net Square Feet) |
|-----------------------------|------------------------|
| Administrative Office Staff | 115 |
| Operations Office Staff | 115 |
| Vehicle Operators | 45 |

³⁴ This table shows a sample of the square foot assumptions provided in APTA's *Architectural and Engineering Design for a Transit Operating and Maintenance Facility* (BTS-BMF-RP-001-11); a full list of every space assumption will be prepared with the final results.



EV/Charging Infrastructure Needs

The EV/Charging Infrastructure measure will be based on the service levels on each BRT route, the total power (in kWh) required to provide that service, and the average battery capacity of the vehicle. The assumptions for these variables are shown in Table K-19. These variables will feed into a calculation that estimates the total daily energy needs for each route, which will then be divided by an assumed energy limit for a standard vehicle charger (at a garage and/or maintenance facility) as shown below.

Table K-19 Vehicle Battery Capacity Assumptions³⁵

| Bus Size | Usable Battery Capacity (kWh) | kWh per mile | Single-Charge Revenue Distance Maximum |
|----------------|-------------------------------|--------------|--|
| 40' (Standard) | 400 | 3.5 | 114.29 |
| Articulated | 600 | 3.5 | 171.43 |

$$\text{Total Power Need } (P) = \text{Daily Platform Miles} * \text{kWh per mile}$$

$$\text{Available Charging Time } (T) = 24 - \left(\text{Span} + \frac{1}{2} \text{hour}^{36} \right)$$

$$\text{Charger Power Level } (L) = 150 \text{ kW} * 90\%$$

$$\text{Chargers Required} = \frac{P}{L * T}$$

For each route, the total mileage capacity for a standard battery will be compared against the route's round-trip distance. If the roundtrip distance exceeds the limits of a single charge, then on-route charging and/or an alternative vehicle fuel type will need to be considered for that route. Routes that will likely fall into this category will be identified for future consideration of solutions.

This analysis will focus on the number of chargers required for each route, which will be incorporated into the capital cost estimates. The analysis will not take into account wider infrastructure needs, such as increased capacity in the regional electrical grid, the construction and/or expansion of substations, etc. This measure will not be used to prioritize routes.

³⁵ Operating assumptions based on average of multiple vehicle manufacturers and models

³⁶ One half hour is added to the span to account for pre-check and post-check at the garage



K.4 Rating Methodology

Each route will be evaluated based on the prioritization measures outlined in Section 2 of this memo. For each of these measures, each route will be rated as a high, medium, or low based on how its performance compares to the other 27 routes being evaluated. This will result in more than 25 individual measure ratings which will be rolled up to provide a high, medium, or low rating for the eight categories of measures (e.g. Transportation Impacts, Readiness, etc.). An example of this is shown in Table K-20.

Table K-20 Sample Route Rating Methodology

| Category | Measure | Route A | Route B |
|------------------------|---------------------------------------|---------|---------|
| Ridership | BRT Ridership | H | M |
| | Service Efficiency | M | L |
| | Mode Shift | M | H |
| Transportation Impacts | Congestion Reduction | M | M |
| | VMT Reduction | M | L |
| | Vehicle Emissions Reduction | M | M |
| | Transit Accessibility Improvement | H | L |
| | EEA Transit Accessibility Improvement | H | M |
| | Connections to HCT | H | L |
| | Safety | H | L |
| | Run-time Improvement | L | H |

Once the route level evaluation is finalized, the system-level measures identified in this memo will be calculated for the complete networks. This will provide insight into the scale of impacts likely for system level implementation.



APPENDIX L. MODELING METHODOLOGY

This study uses the latest NVTA TransAction Model Version 1.0.6 to model proposed BRT routes individually and the proposed BRT system as a whole. TransAction Model Version 1.0.6 was an updated version of TransAction Model Version 1.0, with the following revisions:

- ◆ Input files were updated based on the COG/TPB Ver. 2.4.6 Model input files.
- ◆ Congestion degradation for bus speed was revised using the updated procedure in COG/TPB Ver. 2.4.6
- ◆ Land use forecasts are based on the MWCOC Round 10 Cooperative Forecasts
- ◆ DTALite was incorporated as part of the user interface.

TransAction Model Version 1.0 was developed based on the COG/TPB Ver. 2.4 Model, which was released for production use on March 26, 2021 and includes enhanced functionalities and features for the macroscopic modeling and added mesoscopic modeling capabilities. Detailed information on model functionalities, calibration, and validation can be found in the report *NVTA Model Development: Calibration and Validation*.

TransAction Model Version 1.0.6 networks are based on networks from the COG/TPB Gen2/Version 2.4.6 model and TransAction Model Version 1.0. In the COG/TPB Ver.2.4.6, the Constrained Long-Range Plan (CLRP) transportation networks were derived from the TPB Air Quality Conformity Analysis of the 2022 Update to Visualize 2045, a Long-Range Transportation Plan (LRTP) for the National Capital Region, and the FY 2023-2026 Transportation Improvement Program (TIP).

To support the NVTA's the TransAction Update and Six Year Program, a 2045 TransAction No-Build network was developed to represent the most likely future transportation network for Northern Virginia, in the absence of the projects being evaluated for TransAction.

Within Northern Virginia, changes were made to the CLRP network to support the evaluation of the TransAction plan including:

- ◆ Keeping projects fully funded by NVTA and other agencies; and
- ◆ Removing projects on the TransAction "Build" project list.

Outside of Northern Virginia, the CLRP network is retained.

For this BRT study, the baseline network was developed based on the network for FY2024 Long Term Benefit (LTB) Build 1 analysis, which was used as the base for project prioritization for FY2024-2029 Six Year Program (SYP). NVTA provided a list of projects to update this SYP baseline network, as shown in Table L-1. Some of the SYP projects in the previous cycles had changes in the funding status. If a project is fully funded, it is included in the baseline network.

Proposed BRT routes/corridors were coded based on the COG/TPB Gen2/Version 2.4.6 model network coding conventions. For detail, reference the network documentation, *Highway and Transit Networks used in the Air Quality Conformity Analysis of the 2022 Update to Visualize 2045 and the FY 2023-2026 TIP (Gen2/Ver. 2.4 Travel Model)*.



Table L-1 NVTA BRT Baseline Network Update

| PIMMS ID | Project Title | Project Sponsor | Funding Programs | Project Status | LTB BUILD1 | | | Comparisons |
|----------|--|-----------------------|-----------------------|---------------------------|------------------|--------------|-----------|-------------|
| | | | | | Completed CY2024 | Funding Gaps | IN BUILD1 | |
| 142 | Ballston Metrorail Station West Entrance | Arlington County | FY 2015-16/FY2022-27 | Underway | NO | YES | NO | YES --> NO |
| 3 | Crystal City Metrorail Station East Entrance and Intermodal Connections | Arlington County | FY 2018-23 | Underway | NO | NO | YES | NO --> YES |
| ARL-022 | Shirlington Bus Station Expansion | Arlington County | FY 2024-2029 | Not started | NO | NO | YES | NEW |
| 310 | Soapstone Drive Extension: Sunset Hills Road to Sunrise Valley Drive | Fairfax County | FY 2020-25 | Not started | NO | NO | YES | NO --> YES |
| 325 | Seven Corners Ring Road Improvements: Arlington Boulevard (Route 50) Westbound Ramp to Castle Place/Sleepy Hollow Road | Fairfax County | FY2022-27/FY2024-2029 | Underway (in study phase) | NO | NO | YES | NO --> YES |
| LDN-029 | Old Ox Road Widening—Shaw Road to Oakgrove Road | Loudoun County | FY2024-2029 | Not started | NO | NO | YES | NEW |
| LDN-033 | Sycolin Road Widening—Loudoun Center Place to Crosstrail Boulevard | Loudoun County | FY2024-2029 | Not started | NO | NO | YES | NEW |
| LDN-034 | Route 15 at Braddock Road Roundabout | Loudoun County | FY2024-2029 | Not started | NO | NO | YES | NEW |
| 32 | Route 28 Corridor Roadway Improvements—East of Route 234 (Manassas Bypass) | Prince William County | FY 2015-16/FY 2018-23 | Underway | NO | NO | NO | YES --> NO |
| PWC-040 | Route 234 and Sudley Manor Drive Interchange | Prince William County | FY2024-2029 | Not started | NO | NO | YES | NEW |
| PWC-041 | Route 234 Bicycle and Pedestrian Facility Over I-95 | Prince William County | FY2024-2029 | Not started | NO | NO | YES | NEW |
| PWC-042 | Route 234 Operational Improvements | Prince William County | FY2024-2029 | Not started | NO | NO | YES | NEW |
| PWC-043 | The Landing at Prince William Transit Center | Prince William County | FY2024-2029 | Not started | NO | NO | YES | NEW |



| PIMMS ID | Project Title | Project Sponsor | Funding Programs | Project Status | LTB BUILD1 | | | Comparisons |
|----------|---|-----------------------|--------------------------------|----------------|------------------|--------------|-----------|-------------|
| | | | | | Completed CY2024 | Funding Gaps | IN BUILD1 | |
| PWC-044 | Triangle Mobility Hub and First/Last Mile Connection Improvements | Prince William County | FY2024-2029 | Not started | NO | NO | YES | NEW |
| 328 | West End Transitway Phase 1b: South Van Dorn Street and Bridge Design | City of Alexandria | FY2022-27/FY2024-2029 | Underway | NO | NO | YES | NO --> YES |
| ALX-033 | Alexandria Metroway Enhancements | City of Alexandria | FY2024-2029 | Not started | NO | NO | YES | NEW |
| ALX-037 | Smart & Connected Vehicle Infrastructure | City of Alexandria | FY2024-2029 | Not started | NO | NO | YES | NEW |
| 48 | Old Lee Highway (Blenheim Blvd) Multimodal Improvements Phase 1 | City of Fairfax | FY 2018-23/2020-25/FY2024-2029 | Underway | NO | NO | YES | NO --> YES |
| CFC-011 | City of Falls Church Signal Prioritization Project | City of Falls Church | FY2024-2029 | Not started | NO | NO | YES | NEW |
| MAN-003 | Roundabout at Route 28 and Sudley Rd | City of Manassas | FY2024-2029 | Not started | NO | NO | YES | NEW |
| CMP-001 | Route 28-Centre ville Road Corridor Improvements | City of Manassas Park | FY2024-2029 | Not started | NO | NO | YES | NEW |
| 157 | East Elden Street Improvements & Widening | Town of Herndon | FY 2015-16 | Underway | NO | NO | YES | NO --> YES |
| 313 | Franconia-Springfield Passenger Rail Bypass | DRPT/VPRA | FY 2020-25 | Underway | NO | NO | YES | NO --> YES |
| VRE-017 | VRE Backlick Road Station Improvements | VRE | FY 2024-2029 | Not started | NO | NO | YES | NEW |



Table L-2 summarizes BRT operation span and frequency by route/corridor.

Table L-2 BRT Corridors: Operation Span and Frequency

| Route | BRT Type(s) | Weekday Start | Weekday End | Span Length (minute) | Peak Frequency (minute) | Off-Peak Frequency (minute) | Weekend Start | Weekend End | Span Length (minute) | Headways (minute) |
|-------------------------------|------------------------|---------------|-------------|----------------------|-------------------------|-----------------------------|---------------|-------------|----------------------|-------------------|
| A1X (Metroway) | III | 6:00:00 AM | 12:00:00 AM | 18 | 12 | 12 | 6:00:00 AM | 12:00:00 AM | 18 | 12 |
| Chain Bridge | II, III | 6:00:00 AM | 12:00:00 AM | 18 | 10 | 15 | 6:00:00 AM | 12:00:00 AM | 18 | 15 |
| Columbia Pike to Crystal City | II, III, IV | 6:00:00 AM | 12:00:00 AM | 18 | 10 | 12 | 6:00:00 AM | 12:00:00 AM | 18 | 12 |
| Columbia Pike to DC | II, III, Express | 6:00:00 AM | 12:00:00 AM | 18 | 10 | 15 | 6:00:00 AM | 12:00:00 AM | 18 | 15 |
| Duke Street | II, III | 6:00:00 AM | 12:00:00 AM | 18 | 10 | 15 | 6:00:00 AM | 12:00:00 AM | 18 | 15 |
| Franconia-Ft Belvoir | Express | 5:00:00 AM | 7:00:00 PM | 14 | 15 | 20 | 7:00:00 AM | 7:00:00 PM | 12 | 30 |
| Gallows Road | II, III | 6:00:00 AM | 12:00:00 AM | 18 | 10 | 15 | 6:00:00 AM | 12:00:00 AM | 18 | 15 |
| Glebe Road | II | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 6:00:00 AM | 12:00:00 AM | 18 | 20 |
| I-495 North | III, Express | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 7:00:00 AM | 7:00:00 PM | 12 | 30 |
| I-495 South | II, III, Express | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 7:00:00 AM | 7:00:00 PM | 12 | 30 |
| Leesburg-Dulles Town Center | I, Non-Freeway Express | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 6:00:00 AM | 12:00:00 AM | 18 | 20 |
| Little River Turnpike | II, III | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 6:00:00 AM | 12:00:00 AM | 18 | 20 |
| Manassas Line | III | 6:00:00 AM | 12:00:00 AM | 18 | 10 | 15 | 6:00:00 AM | 12:00:00 AM | 18 | 15 |
| Northwest BRT | I, II, Express | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 6:00:00 AM | 12:00:00 AM | 18 | 20 |
| Old Keene Mill | I | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 6:00:00 AM | 12:00:00 AM | 18 | 20 |
| Prince William Parkway | I, II, Express | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 6:00:00 AM | 12:00:00 AM | 18 | 20 |



| Route | BRT Type(s) | Weekday Start | Weekday End | Span Length (minute) | Peak Frequency (minute) | Off-Peak Frequency (minute) | Weekend Start | Weekend End | Span Length (minute) | Headways (minute) |
|----------------------|----------------------------------|---------------|-------------|----------------------|-------------------------|-----------------------------|---------------|-------------|----------------------|-------------------|
| Reston-Fair Oaks | II, III, Non-Freeway Express | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 6:00:00 AM | 12:00:00 AM | 18 | 20 |
| Richmond Highway BRT | IV | 6:00:00 AM | 12:00:00 AM | 18 | 10 | 15 | 6:00:00 AM | 12:00:00 AM | 18 | 15 |
| US 1 South | I,II | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 6:00:00 AM | 12:00:00 AM | 18 | 20 |
| US 29 East | II,III | 6:00:00 AM | 12:00:00 AM | 18 | 10 | 15 | 6:00:00 AM | 12:00:00 AM | 18 | 15 |
| US 29 West | II,III | 6:00:00 AM | 12:00:00 AM | 18 | 10 | 15 | 6:00:00 AM | 12:00:00 AM | 18 | 15 |
| US 50 East | II, III, IV, Express | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 6:00:00 AM | 12:00:00 AM | 18 | 20 |
| VA 28 North | III, Express | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 6:00:00 AM | 12:00:00 AM | 18 | 20 |
| VA 28 South | II, III, Express | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 6:00:00 AM | 12:00:00 AM | 18 | 20 |
| VA 7 | I, II, III, IV | 6:00:00 AM | 12:00:00 AM | 18 | 10 | 15 | 6:00:00 AM | 12:00:00 AM | 18 | 15 |
| West End Transitway | II, III, Express | 6:00:00 AM | 12:00:00 AM | 18 | 10 | 15 | 6:00:00 AM | 12:00:00 AM | 18 | 15 |
| I-95 Express | IV, Express | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 7:00:00 AM | 7:00:00 PM | 12 | 30 |
| I-66 | II, Express, Non-Freeway Express | 6:00:00 AM | 12:00:00 AM | 18 | 15 | 20 | 7:00:00 AM | 7:00:00 PM | 12 | 30 |

* Peak period: 6 AM–9 AM, 3 PM–7 PM



Table L-3 shows BRT speed and runtime by route/corridor.

Table L-3 BRT Corridors: Speed and Runtime

| Route | Bi-Directional Length (mile) | Peak Speed—Existing (mph) | Peak Speed—BRT (mph) | Peak Runtime One Way (minute) | Peak Speed Change | Off-Peak Speed—Existing (mph) | Off-Peak Speed—BRT (mph) | Off-Peak Runtime One Way (minute) | Off-Peak Speed Change |
|-------------------------------|------------------------------|---------------------------|----------------------|-------------------------------|-------------------|-------------------------------|--------------------------|-----------------------------------|-----------------------|
| A1X (Metroway) | 16.80 | 14.73 | 16.46 | 30.63 | 11.70% | 14.55 | 16.46 | 30.63 | 13.07% |
| Chain Bridge | 25.09 | 15.20 | 20.14 | 37.37 | 32.50% | 17.61 | 23.29 | 32.31 | 32.31% |
| Columbia Pike to Crystal City | 12.80 | 11.59 | 15.60 | 24.60 | 34.60% | 12.60 | 16.93 | 22.67 | 34.42% |
| Columbia Pike to DC | 25.53 | 13.45 | 16.26 | 47.11 | 20.90% | 14.09 | 17.02 | 44.99 | 20.85% |
| Duke Street | 8.36 | 13.35 | 17.58 | 14.27 | 31.67% | 14.50 | 19.09 | 13.14 | 31.62% |
| Franconia-Ft Belvoir | 12.45 | 18.15 | 18.15 | 20.57 | 0.00% | 18.66 | 18.66 | 20.01 | 0.00% |
| Gallows Road | 27.75 | 13.69 | 18.15 | 45.86 | 32.62% | 14.75 | 19.57 | 42.55 | 32.61% |
| Glebe Road | 15.31 | 12.36 | 15.44 | 29.74 | 25.00% | 13.06 | 16.33 | 28.13 | 25.00% |
| I-495 North | 27.51 | 22.66 | 24.61 | 33.54 | 8.61% | 23.20 | 25.26 | 32.67 | 8.87% |
| I-495 South | 29.65 | 20.13 | 23.03 | 38.62 | 14.44% | 22.94 | 25.95 | 34.28 | 13.13% |
| Leesburg-Dulles Town Center | 27.52 | 30.14 | 32.65 | 25.29 | 8.33% | 31.75 | 34.35 | 24.03 | 8.18% |
| Little River Turnpike | 31.09 | 15.47 | 20.07 | 46.47 | 29.71% | 15.83 | 20.52 | 45.46 | 29.58% |
| Manassas Line | 17.14 | 13.99 | 18.89 | 27.23 | 35.00% | 13.87 | 18.89 | 27.23 | 36.17% |
| Northwest BRT | 46.81 | 22.54 | 25.74 | 54.55 | 14.19% | 22.66 | 25.94 | 54.14 | 14.44% |
| Old Keene Mill | 27.30 | 19.81 | 22.78 | 35.96 | 15.00% | 19.67 | 22.78 | 35.96 | 15.77% |

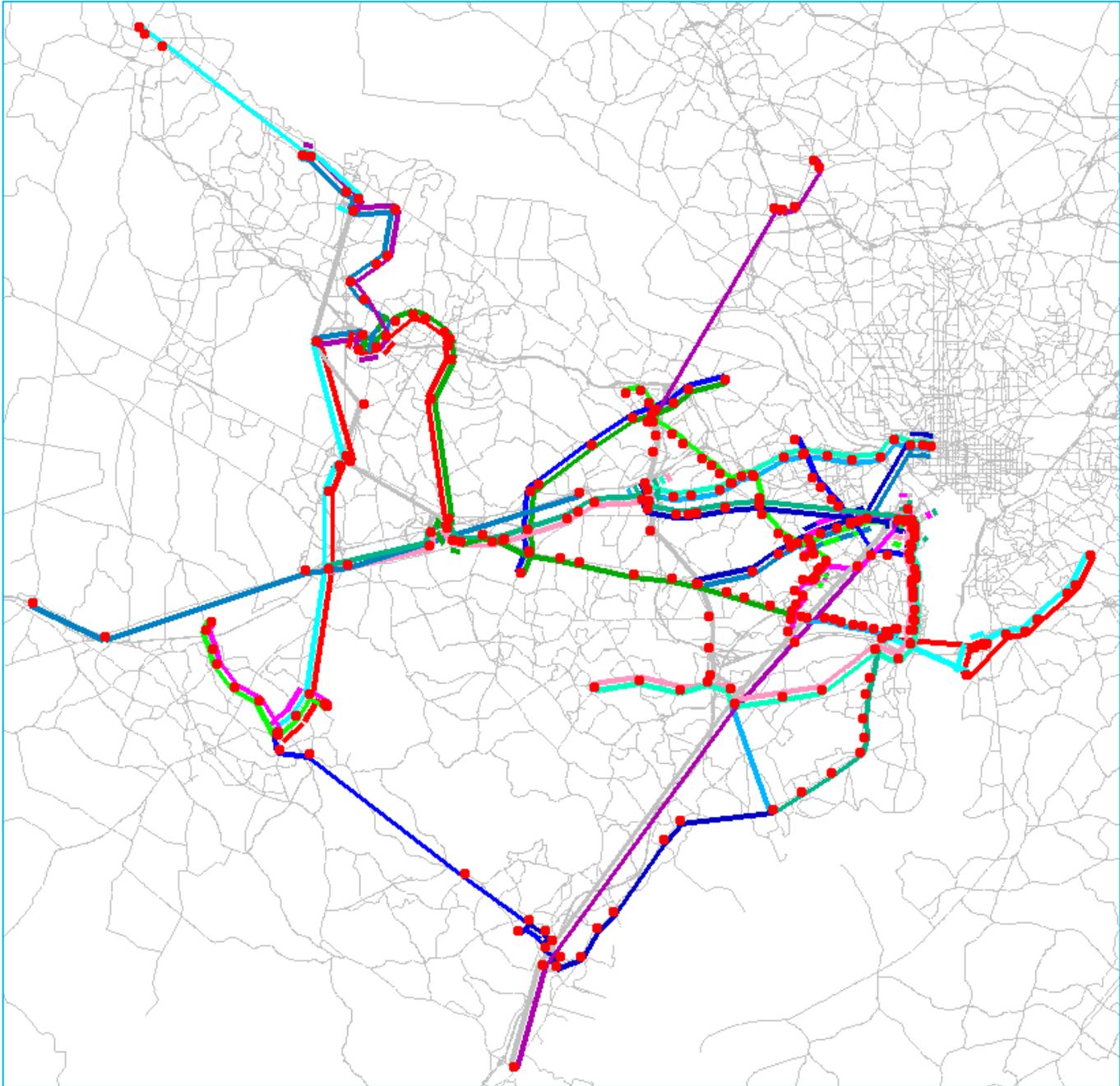


| Route | Bi-Directional Length (mile) | Peak Speed—Existing (mph) | Peak Speed—BRT (mph) | Peak Runtime One Way (minute) | Peak Speed Change | Off-Peak Speed—Existing (mph) | Off-Peak Speed—BRT (mph) | Off-Peak Runtime One Way (minute) | Off-Peak Speed Change |
|------------------------|------------------------------|---------------------------|----------------------|-------------------------------|-------------------|-------------------------------|--------------------------|-----------------------------------|-----------------------|
| Prince William Parkway | 29.92 | 24.31 | 25.93 | 34.62 | 6.66% | 25.30 | 27.05 | 33.18 | 6.92% |
| Reston-Fair Oaks | 31.73 | 17.86 | 21.32 | 44.65 | 19.37% | 18.45 | 21.88 | 43.51 | 18.58% |
| Richmond Highway BRT | 16.82 | 14.25 | 21.37 | 23.61 | 50.00% | 14.80 | 22.20 | 22.73 | 50.00% |
| US 1 South | 32.61 | 13.68 | 16.00 | 61.15 | 16.96% | 14.13 | 16.51 | 59.26 | 16.86% |
| US 29 East | 26.13 | 12.80 | 16.10 | 48.69 | 25.79% | 13.01 | 16.36 | 47.91 | 25.82% |
| US 29 West | 29.86 | 13.75 | 18.17 | 49.31 | 32.09% | 13.84 | 18.36 | 48.80 | 32.62% |
| US 50 East | 25.45 | 15.39 | 17.47 | 43.70 | 13.53% | 16.73 | 18.92 | 40.36 | 13.07% |
| VA 28 North | 43.32 | 20.73 | 21.37 | 60.81 | 3.10% | 22.22 | 22.78 | 57.04 | 2.51% |
| VA 28 South | 40.81 | 21.72 | 23.57 | 51.95 | 8.49% | 23.31 | 25.28 | 48.44 | 8.43% |
| VA 7 | 25.21 | 12.29 | 16.66 | 45.41 | 35.52% | 12.62 | 17.11 | 44.21 | 35.58% |
| West End Transitway | 19.78 | 15.66 | 18.20 | 32.61 | 16.21% | 15.04 | 18.20 | 32.61 | 20.99% |
| 95 Express | 66.60 | 28.20 | 28.40 | 70.30 | 0.71% | 27.20 | 28.40 | 70.30 | 4.41% |
| I-66 | 45.70 | 21.40 | 22.20 | 61.70 | 3.74% | 22.50 | 23.30 | 58.95 | 3.56% |



Figure L-1 shows the BRT routes and stations included in the Cube network.

Figure L-1 BRT Routes and Stations in Cube Network



APPENDIX M. JURISDICTIONAL BRT SYSTEM FEEDBACK TO BE CONSIDERED FOR FUTURE PLANNING STUDIES

| Route | Potential Change | Source |
|------------------------------|---|-----------------------|
| #2 – Metroway | Review station locations | Alexandria |
| #3 – Duke Street | Remove Dove St | Alexandria |
| | Change BRT Type to Dedicated | Alexandria |
| #4 – West End Transitway | Extend south to Kingstowne | FCDOT |
| | Add additional peak-only express service to the Pentagon | Alexandria |
| | Change BRT Types by segment | Alexandria |
| #11 – Beltway South | Could connect to Eisenhower Metro station rather than King St Metro station | Alexandria |
| #17 – West Ox Road | Reroute western terminus to end at Herndon instead of Innovation station | FCDOT |
| #18 – Sterling Connector | Reroute southern terminus to end at Herndon instead of Dulles Airport | FCDOT |
| #20 – VA 28 North | Extend Potential Route 20 (VA 28 North) to Manassas Park to connect with Potential Route 23 (Manassas Connector) | City of Manassas Park |
| #21 – I-66 Express | Extend eastern terminus to Dunn Loring to provide addition transfer opportunities | FCDOT |
| | Keep on I-66—Comprehensive Plan closes US 29 through the Battlefield | Prince William County |
| #22 – VA 28 South | Extend beyond the City of Manassas towards the GMU-Innovation Campus | OmniRide |
| #23 – Manassas Connector | Change BRT Type to something without dedicated lanes | Prince William County |
| #24 – Prince William Parkway | Terminate at the new Neabsco Commuter Parking Garage | Prince William County |
| #26 – I-95 Express | Serve new Neabsco Commuter Parking Garage instead of the PRTC Transit Center | Prince William County |
| #27 – US 1 South | Include dedicated lanes (business access/transit lanes) along US 1 – Advanced BRT instead of Basic | Prince William County |
| | Realign to terminate at the planned mixed-use Quartz development on the NW corner of Prince William Pkwy & Minnieville Rd | Prince William County |
| #28 – Old Keene Mill | Reroute eastern end from Telegraph Rd to Franconia Rd | FCDOT |



| | | |
|---|---|-----------------------|
| New Route – Fairfax County Parkway | Add new route along Fairfax County Parkway from Herndon to Franconia-Springfield | FCDOT |
| New Route – Braddock Route | Add new route mirroring FC306 along Braddock Rd | FCDOT |
| New Route—Beltway | Add new route mirroring FC494 on the Beltway between Tysons and Franconia-Springfield | FCDOT |
| New Route—South Riding to Franconia Springfield | Add new route along US 50, I-66 & I-495 mirroring FC670 | FCDOT |
| New Route – Manassas to Tysons | Considerations for Manassas to Tysons vicinity | City of Manassas Park |

