

NORTHERN VIRGINIA REGIONAL BUS TRANSIT ANALYSIS

EXECUTIVE SUMMARY

prepared for

Northern Virginia Transportation Commission

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July 2024



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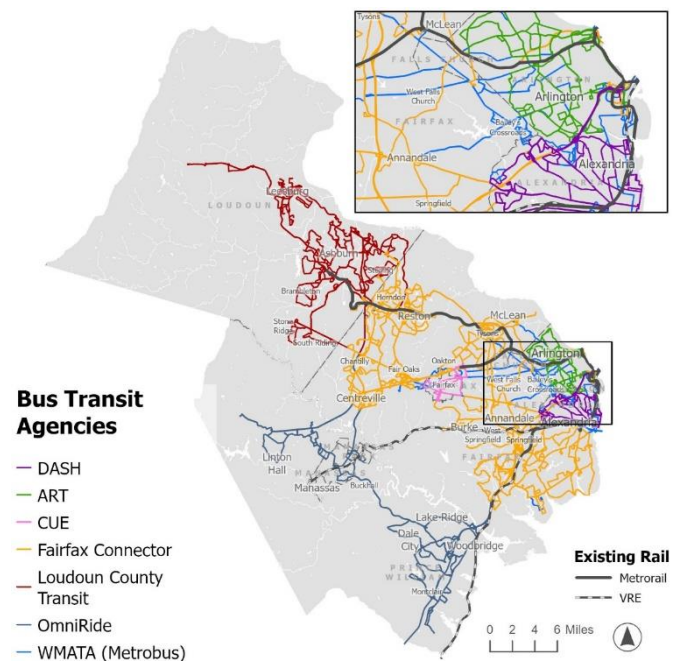
Study Overview

The purpose of this Northern Virginia Transportation Commission (NVTC) Regional Bus Transit Analysis is to provide a regional context and analysis of existing and planned services by the bus transit providers operating in Northern Virginia and to serve as a complementary strategic planning resource for the Commission and its jurisdictional members. NVTC serves as a regional forum for coordinating the provision and funding of public transit services for the counties of Fairfax, Arlington and Loudoun and the cities of Alexandria, Fairfax and Falls Church.

There are six local bus transit providers that are the focus of the study to identify opportunities for coordination of bus service, operations and investment. These bus providers include:

- Arlington Transit (ART), Arlington County, Virginia
- City-University-Energysaver (CUE), City of Fairfax, Virginia
- Driving Alexandria Safely Home (DASH)– Alexandria Transit Company, City of Alexandria, Virginia
- Fairfax Connector, Fairfax County, Virginia
- Loudoun County Transit, Loudoun County, Virginia
- OmniRide, Potomac and Rappahannock Transportation Commission (PRTC)

FIGURE ES-1. EXISTING BUS TRANSIT



In addition, since Northern Virginia is also served by the Washington Metropolitan Area Transit Authority's (WMATA) Metrobus, this study also takes into consideration the role of Metrobus in serving Northern Virginia, currently being reimagined in WMATA's bus network redesign effort.

Using the transit system strategic plans and transit development plans (TSPs and TDPs) developed by the Virginia bus service providers in Northern Virginia as a foundation, this study provides a macro-level assessment of how bus systems are serving the region, regardless of provider. Elements of the project include (1) a regional summary of existing bus service and performance and planned bus changes and improvements; (2) evaluation of demographic and socioeconomic characteristics, development patterns and travel demand to identify areas where there is a high propensity to use transit services; (3) an analysis of service gaps in the regional bus transit network; (4) identification of cross-jurisdictional high priority transit corridors; (5) an overview of existing and planned bus facilities including identifying opportunities for shared facilities and other infrastructure; and (6) an assessment of existing and anticipated financial needs to support the regional bus system.

Planned Improvements

TSPs and TDPs set the goals and priorities for each provider and define strategies, which often take the form of recommendations with a regional impact. The meta-analysis of Northern Virginia TSPs and TDPs reviewed those recommendations under a regional lens and assessed their potential impact on transit in the region. Common elements and types of improvements highlighted across the region include:

- Common service objectives include providing transit service that is more direct and faster, more frequent, and across a longer span; providing more cross-county/region connections and reverse-commute routes for increased coverage and connectivity; and other service improvements in support of goals of accessibility, safety and security, equity, and mobility.
- TSP/TDP service changes vary by agency but include improvements such as expanding/streamlining service, adding more service on middays and weekends; expanding coverage to provide access to more residents; and adding new connections to activity centers and transportation centers such as Metrorail stations.
- Priority corridors are called out in the plans as focal areas for increased investment. There are six corridors where elements of Bus Rapid Transit have been implemented or advanced through planning and project development studies: Metroway (Crystal City-Potomac Yard), Columbia Pike Premium Transit, Envision Route 7, Richmond Highway Bus Rapid Transit (The One), Duke St Transitway, and West End Transitway.
- Other plan elements found in multiple plans include partnering with other modes for first/last mile connections; utilizing technology, such as signal priority and real-time arrival information; infrastructure enhancements to make bus service more accessible and attractive; and introduction/expansion of on-demand services.

System Performance

The seven bus transit agencies included in this analysis vary significantly in size, from WMATA (one of the largest transit agencies in the country) to CUE's two routes serving Fairfax City. Service standards for each agency were reviewed and the performance of the combined regional bus system was evaluated across a range of metrics such as coverage, span, level of service, and ridership.

Service Standards

Each Northern Virginia bus transit operator sets various service standards in their transit planning documents (TSPs, TDPs, etc.) that outline the level of service they aim to provide. Service standards for frequencies vary for peak (15-30 minutes) and off-peak service (15-60 minutes) and service spans that are, at minimum, 14 hours per day on weekdays. The industry standard for on-time performance (OTP) is 85%, and each agency provides that level, in some cases, exceeding it by over 10%. DASH and ART, which generally provide mostly local service, have between 90% and 99.5% of residents in their service areas within walking distance, while Fairfax

Connector is closer to half of residents within walking distance and Loudoun County Transit and OmniRide do not have standards for walk access to service.

Service Coverage and Level of Service

The bus transit providers service areas overlap in the region to provide very good coverage, span, and frequencies, but the level of service varies by geography and by time period. Peak coverage and frequency is best for areas inside the Beltway and along major corridors as shown in **Figure ES-2**. Off-peak service on weekdays has reduced coverage and frequencies as seen in **Figure ES-3**. Service drops off even more on weekends when peak-only commuter routes are not operating.

FIGURE ES-2. WEEKDAY PEAK AVERAGE HEADWAY

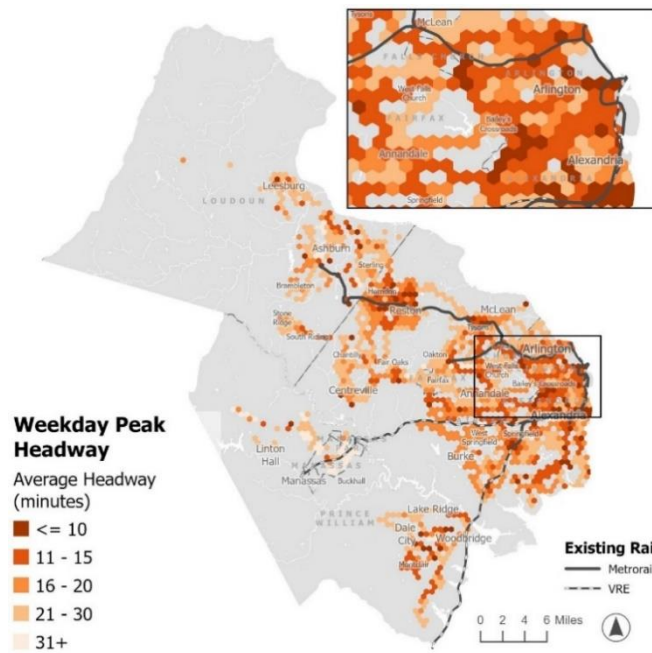
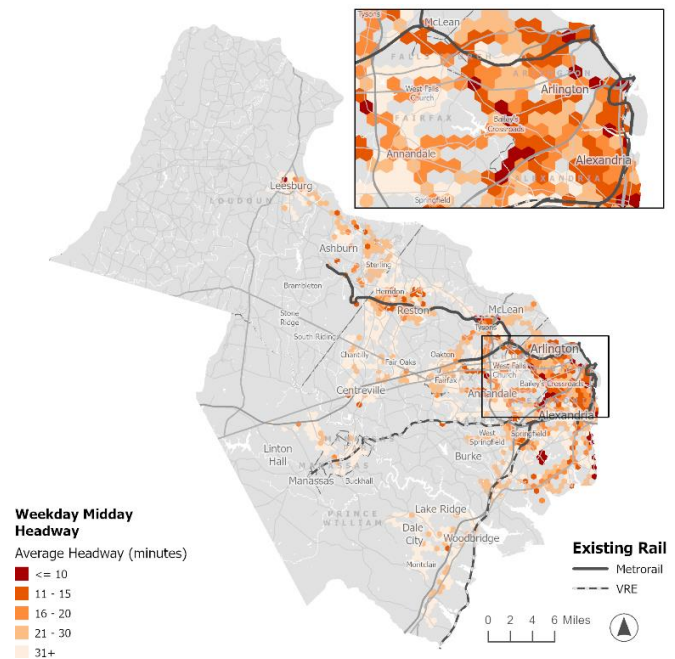


FIGURE ES-3. WEEKDAY MIDDAY AVERAGE HEADWAY



Ridership

Around 40% of the public transportation trips in Northern Virginia take place on buses, with 31.5 million trips on buses completed in 2023. Metrobus carries the region’s largest percentage of bus trips with 38.8% of annual bus trips across Northern Virginia. The next largest share is carried by Fairfax Connector (28.5%), followed by DASH (15.8%), ART (7.0%), OmniRide (5.2%), CUE (3.0%) and Loudoun County Transit (1.7%).

Bus Transit Market Evaluation

Understanding a region's potential bus transit markets and service gaps is critical to creating a regional bus transit network that meets the needs of all the region's residents. A thorough assessment of the network considers needs from many perspectives and is sensitive to variations in demographic and socioeconomic characteristics, development patterns and travel demand.

Figure ES-4 shows the Transit-Oriented Population Propensity for the study area. Across this region, the areas with the highest concentration of transit-oriented populations include neighborhoods in and adjacent to Alexandria and Arlington. Areas with a moderate-to-high propensity score typically show significant concentrations of population, zero- and one-car households, low-income individuals, or some combination thereof. In the overall area, moderate-to-high levels of transit-oriented populations tend to be either close to a major activity center or transit corridor.

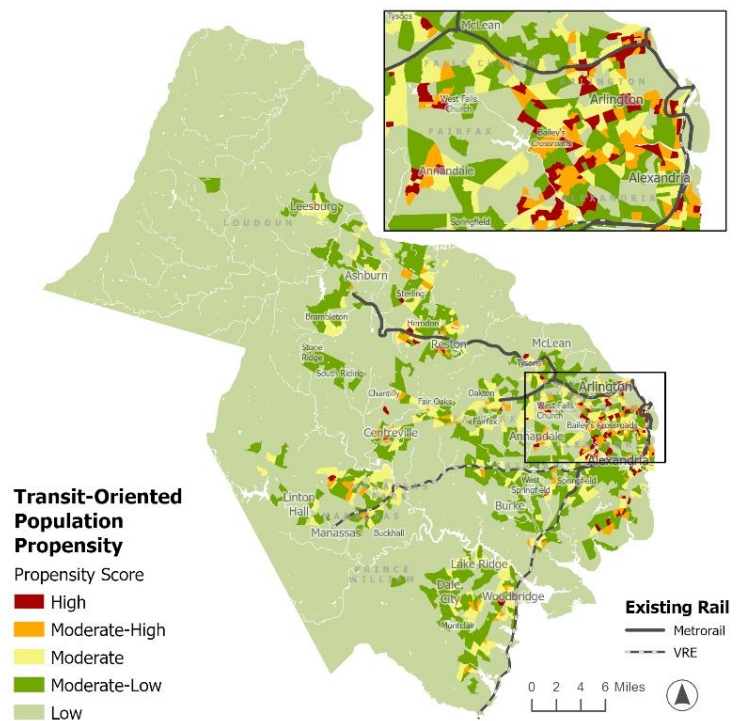
The market evaluation included an analysis of population and job growth in the region. The population of Northern Virginia is forecasted to grow from 2.70 million people in 2025 to 2.97 million people in 2035, an increase of 10%. The employment in Northern Virginia is forecasted to grow from 1.57 million jobs in 2025 to 1.77 million jobs in 2035, an increase of 13%.

Changes in the amount and distribution of population and jobs across the region is expected to impact travel patterns, with some of the faster growing trip markets being inter-county flows within Northern Region, rather than radial travel to the region's core. The travel flows expected to see the highest amount of growth are between central Fairfax County and inside the Beltway to northern Fairfax County, as well as between western Loudoun County and northern Fairfax County.

Service Gap Analysis

A data-driven service gap analysis used the transit market findings and planned service improvements from the transit agencies' TSPs/TDPs to identify and plan for gaps in the regional bus transit network. Three types of gaps were considered: geographic (missing service), level of service (mismatch in the amount of service and

FIGURE ES-4. TRANSIT-ORIENTED POPULATION PROPENSITY



demand by time period), and type of service (missed connections or types of service), which, when combined, provide a holistic look at potential service gaps throughout the region.

Figure ES-5 shows the intensity of gaps in weekday service during the morning peak period in the region. In areas without bus transit service, isolated pockets in Tysons Corner have a high need for service considering job and population density. For areas with existing bus service in the AM peak, areas in Loudoun County, namely Leesburg, Ashburn, Sterling, and downtown Stone Ridge; Gainesville, Sudley and Southbridge in Prince William County; Manassas Park and areas in Fairfax County, including Chantilly, Centreville and southern Fair Oaks, all have the highest concentrations of areas needing increases in existing bus service frequencies.. Most equity emphasis areas (EEAs) have existing bus transit services, with the exception of one in Woodbridge, and many are well served by bus transit during the AM peak period.

FIGURE ES-5. WEEKDAY AM PEAK GAPS

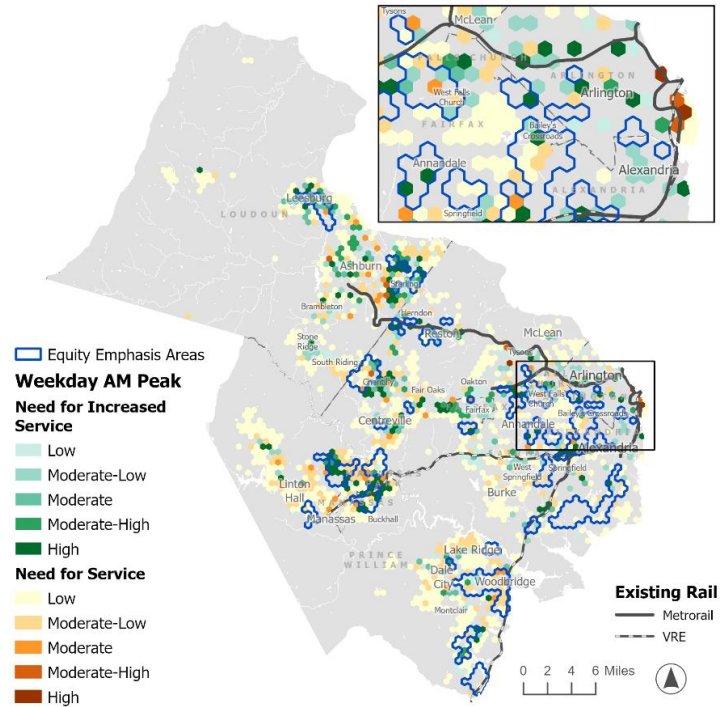


Figure ES-6 highlights gaps in service during the midday portion of the weekdays. Considering midday gaps is important to ensure that service is provided for all riders and for various needs beyond the traditional 9:00 a.m. to 5:00 p.m. commute times. Similar to AM peak service, areas in Loudoun County, Sudley, Chantilly, southern Fair Oaks and Southbridge have a concentration of areas needing increased bus transit service. Most EEAs capture areas needing increased transit service, aside from Woodbridge, where midday bus transit service is lacking.

FIGURE ES-6. WEEKDAY MIDDAY GAPS

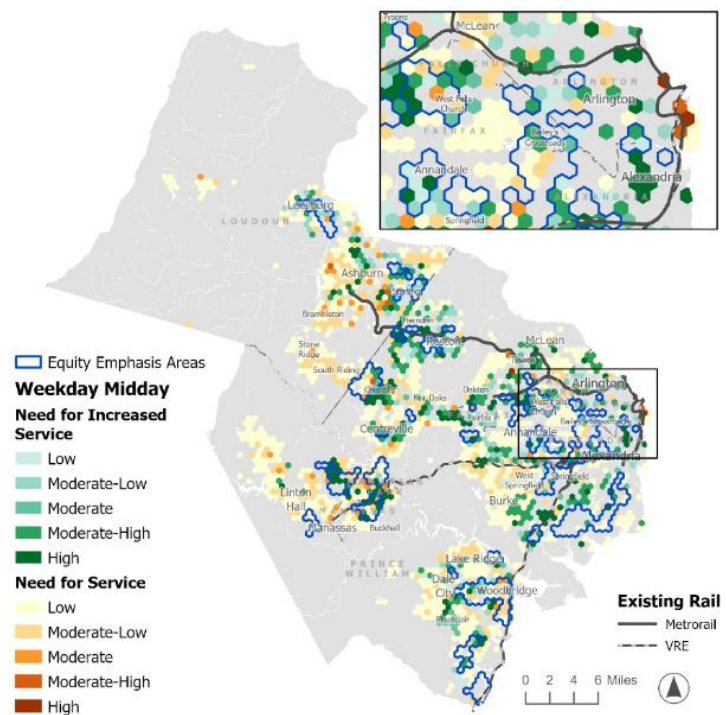
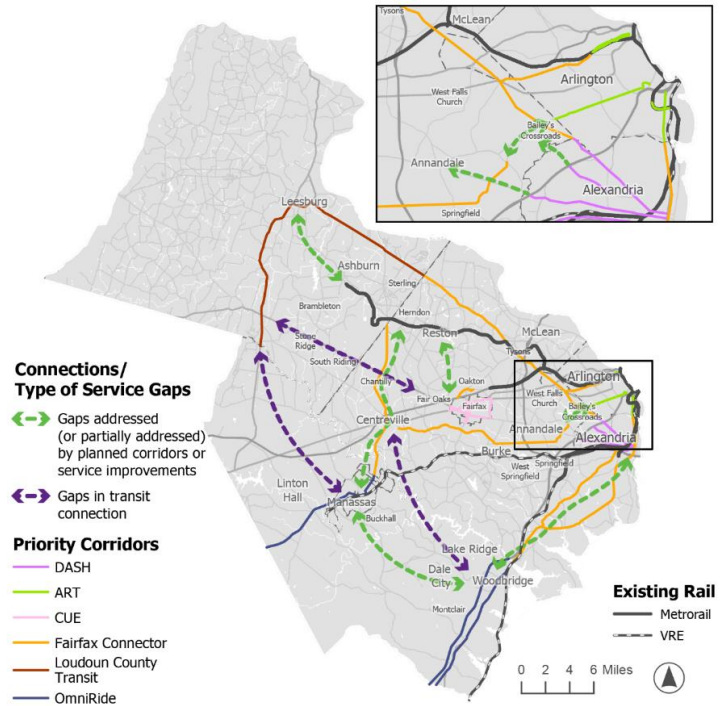


Figure ES-7 summarizes types of service gaps, noting which are addressed, at least partially, by planned corridors or service improvements (from the meta-analysis of TDP/TSPs), as confirmed in gap analysis workshops with local transit partners. The areas highlighted in purple are those that remain as gaps in transit connection even after considering future plans and improvements. The remaining gaps are primarily between Leesburg and Manassas, on US 50, between the Stone Ridge area in Loudoun County, and areas in central Fairfax County and Woodbridge to Central Fairfax City.

FIGURE ES-7. SUMMARY OF SERVICE GAPS



Northern Virginia Priority Transit Corridors

One key component of this study focused on identifying priority corridors that are good candidates for additional service and investment in the short-term and for implementation of high-capacity transit in the long-term. Candidate corridors reflect those cumulatively identified through the stakeholder outreach, the meta-analysis of strategic plans and the gap analysis. Performance metrics were calculated for each corridor and presented in the accompanying spreadsheet tool for weighting, grouping and prioritization of projects across the region.

WHAT IS A PRIORITY CORRIDOR?

Priority corridors are multijurisdictional corridors with strong transit demand potential that warrant additional study and investment in order to:

- Provide additional transit service in underserved markets (short-term).
- Identify markets for high-capacity transit service such as Bus Rapid Transit (BRT) (long-term).
- Supplement the existing bus and rail network.

Figure ES-8 depicts the priority corridors in the study region (with each color serving to identify a unique corridor). A large number of corridors connect regional destinations to the population centers near Washington, especially the Rosslyn, Pentagon, and King Street-Old Town Metrorail stations in Arlington and Alexandria. In more sparsely populated parts of the study area, corridors are typically aligned along major state highways and interstates.

In order to compare corridors and sub-corridors for prioritization, a consistent set of metrics was developed that could be applied for the entire region. Prioritization metrics were chosen across three major themes: effectiveness, equity and efficiency.

When the prioritization tool is applied to the priority corridor segments using unweighted metrics, the top-rated segments include Leesburg Pike, West End Transitway, US 1 (Inside the Beltway), Columbia Pike, US 1/Richmond Highway in Fairfax County, Duke Street in Alexandria, and US 50, Wilson Boulevard, and Glebe Road in Arlington.

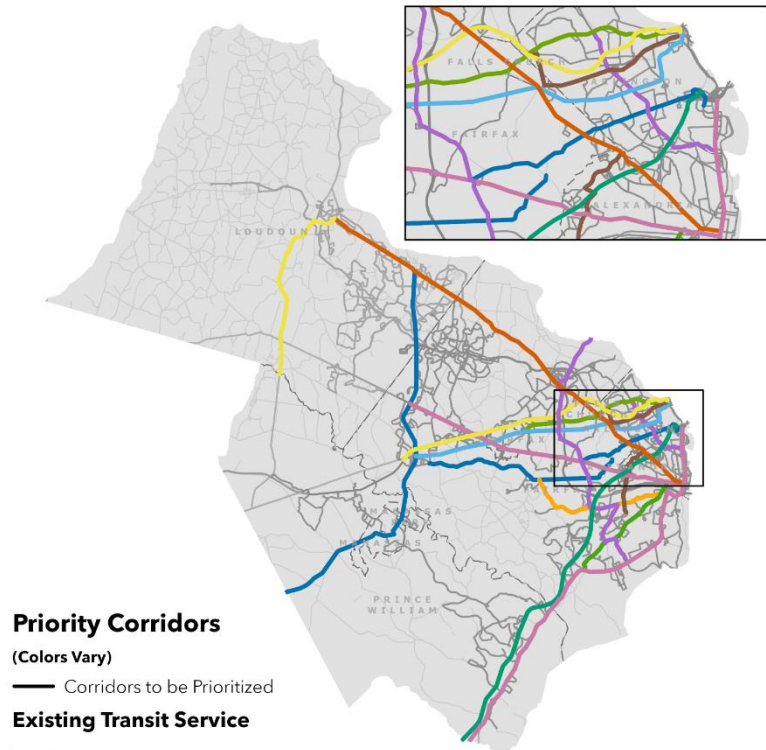
For the past two decades, progress has been made towards implementing BRT or “rapid bus” improvements in some of the priority bus corridors in the region. Northern Virginia has long recognized the need for a regional network of high-capacity bus services to supplement the existing rail networks and provide high-quality transit service across the region. Developing and implementing such a system is difficult because of the multijurisdictional nature of so many of the major bus corridors in the region.

Bus Facilities

As part of the study, all existing and planned bus facilities owned or operated by each of the Commission’s jurisdictional members were inventoried. These facilities include bus maintenance and storage yards to store and maintain the more than 800 buses owned by the six local bus operators, fueling stations, administrative centers and passenger-facing amenities. Interviews with each agency were conducted to identify common infrastructure needs and inform recommendations to support new and strengthen existing collaborations for bus service and operations in Northern Virginia.

A critical element of bus infrastructure in Northern Virginia are the region’s bus stops, as they are the facilities that passengers interact with. A bus stop demand analysis was conducted to identify bus stops or bus bays

FIGURE ES-8. PRIORITY CORRIDORS



experiencing high levels of bus activity relative to the available capacity of these stops. The analysis found that 18% of the bus stops in the region may have two vehicles scheduled to serve it at a given time on a weekday, but only 1.1% have three or more vehicles scheduled at a given time, representing a potential capacity limitation only around 0.2% of the time.

Due to the overlapping service areas and investment interests of the seven bus operators, there is a strong potential for exploring shared facilities with interagency ownership, management and/or operations of bus transit infrastructure. **Table ES-1** provides a list of key shared facility needs and the suggested general facility location. While these recommendations are not definitive, they intend to spark innovative conversations between agencies which may not have previously considered mutual facility needs and the achievable alignment of capital investments for their adjacent services.

TABLE ES-1. SHARED FACILITY NEEDS AS OPPORTUNITIES FOR COLLABORATION

Facility Need	Operating Agencies	General Facility Location
EV Charging for Long-Haul Service Fleet	ART, Loudoun County Transit, OmniRide	Arlington Operations and Maintenance Facility
EV Charging for Local Bus Service Fleet	ART, WMATA	Four Mile Run Bus Garage
Passenger Amenity	CUE, Fairfax Connector	Monument Drive Parking Garage
Passenger Amenity	ART, DASH, WMATA, OmniRide, Fairfax Connector	Bailey's Crossroads
On-Route EV Charging Facilities for Long-Haul (Loudoun County Transit) and Local Bus (Fairfax Connector) Service Fleet	Fairfax Connector, Loudoun County Transit	Tysons
On-Route EV Charging Facilities for Local Bus and BRT Service Fleet	ART, DASH, WMATA	Metroway
Heavy Maintenance Facility for Specialized Servicing	All Agencies	Central to all jurisdictional members, such as eastern Fairfax County
Training Facility or Simulator	All Agencies	Mobile, or central to all jurisdictional members, such as eastern Fairfax County

Financial Needs

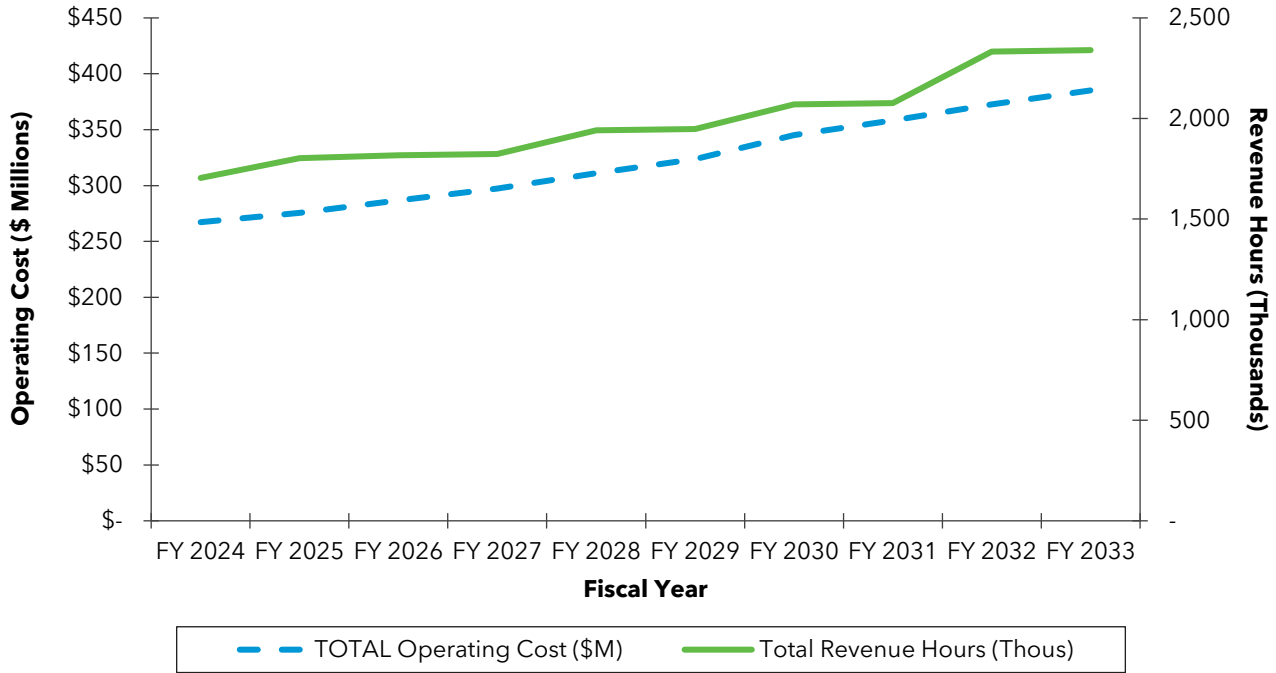
Operating Costs and Revenues

Figure ES-9 shows the regional total of operating costs by year, growing from \$265.1 million in FY 2024 to \$385.1 million in FY 2033, a 45% increase. The amount of planned bus service, in revenue hours by year, are also shown on the chart, increasing from 1.70 million to 2.34 million, an increase of 37.6%.

A mix of federal, state, regional, local, and other operating funding sources are expected to be used for operating revenues. Local funding sources account for about half of revenue, followed by state sources (20%)

and regional sources (16%). Fares are expected to represent 9% of the operating funding for the bus systems. Two of the systems, DASH and CUE, and fare-free and do not rely on this funding source.

FIGURE ES-9. REGIONAL OPERATING COSTS AND REVENUE HOURS BY YEAR



Note: This figure does not include WMATA.

Capital Costs and Revenues

Figure ES-10 breaks down the capital costs by the type of capital improvement from FY 2024 through FY 2028. Fleet replacement and expansion needs account for 32% of the capital costs, facilities are 13% of the capital costs, and major capital projects are 52% of the capital costs. Major capital projects include BRT projects such as the Richmond Highway BRT in Fairfax County and Duke Street Transitway and West End Transitway in Alexandria. This category also includes investment in Fairfax Connector’s electric bus infrastructure. The Other category includes technology/intelligent transportation systems (ITS) for ART, Fairfax Connector, Loudoun County Transit, and OmniRide.

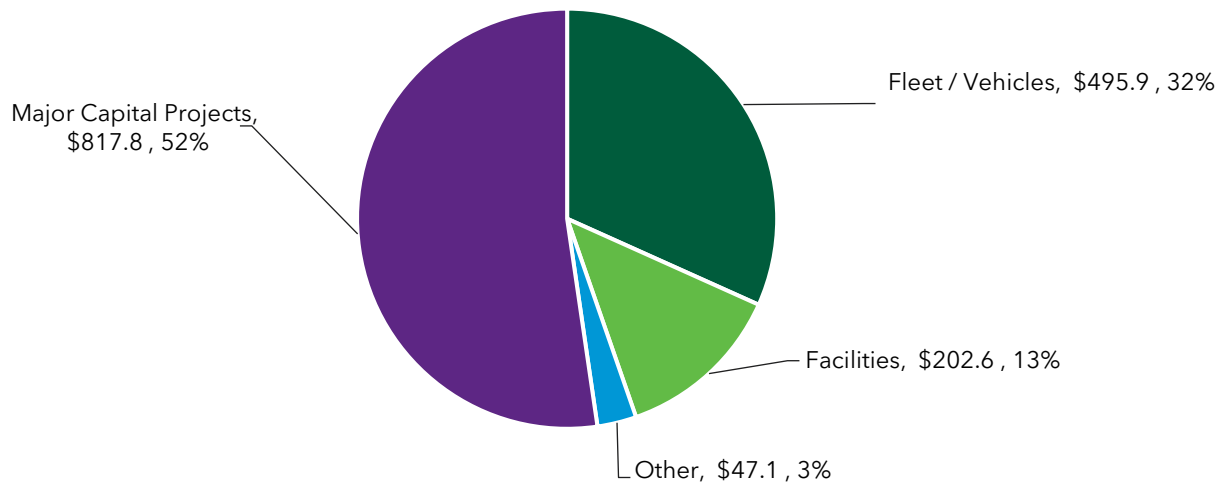
For capital expenditures, the largest sources of funding are federal (42%), state (19%), and regional sources such as NVTA (21%). Local funding of capital expenditures is 15% of the total, accounting for a smaller share than for operating expenses.

Summary of Financial Needs

This financial needs assessment provides a regional total for the operating and capital expenditures expected over the next ten years by bus operators in Northern Virginia. **Figure ES-11** shows the combined total annual expenditures, both operating and capital, between FY 2024 and FY2028. During this time period, the annual

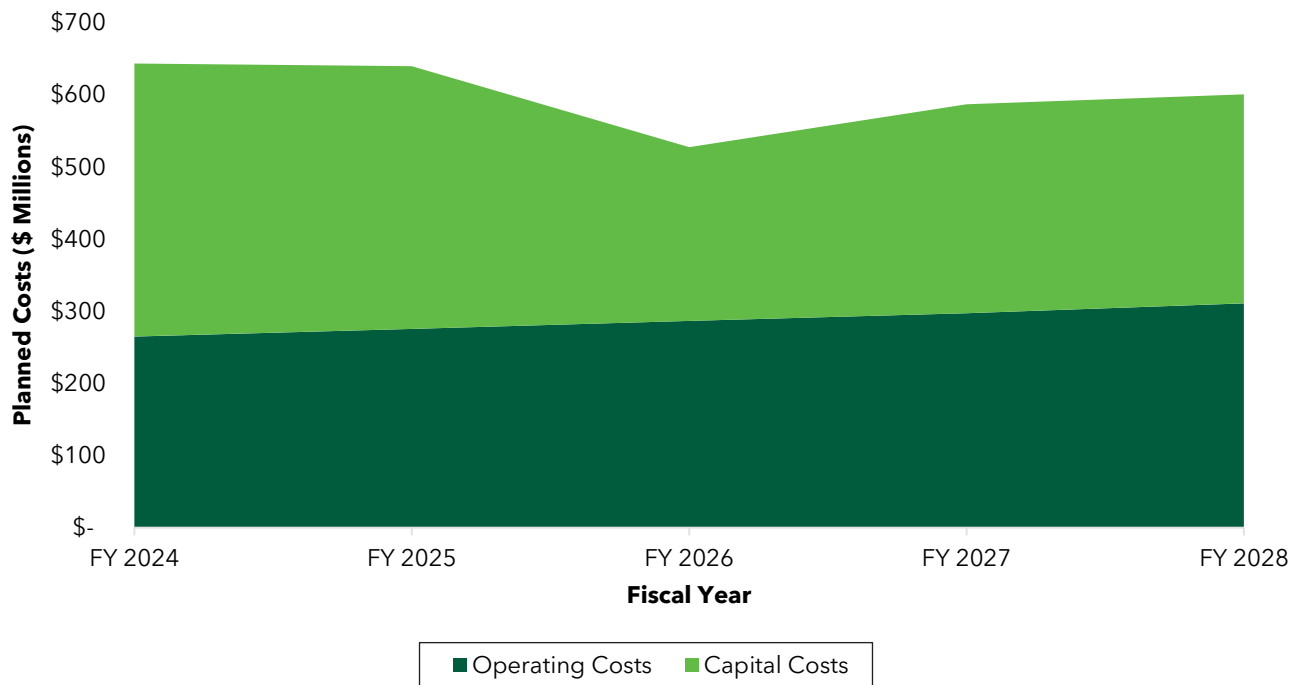
costs are approximately \$600 million per year, or a total of \$3 billion over five years. The total planned expenditures over ten years, based on agency TSPs/TDPs and CIPs, is \$5.8 billion (but may not fully reflect all capital costs in the FY 2029-FY 2033 period).

FIGURE ES-10. CAPITAL COST FORECAST BY INVESTMENT TYPE (\$ MILLIONS), FY 2024-FY 2028



Note: This figure does not include WMATA.

FIGURE ES-11. TOTAL REGIONAL BUS FINANCIAL NEEDS, FY 2024-FY 2028



Note: This figure does not include WMATA.

The financial needs assessment also looked beyond what is included in the agency TSPs/TDPs and CIPs to other needs identified in this study. These include:

- **Additional investments to address service gaps identified in this study.** The total annual operating cost is estimated to range between approximately \$36 and 42 million. The fleet required to operate that service would add roughly \$18 million in capital expenditures.
- **Potential priority corridor investment needs.** This study has identified corridors in the region that are candidates for increased investment in transit, without being prescriptive about the specific types of investment in bus services and infrastructure. For the six corridors where BRT service has been initiated or is in project development, full implementation would require at least \$1.7 billion in capital funding. For other corridors where the types of bus improvements, the total level of investment would vary significantly based on the number of corridors implemented and the different levels of investment ranging from enhanced bus customer facilities (\$2.7 billion) to full BRT implementation (\$23.3 billion beyond the cost for the corridors in project development).
- **Potential additional shared facility investment needs.** Collectively, the six Virginia bus operators have planned for nearly \$500 million in investment in facilities, some of which could be directed towards shared facilities. This total may not fully capture investments towards the transition to electric vehicle technologies or other unfunded facility needs.