



## EXECUTIVE SUMMARY

# VRE Gainesville-Haymarket Alternatives Analysis Report

Prepared for  
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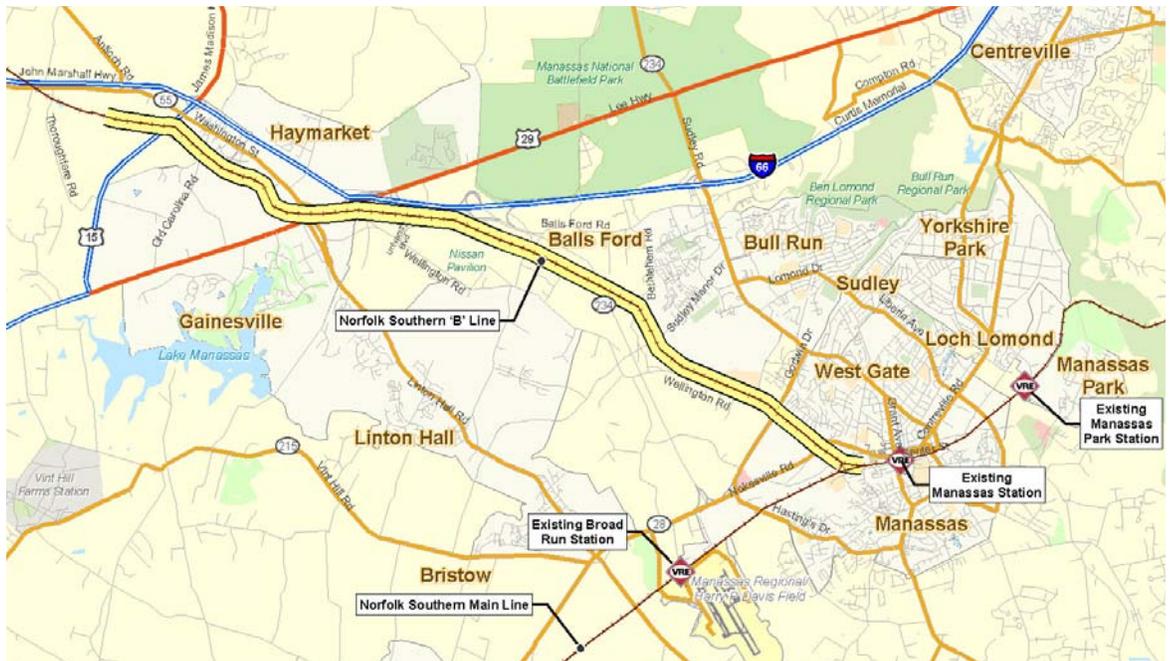
# Executive Summary

## Introduction

The Virginia Railway Express (VRE) Gainesville-Haymarket Alternatives Analysis is an initiative of the VRE to enhance transit services in order to improve mobility and regional access for residents in the northern Virginia communities of Gainesville and Haymarket. The Alternatives Analysis is one step in determining eligibility of federal funding for the project through the Federal Transit Administration (FTA) New Starts program. The Alternatives Analysis, which is composed of a data collection effort, stakeholder and public involvement, and a two-tiered screening of alternatives, is the first step in FTA's Project Planning and Development process.

The study area for the VRE Gainesville-Haymarket Alternatives Analysis consists of the corridor of Gainesville-Haymarket and its connection to Washington DC (DC). This includes approximately 11-miles along the existing Norfolk Southern (NS) B Line corridor that connects Manassas, the Linton Hall/Sudley/Balls Ford area, Gainesville, and Haymarket. Figure 1 shows the NS B Line corridor relative to the existing VRE stations and the study area cities and towns.

Figure 1: Study Area



VRE identified potential stakeholders and conducted meetings with them early in the study to gather critical input. Stakeholder groups were categorized into transportation and agency stakeholders. The transportation stakeholders include NS; FTA, Region 3 (Philadelphia); Virginia Department of Rail and Public Transportation (DRPT); Potomac and Rappahannock Commission (PRTC); Northern Virginia Transportation Commission; and Virginia Department of Transportation (VDOT). The agency stakeholders include Prince William County; City of Manassas; Town of Haymarket; and National Park Service Manassas National Battlefield. In addition, three public involvement meetings, July 2008, October 2008, and May 2009, were conducted as part of the public involvement process throughout the study to enlist support, hear concerns, and educate the public on the goals of the study.

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## Purpose and Need

The purpose of the VRE Gainesville-Haymarket Alternatives Analysis is to define the most appropriate transit investment strategy for improving mobility and regional access for residents in the northern Virginia communities of Gainesville, Haymarket, and Sudley Manor. The need for the Gainesville-Haymarket Alternatives Analysis is demonstrated in four main areas:

- Improve Regional Transit Access and Mobility
- Improve Regional Air Quality
- Encourage Smart Growth Development Initiatives
- Support Economic Growth

The goal of this study is to identify conceptual routing options, operational characteristics, environmental issues, costs, and design constraints that meet the stated Purpose and Need for the project.

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## Alternatives Identification and Screening

The methodology used to identify and screen the proposed alternatives was a two-tiered approach, designed to be consistent with FTA requirements and to encourage consideration of the full range of potential project benefits and impacts. Tier 1 is a qualitative process that examines a larger set of alternatives. Tier 2 is a more quantitative process that looks at a smaller, more refined set of alternatives.

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### Tier 1

A Tier 1 screening workshop was conducted in November 2008 to provide a forum for gathering input. Workshop participants selected evaluation criteria for the Tier 1 screening, as well as the list of alternatives that would be screened. This list of

alternatives was derived from a review of existing conditions, plans, and previous studies. The evaluation criteria included:

- Access and Mobility
- Traffic Congestion
- Environmental Considerations
- Smart Growth
- Economic Development
- Capital Costs and Effectiveness
- Ease of Implementation

The initial list included 13 alternatives. These 13 alternatives include various modal options including commuter rail, light rail transit, heavy rail transit, automated people mover, commuter bus, and bus rapid transit.

The Tier 1 screening was performed to evaluate the ability of each alternative to meet the goals and objectives outlined for the study. The Tier 1 evaluation criteria were primarily qualitative and intended to narrow the range of alternatives to a smaller set for further evaluation in Tier 2. A numerical score was assigned to each alternative for the evaluation criteria, allowing the alternatives to be rated and compared to one another. From this screening process, the six alternatives with an overall positive rating were carried forward into Tier 2 for further evaluation: 1A, 1B, 1C, 1D, 5A, and 5B.

Alternative 1A provides new commuter rail service from Gainesville-Haymarket to DC, overlaying the existing service on the VRE Manassas Line from Broad Run to DC. This alternative exceeds the current 40 trains per day VRE allocation on the CSX tracks between Alexandria and DC Union Station. Implementation challenges for this alternative include the need to negotiate for additional slots above the 40 trains per day maximum.

Alternative 1B provides new commuter rail service from Gainesville-Haymarket to DC, but does not exceed 40 trains per day VRE allocation between Alexandria and Union Station. There are no major implementation challenges since additional slots for operating trains are not needed.

Alternative 1C provides new commuter rail service from Gainesville-Haymarket to DC and a new commuter rail shuttle service from Gainesville-Haymarket to Alexandria. Shuttle service to Alexandria overlays, for just a short distance, the CSX-owned stretch of track into DC on which VRE service is limited to 40 trains per day. A commuter rail shuttle service between Prince William County and Alexandria offers the opportunity to increase frequency from Gainesville-Haymarket into the greater DC area. Once in Alexandria, passengers can connect to Metrorail to reach a wide range of destinations within DC. Implementation challenges include coordinating with NS and CSX to operate expanded peak service and off-peak

shuttle service within the NS corridor and to obtain expanded access to the Alexandria station.

Alternative 1D provides a continuous commuter rail corridor from Gainesville-Haymarket to DC via Broad Run Station. Inbound service would originate in the Gainesville-Haymarket area, travelling east toward Manassas. Short of Manassas Station it would turn south, bypassing Manassas and proceeding to Broad Run Station. After a station stop, the train would reverse direction, serve Manassas Station, and continue toward DC along the current Manassas Line route, making all of the existing stops along the way. Outbound trips would travel this same corridor in the reverse direction. The greatest benefit with Alternative 1D is for Broad Run riders. This alternative provides the most peak service of any alternative to or from Broad Run. Implementation challenges for this alternative include accommodating a reverse movement of trains to service Broad Run.

All commuter rail alternatives selected to move forward to the Tier 2 analysis are expected to improve regional transit access and mobility, reduce the number of single occupancy vehicles on roadways, and support transit-oriented development (TOD) and smart growth initiatives in Prince William County. Alternative 1D is expected to contribute the least benefit in these areas since the travel time for VRE riders from Gainesville-Haymarket to DC under this alternative is significantly increased compared to the other commuter rail alternatives.

Alternative 5A would provide new feeder bus service from Gainesville-Haymarket to Broad Run to connect to the existing VRE Manassas Line service from Broad Run to DC. There would be no change in VRE service with this alternative. This alternative is expected to increase transit access and mobility in the region, but it is not anticipated to remove a significant number of single occupancy vehicles from surrounding roadways. This is due to limited bus capacity and few travel advantages in comparison to driving to Broad Run. The required transfer to reach downtown DC also lessens the attractiveness of this alternative. An operational disadvantage for the alternative is that roadway congestion may delay its service and decrease its reliability.

Alternative 5B would provide direct bus service from Gainesville-Haymarket to DC (Pentagon) via Cushing Park and Ride Lot and the State Department. This alternative would utilize I-66 High Occupancy Vehicle (HOV) lanes where possible. There would be no change in VRE service with this option. This alternative is expected to increase transit access and mobility in the region and remove some single occupancy vehicles from the highway network into DC. It is expected to generate some vehicular activity on local roads near park and ride stations. It has the operations cost and environmental disadvantage of not facilitating a transfer to Metrorail [an opportunity constrained by bus terminal capacity constraints at Vienna / George Mason University (GMU) and other Metrorail stations].

Both commuter bus alternatives selected to move forward to the Tier 2 analysis are expected to increase transit access and mobility in the region and strongly promote TOD in Prince William County. Both alternatives have environmental and implementation advantage of using the existing roadway and highway network in its corridor. They both require new park and ride facilities, which could have environmental impacts. They are also cost-effective options, as the only capital costs would include the purchase of new buses and the construction of expanded maintenance and storage facilities.

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## Tier 2

The set of Tier 2 alternatives started with the six Build Alternatives from Tier 1: 1A, 1B, 1C, 1D, 5A, and 5B. In addition to the six Build Alternatives, a No-Build and two Baseline Scenarios were identified for the purpose of evaluation and comparison. This is an integral part of the FTA Planning and Project Development process.

In a No-Build Scenario, the existing transportation systems are carried forward to the future committed transportation network in the project area at a specified Forecast Year. The No-Build Scenario includes all programmed and funded improvements to the existing highway and transit services. In this study, the No-Build Scenario includes a bus route proposed by PRTC from Dominion Valley Drive to Cushing Park and Ride Lot to Tysons East Metrorail Station. Cushing Park and Ride Lot is a future committed project. The No-Build Scenario also includes a modified bus route along Linton Hall to Cushing Park and Ride Lot to Pentagon/State Department. The Forecast Year used is 2030.

A Baseline Scenario is created to identify the best option for meeting the transportation needs of the study area, but with smaller capital investments than are proposed in the Build Alternatives. Two potential Baseline Scenarios were evaluated in this Alternatives Analysis.

*Baseline Scenario 1:* A new I-66 commuter bus service from Haymarket to the Pentagon Metrorail Station via Cushing Park and Ride Lot and the State Department. The specific program for this potential Baseline Scenario was refined through several collaborative meetings with VRE and PRTC through the planning process. This Baseline Scenario displaced Build Alternative 5B, which shared the same service plan. Thus, Build Alternative 5B was removed from consideration.

*Baseline Scenario 2:* Feeder shuttle bus service from park and ride lots in Haymarket, Gainesville, and Sudley Manor to Broad Run Station timed to meet expanded VRE service. This expanded VRE service provides two additional AM peak inbound and two additional PM peak outbound trains.

After analyzing these two potential Baseline Scenarios, it was determined that although Baseline Scenario 1 is a potentially more attractive alternative in terms of

direct transit service to downtown DC, it is outside of the study area defined in this Alternatives Analysis. It encompasses a broader travel shed than identified in the Purpose and Need. There is also a separate study currently being conducted by DRPT to evaluate transit options along I-66. Thus, it was determined that Baseline Scenario 2 would better serve the goals and objectives of this study.

Baseline Scenario 2 displaced Build Alternative 5A, which shared the same service plan. Build Alternative 5A was removed from consideration.

The remaining Build Alternatives include Alternative 1A, 1B, 1C, and 1D. Further analysis of these alternatives warranted some additional revisions. Alternative 1A exceeds the 40 trains per day maximum per VRE's agreement with CSX. While a modification to this agreement is desirable, it cannot be done without significant additional capital funding. Alternative 1A is similar to Alternative 1B in all other aspects. Alternative 1A was removed from consideration. Alternatives 1B, 1C, and 1D have the option to expand beyond the 40 trains per day maximum at a later time, but for the purposes of this study, the frequency of these alternatives was kept within the current limits set by VRE's agreement with CSX.

To test the attractiveness of commuter rail service within the study area, two additional alternatives were evaluated in terms of ridership potential only. These two alternatives, 1G and 1H, were modeled with all service originating from Gainesville (Alternative 1G) or Haymarket (Alternative 1H), and no service to/from Broad Run. These alternatives were analyzed to test the model's sensitivity to frequency of service from the Gainesville-Haymarket area, and were only evaluated in terms of ridership. Service frequency assigned to each of these alternatives in the model was similar to the existing Manassas Line frequency originating in Broad Run.

The following is a list of the Tier 2 alternatives that were evaluated:

- No-Build
- Baseline Scenario 1
- Baseline Scenario 2
- Alternative 1B
- Alternative 1C
- Alternative 1D
- Alternative 1G (Ridership Only)
- Alternative 1H (Ridership Only)

Evaluation of Tier 2 Alternatives were performed in six main areas: environmental considerations, noise and vibration analysis, conceptual plan, operating plan, conceptual capital costs, conceptual operating and maintenance costs. Based on the elements of evaluation, more quantitative indicators were developed in five areas: Ridership Potential, Infrastructure, Operations and Maintenance, Environmental Considerations, Noise and Vibration, and User Benefit.

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## Environmental Considerations

### Build Alternatives

Based on the environmental factors indicated, potential impacts to water resources, such as floodplains and wetlands, are the greatest concern. As the rail alignments for Alternatives 1B, 1C, and 1D head west of US 29, large areas of wetlands and floodplains have been identified. Impacts to these resources may occur from land disturbing activities, such as acquiring additional right-of-way to construct a second track, or the provision of stations and park and ride lots. Impacts to these resources would require agency coordination, environmental permitting, and mitigation. Impacting these resources could impact project schedule and costs. At this level of analysis, significant changes in environmental considerations do not occur from one Build Alternative to another since operational characteristics are largely what defines each alternative.

### Baseline Scenarios

Baseline Scenarios 1 and 2 utilize the existing roadway network and do not require land acquisition for the alignment. The park and ride lots for Baseline Scenarios 1 and 2 may have potential environmental impacts, including to wetlands. These will be evaluated when sites are determined in the next phase of the project.

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## Noise and Vibration

### Build Alternatives

Based on the Tier 2 screening, the Build Alternatives 1B, 1C, and 1D have greater potential for noise and vibration impact than the Baseline Scenarios. Alternative 1C has the greatest number of trains in use and the most frequent service on the corridor. Of the Build Alternatives, Alternative 1C would have the greatest noise and vibration impacts.

A greater amount of ambient noise can be observed in Gainesville versus Haymarket as a result of denser and more commercial development. Haymarket has less ambient noise and more residential development. Based on this information, the Build Alternatives have the potential for the most noise impacts, but it is anticipated that these impacts would be more apparent with an alignment that extends all the way to Haymarket than one that ends in Gainesville.

### Baseline Scenarios

Baseline Scenario 2 has a greater potential for noise and vibration impact than Baseline Scenario 1, since it expands existing VRE service, and commuter rail services have higher noise and vibration impacts than bus services.

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## Infrastructure

### Build Alternatives

Alternatives 1B, 1C, and 1D share the same alignment. The only difference between the Build Alternatives would be the operating parameters, such as service frequency. For example, Alternative 1C adds a commuter rail shuttle service from Gainesville-Haymarket to Alexandria in addition to the proposed rail infrastructure improvements.

Infrastructure improvements include up to three stations with low level platforms, elevators, fare collection equipment, and parking facilities. There would be one storage yard along the alignment. Potential stations along the new branch of VRE service from Gainesville-Haymarket to Manassas under the Build Alternatives would be located in the vicinity of:

- Proposed Haymarket Station, Haymarket
- Proposed Gainesville Station, Gainesville
- Proposed Sudley Manor/Innovation Station, Sudley

### Baseline Scenarios

Baseline Scenario 1 would originate service at a park and ride lot west of the Town of Haymarket. It would travel on Route 15 to I-66, where it would use the HOV lane to head east toward DC. It would then head south on Route 234 Bypass to the Cushing Park and Ride Lot. After picking up passengers at the Cushing Park and Ride Lot, the Baseline Scenario would route buses back onto I-66 in the HOV lane. The route would follow I-66 into downtown DC where it would stop at the State Department and then proceed to the Pentagon Metrorail Station. There would be no change to the existing VRE Manassas Line service.

The alignment for Baseline Scenario 2 would include three new feeder bus services originating from Haymarket, Gainesville, and Sudley Manor/Innovation to connect to the existing VRE Manassas Line service at Broad Run Station. All three routes would require park and ride lots.

Baseline Scenario 2 would not have any changes to the existing VRE Manassas Line alignment. There would be changes to the frequency of VRE service on the Manassas Line, thus resulting in the need for expanded parking lots at several stations.

### Capital Cost

The capital cost estimates include infrastructure items, such as track installation, land acquisition, station design and parking, signal system installation, and equipment acquisition. The cost assumptions do not include grade separation projects along the NS B Line. These are independent projects that VRE will coordinate with VDOT and other agencies as required. Capital cost estimates do not include improvements

required to overcome VRE capacity constraints, such as the 40 trains per day, associated with any of the build alternatives. Table 1 (page ES-14) contains a summary of the capital cost estimate.

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## Operating and Maintenance Costs

Operating and maintenance (O&M) costs are the expenses incurred to provide day-to-day operations and maintenance of the transit system. Labor and direct expenses are two main components of O&M costs. Labor expenses include salaries of management, administrative, operations, and maintenance staff. The staffing level required for a project is based on the fleet size and the hours of operation for the proposed service. Direct expenses include costs for management, administration, operations, equipment and right-of-way maintenance, power/utilities, spares/consumables, cleaning/facilities maintenance, and other contingencies. These costs can be partially offset by fare revenues, but fare revenues were not accounted for in this phase of the study.

Conceptual operating and maintenance costs were calculated based on alignments, operating plans, and service levels. The operating plans, including travel time, headways and trips, and a summary of the O&M cost estimates are shown in Table 2 (page ES-15).

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## Ridership Procedures

A travel demand model forecasting process was developed as part of the Tier 2 analysis of this study in order to forecast the projected ridership and user benefits for each build alternative and provide more quantitative measures of evaluation. This process was based on the current Metropolitan Washington Council of Governments (MWCOC) model set, related work on other projects in the DC metropolitan area, and adjustments to better match observed transit travel in the study area.

The primary modeling assumptions made in the Alternatives Analysis include:

- Operating plans were defined within the current VRE capacity constraints (i.e. 40 trains per day maximum on the CSX-owned segment from Alexandria Station to Union Station).
- Land use inputs for the model were consistent with current approved plans.
- It should be noted that the model is very sensitive to service frequencies. It is more closely calibrated to a frequent urban service like Metrorail or Metrobus than a suburban commuter rail service.

The forecasting results confirm that there is a demand for improved transit service in the Gainesville-Haymarket area. Specifically, there are an estimated 1,000 to 3,600 trips attributable to the Gainesville-Haymarket branch, as determined when

comparing the number of trips forecasted to/from the study area for the No-Build Scenario versus the Build Alternatives. The test model runs, Alternatives 1G and 1H show that the Gainesville-Haymarket branch attracts more riders than the existing Broad Run alignment.

Based on the alternatives evaluated, further refinement is needed to determine the most appropriate operations plan between termini (Gainesville-Haymarket and DC), as well as the probability of increasing VRE's system wide capacity beyond the current 40 trains per day maximum. This would enable greater service frequency, thus increasing ridership. Table 2 contains a summary of Manassas Line Trips for the Build Alternatives and the Baseline Scenarios.

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## User Benefit

User benefits are the equivalent hours of traveltime savings associated with improvements in transit service levels for all users of the transportation system and are expressed in hours. User benefit hours are one piece of the cost effectiveness equation, one of the "qualitative" New Starts criteria under FTA's Project Planning and Development process. The other piece of the cost effectiveness equation is the annualized capital and operating costs. Together, the user benefit hours and the annualized costs result in a cost effectiveness measure in the form of total project cost per hour of transportation system user benefits.

The User Benefits (in hours) are shown in Table 2. Alternative 1C has the highest Annual User Benefits, with 1,055, but it also has the highest Total Annualized Capital Cost and Total Annual Operating Cost.

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## Screening Conclusions

The Tier 2 results provide some definitive results regarding ridership, capital cost estimates, O&M cost estimates, and preliminary environmental assessments. In terms of ridership, it has been determined that the Gainesville-Haymarket corridor attracts additional riders to VRE service from the region. It is also clear that the model responds more favorably to increased frequencies than any other modification to an alternative. The Gainesville-Haymarket branch would add needed capacity and choice to the study area corridor. This branch has the potential to generate trips in the range of 1,000 to 5,000 per day based on the projections developed for this study and the earlier VRE Strategic Plan.

The capital cost estimates demonstrate that Alternative 1C has the highest cost due to the amount of equipment that would be needed. With Gainesville as the terminus for the Gainesville-Haymarket branch of service, the cost range of alternatives drops to \$127 million to \$218 million (from the full build to Haymarket range of \$153 million to \$244 million). Terminating in Gainesville reduces costs for the station

development, land acquisition, and track construction. The O&M cost estimate for Alternative 1C is highest due to the frequency of service throughout the day.

Preliminary environmental assessments demonstrate that an end of line station in Gainesville is more favorable for the Build Alternatives than an end of line station in Haymarket. This is a result of potential water resources impacts along the south side of the NS B Line west of US 29, as well as the potential for greater noise and vibration impacts. The environmental assessment also demonstrates that Sudley Manor/Innovation would be a difficult location to site a station due to a significant number of water resources in the vicinity of Sudley.

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## Recommendations

The concept of a rail extension to Haymarket or Gainesville has merit based on the initial ridership and user benefit results shown in this report. The three specific alternatives, Alternative 1B, 1C, and 1D, shown in this Alternatives Analysis represent different ways of delivering the service, but all three include the extension of service to the Gainesville-Haymarket area. The next phase of the project will look more closely at how the rail service is provided.

It is recommended that Baseline Scenario 2 and Build Alternatives 1B and 1C move forward into the next phase of the project for more detailed analyses. Baseline Scenario 1, the I-66 bus service, has merit and should be considered as part of the overall I-66 Transit Study being conducted by DRPT. Differences in the Build Alternatives are primarily operational, as the rail alignment for each alternative is the same. Environmental screening suggests that the rail corridor between a Gainesville Station and a Haymarket Station has a higher potential for wetland impacts if expansion of the rail right-of-way is required. Ridership forecasts for Alternatives 1G and 1H (test options) suggest that there is a relatively small difference in daily boardings between a Haymarket and Gainesville terminus. This end of the line option can be applied to any of the three Build Alternatives. Although it helps demonstrate the merit of the proposed extension, Alternative 1D should be eliminated from further consideration because it presents a challenging operational plan.

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## Next Steps

The most significant challenge in advancing a transit investment strategy for the Gainesville-Haymarket corridor is two-fold: 1) the Gainesville-Haymarket area is a part of the I-66 transportation corridor, which requires a multimodal solution to the transportation and mobility issues; and 2) there are more funding needs than there is funding available at both the federal and state levels. This challenge underscores the need to make decisions in a regional context.

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## Federal Funding

The immediate challenge that needs to be addressed is to decide whether federal funding will be sought. There is one primary source of federal funds for major capital investment transit projects – the FTA’s New Starts Program. This program is highly competitive with projects across the country competing for a limited pool of funding. FTA has developed a process to evaluate the many applications for funding they receive. The process, which has nine different areas of assessment, primarily consists of two overriding criteria: user benefit and cost effectiveness. Based on the nine areas of evaluation, FTA assigns a rating designating a project’s eligibility for funding. The ratings are: High; Medium High; Medium; Medium Low; and Low. A project generally needs to achieve a Medium rating to qualify for federal funds through the New Starts Program. The initial assessment of user benefit conducted as part of this Alternatives Analysis suggests that the VRE Build Alternatives will likely be in the Medium Low to Low range making funding through the New Starts program unlikely. It is possible that adjustments to the travel demand forecasting process and a refinement of the cost estimates may improve the rating. At this point, however, New Starts funding appears unlikely.

In recent years, FTA has administered a second program called Small Starts. This program is for projects under a total capital cost of \$250 million. One advantage of the Small Starts Program is that FTA relaxes some of the more stringent modeling requirements, allowing more flexibility in how the forecasts are prepared. An initial assessment of the Build Alternatives with respect to the Small Starts Program criteria indicates that the ratings could improve to Medium or better. The one drawback to a Small Starts application is that the federal share is limited to \$75 million of the total cost. In the New Starts Program, the federal share can range up to 80 percent of the total cost.

There are a few other limited federal funding programs that could potentially provide a small portion of the funds needed. These programs include congestion mitigation and air quality (CMAQ), grade crossing enhancements, and fixed guideway modernization (a formula based program).

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## State Funding

The primary source of state funding would be through the Rail Enhancement Fund (REF). The Commonwealth has already invested in the NS B Line corridor using monies from the REF. This program is a competitive process that uses a cost benefit analysis approach developed by DRPT. Other state options include a budget line item appropriation or dedicated funding source being created.

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## Other Funding Sources

One advantage of a fixed guideway transit system is that it can attract investment around its stations. This presents a funding opportunity if this potential for

development can be channeled into a funding stream. Some areas have created special assessment districts around stations to capture value, which is then returned to help pay for the transit investment. The funding from special assessment districts typically help to repay funds borrowed up-front to pay for the project and/or fund the on-going maintenance and upkeep of the service and facilities.

Private sector investment is also a possibility, particularly around the station sites. There has been some initial interest expressed to VRE by developers in partnering to develop the stations. This could present an opportunity up-front to fund the construction of the stations.

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## Environmental Review

No matter what funding sources are ultimately tapped, the project will need to complete the state environmental review process. The federal environmental review process will also need to be addressed if a federal permit or action is required and/or federal funds are sought. In both cases, preliminary engineering (30 percent plan development) would need to be undertaken to support the environmental review.

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## Federal Review

If any Federal Permits or Actions are required, the project will follow the NEPA process. Depending on activities planned, this could be in the form of a Categorical Exclusion, Environmental Assessment, or an Environmental Impact Statement. Since any of the proposed Build Alternatives would share the track with existing freight rail (NS), it is likely that both the FTA and Federal Railroad Administration (FRA) would be involved. Coordination with the FTA and FRA would be required to determine the appropriate level of NEPA documentation.

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## State Review

Under the state review process, a joint permit application from the US Army Corps of Engineers (USACE) and the Virginia Department of Environmental Quality (VDEQ) would be required for any land disturbing activities affecting waters along the corridor. Applying for a joint permit application has several requirements that include establishing the limits of jurisdictional wetlands with the USACE, compliance with Section 106 of the National Historic Preservation Act, and an element of public involvement. This is required under Section 404 of the Clean Water Act. It should be noted that if the project goes through the NEPA process, permitting under Section 404 of the Clean Water Act would apply. There are provisions that allow the Section 404 process and NEPA to be integrated.

The Commonwealth of Virginia also requires an assessment of potential environmental impacts for state funded projects. This evaluation is coordinated through the VDEQ. Based on the Virginia Code Sections 10.1-1188 et seq., state agencies are required to prepare and submit environmental impact reports for

construction of facilities that cost \$500,000 or more and land acquisitions for construction, to include leases and expansions of facilities. Coordination with VDEQ would be required determining if the proposed action meets the criteria established for environmental impact reporting of state projects.

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## Other Considerations

VRE also needs to consider whether a Minimum Operating Segment (MOS) to Gainesville should be pursued, and if so, whether Haymarket should be studied further. The next step that VRE needs to take to advance the project includes initiating the formal environmental review process through either the federal and/or the state regulations based upon funding decisions and permit requirements. The next step would also include further development of the conceptual design for each alternative and initiating Preliminary Engineering of the preferred alternative.

**Table 1: Comparison of Tier 2 Alternatives**

Indicator	No-Build	Baseline 2	Alt. 1B	Alt. 1C	Alt. 1D
Total Manassas Line Study Area Trips <sup>1</sup>	5,234	6,156	6,126	9,156	6,582
User Benefits <sup>1</sup> (Hours)	-	878	-153	1,055	222
Capital Cost Estimate <sup>2</sup>	\$6 million	\$102 million	\$153 million	\$244 million	\$202 million
Equipment Needed	2 Coaches	2 Locomotives 26 Coaches 5 Buses	1 Locomotive 12 Coaches	6 Locomotives 30 Coaches	2 Locomotives 26 Coaches
O&M Cost Estimate <sup>2</sup>	\$19 million	\$25 million	\$27 million	\$44 million	\$30 million
Cost per Hour of User Benefit <sup>3</sup>	-	-	-\$42	\$95	\$140
Environmental Assessment	N/A	Potential wetland impacts at station sites	Potential wetland impacts along alignment and at station sites	Potential wetland impacts along alignment and at station sites	Potential wetland impacts along alignment and at station sites
Noise and Vibration	N/A	Lower Impact for Bus Service	Higher Impact for Rail	Highest Impact for Rail-Greatest Frequency	Lowest Impact for Rail-Lowest Frequency

1. Computation details in Appendix E of the Alternatives Analysis Report.

2. Gross Annual Estimate.

3. Incremental to Baseline 2.

**Table 2: Headway, Travel Time and Number of Trips for Build Alternatives and Baseline Scenarios**

			Headway (min)	Travel Time (min)	Headway (min)	Travel Time (min)	Headway (min)	Travel Time (min)	# VRE Trips Per Day <sup>1</sup>
			<u>New CR from G-H to DC</u>		<u>Modified Existing CR from Broad Run to DC</u>				
Alt. 1B (Rail)	AM	In	52	89	52	75			20
	Peak	Out	180	85	180	75			
	Off- Peak	In	480	84	480	70			
	Peak	Out	480	84	480	73			
			<u>New CR from G-H to DC</u>		<u>Modified Existing CR from Broad Run to DC</u>		<u>New CR Shuttle from G-H to Alexandria</u>		
Alt. 1C (Rail)	AM	In	60	89	30	75	30	59	20
	Peak	Out	180	85	0	0	30	69	
	Off- Peak	In	0	0	480	70	30	59	
	Peak	Out	0	0	480	73	30	66	
			<u>Modified CR from G-H to DC (via Broad Run)</u>						
Alt. 1D (Rail)	AM	In	25	101					18
	Peak	Out	90	101					
	Off- Peak	In	480	96					
	Peak	Out	480	99					
			<u>New Commuter Bus from Haymarket to DC</u>						
Baseline 1 (Bus)	AM	In	30	90					22
	Peak	Out	90	58					
	Off- Peak	In	180	71					
	Peak	Out	180	52					
			<u>New Commuter Bus from Haymarket to Broad Run</u>		<u>New Commuter Bus from Gainesville to Broad Run</u>		<u>New Commuter Bus from Sudley Manor to Broad Run</u>		
Baseline 2 (Bus)	AM	In	23	17	23	16	23	7	60
	Peak	Out	180	16	180	14	180	8	
	Off- Peak	In	480	16	480	14	480	8	
	Peak	Out	240	18	240	16	240	7	
			<u>Enhanced CR from Broad Run to DC</u>						
Baseline 2 (Rail)	AM	In	23	75					20
	Peak	Out	180	75					
	Off- Peak	In	480	70					
	Peak	Out	240	73					

1. VRE trips for the commuter rail alternatives are on Manassas Line only.
2. CR=Commuter Rail; G-H=Gainesville-Haymarket.
3. VRE operates Monday through Friday from 5:00 AM to 8:00 PM. This represents a 15-hour service day.
4. AM peak service operates from 5:00 AM to 8:00 AM. PM peak service operates from 4:00 PM to 7:00 PM.
5. There are no pre-AM peak or post-PM peak train starts.
6. During the midday off-peak service (OP), there is one inbound and one outbound trip.
7. There are up to two reverse peak trips in Alt. 1B and one reverse peak trip in Alt. 1C and 1D during both the AM and PM peak service periods.
8. Baselines assume utilizing HOV lanes.
9. Baselines assume no intermediate stops.