VIRGINIA RAILWAY EXPRESS

STRATEGIC PLAN 2004-2025

MAY 2004

PARSONS BRINCKERHOFF

Contents

Tables

Maps

MAPS ARE PROVIDED AT THE BACK OF THE DOCUMENT

Figures

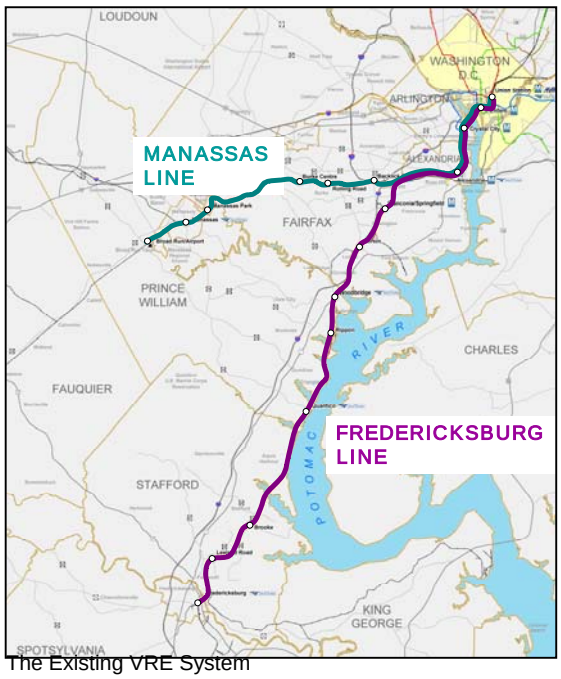
EXECUTIVE SUMMARY

Current State of the Railroad

Today, the Virginia Railway Express (VRE) stands at an important junction: in the typical weekday peak period, many trains and parking lots are full, yet the demand for VRE service continues to grow. The service is "a victim of its success." All the performance measures—ridership, customer satisfaction, on time performance—indicate a successful operation, yet nine of the 13 station parking lots are full, and ten of the 24 peak trains are crowded to capacity or beyond. Core system requirements are increasing. Station maintenance costs are rising as the system ages. There is an immediate need for new bi-level railcars and locomotives. Parking is inadequate—whether its parking for commuters at the station or parking for the equipment sets in Washington, DC. There is substantial local interest in extensions of VRE service to Spotsylvania and Fauquier Counties and the I-66 corridor to Gainesville and Haymarket, as well as for run-through service at Washington, DC with MARC, the Maryland commuter railroad, yet the available funding is inadequate to meet even the core requirements.

VRE is faced with large capital investment needs at a time when public funds for transportation projects are scarce. By most accounts, VRE continues to deliver a high quality service to its customers. VRE's greatest challenge moving forward will be obtaining the funding necessary to increase the size of its operation to meet increasing demand while maintaining service quality.

At its founding in 1992, VRE's vision was to provide a safe, convenient, energy-efficient public transportation alternative to driving congested highways from the Northern Virginia suburbs to the business districts of Alexandria, Crystal City and Washington, DC. Each weekday, VRE now operates 32 trains over two branch lines, covering 90 route miles and serving 18 stations in eight Northern Virginia jurisdictions, and carrying upwards of 15,000 passenger trips.



The Existing VRE System

Organizationally, the Virginia Railway Express is a joint project undertaken by two commissions – the Northern Virginia Transportation Commission (NVTC) and the Potomac and Rappahannock Transportation Commission – which represent the Northern Virginia counties and municipalities in the VRE service area. Members of both entities sit on the VRE Operations Board, which governs VRE. Daily operations and capital projects are financed from a combination of federal, state and local grants, and through the sale of tickets.

The Strategic Planning Process

In 2001, the Commissions authorized the VRE Chief Operating Officer to prepare a Strategic Plan to guide the future growth and development of the VRE system. Specifically, the Strategic Plan was to estimate future ridership demand, identify the extent, quantity and type of service that VRE would need to provide to meet its future market potential, determine the required capital projects and associated costs, and identify potential implementation and funding strategies. The plan was progressed in two steps. The Phase 1 Strategic Plan was completed in May 2002, focusing on the VRE core network and short-term needs through 2010. The VRE Operations Board subsequently directed a more comprehensive Phase 2 analysis to formulate a long-range vision and Strategic Plan for the railroad through 2025. The principal topics and issues addressed in the Phase 2 work effort included:

- Determining the ultimate size and extent of the VRE network, and the frequency and type of train service, that is consistent with regional travel projections through 2025
- Quantifying the magnitude of capital investment required in the core network through 2025 for stations and station parking, rolling stock (coaches and locomotives), train storage and maintenance facilities, and railroad infrastructure.
- Estimating the potential ridership benefits, capital costs and other impacts of potential extensions of VRE service
- Formulating alternative strategies for achieving long-term ridership objectives
- Prioritizing capital investment needs and service expansion options.

VRE retained the firm of Parsons Brinckerhoff, Inc. to prepare the Strategic Plan, working cooperatively with VRE Staff and the three operating railroads (CSX, Norfolk Southern, and Amtrak). Woodside Consulting Group, Inc. provided additional assistance, preparing a study of operational and infrastructure requirements to support extension of VRE service beyond Manassas to Bealeton and/or Haymarket.

This report documents the results of Phase 1 and Phase 2 strategic planning efforts. This document was not intended to prescribe budget or policy decisions, but rather to:

- Establish the overall direction in which VRE should head,
- Provide the technical basis on which the VRE Board can make policy decisions about investment priorities,
- Inform the development of VRE's out-year Capital Improvement Plan (CIP) and Six-Year Financial Plan.

Drafts of this report were reviewed by VRE staff and other stakeholders, and a VRE Board workshop was held on February 6, 2004 to discuss the Phase 2 Strategic Plan. Board members indicated that they would like VRE to meet its core needs for 2025, explore potential expansion of VRE service to Gainesville/Haymarket and Spotsylvania, and work with the counties to implement Transit Oriented Development (TOD).

The Strategic Plan is fundamentally market-driven, and shows where regional development and travel patterns are leading VRE over the next 20 to 25 years. The plan recognizes, but is not constrained by, the current federal, state and local municipal budget limitations and the current funding climate in which money for large capital projects is difficult to obtain.

This document is intended to identify and clarify the relevant issues and provide insight to the VRE Board, the staff, and the stakeholders, as they wrestle with the decisions that will determine the direction and vision of VRE in the short term and the years to come. Implementing the plan will require difficult tradeoffs and critical decisions with regard to the specific steps VRE should take to respond to both market forces and fiscal and political realities.

The VRE Ridership Market

In the first half of 2003, VRE ridership grew to a new record of approximately 15,000 riders per day. Over the past four years, ridership growth has averaged 16 per cent per year, and VRE now carries twice as many riders as it did in 1999. VRE's principal market is the journey-to-work or commuter trip from the Northern Virginia suburbs to the central business district (CBD), which is defined as the downtown areas of Washington, DC as well as employment centers in Crystal City and Alexandria.

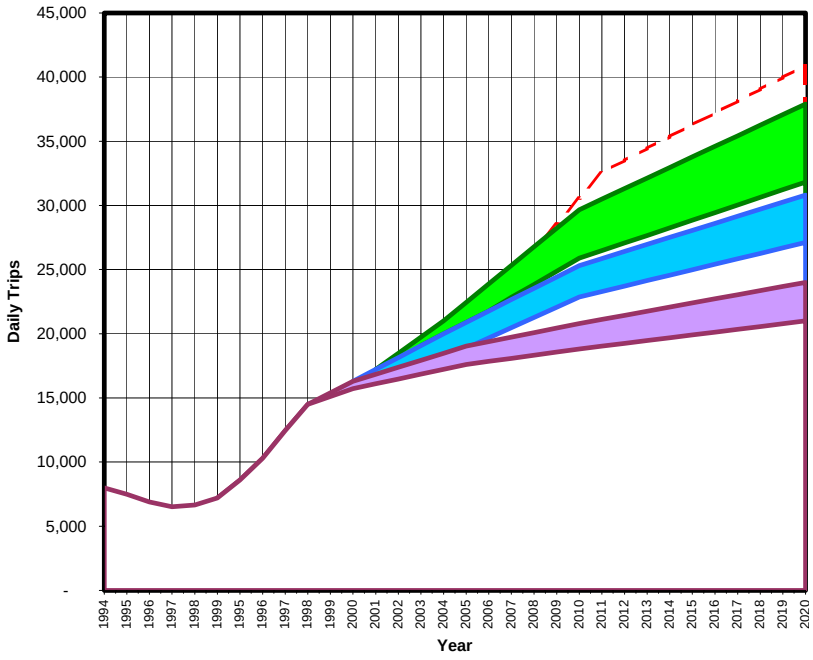
The strategic planning process included an investigation of regional travel patterns and the primary issues that are determining factors for VRE ridership. This includes historical ridership trends, demographic trends and existing and projected future regional travel patterns. The VRE ridership forecasting model, used over the past several years for annual projections of VRE ridership and revenue, was updated and re-calibrated to the most recently available round of regional travel data from the Metropolitan Washington Council of Governments (MWCOG) and incorporated the factored results of the Fall 2002 VRE survey with respect to trip-making on VRE.

The population and employment trends in VRE's core service area show strong growth through 2010 and long-term growth at a somewhat slower rate through 2025. Currently, the fastest rate of suburban growth is at and beyond the outer edges of the VRE service area – in the counties of Prince William, Stafford, Spotsylvania and Fauquier – as residential construction and population continue to thrust outward.

In VRE's principal travel market—work trips from the Northern Virginia suburbs to destination zones surrounding the four innermost stations—future increases in ridership will be a function of two factors in combination:

- Increasing market size, fueled by population growth in the outlying areas and employment growth in the central business district
- Increasing VRE market share, driven by improvements in the level of service offered by VRE, and the cost of that service, relative to those provided by alternative modes of transportation.

A good general rule of thumb emerging from the Strategic Plan analysis is that VRE ridership has the potential to approximately double between 2004 and 2025, with a program of steady investment in the capacity of the rail system. A target level of 30,000 daily VRE trips by the year 2025 is appropriate as a guide for future planning. With proactive leadership and strong, early investment in the railroad, daily ridership as high as 40,000 trips is achievable, but the level of investment necessary over the next decade may not be financially feasible. If funding remains severely constrained, or if suburban growth in the region happens in a more scattered fashion, then VRE ridership demand might taper off between 20,000 and 25,000 daily trips.



VRE Daily Ridership—Historical and Range of Future Projections

Strategic Plan Scenarios and Recommendations

Using VRE's future market potential as a guide, the strategic planning process has attempted to define a vision for the railroad in the year 2025 – in terms of its physical extent, the number of trains and the type of schedule operated, and its organizational structure. Three illustrative scenarios were developed for the prioritized staging of service improvements, line extensions and capital investment through 2025, representing the range of potential strategies from a relatively unconstrained, market-driven strategy at the high end (the Aggressive Growth Scenario) to a financially-constrained strategy (the Deferred Growth Scenario) at the low end. The third strategy (the Targeted Growth Scenario) falls in-between, focusing early and medium-term investments on the most productive service improvements and expansions.

A range of ridership estimates were developed that cover the spectrum offered by these three scenarios and also represent the realistic high and low ends of the range of potential future VRE ridership through 2025.

The Strategic Plan study treated the three scenarios equivalently and did not evaluate them against one another or take a position in favor or against any one of them. In effect, each option represents a potentially feasible and rational way to proceed – at three significantly different rates of capital expenditure. The higher cost Aggressive scenario is able to deliver greater benefits sooner. In the lower cost Deferred scenario, commuter rail investment lags behind suburban population growth, resulting in

development patterns that are less favorable with respect to rail travel and a lower overall level of VRE ridership.

However, each of the scenarios has common elements and the same set of near term priorities. The Strategic Plan recommends that VRE's service strategy should have the following three key elements:

1. Develop the core network in order to build up capacity in available parking, station facilities, and railroad infrastructure. Then, capital and operating funds permitting, extend the service beyond the core network
2. Improve the service and expand the coverage within the territory encompassed by VRE's two commissions. Extend the service first in the territory encompassed by the Commissions
3. In coordination with local jurisdictions, proactively seek development partnerships for funding that would enable VRE to grow beyond its boundaries. Such partnerships should support the growth of freight and intercity rail as well as commuter rail in the region.

Core Network Needs

The principal short-term needs for VRE to keep pace with its ridership growth are in the areas of station parking, rolling stock and train storage and maintenance capacity. These basic needs must be met before serious consideration can be given to increasing the quantity of VRE train service or extending VRE service beyond its current service limits. Capital investments must be made in each of these core areas together, as part of a coordinated program, in order for VRE to continue to deliver a high-quality commuter rail service. Under-investing in any one facet of the core network would create a capacity constraint that could render other elements of the system less than fully usable.

The Strategic Plan recommends the following short-term investments, to address the urgent need for additional system capacity and to replace rolling stock assets

- Immediate procurement of 11 cab cars, using available funding, with delivery in the 2006-2007 timeframe, to replace the Mafersa and Sounder cab cars
- Procurement of 50 additional coaches, including a mix of cab cars and trailer units, with delivery in the 2007-2009 period, to provide for growth and to replace the Sounder and older Gallery coaches
- Procurement of 21 new, high-powered Tier II locomotives to haul longer trainsets more efficiently and with reduced emissions.
- Expansion of mid-day storage capacity for VRE trains in the Washington Terminal area, to permit VRE to run longer trains and/or more trains into Washington
- Development of basic equipment maintenance facilities at the VRE Crossroads and Broad Run yard locations

- Identification and acquisition of property to satisfy medium to long term train storage and maintenance needs in the Manassas-Gainesville-Haymarket corridor
- Continuation of the program to expand station parking and offer improved alternative station access options for VRE riders at locations where parking demand is at or reaching capacity, in cooperation with the affected counties and local municipalities (e.g., Woodbridge, Rippon, Brooke, Fredericksburg, Burke Centre, Manassas and Broad Run)
- Lengthening of station platforms where necessary to accommodate longer trains.

The Strategic Plan also includes the following recommendations with respect to long-range investment in core network facilities through 2025, to support VRE ridership in the range of 25,000 to 40,000 daily trips:

- The addition of 6,000 to 8,000 parking spaces on the Fredericksburg Line and 6,000 to 9,000 spaces on the Manassas Line by 2025.
- Capital improvements at each of the four major CBD stations – The lengthening of existing platforms and improvements to CBD stations in order to accommodate longer trains and increasing passenger loads.
- Staged acquisition of coach equipment, resulting in a total VRE fleet of standardized, modern bi-level coaches that numbers between 110 at the low end and 170 at the high end by the year 2025
- Construction of an intermediate maintenance facility, as well as sufficient yard storage space to accommodate the increased fleet size, both overnight in Northern Virginia yards or mid-day at Washington Terminal, to enable the implementation of more independent, reliable maintenance practices.
- Second side platforms, rail infrastructure improvements and dispatching changes for better operational flexibility.
- In addition to the parking, fleet and storage needs identified in Phase 1, VRE will need to invest in fleet maintenance facilities, because the existing facilities in Washington do not have sufficient capacity to satisfy VRE's needs over the long term, as the size of the fleet grows and mandated fleet maintenance requirements increase.

Potential Network Expansion

The growth of the northern Virginia suburbs and the availability of affordable new housing are pushing the demand for commuter rail service beyond the boundaries of the current VRE network. The Strategic Plan study analyzed potential extensions of VRE service on existing rail freight lines in Virginia – southward from Fredericksburg into Spotsylvania County, southwestward from Manassas into Fauquier County, and westward from Manassas to Gainesville and Haymarket. The table below summarizes the costs and potential ridership associated with each expansion route.

Potential VRE Expansion		
	Capital Cost, including fleet (In Millions of 2003 Dollars)	**2025 Ridership Projections** (New Riders/Day)
Gainesville	$54.6 – $69.6	3,100 – 5,500
Haymarket	$53.3 – $68.3	
Fauquier	$40.6 – $60.6	1,100 – 2,000
Spotsylvania	$16.6 – $19.1	1,000 – 1,500

These are not mutually-exclusive expansion options. In fact, the long-range growth projections and strong station-area development potential in each of these corridors support the eventual extension of VRE service. However, phased implementation of extended service is likely to be the way that service evolves, given the intensive capital needs. The Strategic Plan has identified the following priorities:

1. Gainesville or Haymarket – very strong current growth and station development opportunities, strong ridership potential, able to be implemented within VRE Master Agreement. Service could be implemented in stages to save initial capital costs and dovetail with a major State highway grade crossing elimination project, starting with an interim 8-mile extension to Gainesville, followed ultimately by a 3 mile extension to Haymarket
2. Spotsylvania – relatively low incremental cost since VRE trains already use a yard facility in Spotsylvania, strong current demand for VRE service, provides relief for overcrowded Fredericksburg station
3. Fauquier – lesser current demand, more limited land development potential, longer-range opportunity to implement in tandem with improved intercity passenger service on the same route.

In all cases, service extensions are only viable if VRE's core network needs also are being funded and addressed. These projects, therefore, are additive to VRE's basic needs for station parking, rolling stock and train storage and maintenance facilities.

During the course of the development of the VRE Strategic Plan, there has been interest expressed in the possibility of extending VRE service even further than Spotsylvania and Fauquier Counties – to Richmond on the CSX RF&P Line and to Charlottesville on the NS Piedmont mainline. Consideration of Richmond and Charlottesville service was outside the scope of the strategic plan study, but investment decisions by VRE emanating from the strategic plan, particularly those affecting service to Spotsylvania and Fauquier, will need to account for the possibility of future longer-distance service – so that VRE investments are made wisely and cost-effectively.

The notion of integrating the commuter rail services of VRE and MARC and running commuter trains through Union Station to destinations on the far side of the region is a compelling one and has the potential to significantly increase the number of travel markets that the regional commuter rail network can serve. There are many hurdles, however – physical, operational, financial and institutional – that will need to be

resolved before run-through service can become a reality. Run-through service is not an alternative to investment in the core VRE network and should only be considered as an incremental improvement over and above full investment in the core network.

Phased Service Improvement and Capital Investment Plan

At the present time, VRE is limited in the number of trains in can run – by agreement with CSX and because of train storage yard constraints. In the short term, VRE will look to increase its passenger-carrying capacity by lengthening its existing trains and making the necessary investments in rolling stock, storage yards and railroad capacity. As the VRE ridership market continues to grow and the committed rail infrastructure projects are completed, VRE will be able to start increasing the number of trains it operates. The pace at which VRE increases service, and the type of service it operates, will depend upon which of the three Strategic Plan scenarios is being followed, and the rate at which VRE is able to make capital investments.

The Deferred Growth Scenario would retain the existing 11 trainsets for an extended period. The Targeted and Aggressive scenarios would increase VRE service incrementally – first to 13 trainsets, then 16 (offering the potential for peak 20-minute headways, express service and service to Haymarket), and ultimately 19 (full service with line extensions on both the Fredericksburg and Manassas lines).

The VRE Strategic Plan includes a three-phase program of capital investments to support and enable the planned steps in increased service and to respond to increasing levels of demand. The projects and dollar value of investments in each phase vary for each of the three potential Strategic Plan scenarios: Targeted Growth, Aggressive Growth, and Constrained Growth. The table below presents the estimated average annual capital expenditures on VRE infrastructure and rolling stock projects that are necessary to accommodate the full range of projected future demand, roughly corresponding to the three scenarios.

As a point of reference, VRE's FY 2004 capital budget includes $11.5 million in capital projects. These figures exclude debt service, lease costs and access fees, which in FY2004 are estimated to generate an additional $18.3 million in costs. The future costs also exclude current projects for which funding already has been committed, such as the CSX MOU rail infrastructure capacity projects and the current parking lot expansion projects at Manassas and Woodbridge.

Annual Capital Investment Needs (in Millions of 2003 Dollars)						
	2004			2005 - 2009	2010 - 2015	2015 - 2025
		Low (Deferred)	Infrastructure	$10.6	$21.1	$14.3
			Rolling Stock	$29.0	$13.0	$4.6
			Total	$39.6	$34.1	$18.9
Infrastructure	$10.5	**Medium** (Targeted)	Infrastructure	$22.7	$55.8	$25.7
Rolling Stock	$1.0		Rolling Stock	$29.0	$19.7	$10.0
Total	$11.5		Total	$51.7	$75.4	$35.7
		High (Aggressive)	Infrastructure	$40.2	$71.2	$24.6
			Rolling Stock	$29.0	$27.1	$10.5
			Total	$69.2	$98.3	$35.0

All three scenarios require additional funding significantly above current levels. In all three scenarios, between FY2005 and FY2009, average annual capital expenditures for rolling stock will need to increase to almost $30 million, as VRE acquires new locomotives, cab cars and trailer coaches to replace obsolete existing equipment and prepare for continued ridership growth.

Of the three scenarios, the low-end, or Deferred Growth, scenario is more responsive to the financial constraints that currently affect transportation investment in the region, keeping VRE capital expenditures on infrastructure (stations and facilities) at approximately existing levels through FY2009. Rolling stock needs, however, will drive total capital investment well above the current level. This scenario limits early investment to core needs and both expends capital funds and improves VRE service at a slower pace than either of the other two scenarios. As a result, the VRE network would be capacity-constrained through the early years of the plan, with demand for service exceeding the supply that VRE is able to offer. Within this scenario, VRE could choose to use pricing strategies (involving rail fares and potentially station parking fees) to dampen the rate of ridership growth, keeping demand for rail service in line with the supply that VRE can deliver, and generating a higher level of per capita revenue that could be used to partially fund ongoing capital investment and minimize local subsidies. With much of the planned suburban growth occurring before VRE has the ability to serve it well, this scenario is not likely to generate induced demand or transit-oriented development to the extent that either of the other two scenarios can - so the long-term level of VRE ridership and market share will be lower.

Financial, Institutional and Organizational Issues

VRE is showing signs of outgrowing its original organizational framework – both in terms of the size and complexity of its operation, and its geographic extent. It has reached and surpassed the level of ridership for which it was originally designed. As an entity of the two Commissions, VRE relies heavily on the member jurisdictions for funding support.

If the level of required annual capital investment increases as provided for in the Strategic Plan under any of the scenarios, and if the amount of required operating subsidy also increases as expected as VRE adds new trains, then VRE in its current form would look to the local jurisdictions to contribute at least their historical share of the railroad's capital and operating subsidy. In the current budget climate, this will be difficult to do.

As a result, the VRE member jurisdictions have an incentive to modify VRE's current funding mechanisms and relationships to permit the higher future costs to be spread among a greater number of benefiting parties, thereby reducing the share (but not the total quantity) of costs to the member jurisdictions. Changes to VRE's organizational structure, or changes to the institutional relationships among VRE's existing and prospective future stakeholders, may be necessary to accomplish the funding goals.

The scope of the Strategic Plan study did not include a comprehensive analysis of organizational and financing alternatives. The study's technical work has concluded that the *status quo*, in terms of VRE's operations, its performance, and its financing structure, is not sustainable over the long term. Consequently, as the VRE Operations Board and the Commissions set the course for VRE's future growth, begin implementing the Strategic Plan, and explore partnerships with other prospective stakeholders, consideration of institutional and organizational alternatives and innovating financing options will be an important part of the way forward.

VRE Moving Forward

Doubling VRE ridership by 2025 is achievable based on the market projects and a reasonable target for VRE's future planning. Moving towards that goal requires action on the part of the VRE Operations Board with respect to specific investment decisions and overall policy-making. This report has presented three possible strategies which could be followed – Targeted Growth, Aggressive Growth and Deferred Growth. These options are illustrative, and the VRE Board may choose a different route or combine aspects of each of them. However, adopting and then following an overall strategy or "game plan" is important – to guide short-term and tactical decision-making and help ensure that VRE invests cost-effectively and proceeds towards its long-range objectives in the most efficient way possible. Many of the decisions made by VRE in the short term – affecting rolling stock, infrastructure, operating agreements, organizational and institutional relationships, and financing – will lay the groundwork for commuter rail service in Northern Virginia over the next 50 years. Those decisions are likely to involve difficult tradeoffs, as most of the easy and inexpensive options have already been explored.

The ridership market benefits of the Aggressive Growth Scenario are desirable, as are its ability to help shape the way future development occurs in the region and its ability to offer VRE commuter rail service to a larger geographic area. However, the money to pursue aggressive growth, at least in the short term, just isn't available. Fiscal realities point towards the Deferred Growth Scenario, which itself requires a significant step up in terms of annual capital and operating subsidy just to preserve VRE's existing share of the CBD commute market within the territory it now serves. A realistic and achievable strategy, therefore, could be for VRE to proceed with the short term investments required to support the Deferred Growth Scenario, while actively pursuing increased public funding for beneficial growth projects and seeking partnerships with the freight railroads, other passenger rail interests, the adjoining counties, and station

area developers to minimize the overall funding support for VRE that will be necessary from its local member jurisdictions.

Based on the technical work of the study, as well as input from the Board at its February, 2004 workshop, the Strategic Plan recommends that VRE pursue the following initiatives:

- Work towards a ridership goal of 26,000 – 30,000 trips per day
- Improve the core VRE network and expand its capacity to carry VRE riders
    - Acquire additional rolling stock and locomotives
    - Construct storage and maintenance facilities
    - Improve parking and station access
- Pursue expansion to Gainesville and Spotsylvania
- Explore opportunities for partnerships, including transit oriented development
- Update the plan in three to five years.

1. CURRENT STATE OF THE RAILROAD

VRE System Overview

The Existing VRE Network

The Virginia Railway Express (VRE) operates passenger trains on an 89 route-mile system connecting Washington, DC with Fredericksburg and Manassas, Virginia. From Union Station in the District of Columbia, the Fredericksburg and Manassas lines share the same right-of-way for approximately 9.6 miles, to just south of Alexandria, Virginia, where they diverge.

The Fredericksburg Line roughly follows Interstate 95 and the Potomac River, using the CSX-owned mainline between Washington and Richmond. The line passes through the District of Columbia, Arlington County, the city of Alexandria, Fairfax County, Prince William County, Stafford County and the city of Fredericksburg.

The Manassas Line runs in a westerly direction from Alexandria, roughly paralleling Interstate 66 approximately five miles to the south of the interstate. After leaving Alexandria, the line serves Fairfax and Prince William counties, passing to the south of the city of Fairfax and going through the cities of Manassas Park and Manassas. The right-of-way is owned by the Norfolk Southern Corporation.

The primary mission of the Virginia Railway Express is to transport commuters between outlying suburbs and the Washington-Arlington urban core. The service is heavily oriented towards the central business district in the morning peak and in the opposite direction in the evening peak. Some tourists and “day-trippers” also ride the trains, but there are limited opportunities for non-commuters and people who work non-traditional hours to ride VRE. The only non-peak service is an early-afternoon return trip from Washington on each line, and two limited-stop reverse-direction trains on the Manassas Line in each peak period. There is no service on weekends and holidays.

VRE serves 18 stations. The two lines share four stations: Washington Union Station and L’Enfant in the District of Columbia, and Crystal City and Alexandria in Virginia. Union Station and Alexandria are also Amtrak stations for intercity passenger trains as well as VRE. MARC commuter trains to Maryland also use Union Station. There are four additional stations that have both Amtrak and VRE service: Woodbridge, Quantico and Fredericksburg on the Fredericksburg Line, and Manassas on the Manassas Line. The rest of the stations serve VRE trains exclusively. Most VRE stations have free parking lots.

VRE is an integral part of the greater Washington region’s public transportation network and is linked to all of the other modes that operate in the region. There are connections to Amtrak at six stations. Moreover, certain Amtrak trains honor VRE tickets and become, in effect, additional frequencies between the stations served by the Amtrak train. VRE connects with the Washington Metrorail system at five stations (Union Station, L’Enfant, Crystal City, Alexandria and Franconia/Springfield). Local

bus routes of several operators provide service to and connections with VRE at many stations, often with free transfer to local buses. Connecting service information generally is readily available to the public through the VRE website or by telephone. Every station except Broad Run, Brooke, Leeland Road and Rippon has a connection to some form of public transportation.

A map of the existing VRE network showing the extent of service and the location of stations is shown in Map 1. VRE is a tenant on three railroads (CSX Transportation, Norfolk Southern, and Amtrak) and contracts with Amtrak to operate the trains. The VRE territory is a busy, mixed-traffic environment, which VRE shares with intercity passenger and freight trains. VRE owns rail yards at the two southern ends of its system (Broad Run at Manassas Airport, and Crossroads south of Fredericksburg) for overnight storage of equipment. The Amtrak operating agreement provides for mid-day storage of VRE trainsets at Ivy City in Washington, D.C. During this time, Amtrak also does some light servicing and maintenance. Amtrak maintains VRE locomotives and cars at its Ivy City yard and shops. At Broad Run and Crossroads, a contractor does overnight cleaning, and contractors fuel the locomotives. None of these facilities is equipped for major overhauls or heavy repairs.

VRE operates a total of 32 trains each weekday, primarily inbound to Washington, DC during the morning peak period and outbound from Washington in the afternoon peak, requiring 11 different equipment sets of varying length. The existing VRE fleet, including equipment currently on order but excluding short-term leased equipment, consists of 15 locomotives and 96 coaches. The Washington Terminal Coach Yard, however, can accommodate only 69 VRE units for mid-day storage – 11 locomotives with 58 coaches – which poses a severe capacity constraint for VRE.

History

Unlike most commuter rail operations, VRE was not the direct descendent of a freight railroad's passenger service. The vision for the Virginia Railway Express was born out of the relentless growth of the Northern Virginia suburbs in the Seventies and Eighties and the desire for convenient, energy-efficient, public transportation as a viable alternative for commuters from Virginia to Washington, DC. Commuter service commenced in 1992, superimposed on a railroad infrastructure with already long established traffic patterns for freight and intercity passenger trains.

In 1992, VRE operated 16 trains on a $21 million operating and capital budget; in 2003, VRE operated 32 trains on a $55 million operating and capital budget.

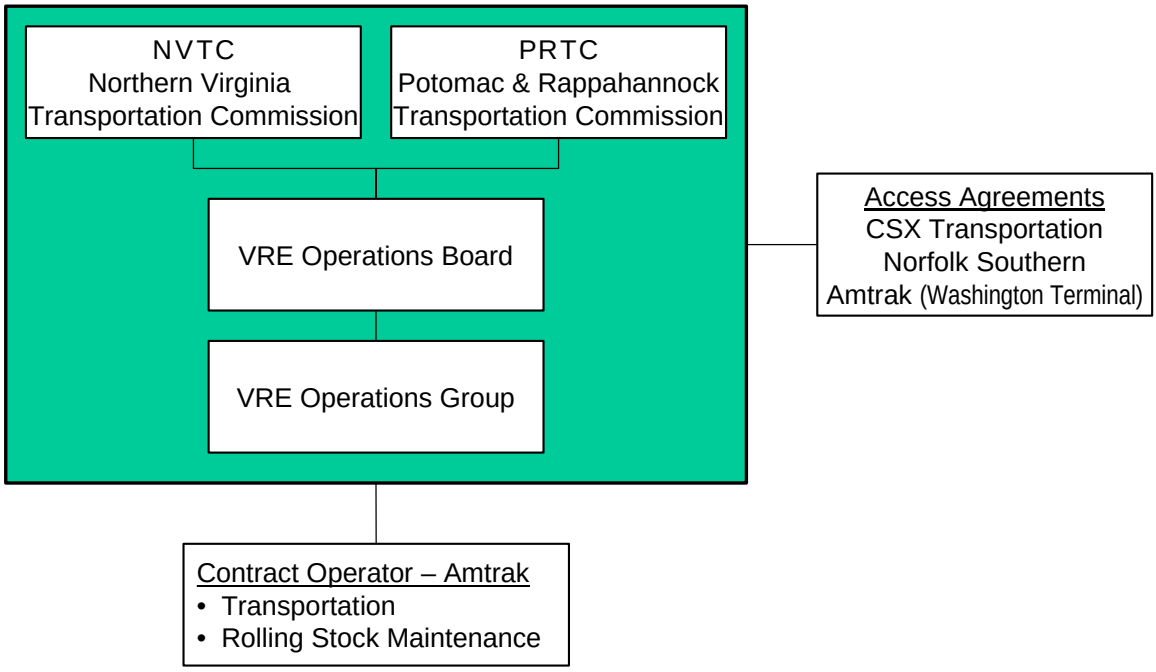
Over the first ten years of its existence, VRE's capital needs have been concentrated on stations and rolling stock, taking advantage of the existing railroad infrastructure and the initial construction of its two outlying train storage yards. As the system has begun to reach its capacity, VRE has accommodated ridership growth primarily by expanding parking at its stations and expanding its rolling stock fleet, through a combination of short-term leases of equipment and acquisition of available second-hand coaches from other commuter rail properties.

Organizational and Financial Structure

The Virginia Railway Express (VRE) is a joint project undertaken by the Northern Virginia Transportation Commission (NVTC) and the Potomac and Rappahannock

Transportation Commission (PRTC). NVTC is a state-created entity of Arlington, Fairfax, and Loudon counties and the cities of Alexandria, Fairfax and Falls Church. PRTC's member jurisdictions are Prince William and Stafford counties and the cities of Fredericksburg, Manassas, and Manassas Park. The geographic boundaries of the two commissions and member jurisdictions are highlighted in Map 1. Figure 1-1 presents a simplified chart of VRE's organizational structure and relationships with its contract operator and host railroads.

Figure 1-1
VRE Organizational Structure



Under the Master Agreement, NVTC and PRTC jointly own and operate the VRE. Service started on both the Manassas and the Fredericksburg lines in 1992. Currently, VRE operates 32 trains per weekday, primarily in the morning and evening commuter peak periods.

Amtrak operates the VRE trains over its own lines in Washington Terminal and over the existing lines of CSX Transportation, Inc. (CSXT) and Norfolk Southern Corporation (NS) pursuant to individual operating and access agreements with the freight railroads. An Operating Agreement between VRE and Amtrak covers the use of Amtrak operating crews, facilities, and maintenance of equipment employees.

An Operations Board governs VRE with delegated authority from the commissions. This board was established under the Master Agreement to coordinate the development and operation of VRE. The Operations Board consists of seven appointed members: three commissioners from NVTC, three commissioners from PRTC, and an *ex officio* representative from the Virginia Department of Rail and Public Transportation. The Board serves as an advisory body to the NVTC and PRTC commissioners and oversees the development and operation of VRE. It is responsible, within the scope of approved budgets, for the management of all monies attributable to VRE, including federal and commonwealth grant funds as well as local contributions.

The Master Agreement makes the Operations Board responsible for the annual preparation and revision of VRE's budget, as well as a six-year financial plan for approval by the commissions.

The Operations Board established the Operations Group in 1991 to oversee day-to-day operations and to participate in strategic and financial planning for the system. Currently, the Operations Group consists of approximately 30 full-time professional/technical staff. VRE is financed with bond proceeds, federal and Commonwealth of Virginia grants, appropriations from participating and contributing jurisdictions, and with the revenue derived from ridership. VRE currently spends an average of $13-$15 million per year on capital projects. Many of these projects receive federal funding, which can cover up to 80 percent of the total cost, with the remainder comprising the "non-federal share."

VRE's direct operating expenses were approximately $24.8 million in FY03 , of which approximately 62% is covered by passenger fares. The bulk of the non-federal share for VRE capital projects falls primarily to local jurisdictions. The overall level of local financial support remained stable at approximately $5.8 million annually for several years, with VRE able to fund a portion of its annual expenses from its debt service reserve. With overall annual costs increasing and the debt service reserve funds fully expended, the level of local financial support in FY 2004 increased to $6.4 million.

The Strategic Planning Process

The fundamental objectives of the VRE Strategic Plan are as follows:

- Enable the service owners to establish a future vision for the VRE system.
- Define the future extent and level of VRE service that is supportable by projected ridership demand.
- Define the appropriate level of long term public investment in VRE commensurate with the ridership and mobility benefits realized.
- Identify capital investment requirements, both in terms of short-term priorities and long-term needs.
- Identify opportunities for funding partnerships and organizational changes that can help enable the vision to be achieved.

A strategic plan is needed now because VRE has been very successful in accomplishing its primary mission, and that success has brought ridership growth beyond the original vision of 10,000 trips per day. Ridership has been growing steadily since FY 1999 and is projected to reach or exceed 18,000 riders by 2010, which is almost twice the level of ridership envisioned in the original VRE planning. Without a comprehensive strategic plan and the actions that result from it, constraints in railroad line capacity, train storage capacity, rolling stock equipment ownership, and station parking availability will severely dampen or limit projected growth.

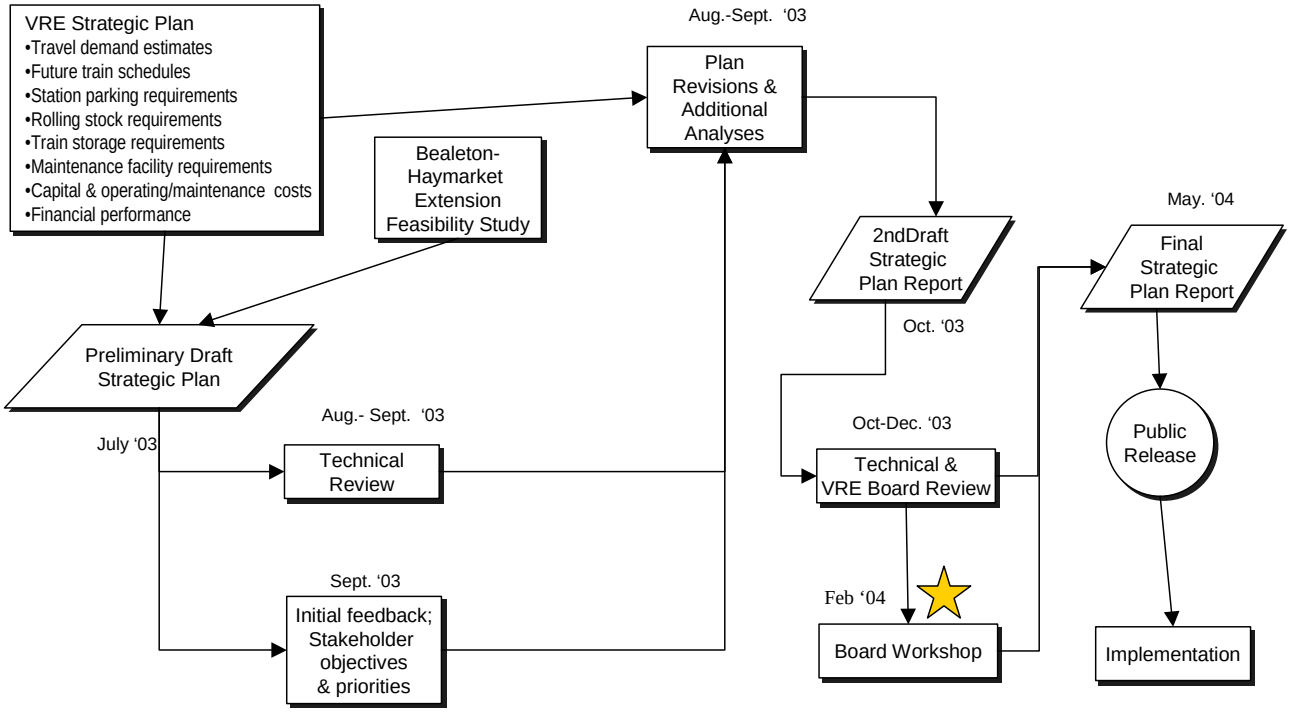
Key elements of the strategic plan include:

- A vision for the future role of VRE in the region's transportation system
- An operating plan (in other words, a description of the proposed service)
- Tabulation of infrastructure and rolling stock fleet requirements
- Estimates of projected ridership and fare revenue
- Estimates of capital costs and annual operations and maintenance costs
- An evaluation of alternative network, service and investment scenarios, including lower-cost and higher-cost options
- A program of phased capital investments, service growth and expansion.

The planning process has been a two-phase effort. The **Phase 1 Preliminary Plan** was documented in a report dated June 2002 and addressed immediate short-term needs and identified early action items prior to the completion of the full comprehensive long-range plan. Its focus was on the existing VRE service territory – identifying and prioritizing projects that were deemed essential for maintaining a high level of service quality while accommodating increasing ridership demands through 2010.

The **Phase 2 Full Strategic Plan**, diagrammed in Figure 1-2, addresses service improvement alternatives and associated capital investment requirements and operational and institutional issues over a longer horizon period – through 2025. This system plan provides a blueprint for shaping the extent of the VRE network, the frequency and type of service to be offered, and the most cost-effective strategies for procuring and maintaining the rolling stock fleet. Service designs and operating plans have been developed for a range of alternative scenarios.

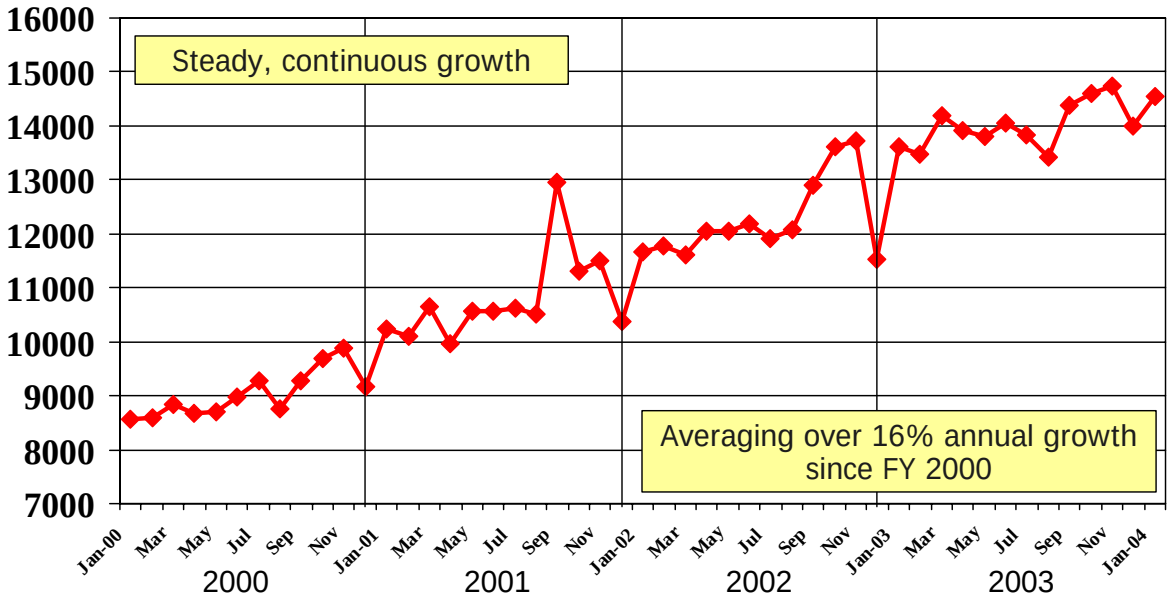
Figure 1-2
The Strategic Plan Process



Existing Conditions – VRE at Capacity

From a modest beginning of 16 trains and 1,800 riders per day in 1992, VRE now operates 32 trains carrying approximately 15,500 daily riders on a service that was designed and sized for 10,000 riders a day. VRE's ridership has been steadily increasing at an average rate of about 16 percent per year over the past four years (Figure 1-3), which places VRE near the top of all U.S. commuter railroads in terms of the rate of ridership growth. A total of over 3 million passenger trips per year are made on the VRE. Ridership demand continues to grow, despite fare increases and increasingly crowded trains and station parking lots.

Figure 1-3
VRE Ridership, 1997-2002



Overall, on-time performance (OTP) is above 90 percent. Through the first three quarters of FY 2004, monthly Fredericksburg Line OTP ranged from 74 to 89 percent. The Manassas Line achieved a higher level of OTP than the Fredericksburg Line – between 86 and 93 percent. The Fredericksburg line, owned and operated by CSX, has a greater traffic density and presents a greater operating challenge because of the relatively heavy mix of commuter, intercity passenger and freight traffic, when compared with the Manassas Line. The Manassas Line is owned and dispatched by Norfolk Southern west of the junction of the two lines at Alexandria and has a lower level of freight and overall traffic than the Fredericksburg Line.

One factor contributing to the VRE's recent success has been its strong focus on customer service and the one-on-one relationship that it has built with many of its riders. Some original VRE riders continue to ride today, a notable achievement in an area as product sensitive as Northern Virginia where there are alternative transportation choices. The underlying VRE philosophy that drives VRE's excellent relationship with its riders is that VRE is committed to make commuting on its trains as efficient, reliable, and stress free as possible-- safe transportation on time. Without investment, however, the traditionally high level of customer satisfaction offered by VRE will gradually erode as increasing numbers of commuters have difficulty finding available parking and seats on the trains.

Rail Infrastructure. Over the first ten years of its existence, VRE has focused its capital investment primarily on stations and rolling stock, taking advantage of the existing railroad infrastructure. VRE trains operate in a mixed traffic environment, with commuter, intercity passenger and freight trains sharing the same tracks and rights-of-way. By their very nature, commuter rail operations such as VRE consume a major share of the available railroad line capacity during weekday peak commute hours, and relatively less at other times. Demand for rail freight is increasing in the Northeast

U.S., with the need to maintain high levels of performance and reliability to enable rail to compete with the over-the-road mode, and increasing pressure to operate passenger and freight trains in mixed traffic during the weekday commuter peak periods. This in turn will drive the need for additional capacity improvements to ensure that all rail operators are able to offer reliable service to their customers.

VRE participated in the recent $12.5 million upgrade to the CSX railroad infrastructure at AF Interlocking in Alexandria, the junction where the Fredericksburg and Manassas Lines converge. This was VRE's first public-private partnership in cooperation with CSX, the Commonwealth of Virginia, and the two Commissions. The agreement that fostered this project also committed other line capacity improvements over the next five years that provide the framework for VRE expansion up to as many as 40 trains per day, as is discussed in Phase I of the Strategic Plan.

Rolling Stock. Throughout most of VRE's history, capacity growth was met by a significant amount of equipment leased for relatively short terms to supplement the equipment VRE owned. Most recently, VRE took advantage of the excess equipment owned by Sound Transit (the new-start commuter rail system in the Seattle region) to lease 18 high capacity bi-level cars, enough for three train sets. In addition, a number of bi-level Gallery cars formerly in service on Chicago commuter lines have been refurbished and put into VRE service. Even so, the practical carrying capacity of the existing fleet and system has effectively been reached, with several peak period trains having standees approaching Washington Union Station and a number of station parking lots filled to capacity.

Although VRE has been able to accommodate its ridership demand up until now, the continued dependence on borrowed or leased equipment means that available seats will peak by 2006, and then drop off unless VRE invests in additional new rolling stock. VRE's lease on the three sets of Sounder cars is short term and relatively costly, so it will make sense to return this equipment to Seattle as soon as sufficient other rolling stock is available. Putting the full complement of 45 Gallery cars in service will compensate for the loss of the Sounders and the prospective sale of the Mafersa single level cars, but the Gallery cars themselves are just a stop-gap measure. They have only a limited life-expectancy and will need to be replaced in the 2010-to-2015 timeframe.

VRE must acquire additional railcars and locomotives to maintain its current operation and sustain growth. Without a new procurement, the combination of increasing ridership demand and an aging existing fleet will lead to VRE seat shortages by the end of the decade. As a start, $100 million is urgently needed to acquire approximately 50 bi-level railcars. In addition, the entire diesel locomotive fleet will need to meet new Federal clean air standards, which recently have become more restrictive, and VRE will have to either upgrade its existing fleet or acquire new clean, high-horsepower locomotives.

Station Parking. As of March, 2004, eight of VRE's 13 rail station parking lots reach or exceed their practical capacity (85% or better utilization) before the end of the morning peak period, This is the case despite a steady program of parking expansion at VRE stations over the past several years. In response, many passengers are now arriving for earlier trains, or parking illegally, or circling in vain to find a parking spot.

The end of the line stations, Fredericksburg and Broad Run, continue to see parking demand well in excess of the available supply, with recently-expanded parking lots

almost immediately filling to capacity. Woodbridge, currently at 90 percent utilization, is scheduled to have additional surface parking capacity added in 2004, with a second parking garage to follow. Plans are underway for new parking structures at Burke Centre and Manassas, both of which are at or over full capacity. The only three stations with substantial quantities of available parking, Manassas Park, Rippon and Lorton, have all seen a recent doubling of available surface parking – and at the first two locations the expansion lots are rapidly filling up. Seven existing stations, divided between the two lines, are of concern with respect to parking capacity in the short to medium term. Analysis of VRE ridership survey data indicates that passengers are quite willing to drive from five to ten miles to reach the rail station. In the near future, no further parking expansion will be possible without additional capital funding.

Train Storage. After the morning peak period, all 11 VRE train sets end up at Amtrak's Ivy City Coach Yard where they are stored and serviced until they are required for the afternoon trains. Midday storage has become critical since there is no additional space for passenger car storage. The VRE area of Ivy City can accommodate 69 units (locomotives and coaches), which is exactly how many units are currently operated and stored.

To accommodate additional trains for ridership growth, or even additional cars on existing trains, more storage space will have to be created in or near Washington Terminal. This requires capital investment and new construction. VRE is working with Amtrak and CSX on a plan for increasing train storage capacity at Washington.

Addressing these capital needs will directly benefit VRE's riders, but it also will have an impact on the entire region. VRE's commuter rail service is part of the larger Northern Virginia transportation network and provides a travel option for commuters throughout Northern and Central Virginia, including approximately 4,200 government and military workers. Passengers who use VRE create capacity on other modes such as highway and Metrorail.

In addition, VRE is a critical part of the region's transportation infrastructure for regional mobility and for evacuation in the event of an emergency. As an energy efficient mode, VRE also helps address critical air quality and congestion issues in a metropolitan region that has been designated as a severe non-attainment area for ground level ozone and is consistently ranked as one of the nation's most congested regions.

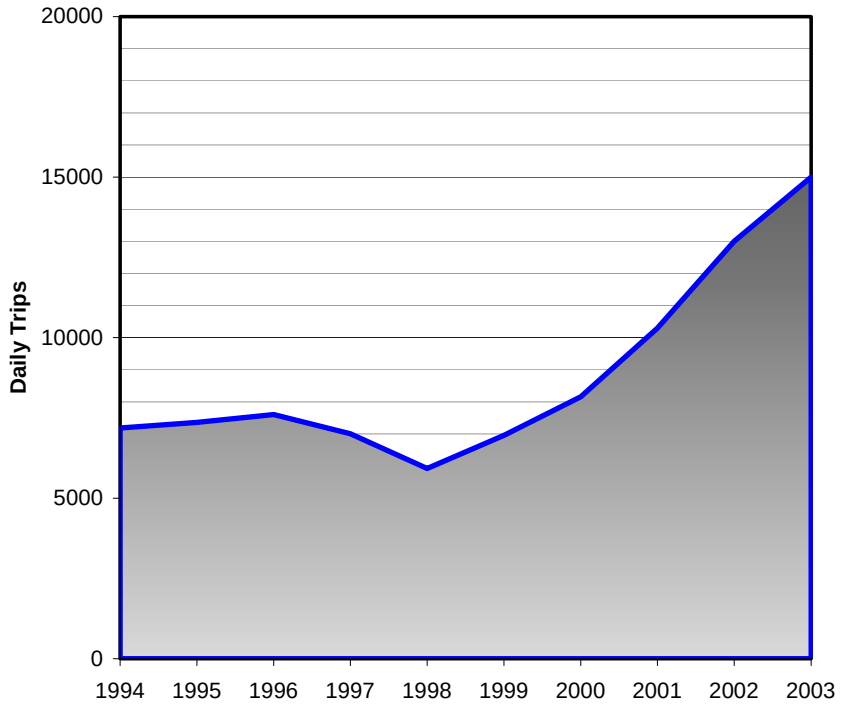
In general, the current VRE system is stretched to the limit of its available capacity and must expand that capacity in the near term if it is going to satisfy growing ridership demand. The pressure of increasing population, poor air quality, and rising traffic congestion, coupled with employer subsidies of public transportation fares, will continue to push VRE beyond the limits of its capacity. The VRE Operations Board and Commissions are now faced with having to justify and obtain the level of investment in infrastructure and operating subsidy necessary to sustain growth and maintain high-quality service. This will be a challenge, since these decisions will extend VRE beyond its historical level of funding commitments.

2. THE VRE RIDERSHIP MARKET

Market Overview

VRE daily ridership in the first half of 2003 grew to the record high level approaching 15,000 trips per day (see Figure 1-1). Over the past four years, ridership growth has averaged 16 percent per year, and VRE now carries twice as many riders as it did in 1999. Factors contributing to the recent growth spurt include continued suburban residential development and population growth in the suburban and exurban communities served by VRE, strengthening of the job market in downtown Washington, DC, increasing congestion on the principal highways serving the Washington business district, the lack of convenient and affordable parking downtown, and expansion and more widespread use of the available Federal transit subsidy programs (MetroChek).

Figure 2-1
Historical VRE Ridership Trend



Train schedules have remained relatively constant over the past three years. Early afternoon trains returning to the suburbs from Washington have been added on both the Manassas and Fredericksburg Lines, but rush hour service headways have remained at approximately 30 minutes. The recent growth in ridership has been accommodated by the acquisition of bi-level coaches with a higher seating capacity than VRE's original single level cars.

VRE's principal market is journey-to-work or commuter travel from northern Virginia suburbs to the Washington, DC central business district and employment centers in Crystal City and Alexandria, VA. The service provided by VRE is concentrated during weekday rush hours and is strongly focused on the peak direction of travel – inbound towards Washington in the morning and outbound in the afternoon. As a result, other travel markets and trip purposes are not served very well by VRE.

Ridership is relatively evenly split between the two branch lines, with the Fredericksburg Line carrying slightly more riders. VRE ridership tends to peak in the Spring and Fall months (April through June and September-October). Within the workweek, travel tends to be heavier in the middle of the week than on Mondays and Fridays. As a result, typical mid-week, Spring or Fall traffic levels are used as the basis for service, fleet and facility planning.[1]

Maps 2 and 3 show the distribution of home origins and workplace destinations of VRE riders, based on survey responses from October 2002. Clusters of demand are evident along the VRE service corridors and in proximity to VRE stations, but there are a significant number of commuters from all across the northern Virginia region who ride the VRE, generally residing south of I-66 and outside the Beltway. Rolling Road and Burke Centre present the highest concentration of VRE riders. Passenger origins tend to be more dispersed along the Fredericksburg Line, where the average rail commuter has to drive a longer distance to reach a VRE station.

Most VRE riders drive to a suburban station, park their car, and take the train to the central business district. Approximately 15 percent use other means to get to the station – they walk, carpool, get dropped off, bike, or take a feeder bus at one of the few stations that offers feeder service.

VRE Patronage Forecasting Methodology

The strategic planning process included an investigation of regional travel patterns and the primary issues that are determining factors for VRE ridership. This includes historical ridership trends, demographic trends and existing and projected future regional travel patterns. The regional travel demand estimates prepared by the Metropolitan Washington Council of Governments (MWCOG) were formatted into a large database. The resulting set of origin-destination trip tables provides a comprehensive picture of trip making characteristics of commuters in the corridors served by VRE trains. Also, the results of a VRE passenger survey in October 2002 provide specific geographic information about the current origins and destinations of VRE customers (see Maps 2 and 3).

[1] The same principle applies in assessing freight traffic. The line capacity has to accommodate the peaks and not just the weekly or seasonal averages.

Forecasts of future demographic growth in the region through 2025, and the effects of that growth on trip-making patterns, were prepared independently by MWCOG and have been used to estimate the effects of projected population and employment growth on the size of the travel markets in which VRE service competes. MWCOG travel analysis zones (TAZs) were aggregated into VRE origin catchment areas, based on the distribution of home origin locations associated with each VRE station. In the area surrounding and to the west of Manassas, where extension of the VRE network is contemplated, several additional catchment areas were defined to enable travel patterns and existing VRE mode shares to be estimated, and future shares projected. Map 4 shows the boundaries of the various VRE origin catchment areas.

A similar aggregation of TAZs was performed for VRE destinations. Four relatively large destination zones were identified, associated with each of the major VRE destination stations: Union Station, L'Enfant, Crystal City and Alexandria. Together, these zones are defined and classified for purposes of this study as the "VRE Central Business District." Within these zones, smaller aggregations of TAZs also were identified so that the differences in VRE mode share for workplace destinations within walking distance of the four stations could be captured. The destination zone boundaries are shown in Map 5.

The VRE ridership forecasting model, used over the past several years for annual projections of VRE ridership and revenue, was updated and re-calibrated to the most recent available round of regional travel data from MWCOG, (Round 6.2), plus the factored results of the Fall 2002 VRE survey, with respect to trip-making on VRE. This model then was used to predict the future level of ridership under various alternative rail service plans, including changes in service frequency and the geographic extent of rail service.

Future updates of the ridership projections will account for the changes contained in the Round 6.3 regional demographic and travel forecasts, and also will use the results of the 2000 Census journey-to-work data to refine the model. Neither the Round 6.3 MWCOG data nor the 2002 Census data were available in time for use in the Phase 2 VRE strategic planning effort.

The regional projections present one view of future demographic growth and travel patterns within the region. Following several decades of suburbanization and the increasing dispersion of population and jobs – the regional models and projections tend to forecast the general continuation of these historical trends. While useful for general transportation planning and as for the evaluation of a wide array of transportation issues and projects across the entire region, the projections may not capture the full effect on land development and trip-making patterns of making significant improvements in rail access between the city and suburbs. In particular, these data do not fully account for the ability of major transit investments to induce a higher level of overall travel in the corridors they serve, or the complementary effects of relatively intensive, well-designed development in the immediate vicinity of rail stations on both the quantity of travel and the share of those trips using transit.

Analysis of travel patterns and mode choices within the VRE service area at the TAZ level yielded information that shows these effects at work, with respect to the existing VRE system. Based on these observations, a sensitivity analysis was undertaken to develop an estimate of the potential effects on VRE ridership of transit-oriented development (TOD) – providing concentrations of new residential or commercial development in close proximity to rail stations – and the potential effect of the presence of VRE service on regional trip-making patterns within growing portions of the region. The potential change in ridership demand was estimated discretely for each existing and potential new VRE station. The results were checked at the destination end to make sure in the high range forecasts that the proportion of trips into the CBD destination zones from the VRE service area was not out of proportion.

These two sets of potential ridership estimates then were used to define the limits of a range of projected future ridership – with the COG projections on the low end representing the historical trend projection, and the alternative estimates indicating the up-side potential for VRE ridership of proactively engaging local jurisdictions and developers in an aggressive program to plan for and implement TOD projects and other rail-friendly development. Actual future performance should fall somewhere in-between.

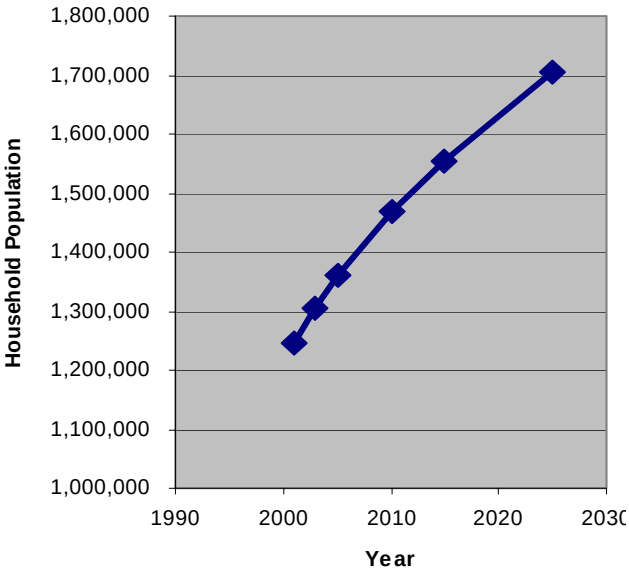
The analysis focused on defining and understanding the work trip market. Other trip purposes are reflected in the estimated daily ridership totals through factoring up of work trips, based on historical experience.

Regional Demographic and Trip-Making Trends

Population and Employment

VRE is situated in a region that is growing at a relatively fast pace – in terms of both population and employment. That growth is projected to continue into the future, with household population within the VRE catchment areas estimated to increase by 36 percent, and total employment projected to increase by 41 percent, between 2001 and 2025. However, the rate of growth will start slowing after 2010 as many of the outlying suburban counties become built-out and the pace of new residential construction slows. Figures 2-2 and 2-3 illustrate these anticipated trends.

Figure 2-2
Projected Population Growth Within
VRE Origin Catchment Areas



Source: MWCOG Round 6.2 Projections

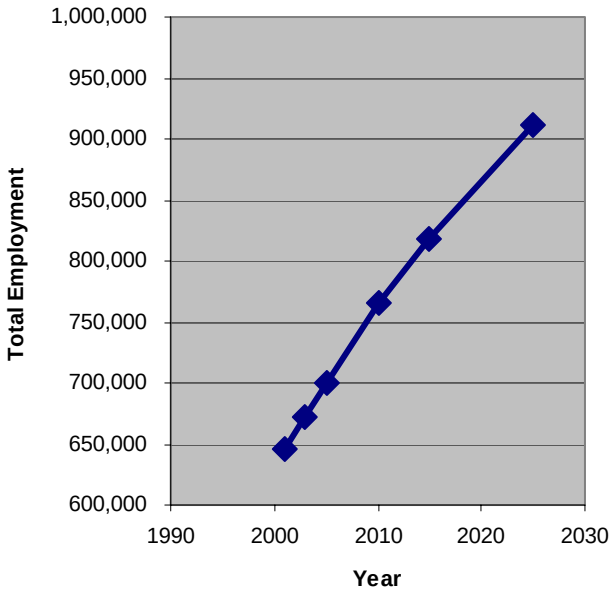


Figure 2-3
Projected Employment Growth Within
VRE Central Business District Destination Zones

Table 2.1 shows projected population and employment growth by VRE catchment area. There are some interesting differences by area. The highest rates of population growth are projected to occur in the outlying portions of the study area, particularly along the I-66 corridor in Gainesville, Haymarket and Loudoun County. With respect to employment, the projections indicate strong growth in the Fredericksburg area (including Spotsylvania and Stafford Counties), and in the industrial corridor between Manassas and Gainesville.

Overall population within the VRE suburban service area is projected to grow by 400,000 between 2001 and 2025. However, total employment is projected to grow by only 200,000 – in the identical geographic area over the same time period. While not every person is a worker, and other demographic, economic and social factors also affect where people choose to live and work, these data indicate that the VRE service area will likely be a significant net *exporter* of workers to elsewhere in the region over the next 25 years. The central business district will be the recipient of a significant number of these work trips from the suburbs.

Table 2.1
Projected Population and Employment Growth Within VRE Catchment Areas

	Household Population				Total Employment			
Origin Catchment Area	2001	2025	Growth	Pct.Change	2001	2025	Growth	Pct.Change
Lorton	56,563	73,813	17,250	30.5%	39,171	51,391	12,220	31.2%
Woodbridge	95,613	104,812	9,199	9.6%	32,504	43,579	11,075	34.1%
Rippon	66,352	82,056	15,704	23.7%	10,665	17,078	6,413	60.1%
Quantico	74,397	111,780	37,383	50.2%	26,887	33,845	6,958	25.9%
Brooke	7,337	9,873	2,536	34.6%	2,369	3,581	1,212	51.2%
Leeland Road	46,883	66,503	19,620	41.8%	16,821	29,422	12,601	74.9%
Fredericksburg	81,675	111,299	29,624	36.3%	47,751	81,112	33,361	69.9%
Backlick Road	98,083	111,983	13,900	14.2%	51,597	57,917	6,320	12.2%
Rolling Road	67,248	73,674	6,426	9.6%	7,278	7,564	286	3.9%
Burke Centre	60,652	72,809	12,157	20.0%	11,192	12,838	1,646	14.7%
Fairfax Station	23,943	29,758	5,815	24.3%	2,402	2,624	222	9.2%
Fairfax City	21,485	24,008	2,523	11.7%	31,029	32,695	1,666	5.4%
Centreville/Chantilly	75,921	101,100	25,179	33.2%	75,375	120,609	45,234	60.0%
Clifton	2,650	3,101	451	17.0%	451	412	(39)	-8.6%
Manassas Park	91,054	111,149	20,095	22.1%	12,233	16,101	3,868	31.6%
Manassas	30,370	33,277	2,907	9.6%	15,878	18,145	2,267	14.3%
Sudley Manor	30,866	41,772	10,906	35.3%	19,512	45,304	25,792	132.2%
Gainesville	12,372	36,787	24,415	197.3%	4,261	11,421	7,160	168.0%
Haymarket	10,910	35,554	24,644	225.9%	1,520	2,917	1,397	91.9%
South Loudoun	12,994	84,966	71,972	553.9%	4,437	9,646	5,209	117.4%
Delaplane/Hume	11,509	18,729	7,220	62.7%	1,613	2,419	806	50.0%
The Plains	2,673	4,346	1,673	62.6%	593	892	299	50.4%
Warrenton/New Baltimore	20,528	32,676	12,148	59.2%	11,987	23,034	11,047	92.2%
Broad Run	21,817	31,468	9,651	44.2%	8,375	12,937	4,562	54.5%
Nokesville	2,332	4,373	2,041	87.5%	905	906	1	0.1%
Calverton/Bealeton	25,033	39,822	14,789	59.1%	3,479	5,813	2,334	67.1%
Total -- VRE Service Area	1,051,260	1,451,488	400,228	38.1%	440,285	644,202	203,917	46.3%

Source: MWCOG Round 6.2 Forecasts

Work Trips to Central Business District

Table 2.2 looks at the work trip characteristics of the VRE catchment areas, as well as the destination zones surrounding the four innermost VRE stations – Union Station, L'Enfant, Crystal City and Alexandria. VRE's principal travel market comprises journey-to-work trips from the origin catchment areas to the downtown central business district destination zones. The table illustrates the current magnitude of these trips and the extent to which they are projected to change through 2025.

In 2001, about 20 percent of all workers in the VRE catchment areas commuted to jobs in the central business district. MWCOG projects that the VRE catchment areas will generate an additional 40,000 daily work trips to the central business district by 2025. However, the percentage of all workers commuting to the business district is projected to decline, from 20 percent to 17 percent, reflecting the expected continuation of strong suburban employment generation in the region.

Looking at the same data from the point of view of the CBD destination zones highlights the same general trend. In 2001, the northern Virginia communities and areas served by VRE furnished 12.6 percent of all workers within the central business district as defined for this study. By 2025, the VRE areas' share of all work trips into the CBD is projected to decline slightly, to 12.2 percent, as a higher percentage of downtown jobs are assumed to be filled by residents of the inner urban areas and from other suburban regions such as Loudoun County.

Overall, the work trip market from the VRE service area to the central business district is projected by MWCOG to grow by 28 percent. The rate of growth is projected to be greatest in the outer portion of the VRE service area.

Table 2.2
Work Trips from VRE Origin Catchment Areas to Central Business District Destinations

	2001			2025			Percent Growth	
Origin Catchment Area	Total to 4 CBD Zones	Total to All Dests	Pct. to 4 CBD Zones	Total to 4 CBD Zones	Total to All Dests	Pct. to 4 CBD Zones	To 4 CBD Zones	To All Dests
Lorton	10,089	37,743	26.7%	12,849	50,459	25.5%	27.4%	33.7%
Woodbridge	11,611	64,473	18.0%	12,616	77,545	16.3%	8.7%	20.3%
Rippon	6,931	43,960	15.8%	8,656	59,974	14.4%	24.9%	36.4%
Quantico	8,629	55,806	15.5%	12,246	89,133	13.7%	41.9%	59.7%
Brooke	650	5,625	11.6%	746	7,982	9.3%	14.8%	41.9%
Leeland Road	1,967	34,856	5.6%	2,379	52,839	4.5%	20.9%	51.6%
Fredericksburg	3,559	58,821	6.1%	3,818	85,424	4.5%	7.3%	45.2%
Backlick Road	21,776	74,912	29.1%	25,110	88,818	28.3%	15.3%	18.6%
Rolling Road	12,392	49,141	25.2%	13,062	54,401	24.0%	5.4%	10.7%
Burke Centre	8,682	44,596	19.5%	9,982	52,954	18.9%	15.0%	18.7%
Fairfax Station	2,660	17,083	15.6%	2,922	19,956	14.6%	9.8%	16.8%
Fairfax City	3,508	16,725	21.0%	3,957	18,777	21.1%	12.8%	12.3%
Centreville/Chantilly	8,974	60,941	14.7%	10,961	81,594	13.4%	22.1%	33.9%
Clifton	239	1,943	12.3%	247	2,003	12.3%	3.3%	3.1%
Manassas Park	7,747	67,764	11.4%	9,119	86,352	10.6%	17.7%	27.4%
Manassas	1,517	21,269	7.1%	1,905	26,190	7.3%	25.6%	23.1%
Sudley Manor	2,072	18,978	10.9%	2,906	30,331	9.6%	40.3%	59.8%
Gainesville	761	8,716	8.7%	1,903	26,023	7.3%	150.1%	198.6%
Haymarket	650	7,345	8.8%	1,848	24,905	7.4%	184.3%	239.1%
South Loudoun	249	5,305	4.7%	3,500	66,892	5.2%	1305.6%	1160.9%
Delaplane/Hume	342	9,220	3.7%	545	16,387	3.3%	59.4%	77.7%
The Plains	106	1,989	5.3%	166	3,537	4.7%	56.6%	77.8%
Warrenton/New Baltimore	723	15,300	4.7%	1,144	27,685	4.1%	58.2%	80.9%
Broad Run	976	13,722	7.1%	1,502	21,932	6.8%	53.9%	59.8%
Nokesville	111	1,612	6.9%	196	3,161	6.2%	76.6%	96.1%
Calverton/Bealeton	623	20,441	3.0%	1,048	36,366	2.9%	68.2%	77.9%
Total from VRE Svc. Area	117,544	758,286	15.5%	145,333	1,111,620	13.1%	23.6%	46.6%
Total from All Origins	929,748			1,190,497			28.0%	
% from VRE Svc. Area	12.6%			12.2%				

VRE Share of the Work Trip Market to CBD Destination Zones

Table 2.3 presents the proportion of all work trips from the VRE origin catchment areas to the central business district destination zones that used VRE in the year 2000, the last year of available detailed data. These percentages represent VRE's "mode split" in the corridors and travel markets that VRE serves. From VRE's overall northern Virginia service area, excluding the zones close to Washington, DC where convenient Metrorail and bus service to the core is offered, the railroad in 2000 captured only 9.3 percent of all work trips to and from the central business district. With continued rapid growth in VRE ridership, the current (2004) VRE mode share is considerably higher, estimated to be close to 14 percent.

Were that volume of people to attempt to drive to their workplaces during rush hours, the region's highways – including I-95, I-667 and the Capital Beltway –would experience a marked increase in traffic congestion. Similarly, were they to all attempt to take the Metro, they would significantly worsen already crowded conditions.

The year 2000 data show that VRE share tends to increase with distance from the CBD. In the areas with the greatest concentration of VRE riders, such as in the vicinity of the Woodbridge or Burke Centre stations, VRE captured 8-to-9 percent of all CBD work trips. Closer in (say, around Lorton or Backlick Road), VRE captured a much smaller share, on the order of 1-to-3 percent.

As one moves further outward, though, VRE's mode shares increase significantly. In Fredericksburg and the surrounding areas of Stafford and Spotsylvania Counties, VRE's mode share in 2000 was in the 35-to-41 percent range. In the Manassas and Broad Run area, VRE captured in 2000 was over 30 and 50 percent, respectively, of all CBD work trips.

The VRE share also was significantly higher for trips to workplaces in the vicinity of Washington Union Station (approximately 17 percent), which is a difficult location to reach by car and requires an intermediate transfer to reach on the Metrorail Red Line. VRE shares dropped to the 9 percent range for trips to workplaces near L'Enfant and Crystal City, which are reachable directly by Metro for many northern Virginia residents. VRE captured only about 5 to 6 percent of all trips to Alexandria, reflecting that driving to Alexandria is relatively easier than driving into Washington, DC.

The relationship of increasing VRE share to increasing distance from the CBD is assumed to have remained similar to that experienced in 2000, even though overall VRE shares of work trips have increased across-the-board, because commuter rail service tends to be more time and cost-competitive with other transportation modes for longer-distance work trips.

Table 2.3
VRE Share of Work Trips from VRE Origin Catchment Areas to Central Business District Destinations – Year 2000

Destination Zone:

	Origin Catchment Area	Union Station	L'Enfant	Crystal City	Alex-andria	Total to 4 CBD Zones
4	**Lorton**	7.6%	3.7%	1.3%	0.3%	2.6%
5	**Woodbridge**	14.9%	6.1%	9.2%	6.0%	8.1%
6	**Rippon**	8.2%	5.2%	6.5%	7.2%	6.2%
7	**Quantico**	16.3%	7.9%	12.3%	10.2%	10.6%
8	**Brooke**	31.9%	19.1%	17.7%	8.3%	18.1%
9	**Leeland Road**	70.3%	48.1%	39.8%	17.0%	41.4%
10	**Fredericksburg**	90.0%	4.7%	39.3%	39.5%	35.1%
11	**Backlick Road**	7.8%	3.3%	1.4%	0.0%	2.7%
12	**Rolling Road**	0.9%	5.8%	2.1%	0.6%	3.0%
13	**Burke Centre**	21.9%	15.2%	1.7%	1.0%	8.7%
14	**Fairfax Station**	20.6%	15.0%	0.4%	0.0%	8.2%
15	**Fairfax City**	3.5%	1.7%	0.0%	8.8%	2.0%
16	**Oakton**	0.0%	0.0%	0.0%	0.0%	0.0%
17	**Centreville/Chantilly**	2.4%	1.1%	1.1%	0.0%	1.2%
18	**Clifton**	96.0%	32.2%	3.0%	0.0%	22.2%
19	**Manassas Park**	12.5%	8.7%	8.7%	3.4%	8.7%
20	**Manassas**	42.7%	33.2%	30.5%	11.7%	31.7%
21	**Sudley Manor**	12.6%	5.8%	12.8%	15.0%	9.4%
22	**Gainesville**	17.0%	15.9%	25.7%	26.1%	19.6%
23	**Haymarket**	18.8%	8.8%	25.7%	14.5%	15.6%
24	**South Loudoun**	5.2%	1.8%	2.9%	0.0%	2.6%
25	**Delaplane/Hume**	7.2%	6.3%	1.3%	5.4%	4.2%
26	**The Plains**	0.0%	5.0%	0.0%	19.5%	3.2%
27	**Warrenton/New Balt**	15.4%	13.8%	6.5%	0.0%	10.1%
28	**Broad Run**	51.0%	54.9%	68.1%	42.4%	57.0%
29	**Nokesville**	90.0%	25.7%	31.4%	0.0%	36.6%
30	**Calverton/Bealeton**	38.1%	14.8%	13.6%	8.5%	16.3%
	Total from VRE Svc. Area	16.8%	8.9%	8.8%	5.6%	9.3%

Projected Ridership Growth Through 2025

In VRE's principal travel market – work trips from the northern Virginia VRE service to the destination zones surrounding the four innermost stations – future increases in ridership will be a function of the combination of two factors:

- Increasing market size, fueled by population growth in the outlying catchment areas and employment growth in the central business district – and also influenced by the level and convenience of rail service offered to the CBD and the specific patterns of land development that occur in the vicinity of rail stations
- Increasing VRE market share, driven by improvements in the level of service offered by VRE, relative to those provided by alternative modes of transportation.

The historical data on trip-making and modal choice patterns for the VRE service area, including small sub-zones within the service area, indicate two ways in which the presence of commuter rail service affects travel patterns. First, those zones that are situated in close proximity to rail stations have a higher-than-average percentage of total work trips going to work destinations within the central business district. Second, VRE's share of total work trips to the central business district is higher for zones in proximity to VRE stations, compared with zones located further away from the station.

Figure 2-4 illustrates the extent to which the number of work trips from VRE catchment areas to CBD destination zones might increase as a result of VRE service being extended to new stations or significantly improved at existing stations where future transit-oriented station area development is proposed or possible.

Reasonable estimates were made of the percentage of workers commuting to downtown jobs and the share of those commuters who would potentially take the train – for selected zones in close proximity to existing or new VRE stations where new or additional future development is possible. These estimates adjust upwards the average percentages that are applied to wider geographic areas in the MWCOG projections and provide an indication of the up-side ridership potential for VRE associated with transit oriented development and the induced demand for travel to the CBD that the presence of a commuter rail link can generate.

These effects represent the high end of the range of possible increased demand and would only be realized at those locations where VRE service is provided or extended, and where a proactive partnership with developers and local jurisdictions results in the development of transit-friendly land uses and densities.

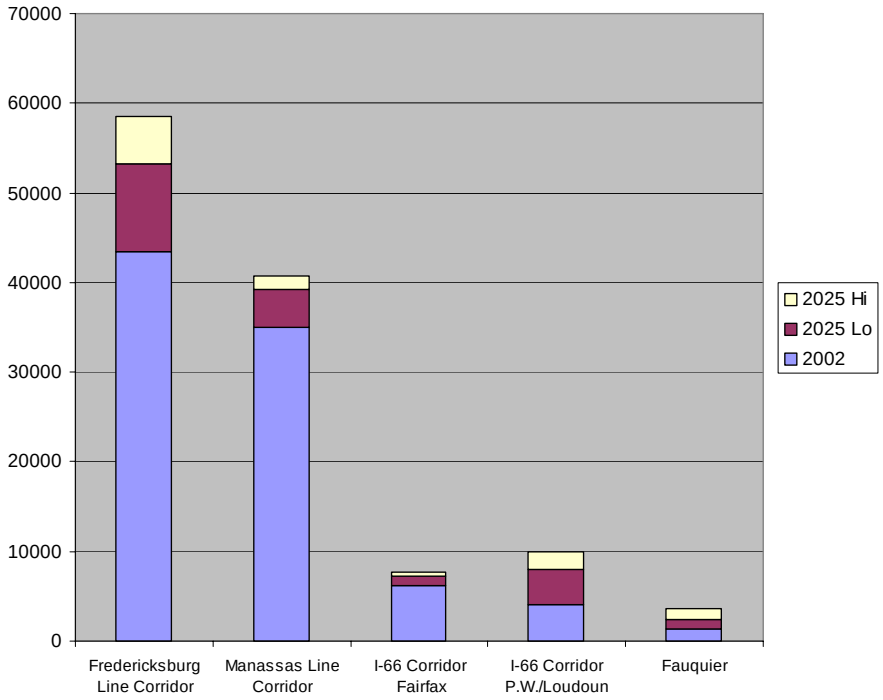
VRE market share – the percentage of work trips attracted to the VRE mode – is a function of the relative convenience and attractiveness of VRE relative to other transportation modes. Several underlying factors will tend to favor VRE over time, including:

- Increasing highway congestion and limited or no investment in more capacity once the Springfield interchange project is completed, in routes to and from the CBD
- Limited capacity of Metrorail service out of Vienna without major new investment

- Limited anticipated future growth in inventory of parking, downtown and at Vienna Metro

Some factors go the other way, such as the capacity boost that the completion of the Springfield interchange will provide, CLRP projects such as I-66 widening, and HOV lane extensions in I-66 corridor and along the Capital Beltway. Most important for VRE's mode share, however, will be the VRE level of service – peak frequency of service and running time – as well as the reliability and predictability of that service for commuters.

Figure 2-4
Total Daily Work Trips to CBD from the VRE Service Area – Current, Projected 2025 Baseline, and 2025 with Transit-Oriented Development and VRE Induced Demand



Potential future ridership in the year 2025 was estimated for several alternative service scenarios, including:

- Baseline – existing service
- Improved service within core network
- Shorter headways and extended peak operating window
- Zone express service
- Service extension options

- Gainesville–Haymarket, Start-up service to Gainesville
  - Three round trips to Gainesville each day in addition to service to Broad Run. One Broad Run round trip would be diverted to Gainesville and two new trains added.
- Gainesville–Haymarket, Full Gainesville service
  - Six Round trips to Gainesville, three from Broad Run, 15 minute headways from Manassas, some skip-stop trains.
- Gainesville–Haymarket, Full Haymarket service
  - Extend the Gainesville Service described above to Haymarket
- Fauquier County (extension to Bealeton-Remington area)
  - Gainesville/Haymarket Service as above. Extend the three Broad Run round trips to Bealeton or Remington
- Spotsylvania County (new station at Crossroads site)
  - to provide some relief to Fredericksburg parking and attract more riders from south of Fredericksburg.

Interim year ridership was derived based on selected ridership model runs using the MWCOG interim year trip tables for 2005 and 2015, with results Interpolated for other years and for all other scenarios.

The incremental daily ridership associated with expanding off-peak service also was estimated, including mid-day service (with either bi-hourly or hourly service frequencies) and additional evening trains leaving Washington between 7:30 and 10:30 pm. Potential ridership associated with service on weekends was not explicitly analyzed.

A separate analysis was undertaken to estimate the potential ridership associated with extending selected VRE trains through Washington, DC to destinations in Maryland, which concluded that up to 3,000 daily trips could be added to VRE's ridership totals if run-through service were instituted.

Assessing the potential size of the travel market for VRE service extended to Richmond and Charlottesville was outside the scope of this study, and data on the magnitude of existing and potential future trip-making in these long-distance corridors were unavailable.

The analysis to date has not included estimates of potential reverse commute ridership on VRE to workplaces in the northern Virginia suburbs. On commuter rail systems that provide reasonable reverse commute service, commuter rail shares of the reverse-peak trip market fall in the 1 to 2 percent range. Volumes of riders are small relative the size of the peak direction market and do not drive the level of required investment in rolling stock, although serving this market may require significant additional rail infrastructure and on VRE would most likely trigger the installation of additional station platforms so that trains could serve both directions of travel simultaneously.

The analysis to date has also excluded explicit estimates of ridership associated with trip purposes other than work trips, although the factors in the ridership model that estimate the increases in ridership associated with adding off-peak service are based

on data from the MARC Penn Line and elsewhere-- data that include trips other than work trips.

Airport trips are another potential market that commuter rail can serve. Though VRE will not have a station within convenient walking distance of the terminals at Ronald Reagan National Airport, a relatively convenient transfer to Metrorail at Alexandria could be provided to facilitate airport-related trips, and extension of VRE operations to a bi-directional, all-day long service would make the railroad a more attractive option for air travelers. Subsequent studies will need to quantify the potential magnitude of VRE's share of non-work travel markets such as airport access or travel to special cultural or sporting events in Washington, DC.

Figure 2-5 and Table 2.4 present an amalgamation of these forecasts, organized according to the three scenarios for future VRE growth and investment, which are described later in this report. The three scenarios – targeted growth, aggressive growth and constrained growth – represent the range of potential future strategies that VRE could pursue. Within each scenario, a range of potential future demand is shown. The constrained scenario retains the current train schedule and service territory, although investment in station parking and rolling stock capacity is assumed to be provided at sufficient levels to sustain growth. The targeted and aggressive scenarios increase the level of VRE service over time and extend VRE service in phases – initially in the Gainesville-Haymarket corridor and ultimately to Spotsylvania and Fauquier Counties. Capital investment and service expansion is assumed to occur more rapidly in the aggressive scenario than in the targeted scenario.

Table 2.5 presents the year 2025 market size and VRE share estimates for the work trip market from VRE station catchment areas to central business district destination zones, for each of the three scenarios.

Figure 2-5
Projected VRE Ridership Growth Through 2025

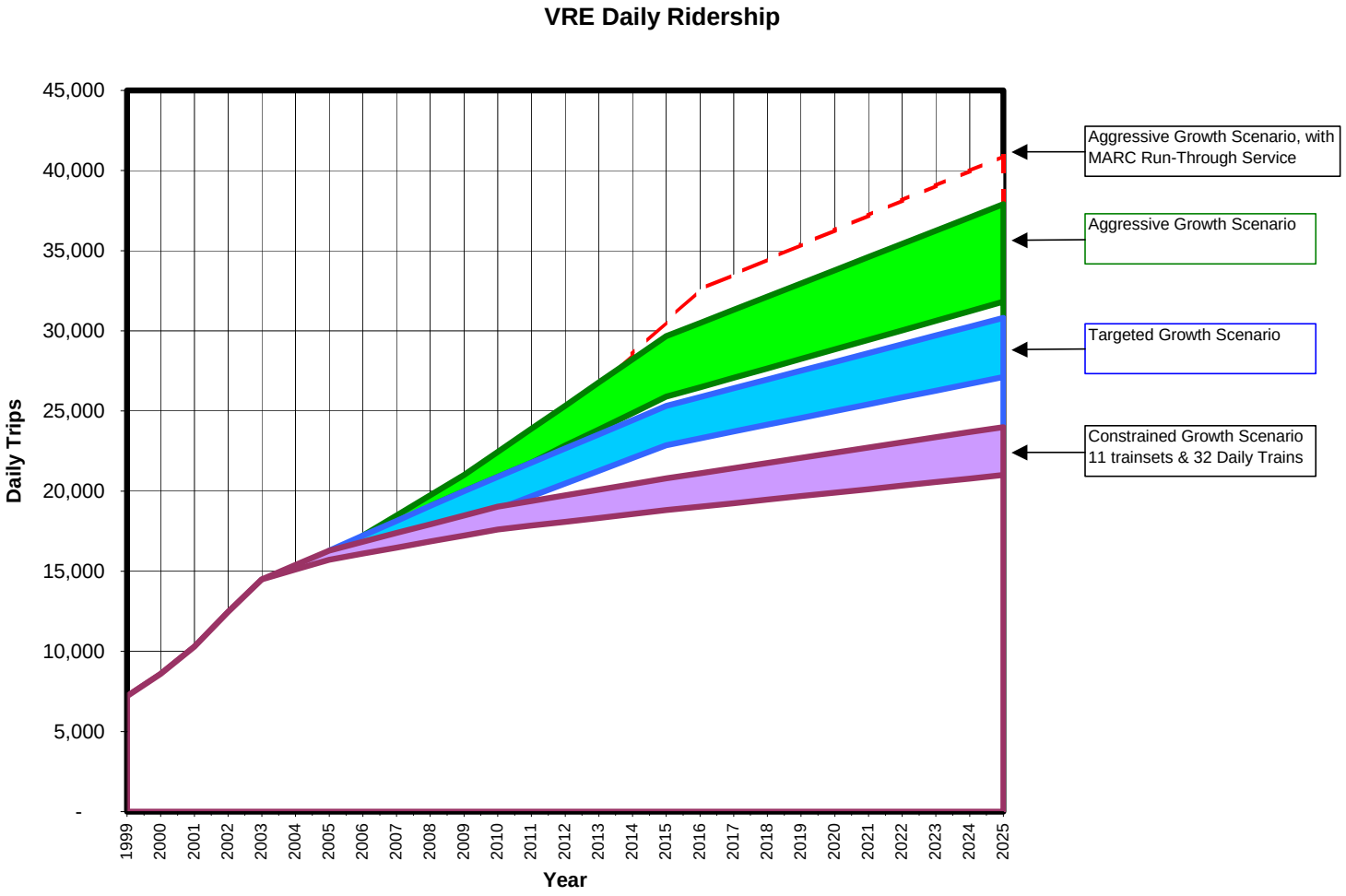


Table 2.4
Estimated Daily VRE Ridership by Scenario

Strategic Plan Scenario		1999	2000	2003	2010	2015	2025
Constrained Growth	Low	7,200	8,600	14,500	17,600	18,800	21,000
	High				19,000	20,800	24,000
Targeted Growth	Low				18,900	22,900	27,100
	High				20,900	25,300	30,800
Aggressive Growth	Low				20,900	25,900	31,800
	High				22,400	29,700	37,900
	High w/ MD Run-Through				-	30,600	40,900

Table 2.5
CBD Commute Market Size and Estimated VRE Shares in 2025, by Strategic Plan Scenario

		Home-Based Work Trips to CBD	VRE Share of CBD Work Trips	Daily Work Trips via VRE	Daily Total Trips via VRE
Existing Condition*		93,700	15.2%	14,200	14,500
2025 Constrained Growth	Low	117,900	17.5%	20,600	21,000
	High	118,800	19.6%	23,300	24,000
2025 Targeted Growth	Low	119,700	22.1%	26,400	27,100
	High	124,000	23.6%	29,300	30,800
2025Aggressive Growth	Low	120,800	24.5%	29,600	30,500
	High	127,500	27.8%	35,400	37,900

*Based on 2003 VRE daily ridership and 2001 estimate of CBD work trips.

3. VRE IN THE FUTURE

Using VRE's future market potential as a guide, the strategic planning process has attempted to define a vision for the railroad in the year 2025 – in terms of its physical extent, the number of trains and the type of schedule operated, and its organizational structure.

The market assessment and regional forecasts make clear that demand for VRE's services will continue to grow into the future. The readily-observable current pace of new land development, particularly residential development, in the areas surrounding many of VRE's stations provides strong supporting evidence.

Since the railroad is currently operating at or a little above its practical capacity, VRE either will have to invest in more capacity or start turning away potential customers. In a strong growth environment, maintaining the *status quo* is not a realistic option. If the entities that now fund the VRE – the Federal government, the Commonwealth of Virginia, and the jurisdictions that comprise the NVTC and PRTC – are unable to increase capital and operating support for VRE and sustain it at high enough levels to allow the service to grow to keep up with demand, VRE will be faced with difficult choices:

1. Maintain the current operation, managing scarce resources as effectively as possible and making small incremental investments to increase capacity and the quantity of service,
2. Raise the fare substantially in an effort to curb the growth in demand and generate sufficient income to preserve a premium quality of service, in effect rationing the service to those willing to pay a premium for it, or
3. Find additional sources of funds to support VRE's growth, lessening the financial burden on the VRE's member jurisdictions.

Following the first path will gradually lead to a deterioration in the traditionally high quality of service experienced by VRE passengers, as demand for rail service increases faster than the available supply. Trains would become more crowded with standees, station parking lots would fill up earlier in the morning rush hour, trip times would get longer as the passenger boarding and alighting process at stations takes longer. Reliability and on-time performance would start to decline as the rolling stock and infrastructure age and show the effects of chronically underfunded maintenance and capital renewal. Without the prospect of significant public investment in the betterment of the railroad, VRE's relationship with its host railroads also could become more strained, negatively affecting customer service.

The second path – fare policy – is a tool that VRE can use to help manage both the demand for service and the level of operating subsidy and capital required to support the service. Discussion of the fare and rate of increase of fares is carried out in the context of the annual process of setting the next fiscal year's VRE budget and six-year budget projections. Raising or adjusting fares can be an appropriate tactical response to current financial mandates and directives. Increasing fares, parking fees, and non-transportation revenue could help VRE defray rising costs and help fund a portion of its

ongoing capital needs, while helping to keep required local subsidies as low as possible. At the same time, a significantly higher fare structure would drive the most fare-sensitive customers away from the railroad – which could help ease the rush hour parking and standee problem. In the context of long-range strategic planning, however, discussion of fare policy relates directly to VRE's role and objectives as a public transportation provider. Dramatically increasing the fares that VRE customers pay, relative to inflation and the cost of travel by other modes, will fundamentally change VRE's place in the spectrum of regional transportation choices – tending to make it more of an exclusive or "high end" service than a mode of public transit between the city and suburbs. Though the trips of many VRE riders are subsidized, in part and in some cases entirely by Federal transit subsidy programs, a significant share of VRE's customers do not participate in such programs. In general, as fares rise relative to the cost of other modes, VRE's share of the suburb-to-central business district commuting market will decline. To the extent that a premium-fare VRE remains a viable commuting choice for a diminishing segment of the population working in the CBD, VRE's broad base of support as a regional public transportation service may become undermined and diminished, putting at risk at least some of its current public sources of funding support. Predicting all of the economic and public policy factors affecting VRE's budgeting and finances over a 25 year period is not possible with any precision in the strategic planning process. As a result, fundamental fare policy issues are not directly considered in this document and are left to the annual budget process and subsequent analyses once the VRE Operations Board has established a strategic direction. The financial performance estimates that are presented in Section 9 of this report attempt to cover a range of possible future conditions within which VRE's actual performance might fall.

The third option listed above – seeking partners and additional sources of funds – is a potentially appealing way to broaden the base of support for VRE, spread costs, and recognize its broadening geographic appeal. However, following this path will require VRE to re-think itself and could lead toward a significant change in the transportation mission, geographic coverage, organizational structure, and even the day-to-day management and operation of the VRE. As with fare policy, analysis of such changes is beyond the scope of the Strategic Plan, which focuses on technical issues: the ridership market, railroad operations, and required transportation system investments.

Clearly, difficult policy choices will need to be made by the VRE Board, informed both by the Strategic Plan and by the political and economic climate and other factors that the plan is unable to address definitively. The most appropriate short-term policy may entail some combination of all three options described above. As policy direction is established and conditions change over time, this Strategic Plan will need to be updated and refined – including specific elements such as the scope and timing of capital projects and changes to the VRE train schedule. For the time being – in the Spring of 2004 – the VRE Strategic Plan focuses on answering the question originally asked of VRE staff by the VRE Operations Board: What type and level of service should the VRE provide, and what investments will be required, to meet the VRE region's projected commuter rail demand in the year 2025?

Since VRE's mission is based on customer service, and since the region's overall plans for growth and economic development depend in part upon the ability of public transportation modes to carry an increasing share of rush hour commuter trips across the region, the VRE Strategic Plan is a plan for growth – increasing the quantity and extent of VRE service as the population, employment and economic activity in the

corridors it serves also grow. The Plan identifies a long-range vision and also a short-term action plan that is targeted at actions that VRE and its stakeholders should take to address capacity issues of immediate concern and also to build a foundation upon which future expansion can be undertaken cost-effectively.

What's Possible by 2025?

VRE has the potential to at least double its current ridership by 2025. That implies more trains, longer trains, bigger parking lots and garages at many existing stations, and expansion of VRE to new stations and areas beyond its current service territory.

Maintaining VRE's traditionally strong customer service focus will become increasingly difficult as the size of the system grows, and investment in both infrastructure and equipment will be needed to ensure that operations remain reliable.

Many in the greater Washington region have envisioned a future where commuter rail service is run in a coordinated, integrated fashion, instead of having two entirely separate systems for Virginia and Maryland. This vision includes offering travelers the ability to ride commuter trains from one side of the region to the other. Better integration of VRE and MARC service will help mitigate congestion on some of the most crowded portions of Washington's Metro system and will establish the railroad as a key link in the overall regional transit system.

The increase in peak period service and expansion of VRE service into off-peak hours will require investment in additional railroad infrastructure – to preserve the ability of the freight railroads to meet their own customers' demands for reliable on-time service.

Both the passenger and freight business in the region are growing enough to warrant increased rail service. There is the need to operate passenger and freight trains at the same time of day. Freight trains, therefore, will not be able to avoid sharing the track network with passenger trains. To facilitate shared operations, additional tracks will need to be built at strategic locations to allow train dispatchers to keep the train movements flowing smoothly. These investments in rail capacity will provide wide ranging benefits to multiple constituencies, including:

- Improved through freight capacity for CSX and Norfolk Southern
- Capacity for increased intercity passenger service – high-speed rail, and intercity service within Virginia
- Capacity for increased commuter service – for Federal government workers and other commuters
- Easier public transportation access to Reagan National Airport
- Faster, more reliable and more cost-effective local freight service for shippers in the region.

All of these beneficiaries should share in the costs of creating the necessary infrastructure.

A realistic target for daily VRE ridership by 2025 lies somewhere between 25,000 and 35,000 trips – or an approximate doubling of current ridership. The range is a wide one, because there are a number of factors that will affect future ridership. Some are

able to be influenced by VRE and its stakeholders, such as fare policy, the pace and extent of capital investment, and decisions that directly affect VRE's operations, capacity and service quality. Many factors external to VRE and beyond its control also can affect both the regional transportation network as well as land development patterns in the corridors served by VRE. These factors include:

- The state of the local and regional economy, with respect to housing development, job creation, and the strength of the central business district
- Local zoning decisions relative to land available for new housing at the extremities of the VRE service area
- The extent of transit oriented development at and around existing and potential new VRE stations
- The ability of VRE to negotiate the necessary railroad operating and access agreements to allow for expansion
- The level to which commuter rail fares are subsidized through Federal or other programs, and the rate of participation among commuters
- The extent to which major investments are made for other transportation modes in the corridors served by VRE, including any further extension of the Metrorail Orange or Blue lines, or the extension of HOV lanes on I-95 and I-66 beyond what is included in the region's current long-range plan.

Recognizing the uncertainties associated with predicting the future, the strategic plan must be flexible enough to allow VRE to be successful no matter how these factors, particularly the external ones, play out over time. A good example is provided by the last bullet point above. Regional transportation investment decisions with respect to Metrorail and regional high-occupancy vehicle (HOV) lanes could yield two significantly different future visions for VRE's role in providing regional commuter service:

1. Assuming that HOV lane extensions proceed as planned and that funding limitations and extensive capital needs in other corridors prevent or considerably delay beyond 2025 extension of Metrorail in the I-66 and I-95 corridors, then VRE would become the preferred long-distance regional transit mode in portions of the I-66 and I-95 corridors beyond the reach of the current Metro system.
2. Or, if plans were to be advanced to extend Metrorail westward to Centreville and southward to Woodbridge, and HOV lanes also were extended westward to Haymarket and southward into Stafford County, then VRE's long-term share of the commuter market to the central business district would be smaller and more focused on the outer portions of the network.

In both cases, VRE will retain a significant role and ridership base and will serve the market for longer-distance commuting, including territory beyond the direct reach of the Metro. Both cases therefore support the vision of VRE extending its service southward into Fauquier and Spotsylvania counties. The fundamental difference is that, in the second case with extensions of Metro and HOV lanes, the inner portion of the existing Fredericksburg Line and the corridor along I-66 within Prince William County would be

served predominantly by Metro and the HOV lanes, with VRE focusing its service in the other territory it serves, such as Burke Centre, Manassas and Fredericksburg.

In the latter case, at the time when major investments in other modes are made along the inner portions of the VRE network, VRE will be able to redeploy its rolling stock to the fast-growing outer portions of its territory, modify its schedules to provide express commuter rail service to the CBD for these longer-distance trips, and more aggressively pursue expansion beyond its current terminal points. In this way, VRE will be able to make productive use over the long term of the projects that are expected to be constructed and the equipment that will be acquired in the near term.

Capital funds for both highway and transit projects are likely to be severely constrained for the foreseeable future, and the Federal contribution may diminish. Other corridors throughout the region may have higher priorities than the I-95 and I-66 corridors. If Metrorail and HOV extensions are deferred either for lack of funds or in response to priorities elsewhere, VRE is well positioned to offer a cost-effective, fundable option in developing the I-95 and I-66 corridors. In that case, daily VRE ridership at the level of 35,000 daily trips or above is potentially achievable.

How Can We Get There from Here?

VRE faces the same fiscal constraints as all the other transportation providers and agencies in the region. Extensive capital needs within the core network to increase capacity, and a compelling argument for extension of the network to serve the rapidly-developing outer portions of the region, create a significant funding challenge for VRE moving forward.

Recognizing the tradeoffs that exist, and not knowing the extent to which VRE will be able to successfully make the case for increased investment, the Strategic Plan has identified three illustrative scenarios for meeting its demand and realizing its long-range potential, consistent with the vision outlined above. These scenarios are not the only available options, but they show three possible paths that VRE could follow in terms of prioritizing its investments and growth in service. They are intended primarily to illustrate what is possible in terms of VRE system growth at different levels of capital investment and operating support – particularly in the early years through 2009. Shown in Figure 3-1, these scenarios are labeled Targeted Growth, Aggressive Growth and Deferred Growth.

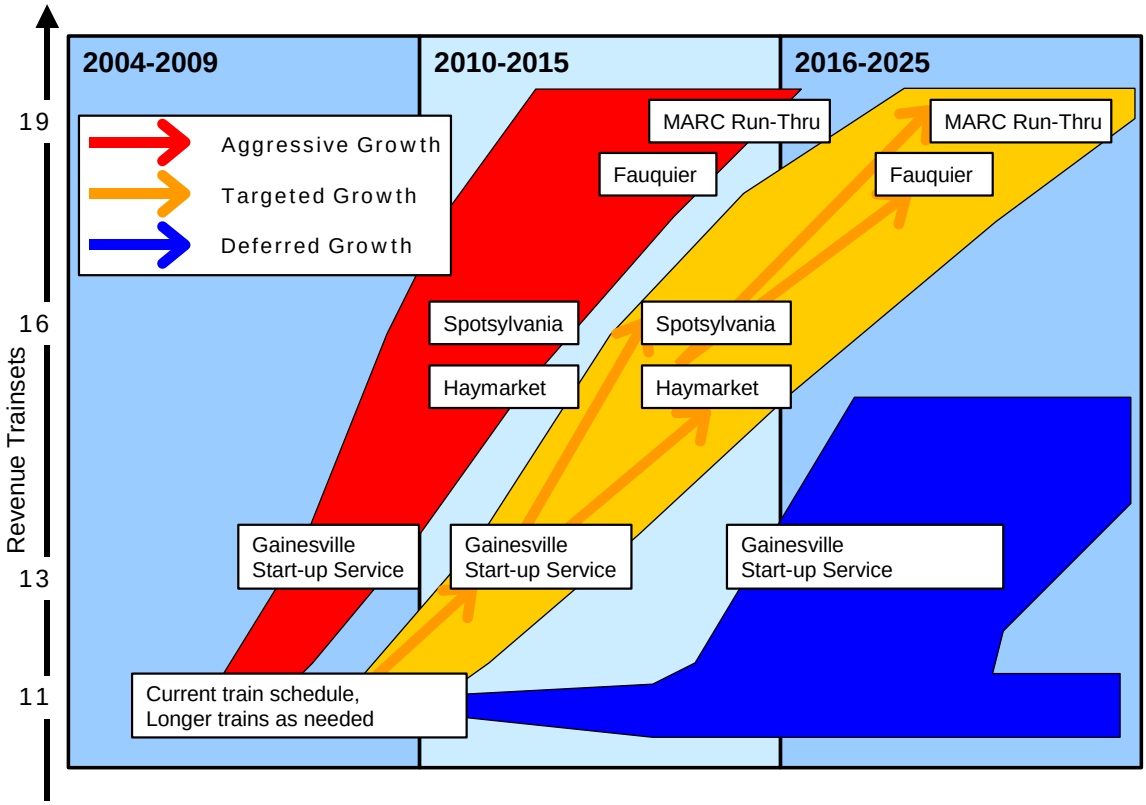
The Targeted Growth scenario represents a middle-of-the-road approach that focuses early investment on core needs and a phased expansion of service in the Gainesville-Haymarket corridor, with additional network expansion in later years. It has formed the baseline for development of the Strategic Plan assumptions about facility, infrastructure and fleet requirements, and the phasing of capital projects and improvements to the VRE operating plan. It is driven primarily by the market for commuter travel, aimed at VRE increasing over time its share of work trips from its catchment areas to the central business district, while facilitating VRE's ability to influence patterns of new development in the vicinity of existing and new stations in a way that reinforces the advantages of travel by rail. It requires a significant increase in the level of capital and operating funding support for VRE but ramps up that investment over time.

The Aggressive Growth scenario represents a more unconstrained approach to meeting VRE's market potential. By investing in service extensions earlier than in the

targeted scenario, this scenario has a greater potential to induce future increases in travel demand to and from the CBD and to facilitate transit-oriented development at multiple locations along the VRE network. It front-loads much of the required capital investment, simultaneously addressing core needs and expansion opportunities, which may not be realistic given the region's current fiscal environment.

The third scenario, Deferred Growth, is more responsive to the financial constraints that currently affect transportation investment in the region. It limits early investment to core needs and both expends capital funds and improves VRE service at a slower pace than either of the other two scenarios. As a result, the VRE network would be capacity-constrained through the early years of the plan, with demand for service exceeding the supply that VRE is able to offer. Within this scenario, VRE could choose to use pricing strategies (involving rail fares and potentially station parking fees) to dampen the rate of ridership growth, keeping demand for rail service in line with the supply that VRE can deliver, and generating a higher level of per capita revenue that could be used to partially fund ongoing capital investment and minimize local subsidies. With much of the planned suburban growth occurring before VRE has the ability to serve it well, this scenario is not likely to generate induced demand or transit-oriented development to the extent that either of the other two scenarios can – so the long-term level of VRE ridership and market share will be lower.

Figure 3-1
VRE Strategic Plan Scenarios (Illustrative)



All three scenarios allow for VRE to monitor the progress and performance of its initial investments – and adjust the pace of growth and development thereafter either upward or downward in response to demand pressures, external economic or political factors, and funding availability.

What's Achievable by 2010?

In the near term, VRE can support any of the three possible growth scenarios by adopting an investment strategy and taking actions with three major thrusts:

- Build a strong core network foundation, focused on maintaining the highest level of service quality and providing sufficient capacity for growth in areas where VRE currently provides service
- Extend and/or increase VRE service within the jurisdictional limits of NVTC and PRTC, in response to a growing commuter market
- Establish strategic partnerships to tap new sources of funds, encourage rail-friendly development, and enable VRE to serve markets beyond its traditional boundaries.

Build a strong core network foundation.

VRE and its stakeholders can take several actions in the short term to set it on a course for growth that is consistent with the potential futures outlined above, focusing on the territory covered by the two governing commissions and making decisions and taking actions that are under VRE's control.

The required near-term investments in rolling stock, suburban station parking, CBD station capacity, and train storage and maintenance facilities are the same regardless of the vision of the future. Decisions about whether or not VRE should aim for the high end of its projected range of demand or aim more for a middle-of-the-road outcome can be deferred until after core needs are met and do not need to be made now.

Extend and increase VRE service within NVTC/PRTC territory.

Strong market potential exists for extension of VRE service within the VRE's existing territory, including:

- More frequent service in the peak periods
- Longer peak windows (earlier morning trains, earlier and later evening trains)
- Faster run times, taking advantage of investments in rail system capacity, basic rail infrastructure and more efficient passenger downtown station configurations, and including introduction of peak express service from the outlying portions of the network
- Increased off-peak service, including mid-day, evening and eventually weekends.

In order to meet growing demand in western Prince William County VRE should consider extending service within Prince William County to Gainesville and eventually Haymarket (once the US 29/I-66 interchange project is completed). New stations

should be implemented where warranted by local development and opportunities to improve regional park and ride access.

Establish strategic partnerships.

VRE should consider seeking partnerships with entities that can help it achieve its long-range vision, including:

- The freight railroads (Norfolk Southern and CSX)
- Amtrak
- The Commonwealth of Virginia
- The State of Maryland, District of Columbia, and the Federal government
- Coalitions and Groups that Support and advocate for investment in the regional railroad system
- Counties and municipalities
- Developers, employers and landowners.

Potential goals of these partnerships should be to:

- increase the level of funding available to VRE or to help VRE tap into new or non-traditional sources of funding
- encourage development that creates or reinforces travel markets that VRE can serve well
- enable VRE to productively serve markets outside its traditional territory.

In partnership with others, VRE can then take steps towards extending service to Gainesville/Haymarket and other projects such as extending service into Fauquier and Spotsylvania Counties, instituting run-through service with MARC at Washington, and perhaps expanding VRE's role in serving the longer-distance travel markets in the Washington-Richmond and Washington-Charlottesville corridors. The costs and benefits of many of these projects are discussed later in this plan.

4. CORE NETWORK NEEDS

The principal short-term needs for VRE to keep pace with its growth are in the areas of station parking, rolling stock and train storage capacity at Washington, DC. Capital investments must be made in each of these core areas together, as part of a coordinated program, in order for VRE to continue satisfying the demand for commuter rail service. Under-investing in any one facet of the core network will create a capacity constraint that could render other elements of the system less than fully usable. For instance, new rail cars can only be operated if there is space to store them mid-day in Washington. They will be filled with passengers only to the extent that parking and other modes of station access can be expanded to accommodate additional commuters.

In addition to the parking, fleet and storage needs identified in Phase 1, VRE will need to invest in fleet maintenance facilities, because the existing facilities in Washington do not have sufficient capacity to continue to satisfy VRE's needs over the long term, as the size of the fleet grows and mandated fleet maintenance requirements increase.

At a minimum, to maintain its high levels of service quality and preserve or increase its share of the journey-to-work travel market in the corridors it serves, VRE must continue to invest in critical core facilities. These investments are the bedrock upon which the future growth and expansion of VRE service can be built. Promoting expansion without satisfying core needs would be counterproductive – an inefficient use of scarce resources, as well as potentially damaging to VRE's overall quality of service.

Core network projects will tend to be the most cost-effective investments for VRE to make. There also will be relatively little risk that investments in the core network made in the short term to support projected demand through 2010 will be rendered obsolete in the future either by changes in demand or improvements or expansion of other transportation modes and facilities in the corridors served by VRE.

Core network needs for VRE are summarized below for the following categories of investments:

- Existing suburban stations
- New Suburban Stations
- CBD Stations
- Rolling Stock
- Storage Yards and Maintenance Facilities
- Rail Infrastructure.

Existing Suburban Stations

Keeping up with the growth in demand for parking and access is the greatest challenge currently facing VRE at its 14 suburban stations. VRE has stepped up to this challenge by working in partnership with the local jurisdictions, as well as with station area landowners, to increase parking capacity in a way that is consistent with the character of local communities, is environmentally sound and supports station area development plans and opportunities.

For the foreseeable future, VRE's capital program will need to include projects to expand parking at existing VRE stations. As the readily available land fills up, these projects will become more difficult and expensive. An increasing percentage of VRE's station parking needs will need to be accommodated in parking structures, which typically cost about three times as much per space as surface parking. Where station area development is occurring or is possible, VRE should seek to partner with developers and the local jurisdictions to enable station-area transit oriented development (TOD), which can boost the size of VRE's travel market and create development value that can be tapped to help offset the construction cost of additional station parking. In addition, TOD facilitates and encourages the use of non-automobile modes of access to rail stations, such as walking or bicycling. Lorton is an example of where this approach has been implemented successfully. Rippon, Brooke and

Backlick Road are stations where joint development opportunities have been the subject of preliminary discussions. Future potential also exists at stations such as Woodbridge, Leeland Road,, , Manassas Park, , and Broad Run.

At all stations, alternatives to the single-occupant automobiles and the parking demand they generate, must be accommodated and encouraged where possible. These other modes may include walking, cycling, kiss-and-ride, buses and paratransit vans. Each of these modes, when present, needs to be accommodated in the design of a station and the access to it through the surrounding neighborhood. Since each transportation mode has specific circulation and operational requirements, individual modes must be carefully addressed in the station and parking lot design process. In all cases, station designs shall promote safety, minimize conflicts between modes, and ensure accessibility for persons with disabilities.

Parking is not the only capital need at stations, however. As VRE ridership grows, so will train lengths – even if VRE increases the number of trains operated. Based on the projected future demand, maximum train lengths (known as "consists") are expected to grow from six cars today to eight by 2010 and to as many as nine or ten in the 2015 to 2025 timeframe. This will require lengthening platforms and canopies at stations. Based on the Phase I Strategic Plan, the current capital program provides for this need on an ongoing annual basis.

As a new-start commuter rail system looking to minimize capital costs, VRE elected early on to build platforms and most of its parking lots on one side of the right-of-way. As ridership builds and the number of trains increases, this configuration will constrain capacity and limit the ability of VRE to meet its goals for reliability and maximize its market potential. Putting additional platforms on the opposite side of the tracks will be a costly proposition, however, since grade-separated pedestrian access from one side of the right-of-way to the other also will be required.

On the Fredericksburg Line, off-side platforms already exist or are planned at four of the eight stations. So, universal access to both main tracks can be achieved by adding platforms and building grade-separated pedestrian crossings at the remaining four stations: Lorton, Rippon, Brooke and Leeland Road. The estimated capital cost of the off-side platform projects at these stations is approximately $18 million. Completing these projects relatively soon in the capital program could be a cost-effective near-term option for increasing railroad capacity and improving service reliability. Additional mainline tracks will still be required over the long-term. Any future station improvement projects should allow for the future addition of a third mainline track wherever possible..

Compared to the costs of building new rail infrastructure, installing off-side station platforms can be a cost-effective solution. An ADA-compliant platform connected across the tracks by an overpass or underpass has an order of magnitude cost of between $2 and $5 million, depending upon local conditions. Building a mile of new track, or installing a new interlocking with universal crossovers to enable dispatchers to route trains to any available track, fall within the same general price range.

On the Manassas Line, only the Manassas station has a platform on both main tracks. For VRE to have access to both tracks along the entire line, platforms and grade-separated pedestrian access would need to be constructed at Backlick Road, Rolling Road, Burke Centre and Manassas Park. The estimated cost of the off-side platform projects at these stations is approximately $17 million or a little under $6 million each on average. This line has less freight traffic than the Fredericksburg Line, so the

decision to add the off-side platforms would be driven by VRE service objectives and the improved reliability of the operation in the event of a delay or blockage along the one track that currently has VRE platforms.

The ability of VRE's ridership forecasting model to forecast passenger boardings and parking demand at each individual station out to 2025 is limited. The available ridership estimation tools give a good picture of projected demand for the system as a whole and at the branch line level, but they become considerably less precise at the individual station level. Nevertheless, a look at growth trends and the range of future potential utilization at individual stations is appropriate as part of the overall strategic plan.

BY 2025, a total of 6,000 to 8,000 parking spaces will be needed on the Fredericksburg Line, and between 6,000 and 9,000 will be needed on the Manassas Line. Table 4.1.1 summarizes the range of anticipated future parking space requirements at each existing VRE station. A range of values is provided for two horizon years, 2010 and 2025. The range of projected demand covers the three strategic investment scenarios. In addition, parking demand will be affected by the timing and extent of parking expansion at adjacent stations, and the possible implementation of new stations or line extensions. The table also shows the existing inventory of parking at each station, and the capacity of each station's parking lot(s) once currently funded or otherwise committed projects have been completed.

Table 4.1.1
VRE System Station Parking Requirements Through 2025 – Existing Service Territory

	PARKING SUPPLY		PARKING DEMAND			
	2004 Spaces	Committed by 2010	Demand Low 2010	Demand High 2010	Demand Low 2025	Demand High 2025
FREDERICKSBURG LINE						
Existing Stations						
Fredericksburg	923	923	850	1,050	950	1,250
Leeland Rd.	652	652	600	850	800	1,100
Brooke	300	500	400	550	650	1,000
Quantico	258	258	240	300	260	400
Rippon	600	600	550	900	850	1,300
Woodbridge	588	738	850	1,020	1,250	1,550
Lorton	250	250	320	400	450	600
Franconia-Springfield	200	200	200	200	200	200
Fredericksburg Line Total	**3,771**	**4,121**	**4,010**	**5,270**	**5,410**	**7,400**
MANASSAS LINE						
Existing Stations						
Broad Run	696	696	600	1,000	800	1,150
Manassas	374	694	500	600	650	850
Manassas Pk	677	677	600	725	780	1,100
Burke Centre	543	1,043	750	880	950	1,460
Rolling Rd.	370	370	370	600	370	670
Backlick	200	200	175	230	250	370
Manassas Line Total	**2,860**	**3,680**	**2,995**	**4,035**	**3,800**	**5,600**
SYSTEM TOTAL	**6,631**	**7,801**	**7,005**	**9,305**	**9,210**	**13,000**

A brief review of each of the 14 existing suburban stations follows. For each station where VRE parking is provided, a graph is provided, comparing parking demand with the available or potential supply – for the current (2004) situation as well as projections for 2010 and 2025. Currently funded or planned parking projects are shown, along with the anticipated parking expansion potential at each location, which depends upon local site conditions and estimated 7property availability. The range of projected demand covers the three strategic investment scenarios. In addition, parking demand will be affected by the timing and extent of parking expansion at adjacent stations, and the possible implementation of new stations or line extensions.

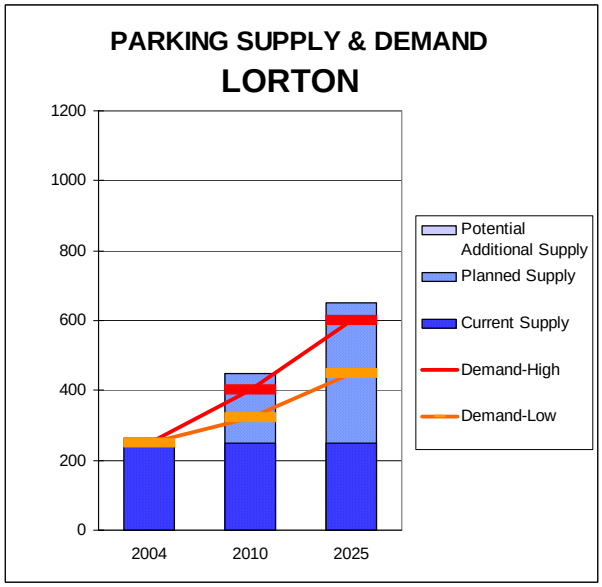
Fredericksburg Line

Franconia/Springfield

This is the terminal station of the Metrorail Blue Line. A large majority of the users of this station take Metro, which provides less expensive and more frequent transit service to the central business district. VRE provides a more convenient alternative for a relatively small number of passengers – mainly those going to the area of Washington, DC surrounding Union Station or transferring to MARC trains for trips to Maryland.

The existing station has two side platforms; both are accessible from Metrorail and the Metro parking garage and bus bays via an overhead concourse equipped with elevators and stairs. The east side platform is much more heavily used by VRE than the west side platform. Future plans call for a three-track configuration of the railroad at this location. In the current state of plans, the platform adjoining number 2 track becomes a center platform serving tracks number 1 and 2 and VRE would have access to all three tracks.

Lorton



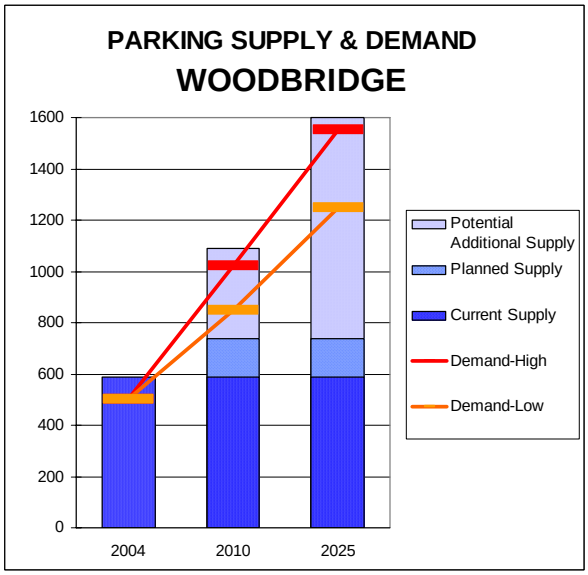
Lorton is a success story as a commuter rail station for transit-oriented development. It has been identified as a model that can be applied to other stations to develop and market land in a way that encourages use of VRE, creates value for land developers, reduces public capital investment requirements by having developers share in the costs of building and expanding station facilities, and helps implement County land use plans that emphasize smart growth and efficient development.

This station was part of the original VRE system plan but was implemented later so as to coordinate with extensive residential development of large tracts of land surrounding the station site. The station platform and facilities were constructed by VRE, and the construction and expansion over time of the station parking has been the responsibility of the developer of the adjoining residential community. The parking lot has been expanded once and now holds 250 cars. The developer is committed to building additional parking at the station as additional residential units are completed. A village center with retail and community facilities is being developed immediately adjacent to the station. The development plan has concentrated the densest residential concentrations closest to the rail station to maximize the potential for pedestrian access, and the developer has indicated that the convenient VRE access to Washington, DC, Crystal City and Alexandria has been a strong selling point for potential home buyers.

Although the development closest to the station has not been built yet, survey numbers indicate that eight percent of the riders access this station by walking, as opposed to three percent who walk system-wide. This supports the idea that transit-oriented development will work at other existing and new stations along the system, when it is

compatible with local comprehensive plans. 400 spaces exist today at Lorton. Can you give a range for the projected # of spaces needed under each scenario that corresponds with the chart?

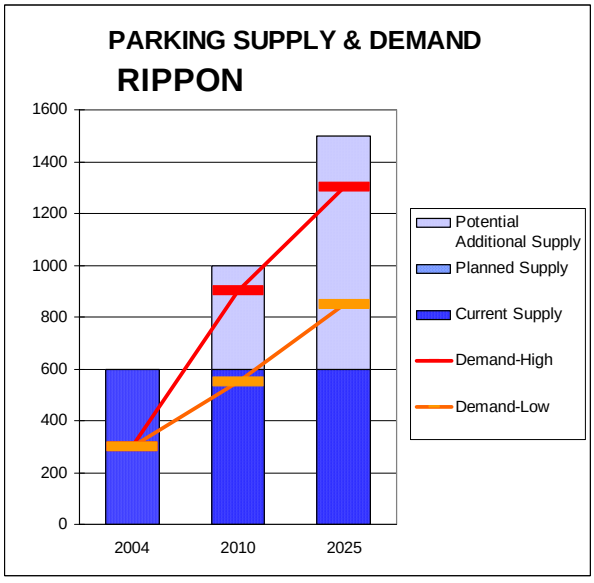
Woodbridge



The station at Woodbridge has VRE's sole existing parking garage and the most elaborate new station building. It is VRE's third busiest suburban station (after Fredericksburg and Broad Run). Woodbridge draws customers from a wide geographic area, because of its excellent regional highway access. It is the VRE station on the Fredericksburg Line located closest to both US Route 1 and Interstate 95. VDOT has plans to make access to Woodbridge station even better, by extending Route 123 across Route 1 and the railroad via a new bridge, with more direct access to the station parking lots. In addition, a second passenger platform will be added on the west side of the 2-track right-of-way.

At Woodbridge, a 150-space surface parking lot is being developed adjacent to the existing parking garage, scheduled for completion in 2004. This will provide an interim solution for the lack of parking at Woodbridge, but demand is expected to outstrip the capacity of this lot within a few years. Plans call for further parking expansion at this station by constructing a 500-space parking structure similar to and adjacent to the existing garage. With the second garage in place, the inventory of parking spaces at Woodbridge will be between 1,100 and 1,200 spaces.

Rippon



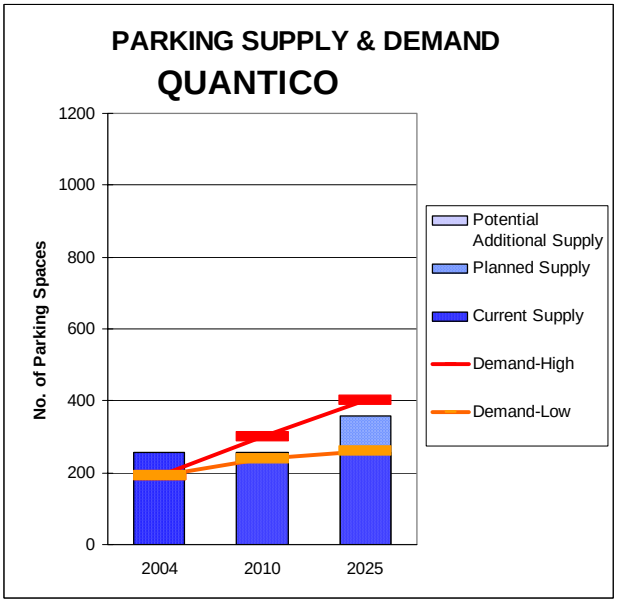
This station has seen explosive growth over the past couple of years. When the developer of the land adjacent to station opened up a direct access road to the station in the summer of 2002, the driving route into the station became much less circuitous, and the 300-space surface parking lot quickly filled to capacity. A direct roadway now runs from the station site to Route 1 and an interchange with I-95. The developer of the adjacent homes and townhouses agreed to lease VRE a new temporary 320-space surface lot adjacent to the existing lot, which opened in March 2004.. Over the long term, however, construction of a parking garage will be warranted at this location, despite its unstable soil conditions and relatively high cost of construction.

There is strong potential for transit-oriented development at Rippon, with the developer of adjacent residential properties expressing interest in creating higher-density

residential development within walking distance of the VRE station and helping to increase the inventory of commuter parking at the station.

Rippon has been identified in past studies as a potential location at which to turn back inner zone VRE trains, at such time as demand warrants and capacity investment enables the operation of zone express service on the Fredericksburg Line. As at Franconia-Springfield, a third mainline track would be added outboard of the existing platform track, with the existing side platform converted to an island platform. A second side platform on the most westerly track (Track 3) would be added to give VRE universal access to all three tracks. VRE trains would stop and change direction using the center track, enabling through traffic to use the outer tracks in either direction while the train is laying up at the station.

Quantico



Quantico is one of the few former stations of the RF&P Railroad that VRE currently uses. The station is located within the town of Quantico, which is totally surrounded by the Marine Corps base. The only external vehicular access to both the town and station is through one of the base's checkpoints, which can result in driving delays during periods of high alert making the drive from the surrounding areas to the station more unpredictable than would otherwise be the case. A significant share of the VRE passengers who live off-base but in the vicinity of Quantico actually use the stations either upstream or downstream (Brooke and Rippon), because of easier and more predictable highway access. On the other hand, a limited number of Amtrak regional trains stop at Quantico each day, offering an "express" service to Washington for VRE monthly and weekly ticket holders.

VRE's plans call for rehabilitation of the existing historic station building. No significant increase in the station's limited parking capacity is contemplated, however. The station has platforms on both main tracks, but virtually all VRE trains use only the east side platform and track.

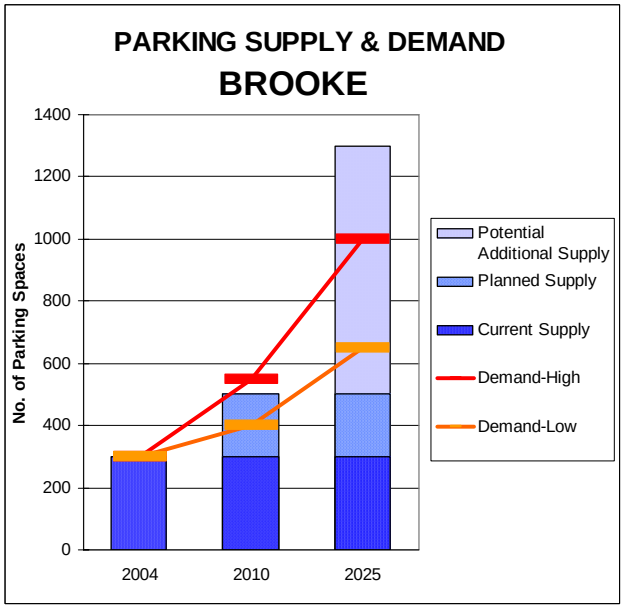
Brooke

Situated to the east of Stafford, near the Potomac River, Brooke Station is located within a small hamlet, in an area that is zoned primarily for low-density residential use. Over the years, it has had a reputation as a sleepy, out-of-the-way station, but over the past year its 300-space parking lot has become 100 percent full.

Access to the station from I-95 and Route 1 is relatively direct, but the station is over three miles from Route 1. Part of the access is via an improved arterial roadway. The remainder is via relatively narrow two-lane rural roads. Even so, VRE riders drive to this station from a wide area of the region, including many riders who live in Aquia Harbour, Garrisonville and other communities along and to the west of US 1 and I-95.

Stafford County has indicated that it is planning to eventually extend the improved arterial roadway to the railroad, extend water and sewer service and develop a neighborhood village center at Brooke. This opens up the potential for even better highway access to the VRE station and offers the future possibility of higher-density transit-oriented development in the immediate station vicinity. The commuter rail station can become the focal point of the village center development.

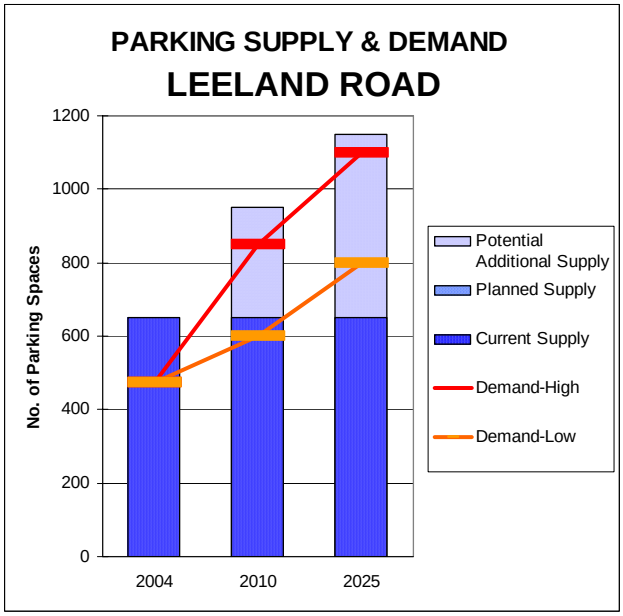
However, this kind of development is not imminent, and the parking capacity at Brooke should be expanded immediately. Several parcels of land adjacent to the station are potentially available for expansion of station parking and also could be part of a future village center and transit-oriented development plan.



Leeland Road

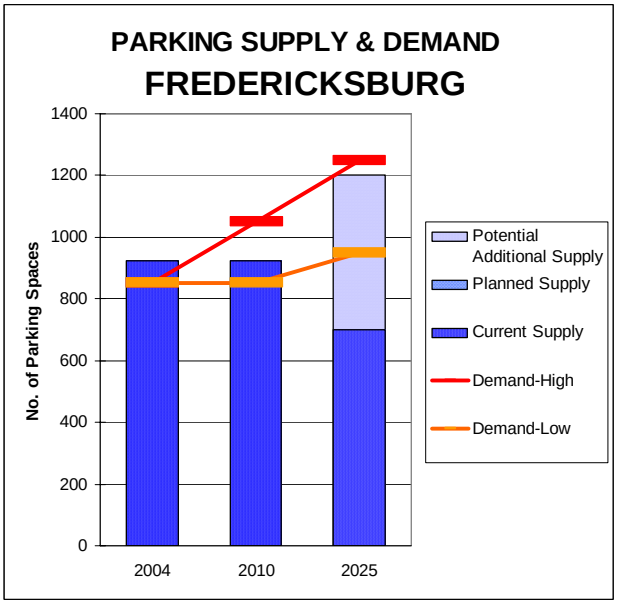
Leeland Road is the other VRE station within Stafford County. Situated closer to Fredericksburg, the area around the station has seen more intense residential development than the area around Brooke. The station draws riders from the increasingly built-up northern edges of Fredericksburg and is the easiest VRE station to reach for commuters from King George County to the east.

The original surface parking lot has been expanded once, and its current capacity of 650 spaces is sufficient to handle the demand. However, over the next decade, the current parking lot will reach capacity and additional expansion will be required.



Fredericksburg

Fredericksburg Station, like Quantico, is an original station on the RF&P Railroad and is situated at one end of Fredericksburg's historic downtown. The railroad is elevated as it crosses the Rappahannock River and passes through town, and there are two side platforms with stair and elevator access to street level. The historic station building is now a restaurant. Parking is scattered among several urban sites in the station vicinity, with the newest lots located several city blocks from the station. The total inventory of available parking space is just shy of 1,000 spaces, including parking lots leased by VRE on a short-term basis. The parking at Fredericksburg is heavily utilized.

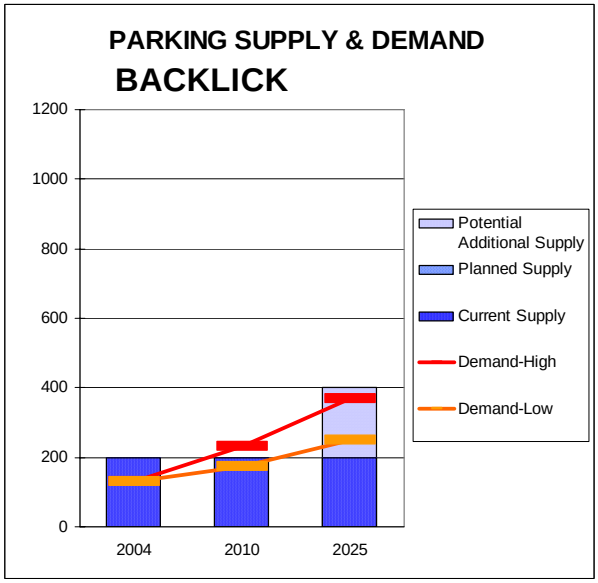


Many riders using Fredericksburg Station live in Spotsylvania County, with lesser numbers coming from Caroline County and King George County as well. Future parking demand at Fredericksburg is uncertain and depends upon whether or not a new VRE station is built in Spotsylvania County. Such a station has been discussed between VRE and Spotsylvania County officials, and the most likely site for such a station has been identified in consultation with the property owner, but a decision about whether to build this station, and if so, when, has not yet been made. This potential project is discussed in greater detail in the "Potential Network Expansion" section of this report.

If a new Spotsylvania station is built, the existing parking at Fredericksburg will be sufficient over the long term. If the Spotsylvania station is not built or its implementation is deferred for an extended period of time, then parking demand at Fredericksburg will rise above the current supply. In that case, either a parking structure would have to be constructed near the train station in Fredericksburg.

Manassas Line

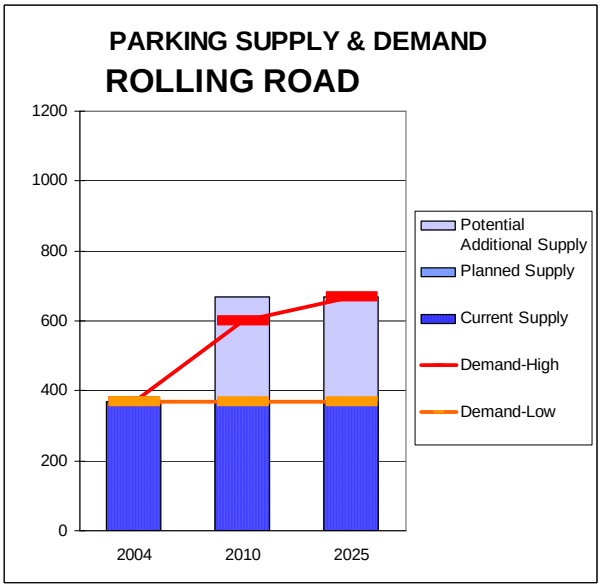
Backlick Road



Backlick Road is the VRE origination station situated closest to the Washington Beltway and the central business district. It is situated in the part of VRE's service territory where a high share of commuters from the surrounding area work within the central business districts served by VRE, but only a very small share of those trips currently use VRE, because automobile drive times are relatively short and both Metro rail and bus routes offer other public transportation choices for these commuters. A relatively small swing in the VRE share percentage – driven either by traffic congestion or changes in rail service – can have a significant effect on ridership over time.

The existing 200-space parking lot is about two-thirds full. By 2015, the high end ridership forecast shows current parking capacity being filled and expansion being required. There is a potential development project for the immediate station vicinity that offers the possibility for transit-oriented development and could offer the possibility for future parking expansion, perhaps through construction of a parking deck above a portion of the existing surface lot. There is also a possibility for joint development at this location. Alternative modes of access to this station should also be considered, as the zoning around the station makes parking expansion difficult.

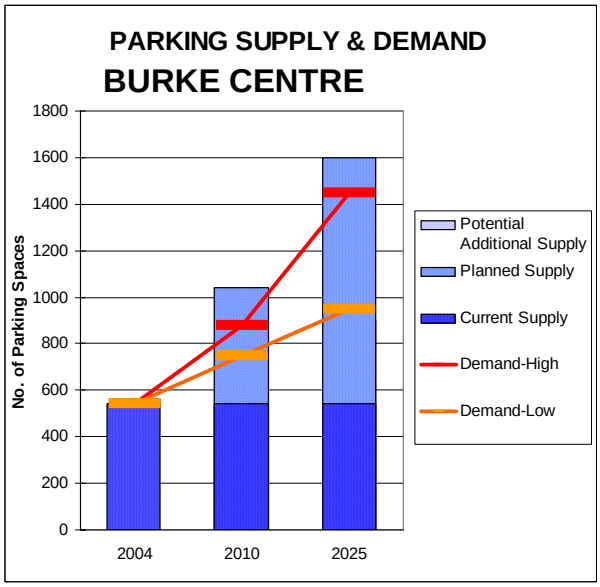
Rolling Road



The Rolling Road station sits amidst an established residential area. Its 370-space surface parking lot is filled to capacity on a daily basis. Fairfax County has commissioned a study to explore alternatives for expanding parking at the Burke Centre and Rolling Road stations on the Manassas Line. This study has concluded that Rolling Road is a difficult location at which to expand parking, given the proximity of residential areas, and local concerns that a parking structure would be incompatible with the surrounding neighborhood.

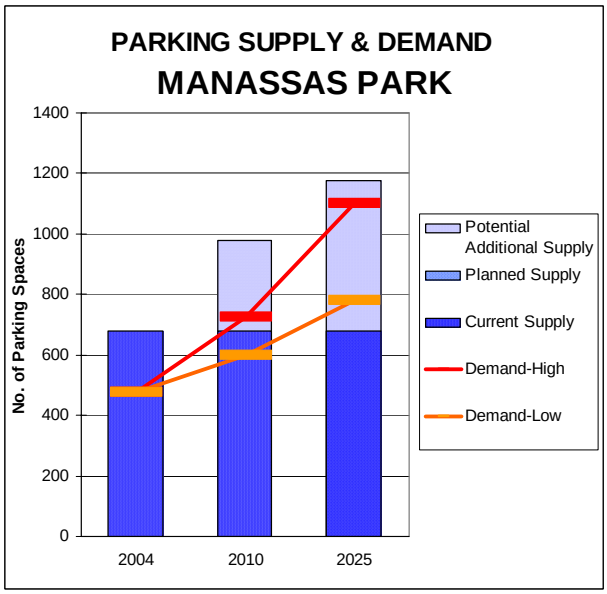
Burke Centre

Burke Centre Station is located in the middle of a relatively densely-developed residential community with a significant volume of commuters to the central business district. The 543-space existing parking lot fills to capacity well before the end of the morning peak. The Fairfax County parking study determined that construction of a parking garage at Burke Centre is feasible and could yield a total of approximately 1,600 parking spaces at the station, which is estimated to be sufficient to meet projected long-range needs. Fairfax County is currently operating a neighborhood feeder bus network that is coordinated with VRE's schedules and offers alternatives to the drive-and-park mode.

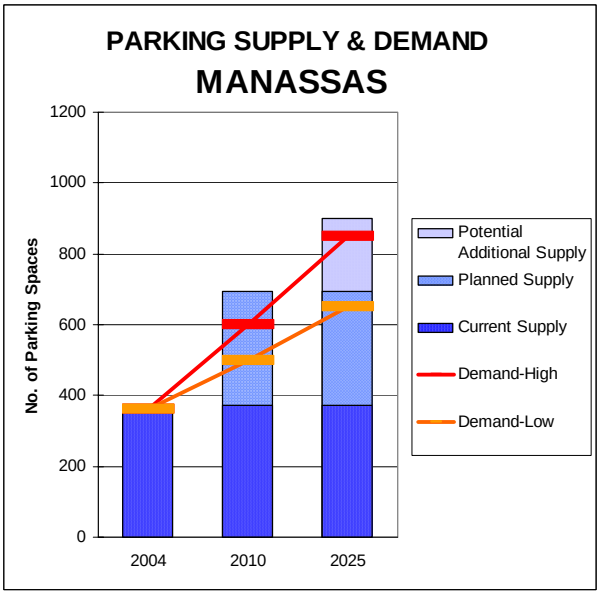


Manassas Park

VRE customers drive from a relatively wide area to reach Manassas Park, which contrasts with the relatively compact catchment areas for Burke Centre and Rolling Road. The surface parking lot at Manassas Park was recently doubled in size to approximately 680 spaces, and the platform has been extended to provide a direct pedestrian connection to the new parking lot, which already is more than a third full on most days. Based on projected residential development and population growth in the area, demand for parking is expected to exceed the capacity of the current facility by 2015. No plans to expand parking further at the station have been proposed at this time. Opportunities for additional surface parking contiguous to the existing lot are limited based on site topography and local development plans. A parking deck could be considered in the future, or additional surface parking could be contemplated on the north side of the tracks at such time as the station is expanded to provide platforms on both main tracks.



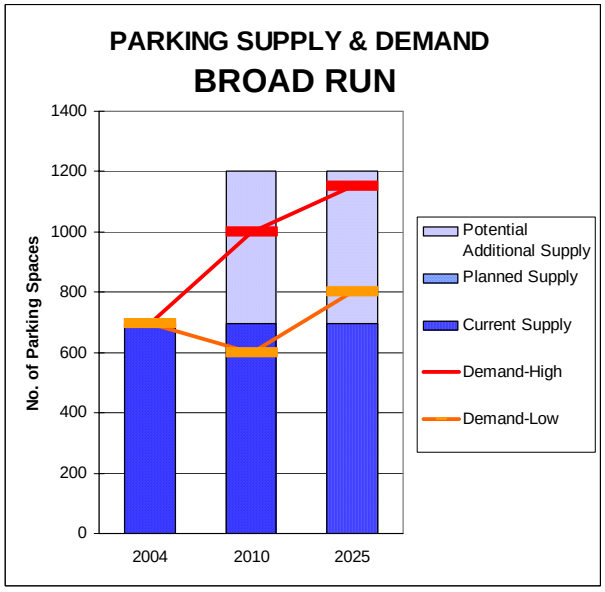
Manassas



The existing station sits in the heart of the downtown area of the City of Manassas. It includes an historic station building and is the only station on this line with platforms on both main tracks. The platforms are sandwiched in between multiple street grade crossings. Pedestrians looking to cross the tracks do so at one of the grade crossings. Commuter parking is fragmented among several lots.

At Manassas, the city has selected a site for a new parking structure, which is currently under design and which will add approximately 300 spaces, immediately adjacent to the station. There are no current plans for additional parking expansion. The existing station at Broad Run and potential new stations such as Sudley Manor and Gainesville on the proposed line to Haymarket (as described in a subsequent section of this report) could provide some relief of parking demand at both Manassas and Manassas Park.

Broad Run/Airport



Broad Run is VRE's second most heavily-used suburban station. The surface parking lot was recently doubled in size from 300 to 600 spaces, and the larger lot is now completely full. Broad Run is the VRE station closest to the rapidly developing residential corridor along Linton Hall Road in Prince William County. The newly-opened Route 234 Bypass provides relatively fast regional highway access to the area from the north and south, and there are a significant and growing number of VRE commuters who come from Fauquier County and drive to the station at Broad Run. The VRE origin scatter diagram (Map 2) shows the relatively wide area served by this station.

Parking expansion projects are underway and will add up to 250 spaces. Over the longer-term, however, the ridership demand at Broad Run will be a function of VRE's plans for extending service. An extension of VRE either in the direction of Gainesville and Haymarket or into Fauquier County would divert riders from Broad Run, negating the need for a larger parking lot. In that case, the existing parking lot would have sufficient capacity to accommodate projected demand through 2025.

New Suburban Stations

New commuter rail stations will also help relieve parking constraints at nearby adjacent stations where expansion of parking is not possible or very expensive. New stations also should be considered where they can generate new ridership or satisfy markets that are not well served by existing stations. One potential station, Cherry Hill, meets these criteria and is described below.

However, new stations should not be built indiscriminately. They add to the running time for passengers who board "upstream" of the new station – making the railroad marginally less time-competitive relative to other transportation modes in the same corridor. Adding station stops also decreases the average speed of commuter trains relative to other non-stop trains that also are operating on the rail network, such as Amtrak regional trains or high-priority intermodal freight trains. Wider discrepancies in average speeds make it more difficult for train dispatchers to operate mixed traffic on a busy main line. Consequently, the owners of the rail lines (CSX and NS) generally do not favor the introduction of new commuter stations on their main lines without also simultaneously addressing line capacity needs.

The advantages of building a new intermediate station generally outweigh the disadvantages when the station will allow commuter rail to grow the business by at least 200 or 300 morning boardings, can be constructed with less capital expense than modifications to existing stations and parking facilities, and where there is either significant transit-oriented development potential or regional highway access that is superior to existing stations – provided that sufficient rolling stock is able to be obtained to accommodate the projected growth in ridership.

Cherry Hill

Cherry Hill is located in Prince William County, on the Fredericksburg Line between Rippon and Quantico, on a broad peninsula of land between Powells Creek and Quantico Creek, to the east of Dumfries. The Cherry Hill area has relatively low densities compared to nearby areas, but there are plans for extensive development, including several thousand new residential dwelling units, and a proffer agreement for a new VRE station with surface parking. A station at this location, in addition to serving the immediate neighborhood, would help relieve the heavy demand for parking at Rippon and offer convenient access to VRE from the Dumfries area along U.S. Route 1.

The station site and parking would sit on a bluff overlooking the rail line. To reach the track most commonly used by VRE trains, a bridge across the right of way would need to be built, with a stair and elevator down to the platform, similar to what exists today at Rippon. The station also includes provision for the construction of a second platform on the west side main track, with a ramp or second elevator, to increase the railroad's operating flexibility and enable future bi-directional VRE operations.

Based on the MWCOG travel data, Cherry Hill would serve a base number of 300 to 400 morning boardings. When the potential for transit-oriented development and VRE induced demand effects are taken into consideration, ridership by 2025 in the range of 400 to 800 boardings is possible. Initial parking of 200 to 300 spaces will be sufficient for the short term, allowing for potential future expansion to a 600 space lot.

The estimated cost to construct this station is in the $6.5 to $9.5 million range, depending upon the extent of parking provided and including the construction of two platforms, a pedestrian bridge and associated facilities.

Other Potential New Stations

Other potential new stations were considered but are not recommended in the Strategic Plan for near term action, primarily because: (1) they do not appear to be able to generate sufficient incremental VRE ridership demand to offset their implementation cost and the impact of adding a stop on journey times for riders from "upstream" stations, or (2) local impacts and issues associated with new station development have not yet been fully articulated and analyzed. In all cases, planning for new commuter rail stations must be a cooperative partnership among local municipalities, affected communities, and the VRE.

CBD Stations

VRE's "downtown" stations include the four stations where a high majority of its riders disembark in the morning and board their trains in the evening: Washington Union Station, L'Enfant, Crystal City and Alexandria. As with the rest of the system, these stations were designed originally to handle a passenger load less than VRE carries today. As VRE ridership grows, these stations will no longer be able to provide VRE passengers with an acceptable quality of service, unless investment is made to upgrade them and increase their capacity. In addition, improvements at these locations would be required if VRE and MARC decide to pursue run-through service. Improvements at all four stations should be made by 2010 to facilitate overall ridership growth. The projects described below are incremental in the current capital program and are assumed in the strategic plan to be implemented in the first six-year phase of capital investments.

Washington Union Station

Union Station serves MARC and Amtrak in addition to VRE and has a total of 20 usable platform tracks, 14 on the upper level and six on the lower level. Only the lower level tracks are accessible to VRE trains going to and from northern Virginia. VRE now generally uses a single island platform on the lower level of Union Station. In the morning, VRE trains discharge their passengers and then proceed to the Coach Yard for storage during the mid-day (except for the two Manassas Line trains that turn at the platform and return to Virginia for second trips and then end up eventually at the Coach Yard). The Fredericksburg and Manassas Line trains are spaced sufficiently apart so that it is rare for two VRE trains to be occupying a platform track simultaneously. This will change as VRE ridership grows and VRE adds new peak trains and shortens its peak headways.

To accommodate future growth, commuter rail services may require as many as two island platforms and four station tracks on the lower level during the morning and evening peak periods. This would allow for both peak direction and reverse-peak trains – with reverse-peak service provided either by VRE trains turning at the platform at Union Station or by MARC trains running through to Virginia. Amtrak also uses the

lower level platforms for its regional and long distance services that run through Washington, as well as for some Northeast Corridor trains that originate or terminate in Washington. And, Amtrak uses those tracks in the station area for changing between electric and diesel locomotives on some of its through trains – a maneuver that requires the use of multiple tracks and a station dwell time of 20 minutes or more.

The limited capacity of the lower level will need to be preserved and allocated carefully in the future to accommodate planned increases in VRE, MARC and intercity passenger services. Capital investment in both station facilities and rail infrastructure can help stretch the capacity of the lower level to its maximum. Adding new platform tracks to the lower level probably is not possible given the existing physical constraints.

The air rights above the platform area at Union Station were recently sold to a developer who is looking to construct a large office development atop the station on a new deck structure one level above the track/platform level. The project, called Burnham Place, will result in 8,500 to 10,000 additional workers at the site. The project intends to reconstruct and greatly improve the passenger concourse above the lower level platforms used by VRE, to provide better passenger loading, improved connectivity between the various modes at Union Station, centralized ticketing, and enhanced security. The project will include new elevators, escalators and stairs to the platforms, including the platforms on the station's lower level used by VRE.

The Burnham Place project will provide good pedestrian connections to the north of Union Station, which is a district slated for extensive new commercial development in the near future. Ideally, this project also will be able to make more convenient the pedestrian access between the lower level concourse and the Metro Red Line station, a need that must be met for MARC run-through service to proceed. VRE will need to participate actively in the development and monitoring of this project to ensure that it satisfies VRE's requirements. Because the design has not yet been finalized, the VRE Strategic Plan cost projections include $5 million in the near term for additional VRE station improvements at Union Station (in 2003 dollars), which could cover ticket vending equipment and passenger circulation facilities not provided by the Burnham Place project. The plan also includes a longer-term project line item for future capacity-related needs at an estimated $10 million. Although specific needs and solutions are as yet undefined, and depend in part on factors beyond VRE's control, it is appropriate for VRE to anticipate ongoing investment in facilities at Washington Terminal over the life of the strategic plan.

The Burnham Place improvements will force the issue of platform height on the lower level of Union Station, because the project will likely construct new platform escalators and elevators. The lower level currently has exclusively low platforms, with the upper level having a mix of high and low platforms. Amtrak long distance intercity trains will most likely continue to use low platforms. Amtrak regional trains could use either low or high platforms, but passengers would be better served by high platforms. Future high-speed intercity trains to Virginia and North Carolina will likely use high-level platforms at Washington Union Station. Any MARC trains using the lower level (including any future run-through trains) will require high platforms – to facilitate efficient boarding and alighting of relatively high volumes of peak passengers while keeping dwell times reasonably short. VRE at present is exclusively a low platform railroad. The Mafersa and Kawasaki coaches can platform at either height, but the Gallery and Sounder cars can only serve a low platform. With VRE likely to remain a low platform railroad, at least in the short term, the Union Station lower level should be

configured to permit low platform boarding for VRE and also to accommodate a possible increase in high-level boarding in the longer-term future.

L'Enfant Station

This is VRE's busiest station, situated on the south side of the Washington, DC business district, and used by almost 40 percent of VRE's customers. Within walking distance of the station is a large office district, where several Federal agencies are headquartered. The VRE station also is a one-block walk from the L'Enfant Plaza Metrorail station, one of the Metrorail's three major downtown transfer stations, with access to four of the five Metrorail lines. The downtown Washington office district is relatively easily accessible from L'Enfant via a transfer to the Metrorail. The majority of VRE riders at L'Enfant transfer to and from the subway. Employment in downtown Washington is projected to continue to grow, while the area in the immediate vicinity of L'Enfant Station is almost fully built-out. So, the subway transfer will become increasingly important and serve a higher percentage of VRE riders in the future.

Improvements to the station in the near term are necessary to accommodate the growing passenger volumes at this station. The railroad in the vicinity of the VRE L'Enfant Station currently is configured with two main tracks – with a side platform for VRE passengers on the northernmost track. The railroad right-of-way, which varies from 4 to 5 tracks wide in this area, can include an enlarged station that incorporates the following elements:

- Center island platform serving two tracks, enabling trains operating in both directions to stop at the station
- Primary street access at Sixth Street, with a secondary access point at Seventh Street
- Improved passenger connections to and from the Metrorail station at L'Enfant Plaza, including:
    - A below-ground passageway beneath Sixth Street providing a direct, weather-protected transfer path between the VRE station and the mezzanine level of the L'Enfant Plaza Metrorail station.
    - Provision for escalators and elevators to facilitate passenger access and meet the standards of the Americans with Disabilities Act (ADA)
    - Sufficient pedestrian circulation capacity to simultaneously handle two full trainloads of passengers

A conceptual design study for the L'Enfant station improvement has been completed and a draft report issued in November, 2001. The island platform would have an average width of 33 ft. (widening to 43 ft. in the center and tapering at the ends to accommodate the alignments of the adjacent tracks). The platform would be 900 feet long, capable of platforming 10-car trains.

The Strategic Plan cost estimates include $60 million for the station (and the underground connection to Metrorail. An additional $30 million allowance for possible additional waiting room and headhouse facilities also is included. These additional

facilities would provide retail concessions and amenities for VRE passengers that area appropriate and typical for a major downtown commuter rail terminal.

Crystal City Station

Crystal City is VRE's second busiest station, serving a large office employment center and also offering a transfer to Metrorail (via a two-block walk) for trips to the Pentagon, Rosslyn, Falls Church and the western edge of downtown Washington.

Crystal City Station currently has a single side platform and is located in a two-track stretch of railroad as it approaches the Potomac River crossing. Future plans call for installation of a third track in the near term and eventually a fourth track – to help separate passenger and freight train movements in the area. There are two primary reasons for VRE to consider enlargement, re-construction or even relocation of the Crystal City station:

1. To provide an island platform accessible from two passenger tracks
2. To provide better pedestrian and local transit connections for VRE passengers.

An island platform station can be constructed without negatively affecting freight capacity once the third track project is built. An island platform will permit passenger trains operating in either direction to stop at the station, which is a requirement for northern Virginia reverse-commute service or for effective Maryland run-through service.

The VRE Crystal City station could be kept at its existing location or moved to a nearby site that perhaps:

- better serves the adjoining office employment districts (existing Crystal City and the proposed new development at Potomac Yard)
- improves connections to pedestrian pathways
- offers convenient transfers between VRE and the proposed Route 1 corridor light rail line and other local transit services
- provides improved pedestrian or connecting transit access to Reagan National Airport.

The project is not currently funded, and the long-term station location and configuration remain to be determined. Wherever the new station is built, a grade-separated pedestrian crossing (either bridge or tunnel) with elevators will be required.

VRE's SAFTEA authorization request includes approximately $14 million for platform and circulation improvements at Crystal City. The Strategic Plan cost estimates include an allowance for a total of $50 million, which would cover development of a new station at a different location, with pedestrian connections to adjacent development and links to feeder transit services. Though not an urgent need for VRE, rebuilding the Crystal City station is an important part of the overall plan to increase the railroad's share of work trips from the VRE service are to the central business district.

Alexandria Station

Alexandria is becoming an increasingly important destination station for VRE. In the year 2000, about 8 percent of VRE's peak period riders detrained at Alexandria. That

percentage will increase as extensive new local office development projects are completed, such as the US Patent Office complex.

VRE's station facilities are on the westerly side of the railroad right-of-way. The vast majority of workplace destinations, as well as the Old Town Alexandria cultural district, are located to the east of the station. Most VRE passengers have to walk to the King Street sidewalk and use the street/sidewalk underpass beneath the railroad to reach their desired destinations.

To minimize walking distances to adjacent employment and improve the transfer between VRE and Metrorail, the Strategic Plan recommends a capital project to construct a new pedestrian connection – directly linking the VRE and Metrorail stations and shortening the walk route to the developed areas of Alexandria.

A stair, escalator and elevator would descend from each of the two rail station platforms to a underground concourse that would tie directly into the southern portion of the Metrorail station mezzanine, within the free zone. From this point, there would be direct access up to the Metrorail platform or out to the bus bays and street. A minimum of two to three minutes of time would be saved by passengers transferring between VRE and Metro or walking to points east of the station. The elevator access and weather-protected walking path would offer a much more convenient transfer to Metro – for VRE passengers heading either to destinations along the Metro Blue or Yellow lines or air passengers heading to Reagan National Airport.

The east side platform also would need to be lengthened as needed to accommodate full-length VRE trains. The main platform on the west side has ample existing length.

Concept plans and design studies have not yet been prepared for these improvements, but a capital cost allowance of $10 million (in 2003 dollars) has been assumed in the Strategic Plan.

Rolling stock

The pressure of increasing ridership demand is being felt not only at VRE's station parking lots, but on their rolling stock fleet as well. Standees on peak trains are a routine occurrence. Over the past year, VRE ridership growth at the suburban stations closest to Washington has tapered, at least in part in response to the fact that seats on board peak period trains are increasingly hard to come by. VRE's ability to add service in response to this demand is constrained by the CSX operating agreement and the Memorandum of Understanding among CSX, VRE and the Commonwealth of Virginia, which allow for incremental increases in VRE service linked to the completion of certain infrastructure projects. Another constraint is the available train storage capacity for VRE in Washington Terminal, which has been stretched to its limit. Until these constraints are lifted, VRE service will be limited to 11 trainsets, 32 daily trains, and the mid-day storage of 69 pieces of equipment (58 coaches and 11 locomotives) at the Ivy City Coach Yard in Washington Terminal.

VRE's response to this constraint has been to transition to a higher-capacity fleet of coaches, substituting recently-acquired bi-level cars for the original single-level, lower capacity Mafersa coaches. Given the long lead time for new coach procurement, VRE has taken advantage of opportunities to acquire surplus existing equipment from other properties, including the Seattle Sounder and Chicago Metra systems. As a result, the VRE coach fleet currently comprises four different types of coaches, with different

seating arrangements and capacities, door configurations and operational and maintenance characteristics.

VRE recognizes that the current situation, while expedient in the short term, is not optimal with respect to either customer service or long-term operations and maintenance costs. The VRE Strategic Plan, therefore, identifies a rational fleet procurement strategy that ultimately will provide a standardized fleet of modern, high-capacity bi-level coaches for the VRE system, with seating capacity sufficient to accommodate projected ridership growth.

VRE's existing locomotives are under-powered for the heavy, long bi-level trains that VRE intends to operate. They also are in need of a substantial overhaul, they do not meet current air quality standards, and there are not enough of them to operate the full VRE service into the future. As a result, the Strategic Plan calls for replacement of the diesel locomotive fleet with standardized, modern, high-horsepower units that comply with Tier II air quality standards.

To the extent that funding can be obtained for a large, near-term coach procurement and replacement of the existing diesel locomotives, the transition to a standardized VRE fleet can be substantially in place by 2010, at costs that are expected to be extremely competitive.

Coaches

The current VRE fleet, as the table below indicates, comprises four types of coaches – three different bi-level configurations (the Kawasaki cars, Pullman Gallery cars and the Sounder cars), plus the original fleet of Mafersa single-level coaches.

Table 4.4.1
VRE Passenger Coach Fleet

No.	Manufacturer	Type	Seats	Single/ Bi-Level	Boarding Level	Remarks
10	Mafersa	Cab Car	100	Single	High/Low	
28	Mafersa	Trailer Coach	109	Single	High/Low	To be sold, 2004
4	Kawasaki	Cab Car	135	Bi-Level	High/Low	
9	Kawasaki	Trailer Coach	144	Bi-Level	High/Low	
15	Pullman	Trailer Coach	157	Bi-Level Gallery	Low only	FIRST AND SECOND ORDER Delivery completed in 2003
28	Pullman	Trailer Coach	157	Bi-Level Gallery	Low only	THIRD ORDER Delivery to be completed in 2004
2	Pullman	Cab Car	153	Bi-Level Gallery	Low only	
4	Bombardier	Cab Car	134	Bi-level	Low only	Sounder lease – to be terminated by end of CY 2007
14	Bombardier	Trailer Coach	144	Bi-level	Low only	

The shaded area indicates coaches that are being leased from the Seattle Sounder commuter rail system on a short-term basis. This equipment is expected to be returned to Seattle once replacement Gallery equipment has been received and placed in service.

In response to continuing growth in ridership demand beyond the capacity of the fleet that was in place in the late 1990s, VRE has expanded its fleet of coaches and is now running longer trains than at any time in its history. Because of the scarcity of train storage capacity at VRE's yard facilities and the cost of lengthening station platforms, all recently-acquired coach equipment has been in a bi-level configuration, with higher seating capacities than the original Mafersa single-level cars.

Funding constraints, coupled with the long lead time required for procuring new rail cars, have led VRE to the short term lease of surplus rail equipment from the Seattle Sounder system (three train sets comprising 18 Bombardier bi-level cars) and purchase and rehabilitation of a total of 45 Gallery coaches from the Metra commuter rail system in Chicago. Were all of this equipment to be available on the VRE property simultaneously, the fleet would comprise a total of 114 coaches, 76 of them bi-levels, with a total seating capacity of approximately 15,500. However, as the Gallery cars are rehabbed and received, the lower-capacity Mafersa cars will be sold (later in 2004, with some of the cab cars retained until 2006-2007), and the three Sounder trainsets will be returned to Seattle (by the end of 2007 at the latest). The VRE coach fleet in 2007, therefore, is expected to comprise 69 vehicles – the 13 Kawasaki bi-levels, 45 Gallery cars, plus 11 new cab cars needed to replace the Mafersa cab cars. This all-bi-level fleet will have more seating capacity than the current mixed fleet of 74 vehicles operated by VRE in 2003, although the limited train storage capacity at Washington Terminal and the need to hold some equipment in reserve for maintenance and repair limit the number of cars and seats that VRE can operate on any given day.

Short Term Fleet Program

VRE initially acquired 15 Gallery cars from Metra's Chicago service between 2001 and 2003 and within the past two years has purchased 35 additional Gallery cars from Metra, which as of the writing of this report are in the process of being overhauled, both mechanically and cosmetically, and introduced into VRE service. Thirty of these cars will be used in revenue service with five cars held as a "ready reserve" – bringing the total number of usable Gallery cars to 45.

The 45 Gallery coaches currently being acquired by VRE have a limited life span and represent only a temporary, stop-gap solution to VRE's seating capacity problem. The 15 original Gallery coaches are projected to be serviceable only through 2009. The 30 units acquired more recently are of a slightly newer vintage, and some are projected to last through 2015.

The Mafersa coaches, manufactured in 1992, are in generally good mechanical condition but have reached the point in their life cycle where a mid-life overhaul is due. Given the steady increase in peak ridership and the lack of mid-day train storage space at Washington Terminal, the Mafersas are significantly less efficient than the bi-levels, because their seating capacity is 25 to 30 percent lower than any of the bi-level coach configurations. Consequently, VRE was faced with two fundamental options with respect to the Mafersas:

- Retain them and put them through an overhaul program, or
- Dispose of them (e.g., sell them to another commuter rail property) and accelerate the transition to an all bi-level fleet.

VRE elected to pursue the latter option and has agreed to the sale of all 38 Mafersa units to the Connecticut Department of Transportation. As part of this agreement, VRE will retain the use of seven of the Mafersa cab cars through 2006. As a consequence of the sale, VRE will obtain funds that can be used to make needed short-term capital improvements, as well as to establish a reserve fund that was recommended in the last audit. VRE also will be able to avoid incurring the overhaul costs for the Mafersa fleet.

Strong ridership growth, the pending sale of the Mafersas, and the relatively short expected life span of the Gallery cars reinforce the need for VRE to proceed immediately with the procurement of new high-capacity bi-level coaches. The procurement process for new commuter rail coaches typically requires three to four years from the initial purchase decision to delivery and commissioning of the initial units. VRE's intent is to expedite the procurement process so that approximately 50 new coaches will start to be delivered in 2007. VRE expects to be able to obtain a competitive price for this equipment, based on coach production capacity that is expected to be available in the industry later this decade, as well economies of scale that will be available with a large order. Funding for this coach procurement has been included in Virginia's request for the SAFTEA Federal transportation reauthorization legislation.

Even with a fast-track procurement, there is a risk that the first new vehicles will not be able to be received and accepted for service before the time that the seven Mafersa cab cars will need to be released to Connecticut and the Sounder trainsets returned to Seattle. To protect against a potential shortage of both coach seats and cab control cars, VRE plans to advance the immediate procurement of 11 cab cars, using available sources funds that do not require Federal legislative approval. Each VRE train is required to have one cab control car, positioned at the end of the train opposite the locomotive, so that the train can operate either in "push" mode (cab car in front) or traditional "pull" mode (locomotive in front). The 11 cab cars preferably would be new units, but other options also could be considered, such as leasing cab cars from another property, acquiring and retrofitting additional Metra Gallery cars as cab cars or converting existing VRE Gallery trailer coaches to cab cars. In any case, the 11 cab cars need to be available for service in the 2006-2007 timeframe. This will bring the number of cab cars in VRE fleet up to 17, including the four Kawasaki bi-level cab cars and two Gallery cars that currently are equipped as cab cars.

Medium to Long-term Coach Requirements

Building upon the short-term actions to replace the Mafersa cars with Gallery bi-levels, and working towards the objective of operating a standardized, all-bi-level fleet, the VRE fleet strategy identifies coach procurement through 2025, for each of the three strategic plan scenarios and the full range of projected future ridership levels.

The recommended short-term actions with respect to the VRE fleet, as described above, are common to all three of the strategic plan scenarios. The scenarios vary, however, with respect to the number and timing of future coach acquisitions in the 2010-2025 period.

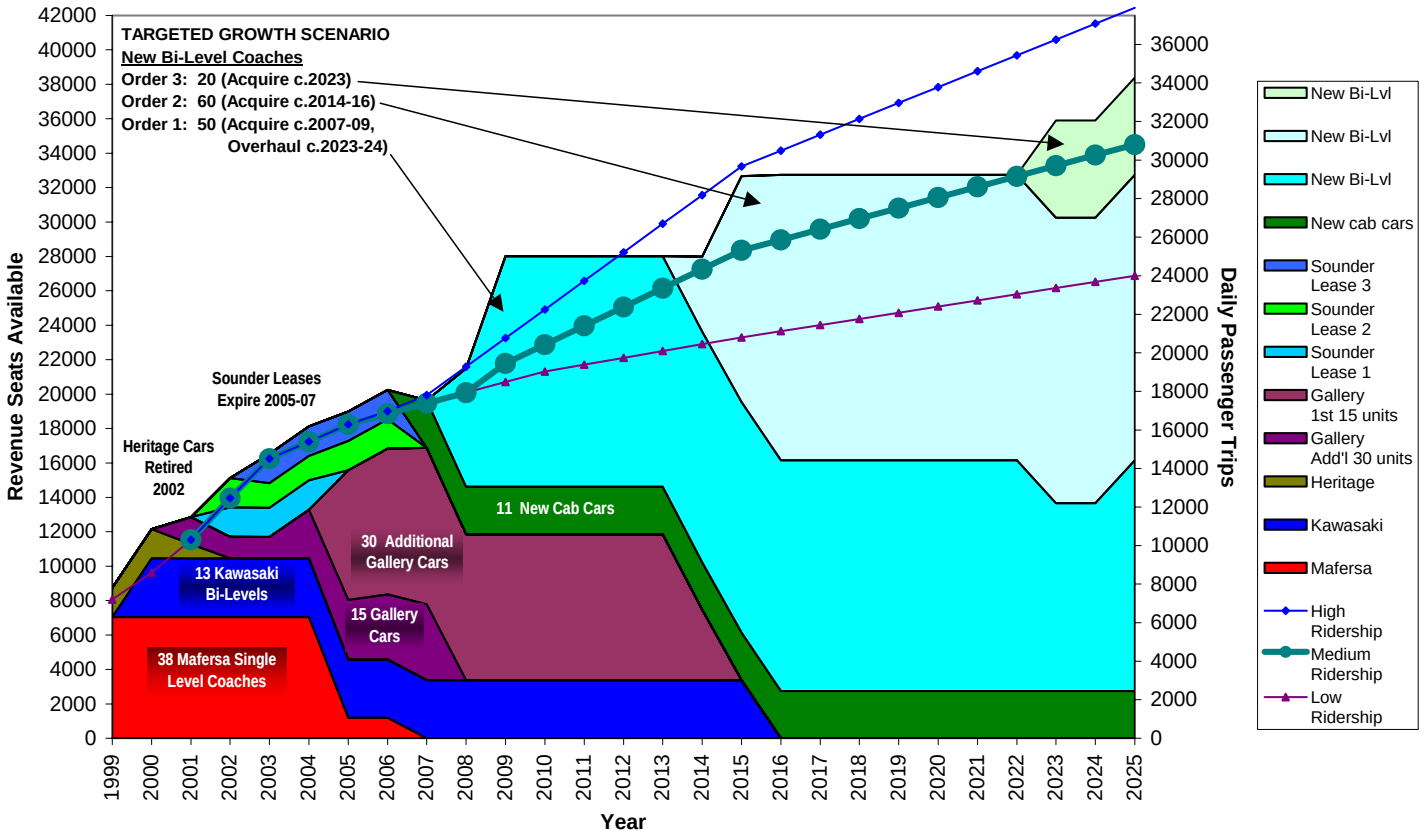
The chart in Figure 4-4-1 shows VRE's coach fleet plan through 2025 based on the mid-range ridership forecast, which roughly corresponds with the Targeted Growth Scenario. The chart illustrates the relationship between the aggregate peak period seating capacity of the available equipment and the range of projected daily ridership

levels, annually through 2025. Seating capacity and ridership are plotted on different scales to reflect the fact that fleet planning is based on average peak car occupancies in the 85 to 90 percent range. Revenue seat numbers assume trips in both the morning and evening peak periods but exclude additional trips made during the mid-day period. Although figures for the current year show available seats exceeding projected ridership, some trains operating during the high mid-week period have passenger loads in excess of capacity, with no ability to add cars because of the limited train storage available in Washington.

In the Targeted Growth Scenario, the oldest 15 Gallery cars would be retired as the first order of 50 new coaches (including a mix of trailer coaches and cab cars) is received in the 2007-2009 period.

A second order of approximately 60 coaches in the 2014-2016 period will be needed to support projected ridership growth and to enable the remaining Pullman Gallery cars to be retired. At this point in time, the 13 Kawasaki coaches could be sold, prior to their mid-life overhaul, and VRE would have a standardized fleet of modern bi-level equipment. Standardizing and modernizing the fleet will enable VRE to achieve long term maintenance cost savings, improve the availability of the coach fleet for revenue service, and thereby keep spare fleet requirements to a minimum.

Figure 4-4-1
VRE Ridership Demand Versus Seat Availability (Hypothetical) – Coach Requirements to Meet Targeted Growth Scenario



In the post 2015 period, still more coach equipment will be needed to accommodate ridership growth and network expansion. For the Targeted Growth Scenario, this supplemental coach order is projected to occur in the 2023 timeframe and comprise approximately 20 additional vehicles. The additional equipment also will enable VRE to conduct a mid-life overhaul program on its original set of new bi-level coaches in the 2023-2024 period.

Total VRE coach requirements for various years through 2025, for each type of equipment and for the high, medium and low levels of projected ridership, are presented in Table 4.4.2, including allowances for spare equipment. By 2025, the coach fleet will range from 100 vehicles (for the low end of the ridership range at 24,000 daily trips) up to 160 vehicles (for the high end of the ridership range at approximately 40,000 daily trips). The Targeted Growth Scenario, corresponding to the mid-range ridership forecast, provides for a 140-coach fleet by 2025.

Table 4.4.3 indicates the size and projected timing of new coach acquisition for each of the three strategic plan scenarios. All three scenarios are based on selling the Mafersa coaches, acquiring 11 cab cars as soon as possible (to replace the Mafersa and Sounder cab cars) and acquiring an additional 50 coaches in the 2007-2009 timeframe to replace the leased Sounder trainsets and the oldest of the Gallery cars. All three scenarios dispose of the Kawasaki bi-levels and achieve a standardized bi-level coach fleet in the 2015 timeframe. The other two scenarios diverge from the Targeted scenario only after 2009 – in terms of the size and timing of additional coach purchases through 2025 to meet ridership demands.

Figure 4-4-2 shows the equipment needs in response to the Aggressive Growth Scenario and the high end of the range of projected ridership. To stay ahead of ridership demand, a supplemental coach order would need to placed to enable an additional 75 coaches to be available for service in the 2013-2015 period, followed by an additional increase of 25 coaches in the 2019-2020 period – bringing the total coach fleet to 160 units. Figure 4-4-3 shows that a significantly lower quantity of coach equipment would be required for the Deferred Growth Scenario to meet the low end of the projected ridership range.

In the 2009-2015 period, if ridership tracks at or towards the low end of the range, it would be possible to retire a portion of the Gallery fleet sooner, though some of the Gallery equipment would need to be retained through 2015. In the 2014-2016 period, approximately 39 additional bi-level coaches would be acquired to permit the current Gallery fleet to be retired and the Kawasaki bi-levels to be sold prior to their mid-life overhaul.

Table 4.4.2
VRE Coach Requirements Through 2025

	Existing 2003	Planned 2005-06	Planned 2007
New Bi-Level Cab Ca	--	--	11
Gallery Coach	5	45	45
Sounder Coach	18	12	--
Kasasaki Coach	13	13	13
Mafersa Coach	38	7	--
Total	74	77	69

			2010	2017	2025
AGGRESSIVE GROWTH	HIGH RIDERSHIP	New Bi-Level Coach	61	135	160
		Gallery Coach	30	--	--
		Kasasaki Coach	13	--	--
		Total	104	135	160
TARGETED GROWTH	MID-RANGE RIDERSHIP	New Bi-Level Coach	61	120	140
		Gallery Coach	30	--	--
		Sounder Coach	--	--	--
		Kasasaki Coach	13	--	--
		Mafersa Coach	--	--	--
		Total	104	120	140
DEFERRED GROWTH	LOW RIDERSHIP	New Bi-Level Coach	61	100	100
		Gallery Coach	15	--	--
		Kasasaki Coach	13	--	--
		Total	89	100	100

Total coach fleet, including car cars and trailer coaches.
Includes allowances for protect, spare and out of service equipment.

Table 4.4.3
VRE Coach Procurement Through 2025, By Strategic Plan Scenario

		New Bi-Level Coaches to be Acquired… 2006-07	2007-09	2013-15	2014-16	2019-20	c. 2023	Cumulative Total	
Aggressive Growth	Cab Cars	11	9	5		3		28	160
	Trailers	--	41	69		22		132	
	Total	11	50	74		25			
Targeted Growth	Cab Cars	11	9		5		--	25	140
	Trailers	--	41		54		20	115	
	Total	11	50		59		20		
Deferred Growth	Cab Cars	11	9		5			25	100
	Trailers	--	41		34			75	
	Total	11	50		39				

Figure 4-4-2
VRE Ridership Demand Versus Seat Availability (Hypothetical) – Coach Requirements to Meet Aggressive Growth Scenario

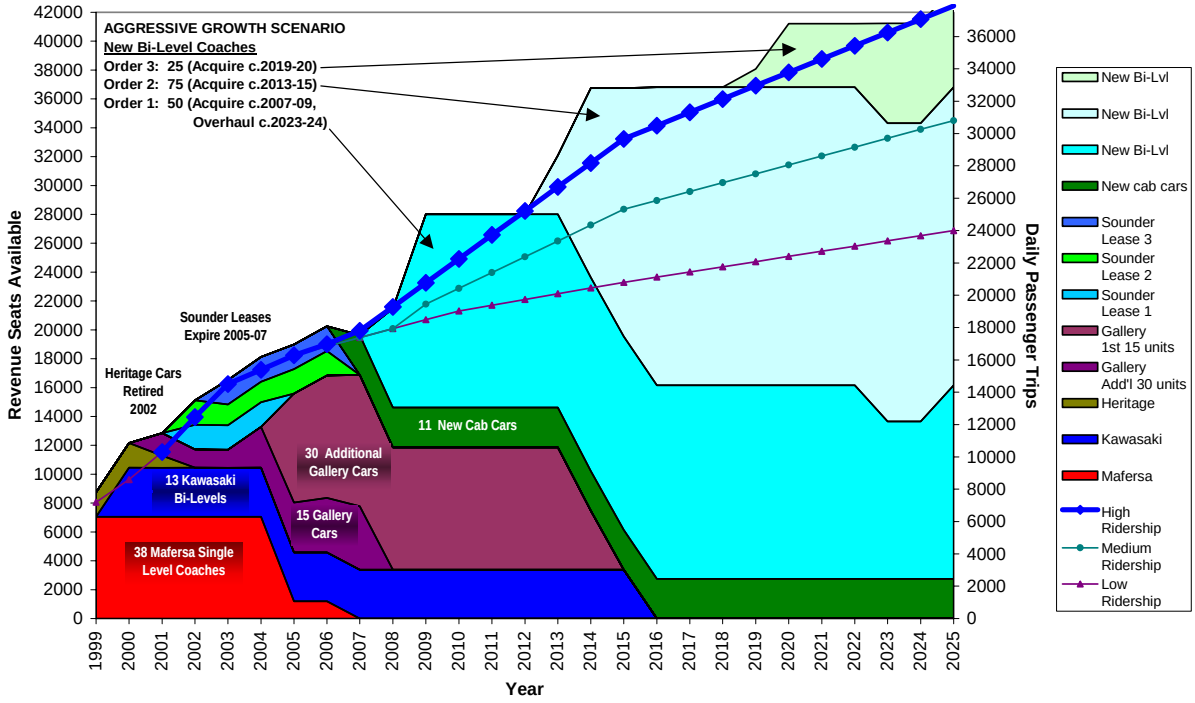
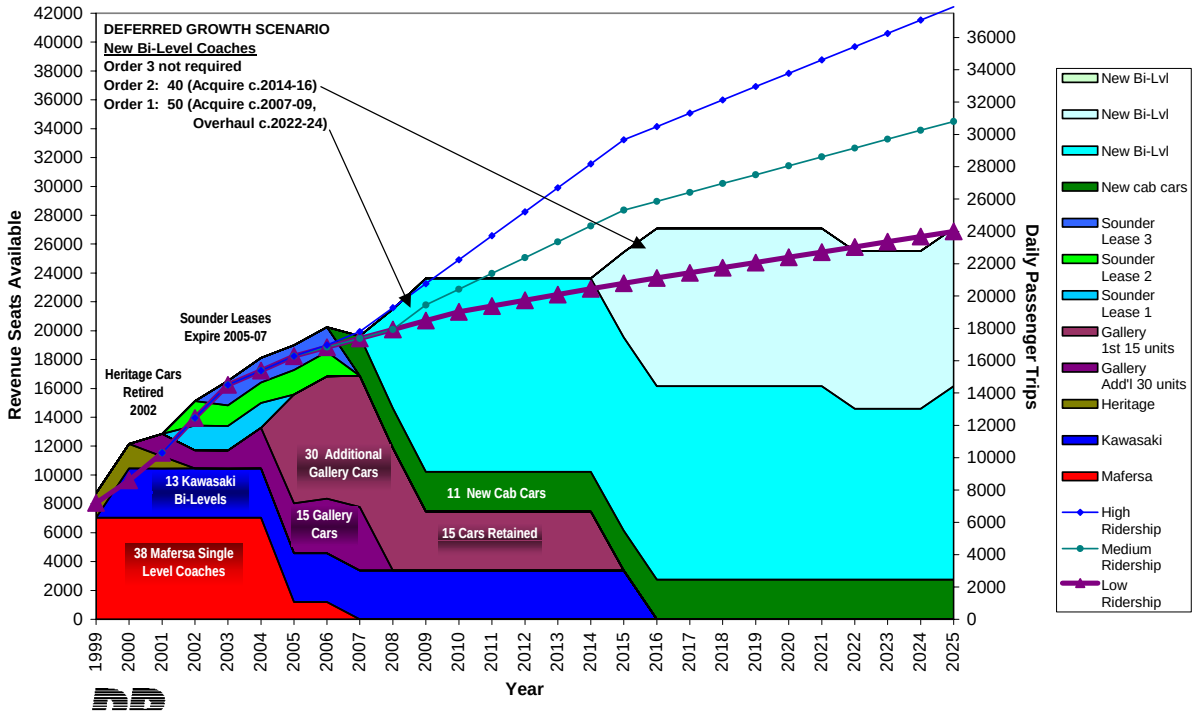


Figure 4-4-3
VRE Ridership Demand Versus Seat Availability (Hypothetical) – Coach Requirements to Meet Deferred Growth Scenario



The High Boarding-Versus-Low Boarding Issue

All current VRE station platforms are low-level. This configuration is not only cheaper to construct and maintain but also the low level platforms pose no clearance problems for the freight operation. The current design concept for the new L'Enfant station incorporates a high level platform as an alternative to replacing a bridge. VRE prefers the low-level option. Amtrak has put forth several plans that call for some of the lower level tracks at Washington Union Station to have high-level platforms. Run through service to Maryland would bring VRE trains to stations with high-level platforms on two of the three MARC lines -- the Penn and Camden lines to Baltimore.

In the current fleet, the Mafersa and Kawasaki cars are suitable for either high or low platform operation. The Gallery and Sounder cars can operate at low platforms only. This issue affects ridership, coach configuration, and capital investment needs. Timing and pricing considerations in the short term most likely dictate the use of an off-the-shelf configuration for the coach order, perhaps procuring in tandem with another property. While the greatest long-term operating flexibility would be achieved by acquiring a high and low boarding vehicle, ideally with remote control door and trap operation to facilitate a one-person operation and allow the fastest possible loading and unloading, overall cost considerations and the availability of production line capacity for low boarding cars may dictate that VRE evolve in the direction of an all-low platform operation. Run through service, should it occur, would be with MARC equipment if the run-through involved high-level platforms.

Locomotives

Table 4.4.4 lists the existing fleet of VRE locomotives, including 15 units owned by VRE and six leased units.

Table 4.4.4
Existing VRE Locomotive Fleet

Manufacturer	Model	Ownership	Built/Reblt	HP	Road Nos.	Total
GM-EMD-MK	GP39-2C	VRE	1991	2300	V01-V10	10
GM-EMD-MK	GP40-2C	VRE	1995	3000	V20-V24	5
GM-EMD	F40PH	Amtrak	1985-87	3000	V30-V31	2
			2003	3000	V32-V33	2
GM-EMD	F59P	Sound Transit	2001	3000	V40-V41	2

The shaded area indicates locomotives that are being leased – the F40-PH units from Amtrak and the F59P units from the Seattle commuter rail system.

While these 21 existing locomotives adequately serve VRE's existing operation, none of them is suitable over the long term for meeting VRE's needs. The six leased locomotives will need to be replaced in the near-term future:

- Two of the F-40s are rapidly approaching the end of their useful lives and will need to be rebuilt or replaced. The other two should be serviceable through 2010.
- The two Sounder F-59s will need to be returned to Sound Transit in Seattle along with the leased Sounder coaches.

The 15 VRE-owned GP-39 and GP-40 locomotives are also now in need of replacement. These locomotives were logical choices for VRE when it was a start-up operation. They could be acquired relatively inexpensively as re-manufactured units that at the time were in plentiful supply from locomotive suppliers. Their capacity and performance were adequate for the short trains, with relatively small passenger loads, that VRE initially carried.

However, in order to add more seats to accommodate ridership today, some VRE trainsets will need to be lengthened from six to eight cars in the not-too-distant future. In addition to requiring a larger coach fleet, this also will trigger an upgrade to VRE's locomotive fleet to locomotives with higher horsepower and greater head end power (HEP) capacity for running the train's lighting, heating and air conditioning.

The number of required locomotives through 2025 is a function of the pace at which new train service is added, which in turn depends upon plans for line extensions, completion of rail infrastructure capacity projects, and agreements between VRE and its host railroads concerning the pace of service growth.

A summary of VRE's projected locomotive requirements is shown in Table 4.4.5. Future growth needs are based on service expanding ultimately to between 16 and 19 trainsets, reflecting closer peak hour headways, mid-day and evening service, and expansion of the route network. For estimating future requirements, one locomotive per train is assumed, for trainsets with up to ten coaches.

Table 4.4.5
VRE Locomotive Requirements Through 2025

	Present (2003) Equipment on Roster	Phase 1 (2010)	Phase 2 (2015)	Phase 3 (2025)
Number of Revenue Trainsets	11	13	16	19
Protect Engines	3	3	3	3
Shop Spares	7	5	5	5
Shop Margin	33%	24%	21%	19%
TOTAL LOCOMOTIVES*	**21**	**21**	**24**	**27**

* includes Protect, Spare and Out of Service locomotives

The overall locomotive requirements assume that a protect unit (extra locomotive) is maintained at three locations, Crossroads, Broad Run, and Ivy City, so that a locomotive or cab car failure at the start of a run will not necessarily result in cancellation of the train. In addition, an allowance is made for five spare locomotives that are assumed to be in the shop for maintenance work, repairs of overhaul or otherwise are out of service. This allowance, known as the shop margin, currently represents 26 percent of the fleet. As more modern locomotive equipment is acquired and VRE's maintenance capabilities improve, the shop margin as a percentage of the total fleet should be able to be reduced to 20 percent or less, given the current maintenance regimen of programmed federal inspections and reactive maintenance (fixing problems as they occur). The shop margin could conceivably be reduced even further, should VRE decide in the future to adjust its maintenance philosophy to incorporate a strict regimen of progressive maintenance.

The Phase 1 preliminary plan, prepared in the spring of 2002, advanced two possible strategies for the locomotive fleet. One called for the gradual replacement of the entire locomotive fleet by 2010; the other was predicated on overhauling and continuing to use the existing 15 VRE-owned units. As Phase 2 of the Strategic Plan progressed, and the strong future growth potential of VRE has become clearer, several factors have combined to render the latter overhaul option unworkable:

- The existing locomotives do not have enough horsepower to continue to meet performance requirements for acceleration and top speed as VRE's trains get both longer and heavier. This is especially true for the 2,300 HP GP-39 units. The bi-level coaches that have become the staple of VRE's operation are significantly heavier than their single-level Mafersa counterparts. In addition, today's six-car trains could grow to eight or even10 cars as ridership continues to grow over the next five to ten years.
- New clean air regulations now make it desirable for VRE to align with the railroad emissions requirements that will be introduced in 2005. Only newly built Tier II locomotives will meet these requirements. In a region that is designated as a severe non-attainment area, VRE can thus contribute to better air quality twice over, once by enticing people away from automobiles and again by reducing the level of emissions generated by its locomotives.
- Continuing growth in ridership demand will push VRE in the direction of increasing the number of trains it operates, which, in turn, will increase the required size of the locomotive fleet well beyond the current 15 VRE-owned units. If VRE is able to procure on the order of 20 new locomotives as part of a single order, the opportunity will exist to obtain a competitive unit price, modernize and standardize the locomotive fleet, and realize in the near term the benefits cited above.

The Strategic Plan recommendation for VRE's locomotive fleet is to convert to a modern, standardized fleet as soon as practically possible – conceivably in the 2007 timeframe. The intent is to initially acquire 20 new locomotives, which will satisfy VRE's locomotive requirements for revenue trainsets and shop margin through at least 2015 and most likely beyond. The requirement for protect engines can be met either by assigning three of the new units or by retaining a limited number of the existing

3,000 horsepower units, which also would allow for a more rapid than predicted increase in revenue train service.

VRE has requested that the Governor of Virginia add $41 million to VRE's SAFTEA reauthorization request to fund 20 new Tier II locomotives. The specification for new locomotives will incorporate the following minimum design standards:

- Tier II compliant (meets new Federal emissions standards)
- Horsepower sufficient to haul consist of up to ten stainless steel bi-level coaches
- Top speed of at least 80 mph.

The total capital cost of acquiring 20 new locomotives is expected to fall in the range of $40 to $60 million.

In the short term, selected existing units will receive HEP upgrades and undergo a limited overhaul program, to keep the fleet running until new equipment is received. In addition, VRE will lease additional locomotives on a short-term basis as needed to enable the GP units to be retired in advance of the receipt of new units and to permit the Sounder locomotives to be returned to Seattle by the end of 2007.

Table 4.4.6
VRE Locomotive Procurement Through 2025, By Strategic Plan Scenario

	2005-09	2010-15	2016-25	Cumulative Total
Aggressive Growth	20	4	3	27
Targeted Growth	20	--	4	24
Deferred Growth	20	--	--	20

Storage Yards and Maintenance Facilities

Storage yards and maintenance facilities are important components of the VRE operation and are just as much a constraint on future growth as the availability of rail cars. Even if VRE had unlimited rolling stock, the current yard constraints would prevent VRE from deploying significantly more or longer trains. Additional mid-day storage space for VRE trains is urgently needed in or around Washington, requiring capital investment. At a minimum, space for 20 additional coaches is needed in the immediate near term to allow VRE to lengthen trains to address the current standee situation. An additional 10 to 20 spaces are estimated to be required by 2010 to accommodate additional trainsets or a lengthening of the current trainsets. In order for VRE ridership growth to continue, construction of additional train storage and maintenance facilities must occur in tandem with the acquisition of additional railcars and expansion of station parking capacity.

Mid-Day Storage Requirements

VRE's mid-day storage facility at the Washington Terminal Coach Yard comprises seven storage tracks of varying lengths, with a total capacity for storing 69 pieces of equipment (including locomotives and coaches). VRE's current operation manages to fit all 11 of its revenue trainsets into this yard by the end of the morning weekday peak period, by doubling up trains on two of the tracks and storing three trains end-to-end on the longest track. VRE occupies all 69 available storage positions (with 58 coaches and 11 locomotives). Despite the regular presence of standees on some peak VRE trains, and the current availability of additional coaches as a result of recent equipment purchase and lease activity, VRE cannot add a single coach to any train that has to lay over in the Coach Yard.

Strong projected VRE ridership growth driven by demographic trends, coupled with the push to improve the level of VRE service and extend the reach of the VRE network, will require VRE to lengthen its trains – initially to eight car consists and perhaps ultimately to ten cars – and increase the number of trains it operates. This will quickly and dramatically increase the requirements for VRE train storage at Washington, as Table 4.5.1 indicates.

Table 4.5.1
Projected VRE Mid-Day Storage Requirements at Washington Terminal Through 2025

	Existing (2003)		Phase 1 (by 2010)	Phase 2 (2010 - 2015)		Phase 3 (by 2025)	
	Capacity	Utilization		Low	High	Low	High
Trainsets / Tracks	11	11	13	16	16	19	19
Total units (cars & locomotives)	69	69	100	118	127	137	157

Note:
Future requirements based on mid-day storage of 100% of revenue trainsets at Washington Terminal.
Operating plans that provide for reverse-peak and/or mid-day service will reduce mid-day storage requirement at Washington.

Various schemes have been proposed over the years to increase storage. Both the Wedge Yard and the Crescent Track have been proposed and studied, and these were identified in the Phase 1 VRE Strategic Plan as the preferred near term locations for expanded mid-day storage. While both projects are physically feasible, neither has progressed significantly towards implementation. The real estate negotiations among VRE, CSX and Amtrak have been difficult and have not yet achieved a favorable outcome or agreed-upon solution. One or both of these facilities may yet prove to be workable short to medium term solutions. However, finding additional space for VRE midday storage is imperative and urgent, so VRE has expanded its focus to include other potential locations within the terminal area, including the former B&O Eckington Yard, the former Penn Central Ivy City Team Track, also known as the Hecht site, and a possible side track within the existing right-of-way adjacent to L'Enfant Station. Either of the first two sites would have the distinct advantage that a relatively small but independent maintenance facility, separate from the existing Ivy City shops, could be constructed to service VRE equipment during the mid-day layover period. This would provide needed additional shop capacity that would be difficult or impossible to provide within the constrained boundaries of the existing Amtrak Ivy City Shop. It also would more readily facilitate maintenance activities were VRE to decide to engage a maintenance operator other than Amtrak at some point in the future.

Significant disadvantages include the property acquisition costs and uncertainty about the owner's willingness to sell. Moreover, in the case of the Hecht site, it would be necessary to extend the current 'Avenue' interlocking north of the New York Avenue bridge and construct track connections to enable VRE trains to get to the Hecht site while minimizing interference with Amtrak's Northeast Corridor Operations. The Hecht site also is encumbered by an existing lease and would in all likelihood not be ready for VRE's use until at least 2007. While the Hecht site may be viable as a longer term solution to a VRE dedicated yard and mid-day maintenance facility in Washington, it will not be an easy solution, nor can it be quickly achieved.

The L'Enfant side track is a possible interim solution for increasing VRE's effective storage capacity while plans and designs for a permanent long-term solution within the terminal are finalized. The track would be placed on an existing but currently unoccupied track "slot" on the elevated embankment between the north end of the VRE station platform at L'Enfant and the interlocking at Virginia Avenue. The track would be accessed by means of a hand-throw, electric lock turnout north of the station platform and would have room for the storage of two 8-car trainsets. The benefit of this location is its location off of the mainline and north of VRE's heaviest station (L'Enfant). It would not impact freight operations through the L'Enfant area or across the Long Bridge. There would be two possible ways of operating this side track: the simplest operation would be to take two VRE trains and skip the last stop at Union Station, instead ducking the trains into the side track upon discharging passengers at L'Enfant. This would require Union Station-bound passengers on these trains to either transfer to the subsequent VRE train or transfer to the Metro. The other approach would be to deadhead two trains back from Union Station and into the side track. This would consume additional line capacity in the First Street Tunnel and at Virginia Avenue Interlocking and might result in an increase in congestion and delays. As a temporary interim measure, however, the disadvantages could be tolerated in exchange for the ability to operate more and longer VRE trains before the time when new permanent storage facilities north of Union Station could be constructed.

Another potential short-term method for increasing VRE peak period capacity to Washington would be to take one trainset that currently is stored at the Coach Yard and instead couple it to the late morning peak VRE train that currently returns to Broad Run on the Manassas Line. The two trainsets would run as a single train back to Broad Run, so as not to consume additional train slots on the CSX line, which are regulated by the agreement between VRE, CSX and the Commonwealth of Virginia. The trains would be uncoupled at Broad Run, with one of the trains stored there during the mid-day and the other returning to Washington on its regular late morning schedule. The early afternoon VRE train from Washington to Broad Run would retrieve the stored trainset and return it to Washington for service in the evening peak. Since only ten trainsets would need to be stored at the Coach Yard instead of eleven, two of these trains could be made longer (as could the train that would be stored at Broad Run). This scheme would consume some additional platform track capacity on the lower level of Union Station during the peak period, which is expected to be available in the short term.

Overnight Storage Requirements

The present overnight storage locations, Crossroads on the Fredericksburg Line and Broad Run on the Manassas Line, each have eight tracks. They are adequately sized to handle the present day equipment sets but offer only limited potential for future growth – either by lengthening trainsets or adding new trainsets.

As ridership grows, the decision about whether to add new trains, lengthen existing trains, or both, will be made as a result of many interrelated market, financial and political factors. Over the long term, the capacity and configuration of VRE's storage yards should not dictate how the service is operated. The Strategic Plan, therefore, provides for a phased program of capital investments at outlying yards to permit VRE maximum flexibility in growing its service cost-effectively.

In order to flexibly accommodate future needs, storage yards should be planned and designed to be able to accommodate either smaller numbers of long trains, or a higher number of shorter trains. Specifically, yards should be planned for up to ten-car VRE train lengths. The maximum length trains that can be stored in the existing yards are nine cars at Crossroads and eight cars at Broad Run. These maximum lengths are available on only a single track at each yard. All other tracks are shorter and offer less storage capacity. Yard sites also should be planned to be able to store sufficient numbers of trainsets to permit future VRE service at 20-minute headways, with zone express service offering improved running times from the fast-growing outer portions of the VRE service area.

The additional property required to accommodate these long-term requirements should be identified and either purchased or otherwise protected for future rail use immediately – to prevent its prior development for other purposes.

Where possible, yard expansion projects should be undertaken incrementally in phases, to minimize wasted investment and permit VRE to tailor its facilities to its specific needs as the system evolves. Projects at existing and potential future yard locations should simultaneously address storage and equipment maintenance needs, taking advantage of economies of scale where possible.

At Crossroads, the Strategic Plan calls for an increase in the number of trainsets from six to as many as nine by 2025, as shown in Table 4.5.2. Near term investment at Crossroads, to support growth to 2015, ideally should create sufficient storage for eight trainsets up to eight cars long. Extension of any of the existing storage tracks to permit 8-10 car train lengths is problematic, given the steeply sloping topography and the concerns of nearby property owners about locomotive noise. A large parcel of industrial property, situated immediately adjacent to and at the same elevation as the existing yard, is available for acquisition and could be better suited to yard and maintenance facility expansion.

At Broad Run, the ultimate function and size of the yard facility is less certain, given the possibility of extensions of VRE service in the Gainesville-Haymarket corridor and/or beyond Broad Run into Fauquier County and beyond. Were VRE Manassas Line service to continue to terminate exclusively at Broad Run through 2025, the projected operating plan would include eight revenue trainsets, which could include several sets with 8-to-10 cars. On the other hand, if full VRE service ultimately is extended to Haymarket and Remington (or beyond), Broad Run might cease to be an overnight storage location altogether. In this scenario, it might become the preferred location for a VRE equipment maintenance facility and for storage of any equipment that is not in revenue service. A few of these potential medium and long-range overnight storage scenarios for the Manassas Line are presented in Table 4.5.3, including Broad Run as well as other potential sites on the Gainesville-Haymarket Line and in Fauquier County. These scenarios illustrate the range of possible future yard configurations.

The wide range poses a dilemma for short-term capital investment planning at Broad Run. Major expansion of the property is difficult given site topography and adjacent property uses. Limited expansion of the yard to provide additional tracks, and to lengthen at least some existing tracks, would be consistent with its potential long-term use either for overnight storage or as a maintenance shop. Expansion projects should be limited to those that can be made cost-effectively, with the objective of being able to accommodate eight trainsets up to eight cars long.

If the decision is made by VRE to extend service to Gainesville or Haymarket, a site for a train storage facility should be selected now and reserved or acquired. The site should be large enough to accommodate overnight storage of up to eight 10-car trainsets, providing some future expansion capacity beyond the six trainsets envisioned in the 2025 operating plan. A separate analysis would be required to determine if it makes sense for VRE to build this new facility as part of the first phase of a line extension, perhaps reducing capital investment needs at Broad Run, or for VRE to defer construction of a Gainesville-Haymarket yard in lieu of near-term investment and expansion of Broad Run, with VRE trains being deadheaded to their starting point on the Gainesville-Haymarket line. Either option is a potentially feasible interim solution with VRE traffic at relatively low levels.

Similarly, if VRE decides to extend service to Fauquier County, a site for outlying train storage should be identified along the NS Piedmont mainline. This site selection needs to take into account any potential for further extension of VRE service to Culpeper or further south.

Table 4.5.2
Projected VRE Fredericksburg Line Overnight Storage Requirements at Crossroads Yard Through 2025

	Existing (2003)		Phase 1	Phase 2 (2010 - 2015)		Phase 3 (by 2025)	
	Capacity	Utilization	(by 2010)	Low	High	Low	High
Trainsets / Tracks	8	6	7	8	8	9	9
Total units (cars & locomotives)	64	38	56	63	69	71	81

Table 4.5.3
Projected VRE Manassas Line Overnight Storage Requirements Through 2025

	Existing (2003)		Phase 1	Phase 2 (2010 - 2015)		Phase 3 (by 2025)	
	Capacity	Utilization	(by 2010)	Low	High	Low	High
Total Manassas Line							
Trainsets / Tracks	8	5	6	8	8	10	10
Total units (cars & locomotives)	58	31	44	55	58	66	76
Broad Run/Fauquier Branch							
Trainsets / Tracks	8	5	6	3	3	4	4
Total units (cars & locomotives)	58	31	44	24	25	26	28
Gainesville-Haymarket Branch							
Trainsets / Tracks	--	--	--	5	5	6	6
Total units (cars & locomotives)	--	--	--	31	33	40	48

Note:
Phase 1 -- For Gainesville start-up service, trains assumed to be stored overnight at Broad Run.
Phase 2 -- Assumes VRE service to Haymarket and Broad Run.
Phase 3 -- Assumes VRE service to Haymarket and Fauquier County (e.g., Remington).

Equipment Maintenance Options

Currently Amtrak is the contract operator and equipment maintainer for VRE, and virtually all significant maintenance activities are centralized at the Amtrak shop at Ivy City, within Washington Terminal.

The size of the VRE fleet is growing beyond the capacity of the existing maintenance facilities. Starting from the original 38 Mafersa coaches, which satisfied VRE's requirements through the late 1990s, VRE's coach fleet has grown steadily over the past several years and will exceed 100 vehicles within the next six months. When the three leased Sounder trainsets are returned to Seattle and the full complement of 45 Gallery cars has been received, VRE will have a total coach fleet of 96, comprising three distinct types of vehicle.

The number of locomotives has not grown as rapidly, but with the planned addition of trains following completion of programmed rail capacity projects and the extension of service on the Gainesville-Haymarket branch, VRE's locomotive fleet is expected to increase from 21 to as many as 27.

In addition to its lack of expansion capacity, another problem for VRE with the existing arrangements for rolling stock maintenance is the lack of a dedicated facility and staff for the inspection, maintenance and repair of VRE equipment. At the Ivy City facility in Washington Terminal, VRE must compete for resources with MARC and with Amtrak itself, and the mid-day maintenance window can be rather short. Continued reliance on Ivy City as the sole maintenance location necessarily presumes that Amtrak continues to be the contract maintainer. The size of the VRE operation and the contemplated future equipment needs indicate that VRE will have outgrown the original concepts of equipment maintenance, which was essentially an "add on" to Amtrak's Ivy City mission. VRE also is not satisfied with the length and unpredictability of the turnaround time for maintenance and repair of its equipment at Ivy City.

The anticipated growth in the size of the VRE fleet, coupled with an increasingly large MARC commuter rail fleet also being maintained by Amtrak in Washington, and expected growth in Amtrak's own intercity passenger rail business, will severely tax the existing facilities. Safety will always come first, and the highest priority for the equipment maintenance function will continue to be the safe operation of the trains and the timely repair of safety-critical defects. In a capacity-constrained facility, this will push other maintenance and non-safety critical repair work to the back burner. The result could be longer maintenance turnaround times, which would negatively affect equipment availability and have the effect of requiring VRE to invest in additional rolling stock to ensure that sufficient equipment is available for daily peak service. Amtrak's ability to regularly wash each train set at Washington Terminal, which is difficult to accomplish today, will become more difficult as the fleet expands. Similarly, preventive maintenance and minor repairs work will become more difficult to schedule, with the likely result that an increasing number of coaches over time may need to be operated a something less than the high standard that VRE desires and expects.

Without investment in new maintenance facility capacity, and greater control over its equipment maintenance functions, VRE's prospects are for increasing delays and costs associated with equipment maintenance and repair, a decline in the overall

quality of the fleet, and additional rolling stock acquisition to support the required shop margin.

As a result, VRE's strategy moving forward is to begin performing routine maintenance and inspection functions at VRE's own facilities. The long range Strategic Plan includes a combination of new facilities at the two existing outlying yards, plus additional intermediate maintenance facilities at a site that has yet to be determined. In the short term, a relatively low level of investment in maintenance facilities at both Crossroads and Broad Run will give VRE additional maintenance capacity and flexibility to perform more routine inspection and maintenance activities during the overnight layover. Construction of a pit track at Broad Run to permit underbody coach inspections will complement the capability that already exists at Crossroads, is essential for meeting VRE's immediate needs given new Federal vehicle inspection requirements, and should be progressed as rapidly as possible. In addition, the near-term plan calls for about $2 million of capital investment in equipment maintenance at each of the two outlying yard locations – including Butler-type support buildings, an indoor facility for performing basic maintenance with a capacity of two cars using forklifts, and car wash equipment.

These facilities will permit but do not require VRE to obtain a contractor, separate from Amtrak, to perform the maintenance functions. Over time, a programmed maintenance strategy could be devised that would transfer some or most of the routine inspection, maintenance and running repair functions from Ivy City at Washington to the VRE facilities in Northern Virginia. Heavy repairs, overhauls, and longer-term programmed work could be handled on a contract basis at off-site facilities, or by Amtrak at Washington. Implementing these relatively modest near-term facility improvements at Crossroads and Broad Run will afford VRE some flexibility in the development of a maintenance philosophy and selection of a contractor that are optimal for VRE.

VRE's capital needs with respect to fleet storage and maintenance are summarized in Table 4.5.4. VRE's five-year plan includes a $40 million medium maintenance facility, which could result in the creation of up to 60 jobs at a new maintenance location in Virginia.

Table 4.5.4
Storage and Maintenance Facility Estimated Capital Costs

Costs in millions of 2003 dollars		2004-2009	2010-2015	2016-2025	Cumulative Total
AGGRESSIVE GROWTH --- HIGH RIDERSHIP	Washington Terminal	$10	$50	$0	$60
	Crossroads Facilities	$5			$5
	Broad Run Facilities	$5			$5
	Haymarket Line Yard		$7		$7
	Fauquier Yard			$5	$5
	Intermediate Maintenance Facility	$25	$50		$75
	Total	$45	$107	$5	$157
TARGETED GROWTH --- MID-RANGE RIDERSHIP	Washington Terminal	$10	$50	$0	$60
	Crossroads Facilities	$5			$5
	Broad Run Facilities	$5			$5
	Haymarket Line Yard		$7		$7
	Intermediate Maintenance Facility		$50		$50
	Total	$20	$107	$0	$127
DEFERRED GROWTH --- LOW RIDERSHIP	Washington Terminal	$5	$0	$0	$5
	Crossroads Facilities	$3			$3
	Broad Run Facilities	$4			$4
	Intermediate Maintenance Facility		$25	$25	$50
	Total	$12	$25	$25	$62

Rail Infrastructure

Rail infrastructure projects are included in the Strategic Plan in order to provide sufficient capacity on the railroad for the simultaneous growth of passenger and freight traffic.

On the CSX RF&P Line, a plan has been developed for improving speeds and line capacity to support the anticipated future growth of commuter, high-speed intercity and freight traffic on the line. The following projects, which have been identified in a memorandum of understanding (MOU) signed by CSX, the Commonwealth of Virginia and VRE, and for which $66 million of capital funding was established, represent the highest-priority initial phase projects that were identified in this plan and are in the process of being designed and implemented:

- AF Interlocking reconfiguration (completed in late 2001)
- New bridge across Quantico Creek (estimated completion 2006).
- L'Enfant freight bypass track and interlocking reconfiguration
- Third track, RO to SRO Interlocking (Arlington-Crystal City area)
- Crossovers at Arkendale (Aquia)
- Third track, Franconia Hill (AF to Ravensworth Interlockings)
- Crossovers at Ellett
- Third track, Fredericksburg to Crossroads.

The timing of these projects has slipped from the original schedule outlined in the MOU, but they continue to be fully funded and remain the highest-priority rail infrastructure improvements on the CSX RF&P Line.

Other future projects that are included in the long-range plan for the Targeted and Aggressive Growth Scenarios entail constructing portions of a third mainline track in areas that are not constrained by major physical obstacles such as river crossings:

- 3rd track, Ravensworth to Colchester (Occoquan), 6.7 mi.
- 3rd track, Powells to Aquia (via Quantico), 12.0 mi.
- 3rd track, Aquia Creek to Dahlgren Jct., 8.7 mi.

This additional track capacity will enable VRE to run additional Fredericksburg Line trains beyond those provided for in the MOU – either to reduce peak headways, extend the duration of the peak period, initiate zone express service from the outermost stations on the line, or increase the amount of VRE service at off-peak times.

On the NS Line, the capacity of the two-track line between Alexandria and Manassas is expected to be sufficient to accommodate projected future levels of train operations. Any new construction within or adjacent to the right-of-way, however, should allow for the future addition of a third mainline track should traffic require one in the future. Significant off-peak or reverse-peak service may trigger the need for some additional future capacity investment.

Estimated capital costs for rail infrastructure improvements are presented in Table 4.6.1 for each of the three Strategic Plan scenarios. Cost estimates for the mainline track projects were obtained from previous engineering studies of these potential projects. The estimated costs for signal system upgrades and for Washington Terminal capacity enhancements are allowances, for initial planning purposes only, and are not based on concept plans or a definitive scope of work.

Table 4.6.1
Rail Infrastructure Capital Cost Allowances

Costs in millions of 2003 dollars		2004-2009	2010-2015	2016-2025	Cumulative Total
AGGRESSIVE GROWTH --- HIGH RIDERSHIP	Miles of Additional Mainline Track	*0*	*6*	*24*	*30*
	Rail Infrastructure (beyond MOU)	$0	$37	$163	$200
	Signal System Upgrade	$0	$20	$0	$20
	Washington Terminal Capacity	$0	$25	$25	$50
	Total	$0	$82	$188	$270
TARGETED GROWTH --- MID-RANGE RIDERSHIP	Miles of Additional Mainline Track	*0*	*0*	*15*	*15*
	Rail Infrastructure (beyond MOU)	$0	$7	$81	$88
	Signal System Upgrade	$0	$0	$20	$20
	Washington Terminal Capacity	$0	$0	$25	$25
	Total	$0	$7	$126	$133
DEFERRED GROWTH --- LOW RIDERSHIP	Miles of Additional Mainline Track	*0*	*0*	*0*	*0*
	Rail Infrastructure (beyond MOU)	$0	$0	$0	$0
	Signal System Upgrade	$0	$0	$0	$0
	Washington Terminal Capacity	$0	$0	$25	$25
	Total	$0	$0	$25	$25

Within the territory between Alexandria and Washington, DC, the only major projects beyond those already included in the MOU are a new Potomac River bridge, and installing the fourth main track on existing right-of-way between the Potomac River and AF Interlocking in Alexandria. These projects together would provide for two side-by-side double-track railroads – one for passengers and the other for freight – all the way from Virginia Avenue Tower in Washington to the mixing bowl at AF Interlocking. This improvement offers the greatest long-term flexibility to VRE and the other passenger operators in designing their service plans to best meet their market objectives. It also is a requirement for unencumbered run-through service. The VRE commuter rail service is only one of many potential stakeholders in this set of capacity projects. As a result, the costs of these long-term capital projects are not included in the VRE Strategic Plan.

Train Dispatching and Operational Control

Historically, the operation and supervision of rail traffic in the greater Washington, DC region, including Northern Virginia and Maryland, has been fragmented – controlled by at least three different organizations, from five different dispatching locations:

- Washington Terminal, including C, K and A Interlockings – controlled by Amtrak, from K Tower at Union Station
- Northeast Corridor, from New York Avenue to Trenton, NJ – dispatched by Amtrak, from its Centralized Electrification and Traffic Control (CETC) facility, in Philadelphia
- MARC Camden and Brunswick Lines (CSX Capital and Metropolitan Subdivisions, including F and QN Interlockings at Washington), Alexandria Extension from CP-Virginia to Hyattsville, and the RF&P Subdivision from RO Interlocking south to Richmond and beyond – dispatched by CSX, from its control center in Jacksonville, Florida
- CP-Virginia via the Virginia Avenue Tunnel, Anacostia Jct. and Benning Yard to Landover, including L'Enfant Station and the Long Bridge – formerly controlled by Conrail (now CSX) from its control center in Selkirk (Albany), New York.
- AF Interlocking to Manassas and beyond – dispatched by Norfolk Southern, from its control center in Greenville, South Carolina.

CSX, since the breakup of Conrail, has acted to consolidate its dispatching functions in Jacksonville, which reduces the number of locations from five to four – which still is an awkward arrangement for passenger trains that have to traverse multiple territories.

The increased volume of train movements in the region, particularly on the line from CP-Virginia to Alexandria, and the necessary mixing or interleaving of freight and passenger trains on the Long Bridge prior to the construction of additional rail capacity across the Potomac River, will increase the density of train movements in this territory, especially during the weekday commuter peak periods. This will create a situation where careful attention is required on the part of train dispatchers to make the most productive use of the capacity that will exist following the proposed infrastructure improvements.

Consolidation of the dispatching functions at Washington Terminal and on the commuter lines emanating from Washington would provide for integration and closer control of rail operations in the Washington area. It also provides the opportunity to bring day-to-day operational decision-making closer to the affected stakeholders, including decisions about the response to delays, breakdowns or other incidents on the line, the imposition of slow orders or other actions in response to inclement or extreme weather conditions, or the coordination and handling of emergency situations, including the possible evacuation of the capital as happened on September 11, 2001. Maintaining safe operations would continue to be of paramount importance, and the organization, management and operating procedures of the new facility would need to be structured in a way that protects business interests of the freight railroads and the transportation objectives of all of the affected operators: CSX, NS, Amtrak, MARC and VRE.

Such an investment in a Washington-area control center may be economically justifiable, based on the increased dispatching workload, the fact that the Washington commuter area will require a method of operation and dispatching different from the rest of the CSX and NS network, and the limited expansion capacity at existing control center facilities, such as the CSX Dufford Center in Jacksonville.

Ideally, from the standpoint of passenger service, the limits of the territory to be incorporated in a new control facility should include the full extents of the Washington region's commuter service. It could include the CSX RF&P Line, Alexandria Extension and freight/commuter lines in Maryland, the NS line from Alexandria to Manassas, and the Washington Terminal complex. If the benefits are shown to outweigh the costs, the territory could be extended further to include the southern portion of the Amtrak Northeast Corridor and additional pieces of the CSX and NS networks.

The scope of such a project has not yet been developed, nor have sources of funding been identified. The potential benefits of such a project to VRE service will not, by themselves, be sufficient to make the case for such a major change in the existing ownership and control of train dispatching functions. Similar benefits also would accrue to the region's other passenger operators – MARC and Amtrak. However, the project would also have to represent a win-win situation for both CSX and NS. In order for either railroad to cede some measure of its independence with respect to train dispatching and control, they will have to receive substantial compensating benefits. Therefore, the project probably only makes sense in the context of a bigger plan, agreed to and funded by multiple stakeholders, that fundamentally addresses and relieves the bottlenecks in the existing regional rail freight network and gives each of the freight railroads substantially more capacity, greater clearance and weight allowances, and greater flexibility in scheduling their own traffic through the region.

VRE would not proceed unilaterally to implement such a project. However, the potential benefits of such a project in terms of VRE's ability to offer the highest level and quality of service to its customers make it entirely consistent with VRE's goals and a logical initiative to include in its long-range plan. The Strategic Plan, therefore, includes a capital line item and an allowance of $25 million for the facility and associated systems and equipment costs of establishing a regional control center in the Washington area.

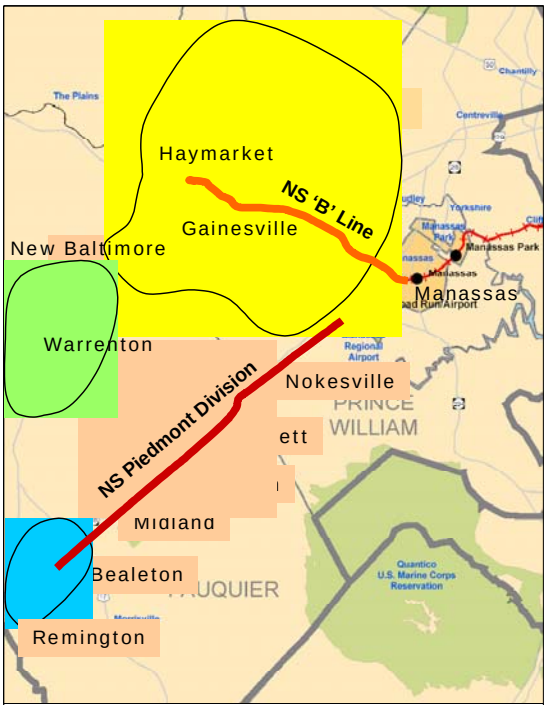
The ramifications of this potential change are extensive and require careful consideration, analysis, design, negotiation and agreement among the interested parties prior to implementation. Such analysis and discussion is outside the scope of this strategic plan study.

5. POTENTIAL NETWORK EXPANSION

Gainesville-Haymarket

The growth of the northern Virginia suburbs and the availability of affordable new housing are pushing the demand for commuter rail service beyond the boundaries of the current VRE network. Two possible routes for a westward service extension exist, as shown in Figure 5-1. Both are Norfolk Southern (NS) rail freight lines – one heading west generally paralleling Interstate Route 66 through Gainesville to Haymarket, and the other heading southwest into Fauquier County. These are not mutually exclusive alternatives, and, in fact, the long-range demand projections support VRE service on both lines. However, phased implementation of extended service is likely to be the way that service evolves.

Figure 5-1
Potential VRE Service Extensions West of Manassas



A strong case can be made for an extension of the VRE Manassas Line westward along the Norfolk Southern freight line towards Gainesville and Haymarket. The western portion of Prince William County, centered on Gainesville, is one of the fastest-growing residential areas in the region, and job growth in the corridor also is projected to be strong. Rail service is consistent with county growth plans. Institution of commuter rail in this area would expand VRE's core business of transporting relatively long haul commuters to the Central Business District. VRE will be competitive with highway-based modes for trips from this area to the Central Business District, because of the ever-growing highway congestion. Development in this corridor is rapid enough already that one issue of concern is that potential land for stations could face short-term development pressure.

Future incremental daily ridership from this area could be in the range from 3,100 to 5,500 trips, with the higher level of demand associated with full peak service at 30 minute headways, coupled with aggressive but reasonable assumptions about transit-oriented development adjacent to station sites and VRE's ability to induce increased demand for work trips to the CBD. Between 1,400 and 2,200 parking spaces would need to be constructed at the three potential station locations. Effective transit-oriented development can help reduce but not eliminate the need for parking. Much of the rapidly-developing area of western Prince William County will be within convenient driving distance of potential rail stations along this line.

In the winter of 2002-3, Parsons Brinckerhoff undertook a rail operations and engineering study in cooperation with Norfolk Southern and the Woodside Consulting Group to determine the impacts of potential VRE commuter trains on the operations both of NS freight trains and Amtrak passenger trains. The study, completed in the spring of 2003[2] identified specific railroad capacity needs and estimated construction costs to mitigate the impacts of rail commuter service. The study concluded that the proposed expansion to Bealeton/Haymarket was physically and operationally feasible, and that investments in railroad system capacity would be required to enable both passenger and freight services to grow and operate reliably in the future.

Significant capital improvements to the current railroad infrastructure are required to accommodate a mixed passenger and freight operation as well as taking into account future growth in VRE, freight, and intercity passenger service. The line west from Manassas through the Gainesville/Haymarket corridor (The B Line) is a single track, dark (unsignaled) railroad with a maximum authorized speed of 45 mph with 25 mph speed restrictions at some locations. Access to the line is through the Norfolk Southern yard at Manassas, which is controlled by hand-throw turnouts and which trains are now able to traverse only at a speed of 10 mph. No passenger trains currently operate over the line.

The 'B' Line originally was a minor branch line for the Southern Railway. However, as Norfolk Southern's network has evolved and the availability of the Amtrak Northeast Corridor for freight traffic has declined, the 'B' Line has become a strategically important link in Norfolk Southern's primary north-south route along the east coast – linking Virginia and the Southeast with Pennsylvania, New Jersey and New York. The line carries several time-sensitive, high-priority intermodal trains, and the level of freight traffic is projected to increase in the future.

[2] "Virginia Railway Express Service Extension Study," Woodside Consulting Group, Palo Alto, April 2003 Included as an appendix to this report.

In order to provide for the efficient movement of both passenger and freight trains, NS will require at a minimum a double-track railroad and a signal system with centralized traffic control for any new territory over which VRE commuter trains will run. On the 'B' Line, this means building the second track and adding the entire signal system. Straightening the existing line or adding superelevation to curves to increase the speed of the line also would be desirable for both freight and passenger operations.

Norfolk Southern is in the process of upgrading a similar line for passenger service in North Carolina and has found that main line curves maintained for passenger train speeds require higher elevation of the outside rail than curves in freight-only territory. The effect is that the inside rail wears out more quickly, and more frequent timber-and-surface work is required because of passenger train speeds. Most of the upgrading on the B Line will increase the maintenance costs for the right-of-way, and VRE should budget to absorb those increases.

Capital upgrades to rail infrastructure on the Norfolk Southern B Line that are necessary for the extension of passenger service include:

- Double track
- Traffic Control signaling
- Special electronics and circuitry for highway warning devices
- Power turnouts on all legs of Manassas wye and on all crossovers and station tracks
- 30 mph on both legs of upgraded Manassas wye
- 60 mph maximum freight train speed; 79 mph passenger speed where feasible.

The 'B' Line has several grade crossings between Manassas and Haymarket; two are particularly problematic, and VDOT has plans for their grade separation:

- State Route 28—Nokesville Road at Manassas, and
- US Route 29—Lee Highway at Gainesville.

The former project is expected to be completed within the upcoming six year capital program period. A preliminary design exists for the latter project, which includes a new interchange with Interstate 66 and the relocation of State Route 55. This will be a massive project, however, and it currently is unfunded, so the timing of its implementation is uncertain. When built, the highway overpasses will allow for a three-track right of way underneath. Both safety considerations and good railroad operating practice would keep passenger operations away from this site, however, until the grade separation project is complete.

Both the nature of the market and the railroad infrastructure improvements required lend themselves to a phased approach to implementation. A workable initial phase could include service to Gainesville, with an interim terminal station stopping short of the US 29 grade crossing. A second phase would expand the service on the branch from three peak trains to six and shorten peak headways from 50 to 30 minutes – either retaining the terminus at Gainesville or extending the line three miles to Haymarket if the US 29 grade separation project moves ahead.

The US Route 15 grade crossing at Haymarket is another major railroad grade crossing that will deserve consideration for grade separation as the local area develops, particularly if VRE service is extended to Haymarket. As is the case with the other crossings, there is no State or Federal funding currently allocated for this project.

Gainesville Start-Up Service

A logical starting point for Gainesville service would include three morning peak trains to Washington, at approximately 50 minute headways, returning to Gainesville in the afternoon peak. There would be an intermediate station stop near the point where the extension of Sudley Manor Road would cross over the rail line. A hypothetical train schedule for this "Phase 1" service is presented in the Appendix. The Gainesville trains would alternate with trains originating at Broad Run, also at 50 minute headways, resulting in train service between Manassas and Washington at 25 minute peak headways, slightly better than today's schedule. Supplemental bus service could be provided from Gainesville and Sudley Manor to Manassas, to connect with the Broad Run trains to reduce the effective headway of the service. Similarly, buses could connect Broad Run station with the Gainesville trains as they pass through Manassas.

The capital improvements recommended in the feasibility study included double tracking and signaling the line where passenger trains operate, raising the authorized speed and upgrading the access to the line through Manassas Yard. Table 5-1 presents the requirements for initial start-up service to Gainesville. A range of costs is presented, between $55 and $70 million, reflecting the existence of issues that require further analysis and which might affect the terms of the agreement that will need to be reached between NS and VRE concerning VRE's use of the 'B' Line. That agreement, which has yet to be negotiated, will determine the extent and cost of capacity improvements on the line that will be required for VRE to begin service to Gainesville.

The high end of the cost range includes all capital projects that NS has identified as being required to support the start-up service. It also includes a cost allowance for a VRE storage yard facility along the 'B' Line route. The low end of the cost range assumes that the new yard facility is deferred to a later phase of development, and it also assumes that the construction of a third mainline track from Manassas to Broad Run can be deferred. The actual mix of projects that will need to be constructed for the start-up phase as well as any subsequent phase will need to be determined cooperatively by NS and VRE. For purposes of the Strategic Plan, the start-up cost for Gainesville service is expected to fall somewhere within the range of costs presented in Table 5.1.

Support facilities on the Manassas Line will need to be expanded to accommodate the increased equipment and ridership. If a new yard is not built at Gainesville as part of the initial project, the existing Broad Run facility is adequately sized to accommodate the extra VRE trainset. The three morning Gainesville trains could deadhead (run empty in non-revenue service) between the overnight storage point at Broad Run and the start of revenue service at Gainesville.

Startup service to Gainesville (Phase 1) will add one equipment set (locomotive and six cars, at a cost of approximately $15 million) to VRE's daily equipment requirements, bringing the daily total up to six sets of equipment.

Table 5.1
Capital Projects Required for VRE Start-Up Service to Gainesville

(All capital costs expressed in millions of 2003 dollars) Not sure about the last column.

Category	Project	Capital Cost Range		Potential Cost Sharing
		Low	High	
Rail Infrastructure	Extend Springfield Runaround Track	$0.6*	$0.6*	No
Rail Infrastructure	Upgrade 'B' Line connection track on north leg of Manassas Wye	$4.9*	$4.9*	No
Rail Infrastructure	Extend 2nd main track, install signal system, Manassas to Gainesville, approx. 8 mi.	$20.4*	$20.4*	No
Rail Infrastructure	Side track for local freight use in Gainesville vicinity	$2.3*	$2.3*	No
Rail Infrastructure	Construct 2nd main track, South leg of Manassas Wye	$1.4*	$1.4*	No
Rail Infrastructure	Construct 3rd main track, Manassas to Broad Run	--	$8.0*	No
Stations	Two commuter stations, with double side platforms, surface parking	$10.0	$10.0	Yes (Developers)
Yards	Potential storage yard at Gainesville	--	$7.0	No
Rolling Stock	One additional 6-car trainset	$15.0	$15.0	No
TOTAL COST		**$54.6**	**$69.6**	

* Source: Woodside Consulting Group, Inc.

Full Service to Haymarket

As a second phase of development, service could be extended on the 'B' Line from Gainesville to Haymarket, a total of about three miles, and the quantity of train service could be expanded to approximate the level of service provided to VRE's existing territory. The number of peak trains would be increased from three to seven, permitting peak headways of 30 minutes. Hypothetical schedules are presented in the Appendix. Reverse-peak VRE service also could be instituted at this time, providing opportunities for inner city and suburban residents to use VRE to travel to workplaces in the I-66 corridor. Limited off-peak service between Washington and Haymarket also could be considered.

The overall level of train service at Broad Run would be reduced to two or three peak trains. Feeder bus connections from Broad Run to Haymarket trains at either Manassas or Sudley Manor could provide additional service frequency at other times of day. Supplemental feeder buses would be more cost-effective than adding more trains but still would require operating subsidies over and above the core VRE service.

The capital investments associated with extending service to Haymarket are presented in Table 5.2. As with the initial start-up phase, a range of capital costs is presented – with the incremental cost of extending VRE service to Haymarket (over and above the cost of the start-up service) in the range of $38 to $68 million, depending upon how much infrastructure work is done in the first phase and how much new rolling stock is

required. Double track and signals with centralized traffic control will be extended to the Haymarket area, at around Milepost 11.5 on the 'B' Line. The logical time at which to extend VRE service to Haymarket is when the major US29/SR55/I-66 highway improvement is made. This project includes grade separating both US29 and SR55 over the railroad at Gainesville, and a portion of the second main track and industrial siding could be constructed as part of or simultaneously with this project.

Depending upon when service is extended to Haymarket and what other service improvements have been made by VRE to support the core network, one to two additional trainsets (capital cost between $15 and $30 million) will likely need to be placed in service at the time full VRE service (e.g., 30 minute peak headways) to either Gainesville or Haymarket is instituted.

Table 5.2
Additional Capital Projects Required for Full VRE Service to Haymarket

(All capital costs expressed in millions of 2003 dollars)

Category	Project	Capital Cost Range		Potential Cost Sharing
		Low	High	
Rail Infrastructure	Extend 2nd main track, install signal system, Gainesville to west end of Haymarket, approx. 3 mi.	$11.5**	$11.5**	Partial (US29 / SR55 / I-66 interchange project)
Rail Infrastructure	Haymarket station track	$1.8*	$1.8*	No
Rail Infrastructure	'B' Line siding extensions between Haymarket and Front Royal (including Allison and potentially additional locations)	$6.0	$6.0	Yes (NS)
Rail Infrastructure	Projects to improve operating speed for passenger and freight trains***	$TBD	$TBD	No
Stations	Haymarket station, with single side platform, surface parking	$4.0	$4.0	Yes (Developer)
Yards	Storage yard for 6 VRE trainsets at Haymarket, if not provided at Gainesville in Phase 1	--	$7.0	No
Rail Infrastructure	Construct 3rd main track, Manassas to Broad Run, if not provided in Phase 1***	--	$8.0*	No
Highway	US 29 and SR 55 grade crossing elimination	n.a.	n.a.	Yes (VDOT)
Rolling Stock	Two additional 6-car trainsets	$15.0	$30.0	No
TOTAL COST		**$38.3+**	**$68.3**	

* Source: Woodside Consulting Group, Inc.
** Scope and cost modified from original Woodside estimate based on NS comments, 7/03.
***Scope and cost of these improvements to be determined during design, subject to cost-effectiveness analysis.

When full VRE service is instituted to Haymarket, an overnight train storage and light maintenance facility will need to be built for the six VRE trainsets that will operate on the branch. This facility should be situated on the 'B' Line, in order to avoid time and

capacity-consuming deadhead moves from Broad Run for large numbers of trains and to ensure the reliability of both passenger and freight service on the line. A preferred site for this facility has not yet been selected, but several candidate locations have been identified in the area between Gainesville and Haymarket.

In progressing this service extension, there are several strategic partnerships that VRE could form as a source of support and funding. Potential implementation and funding partners include:

- Prince William and Fauquier counties, local municipalities, and private sector developers, for the coordinated transit-oriented development of station areas and station facilities
- Commonwealth of Virginia, in light of support of increased intercity service to Charlottesville, Roanoke, and Bristol. Many of the same capital improvements would benefit both services
- Norfolk Southern, because railroad capacity projects in this corridor dovetail with Norfolk Southern's broader initiative to increase capacity for north-south freight service and upgrade the 'B' line route to a major, strategic main line
- I-66 Corridor Project because the proposed VRE service offers the potential to mitigate the negative impacts of highway construction and provide over the long term a productive transportation option for people seeking to travel to the central business district.

Fauquier County

There is another choice for VRE expansion beyond Manassas – into Fauquier County along the Norfolk Southern Piedmont main line from the current VRE terminus at Broad Run to either Bealeton or Remington. Bealeton is 17 miles from Broad Run, and Remington is another 3 miles distant.

In contrast to the Gainesville-Haymarket corridor, the rail corridor through Fauquier corridor represents a smaller market and there is less evidence of current development. There are, however, strong growth prospects. There is available water and sewer capacity in the Bealeton-Remington zone, and there is excellent station area development potential. The County master plan supports growth in the Bealeton-Remington zone, and 8,000 new dwelling units of housing are proposed within the growth area.

Full VRE service to both Haymarket and Bealeton-Remington would require a total of ten Manassas Line equipment sets, along with associated overnight storage and maintenance facilities.

There are six potential station locations on the route between Broad Run and Remington, formerly stops on the Southern Railway – including Nokesville in Prince William County and Catlett, Calverton, Midland, Bealeton and Remington in Fauquier County.

Most of the countryside through which the rail line passes between Broad Run and Bealeton is land planned for rural and agricultural preservation by Prince William and Fauquier Counties. Though some infill and limited subdivision development is

inevitable in this corridor, and would be magnified were commuter rail service to be introduced, the density of development in close proximity to the rail line will never be heavy enough to generate significant numbers of commuter rail riders, particularly given the low percentage of Fauquier County residents with workplaces in the central business districts served by VRE.

The areas surrounding the communities of Bealeton and Remington, on the other hand, are a different story. They lie within an already-established water and sewer district and are targeted as a growth area by Fauquier County. A total of 8,000 new dwelling units are planned for the Bealeton-Remington growth area. There also are active planned development projects at both potential stations locations. At Bealeton, the development will be primarily focused on employment, while at Remington, the station area proposal calls for a more mixed-use development. Both locations have considerable transit-oriented development potential. Because of the potential for transit-oriented development at Remington, this is likely to be the preferred terminus for VRE service extended in Fauquier County.

The operational and engineering feasibility study looked at Bealeton as the terminus, because of a known development project at that location, and did not address the potential extension of service for an additional three miles to Remington, where the local station area development proposal only became known during the course of the study.

Incremental operating costs for Fauquier County service will be reasonable, because some of the Fauquier service will be extensions of trains that would otherwise start out at Broad Run. The operating plan for the Fauquier County service assumes four peak trains operating towards Washington in the morning and returning in the afternoon peak period. The trains would be spaced 30-45 minutes apart. One or more trains at the height of the peak could operate as express trains, skipping some stations on the inner portion of the line in order to shorten as much as possible the journey time by rail.

Three stations are assumed along the extension: Remington, Bealeton and one intermediate park and ride station that could pick up commuters driving from the Warrenton/New Baltimore area. Daily ridership by 2025 is projected to be in the range of 1,100 to 2,000 daily trips, with the higher figure representing more aggressive assumptions with respect to transit-oriented development and induced demand. A total of 600 to 800 parking spaces would need to be developed at the three station locations. Demand would be slightly higher at the intermediate park-and-ride station without a VRE extension to Gainesville-Haymarket, with a greater share of Warrenton-New Baltimore riders using the Fauquier service.

The highest VRE mode shares will be achieved with service on both extensions, offering more choices to commuters from Fauquier County. Table 5.3 lists the projects that would have to be implemented in order to initiate VRE service to Fauquier County. The principal rail infrastructure requirement is to restore the second mainline track between Nokesville and Calverton, for a distance of 7 miles. Construction of the second track will be relatively straightforward and less expensive on a per-mile basis than constructing a new track in the Gainesville-Haymarket corridor, since the Piedmont mainline used to be a double track line.

An additional capital project would create a separate side track for the terminal station, whether it is located in Bealeton, Remington or another location, so that VRE trains at

the end-of-the-line can dwell and lay over off of the two-track mainline. The cost estimate assumes three new commuter stations.

In addition to the above projects, Fauquier service should help bear the cost of one or two additional VRE trainsets ($15 to $30 million total cost), which will be required to operate a split VRE service west of Manassas. The overall incremental cost of a VRE line extension to Remington is estimated to be in the range of $40 to $60 million, including new rolling stock.

Table 5.3
Capital Projects Required for VRE Service to Fauquier County

(All capital costs expressed in millions of 2003 dollars)

Category	Project	Capital Cost Range		Potential Cost Sharing
		Low	High	
Rail Infrastructure	Extend 2nd main track, Nokesville to Calverton, 7.0 mi.	$16.0*	$16.0*	Yes (Intercity service)
Rail Infrastructure	Station track at Fauquier terminal station	$1.1*	$1.1*	No
Stations	Three commuter stations, with single side platforms, surface parking	$8.5	$8.5	Yes (Developers)
Yards	Storage yard for 3-4 VRE trainsets	--	$5.0	No
Rolling Stock	1-to-2 additional 6-car trainsets	$15.0	$30.0	No
TOTAL COST		**$40.6**	**$60.6**	

* Source: Woodside Consulting Group, Inc.

Overnight train storage for the equipment that will provide the Fauquier County service is an issue that will need to be worked out as plans for the line extension are developed. One option would be to build a new yard at Remington for a cost of about $5 million. This would eliminate the need for deadhead mileage on the NS mainline, reduce potential operating conflicts between passenger and freight trains, and offer the most train scheduling flexibility to VRE. The Broad Run facility then could be converted for another use, such as a VRE maintenance shop. There is a risk, however, that Remington might not prove to be the optimal VRE yard location – if VRE service someday is extended to Culpeper or further south.

The second option would be to avoid investing in a Remington yard – or at least defer such investment until a firm decision is made about where the "end-of-the-line" will be located. With only a relatively small number of peak period trains to Washington, the Remington service could be operated by storing the equipment overnight at Broad Run and deadheading the trainsets out to the end of the line. Such an option should be feasible, as long as sufficient time is allotted in the deadhead schedules for NS to fit these trains around other freight trains that might be operating at the same time. This option would save some capital cost but increase day-to-day operating costs.

This work effort did not consider requirements for the extension of service beyond Fauquier County – to Culpeper, Charlottesville or any point in between. The previous study by VDOT and NS of potential additional intercity passenger trains did look at requirements to support limited increases in intercity service but did not specifically

look at requirements for commuter rail service, which has significantly different operating characteristics. No significant additional major investments were identified between Culpeper and Charlottesville, but the earlier plan will need to be re-visited, if additional VRE extensions are contemplated.

As the Bealeton and Remington area develops, particularly if the development concentrates higher-density residential uses in proximity to rail stations, there will be sufficient demand to support commuter rail service. The overall demand will be lower than in the Gainesville-Haymarket corridor and will take longer to materialize, so Fauquier service is envisioned as a later phase in the expansion program.

One additional obstacle to near-term implementation is the fact that Fauquier County currently is not a participating jurisdiction in VRE, being a member of neither the Potomac and Rappahannock Transportation Commission (PRTC) or the Northern Virginia Transportation Commission (NVTC). In order for an extension of VRE service to Fauquier County to be considered for implementation, VRE's core network needs will need to be fully funded, and Fauquier County will need to arrange to join the governing structure of VRE or otherwise contribute its appropriate share of VRE's capital investment costs and ongoing operating subsidies.

Commuter bus service in the Route 28 and Route 29 corridors should be considered, connecting with VRE at Broad Run or Gainesville and perhaps also serving other workplace destinations – both as an interim measure to build ridership and offer a long-haul public transportation option in advance of the ultimate extension of VRE service, and as a possible permanent alternative to extended VRE service. The efficacy of commuter bus service will depend in part upon extent of peak traffic congestion in the main highway corridors, as well as the size of the travel market to be served. Based on experience elsewhere, bus service with a transfer to the train will capture a significantly lower market share than direct service, but it offers a potentially cost-effective option. Station facilities and parking lots could be developed in advance of the rail extension and served initially by buses. Operating subsidies for a bus service would need to be borne by the jurisdictions served.

Even after extended VRE service is started, peak train service can be supplemented by buses meeting peak shoulder hour trains at Manassas (either starting there or originating on the Gainesville-Haymarket branch). The peak shoulders are the periods just before and after the heaviest part of the peak period, at times when both rail ridership and highway congestion are at lower levels than at the height of the peak.

One way to cut costs attributable to VRE would be to partner with the interests at the State level seeking to develop enhanced intercity passenger train service in the Washington-Charlottesville-Roanoke-Bristol corridor. The Nokesville-to-Calverton double tracking project would benefit intercity trains as well as commuter and freight trains and was identified as a required capital project in an earlier study of long-distance rail passenger service. A joint program by the Commonwealth of Virginia and VRE to introduce both VRE commuter service and longer-distance train service in this corridor would increase the number of trains and travel markets benefiting from the capital investments.

Spotsylvania County

Commuters from Spotsylvania County on VRE already number in the hundreds. They come from a relatively widely scattered set of origins within the county and mostly drive and park at the station in Fredericksburg. As is the case in other counties that lie at the current fringes of the greater Washington metropolitan area, the pace of residential development is accelerating, and rural areas inexorably are being transformed into suburbs.

Only 6 percent of work trips from the Fredericksburg/Spotsylvania catchment area are destined for the central business district (CBD). However, more than one third of those trips currently are made on VRE – even with relatively long drive access from much of Spotsylvania County to the Fredericksburg station. MWCOG projects that the number of work trips made by residents of Spotsylvania and Fredericksburg will increase by 45 percent between now and 2025, but only a relatively small number of these new commuters are projected to head to the CBD.

There are a couple of strong arguments in favor of the creation of a new station in Spotsylvania County. It would be a relatively low-cost option for VRE and involve very little change to the current railroad operating plan, since VRE Fredericksburg trains already operate to and from the Crossroads storage yard in Spotsylvania. Building this station also would relieve pressure for additional station parking in downtown Fredericksburg, which would be expensive to construct and at odds with the City's plans for the station area. Early implementation of a Spotsylvania station could enable VRE to give up one or more of the parking lots it currently leases at Fredericksburg. A complete new station with 500 surface parking spaces could be built at Route 17 in Spotsylvania County, excluding any required rail infrastructure improvements, for about the same cost as a 500-car garage in downtown Fredericksburg – approximately $7 million. A VRE line extension to Spotsylvania could be implemented in the near term, without a lot of investment beyond the cost of the station facilities and track and signaling modifications in the immediate vicinity of the station.

The logical location for a VRE station within Spotsylvania County is where US Route 17 crosses over the railroad, at the Crossroads Industrial Park. No other potential station locations within Spotsylvania County were considered in this analysis, and options are limited. Heading southward from Crossroads, the rail right-of-way moves further away from the concentrations of new development along Route 1 and passes into Caroline County. Route 17 offers excellent local and regional highway access, from Route 1, Spotsylvania and Massaponax to the west and from New Post and Caroline County to the east.

The station would be located to the south of the Route 17 overpass, where the lead track diverges from the CSX mainline and heads up hill to the VRE Crossroads Yard. The turnout from the mainline to the lead track would be moved and the lead track extended approximately 1,000 feet to the north to make room for a station platform alongside the extended lead track. For VRE service, a relatively simple station with a single side platform would be sufficient to accommodate projected passenger demand and anticipated future train operations. The platform location off of the CSX mainline would minimize any impacts of this station on mainline freight operations.

Should VRE service be extended south to Richmond, with Richmond trains seeking to stop at the Spotsylvania station, an additional side platform could be constructed along mainline Track 2, which passengers could access by crossing the VRE lead track at a

pedestrian grade crossing. This is the same solution as proposed for the Broad Run station with VRE service extended into Fauquier County.

Station plans also should allow for the future possibility of a regional intercity passenger rail station at this location – either in addition to or in lieu of the current Amtrak stop at Fredericksburg.

The Crossroads site offers an excellent opportunity for transit-oriented development. Though the property in the immediate station vicinity is zoned for industrial use, much of the property currently is vacant and could conceivably be partially re-zoned for relatively dense mixed uses.

This would be a relatively low-cost extension of VRE service. Total capital costs are projected to be in the range of $16.6 to $19.1 million, including the station, parking lot, required trackwork and signal system modifications in the station area, and an allowance for an additional four VRE coaches to handle increased passenger loads. At least a portion of the station costs could be borne by private development in the station area, particularly if it is done as part of a coordinated transit-oriented development.

Despite relatively high cost-effectiveness, the Spotsylvania station is not included in the core VRE network because Spotsylvania, like Fauquier County, currently is not a participating jurisdiction in VRE. At this time, expansion obstacles include not having permission from CSXT to expand farther south, and the counties below Fredericksburg are not participants in either of the commissions that own, operate and arrange funding for VRE.

If the necessary operating authority is acquired and the required capital investment needs are determined, then VRE can prepare operational plans for expansion. This project could advance in a relatively timely manner if Spotsylvania County joins the governing structure of VRE or otherwise contributes its appropriate share of VRE's capital investment costs and ongoing operating subsidies.

Table 5.4
Capital Projects Required for VRE Service to Spotsylvania County

(All capital costs expressed in millions of 2003 dollars)

Category	Project	Capital Cost Range		Potential Cost Sharing
		Low	High	
Rail Infrastructure	Extend VRE Crossroads Lead Track, new turnout to mainline Track 2	$1.5	$1.5	Yes (Intercity service)
Rail Infrastructure	Two main line crossovers north of station to provide universal capability	--*	$2.5	No
Stations	Side platform station on Crossroads Lead Track	$6.3	$6.3	Yes (Developers)
Yards	No additional projects	--	--	No
Rolling Stock	Additional coaches (4)	$8.8	$8.8	No
TOTAL COST		**$16.6**	**$19.1**	

* New crossovers not required if already provided as part of Fredericksburg to Crossroads triple tracking.

Richmond and Charlottesville

During the course of the development of the VRE Strategic Plan, there has been interest expressed in the possibility of extending VRE service even further than Spotsylvania and Fauquier Counties – to Richmond on the CSX RF&P Line and to Charlottesville on the NS Piedmont mainline.

Consideration of Richmond and Charlottesville service was outside the scope of the strategic plan study, but investment decisions by VRE emanating from the strategic plan, particularly those affecting service to Spotsylvania and Fauquier, will need to account for the possibility of future longer-distance service – so that VRE investments are made wisely and cost-effectively.

Data on potential travel demand in the Richmond-Washington and Charlottesville-Washington corridors were not available for consideration in the strategic plan, and requirements for investment in rail infrastructure beyond Crossroads and Remington are not known with certainty.

Comprehensive, quantitative analysis of the feasibility, market potential and cost-effectiveness of VRE Richmond and Charlottesville service will need to the be subject of subsequent study – to define the context within which Richmond and Charlottesville service can be considered, identify the prerequisites for such service, and ensure that design concepts for extended service to Spotsylvania and Fauquier enable or at least do not preclude future further extensions of VRE.

Run-Through Service to Maryland

The notion of integrating the commuter rail services of VRE and MARC and running commuter trains through Union Station to destinations on the far side of the region is a compelling one and has the potential to significantly increase the number of travel markets that the commuter rail networks can serve. There are many hurdles, however – physical, operational and institutional – that will need to be resolved before run-through service can become a reality.

Preliminary projections indicate that run-through would generate greater ridership benefits for MARC than VRE. Run-through service would generate approximately 3,000 additional daily trips on VRE, while MARC daily ridership at the L'Enfant, Crystal City and Alexandria stations could be in the range of 10,000 to 20,000 trips. This estimate includes some riders that already take MARC and transfer to the Metro at Union Station.

Other potential benefits of VRE-MARC run-through service – to the Washington metropolitan region as well as two the two commuter railroads – include:

- Potential alleviation of mid-day storage constraints by reducing demand for storage at Washington Terminal
- Potential VRE access to the proposed MARC maintenance facility in Baltimore
- Mitigation of Metrorail's core capacity constraint, through diversion of some passengers from the most heavily congested segment of the Metro Red Line
- Increasing ridership for both systems
- Removing longer-distance commute trips from the Beltway and river crossings

- Improved airport access (potential VRE to BWI Airport, and MARC to Reagan National Airport).

An initial start-up service could consist of up to four run-through trains in each direction in the peak hour, with a total of eight over the course of the full peak period – both morning and afternoon. Initially, the number of trains will be limited by the need to share track capacity with freight traffic across the Potomac River on the 2-track Long Bridge.

The first prerequisite project for run-through service – the reconfiguration of AF Interlocking in Alexandria, Virginia – was completed in mid-October, 2001, using Commonwealth of Virginia funds.

The following additional projects need to be completed, or conditions met, prior to implementing MARC run-through service to northern Virginia – in order for the service to be viable and sufficiently convenient to attract significant numbers of commuters. Given the required lead time for some of these items, a 4-5 year minimum timeframe for implementation is realistic.

Table 5.5
Prerequisites for VRE-MARC Run Through Service

	Sponsorship and funding status	Estimated Additional Capital Cost
Prerequisites for Start-Up Service		
1. L'Enfant freight bypass track	Funded under VDOT-VRE-CSX MOU	None
2. L'Enfant Station – Island platform and METRO connection		$60-$90m
3. Third track and interlocking reconfiguration – RO to SRO	Funded under VDOT-VRE-CSX MOU	None
4. CSX Alexandria Extension Improvements	Funded under MD MTA-CSX Agreement	None
5. Additional VRE and MARC rolling stock		TBD
6. Modified Operating Agreements		TBD
7. Crystal City Station reconfiguration		$14-$50m
8. Washington Union Station – High-Level Platforms & Concourse Improvements		$5m
9. Washington Union Station – Improved Concourse and Pedestrian Connection to METRO		$30m
TOTAL ESTIMATED COST, exclusive of rolling stock		$109-$175m
Prerequisites for Full Run-Through Service		
10. Train Storage and Servicing Facilities		$10-$30m
11. Line Capacity Improvements – Maryland		TBD
12. Washington Terminal Interlocking Improvements		$25m*
13. VRE Cab Signal Equipment for Northeast Corridor Operation		$3m
14. Centralized Washington Area Train Operations and Dispatch Center		$25m*
15. New Potomac River Rail Bridge and Improved Freight Route Through Washington, DC		TBD
TOTAL ESTIMATED COST		TBD

* Cost allowances. Further concept development, feasibility analysis and design required.
TBD – cost to be determined.

The nine prerequisites for start-up run-through service are described below.

1. <u>L'Enfant freight bypass track</u>

   This project is funded as one of the high-priority rail capacity improvements listed in the memorandum of understanding (MOU) signed by VDOT, VRE and CSX. It will provide a third track through the L'Enfant station area to permit

CSX through trains to bypass any passenger activity at the station and minimize the length of the 2-track bottleneck across the Potomac River.

2. L'Enfant Station island platform

   The L'Enfant station project, described previously, provides an island platform, accessible from both tracks leading to and from Union Station. It would enable the station to be served at peak periods by trains operating in both directions. The station project is separate from the bypass track project and currently is unfunded. Both the station project and the bypass track are critical for run-through service and both must be completed before run-through service can be started.

3. Third track and interlocking reconfiguration – RO to SRO

   This project is located in Virginia, in the vicinity of Crystal City. RO Interlocking is located immediately south of the Long Bridge across the Potomac River. At SRO Interlocking, just south of the existing Crystal City VRE station, the 2-track line divides into 3 tracks. The planned project will extend the 3-track line from SRO to RO, as close as possible to the river crossing. The RO-SRO project, coupled with the L'Enfant project described above, will create a separate mainline track for freight trains for almost the entire distance from Virginia Avenue Tower to AF Interlocking in Alexandria – except for a distance of about one mile across the Potomac River on the 2-track Long Bridge. This will minimize the distance over which passenger and freight trains will have to share a 2-track right-of-way within the busy stretch of railroad. Like the L'Enfant project, this project is funded and included in the CSX MOU.

4. CSX Alexandria Extension Improvements

   The Alexandria Extension is the railroad route for CSX trains through Washington, DC – connecting the Virginia Avenue Tunnel and the RF&P Subdivision on the south with CSX's two main lines in Maryland running to the north (Baltimore, Philadelphia) and west (Brunswick, Cumberland). Improvements are needed to increase the capacity of this largely single-track line and maximize the ability of CSX to maintain a smooth flow of trains in both directions. Double-tracking the line has been identified as a high-priority need. A portion of the line is being double tracked and improved through a project funded by the State of Maryland through an agreement with CSX. In addition, CSX has made improvements to allow freight trains to operate at higher speeds through the Virginia Avenue Tunnel and at the point where the Alexandria Extension connects with the main line in Hyattsville, MD. Together, these initiatives will increase the throughput capacity of this line for CSX, provide them with more train dispatching flexibility, and reduce potential conflicts between freight and passenger train movements in the territory between Alexandria and Virginia Avenue.

5. Additional VRE and MARC Rolling Stock

   Both VRE and MARC are operating close to the practical capacity of their respective rolling stock fleets. Any significant incremental ridership attracted by run-through service in either direction will require the acquisition of additional coaches to accommodate the increased passenger loads at acceptable levels of coach occupancy.

6. Modified Operating Agreements

Even a relatively modest start-up operation of run-through service (including both VRE to Maryland and MARC to northern Virginia) will likely push the number of daily commuter train movements beyond the limits provided for in the MOU. To permit more flexible operations planning south of Washington, and to enable the full capacity benefits of proposed infrastructure improvements to be realized by all users of the rail system, the CSX operating agreements with VRE and the Maryland Transit Administration (MTA) should be modified to incorporate the following assumptions:

- During weekday peak periods, exclusive use of one track between AF Interlocking and Washington Union Station for passenger trains in the peak direction of flow (mostly VRE commuter trains, but also including Amtrak and Southeast Corridor high-speed trains or other passenger trains sponsored by the State of Virginia) – northward towards Washington in the morning peak, southward in the evening peak.
- Shared use of the second track across the Long Bridge for all other traffic:
  - northbound and southbound freight trains
  - reverse-direction passenger trains, including Amtrak trains, Southeast Corridor high-speed trains, VRE reverse-peak trains, and MARC run-through trains (southward in the morning, northward in the evening)
  - "slots" on this track would be allocated and reserved for each user
- Shared use of both tracks across the Long Bridge for all users during non-peak periods, with increased capacity for freight movements and reduced (perhaps capped) volumes of passenger trains

An operating agreement also will be required between VRE and the Maryland MTA, which owns and contracts with Amtrak and CSX to operate the MARC system.

7. Crystal City Station reconfiguration

Crystal City Station currently has a single side platform, which can only be accessed during peak periods by passenger trains operating in the peak direction of flow. Run-through service will generate demand at this station for trains operating in both directions, which can only be accommodated if the station is reconstructed to include an island platform fronting on two tracks. The VRE Strategic Plan project to relocate and rebuild this station to provide better access to local employment (currently unfunded) would put the facilities in place that are needed for future run-through service.

Stopping peak period MARC or VRE reverse-peak trains at Crystal City requires prior completion of this project, however, initial run-through service initially could be provided to L'Enfant Plaza and Alexandria prior to completion of the Crystal City station project.

8. Washington Union Station – High-Level Platforms & Concourse Improvements

   The lower level of Union Station, which includes all of the tracks that connect to the First Street tunnel heading towards Virginia (tracks numbered 22 through 29), currently has only low-level platforms. To minimize the required dwell times of MARC trains operating through Union Station to and from Northern Virginia, and to maximize passenger convenience, all MARC run-through trains should stop on tracks with high-level platforms.

   VRE low-boarding equipment (the recently acquired Gallery and Bombardier cars) requires low platforms, as do the Amtrak long-distance trains operating with Superliner equipment (e.g., the Cardinal). Selected tracks are assumed to remain with low-level platforms and would be used by VRE trains.

   The Burnham Place project will develop the air rights above the station's lower level. The development will replace the vertical circulation elements to the lower level platforms. The configuration of platform heights and vertical circulation elements that this project provides should be designed to support the future introduction of VRE-MARC run-through service with minimal additional changes. VRE, while neither project manager nor financier, is nevertheless a key stakeholder since the portion of the station most affected by the project is the portion most used by VRE.

9. Washington Union Station – Improved Concourse and Pedestrian Connection to Metrorail

   In concert with the escalator, stair and elevator replacements noted above, the Burnham Place project plans to upgrade and reconfigure the concourse that sits above the lower level tracks and platforms, to provide an improved level of amenity and comfort for commuters and intercity passengers who use the lower level platforms.

   MARC run-through service to northern Virginia will shift some peak MARC trains from the upper level of Union Station to the lower level, which will significantly increase the walking distance from the platform to the Metrorail station at Union Station for riders who exit these trains in Washington.

   Since approximately half of MARC's Union Station customers transfer to or from Metrorail, the initiation of run-through service may lengthen commute times and inconvenience a large number of existing MARC riders.

   To mitigate this condition, a direct pedestrian link could be constructed between the lower level Union Station platforms and the north mezzanine of the Metro station, including a moving walkway. Such a project is not included in any current plans for Union Station, and feasibility studies and conceptual plans have not yet been undertaken. It would be logical and desirable to add such a project to the scope of the Burnham Place air rights development project for Union Station that is now being initiated.

   Both the concourse improvements and an improved Metrorail connection would benefit VRE customers, and those Amtrak customers boarding or alighting from trains on the lower level tracks – in addition to MARC customers who board or alight at Union Station on run-through trains that platform at the lower level. Sharing of any incremental capital costs among the three railroads, therefore, would be appropriate.

Additional Improvements

Even with the improvements listed above, passenger and freight trains will continue to share the 2-track line across the Potomac River – the Long Bridge. Though it is likely that passenger trains can be given priority during the weekday commuter rush hours, it is also likely that CSX will seek to operate some freight service in both directions during the peak periods, which will limit the number of passenger trains that can be operated in the VRE reverse-peak direction.

In the assumed start-up operation of VRE-MARC run–through service, it is assumed that VRE will no longer operate reverse-peak trains (either turnback trains for second peak trips or deadhead trains for storage). These slots are assumed to be occupied by MARC run through trains. Some of these trains will make the VRE second turns (there is only one such turn in the current schedule, on the Manassas Line). Conversely, VRE trains can be used to make some of the MARC second turns, facilitating the return of this equipment to Virginia. The number of second turn opportunities will depend upon the base schedule and operating plan. It also would be possible in certain run-through scenarios for VRE equipment to make either revenue or deadhead moves to Baltimore for equipment maintenance at the MARC facility there.

On the Long Bridge, between RO Interlocking and the new interlocking west of L'Enfant Station, freight trains are assumed to occupy a slot of approximately 10 minutes, in either direction of travel. Passenger trains, which accelerate more quickly, are assumed to transit this distance in approximately five minutes. These time intervals are based on trains starting from a stopped position and include time for the signals to clear up behind them. The capacity of this track to accommodate mixed traffic is governed by these "slot" occupancy assumptions and the number of slots allocated among the various types of trains within the peak period. The resulting plan allocates capacity for four passenger trains per hour in the VRE reverse-peak direction, at least three of which are assumed to be available for MARC run-through service. CSX will have sufficient capacity "slots" to run a freight train in either direction every half hour, though only a few such slots would normally be occupied each rush hour period. Multiple freight slots are reserved, because the arrival time of freight trains varies considerably day to day.

The maximum number of peak period run-through trains will be constrained by available capacity over the Long Bridge and at Washington Terminal – until such time as additional capacity is created (i.e., a new parallel bridge, or modified terminal interlockings).

The following additional projects are not required in advance of implementing a relatively modest start-up service, but they would be necessary to support a full, reliable, high-quality operation with more than four run-through trains per hour. Unimpeded run-through service will be possible only once separate routes through Washington, DC for freight and passenger trains are created.

10. Train Storage and Servicing Facilities

As with rolling stock, VRE and MARC have limited capacity for train storage and servicing, both at outlying yards and within Washington Terminal. To the extent that run-through service may affect the locations where commuter rail trains are stored and maintained, new facilities may need to be built or existing

facilities expanded to accommodate future run-through service requirements. In some instances, run-through service may actually reduce investment needs or at least improve the utilization of facilities at outlying points, such as VRE's Broad Run yard, or MARC's existing and planned facilities at Baltimore and Brunswick, MD.

11. Line Capacity Improvements – Maryland

The number of peak run-through trains to Maryland destinations that VRE will be able to operate will be constrained by available line capacity for what would be "reverse-peak" trains in MARC territory. At a minimum, VRE should be able to replace in-kind the reverse-peak trains that MARC now operates (1-2 trains per hour on the Camden Line, and 1-2 trains per hour on the Penn Line). Increasing that number of trains, or enabling the running of VRE trains on the Brunswick Line to Silver Spring or Rockville, may require investment in rail infrastructure to provide sufficient capacity for both passenger and freight trains. The extent of required investment needs to be determined through more detailed operations and simulation analysis and appropriate agreements reached with CSX and/or Amtrak.

12. Washington Terminal Interlockings

For volume of through traffic proposed initially (up to 4 through commuter trains per hour in each direction, with a total of 8 through commuter trains in each direction per peak period), no changes to the configuration of K or C Interlockings are assumed. Significantly higher level of traffic are likely to require investments in additional K-C lead tracks or additional parallel crossovers at K and/or C Interlockings.

13. Cab Signal Equipment

Any VRE locomotives and cab cars that will operate on the Amtrak Northeast Corridor (NEC) as part of a run-through scenario will need to be retrofitted with cab signal and related equipment to support the 9-aspect signal system and automatic train stop system that is being implemented on the corridor. The Gallery and Bombardier bi-level cab cars may be excluded, because they will be unable to serve the high-platform stations on the NEC (Penn Line). All other VRE equipment (diesel locomotives, and Kawasaki bi-level cab cars) are assumed to be equipped for NEC operation.

14. Centralized Washington Area Train Operations and Dispatch Center

At the present time, rail traffic in the Washington, DC area is controlled by multiple dispatching centers, stretching from Jacksonville, FL to Philadelphia, PA. In the current environment, monitoring and control of a VRE run-through train from Manassas to Baltimore would be handed off among four different traffic control centers – all in different cities. If the scheduled running time for run-through trains is to be minimized, and the potential for train delays reduced, then consolidation of the train dispatching functions at a single Washington area location makes sense. While not an absolute prerequisite for run-through service, consolidated dispatching would make both the scheduling and operation of run-though trains more straightforward. This was discussed earlier in the report and would improve other aspects of VRE's service as well.

15. New Potomac River Rail Bridge

The number of VRE and MARC run-through trains that can be operated in any hour is constrained by available line capacity on the 2-track Long Bridge, which crosses the Potomac River at Washington. Plans for constructing a new rail crossing of the Potomac and creating a dedicated double-track route through Washington, DC for freight trains have been proposed and discussed at various times in the past – most recently as part of the Mid-Atlantic Rail Operations (MAROPS) initiative on the part of the freight railroads, Amtrak and the mid-Atlantic states. A preferred route and concept plan has not yet been selected; no funding has yet been allocated, nor has a timetable for implementation been established. The combination of a new 2-track bridge over the Potomac and a new or expanded freight route through Washington, DC that bypasses or otherwise relieves the bottleneck of the single-track Virginia Avenue Tunnel would simultaneously improve freight service in both Maryland and Virginia as well as free up the existing rail route for the exclusive use of passenger services.

Several issues will need to be explored further before a specific implementation plan can be recommended and the full costs of implementing run-through service are known:

- Operational Capacity of Long Bridge
- Operational Capacity of Washington Terminal Interlockings
- Train storage and maintenance requirements, by location
- Train crew issues, including:
  - the handling of equipment at Washington, through operation vs. hand-off from one crew to another
  - labor agreements, depending upon who holds the operating contract(s)
  - cross-qualification of crews on expanded crew territory
  - common, single contract operator for MARC and VRE versus multiple operators
  - impact on crew requirements and costs for MARC and VRE.
- Institutional issues, including:
  - renegotiation of existing operating agreements or creation of new agreements among MTA, VRE, Amtrak, CSX Transportation, Norfolk Southern & possible future third-party contractors
  - capital spending and project management responsibilities
  - ticketing & fare collection – joint or common ticketing, possible conversion of MARC to proof-of-payment system, and compatibility with planned regional universal farecard system
  - revenue & cost sharing
  - liability and insurance
  - customer service procedures.

Many of the prerequisite projects for run-through service make sense to support the overall growth of VRE service and are included as recommended projects in the VRE Strategic Plan. Others require partnering with other stakeholders, including Amtrak and the freight railroads. The total required capital cost to implement even a relatively modest start-up run-through service could approach $100 million, including railroad and station infrastructure as well as rolling stock.

MARC, and most-likely VRE as well, will incur incremental operating costs to support run-through service. To the extent that both railroads implement run-through service in a manner consistent with each railroad's planned growth, these costs can be minimized. Elements of railroad operations and maintenance costs include train and engine crews, maintenance of equipment, railroad access fees, operator performance incentives, and management/administrative costs.

Potential cost savings are possible, associated with equipment maintenance and operations at Washington Union Station, however, such savings are not expected to be substantial. A more detailed study will have to be undertaken in coordination with MARC and the District of Columbia in order to fully understand the costs and benefits associated with run-through service.

6. PHASED SERVICE IMPROVEMENT PLAN

VRE is running very close to its practical capacity on both the Fredericksburg and Manassas Lines, with some peak trains having standees on a regular basis. VRE ridership has grown to the point where demand warrants an increase in the number of trains. The decision by VRE to acquire available Gallery coaches from the Chicago commuter rail system will provide sufficient rolling stock for VRE to meet its needs through about 2007. However, there remain constraints in the immediate near term which limit VRE's ability to add trains to its schedule:

- The memorandum of understanding (MOU) among VRE, VDOT and CSX limits VRE to 32 daily train movements until such time as additional capital projects to increase line capacity are completed. The next projects to be implemented – the L'Enfant third track and the Arkendale crossovers – are delayed beyond their originally anticipated 2003 completion date.
- Lack of mid-day train storage space in Washington Terminal effectively precludes the operation of additional trains that would need storage in Washington during the day. The Coach Yard, where VRE stores its 11 trainsets during the mid-day period, is filled to its absolute maximum.

Absent the ability to increase the number of trains, the logical goal for VRE would be to increase the number of coaches as needed on the existing peak trains to provide enough seating capacity for those who wish to ride. VRE currently possesses enough equipment to be able to add coaches to the peak trains, but they are precluded from doing so by the lack of any additional capacity for mid-day train storage. Equipment assignments already have been juggled to ensure that the peak trains are operated with bi-level coach equipment, which have a higher seating capacity than the single-level Mafersa cars. Therefore, VRE will be constrained to its existing operating plan and existing consists (train lengths) until:

- additional mid-day storage capacity is created, or
- VRE is able to bring some of its equipment back to Manassas for mid-day storage, freeing up space in the Coach Yard to lengthen the remaining ten trains.

When the next round of CSX capacity-related capital projects is completed (including the construction of third main tracks on Franconia Hill and through the Crystal City area), VRE will be able to increase the number of trains it operates. Until these projects are completed, VRE will not be able to add trains – even including deadhead (non-revenue) or reverse-peak trains back to Manassas for mid-day storage.

One possibility that would give VRE the opportunity to increase the length of some of its peak trains would be to couple the last two morning peak trains together at the platform in Union Station and run them together as the 8:30 am Manassas train. One of the two trains would be uncoupled at Broad Run station and stored in the yard, returning to Washington coupled up with the return trip of the early afternoon Manassas train. This would enable VRE to reduce the number of trains stored during

the mid-day at the Washington Coach Yard from 11 to 10, enabling additional coaches to be placed on at least two other peak trainsets.

Another potential short-term remedy for the lack of storage capacity at Washington Terminal would be to construct an interim storage track in available right-of-way adjacent to the L'Enfant Station. Two VRE trainsets up to eight cars long could be stored at this location during the mid-day period, reducing the number of trains that would have to be stored in the Coach Yard and enabling some of those trains to be lengthened.

Aside from these or other possible short-term measures to increase train lengths, the Strategic Plan assumes that VRE will generally maintain its existing pattern and frequency of service until at least the 2006-2007 timeframe, when the first order of new coaches will have been received and the next round of MOU capital projects will have been completed.

From that point forward, the Strategic Plan provides a three-step plan for incrementally increasing the quantity of VRE service in response to ridership demand. These improvements in service are assumed to be implemented in phases and coordinated with capital investments that provide sufficient capacity for the increased service. This three-step plan depicts a more simplified process than will likely be the case in actuality, but it is useful as a means of envisioning the evolution of rail service and analyzing the effects of improved service on ridership, costs and financial performance.

Three hypothetical schedules and operating plans have been developed for three periods of time, roughly corresponding to increasing levels of ridership demand:

1. Phase 1: Adding one trainset to each line (prior to 2010 in the Targeted and Aggressive Growth scenarios)
2. Phase 2: Growing to eight trainsets on each line and initiating service to Gainesville (in the 2010-2015 period for the Targeted and Aggressive Growth scenarios)
3. Phase 3: Service extensions to Haymarket and Spotsylvania and Fauquier Counties, with nineteen total trainsets (post-2015 for Targeted Growth Scenario and by 2015 in Aggressive Growth Scenario).

Sample timetables for each of these three phases, on each VRE line, are included in an appendix to the report. These timetables are illustrative rather than definitive and were used as the basis for estimating ridership potential, evaluating infrastructure needs, and calculating operating costs. Table 6.1 summarizes their key characteristics and illustrates the anticipated growth in train service over the course of the three phases.

The **Phase 1** plan adds one trainset to each line in the 2006-2007 timeframe, or when sufficient rolling stock becomes available and additional MOU capital projects are completed.

On the Fredericksburg Line, the new schedule will respond to demand patterns by starting service earlier in the morning. At the height of the peak, the interval between trains will be shortened from 30 minutes to between 20 and 25 minutes. Seven trains will be stored overnight at Crossroads Yard, each making a round trip to Washington

and back – northbound in the morning peak and southbound in the afternoon peak. The Cherry Hill station is assumed to be in operation.

On the Manassas side, adding a trainset will enable the start-up of VRE service to Gainesville, along the Norfolk Southern 'B' Line west of Manassas. New stations are assumed at Gainesville, to the east of the US 29 grade crossing, and at the proposed extension of Sudley Manor Road. Three morning peak trains originate at the Broad Run storage yard, deadhead to Gainesville, and then run as revenue trains to Washington spaced about 50 minutes apart. The remaining three trainsets would originate at Broad Run and operate directly to Washington. The current reverse-peak and mid-day trains would operate to Broad Run as they do today.

Table 6.1
Operating Plan Characteristics of
VRE Phased Service Improvement Plan

	Current Schedule	Phase 1 2007-2010	Phase 2 Low 2010-2015	Phase 2 High 2010-2015	Phase 3 by 2025
Fredericksburg Line Revenue trainsets	6	7	8	8	9
Daily train movements	14	16	18	28	34
Coaches in revenue service	32	49	55	61	70
Manassas Line Revenue trainsets	5	6	8	8	10
Daily train movements	18	20	28	36	42
Coaches in revenue service	26	38	47	50	66
TOTAL Revenue trainsets	11	13	16	16	19
Daily train movements	32	36	46	64	76
Coaches in revenue service	58	87	102	111	136

Sometime in the 2010-2015 period, a **Phase 2** schedule is assumed to be implemented which increases the total number of trainsets in revenue service from 13 to 16, with 8 trainsets operating on each line. For purposes of this analysis, VRE service is assumed to remain within the existing VRE service territory. In this phase, VRE will be able to offer on the Fredericksburg Line either peak headways reduced to 20 minutes (the "Low" case in Table 6-1) or the start of a zone express service at 30 minute headways (the "Phase 2 "High" case). In the latter case, peak trains serving the stations beyond Rippon would skip the innermost stations. The stations between Rippon and Franconia-Springfield would be served by different trains. The first two early morning trains arriving in Washington would turn and head back to Rippon for a

second peak period trip serving the inner zone. The high case also assumes additional mid-day and evening service. The "high" case operates a higher number of daily trains on the line (28) versus the "low" case (18). Infrastructure projects beyond the MOU will likely be required to support the high level of operations.

On the Manassas Line, The US 29 grade separation project is assumed to be completed, and commuter service extended another three miles to Haymarket. Two additional trainsets will enable VRE to provide improved peak headways (30 minutes) for each of the two branch lines beyond Manassas (Haymarket and Broad Run). The largest quantity of service in this phase is allocated to the Gainesville-Haymarket branch, with more limited rush hour only service from Broad Run. During off-peak and peak shoulder hours, train service out of Broad Run can be supplemented by a feeder bus service Between Broad Run and Manassas (where Broad Run passengers could transfer to and from other Gainesville-Haymarket trains), provided the incremental operating cost is supportable.

The split service at rush hours will enable some peak trains to operate as expresses or partial expresses east of Manassas, without having to lengthen headways at the inner stations. The number of daily Manassas Line trains will increase to between 28 and 36. The high end of this range assumes that bi-hourly mid-day service and later evening service is added. Operations analysis of projected passenger and freight train activity during the off-peak periods will need to be undertaken to determine any additional rail infrastructure requirements. However, off-peak service should be easier to add on the Manassas Line, than on the Fredericksburg Line, because the level of freight traffic is lower, at least on the part of the railroad between Alexandria and Manassas.

In total, the number of daily VRE trains is projected to grow to between 46 and 64 – well beyond the 40 train limit provided by the current memorandum of understanding (MOU) with CSX. This will require modifying or extending this agreement, which should become a high priority for VRE. As the capital improvement projects listed in the MOU are completed between Virginia Avenue in Washington, DC and AF Interlocking in Alexandria, the railroad will have received virtually all of the capacity enhancement that is possible without a new bridge across the Potomac River. One main track in this area will be effectively dedicated to carrying nothing but peak direction VRE (and a limited number of Amtrak) trains. The remaining railroad will effectively be a double-track line that carries freight traffic in both directions and any reverse-peak direction commuter or Amtrak trains – with a relatively short single-track section in the middle across the Long Bridge over the Potomac River. In this scenario, it would be logical for CSX to closely control access by reverse-peak and off-peak passenger trains, as well as all VRE service on the CSX RF&P Subdivision, but VRE should not be limited in the number of trains it is permitted to operate from the Manassas Line to Washington, as long as they can fit comfortably in-between other VRE trains and operate single-file on a single track between AF and Virginia Avenue.

The **Phase 3** schedule in effect represents full VRE service in the years approaching 2025, incorporating multiple line extensions to enable VRE to fully tap potential ridership markets in the outlying counties of the region. A third new trainset is added to the Fredericksburg Line (bringing the total to 9), which will permit *both* zone express service and 20-minute peak headways at all stations. A new VRE station at Spotsylvania (Crossroads) is assumed. On the Manassas side, VRE service is assumed to be extended to Fauquier County (Bealeton and Remington). The

operating plan provides for a total of 10 trainsets, six on the Gainesville-Haymarket branch and four on the Fauquier branch. Additional off-peak service and weekend service is assumed to be provided on both lines as warranted by demand, with sufficient capacity improvements to permit reliable freight and passenger operations.

Though not shown in the appended timetables, the Phase 3 operating plans are compatible with extensions of VRE service to Richmond and/or Charlottesville, as well as run-through service to Maryland. For example:

- One or two of the outer zone express trains on the Fredericksburg line could be stored overnight and originate at Richmond instead of Crossroads. This would provide basic Washington commuter service from Richmond, Ashland and other communities in the I-95 corridor. One or more VRE trains could provide a late morning, mid-day and early afternoon service from Washington to Richmond and back – in part duplicating Amtrak's service but offering a greater number of station stops. This can be accomplished without additional equipment (but perhaps requiring additional train crews). Adding rush hour commuter service to Richmond, however, would require the acquisition of additional trainsets.
- Similarly, one or two of the Remington trains could be stored overnight and originate at Charlottesville instead of Remington – providing Washington commuter service from Charlottesville, Culpeper and points in-between. As in the Richmond corridor, Washington commute and mid-day service could be provided with the same fleet of equipment, but providing a morning peak train from Washington that would arrive in Charlottesville at the start of the work day and return in the afternoon peak would require an additional trainset.
- Given the relatively long distances involved, it might be desirable from a passenger comfort point of view to use coaches for this service that have a seating type, configuration and amenities comparable to intercity trains.
- The increased number of reverse-peak trains included in the Phase 3 VRE schedule provide a greater number of opportunities for these slots to be filled by run-through MARC trains instead of VRE trains. (An equivalent number of VRE trains would fill the MARC reverse-peak slots.).

This high level of service in Phase 3 would be greatly facilitated by the construction of a new 2-track Potomac River railroad bridge, which would completely separate freight and passenger traffic north of AF Interlocking and greatly improve VRE's scheduling flexibility. Without a new bridge crossing, the extent of MARC run-through service to Virginia and intercity service to Richmond, Charlottesville or points further south (both of which generate passenger traffic across the Potomac in the reverse-peak direction) would be restricted during weekday peak periods.

Though service extensions are shown in the Phase 3 long-range plan, it would be possible to advance some or all of these extensions within the timeframe of Phase 2, provided the required core network investments are fully funded and the overall level of capital investment can be increased to provide the necessary supporting infrastructure.

On the other hand, financial constraints could conceivably reduce the level of capital funding available to VRE or spread capital projects, including line extensions, over a longer period of time. In this case, the level of VRE service would grow more slowly,

and, consequently, VRE would capture a smaller share of the CBD work trip market, and development in the locations beyond the reach of the VRE network would tend to be less transit-focused than if VRE expansion progressed more rapidly.

7. PHASED CAPITAL INVESTMENT PLAN

The VRE Strategic Plan includes a three-phase program of capital investments to support and enable the planned steps in increased service and to respond to increasing levels of demand. The planned investment program corresponds with the three-phase evolution of the VRE operating plan described in the preceding section and attempts to keep pace with projected ridership demand. These costs exclude current projects for which funding already has been committed, such as the CSX MOU rail infrastructure capacity projects and the current parking lot expansion projects at Manassas and Woodbridge.

Three illustrative scenarios have been developed for the phased implementation of VRE capital projects, corresponding to the three potential strategies outlined in Section 3:

1. Targeted Growth
2. Aggressive Growth
3. Deferred Growth

These scenarios bracket the low and high ends of the range of investment levels that will achieve VRE's long-term objectives. All three fully invest in VRE's core network needs – providing for parking expansion, new rolling stock, yard storage and fleet maintenance facilities. They vary with respect to the pace of investment and service expansion.

Through 2025, total required capital investment is projected to average in the range of $35 million to as high as $100 million per year in the case of the Aggressive Growth scenario (in constant 2003 dollars). Approximately $10 million per year is currently available for discretionary capital projects. Unfortunately, Federal funds available to support the capital program are not keeping pace with ridership growth. This gap will need to be closed and the level of funding increased if VRE is to satisfy the increasing demands for its service and maintain its high standards of service quality.

The first scenario – Targeted Growth – spends capital money at an increasing rate through 2015 and focuses investment on the core network. It includes a phased program of line extensions that is limited in the early years, while core network needs are being addressed, However, it targets initial expansion into the Gainesville corridor, where the early presence of VRE can encourage transit-oriented development and provide a viable public transportation option for commuters to the central business district as well as reverse commuters. This is the "middle-of-the-road" scenario that matches the phased service improvement plan outlined in the previous section. Estimated capital costs by category of projects for this scenario are presented in Table 7-1. Capital needs are approximately $47 million per year through the first six-year period (2009), and grow to approximately $76 million per year in the 2010-2015 period. This program defines the investment that will be required, even in a fiscally-constrained

environment, to maintain a high level of service quality and improve VRE's market share as the region continues to develop and expand.

The second scenario – Aggressive Growth – front loads more of the investment, with the intent of bringing on line the service extension projects sooner, taking full advantage of the opportunity for VRE to influence regional development and travel patterns in a way that maximizes VRE's market potential. In this scenario, service extensions to Spotsylvania and Fauquier Counties, as well as run-through service to Maryland, are in place by 2015. This high-end plan requires investment over the next six years at an average of $64 million per year, increasing to $100 million per year between 2010 and 2015, as shown in Table 7-2.

The third scenario – Deferred Growth – is at the other end of the spectrum. It responds to today's financially-constrained environment and builds up the VRE service more slowly. Core network needs are still addressed, but projects are phased over a longer period of time, and line extensions are deferred until after 2015. Table 7-3 presents a summary of capital costs by time period. The plan estimates the minimum level of capital investment that will be necessary to preserve VRE's historical market share and maintain its level of service. Because the market for work trips to the business district continues to grow, the average annual level of capital expenditure in the early years will still need to increase to approximately $35 million per year, significantly above the current level of $10 to $13 million per year. Over the long term, the lower level of investment in this scenario will make it difficult for the VRE to have a positive impact on development and travel patterns. In addition, in this scenario VRE will have greater difficulty staying ahead of the demand for its service, which will mean more crowded conditions on trains and in stations, greater reliance on modes other than drive-and-park for station access, and perhaps a lowering of overall service quality as perceived by VRE's riders, compared with the other two scenarios.

A more detailed breakdown of the major line items of capital investment requirements is provided in the Appendix. Each of the Strategic Plan scenarios assumes that station parking will have to be continually expanded over the 20-25 year period to keep pace with growing demand. New coaches and locomotives also will need to be acquired in stages over the next 20 years, initially to replace leased equipment and ultimately to keep pace with growing ridership and replace the single-level Mafersa cars.

Table 7-1
Estimated Capital Costs of VRE Strategic Plan
Mid-Range -- Targeted Growth

(All costs expressed in millions of 2003 dollars)

Project Category	2004-2009	2010-2015	2016-2025	Total Cost
Station Parking Expansion	$ 47.3	$ 13.4	$ 9.0	$ 69.7
Suburban Station Improvements	$ 19.7	$ 33.1	$ 39.6	$ 92.4
Central Business District Stations	$ 5.0	$ 120.0	$ 40.0	$ 165.0
New Suburban Stations	$ -	$ 7.2	$ 11.0	$ 18.2
VRE Network Expansion	$ 38.2	$ 19.8	$ 30.6	$ 88.6
Train Storage and Maintenance Facilities	$ 20.0	$ 107.0	$ -	$ 127.0
Rail Infrastructure	$ 6.0	$ 34.1	$ 126.4	$ 166.5
Rolling Stock	$ 174.1	$ 118.0	$ 100.2	$ 392.3
TOTAL CAPITAL COST	**$ 310.3**	**$ 452.6**	**$ 356.8**	**$ 1,119.7**
Average Annual Capital Cost	**$ 51.7**	**$ 75.4**	**$ 35.7**	**$ 50.9**

Table 7-2
Estimated Capital Costs of VRE Strategic Plan
High end of Range -- Aggressive Growth

(All costs expressed in millions of 2003 dollars)

Project Category	2004-2009	2010-2015	2016-2025	Total Cost
Station Parking Expansion	$ 57.1	$ 13.3	$ 11.1	$ 81.5
Suburban Station Improvements	$ 19.7	$ 45.6	$ 28.7	$ 94.0
Central Business District Stations	$ 75.0	$ 90.0	$ -	$ 165.0
New Suburban Stations	$ -	$ 16.9	$ 4.1	$ 21.0
VRE Network Expansion	$ 38.2	$ 45.4	$ 5.0	$ 88.6
Train Storage and Maintenance Facilities	$ 45.0	$ 107.0	$ 5.0	$ 157.0
Rail Infrastructure	$ 6.0	$ 109.1	$ 191.6	$ 306.7
Rolling Stock	$ 174.1	$ 162.5	$ 104.8	$ 441.4
TOTAL CAPITAL COST	**$ 415.1**	**$ 589.8**	**$ 350.3**	**$ 1,355.2**
Average Annual Capital Cost	**$ 69.2**	**$ 98.3**	**$ 35.0**	**$ 61.6**

Table 7-3
Estimated Capital Costs of VRE Strategic Plan
Low End of Range -- Deferred Growth

(All costs expressed in millions of 2003 dollars)

Project Category	2004-2009	2010-2015	2016-2025	Total Cost
Station Parking Expansion	$ 30.1	$ 20.0	$ 12.8	$ 62.9
Suburban Station Improvements	$ 19.2	$ 15.5	$ 18.1	$ 52.8
Central Business District Stations	$ 2.0	$ 60.0	$ 60.0	$ 122.0
New Suburban Stations	$ -	$ 6.2	$ 1.8	$ 8.0
VRE Network Expansion	$ -	$ -	$ -	$ -
Train Storage and Maintenance Facilities	$ 12.0	$ 25.0	$ 25.0	$ 62.0
Rail Infrastructure	$ -	$ -	$ 25.0	$ 25.0
Rolling Stock	$ 174.1	$ 78.0	$ 45.8	$ 297.9
TOTAL CAPITAL COST	**$ 237.4**	**$ 204.7**	**$ 188.5**	**$ 630.6**
Average Annual Capital Cost	**$ 39.6**	**$ 34.1**	**$ 18.9**	**$ 28.7**

8. INSTITUTIONAL AND ORGANIZATIONAL ISSUES

VRE is outgrowing its original organizational framework – both in terms of the size and complexity of its operation, and its geographic extent. It has reached and surpassed the level of ridership for which it was originally designed. Normally, institutional and organizational issues would not be addressed directly in a plan such as this, which is intended primarily to address technical issues of ridership demand, railroad operations, infrastructure requirements and costs. However, part of the task assigned to VRE staff by the VRE Operations Board was to examine alternative funding sources for capital and operating requirements as well as alternative reporting structures for the operation of VRE. The study's technical work has led to the conclusion that the *status quo*, both in terms of VRE's operations and its financing structure, cannot be sustained into the future. Consequently, as the VRE Operations Board and the Commissions evaluate the Strategic Plan and set the course for VRE's future growth, they will need to engage in parallel discussions about how to fund that growth.

As the VRE continues to grow, it will evolve in several ways from a relatively modest start-up operation into a mature commuter railroad. If it is to preserve its excellent relationship with its customers and maintain the high quality of service that those customers have come to expect, the jurisdictions that fund VRE will need to step up to a significantly higher level of ongoing annual investment – both in terms of capital projects and operating subsidies. In the current environment, the local jurisdictions that make up VRE's governing commissions contribute a significant share of the annual capital and operating support for the VRE, but their ability to absorb a major increase in funding support for VRE is limited.

A general fact about public transportation service is that as ridership grows, so does the total subsidy required to cover the system's operating costs, since passenger fares cover less than two-thirds of the cost of running the trains. VRE outperforms most other commuter railroads in terms of the share of operating costs that it recovers from fares and other revenues. Carrying additional riders may create some economies of scale that can decrease the average subsidy per passenger trip, but the total annual subsidy dollars required still tends to increase as both ridership and the quantity of service increase.

Most of the easy and inexpensive capital projects to increase VRE's capacity have already been done. The next generation of projects will be more difficult and costly than those in the past – including parking structures, new station platforms with pedestrian bridges and elevators, new track construction, new and expanded train storage yards requiring acquisition of costly downtown property, and new facilities for VRE rolling stock maintenance. Compared with the cost of new highway or HOV lane construction ($10+m/mi.), or the cost of adding/extending Metrorail lines ($100+m/mi.) or building light rail lines ($30+m/mi.), as estimated from recent projects in the region that have been either implemented or studied, VRE expansion at about $5m/mi. can be considered relatively cost-effective. By investing in the VRE, the region will receive a tangible benefit in terms of rush hour people-moving capacity and mobility choice in the corridors served by VRE.

Many of the required projects will be eligible for Federal funding, and the costs of some projects will be able to be shared with other entities that benefit from them.

Nevertheless, the participating jurisdictions could be faced with securing the local match for a capital program in the range of $60 to $70 million or more per year. Making the financial commitments necessary to support higher levels of both capital and operating support for VRE will be a large challenge for the counties and municipalities that have become used to a total annual capital and operating subsidy that has remained under $6 million for the last several years. Policy decisions will need to be made concerning the extent to which local support can be increased, the extent to which the pace of investment will need to be slowed in response to constrained funding, and the extent to which alternative sources of funding can be tapped.

Among the many possible ideas for alternative funding are several that could have an impact on the way VRE is organized, governed and financed. Travel demand pressures and local political pressures to extend and expand VRE service to new markets offers an opportunity for VRE to change the way in which it receives funds and increase the number of entities with a financial stake in VRE. The extension of VRE service to Virginia counties beyond the boundaries of the VRE commissions – such as Fauquier and Spotsylvania – will drive the need to find ways for these counties to become formal stakeholders and funding participants. One option is working within the existing commission structure – either changing the make-up of the existing commissions or creating one or more additional commissions.

It may be appropriate to adjust the role of the Commonwealth of Virginia in funding the expansion and ongoing operation of VRE, depending upon VRE's potential role in providing longer-distance passenger rail services in the Richmond and Charlottesville corridors or commuter rail services elsewhere in Virginia. Even within the existing VRE territory, several of the rail capacity projects included in the VRE Strategic Plan would have economic benefits for Virginia that extend beyond VRE's core commuter rail business – including benefits for long-distance high-speed rail service, and benefits for the freight railroads and shippers within Virginia that use the railroads.

Many in the region have advocated integrating or better coordinating the two independent commuter rail operations serving Washington, VRE and the MARC system in Maryland. Run through service is possible with capital investment, new track and terminal agreements with the host railroads, and an agreement between the two operating agencies at a minimum. Commuter service integration across state boundaries also raises broader institutional and organizational issues, posing constraints and creating opportunities that are beyond the scope of this work effort to explore – but which must be investigated before informed policy decisions can be made about run-through service. In any case, a strong partnership will be needed between Virginia and Maryland to advocate, fund and implement necessary and mutually-beneficial improvements to regional rail infrastructure.

The Federal government also has a strong interest in the service that the VRE provides and has a legitimate role to play in guiding its future – above and beyond the Federal Transit Administration's traditional role as regulator and conduit for Federal funds. Over half of VRE's customers work for agencies of the Federal government. The commuter rail network also links many Federal facilities – both military and civilian, such as Quantico Marine Base and Fort Belvoir in Virginia, Fort Meade and the Aberdeen Proving Ground in Maryland, the US Patent Office complex in Alexandria, and the Internal Revenue Service in New Carrollton, MD. The mobility offered by the regional rail system also has a role to play with respect to homeland security in the

nation's capital. On September 11, 2001, the commuter rail system was limited in its ability to aid the evacuation of the Capital. The Federal Government's interests in VRE should be explored as the rail system expands and evolves.

The proposed Washington-area train dispatching and operational control center is a project that offers significant benefits to all stakeholders in the region's rail system, including the states of Maryland and Virginia, the Federal Government, the freight railroads, and freight shippers in the region. Such a project will likely be linked to other major capital investment initiatives and would be more difficult to implement by a fragmented group of disparate agencies working independently than by a regional rail consortium or authority acting on behalf of the full range of rail-related interests in the region.

Regardless of the path chosen, VRE's future organization and governance structure should emphasize protecting perhaps one of its greatest assets – and the strong personal relationship that VRE management has forged with its riders, and a commitment to customer service of the highest quality.

9. FINANCIAL CHARACTERISTICS OF THE PLAN

Annual Operations and Maintenance Costs

For each phase of increased VRE service through 2025, annual operations and maintenance costs were estimated. Table 9.1 presents these estimates, in year 2003 dollars. These estimates include all operating costs, including access fees paid to the host railroads, but they exclude estimated annual debt service and operating reserve funding. The financial and subsidy calculations in the next section incorporate these factors. A range of estimates is presented for the Phase 2 and Phase 3 plans. The low end of the range corresponds to a rush-hour focused service with limited off-peak service (similar to today's operation) and ridership towards the low end of the spectrum. The high end of the cost range includes additional off-peak services and ridership towards the high end of the projected range.

The estimates assume a contract operation similar to that currently provided by Amtrak. One or more contracts are assumed to cover operation of the trains, on-board ticket inspection and maintenance of equipment. These estimates were based on historical experience, adjusted to reflect the likelihood of future increased costs in some areas and potential economies of scale in other areas as the overall volume of service and passenger traffic grows.

Costs for train and engine crews were factored up from historical rates based on the projected increase in number of train crews required. This number does not necessarily rise linearly with the number of trainsets in service in Phase 2 and Phase 3, since increasing levels of reverse-peak and off-peak service are assumed to be provided, and several (but not all) trainsets will require both a morning and an afternoon/evening crew, in cases where the trainset makes multiple round trips over the course of a day. Labor and material costs for maintenance of equipment are

assumed to grow proportionally to the size of the fleet. Historical average unit costs for servicing, inspection, maintenance and repair activities are assumed.

Table 9.1
Projected VRE Operations and Maintenance Costs

Cost Line Item	Phase 1 2004 - 2009	Phase 2 2010 - 2015	Phase 3 2016 - 2025
Contract Operator			
Operations	$ 83.5 to $ 88.4	$ 113.0 to $ 147.4	$ 212.9 to $ 286.6
Materials	$ 4.7 to $ 5.0	$ 6.3 to $ 8.3	$ 12.0 to $ 16.1
Incentives	$ 3.8 to $ 4.1	$ 5.2 to $ 11.4	$ 9.8 to $ 13.2
Management	$ 15.6 to $ 16.4	$ 19.9 to $ 21.9	$ 44.6 to $ 54.7
Other	$ 10.8 to $ 11.5	$ 14.7 to $ 19.2	$ 27.7 to $ 37.2
Railroad Access			
Amtrak Fees	$ 6.0 to $ 6.0	$ 7.8 to $ 10.2	$ 14.6 to $ 19.8
CSX Fees	$ 23.4 to $ 27.0	$ 29.4 to $ 42.0	$ 55.0 to $ 81.0
NS Fees	$ 13.8 to $ 13.8	$ 20.2 to $ 25.9	$ 38.4 to $ 50.4
Station Maintenance	$ 9.9 to $ 10.6	$ 12.5 to $ 13.8	$ 27.7 to $ 34.4
Ticketing Costs	$ 5.0 to $ 5.3	$ 6.3 to $ 7.0	$ 14.1 to $ 17.5
Administrative	$ 1.4 to $ 1.6	$ 1.8 to $ 2.1	$ 2.5 to $ 3.4
TOTAL OPERATIONS & MAINTENANCE COST	$ 177.9 to $ 189.7	$ 237.1 to $ 309.2	$ 459.3 to $ 614.3
Average Annual O&M Cost	$ 29.7 to $ 31.6	$ 39.5 to $ 51.5	$ 45.9 to $ 61.4

On-time performance incentive payments are assumed to be paid to the contract operator, based on current contract rates, assuming that the system achieves an average level of 95 percent on-time performance.

Access fees are assumed to be paid to Amtrak as the owner of Washington Terminal and to CSX and Norfolk Southern (NS), owners of the railroad lines over which VRE trains operate. The CSX and NS fees are assumed to be calculated on a train-mile basis, using the current rate, adjusted by the increased number of train miles projected to be operated in each phase. Washington Terminal access fees are calculated based on current contract costs per train, factored up to account for increasing numbers of trains operated and stored at the terminal. As the level of VRE traffic grows, assessing track access costs on a train-mile basis may not be the most appropriate method, particularly if VRE or the State has invested in substantial increased line capacity. Alternatives that cover the railroads' maintenance of way costs and provide for a reasonable fee and be explored during the process of negotiating updated operating and access agreements.

Station maintenance costs, ticketing and ticket processing costs and general administrative costs are factored up from historical rates, based on projected passenger volume growth.

Required Subsidy Level

Two key financial performance indicators have been estimated for VRE through 2025, derived from estimated future ridership and operating costs, and based on a number of underlying assumptions. These indicators are:

- Recovery ratio
- Non-Federal annual capital and operating subsidy.

The recovery ratio is defined to be the percentage of annual operating costs that are covered by passenger fares. VRE historically has been able to achieve recovery ratios in the range of 60 percent. Moving forward, as ridership builds and average train passenger loads increase, economies of scale will tend to lower the unit cost per passenger of operating trains. On the other hand, increasing the total number of trains operated, particularly the expansion of off-peak and reverse commute service and also peak zone express service, will tend to increase operating costs faster than revenue.

The non-Federal subsidy is an estimate of the costs that will need to be generated by the VRE participating jurisdictions and major stakeholders such as the Commonwealth of Virginia – to cover VRE's annual operating deficit and capital investment program. Since commuter rail is not a profitable venture, these subsidies will inevitably increase as the size of VRE operations and its base of ridership increases. This will require the entities that now provide funding support for VRE to increase the level of that support. However, the potential exists to mitigate these effects on the local participating jurisdictions by seeking additional new sources of funding, increasing the level of State funding because of the wider benefits of rail system investment, and/or finding private sector funding partners.

Many variables, including many not directly addressed in the Strategic Plan, will affect these indicators as well as the overall financial performance of VRE in the future. Among these variables are:

- Fare policy
- External economic and other factors influencing ridership demand
- The pace and extent of required capital investment
- The number of trains operated by VRE
- The level of Federal funding
- The level of State and third-party funding.
- Level of debt financing undertaken.

To determine the relative financial characteristics and subsidy requirements of the three strategic plan scenarios, a common set of assumptions was applied to the factors affecting the local and other non-Federal share of the overall subsidy, including both capital and operating components:

- Inflation of access fees at 4 percent per annum
- Inflation of other operating costs at 3 percent per annum

- Ridership levels midway between the high and low ends of the range
- Fares increasing on average at 2 percent per annum
- Federal share of CIP capital costs at 80 percent.

VRE financing is a delicate balance of federal funding, state funding, local government funding, and the farebox. There is no stable, replenishable source of dedicated funds, so the various levels of government involved in sponsoring the VRE will need to agree among themselves on the apportionment of funding responsibility. There are several options open to VRE's stakeholders, which are not all able to be thoroughly evaluated in the context of this study.

Tables 9-2 through 9-4 present estimates of the financial performance indicators, for each of the three growth scenarios that are consistent with VRE's Strategic Plan objectives: Targeted Growth, Aggressive Growth and Deferred Growth. For purposes of presentation, Federal funds are assumed to cover 80 percent of all capital costs for infrastructure and rolling stock projects, and the level of committed state and local capital and operating funding support is carried forward at FY2004 levels, increasing only by the rate of inflation. After these assumptions are made, the remaining estimated funding shortfall is calculated – by year through 2009 and averaged for the 2010-2015 and 2016-2025 periods. The magnitude of the shortfall varies by scenario and is projected to increase over time.

Within any given scenario, changes to any of the above variables could significantly affect the level of local subsidy. Further analysis, outside the scope of this strategic planning effort, will be required to determine the sensitivity of local subsidy estimates to fare policy and other factors.

On balance, to the extent that VRE increases fares over time at a rate generally in line with cost inflation, the VRE recovery ratio is projected to remain at or above the 60 percent level in each scenario. Growing ridership demand will tend to increase average train loads, which can be carried by VRE more efficiently on a per capita basis. This will tend to offset projected higher costs with respect to railroad access fees and service expansion.

The funding shortfall in future years will need to be covered by some combination of the following funding sources:

- Increased Federal funding
- Increased State funding
- Increased funding from existing local VRE member jurisdictions
- Local funding contributions from potential new VRE member jurisdictions
- Funding from other sources (e.g., freight railroads, developers)
- Creative financing mechanisms to defer or spread expenditures (e.g., equipment leases)
- Additional revenue (e.g., increased fares, parking fees).

Required non-Federal subsidy levels are shown to increase significantly in connection with increased levels of investment in the higher-growth scenarios. Even in the most financially conservative scenario, Constrained Growth, the estimated level of non-Federal subsidy will increase from $14.6 million in FY2002 to the range of $23 to $28 million between FY2004 and FY2009, reflecting the increase in required capital investment in fleet, parking and train storage, as well as the loss of about $3 million per year in debt service reserve funds that were available in 2002 and prior years. If the State were to contribute to funding these costs at its historical 60 percent level, and no new sources of funds were identified, the subsidy from the local jurisdictions would increase from the historical $5.6 million level to the $9 to $11 million range over the next 5-6 years.

The Targeted Growth scenario requires annual non-Federal capital plus operating subsidies in the $26 to $36 million range through 2009, or between $3 and $8 million more per year than the Constrained Growth scenario – driven primarily by the higher rate of capital expenditures. The Aggressive Growth scenario requires even more non-Federal investment and subsidy – in the $29 to $41 million range over the next six years. This may very well put this strategy beyond the reach of the current organizational and funding structure of VRE. However, opportunities for funding partnerships also are greater in the higher growth scenarios. To the extent that there are VRE stakeholders interested in pursuing aggressive near-term expansion of the VRE network, this analysis shows that long-term sources of funding in the range of $5 to $7 million per year, over and above the level of funding required for the Targeted Growth scenario will need to be found.

The local participating jurisdictions historically have funded approximately 40 percent of the non-Federal capital and operating subsidy. As the total required subsidy increases in the future, the local jurisdictions will not necessarily have to cover the same proportion of the subsidy. Third party contributions, particularly to the local share of capital costs, will be able to be obtained from developers and the freight railroads. Financial contributions are also anticipated on the part of the counties where VRE service is added, such as Fauquier and Spotsylvania, to help offset the incremental costs of extending and operating the service. Also, increasing the level of State participation is a possibility, to the extent that VRE capital projects will generate wider benefits to the State (including the benefits of improved intercity passenger rail service and improved freight service to shippers) than just those realized by the VRE commuter market.

Both fare policy and the level of funding support from other sources, for either capital requirements or operations, are crucial issues with respect to establishing the level of subsidy that will need to be generated from the VRE participating jurisdictions.

The scope of the Strategic Plan does not encompass the setting of fare policy or budgets for VRE, although information from the Strategic Plan can be used to inform these activities. The VRE Audit and Finance Committee can use the results of this analysis to develop budget alternatives for future fiscal years.

Table 9.2
Estimated Recovery Ratio and Required Non-Federal Subsidy – Targeted Growth Scenario

Costs in Thousands of Dollars, Year of Expenditure

	PHASE 1						PHASE 2	PHASE 3
	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	Average FY 2010-15	Average FY 2016-25
OPERATIONS								
Annual Operating Cost								
Track and Terminal Access Fees	$ 7,045	$ 8,112	$ 8,436	$ 9,749	$ 11,153	$ 12,653	$ 18,144	$ 25,958
Operating Expenses	$ 21,564	$ 25,482	$ 27,244	$ 29,088	$ 31,019	$ 33,039	$ 49,497	$ 67,864
Other Expenses	$ 11,260	$ 11,598	$ 11,946	$ 12,304	$ 12,673	$ 13,053	$ 14,476	$ 18,338
Total	$ 39,869	$ 45,192	$ 47,626	$ 51,141	$ 54,845	$ 58,746	$ 82,117	$ 112,160
Income								
Fare Revenue	$ 16,305	$ 18,972	$ 20,256	$ 21,601	$ 22,992	$ 24,430	$ 30,256	$ 42,740
Other Income, including Federal grants	$ 8,323	$ 7,275	$ 7,275	$ 7,275	$ 7,275	$ 7,275	$ 7,275	$ 7,275
Total	$ 24,628	$ 26,247	$ 27,531	$ 28,876	$ 30,267	$ 31,705	$ 37,531	$ 50,015
Annual Operating Deficit	$ 15,241	$ 18,945	$ 20,096	$ 22,265	$ 24,578	$ 27,040	$ 44,586	$ 62,144
CAPITAL								
Annualized Capital Cost	$ 11,327	$ 55,512	$ 57,177	$ 58,893	$ 60,659	$ 62,479	$ 98,222	$ 61,724
Federal Contribution	$ 9,584	$ 44,409	$ 45,742	$ 47,114	$ 48,527	$ 49,983	$ 78,578	$ 49,379
Debt Service Reserve Fund (unavailable after '03)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Non-Federal Contribution	$ 1,743	$ 11,102	$ 11,435	$ 11,779	$ 12,132	$ 12,496	$ 19,644	$ 12,345
Non-Federal Capital+Operating Subsidy	**$ 16,984**	**$ 30,048**	**$ 31,531**	**$ 34,044**	**$ 36,709**	**$ 39,536**	**$ 64,231**	**$ 74,489**
State Contribution at FY 2004 Level*	$ 11,176	$ 11,511	$ 11,856	$ 12,212	$ 12,578	$ 12,955	$ 14,367	$ 18,200
Local Contribution at FY 2004 Level*	$ 6,353	$ 6,544	$ 6,740	$ 6,942	$ 7,150	$ 7,365	$ 8,168	$ 10,347
Capital+Operating Funding Shortfall**	**$ (545)**	**$ 11,993**	**$ 12,935**	**$ 14,890**	**$ 16,981**	**$ 19,216**	**$ 41,696**	**$ 45,943**
Operating Cost Recovery Ratio	**75.6%**	**74.5%**	**74.3%**	**74.3%**	**74.1%**	**73.9%**	**61.1%**	**63.0%**

*Adjusted for inflation at 3 percent per annum.

**Note:
The funding shortfall in future years will need to be covered by some combination of the following funding sources:
> Increased Federal funding
> Increased State funding
> Increased funding from existing local VRE member jurisdictions
> Local funding contributions from potential new VRE member jurisdictions
> Funding from other sources (e.g., freight railroads, developers)
> Creative financing mechanisms to defer or spread expenditures (e.g., equipment leases)
> Additional revenue (e.g., increased fares, parking fees).

Table 9.3
Estimated Recovery Ratio and Required Non-Federal Subsidy – Aggressive Growth Scenario

Costs in Thousands of Dollars, Year of Expenditure

	PHASE 1						PHASE 2	PHASE 3
	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	Average FY 2010-15	Average FY 2016-25
OPERATIONS								
Annual Operating Cost								
Track and Terminal Access Fees	$ 7,045	$ 8,112	$ 8,436	$ 9,936	$ 11,543	$ 13,262	$ 19,539	$ 28,842
Operating Expenses	$ 21,564	$ 25,791	$ 27,880	$ 30,072	$ 32,370	$ 34,778	$ 52,711	$ 75,404
Other Expenses	$ 11,260	$ 11,598	$ 11,946	$ 12,304	$ 12,673	$ 13,053	$ 14,476	$ 18,338
Total	$ 39,869	$ 45,501	$ 48,263	$ 52,312	$ 56,585	$ 61,093	$ 86,726	$ 122,584
Income								
Fare Revenue	$ 16,305	$ 18,972	$ 20,815	$ 22,582	$ 24,411	$ 26,305	$ 34,003	$ 50,475
Other Income, including Federal grants	$ 8,323	$ 7,275	$ 7,275	$ 7,275	$ 7,275	$ 7,275	$ 7,275	$ 7,275
Total	$ 24,628	$ 26,247	$ 28,090	$ 29,857	$ 31,686	$ 33,580	$ 41,278	$ 57,750
Annual Operating Deficit	$ 15,241	$ 19,254	$ 20,172	$ 22,455	$ 24,899	$ 27,513	$ 45,448	$ 64,834
CAPITAL								
Annualized Capital Cost	$ 11,327	$ 77,101	$ 79,414	$ 81,796	$ 84,250	$ 86,777	$ 128,949	$ 74,427
Federal Contribution	$ 9,584	$ 61,681	$ 63,531	$ 65,437	$ 67,400	$ 69,422	$ 103,159	$ 59,542
Debt Service Reserve Fund (unavailable after '03)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Non-Federal Contribution	$ 1,743	$ 15,420	$ 15,883	$ 16,359	$ 16,850	$ 17,355	$ 25,790	$ 14,885
Non-Federal Capital+Operating Subsidy	**$ 16,984**	**$ 34,674**	**$ 36,055**	**$ 38,814**	**$ 41,749**	**$ 44,869**	**$ 71,238**	**$ 79,720**
State Contribution at FY 2004 Level*	$ 11,176	$ 11,511	$ 11,856	$ 12,212	$ 12,578	$ 12,955	$ 14,367	$ 18,200
Local Contribution at FY 2004 Level*	$ 6,353	$ 6,544	$ 6,740	$ 6,942	$ 7,150	$ 7,365	$ 8,168	$ 10,347
Capital+Operating Funding Shortfall**	**$ (545)**	**$ 16,619**	**$ 17,459**	**$ 19,660**	**$ 22,021**	**$ 24,549**	**$ 48,703**	**$ 51,173**
Operating Cost Recovery Ratio	**75.6%**	**73.6%**	**74.7%**	**75.1%**	**75.4%**	**75.6%**	**64.5%**	**66.9%**

*Adjusted for inflation at 3 percent per annum.

**Note:
The funding shortfall in future years will need to be covered by some combination of the following funding sources:
> Increased Federal funding
> Increased State funding
> Increased funding from existing local VRE member jurisdictions
> Local funding contributions from potential new VRE member jurisdictions
> Funding from other sources (e.g., freight railroads, developers)
> Creative financing mechanisms to defer or spread expenditures (e.g., equipment leases)
> Additional revenue (e.g., increased fares, parking fees).

Table 9.4
Estimated Recovery Ratio and Required Non-Federal Subsidy – Deferred Growth Scenario

Costs in Thousands of Dollars, Year of Expenditure

	PHASE 1						PHASE 2	PHASE 3
	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	Average FY 2010-15	Average FY 2016-25
OPERATIONS								
Annual Operating Cost								
Track and Terminal Access Fees	$ 7,045	$ 8,112	$ 8,436	$ 9,651	$ 10,037	$ 10,439	$ 13,172	$ 19,830
Operating Expenses	$ 21,564	$ 24,514	$ 25,249	$ 27,307	$ 28,126	$ 28,970	$ 35,341	$ 48,695
Other Expenses	$ 11,260	$ 11,598	$ 11,946	$ 12,304	$ 12,673	$ 13,053	$ 14,476	$ 18,338
Total	$ 39,869	$ 44,224	$ 45,632	$ 49,263	$ 50,837	$ 52,463	$ 62,989	$ 86,863
Income								
Fare Revenue	$ 16,305	$ 18,972	$ 19,910	$ 20,879	$ 21,878	$ 22,909	$ 26,199	$ 34,080
Other Income, including Federal grants	$ 8,323	$ 7,275	$ 7,275	$ 7,275	$ 7,275	$ 7,275	$ 7,275	$ 7,275
Total	$ 24,628	$ 26,247	$ 27,185	$ 28,154	$ 29,153	$ 30,184	$ 33,474	$ 41,355
Annual Operating Deficit	$ 15,241	$ 17,977	$ 18,446	$ 21,109	$ 21,684	$ 22,278	$ 29,516	$ 45,509
CAPITAL								
Annualized Capital Cost	$ 11,327	$ 40,556	$ 41,773	$ 43,026	$ 44,317	$ 45,646	$ 83,823	$ 101,462
Federal Contribution	$ 9,584	$ 32,445	$ 33,418	$ 34,421	$ 35,454	$ 36,517	$ 67,059	$ 81,169
Debt Service Reserve Fund (unavailable after '03)	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Non-Federal Contribution	$ 1,743	$ 8,111	$ 8,355	$ 8,605	$ 8,863	$ 9,129	$ 16,765	$ 20,292
Non-Federal Capital+Operating Subsidy	**$ 16,984**	**$ 26,088**	**$ 26,801**	**$ 29,714**	**$ 30,547**	**$ 31,408**	**$ 46,280**	**$ 65,801**
State Contribution at FY 2004 Level*	$ 11,176	$ 11,511	$ 11,856	$ 12,212	$ 12,578	$ 12,955	$ 14,367	$ 18,200
Local Contribution at FY 2004 Level*	$ 6,353	$ 6,544	$ 6,740	$ 6,942	$ 7,150	$ 7,365	$ 8,168	$ 10,347
Capital+Operating Funding Shortfall**	**$ (545)**	**$ 8,033**	**$ 8,205**	**$ 10,560**	**$ 10,819**	**$ 11,088**	**$ 23,746**	**$ 37,254**
Operating Cost Recovery Ratio	**75.6%**	**77.4%**	**78.9%**	**76.5%**	**77.8%**	**79.1%**	**74.1%**	**70.0%**

*Adjusted for inflation at 3 percent per annum.

**Note:
The funding shortfall in future years will need to be covered by some combination of the following funding sources:
> Increased Federal funding
> Increased State funding
> Increased funding from existing local VRE member jurisdictions
> Local funding contributions from potential new VRE member jurisdictions
> Funding from other sources (e.g., freight railroads, developers)
> Creative financing mechanisms to defer or spread expenditures (e.g., equipment leases)
> Additional revenue (e.g., increased fares, parking fees).