

System Plan 2050 Update Summary

June 20, 2025





Virginia Railway Express

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I. INTRODUCTION

This document serves as the summary of the process and key factors informing the recommended vision for 2030 and 2050 Virginia Railway Express (VRE) service identified in the VRE System Plan 2050 update.

I.1. WHAT IS A SYSTEM PLAN?

At a high level, a System Plan is a multi-decade guide to plan for VRE service, investments, and transportation policies. A System Plan analyzes current and projected future transportation conditions and needs, as well as provides recommendations for VRE system modifications to meet those needs. The previously adopted VRE System Plan was completed in 2014 and proposed a broad and transformative vision for the future of VRE service, albeit with some differences between it and this System Plan 2050. Chief among those differences is the lack of a weekend service concept proposed under System Plan 2040. Additionally, the proposed service concept, even in the Plan’s horizon year of 2040, focused heavily on the peak period, peak direction service, with much less service in the mid-day and in the evenings. The System Plan 2050 update was initiated in 2022 to respond to the numerous changes that have occurred in the Washington, D.C. region since the last plan was adopted. Primarily, this included updated population and employment growth forecasts, rise in post-pandemic telework and hybrid work policies, and new opportunities to expand rail service through infrastructure projects enabled by the Commonwealth of Virginia’s Transforming Rail in Virginia (TRV) initiative¹. In addition, 2018 saw the creation of the Commuter Rail Operating and Capital (CROC) fund, a dedicated, non-reverting state funding source for exclusive VRE use with broad allowances for eligible uses.

The System Plan 2050 update was conducted in three Phases (I-III), summarized in Figure I.

Figure I: System Plan 2050 Update Planning Process



¹ For more information about this initiative, see <https://vapassengerrailauthority.org/transformingrail/>.



I.2. SYSTEM PLAN 2050 VISION STATEMENT AND GOALS

The System Plan 2050 update process was anchored by a visioning and goal-setting exercise that resulted in the development of an overarching Plan Vision, as well as four goals, presented below:

Vision

VRE will grow to serve the region as the transportation service of choice by creating meaningful connections and economic opportunities in a safe, sustainable, and equitable manner.

Goals

1. Safety and Reliability

Support a continued strong record of safety; provide a predictable, reliable, comfortable, secure service to customers by maintaining the system to the highest quality.

2. Market Growth and Financial Stability

Grow the market for VRE service while maintaining financial stability; provide service for a full range of travel given changing needs.

3. Regional System Integration and Equitable Service

Serve as a critical element of an integrated and equitable transportation system; promote access for all.

4. Sustainability and Resiliency

Support regional and state-wide environmental sustainability and transportation system resilience.

For more details on the development of the Plan's Vision, its goals and objectives, and the external engagement conducted to establish and reinforce this direction, please see the *System Plan Vision and Goals Technical Memorandum (January 2023)*, and the *System Plan 2050 Engagement Summary (June 2024)*, respectively.

I.3. 2050 SERVICE VISION BENEFITS

Implementation of the recommended 2050 Service Vision will yield significant benefits to the Northern Virginia and Washington, D.C. region as outlined in Table I. In addition to avoided trips and vehicle miles traveled attributable to the increased VRE ridership, additional VRE service in 2050 will save the region's drivers millions of dollars a year in avoided operating costs, prevent millions of tons of CO₂ from entering the atmosphere, and avoid tens of thousands of hours of personal delay on the region's roadways.

A more detailed review of the benefits of implementing the 2050 Service Vision can be found in the System Plan's *Benefits and Financial Analysis Technical Memorandum (June 2024)*.



Table I: System Plan Benefits

All values are in 2050 (unless otherwise noted) ²	Induced trips (new to VRE)		All Trips	
	2030 Service Plan	2050 Service Plan	2030 Service Plan	2050 Service Plan
Annual VMT Reduction	5,446,000	19,469,000	18,283,000	51,188,000
Annual Vehicle Operating Cost Savings	\$891,000	\$3,184,000	\$5,981,000	\$16,744,000
Increase in Passengers from No Build (2050)	178,900	634,800	2,431,800	5,391,100
Annual CO2 Avoided (metric tons)	440	1,560	1,460	4,100
Annual Travel Delay Avoided (Hours)		N/A	47,000	64,000
Annual Freight Benefit of the RF&P Rail Corridor in 2030 (Spotsylvania to Alexandria) ³		\$157,160,000 (in 2020 \$)		
I-95 Truck Trips Avoided in 2030 ⁴	4,180 daily truck trips on I-95 (End-to-end, this equals a lane of trucks from the Pentagon to past Exit 126 in Spotsylvania—57 miles)			

² Source for all data unless otherwise noted: *Benefits and Financial Analysis Technical Memorandum, (June 2024)*.

³ Annual freight benefit source: DRPT 2022 Statewide Rail Plan

⁴ Average payload of a semi-truck: 20.6 tons, typical length of a semi-truck in VA: 72 ft



2. THE 2050 SERVICE VISION

2.1. SETTING THE DIRECTION FOR THE RECOMMENDED 2050 PLAN

The development of the System Plan 2050 Service Vision was guided by the following consensus statements about VRE's role to be within the region in 2050 as identified by VRE staff and informed by input from the VRE Operations Board, external stakeholders, VRE riders, and the public.

Service:

- System Plan 2050 should be a service plan, responsive to anticipated travel needs, rather than a capital plan that aligns with expected available funding. Defining what type of service VRE should be running will determine what capital improvements will be required.
- Predictability helps drive ridership by simplifying schedule comprehension for people. Therefore, endeavor to provide "clockface" scheduling for hourly or more frequent headways, and preferably throughout the service day where feasible.
- Riders will typically wait for trains with headways of 15 minutes or less; with longer headways riders prefer scheduled arrival/departure times.
- The plan should focus on predictability in the peak periods and be market-driven in the off-peak.
- The service should be market-driven to the extent possible. Service levels proposed by time period should follow scheduling best practices when time-of-day demand forecasts are more general given the 2050 planning horizon.
- VRE should serve as a complement to Metrorail in the corridors where both operators will exist in 2050. The plan assumes 2050 Metrorail service is similar to current service.
- The peak periods should be defined as 5 – 9 a.m. and 3 – 7 p.m. based on point of departure. These times should serve as a guide for when service levels should ramp up or down throughout the service day.
- VRE service should be complementary to intercity rail and not seek to replicate or assume the role of intercity rail.
- The market of the nine member jurisdictions should drive the service and thus the brand of VRE, with consistency in governance and ownership of VRE.
- The recommended 2030 service plan, as endorsed by the VRE Operations Board in June 2023, serves as a basis for comparison with the potential service scenarios in 2050.

Infrastructure:

- The plan assumes the Long Bridge, Union Station, First Street Tunnel, and the yards at the ends of the lines remain at their currently planned capacity in 2050. Mid-line yard



constraints should be identified if required as part of the operations modeling of the recommended 2050 scenario.

- The First Street Tunnel is potentially the biggest constraint in the system once the expanded Long Bridge and planned Washington Union Station improvements are complete. VRE will work with partners to raise awareness and advocate for First Street Tunnel improvements outside of System Plan 2050 process.
- The plan should have the ability to present service scenarios that both stay within the confines of currently planned future infrastructure as well as potential service plans that would only be possible with changes to that infrastructure, while still respecting the “significant” constraints in the Washington Union Terminal (WUT) area.
- If including service levels beyond those proposed by the Virginia Passenger Rail Authority (VPRRA) and allowed under current Transforming Rail in Virginia (TRV) rail agreements, the plan should respond to current and proposed infrastructure and the constraints associated with each.
- Current station locations or lifecycle/useful life remaining on assets shouldn’t drive or constrain service scenarios.

Financial:

- Goals of returning to a high farebox recovery and diversification of service should be considered.
- The plan can be reasonably unconstrained; a reasonable vision for 2050 may still require additional committed funding and funding source, as it is a long-term plan that diligent financial management can build towards.
- The plan should position VRE to be able to demonstrate that the organization is responding to transportation needs, making the most compelling case to increase or dedicate funding to VRE to achieve these goals.
- The plan should highlight benefits to Northern Virginia.

2.2. 2050 SERVICE SCENARIO SCREENING

A holistic approach was applied to developing and evaluating potential 2050 service scenarios that considered the consensus statements as well as the extent to which the System Plan vision and goals aligned with each scenario. Key considerations include:

- The 2050 service scenario should be fundamentally aligned with market demand. More information on the System Plan 2050 market assessment is found in the *Ridership Trends and Market Assessment Technical Memorandum (August 2023)*.
- VRE service be integrated with and operate in concert with other regional transit services.



- The 2050 System Plan is designed to be reasonably unconstrained, prioritizing what is necessary to support the recommended service and markets.
- Recommended service should focus on the core (existing service area) and not duplicate intercity rail, which is VPRA's responsibility.
- The 2050 service scenario(s) should be developed so as not to preclude future growth in jurisdiction membership via system expansions as may be requested through 2050 by other jurisdictions or by other states/transit operators.
- “Hard” constraints or limitations of existing or planned infrastructure such as the Long Bridge, First Street Tunnel, Washington Union Station, and the proposed VRE Seminary Yard must be factored into planning.
- Service plans should be calibrated to market demand, referencing stopping patterns, destinations, and activity centers from the market assessment, and should be thoughtfully aligned with planned future intercity rail service in VRE corridors.

Four growth scenarios plus two “baseline” scenarios were evaluated against the considerations above and the identified consensus statements. The recommended 2050 System Plan Service Vision offers a considerable but reasonable service expansion for 2050 and addresses regional natural population and employment growth. This increase in VRE service supports goals such as increasing customer satisfaction, maximizing daily riders, increasing transit connections and underserved riders, while maintaining fiscal responsibility in providing service that meets the market demand, and minimizes the capital cost requirements needed for the new service. The 2050 TRV Baseline Enhanced scenario is a modified version of the TRV 2030 recommended service levels as identified in the TRV rail agreement between VRE and the Virginia Passenger Rail Authority (VPRA), also referred to as TRV Service Plan v6.1, projected forward to 2050. It was retained, as well as the 2050 No Build scenario which holds VRE service to 2024 levels (i.e., 32 daily weekday trains and no weekend service), as the baselines against which the 2050 growth scenarios were evaluated in the scenario screening process. A detailed description of the scenario screening process is outlined in the *2050 Service Vision Technical Memorandum (May 2024)*.

2.3. RECOMMENDED 2050 SYSTEM PLAN SERVICE SCENARIO

This section provides an overview of the recommended 2050 Service Vision scenario terminology. The development process of the 2050 scenarios detailed in the *Service Plan Scenario Refinement Technical Memo (December 2023)*, and the operational evaluation of each scenario is detailed in the *Service Plan Vision Technical Memorandum (January 2023)*.

2.3.1. Recommended 2050 Service Scenario

The recommended 2050 Service Scenario (referred to in plan development as Scenario A1), proposes to increase VRE service by 263% from the existing 16 weekday round trips to 58 weekday round trips (29 on each line) with the implementation of targeted infrastructure upgrades beyond what is included in the investments funded in the TRV Phase 2 infrastructure



plan⁵. Those investments provide for significantly increased capacity and the partial separation of freight and passenger trains between Washington, D.C. and Lorton, Virginia, achieved with the completion of the programmed expansion of the Long Bridge, the addition of third and fourth tracks elsewhere along the VRE Fredericksburg Line corridor, and planned station improvements at VRE L’Enfant, Crystal City, Alexandria, Franconia-Springfield, Brooke, and Leeland Road stations.

The scenario also assumes additional weekend service beyond the six (6) weekend-day round trips included in the TRV Phase 2 Service Plan (Service Plan v6.1) at roughly 41% of weekday service or 34 round trips on Saturday and 30 on Sunday. Specific service attributes of this scenario are identified in Table 2.

Table 2: Service Attributes of 2050 Service Vision

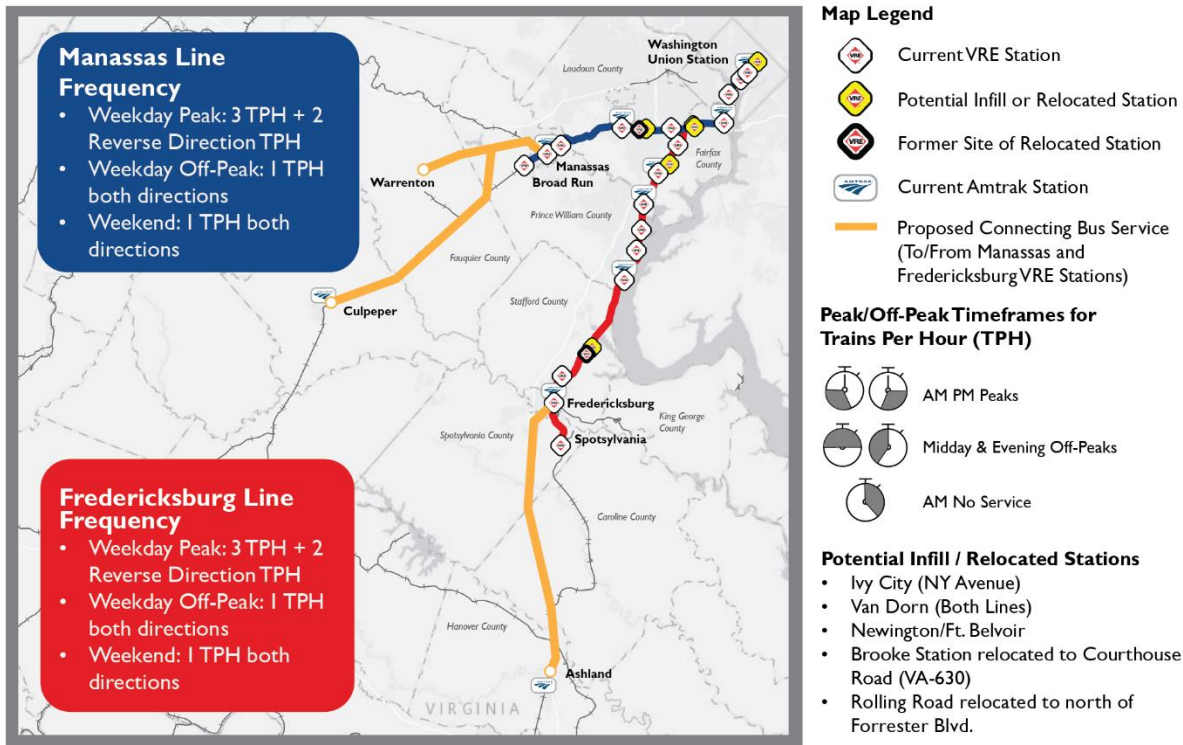
2050 Service Vision	Weekday Service
Peak Period-Direction	20 Minutes, clockface headways
Peak Period-Reverse Direction	30 Minutes
Off Peak	60 Minutes
Number of Daily Trains	116
Number of Trainsets (Consists) Required	23
Express Trains	1 Train per hour in weekday peak period/direction only
2050 Service Vision	Weekend Service
Saturday	60 Minutes, bidirectional service, 17 Round-Trips/Line
Sunday	60 Minutes, bidirectional service, 15 Round-Trips/Line
Weekend Express Trains	None

⁵ The Phase 1 and 2 TRV rail infrastructure improvements will result in a four-track rail corridor between Washington, D.C. and Alexandria and a three-track corridor between Alexandria and Lorton as well as limited three-track segments (passing sidings) south of Lorton. Within the four-track corridor, passenger trains will utilize the two western tracks and freight trains the two eastern tracks in normal operation. Interoperability between all tracks will be maintained for passenger and freight trains. South of Alexandria, passenger and freight trains will continue to share the corridor until the completion of planned Phase 3 and 4 TRV infrastructure improvements (no defined timeline or funding for these improvements as of this Plan). In a full build-out condition, passenger trains will primarily use the eastern track(s) and freight trains the western tracks south of the Franconia Bypass, where passenger tracks will fly over the freight tracks and use the western side of the corridor between there and CP VA south of the First Street Tunnel into Union Station.

Figure 2: Recommended 2050 Service Scenario

Scenario A1 - 20 Minute Peak + Uniform Off-Peak

Increased bi-directional service to minimize storage needs; prioritize market demand over capital expenses



This scenario also proposes a new “Region Commuter” service overlay with new trains making express stops at the outer stations on each line. These trains would provide direct service to Alexandria, Crystal City, L’Enfant, and Washington Union Station for the longer-distance VRE commuters who make up a large share of VRE’s post-pandemic ridership. Each weekday express train would be paired with connecting bus service providing over-the-road coach connections to outlying communities beyond VRE’s service area to address new markets identified in the System Plan 2050 market analysis. Proposed connecting bus service would provide service to new markets including: (1) Fredericksburg to Ashland via Southern Spotsylvania and Caroline County growth centers; (2) Manassas to Warrenton; (3) Manassas to Culpeper, as shown in Table 3.2 and described in more detail in Section 3 of this report. Terminating buses at Fredericksburg and Manassas allows riders the flexibility to transfer to both Amtrak and VRE express trains and provides a faster total trip time versus transferring at Broad Run/Spotsylvania stations. The schedule of commuter buses assumes they will match these train schedules with a planned 5-minute transfer time.



Table 3: Illustrative Connecting Bus Routes

Connecting Bus Route	Illustrative Bus Stop Locations
Fredericksburg to Ashland	Fredericksburg Amtrak/VRE Station Thornburg (Kalahari Resorts) Ladysmith Carmel Church P&R Kings Dominion Ashland Amtrak Station
Manassas to Warrenton	Manassas Amtrak/VRE Station Warrenton P&R Warrenton
Manassas to Culpeper	Manassas Amtrak/VRE Station Midland P&R Brandy Station P&R Culpeper Amtrak Station

2.3.2. No Build Scenario

The No Build Scenario represents VRE’s 2024 service running on expanded infrastructure provided through the state-led TRV initiative, through Phase 2 investments, and plans for capacity expansion through additional track infrastructure. This service scenario assumes eight round trips, as in the current weekday schedules, on both the Fredericksburg and Manassas lines and no weekend service. All trains would use eight-car consists in 2050 and require the infrastructure improvements detailed later in this document and in the *Phasing, Operational and Infrastructure Needs Analysis Technical Memo (June 2024)*.



2.4. OTHER RECOMMENDATIONS CONSIDERED BUT NOT ADVANCED

2.4.1. VRE Run-Through Service to Maryland

The Maryland Transit Administration (MTA) developed a new long-range plan⁶, the MARC Growth and Transformation Plan, that addresses a potential MARC service extension to Northern Virginia. The plan confirms the MARC Brunswick Line has by far the largest market for run-through trips. It also notes the majority of the run-through market from Maryland to Virginia is only to the VRE L’Enfant, Crystal City, and Alexandria stations.

While this System Plan does not preclude accommodating future MARC service in the VRE territory, extending VRE service to Maryland is not recommended in the 2050 System Plan. The market analysis conducted in Phases I and II of this plan shows that most travel from Virginia, and the VRE catchment areas specifically, into Maryland is destined for areas served by the MARC Brunswick Line. Infrastructure constraints, especially at Washington Union Station and Terminal, affect potential run-through service connections to the Brunswick Line and will likely remain unresolved by 2050. More frequent VRE service and reverse-peak service and/or operational integration of MARC trains on the Fredericksburg or Manassas lines can work to build a strong two-seat ride for travel across the greater region. Additionally, current and planned Amtrak intercity rail service, including Virginia-sponsored Amtrak Virginia service, and Metrorail already provide some level of “run-through” service. Planned expansions of these services as well as potential Amtrak procurement of rolling stock that will significantly reduce the dwell time at Union Station for locomotive changes will only enhance and better serve this market.

2.4.2. VRE Extension to Gainesville-Haymarket

Service expansion to the Gainesville-Haymarket area is also not included as a recommendation for 2050 service. As detailed in the *Gainesville Haymarket Memo (2024)*, the market analysis does not support the extension of VRE service along the Norfolk Southern Railway (NS) owned “B Line” branch of the Manassas main line. A potential expansion to Gainesville-Haymarket could be included in a potential future service scenario in the 2050 + time horizon should the following occur in the mid-term future (2030-2050):

- The Commonwealth decides to pursue an inter-city passenger rail expansion along this corridor and assumes the costs of planning and implementation.
- The VRE Operations Board, Prince William County, the Commonwealth, or another body chooses to analyze an extension as part of either a standalone study or as part of a future System Plan update.
- Significant additional federal, state, or regional funding sources for capital investments and operations becomes available that would make service expansions more financially attractive to VRE.

⁶ <https://www.mta.maryland.gov/marc-growth-plan>



Essential to the feasibility of such an extension is formal agreement from NS to allow the extension of VRE service to the B Line. NS has consistently indicated passenger service on the B Line must be “transparent” to existing and future freight operations and not result in any delay to freight trains or deterioration in the level of freight service. Historically this has meant construction of additional main line track capacity within the Manassas to Haymarket segment of the B Line and potentially beyond, towards Front Royal.

2.4.3. Extensions Beyond Line Termini

Based on the themes and trends identified in the Vision and Goals establishment process as well as through a robust Market Assessment at the beginning of the System Plan 2050 update planning process, VRE developed service plan concepts that were grouped into two general categories. Service plans proposed either “held the current service area” or “expanded the current service area.” VRE decided that the bulk of the 2050 service scenarios retained for detailed analysis would focus on holding the current VRE territory. This would maintain existing VRE stations and geographic reach and would focus VRE’s future capital and operating resources on maximizing service and ridership potential within the confines of the current service area. While initially, the goal of the 2050 scenario development process was to be largely unrestrained, internal staff input on the physical, financial, and political feasibility of a geographic expansion in any direction would be highly challenging. Additionally, Amtrak service already exists in these corridors and will be expanded upon completion of the TRV infrastructure improvements. VRE determined that duplicating services in these areas was not the best use of future resources. VRE retained one geographic service expansion scenario in the “short list” of 2050 service scenarios, however, this scenario was not selected to advance to the recommended 2050 Service Vision for the aforementioned expected implementation challenges. A more detailed summary of the scenario screening process can be found in the *Service Plan Scenario Development Technical Memorandum (January 2024)*.

2.4.4. Infill Stations

While the recommended 2050 Service Vision does not include an extension of the system beyond its current southern termini, the System Plan update process included an assessment of specific station relocations and infill station concepts as a way to strengthen the current VRE market and open new markets and connections within VRE’s existing territory. Several locations were considered in this analysis:

New Stations:

1. Ivy City (NY Avenue)
2. Van Dorn (Fredericksburg Line)
3. Van Dorn (Manassas Line)
4. Newington/Ft. Belvoir

Relocated Stations:

5. Brooke Station relocation to Courthouse Road (VA-630)
6. Rolling Road relocation to north of Forrester Blvd.



Each potential new station location was evaluated based on a specific set of criteria, including land use, ridership potential, site constraints, and railroad infrastructure considerations, to assess its feasibility. Based on the results of that analysis, all but the two Van Dorn station locations were removed from further consideration. Both Van Dorn station locations contemplated are positioned in strong, emerging transit markets with substantial ridership potential. These stations warrant further study and consideration for inclusion in subsequent service implementation plans, as no detailed site constraint or “fatal flaw” analysis or rough order-of-magnitude cost estimates were developed as a part of this System Plan update. Details of the assessment methodology and conclusions can be found in the *Phasing, Operational and Infrastructure Needs Analysis Technical Memo (June 2024)*.

2.5. 2050 SERVICE VISION RIDERSHIP FORECASTS

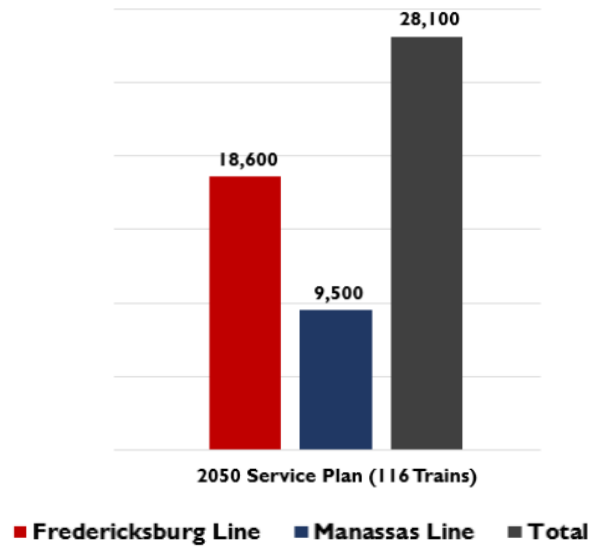
2.5.1. Weekday Ridership

The Recommended 2050 Service Scenario is projected to attract 28,100 average daily weekday riders, with 18,600 from the Fredericksburg Line and 9,500 from the Manassas Line across a 116-train daily schedule. This results in a line demand split of approximately 66% to 34%, respectively, which represents a change from the current demand splits of 55% and 45%, respectively. The higher percentage of ridership growth on the Fredericksburg Line is due primarily to the larger projected population growth in the outer jurisdictions served by the Fredericksburg Line compared to the Manassas Line. VRE proposes to maintain equal service levels on both lines, however, to promote uniformity and predictability in scheduling and operations across lines and to create a consistent customer experience.

Ridership estimates were developed by using Metropolitan Washington Council of Governments (MWCOG) Round 9.2 Cooperative Land Use Forecasts to project growth in population and employment in the VRE catchment areas in concert with using the MWCOG Travel Demand model version 2.4 coded with the 2050 service plan. Additionally, an assumption for telework rates in 2050 was applied to this figure to arrive at a final projection of ridership by line for 2050.

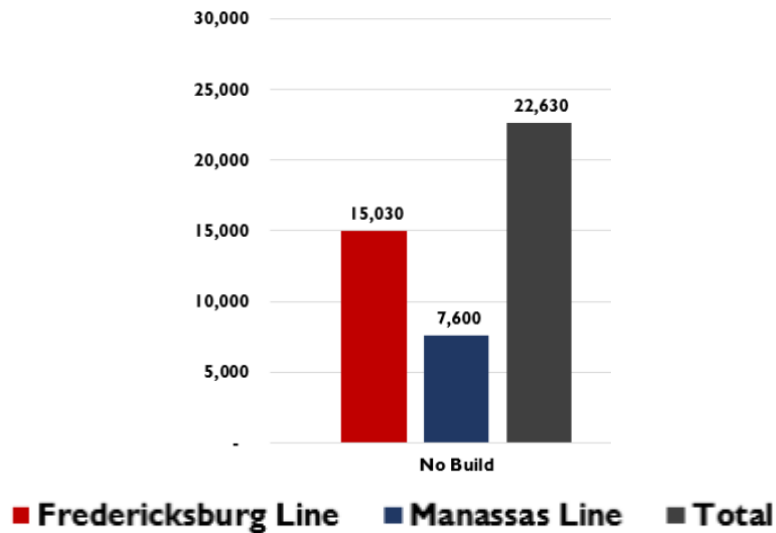


Figure 3: 2050 Service Senario Projected Weekday Ridership



Compared to the No-Build condition in 2050, the Build condition will add 24% more weekday ridership.

Figure 4: 2050 No-Build Projected Weekday Ridership



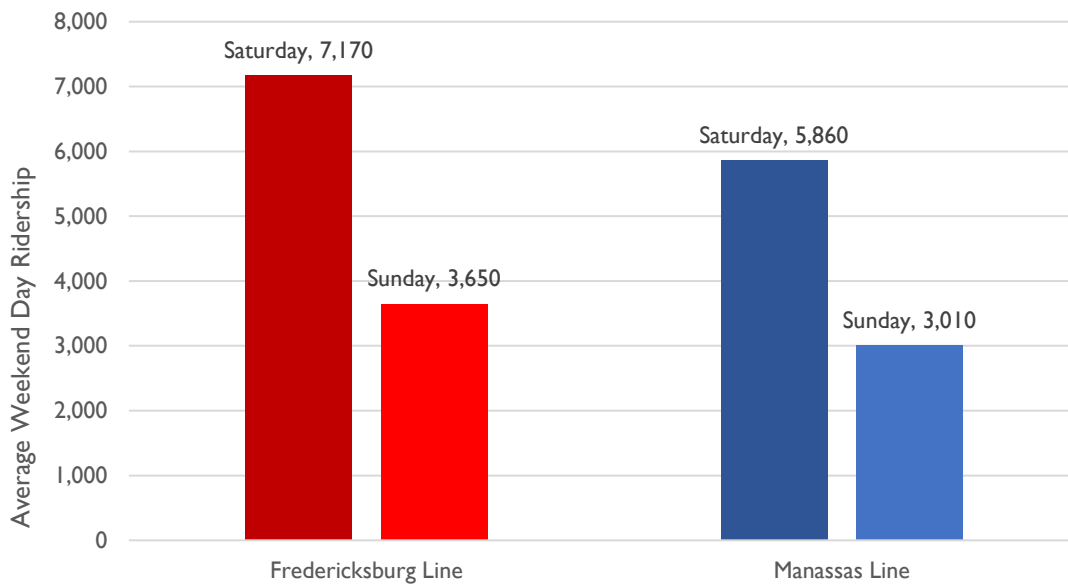
2.5.2. Weekend Ridership

The 2050 Service Vision’s weekend ridership is projected to attract 13,030 riders on Saturdays and 6,751 riders on Sundays across an average of 64 trains per day systemwide (service span on Saturdays proposed to be slightly longer than on Sundays). This represents the commitment to running at least one train per hour in each direction each weekend day.



Similar to weekday service, weekend ridership estimates were developed by using MWCOG Cooperative Land Use Forecasts to project growth in population and employment in the VRE catchment areas in concert with using the MWCOG Travel Demand model coded with the 2050 weekend service plan. Additionally, an assumption for the level of demand relative to weekday service was applied to this figure to arrive at a final projection of ridership by line for 2050.

Figure 5: 2050 Service Senario Projected Weekend Ridership



2.6. 2050 SERVICE VISION COSTS

2.6.1. Projected Capital Costs

For the purposes of the Plan’s financial analysis, all projected capital costs for the recommended 2050 Service Vision are presented as *cumulative costs*, meaning the total gross expenditure required between 2025 and 2050 to fully-implement the service as conceived. A summary breakdown of the major cost categories are included in Table 4. The table includes projects that are identified in VRE’s FY2026-31 Capital Improvement Program (CIP) totalling \$1.4 billion as well as additional capital needs through 2050.

For locomotive and coach costs, a standard unit cost estimation methodology was used: For locomotive purchases before 2030, the FY 2027 average CIP cost was used. For locomotive purchases after 2030, the price is taken as the escalated price two (2) fiscal years after the assumed order year, assuming locomotives are ordered four (4) years before they are delivered and needed in service. The price in any fiscal year would be the FY 2027 CIP cost escalated by 2.7% to that fiscal year. For example, a locomotive needed in service in FY 2050 would be ordered in FY 2046 with a price lock to FY 2048. For railcars, the assumed price is the escalated price two (2) fiscal years after the assumed order year, assuming railcars are ordered four (4) years before they are delivered and needed in service. The price in any fiscal year would be the FY 2027 CIP cost escalated by 2.7% to that fiscal year.



Table 4: 2050 Service Plan Projected Cumulative Capital Needs (2025-2050)

2050 Service Plan Capital Needs			
Improvements	Fredericksburg Line	Manassas Line	Total Cost \$YOE
Platform/Station	Station Improvements L'Enfant, Crystal City, Alexandria, and Franconia Springfield Stations	Platform Expansion Backlick Road, Broad Run and Manassas Stations	\$589.9M
	Platform Expansion Leeland Road, Brooke, Rippon, Fredericksburg, and Woodbridge Stations	2 nd Platform Manassas Station	
Parking	Fredericksburg Parking Rehabilitation, Crossroads MSF/AEW Parking, Leeland Road, Fredericksburg, Brooke, Rippon, and Woodbridge Stations	Manassas Park, Broad Run, and Manassas Stations	\$314.3M
Track	Crossovers (10)	Broad Run Lead Track, Crossovers (8)	\$163.1M
Fleet Replacement	20 Locomotives and 100 Railcars		\$801.0M
Fleet Expansion	21 Coaches ⁷ and 4 Locomotives in FY27 39 Trailers in FY42 39 Trailers and 7 Cabs, 7 Locomotives in FY46		\$857.6M
Recurring	Rolling Stock Maintenance, Station and Facilities Maintenance, and Security Enhancements		\$417.6M ⁸
Other	Crossroads Yard Expansion (AEW Building and Yard Expansion, all phases), Security Cameras and Real Time Traveler Info, Seminary Yard Midday Storage Facility		\$170.2M
Total			\$3,313.7M

⁷ 21 Railcars already ordered and in-design, expected delivery year 2027.

⁸ Excludes CROC Pay-Go contributions and annual contributions to VRE Capital Reserve.



2.6.2. Capital Needs Already Addressed By the VRE CIP and TRV

Much of the identified capital program necessary to achieve the 2050 service plan has already been included in VRE's CIP and/or VPRA's TRV Phase 1 and 2 program of projects. The following table presents those projects planned to be constructed between 2025 and 2035 that are either already included in VRE's CIP or those that will need to be added upon adoption of this System Plan, as well as the funding status of each.



Table 55: System Plan 2030 Service Plan Required Capital Projects and Funding Status

Capital Projects				
Project	Funding Status	TRV Project	VRE CIP	New System Plan Project
L'Enfant Station Improvements and 4 th Track	Partially-Funded	X	X	
Crystal City Station Improvements	Fully-Funded	X	X	
Alexandria Station Improvements	Fully-Funded	X	X	
Franconia-Springfield Station Improvements	Fully-Funded	X	X	
Broad Run Station and MSF Expansion	Fully-Funded		X	
Broad Run Station Parking Expansion (Phase 2)	Not Funded			X
Manassas Station Improvements	Fully-Funded		X	
Backlick Station Improvements	Fully-Funded		X	
Manassas Track 2 (West) Platform Extension	Not Funded			X
Fredericksburg Parking Expansion (mid-term)	Not Funded			X
Leeland Road Parking Expansion (mid-term)	Not Funded			X
Brooke Station Parking Expansion (mid-term)	Not Funded			X
Woodbridge Station Parking Expansion (mid-term)	Not Funded			X
Manassas Station Parking Expansion (mid-term)	Not Funded			X
Manassas Park Parking Expansion	Fully-Funded		X	
Crossroads Yard (MSF) Expansion Phase 1 Employee Parking	Fully-Funded		X	
Crossroads Yard (MSF) Expansion Phase 2 AEW Building	Fully-Funded		X	
Crossroads Yard (MSF) Expansion Future Phases	Not Funded		X	
Rolling Stock Acquisition 21 Trailer Railcars	Fully-Funded		X	
Rolling Stock Acquisition 4 Locomotives	Not Funded	X		
Broad Run Lead Track	Not Funded		X	X
Manassas Line Crossovers (mid-term)	Not Funded		X	X
Fredericksburg Line Crossovers (mid-term)	Not Funded		X	X

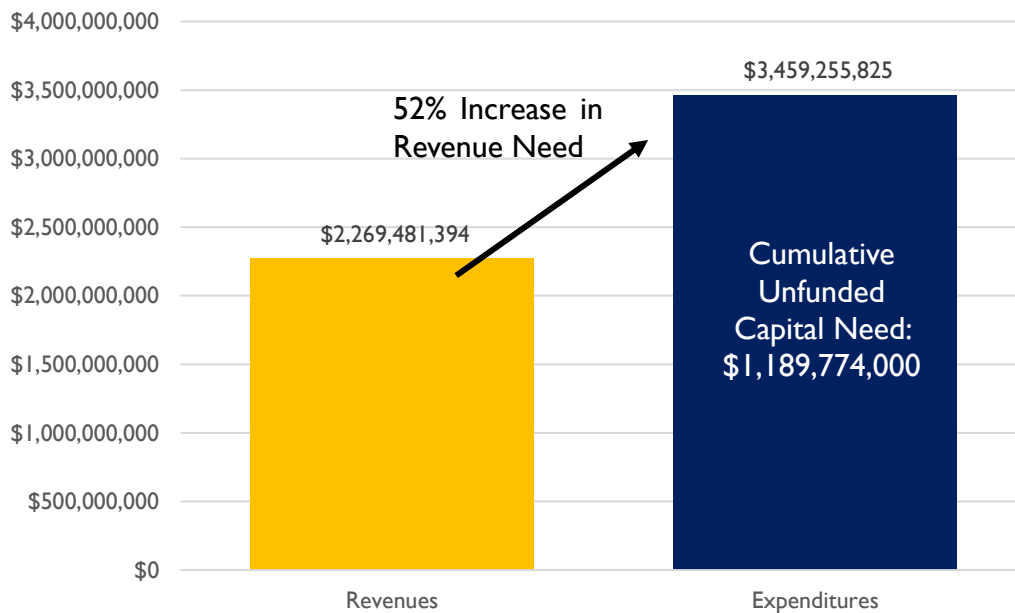


2.6.3. Projected Cumulative Capital Revenues and Need

Cumulative available capital revenues between 2025 and 2050, including only those revenue sources VRE currently has access to or is reasonably expected to have access to between now and 2050, are estimated to be \$2,269.5 million in YOE dollars. Revenue sources include primarily Federal formula funds, state Mass Transit Fund (MTF) capital funds, CROC, and local jurisdiction capital contributions, among others.

Cumulative capital costs for the recommended 2050 service plan are projected to be \$3,459.3 million, including CROC pay-go and contributions to the VRE capital reserve. The primary capital expenditures over the life of System Plan 2050 are rolling stock replacement and expansion. There is projected to be a \$1,189.8 million cumulative unmet capital need through 2050.

Figure 6: Cumulative Capital Need (2025-2050)



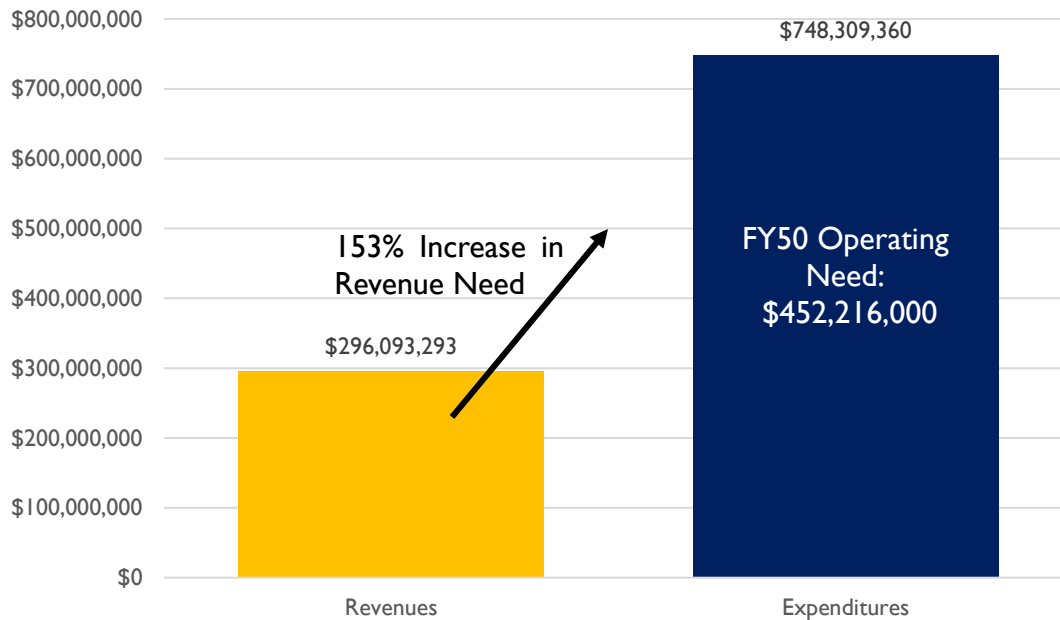
Note: Cumulative Capital Need 2025-2050 is inclusive of annual contributions to VRE Capital Reserve and TRV Pay-Go.

2.6.4. Projected Operating Revenues and Need

It is projected that implementation of the full 2050 Service Vision will require \$748.3 million in FY50 dollars in operating revenues to create a balanced budget for that year. Projected operating revenues, based solely on existing and expected future revenues, including fares, are \$296.1 million in FY50. This means that the projected unmet revenue need in FY50 is \$452.2 million, or a 153% increase from projected available revenues.



Figure 7: 2050 Operating Need



2.7. 2050 SERVICE VISION FLEET NEEDS

It is projected a total of 23 train consists will be required to operate the 2050 Service Vision. This level of service requires 206 passenger coaches in peak daily operation, including 184 revenue vehicles and 22 spares. In addition, 31 locomotives will be required, including 23 revenue locomotives, 5 spares, and 3 “protect” units, serving as backup power stationed at each train yard in the event of a mid-line train disablement.

This represents a net unfunded need of 85 coaches relative to the 121 unit VRE coach fleet expected to be available by 2027, which encompasses the 21 coaches currently in procurement. The 85 coaches exclude the end-of-life replacement of 100 coaches in the current VRE fleet that will be needed before 2050. Considering both expansion and replacement coaches, the combined net unfunded coach need by 2050 is 185 units. The net unfunded locomotive need by 2050 is 31, representing both the need for full replacement of the existing 20 locomotives which will reach the end of their useful lives by 2032, and the need for 11 new locomotives for the planned service expansion.



Table 6: 2050 Fleet Needs

	2050 Build	2050 No Build
Existing 2025 Fleet		
Cab Cars	21	21
Trailer Cars	79	79
Locomotives	20	20
Expected Total Fleet Need		
Coaches	206	100
Locomotives	31	20
<i>SOGR Fleet Replacement Need</i>		
Coaches	100	100
Locomotives	20	20
<i>Fleet Expansion Need</i>		
Coaches	106	0
Locomotives	11	0
Existing Funded Rolling Stock Procurement		
Coaches	21	N/A
Locomotives	0	N/A
Unfunded Need		
Coaches	185	100
Locomotives	31	20



3. 2030 SERVICE PLAN

3.1. 2030 SERVICE PLAN CONTEXT AND CHANGES SINCE 2024

The scope of the System Plan update was structured into three discrete phases, each with a defined scope of work and set of deliverables. Phase I established the System Plan 2050 Vision and Goals, initiated external stakeholder coordination, and completed the analysis of future markets for VRE service and preparation of baseline estimates of 2030 and 2050 VRE ridership. Phase II identified an initial range of long-term (2050) future service concepts that could be operationalized by 2050 as well as four (4) potential near-term (2030) weekday and weekend service alternatives that utilize the TRV Phase 2 infrastructure once complete, and are generally consistent with the approved TRV Phase 2 VRE service levels as outlined in TRV Service Plan V6.1. The *Scenario Development Technical Memorandum (January 2024)* documents development of the near- and long-term service concepts.

A single 2030 service alternative that combines the service attributes of two of the four near-term alternatives evaluated, ultimately referred to as Scenario A, was recommended in mid-2024 as the preferred near-term service plan and to serve as the baseline condition for the development of a recommended 2050 Service Vision.

3.1.1. VPRA Manassas Line Agreement

In late 2024, pending agreements between the VPRA and NS for the purchase of the Manassas Line segment within the VRE service area, and between VPRA and VRE for subsequent purchase of portions of VPRA's newly acquired Manassas Line right-of-way (ROW)⁹, were announced necessitating further modifications to the draft System Plan 2030 service plans. Key to those agreements is the VRE acquisition of ROW from VPRA for the construction of a mid-day storage facility for VRE trains in Alexandria, referred to as the Seminary Yard, to replace both VRE's current mid-day storage location at the WUT Coach Yard and planned facility at WUT/New York Avenue. The impact of this change to VRE's near- and long-term O&M and capital costs is presented in Sections 2.6 and 3.4 of this document.

3.1.2. Fleet Optimization Study

In the fall of 2024, VRE initiated a separate, but interrelated effort to refine 2030 fleet needs based on a revised ridership and load factor demand estimate for both a 2030 no-build and build service scenario. The result of this analysis demonstrated that VRE's existing and under-procurement fleet of 121 railcars would be sufficient to provide the expanded level of service through at least the middle of the 2030 decade and rolling stock expansion requirements would be limited to four (4) locomotives. This greatly reduced the near-term capital needs previously presented as part of the System Plan update in the spring of 2024.

In addition to the revised fleet assumptions, minor revisions were made to the recommended 2030 build service plan. These revisions responded to more recent travel demand data and

⁹ For more information on the full Manassas Line agreement and subsequent Operating, Access, and Financial agreements made between VRE and VPRA see <https://vapassengerrailauthority.org/resources/rail-agreements/>.



considered scheduling nuances for weekday service not previously contemplated as part of the original System Plan 2030 service plan proposal, such as turning some trains at Quantico and applying more realistic terminal dwell and deadhead time assumptions.. Ridership estimates for the revised 2030 Build and No-Build service plans were prepared, employing more recent VRE baseline ridership and travel behavior data and U.S. Census-based population and employment growth data in the VRE service area. This combined with a revised assumption for days in-office for VRE riders, see below, produced a ridership estimate that is better supported by the more modest near-term fleet requirements.

3.1.3. Federal Return-to-Office

Significant and rapid changes to the commuting patterns of federal workers occurred in February and March 2025 after several directives and executive orders mandated that most National Capital Region-based federal workers return to a fully in-person work schedule. VRE further revised its ridership estimates for the 2030 no-build and build service plans to account for this change. Those estimates are presented in this report for the recommended weekday 2030 Service Plan. No changes were made to the recommended 2030 weekend ridership estimates or the recommended 2050 Service Vision.

3.2. RECOMMENDED 2030 SERVICE PLAN

VRE revised the 2030 service plan developed in 2023 based on the changes detailed in the previous section. Looking beyond the TRV Phases I and II period of construction (through roughly 2030), VRE proposes a service expansion plan (see Tables 7 and 8) that achieves the following goals consistent with those contained in the System Plan 2050:

- Expand service to 52 weekday trains as allowed in the TRV service plan v6.1
- Continue to regain lost ridership demand and market share resulting from the COVID remote work era and the period of TRV construction
- Align service to periods of highest overall travel demand in the VRE travel corridors
- Minimize the number of required operating consists through efficient equipment utilization
- Provide mid-day storage at Seminary Yard while minimizing storage capacity
- Avoid conflicts with proposed and existing Amtrak frequencies and create complementary service patterns allowing VRE customers to use certain Amtrak trains for limited-stop travel

Specific assumptions underlying the service plan are:

1. By 2030, Seminary Yard capacity will be at least 14 consists¹⁰, with a potential to store up to 19.
2. All trains traveling from Union Station to Seminary Yard will be non-revenue trains with the decision to convert to a revenue train to be made at the time of service implementation.

¹⁰ In railroad terminology, a “consist” is defined as a locomotive and a set of cars, sometimes referred colloquially referred to as a “trainset” or “train”.



3. Pure run times between Union Station and Seminary Yard are assumed to be approximately 20 minutes to provide flexibility to run some or all these frequencies as revenue movements.
4. Trains require at least 10 minutes to switch ends at terminal stations, this time should be factored into the run time between Union Station and Seminary Yard; the maximum practical dwell at Union Station for turning trains would be 20 minutes.
6. Any service plan should be flexible to accommodate a potential reality where not all revenue trains terminate at Union Station.
7. VRE will not be guaranteed exclusive use of the planned three (3) low-level platform edges at Union Station’s lower level.
8. Amtrak trains running complementarily can and will be used by VRE customers through cross-honor ticketing agreements.
9. There is conceptual support for a short-turn at Quantico station to achieve the dual goals of serving the higher demand between Quantico and Washington D.C. (Zones 6-1) and maximizing service frequencies in these zones while efficiently utilizing equipment.

Table 7: Proposed 2030 Weekday Service Plan

Name	Description	Weekday Trains Per Day	Weekday Express Trains	Saturday Trains Per Day	Sunday Trains Per Day
Current Service	VRE Service 2025-2030	32	1	0	0
2030 Service Plan UPDATED	A slightly modified version of previous 2030 Service Plan that responds to changes in travel demand since 2023, addition of Seminary Yard, and rolling stock limitations.	52	9	26*	26*

*Weekend service would increase from currently planned and funded Saturday-only service of three round-trips per line to 13 round-trips systemwide after 2030. The timeline for initiation of the Saturday-only service and ramp-up has not been determined and is not included in this Plan.



Table 8: 2030 Weekday Service Plan Breakdown by Time of Day and Line

Time Period	Fredericksburg Line	Manassas Line
Peak Period-Peak Direction	AM: 11 PM: 7	AM: 9 PM: 5
Peak Period-Reverse Direction	AM: 3 PM: 2	AM: 2 PM: 2
Mid-Day (Between 10 am and 3 pm)	Northbound: 0 Southbound: 2	Northbound: 1 Southbound: 3
Evening (Departing Origin after 7 pm)	Northbound: 1 Southbound: 2	Northbound: 0 Southbound: 2

3.2.1. 2030 Service Plan Express Train Concept

VRE, through assessment of existing and potential travel markets and rail travel time competitiveness, has determined that inclusion of a limited number of express trains is warranted prior to the full implementation of the 2050 Service Vision’s one peak period express train per hour per line. The proposed nine (9) limited-stop trains after 2030 (six on the Manassas Line and three on the Fredericksburg Line), provide riders with the following benefits:

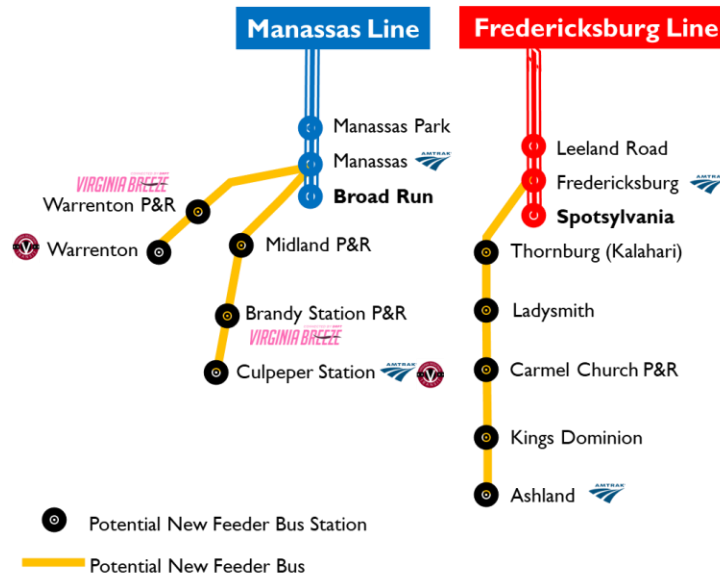
1. A more competitive travel time from the outer jurisdictions, where ridership growth is projected to increase faster.
2. Additional service to those portions of the VRE service area projected to experience high growth.
3. Better load spreading of passengers across all trains in the peak period, peak direction, ensuring that riders boarding at closer-in stations have sufficient seating capacity as demand increases between 2030 and 2050.
4. Improved rail network fluidity and reliability by reducing and eliminating train conflicts in areas of limited infrastructure south of Alexandria.

3.2.2. Proposed Feeder Bus Service After 2030

In addition to expanded rail service levels, VRE proposes a limited network of connecting bus services to better serve the fast-growing communities outside of the existing service area as identified in the System Plan market analysis. This concept includes three bus routes, two connecting to trains at the Manassas Station and one connecting with trains at the Fredericksburg Station. Buses would be timed in both directions to connect only to VRE express trains and a limited number of Amtrak services stopping at these two stations to provide the most time-competitive trip to the D.C. core and other major trip attractors. Growth of the bus concept could occur as more VRE express and Amtrak trains are added to the corridors between 2030 and 2050. A detailed financial, ridership, or operational study of this proposal has not been

conducted and bus operating costs are not included in the 2030 service plan costs. No operator or governance model for this connecting bus service has been assumed.

Figure 8: 2030 Connecting Bus Routes Concept



3.2.3. Weekday No-Build Service Plan

VRE assumed that the No-Build service plan would mimic the existing weekday service of 32 daily trains (16 on each line), accounting for minor modifications to train schedules planned for the Manassas Line.

3.3. 2030 SERVICE PLAN RIDERSHIP FORECASTS

Weekday ridership forecasts for the recommended 2030 service plan, or 2030 Build service plan, and for a No-Build service plan have been updated from the forecasts presented in the *Ridership Trends and Market Analysis Technical Memorandum (August 2023)*. Weekend ridership forecasts were not updated from previous System Plan analyses. VRE conducted these updated forecasts as part of an internal analysis contained in the *Fleet Optimization Study Final Report, (March 2025)*.

3.3.1. Weekday Ridership

VRE projects that the 2030 service plan, in 2030, would attract a systemwide average daily ridership of 15,321, with 6,150 boardings from the Manassas Line and 9,171 from the Fredericksburg Line, a roughly 40/60% line demand split. Compared to the No-Build, VRE expects the Build service plan could attract 2,298 more daily boardings, or 17.6% more demand on weekdays.



Figure 9: 2030 Service Plan Weekday Build Ridership Projection

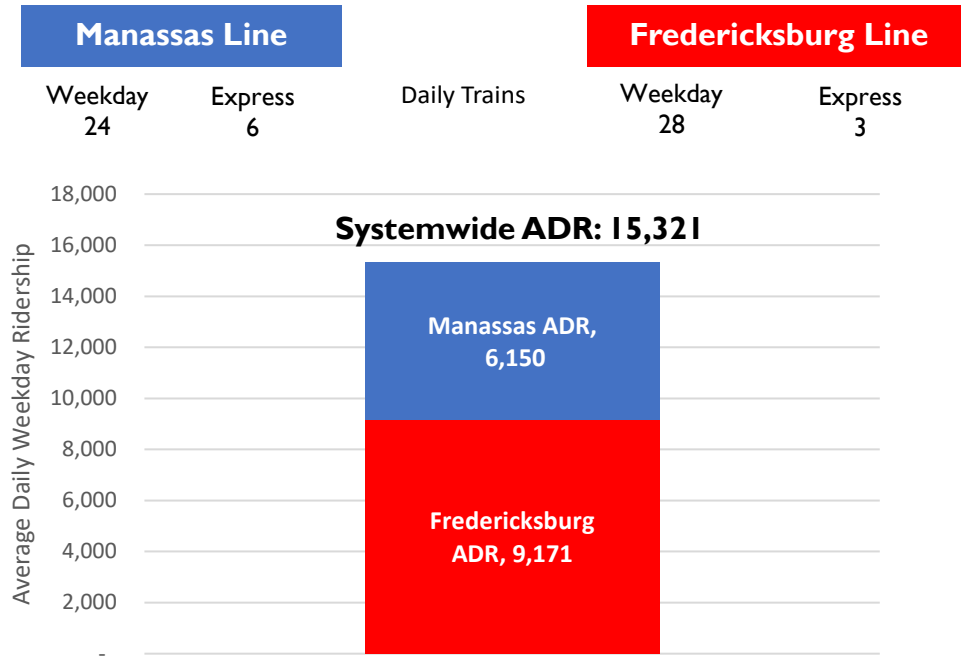
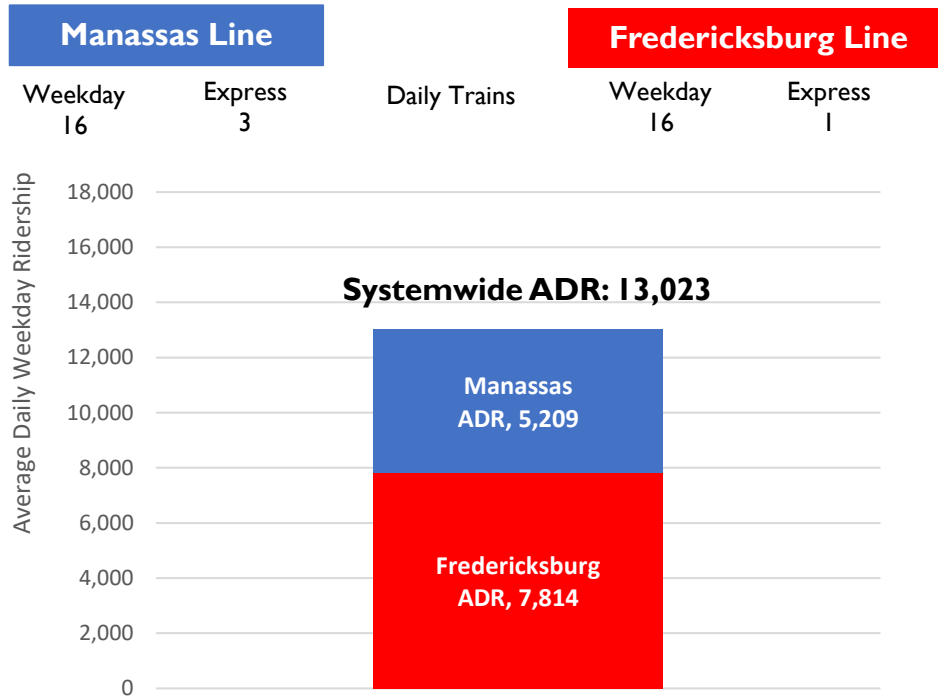


Figure 10: 2030 No Build Service Weekday Ridership Projection





3.3.2. Weekend Ridership

2030 Weekend ridership estimates are presented as a baseline level of service, representing implementation of the three round-trips per line on both weekend days versus the full implementation of the 13 round-trips systemwide proposed in the 2030 service plan. Projections are presented as a range of potential daily boardings due to the high level of uncertainty that exists in projecting weekend demand.

Figure 11: 2030 Baseline Weekend Ridership Projections

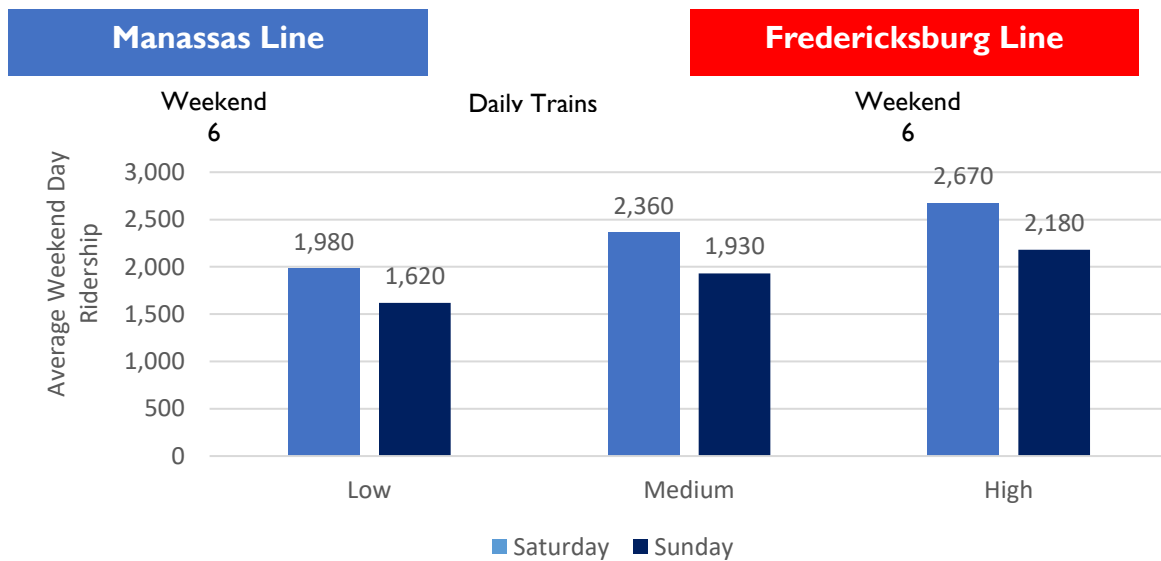
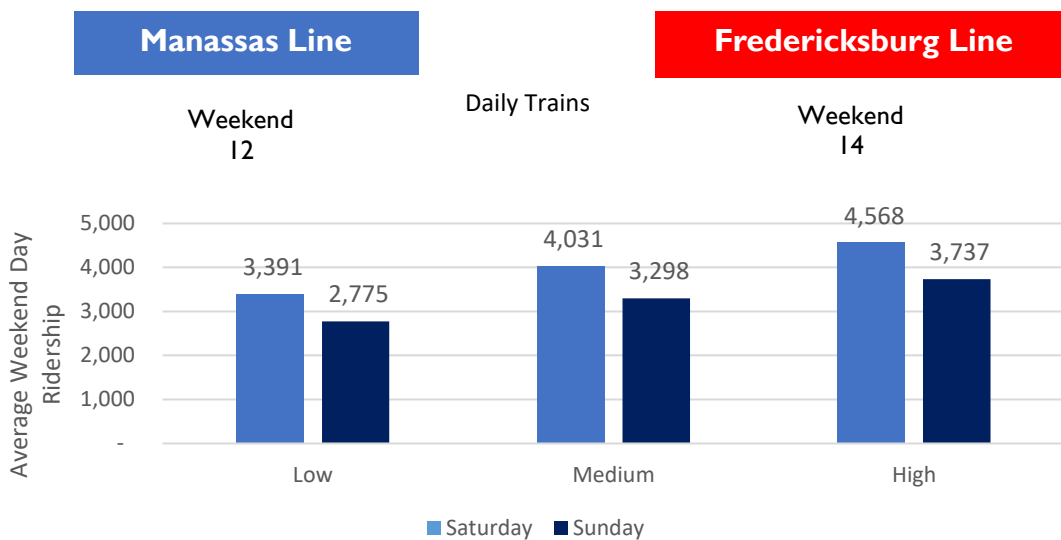


Figure 12: 2030 Build Weekend Ridership Projections





3.4. 2030 SERVICE PLAN COSTS

3.4.1. Projected Capital Costs

For the purposes of the System Plan’s financial analysis, all projected capital costs for the recommended 2030 service plan are presented as *cumulative costs*, meaning the total gross expenditure required between 2025 and 2030, with some exceptions¹¹, to fully-implement the service as conceived. A summary breakdown of the major cost categories are included in Table 8. The table includes projects that are identified in VRE’s FY2026-31 Capital Improvement Program (CIP) totalling \$1.4 billion as well as additional capital needs identified through the system planning process to support the 2030 Recommended Service Plan. A breakdown of projects already included in the VRE CIP and their funding status is included in Table 5.

3.4.2. Projected Cumulative Capital Revenues and Need

Cumulative available capital revenues between FY 2025 and FY 2030, including only those revenue sources VRE currently has access to or is reasonably expected to have access to between now and 2030, are estimated to be \$424 million in YOE dollars (see Figure 13). Revenue sources principally include Federal formula funds, MTF state capital funding, CROC, and local jurisdiction capital contributions, among other minor sources.

Cumulative capital needs strictly between FY 2025 and FY 2030 for the recommended 2030 service plan (Build plan) are estimated to be \$1.34 billion in YOE dollars (see Figure 14). The primary capital needs between FY 2025 and FY 2030 are for the programmed station expansion projects. By comparison, estimated cumulative capital costs for the No-Build condition are \$1.3 billion. The difference between the Build and No-Build condition is largely driven by the need to acquire additional locomotives to operate the proposed increased 2030 service levels. Of the identified capital need for the Build scenario, \$919.1 million is currently unfunded through VRE’s capital improvement program (CIP) while \$883.9 million of the 2030 No-Build scenario is currently unfunded. This large capital shortfall is primarily driven by the need to replace all 20 locomotives currently in operation, as they will reach the end of their useful lives between 2030 and 2032.

¹¹ Certain parking expansion costs, station security, station maintenance, and facilities maintenance costs beyond FY 2030 (through FY 2035) are included in the 2030 projected capital needs identified in Table 8 due to the relative uncertainty in forecasting parking demand versus ridership demand through the 2030 decade. Additionally, two years (FY 2034 and FY 2035) of railcar replacement is included due to uncertainties with rolling stock procurement and manufacturing lead times. Those project costs are not included in the total capital need depicted in Figure 14.



Table 9: 2030 Service Plan Projected Cumulative Capital Needs (2025-2035)

2030 Service Plan Capital Needs			
Improvements	Fredericksburg Line	Manassas Line	Total Cost \$/YOE
Platform/Station	Station Improvements L'Enfant, Crystal City, Alexandria, and Franconia Springfield Stations	Platform Expansion Backlick Road, Broad Run and Manassas Stations	\$555M
	Platform Expansion Leeland Road, Brooke, and Rippon Stations	2 nd Platform Manassas Station	
Parking	Fredericksburg Parking Rehabilitation, Crossroads MSF/AEW Parking, Fredericksburg, Brooke, Brooke, and Rippon Stations	Manassas Park and Manassas Stations	\$204.9M ¹²
Track	Crossovers (4)	Broad Run Lead Track, Crossovers (8)	\$117.5M
Fleet Replacement	20 Locomotives and 36 Railcars (beginning of 100-car replacement) ¹³		\$416M
Fleet Expansion	21 Coaches ¹⁴ and 4 Locomotives in FY27		\$129.6M
Recurring	Rolling Stock Maintenance, Station and Facilities Maintenance, and Security Enhancements		\$146.8 M ¹⁵
Other	Crossroads Yard Expansion (AEW Building and Yard Expansion, initial phase), Security Cameras and Real Time Traveler Info, Seminary Yard Midday Storage Facility		\$94.1M
Total			\$1,664M

¹² Includes capital costs through FY2035

¹³ Includes capital costs through FY2035

¹⁴ 21 Railcars already ordered and in-design, expected delivery year 2027.

¹⁵ Excludes CROC Pay-Go contributions and annual contributions to VRE Capital Reserve.



Figure 13: Cumulative Capital Revenues (2025-2030)

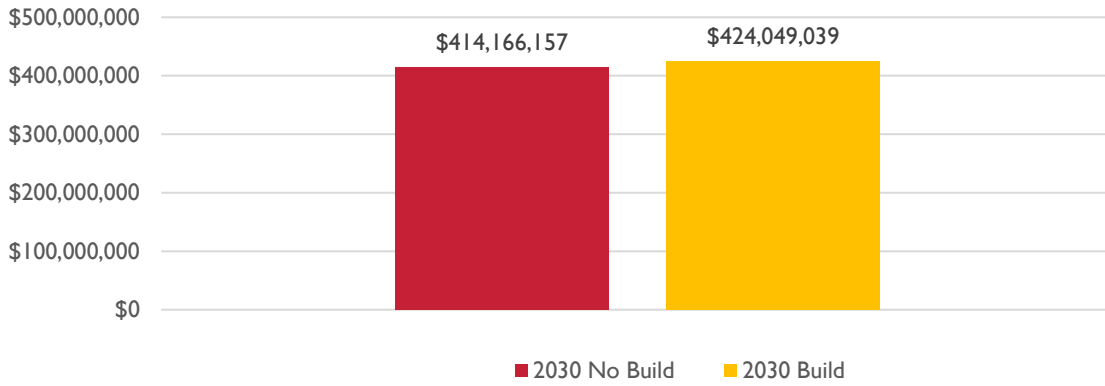
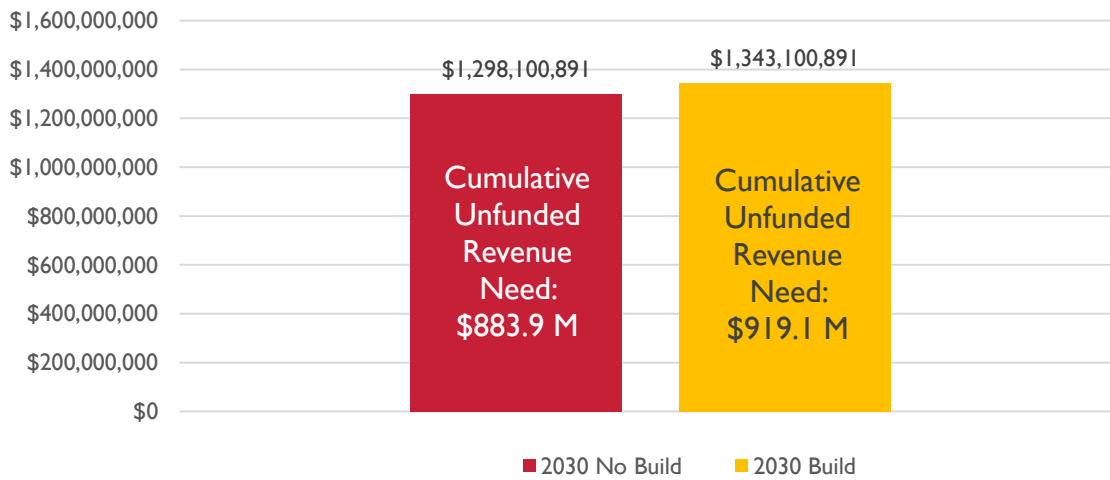


Figure 14: Cumulative Capital Need (2025-2030)





3.4.3. Projected Operating Revenues and Need

In FY 2030, to operate the 2030 service plan, VRE would require \$201.7 million in operating revenues for a balanced budget. Likely available revenues are projected to be \$118.7 million, however, including fares, state operating support, and other sources. This \$83 million revenue shortfall is 48% higher than the projected \$43 million shortfall in FY 2030 for the No-Build service plan. Operating revenues are projected to be 28% higher by implementing the 2030 Build service plan than No-Build service, or \$118.7 million versus \$92.9 million, respectively. These figures include current debt obligations.

Figure 15: 2030 Operating Expenditures

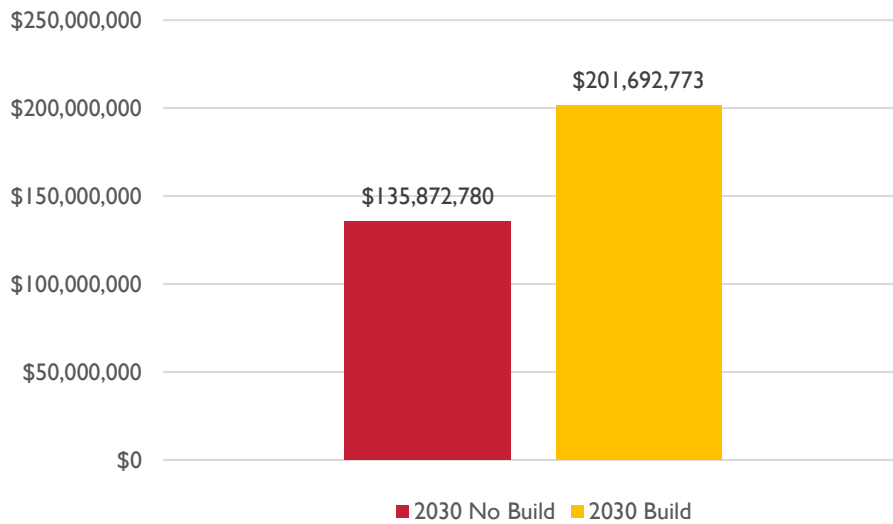
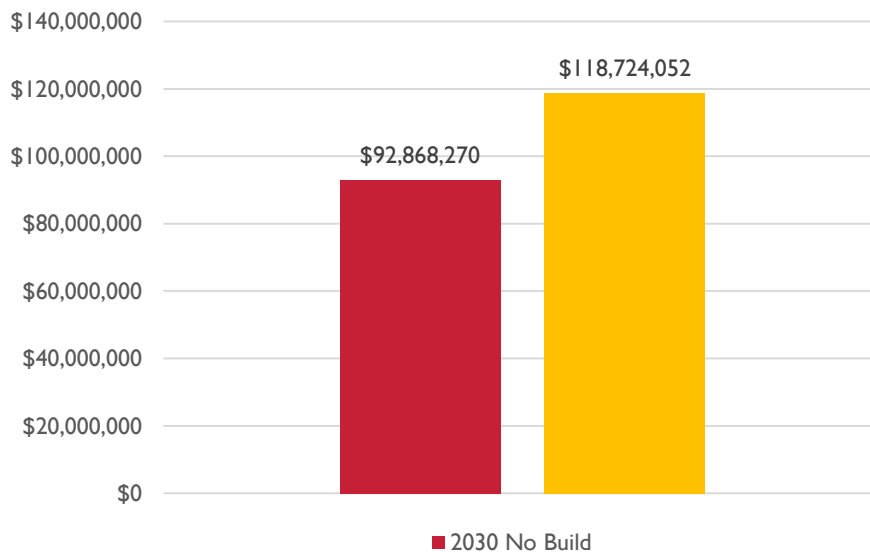


Figure 16: 2030 Operating Revenues





3.5. 2030 SERVICE PLAN FLEET NEEDS

It is projected that a total of 17 consists will be required to operate the 2030 service plan, an increase from the 14 that would be in operation under the No-Build scenario. Based on the results of a train-specific load and demand analyses conducted in the spring of 2025, a total of 118 railcars would be required to operate the recommended 2030 weekday service. VRE expects to take delivery of an order of 21 railcar trailers in 2027 which will bring the total coach fleet size to 121 units.

Figure 17: 2030 Service Plan Weekday Coach Fleet Needs and Available Equipment

	Revenue Trailer	Revenue Cab	Trailer Spares	Cab Spare
Fredericksburg Line	52	10	6	2
Manassas Line	35	7	4	2
Total	87	17	10	4
Grand Total				118
<i>Cars Available 2030</i>				<i>121</i>
Total Trailer Need 2030				97
Total Cab Need 2030				21
Total Trailer Available 2030				100
Total Cab Available 2030				21
Trailer Surplus				3
Cab Surplus				0

With 121 available coaches plus an expanded locomotive fleet, VRE will be able to run the recommended 2030 service plan at the projected 15,321 systemwide weekday average daily ridership with a comfortable margin of capacity for most trains, preventing any one train from operating at greater than 80% of the 130 person seated capacity assumption.

Compared with the No-Build service and demand (101 railcars), 17 more railcars (14 more trailers and 3 more cab cars) will be required for weekday service, meaning that a considerable amount of service expansion after 2030 is possible without further expansion of the railcar fleet. VRE would, however, require 24 locomotives to operate the recommend 2030 service, or four more than currently available in the VRE locomotive fleet. Under the Build condition, 21 locomotives would serve as revenue and spare fleet, while an additional 3 would be required as “protect” locomotives.



Figure 18: 2030 Service Plan Weekday Locomotive Fleet Needs and Available Equipment

	Revenue Locomotives	Spare Locomotives	Revenue Cabs	Spare Cabs
Fredericksburg Line	10	2	10	2
Manassas Line	7	2	7	2
Total 2030 Locomotives Required				21
Total 2030 Cabs Required				21
Protects Required				3
Total 2030 Locomotive Surplus				-4
Total 2030 Cab Surplus				0

3.5.1. 2030 Service Plan Weekend Fleet Needs

Weekend service fleet needs are not included here as only weekday needs were assumed to be the constraining factor in fleet availability for 2030. Analysis has shown that there will be more than sufficient available rolling stock in 2030 to operate the six (6) consists required to run the 26 daily trains proposed for 2030 weekend service.



4. CONCLUSION

VRE has significant opportunities to expand and grow its service to respond to the changes in regional travel patterns in Northern Virginia since the previous System Plan was completed in 2014. System Plan 2050 reconfirms System Plan 2040's commitment to substantially expand weekday VRE service in both the peak and off-peak hours and proposes to add new weekend service that would be phased in over the 2030-2050 time horizon.

4.1. 2030 SERVICE PLAN

While the recommended 2030 weekday service levels are about 63% greater than the levels operated in 2025, VRE operations will remain largely confined to the constraints of the TRV Phase 1 and 2 planned rail infrastructure, with some minor infrastructure additions proposed, such as additional turnouts, based on the refined 2030 service plan and projected 2030 ridership levels. This level and pattern of service will largely continue to serve the peak period, peak direction commuter market into the Washington, D.C. Core, while offering limited services into new markets, such as trips between Washington, D.C. and Woodbridge, Fort Belvoir, and Quantico, at other times of day. The forecast weekday ridership of 15,321 average daily riders (ADR) is about 18% greater than the No Build condition that assumes the continued operation of 32 weekday trains. The greatest ridership growth potential is the currently untapped weekend travel market. Forecast 2030 weekend ADR is estimated to be between 3,083, at the low end, and 4,153, at the high end, or about 20-27% of weekday ADR.

Financially, the proposed 2030 service plan is the most achievable from both a capital and operating funding perspective based on existing and likely future revenue streams. While the majority of the estimated \$1,343 M in cumulative capital needs are already identified and partially funded in VRE's CIP, a critical unfunded need is \$273 M for both the four (4) additional locomotives required to operate the proposed 2030 service and replacement of the *existing* 20 locomotives that will pass the end of their useful lives between 2030 and 2032. The total unmet capital need for the 2030 service plan is \$919.1 M. Projected *additional* cumulative capital revenues for the 2030 service plan are \$9.9 million versus the No-Build, leaving a \$35.1 million additional cumulative revenue need if the 2030 service plan were implemented.

Recommended 2030 weekend service is proposed to be implemented in phases and begin as a limited Saturday-only pilot with three (3) round trips per day, per line. After TRV Phase 2 infrastructure, including the Long Bridge, is in place, three (3) additional round trips are proposed on the Manassas Line and four (4) on the Fredericksburg Line, as well as Sunday service to match Saturday service levels. The weekend service would be scheduled to align closely with leisure, tourism, and sporting event travel demand. Specific schedules will be developed at the time of service implementation.

The 2030 service plan's annual operating need is projected to be \$201.7 million in 2030. The projected deficit in operating revenues is projected to be \$40 million higher than the No-Build scenario, or \$83 million, versus \$43 million, respectively based on current expected revenue sources. Both the 2030 Build and 2030 No Build operating needs are significantly above the \$118.4 M FY2025 VRE operating budget. Given the projected cost increase by 2030, identifying sufficient operating revenues for either the No-Build and Build service levels are a high priority



of VRE in the near-term. The significant ridership growth potential associated with expanded weekday and weekend service, and the relatively moderate increased capital costs required to support the greater service levels, makes the recommended 2030 service plan an attractive prospect to ensure the continued relevance and utility of VRE service to the Northern Virginia and greater Washington, D.C. region.

4.2. 2050 VISION

The recommended 2050 weekday service would transform a largely peak-focused 2030 service plan and grow the shoulders, mid-day, and evening service windows with a clockface, regimented service concept that would provide no worse than hourly service at all times, and half-hourly service in the peak period, reverse direction on both lines. Peak period, peak direction headways would be standardized to 20 minutes, with one train per hour operating as an express train in the peak period, peak direction. While service operated will grow by 123% from 2030 levels, weekday ADR is anticipated to increase by 83% from estimated 2030 levels to 28,100 average trips per day.

The recommended 2050 weekend service would also be standardized, with clockface headways and hourly trains on both lines and in both directions, spanning roughly 6 a.m. to 10 p.m. on Saturdays and 7 am to 9 pm on Sundays with about 162% more service than 2030. The weekend travel market is forecast to continue to be strong at about 35% of forecast weekday ADR. Weekend ADR is estimated to increase by 169% from 2030 levels. The result will be a highly-predictable scheduled railroad capable of supporting weekend work trips, non-work or leisure trips, and special event sporting events, road races, concerts, and festivals.

The cumulative capital need between 2025 and 2050 to fully realize the 2050 Service Vision is \$3.46 billion. The largest category of capital is rolling stock, plus some additional station parking and limited additional trackwork (i.e., crossovers) on the Fredericksburg Line. With cumulative capital revenues of \$2.27 billion expected through 2050, that leaves a \$1.19 billion cumulative revenue gap over the System Plan's 25-year planning horizon.

The operating need for the recommended 2050 Service Vision is \$748.3 M in 2050 dollars. An operating revenue deficit of \$452.2 million is projected in that year, a \$369.2 million increase from the expected \$83 million operating revenue deficit in 2030. This is largely a reflection of the fact that VRE's existing operating revenue sources are not projected to increase commensurate with the proposed increase in service intensity through 2050, even with a more than doubling in the projected daily weekday ridership in 2050. Still, the 2050 Service Vision represents an opportunity for the Northern Virginia region and Washington, D.C. to realize a paradigm shift in the way people move between its suburbs and growing activity centers. The VRE 2050 System Plan and Service Vision should be considered the first in a series of regular updates to the concept of operations for VRE for the next 25 years to enable VRE to grow to serve the region as the transportation service of choice, creating meaningful connections and economic opportunities in a safe, sustainable, and equitable manner.