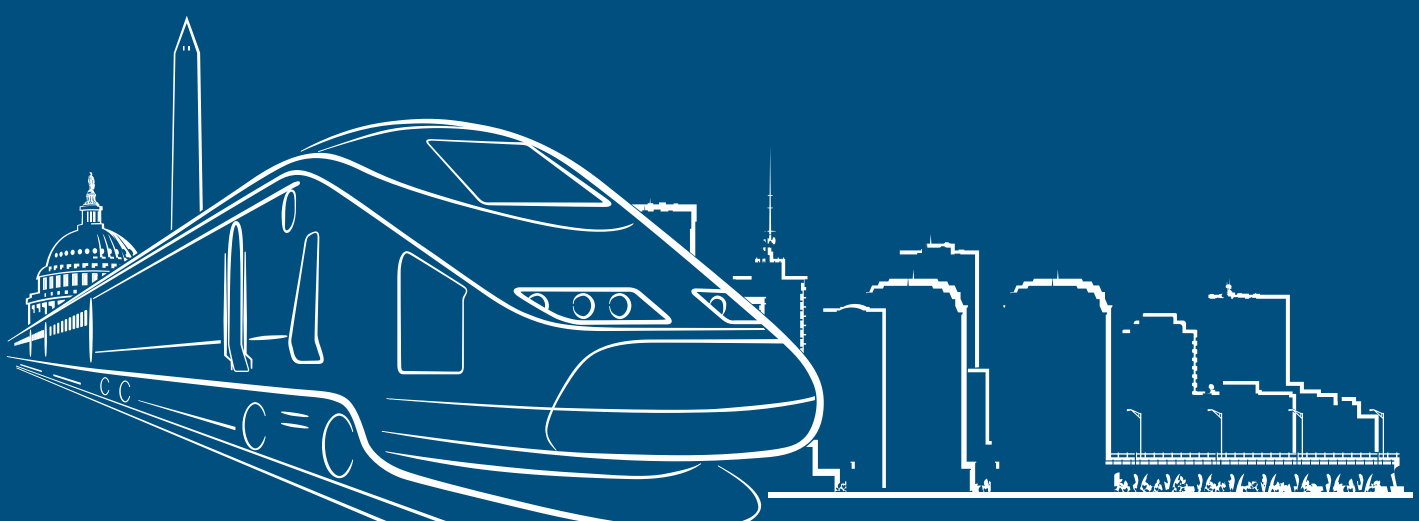
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

A ALTERNATIVES TECHNICAL REPORT



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August 2017

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Alternatives Technical Report

FINAL

DRPT
Virginia Department of Rail and Public Transportation

U.S. Department of Transportation
Federal Railroad Administration

TABLE OF CONTENTS

CHAPTER 2 – PROJECT LOCATION

CHAPTER 3 – EXISTING CONDITIONS IN THE DC2RVA CORRIDOR

1 EXECUTIVE SUMMARY

The Federal Railroad Administration (FRA) and Virginia Department of Rail and Public Transportation (DRPT) have prepared this Alternatives Technical Report as part of a Tier II Environmental Impact Statement (EIS) and Service Development Plan (SDP) for the proposed development of improvements to passenger rail service and rail infrastructure in the rail travel corridor between Washington, D.C. and Richmond, VA (the DC2RVA corridor). The Washington, D.C. to Richmond Southeast High Speed Rail Project (known as the DC2RVA Project, or Project) is being carried out in compliance with the National Environmental Policy Act (NEPA) and implementing regulations, and other applicable laws. The Project is a comprehensive planning effort to determine future investments in the corridor that will deliver higher speed passenger rail service, increase passenger and freight rail capacity, and improve passenger rail frequency and reliability in a corridor shared by growing volumes of intercity passenger, commuter, and freight rail traffic.

This Alternatives Technical Report summarizes the data collection and assessment and alternatives development and screening processes used by DRPT to develop a set of potentially reasonable alternatives for evaluation in the Tier II EIS. Reasonable alternatives meet the Project's Purpose and Need, are buildable, cost-effective, and have acceptable impacts to environmental and community resources.

Additional technical detail, including sets of corridor-wide maps for various existing conditions and possible rail alignment options, are provided in the appendices.

1.1 PROJECT BACKGROUND

1.1.1 DC2RVA Tier II Environmental Impact Statement

The DC2RVA Tier II EIS is being developed as part of a staged approach known as "tiering," which addresses broad programs and issues in an initial (Tier I) analysis, and analyzes site-specific, project-level (Tier II) proposals and impacts in subsequent studies. Both a program-level (Tier I) EIS and a project-level (Tier II) EIS follow the same process; the major difference is in the level of detail and analysis presented.

The original Southeast High Speed Rail (SEHSR) Tier I Final EIS, which received a signed Record of Decision (ROD) from the FRA and Federal Highway Administration (FHWA) in 2002, covered the Washington, D.C., to Charlotte, NC, corridor at a program level, establishing the overall project purpose and need and selected preferred rail corridors, and provided a programmatic-level environmental analysis. Because of the magnitude of the approximately 500 mile-long project study area and the conceptual level of project detail, the DRPT, the North

Carolina Department of Transportation (NCDOT), and their federal partners selected an incremental approach in developing the SEHSR program. Key elements of this approach are:

- Upgrading existing rail corridors instead of developing new corridors
- Utilizing fossil-fuel burning equipment rather than electric-powered equipment
- Adding passenger service as market demand increases and/or when funding is available

The incremental approach selected in the SEHSR Tier I ROD seeks to minimize cost and potential impacts to the environment by utilizing existing railroad tracks and railroad rights-of-way as much as possible. The DC2RVA corridor is the northernmost segment of the SEHSR Corridor, which extends from Washington D.C. through Richmond VA, and from Richmond continues east to Hampton Roads (Norfolk and Newport News), VA and south to Raleigh, NC, and Charlotte, NC, and then continues west to Atlanta, GA, and south to Florida (Figure 1-1). The proposed SEHSR Corridor would extend higher speed rail service from the Northeast Corridor (NEC) southward along a designated high speed rail corridor from Washington, D.C. to Charlotte, NC, and south to Florida.

1.1.2 Project Purpose and Need

A summary of the Project Purpose and Need[1] is presented below.

1.1.2.1 DC2RVA Purpose

The 2002 SEHSR Tier I EIS established the overall purpose for the SEHSR corridor, which, as stated in the Tier I EIS, is to provide a competitive transportation choice to travelers within the Washington, D.C. to Richmond, Raleigh, and Charlotte travel corridor. The purpose of the current DC2RVA project and Tier II EIS is to carry forward the purpose of the SEHSR Tier I EIS within the Washington, D.C. to Richmond segment of the larger SEHSR corridor by identifying the infrastructure improvements necessary to provide a competitive transportation choice for current and future conditions. The Project is expected to provide multiple benefits to the traveling public and the Commonwealth of Virginia, including:

- Providing an efficient and reliable multimodal rail corridor between Washington, D.C. and Richmond and beyond.
- Increasing the capacity of the multimodal rail system between Washington, D.C. and Richmond.
- Improving the frequency, reliability, and travel time of passenger rail operations in Virginia and beyond, and providing a competitive alternative to highway and air travel.
- Accommodating VRE commuter rail service operations.
- Accommodating the movement of freight by rail through the corridor, including to and from Virginia's ports.

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[1] A detailed DC2RVA Project Purpose and Need Statement is available on the Project website at www.DC2RVArail.com, and is presented in Chapter 1 of the Tier II Draft EIS.

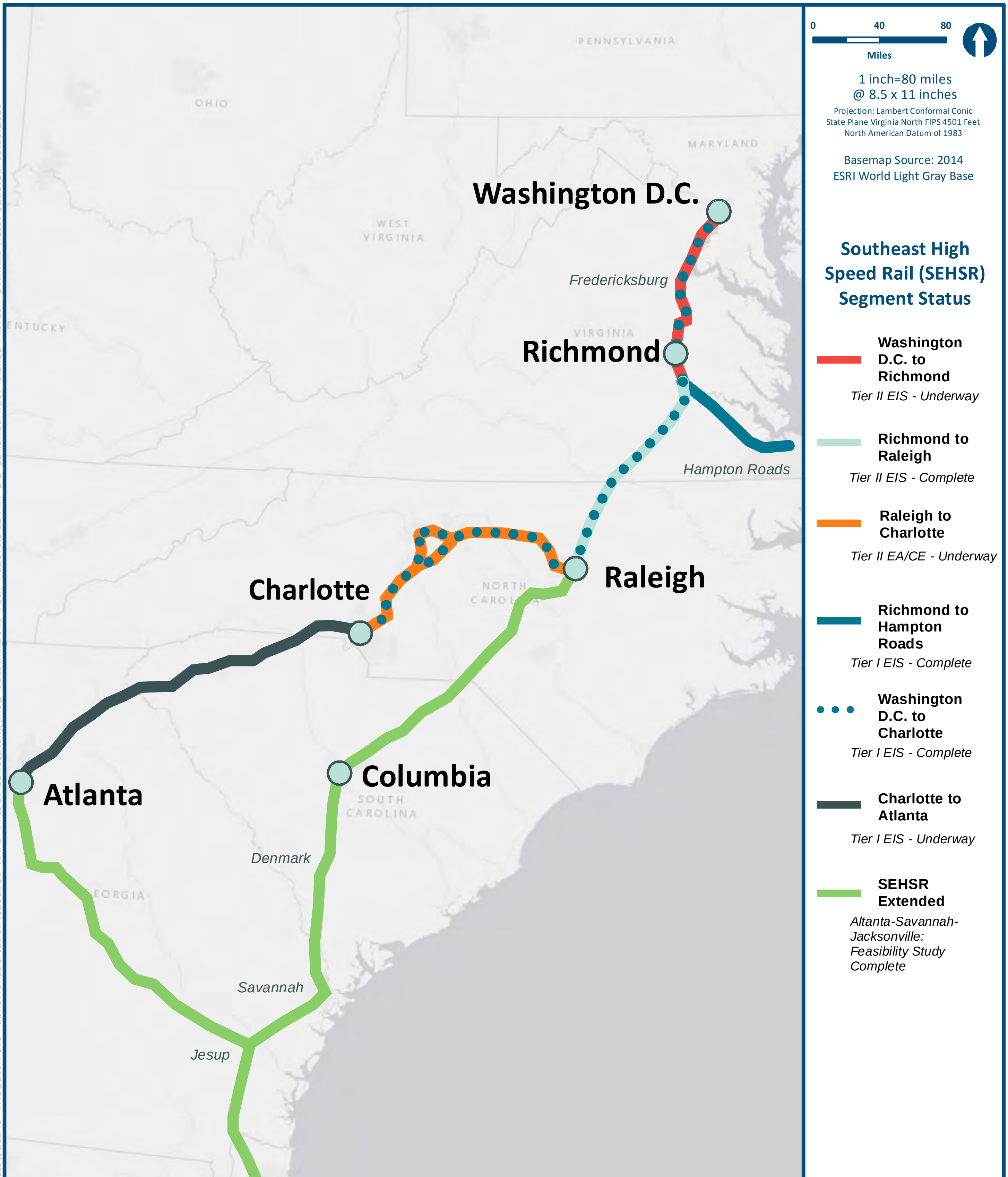


Figure 1-1
SEHSR Corridor

- Improving modal connectivity with other public transportation systems within the corridor to further expand travel options for passengers within Virginia and beyond.
- Improving multimodal rail operations safety in the corridor.
- Improving air quality and reducing greenhouse gas emissions by diverting passenger trips by automobile and movement of freight by trucks to more environmentally sustainable rail transportation.

Implementing higher speed passenger rail service would also encourage economic development in the Commonwealth and along the northeast and southeast travel corridors by expanding competitive travel options in the corridor for business and leisure travelers. Additionally, because the Project corridor is a multimodal corridor shared by freight, intercity passenger, and commuter service, the proposed improvements would also enhance the efficiency of freight rail movements within the corridor. Improvements to freight rail operations in the corridor would encourage economic development by increasing freight traffic through Virginia's ports, and present an opportunity for greater diversion of freight transport from congested highways to rail.

1.1.2.2 Need for the DC2RVA Project

The Tier I Final EIS and ROD for the SEHSR corridor between Washington, D.C. and Charlotte established the needs for the overall SEHSR corridor, including this Project. Current conditions experienced in the Project corridor support the Tier I EIS purpose and need and are the foundation for the Project today. These conditions include:

- **Population Growth**. Population in the corridor and adjacent urban regions continues to grow, increasing demand for reliable and safe travel options for passengers. In addition to overall population growth, changing demographics in the corridor and adjacent urban regions are increasing the demand for passenger rail service.
- **Freight Growth**. Demand for freight movement through and within the corridor is growing as economic activity and population increase. Ongoing expansion of Virginia's deep water ports and intermodal facilities further increases the need for efficient shipment of freight.
- **Congestion in the I-95 Corridor**. The I-95 corridor between Washington, D.C. and Richmond remains congested, despite ongoing and planned improvements. As a result, trip times by highway vehicle are not reliable.
- **Air Travel Delays**. Travel by air is increasingly at capacity, causing delays that generate detrimental economic effects such as lost productivity for travelers and excessive fuel consumption.
- **Rail Capacity in the Corridor**. The shared freight and passenger rail corridor between Washington, D.C. and Richmond is nearing capacity and requires improvements in order to effectively and efficiently meet existing and future demands for intercity passenger service, commuter passenger service, and freight service.
- **Providing Options for Reliable and Convenient Movement of Goods and People**. The transportation network must provide options for reliable and convenient movement of goods and people in order for the Commonwealth and southeast region's economy to remain strong and grow.

- **Air Quality**. There is a need to reduce growth of transportation-related mobile source emissions and the resultant impacts to air quality. Travel or freight movement by train provides a safe and efficient travel mode, and uses less energy and produces fewer emissions per passenger or ton of freight moved per mile.

1.1.3 Agency and Public Involvement

The DC2RVA Tier II EIS is being prepared pursuant to the National Environmental Policy Act of 1969. As per the Council of Environmental Quality (CEQ) regulations (40CFR part 1500 et seq.) for implementing NEPA and FRA's Procedures for Considering Environmental Impacts (64 FR 28545, May 26, 1999), FRA and DRPT conducted scoping to guide the development of the Tier II EIS for the Project. The scoping process invited comments from interested agencies and the public to ensure the full range of issues related to the Project are addressed, reasonable alternatives are considered, and key issues are identified. To provide an early and open scoping process, DRPT and FRA employed many forms of outreach to engage diverse audiences, inform them of the Project, and enable them to contribute their input. These efforts culminated in one agency scoping meeting, four in-person public scoping meetings, and one self-guided online meeting. In total, 3,307 parties participated in the scoping process, providing 1,625 scoping comments. A scoping summary report was prepared and is available on the Project website (www.DC2RVArail.com).

Agency and public input during the scoping process identified several alternatives for consideration, including some that were determined to be indirectly related to, or non-supportive of, the Project's Purpose and Need, such as extending passenger rail service to Bristol, VA, or developing a bicycle trail or greenway along the corridor. Suggested alternatives and infrastructure options that were potentially related to, or supportive of, the Project's Purpose and Need and were considered further included new track alignments along the corridor (including a potential bypass at Ashland and at Fredericksburg), diverting freight trains onto the Buckingham Branch Railroad, various operating modes or service levels (to be addressed as part of the service planning effort for the Project), the concept that the Richmond area be served by only one rail station, and the potential for a new station either in the vicinity of the former Broad Street Union Station (now housing the Science Museum of Virginia) in Richmond or near the Boulevard and Broad Street intersection.

Subsequent to the initial scoping efforts, DRPT conducted additional public meetings and outreach to local and regional planning and governing bodies, including an initial round of three public meetings to present the proposed approach to alternatives development and screening based on Project Purpose and Need, including the range of alternatives identified to date. A subsequent round of three public meetings was held to present the set of alternatives DRPT proposed to carry into the Tier II EIS for further evaluation. These public meetings and associated local and regional outreach, and summaries of the comments received from stakeholders, agencies, and the public, are available on the Project website (www.DC2RVArail.com).

1.2 PROJECT DESCRIPTION

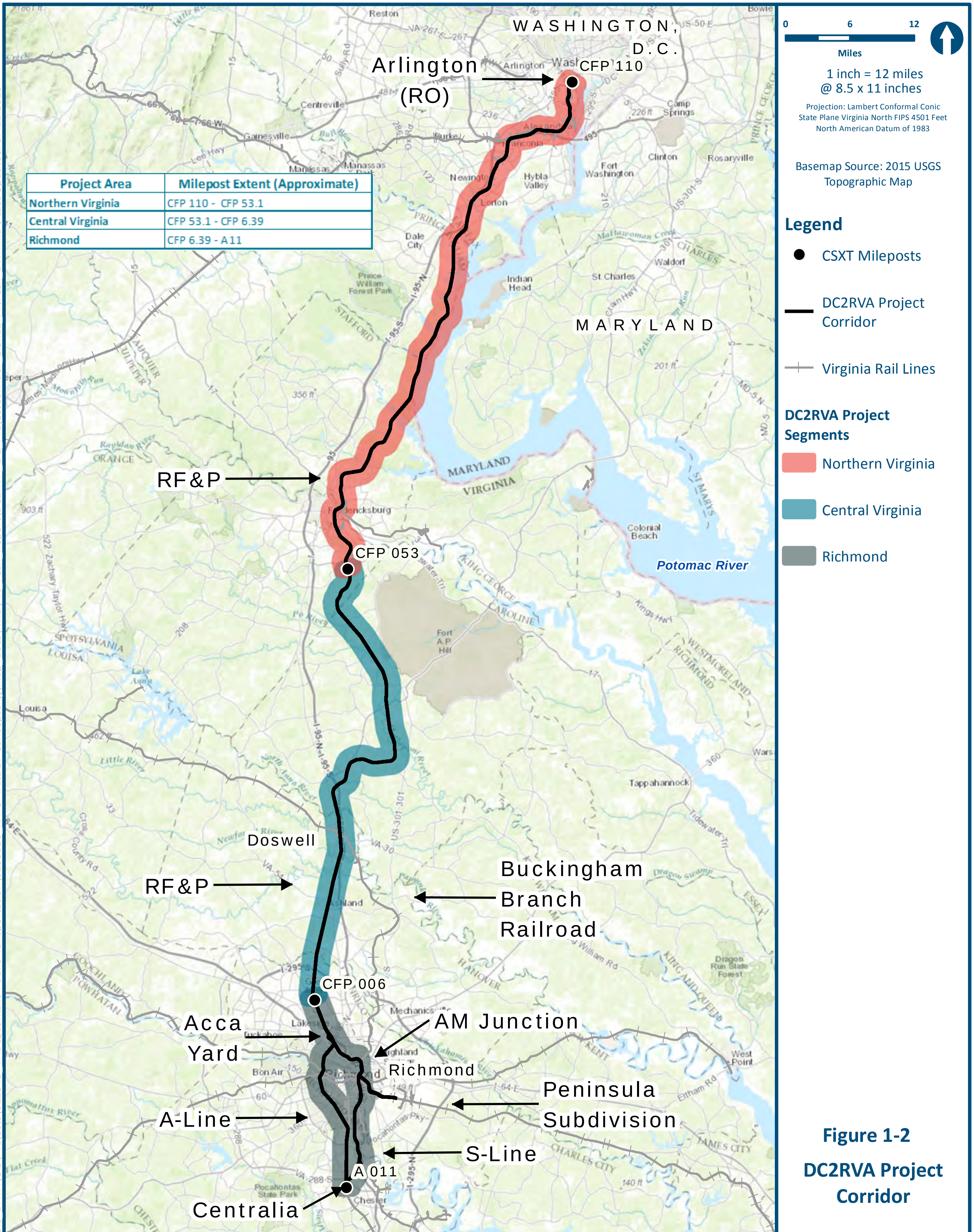
Chapter 2 provides a detailed description of the Project and Project location.

1.2.1 Study Area

The DC2RVA corridor spans 123 miles along an existing rail corridor owned by CSX Transportation (CSXT) between Control Point RO (milepost [MP] CFP 110) in Arlington, VA and the CSXT A-Line and S-Line junction at MP A-11 in Centralia, VA (Chesterfield County) (Figure 1-2). At the northern terminus in Arlington, VA, the Project limit ends at the southern approach to Long Bridge, a double-track rail bridge carrying the rail corridor over the Potomac River to Washington, D.C. The Project corridor follows the CSXT Richmond, Fredericksburg & Potomac (RF&P) Subdivision from the Potomac River to Richmond. The southern terminus in Centralia is the junction of two CSXT routes that begin in Richmond and rejoin approximately 11 miles south of the city. The theoretical study area for ridership and revenue estimation, and rail operations and capacity modeling extends beyond the physical Project limits north to Union Station (which is owned by Amtrak) in Washington, D.C., and the Northeast Corridor (NEC) and south to Norfolk and Newport News, VA and to cities in North Carolina and beyond to Florida. The northern section of the DC2RVA corridor is shared with Virginia Railway Express (VRE), which operates commuter rail service from Washington Union Station to Spotsylvania, just south of Fredericksburg, VA.

Additional segments of the Project include approximately 8.3 miles of the CSXT Peninsula Subdivision CA-Line from Beulah Road (MP CA-76.1) in Henrico County, VA east of Richmond to AM Junction in downtown Richmond, and the approximately 26-mile Buckingham Branch Railroad (BBRR) from AM Junction to the RF&P Subdivision Crossing (MP CA-111.8) north of Richmond in Doswell, VA.

In Arlington, the Project connects to existing CSXT track extending across the Potomac River on the Long Bridge into Washington, D.C. and Union Station, the southern terminus of Amtrak's NEC. The District Department of Transportation (DDOT) is currently studying rail operation and capacity needs across the Long Bridge and extending to Union Station. In downtown Richmond, the Project connects to both the Richmond to Raleigh segment of the SEHSR corridor and the Richmond to Hampton Roads segment of the SEHSR corridor. The Project corridor overlaps with both of these SEHSR segments between Main Street Station in Richmond and Centralia. The Project's southern boundary extends to Centralia to include an analysis of the complete CSXT network on the S-Line and A-Line from Centralia through Richmond as part of the SEHSR corridor.



Project Area	Milepost Extent (Approximate)
Northern Virginia	CFP 110 - CFP 53.1
Central Virginia	CFP 53.1 - CFP 6.39
Richmond	CFP 6.39 - A11

Figure 1-2

DC2RVA Project Corridor

1.2.2 Project Improvements to Passenger Service

The DC2RVA Project identifies specific rail infrastructure improvements and service upgrades to deliver higher speed passenger rail, improve conventional speed passenger service, expand commuter rail, and accommodate growth of freight rail service, in an efficient and reliable multimodal rail corridor. The increased capacity will improve passenger rail service frequency, reliability, and travel time in a corridor shared by growing volumes of intercity passenger, commuter, and freight rail traffic (Figure 1-3).

FIGURE 1-3: RAIL SERVICE BENEFITS

1.2.3 Existing and Proposed Passenger Services

Amtrak currently operates four types of intercity passenger trains[2] through the DC2RVA corridor, as described below and shown in Figure 1-4:

- **Northeast Regional (Virginia) trains** operating in Virginia are extensions of intercity NEC trains from Boston and New York that continue south of Washington, D.C. to points in Virginia. These trains, which operate under the brand name "Northeast Regional," and referred to as "Northeast Regional (Virginia)" in this document, provide regional passenger service in the DC2RVA corridor and make frequent station stops to board and detrain passengers. The Commonwealth of Virginia currently provides financial support for the operation of the Northeast Regional (Virginia) service.
- **Interstate Corridor (Carolinian) trains** are intercity passenger trains that operate through Virginia and into North Carolina. Currently one Interstate Corridor train, named the Carolinian, operates on the DC2RVA corridor, making a daily round-trip

[2] Long distance, interstate corridor (Carolinian), and Northeast Regional (Virginia) passenger trains are FRA-designated classes of passenger trains, based on type of service and length of each train's service corridor (see Chapter 2).

between New York and Charlotte that includes several station stops in the DC2RVA corridor. The State of North Carolina currently provides financial support for the operation of the Interstate Corridor (Carolinian) service.

- **Long Distance trains** operate on routes of 750 miles in length or more, and are part of Amtrak's National Network. In 2015, Long Distance trains provided four daily round-trips in Virginia that used all or part of the DC2RVA corridor, and a fifth Long Distance train operated three times per week in the segment of the corridor between Washington and Alexandria. The Long Distance trains have limited station stops in the DC2RVA corridor.
- **Auto Train** is a unique Long Distance service that operates as a daily nonstop overnight train between dedicated station facilities in Lorton, VA and Sanford, FL, and uses a mix of equipment to carry both rail passengers and their personal vehicles.

Future passenger rail services anticipated as a result of the Project will include the following:

- All existing Amtrak passenger trains currently operating in the DC2RVA corridor.
- Four new Interstate Corridor (SEHSR) passenger trains operating daily round-trips from Charlotte and Raleigh, NC to Washington, D.C. and New York via the DC2RVA corridor and the NEC. These four new Interstate Corridor (SEHSR) trains are anticipated to make limited stops within the DC2RVA corridor.
- Five new Northeast Regional (SEHSR) trains operating daily round-trips from Richmond, Norfolk, and Newport News, VA to Washington, D.C., New York, and Boston via the DC2RVA corridor and the NEC.

Figure 1-5 shows the proposed new passenger services in the DC2RVA corridor that the Project is intended to support in conjunction with existing passenger train frequencies. All intercity passenger trains, whether existing or planned, will benefit from the increased track speeds to be achieved as part of the Project's corridor-wide upgrades to track and signal systems. New and existing intercity passenger trains are anticipated to achieve a maximum allowable speed of 90 mph in the DC2RVA corridor, with the exception of the Auto Train. In addition, all trains (intercity passenger, commuter, and freight) will benefit from improvements in reliability and performance resulting from corridor-wide improvements to train operating capacity, as well as corridor-wide upgrades to existing track, signal systems, and stations and platforms.

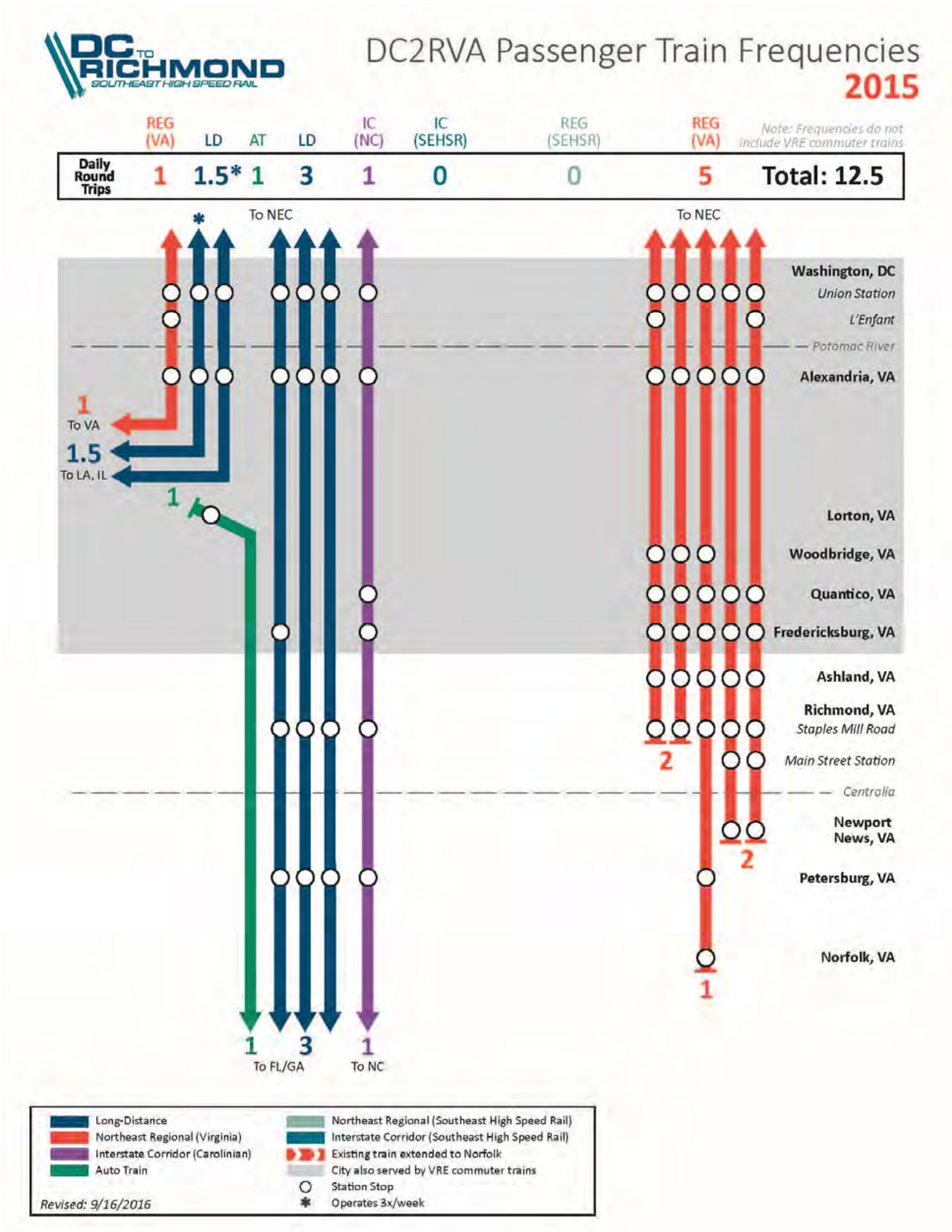


FIGURE 1-4: CURRENT (2015) PASSENGER TRAIN FREQUENCIES IN THE DC2RVA CORRIDOR

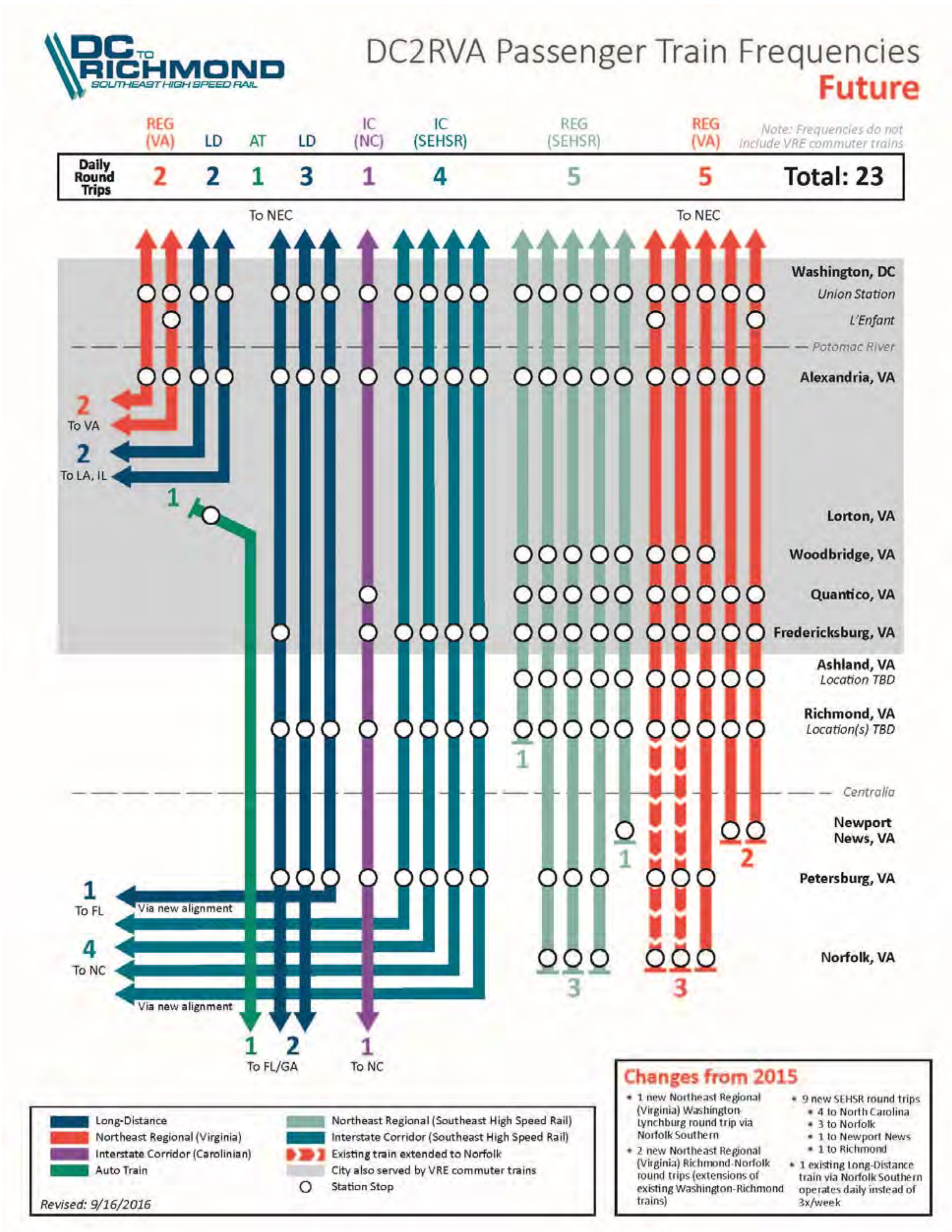


FIGURE 1-5: FUTURE DC2RVA CORRIDOR PASSENGER TRAIN FREQUENCIES AFTER PROJECT COMPLETION

1.2.4 Project Improvements to Rail Infrastructure

Specific improvements to the existing rail infrastructure between Arlington, VA and Centralia, VA include:

- **Corridor-wide improvements to train operating capacity**. These improvements will accommodate more efficient and reliable operation of intercity passenger, commuter, and freight rail service with increased frequency, reliability, and speed. Infrastructure capacity improvements will include an additional main track along most of the corridor, additional sidings, crossovers, yard bypasses and leads, and other capacity improvements at certain locations.
- **Corridor-wide upgrades to existing track and signal systems to achieve higher operating speeds**. These improvements include upgrades to achieve operating speeds up to a maximum allowable speed of 90 mph for both intercity and commuter passenger trains, including curve realignments, higher-speed crossovers between tracks, passing sidings, and grade crossing improvements.
- **Station and platform improvements for Amtrak stations**. These projects will improve the efficiency of railroad operations, improve quality of service, improve accessibility, and accommodate increased ridership.

The Tier II EIS being completed for the Project will assess the environmental impacts of these improvements and identify ways to avoid, minimize, or otherwise mitigate such impacts. The Project may include locations for new or replacement intercity passenger stations on the Project corridor. The Project will accommodate, but does not include improvements planned by Virginia Railway Express (VRE) for its commuter platforms and stations. Additionally, the Project may include capacity improvements adjacent to the rail corridor to address congestion in the Richmond area. Studies in support of the Project will address passenger and freight rail operations and service between Union Station in Washington, D.C. and Richmond and beyond, but the Project does not include physical improvements to the Long Bridge across the Potomac River or to rail infrastructure within Washington, D.C. Other projects will address improvements to the rail infrastructure north of Arlington and south of Centralia along the SEHSR corridor.

1.3 EXISTING CONDITIONS IN THE DC2RVA CORRIDOR

Chapter 3 of this report provides an overview of train operations and track infrastructure in the DC2RVA corridor and includes reference to both Appendix B [Geographic Information System (GIS) Data Received for DC2RVA] and Appendix C (DC2RVA Project Corridor Maps).

CSXT is the owner and operator of the trackage in the DC2RVA corridor and provides freight service. CSXT leases this project entire corridor between the Buckingham Branch Railroad (BBRR), Amtrak, and VRE. The DC2RVA project limits extend approximately 123 miles from the CSXT control point (CP) RO, milepost (MP) CFP-110, located just south of the Potomac River Bridge in Arlington, VA, south to the CSXT A-Line/S-Line junction in Centralia, VA (Chesterfield County) at MP A-11. Additional segments of the Project include approximately 8.3 miles of the CSXT Peninsula Subdivision CA-Line from Beulah Road (MP CA-76.1) in Henrico County to AM Junction in Richmond, VA (just north of Main Street Station), and the approximately 26-mile BBRR from AM Junction to the crossing of the CSXT RF&P Subdivision in Doswell, VA (at MP CA-111.8). Trackage beyond the project limits north of Arlington to

Washington Union Station is also included for project activities related to ridership and operations modeling.

Three other railroads have operating rights on the corridor: Amtrak provides state-supported corridor trains/service (aka “regional service”) and long-distance trains/service along the length of the corridor; VRE provides commuter rail service from Crossroads (Spotsylvania County) north to Washington Union Station; and Norfolk Southern (NS) provides freight service on a limited section north of Alexandria, VA. The BBRR provides freight service on a route within the project area that it leases from CSXT. CSXT has agreements with VRE and Amtrak that give passenger and commuter trains priority during the morning and evening rush hours (6 a.m. to 9 a.m. and 4 p.m. to 7 p.m. on weekdays).

While the existing track and signals and communication systems in the DC2RVA corridor have been modernized to meet current standards, the rail alignments and available rights-of-way are those of a mid–19th century railroad, and in many areas do not efficiently support current train operations, especially given the increase in intercity passenger, commuter, and freight operations which have occurred over the years. The current system’s operations and infrastructure pose constraints and limitations to achieving the DC2RVA Purpose and Need of improved intercity passenger rail service with added frequency, improved reliability, and reduced travel time. Chapter 3 summarizes some of the rail network conditions that potentially affect the Project.

In addition to the rail operations and infrastructure conditions noted above (and described in greater detail in Sections 3.1 and 3.2), there are many sensitive natural and man-made resources along the DC2RVA corridor that could be affected by the Project improvements or pose limitations to how the Project is developed. Existing information on the type and extent of corridor environmental resources has been compiled and assembled in a GIS, described in Section 3.3 (Appendix C). Some of the key resources of concern to the Project identified within the GIS system include:

- **Waterways**. The rail corridor runs north-south, while most waterways drain from west to east towards the Chesapeake Bay. As a result, the corridor crosses numerous large, moderate and small waterways using a combination of bridges and culverts. The potential need for additional bridge capacity over large waterways such as the Occoquan River, Neabsco Creek, Powells Creek, Aquia Creek, Potomac Creek, Rappahannock River, Chickahominy River, and James River can add substantial design constraints, permitting, and construction costs to the Project.
- **Wetlands**. Along with the numerous waterways are extensive areas of wetlands, protected by federal and state regulations. Any Project activities proposed within these protected areas must satisfy regulatory agency requirements. The central portion of the corridor, in particular, has extensive areas of wetlands bordering the corridor.
- **Floodplains**. Floodplains are identified alongside most of the waterways, and could restrict Project design.
- **Endangered & Threatened Species**. If found within the area affected by the Project, endangered and threatened species could be a concern, and could restrict project design and/or construction.

- **Urban/suburban land uses**. The corridor travels through heavily developed urban and suburban areas, particularly in Northern Virginia and near Richmond. There are many areas where residential neighborhoods and commercial/industrial development abuts the right-of-way, and in Fredericksburg, VA and Ashland, VA, the corridor travels through the historic central business districts.
- **Existing infrastructure**. The corridor is crossed by almost 100 roads at grade, and another 100 overpasses carrying highways or pedestrian crossings over the tracks. The Project must be compatible with this infrastructure, or include improvements to the road/rail crossings. In addition, sections of the corridor right-of-way are shared with utilities, including fiber optic and power transmission lines, and petroleum pipelines.
- **Minority and low-income populations**. Minority and low-income populations exist throughout the 123-mile corridor, including distinct areas along the corridor in Northern Virginia, Fredericksburg, Richmond, and Chesterfield County. The Project's alternatives will be evaluated to ensure they do not have disproportionately high and adverse human health or environmental effects on minority and low-income populations along the corridor.
- **Historical resources**. The corridor runs through some of the oldest-settled portions of Virginia. From early Native American tribes seeking food supplies from the area waterways to Civil War soldiers seeking respite from the battlefields, the area has been the locale of historical activities for millennia – activities that resulted in the presence of thousands of historic buildings and archaeological sites which could restrict project design and construction.
- **Parks and playgrounds**. Publicly-owned parks, playgrounds, and other recreation areas are generally protected against use for transportation projects unless no other prudent or feasible alternative exists; many such publicly-owned parks and recreation areas are near the corridor.
- **Wildlife/waterfowl Refuges**. Wildlife and waterfowl refuges are also protected from use for transportation projects, and can restrict project design.
- **Conservation lands**. Lands purchased or developed under the Land and Water Conservation Fund program or otherwise protected through conservation easements can impose limitations on project design and construction activity.
- **Cemeteries**. Cemeteries, whether community facilities or family plots that are no longer maintained, are sensitive resources and can impose limitations on project design.
- **Hazardous waste sites**. The corridor travels through many industrial and commercial areas with sites listed on the National Priority List (NPL), Resource Conservation and Recovery Act (RCRA) Corrective Action Facility list, Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) list[3], or other

[3] In 2014, the U.S. Environmental Protection Agency (USEPA) announced the retirement of CERCLIS, and its replacement with the Superfund Enterprise Management System (SEMS). However, SEMS data did not become available until 2016. DRPT has accessed data from CERCLIS and SEMS to screen and evaluate project conditions and alternatives.

state or local lists of potential hazardous materials or wastes that can pose a health or safety risk during construction or operation of the Project.

1.4 PREVIOUS STUDIES AND DESIGNS

Chapter 4 provides an overview of some of the previous and ongoing rail planning studies in the DC2RVA corridor and adjacent sections of the larger SEHSR corridor. The chapter includes the NEPA status of different areas of the SEHSR corridor and the current plans and projects underway in the area. A detailed list of previous and ongoing studies reviewed for the DC2RVA project is provided as Appendix D.

1.5 ALTERNATIVES DEVELOPEMENT AND SCREENING PROCESS

Chapter 5 presents an overview of the alternatives development and screening process for the DC2RVA project. The process established a range of rail alignments and improvement alternatives for consideration and then systematically evaluated and screened the range of alternatives down to potentially reasonable alternatives for detailed analysis in the Draft EIS. Reasonable alternatives are those that meet the established Purpose and Need, are buildable, cost-effective, and are anticipated to have acceptable levels of impact to the human and natural environments.

The alternatives development process for DC2RVA began with the scoping process and the development of preliminary rail alignments as the initial basis for project build alternatives, recognizing that adding a main line track and/or the potential realignment of the existing main line tracks is the driver for many of the other project-related improvements and potential impacts. Rail alignments—i.e., the location and configuration of the main line tracks—were then screened for possible impacts to key environmental resources. The rail alignments were also used to identify potential modifications to associated highway and rail crossing infrastructure and existing and potential stations. Developing potential rail alignments was an iterative process. Rail alignment modifications were made to avoid or minimize potential adverse effects on environmental resources and existing infrastructure, and to minimize the need for additional new infrastructure, while preserving the ability of that alignment to meet the Project's Purpose and Need. The final screening evaluation process focused on each rail alignment's ability to add capacity to the corridor, reduce trip times based on increased track design speed and increase the reliability of rail operations as defined by the Purpose and Need.

Preliminary rail alignment options were developed for each of the segments along the 123-mile corridor. The reasonable rail alignment options for each segment were then combined to form corridor-wide alternatives, including the following range of alternatives:

- **No Build Alternative**. The No Build Alternative represents the existing conditions in the corridor without the Project, both now and projected into the future, and including other reasonable and foreseeable projects that may be implemented. The specific characteristics of the No Build Alternative will be defined for the corridor and described further in the Draft EIS. While the No Build alternative by definition does not meet the Project's Purpose and Need, it is a required part of the NEPA process and is carried forward into the Draft EIS for detailed analysis at the corridor level.
- **No Additional Track (Minor Improvements) Alternative**. This alternative includes minor improvements to signals and communications systems, at-grade crossing safety

systems, additional crossovers between existing main line track, additional sidings, and realignment or shifting of track within the existing right-of-way or other minor rail infrastructure improvements work. The No Additional Track Alternative does not include additional main line track. No Additional Track, similar to No Build, does not meet the Project's Purpose and Need for the corridor. However, within individual segments and sub-segments the No Additional Track Alternative could meet the Project's Purpose and Need and could be a viable alternative where the existing number of main line tracks provides sufficient capacity through that segment and in sub-segments of the corridor, and where the build alternatives present unacceptable levels of impact to the human and natural environments. Additionally, segment-level No Additional Track Alternatives could be combined with other build alternatives as part of a larger corridor build alternative.

- **Corridor Build Alternatives**. The Corridor Build Alternatives are primarily based on adding an additional main line track and/or shifting existing rail alignments to gain additional capacity and reduced trip time. These build alternatives include:
  - Corridor-wide upgrades to existing track and signal systems to achieve higher operating speeds, including curve realignments, higher-speed crossovers between tracks, passing sidings, and grade crossing improvements.
  - Corridor-wide improvements to train operating capacity to achieve higher passenger train service frequency and reliability, including an additional main track along most of the corridor, and additional controlled sidings, crossovers, yard bypasses and leads, and other capacity and reliability improvements at certain locations.
  - Station and platform improvements for Amtrak stations and rail alignments accommodating additional and/or extended VRE platforms and/or other improvements.

1.5.1 Rail Alignment Options

A number of different resources were used to identify rail improvement alternatives in the DC2RVA corridor. Previous studies such as the SEHSR Tier I EIS were referenced, as was feedback received during agency and public scoping conducted for the DC2RVA Tier II EIS. An engineering Basis of Design (BOD) for track and station improvements was also adopted to inform the design standards of potential improvements. The rail improvement alternatives developed would add new track capacity, realign track to allow greater speeds, modify highway crossings to accommodate the new rail infrastructure, and improve stations and platforms to meet the Project's Purpose and Need. Several past studies identified potential improvements which were integrated into the Project.

The options, as illustrated in Figure 1-6, include a combination of maximizing train speed, maintaining or improving train speed, and minor improvements within and outside of the right-of-way, as follows:

1. **Maximum Speed Option**. Would add one new main track and realign existing main tracks to achieve the maximum allowable speed of 90 mph throughout most of the corridor, unconstrained by existing right-of-way. While this alignment would optimize the track design speed, it would require substantial acquisition of new right-of-way, and would generally have greater impacts to environmental resources and infrastructure.

2. **Improved Speed Alignment Option**. Would add one new main track and realign existing main tracks to improve speed up to 90 mph to the extent possible while staying within the existing right-of-way. For this alignment option, speeds were increased where feasible with the intent to add capacity and improve travel times throughout the corridor. This alignment option would increase track design speed for many segments of the corridor, while limiting impacts and property acquisition outside the right-of-way. Three variations of this option were developed:
    a) **Constrained**—Would add one track and realign existing tracks to improve speed, would be constrained to CSXT-owned right-of-way.
    b) **Hold Bridges**—Would add one track and realign existing tracks except at crossings of major rivers/roads, where the alignment of the existing rail bridges would continue to be used for existing track to reduce potential impacts.
    c) **Optimized Improved Speed (Hold Bridges/Tangents)**—Would add one track and realign existing tracks in curves to improve speed, while continuing to use existing rail bridges and maintaining existing sections of straight (tangent) track; would optimize the use of existing rail infrastructure while also seeking to achieve the maximum design speed of 90 mph where practical while reducing potential impacts.
3. **Existing Speed Option**. Would add one new main track to either side of the existing track while maintaining existing speed. This alignment option would add capacity to the system but would not improve track design to support passenger trains at a 90 mph maximum allowable speed. There are two versions of this alignment option:
    d) West Track Addition—Would add one new track to the west side of existing main line
    e) East Track Addition—Would add one new track to the east side of existing main line
4. **No Additional Track (Minor Improvements)**: Would include small shifts of existing curves (typically moving track center lines less than 10 feet and within the existing right-of-way), as well as minor improvements to signals, communications systems, at-grade crossings, crossovers, and sidings.

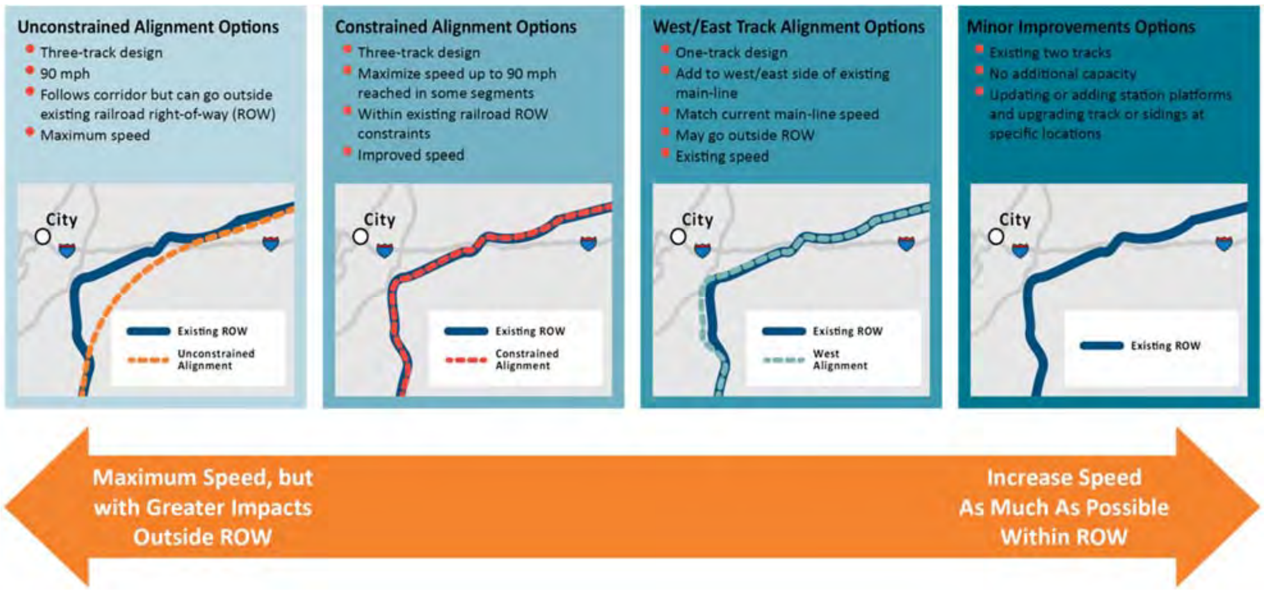


FIGURE 1-6: RAIL ALIGNMENT OPTIONS

1.5.2 Rail Alignment Screening Process

The rail alignments described above were evaluated for potential impacts to major environmental resources, associated highway infrastructure, compatibility with existing and potential station platforms, and the alignment's ability to meet the DC2RVA Purpose and Need. A screening process was developed to systematically evaluate and screen the range of alignment options in order to identify reasonable rail alignments for detailed analysis in the Draft EIS. The screening process was composed of four stages (Figure 1-7):

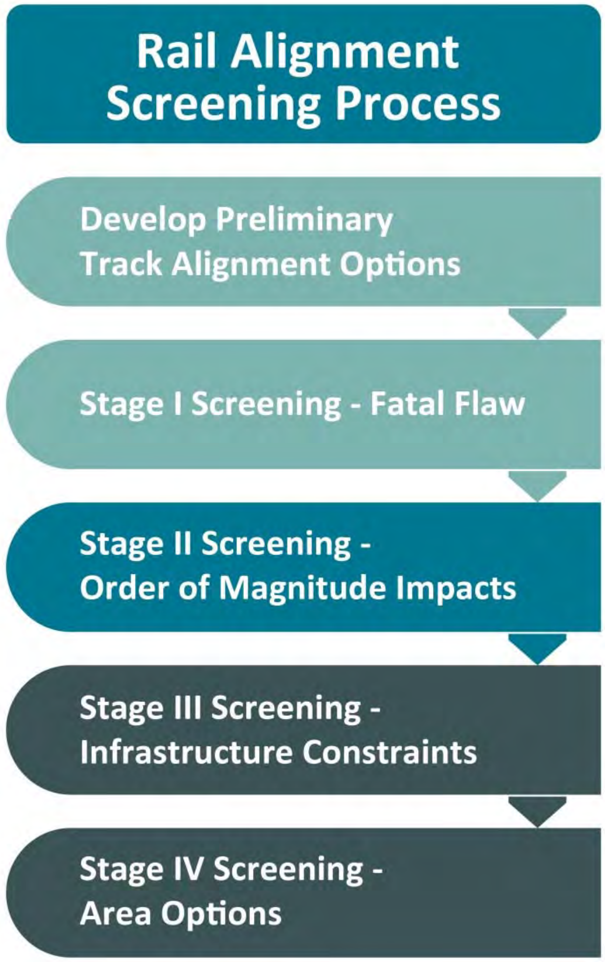


FIGURE 1-7: DC2RVA RAIL ALIGNMENT SCREENING PROCESS

- **Stage I**. Evaluation of rail alignments outside the existing right-of-way for potential impacts to key environmental resources.
- **Stage II**. Evaluation of rail alignments for order of magnitude impacts on additional environmental resources, within and outside the existing right-of-way
- **Stage III**. Evaluation of rail alignments for effects on existing infrastructure, including at-grade crossings, roadway overpasses, and rail bridges over roads or waterways.
- **Stage IV**. Evaluation of additional rail alignments, including bypasses, in areas of special concern (Fredericksburg, Ashland, and Richmond).

1.5.3 Area Options

DRPT identified three areas—Fredericksburg, Ashland, and Richmond—where additional review was warranted to identify potentially reasonable rail alignments. In the historic communities of Fredericksburg and Ashland, where the rail corridor has limited right-of-way, an evaluation of new bypass alignments outside existing right of way occurred as a possible option in lieu of adding a third track at-grade through the respective towns. In Ashland, DRPT also evaluated above-grade and below-grade alternatives for adding a third track. In Richmond, the existing dense urban development, grade changes, and historic rail configuration limit opportunities to improve travel time, plus there were two existing rail lines (A-Line and S-Line) moving north-south through Richmond and multiple existing and potential station locations to consider. Because of these factors, preliminary rail alignments and other improvements for the Richmond area were developed based on serving potential station locations and passenger train routes, and the potential improvements largely utilized existing right-of-way.

In Fredericksburg, adding an additional main track at-grade through the city and over the Rappahannock River along the existing corridor could impact historic resources. As a possible alternative, DRPT considered multiple bypass configurations using 1 track, 2 tracks or 3 tracks along multiple routes. DRPT determined a two-track bypass designed to carry through freight trains around the city has the potential to meet the Project's Purpose and Need. Under the bypass options, the Fredericksburg station would continue to serve Amtrak and VRE trains using the existing two track corridor through the city. Potential bypass routes were screened using the same evaluation process (Stage I, Stage II, and Stage III) described above for other rail alignment options.

In Ashland, adding an additional main track through the town along the existing corridor could impact historic resources, affect local roads and traffic, land use, and other aspects of the human environment. As possible alternatives, DRPT considered multiple options for adding a track through town, including adding a track east or west of the existing two tracks at-grade, adding a track at-grade and shifting the existing tracks to center the alignment along the street axis, elevating one or more tracks through town, and placing one or more tracks below grade in a cut and cover or deep bore tunnel. DRPT also considered multiple bypass configurations using 1 track, 2 tracks, or 3 tracks along multiple routes. DRPT determined a two-track bypass designed to carry through freight and passenger trains around the town could potentially meet the Project's Purpose and Need, and evaluated 2 track bypass alignments east and west of town. The bypass routes were screened using the same evaluation process described above for other rail alignment options. DRPT also evaluated a freight bypass option, where some CSXT freight trains would be re-routed onto an improved BBRR from Doswell to AM Junction, bypassing Ashland and Acca Yard to the south, and thereby opening additional capacity on the existing two tracks through Ashland. In combination with many of these options, DRPT considered station and service options in Ashland, including improving the existing downtown station, relocating the service to a new station just south of Ashcake Road, among other possible locations, and eliminating intercity passenger service to Ashland.

In Richmond, DRPT identified rail alignment and infrastructure improvement options based on potential station locations and service combinations. Identification of rail alignments and improvements in the Richmond area for screening consisted of the following steps:

1. Identify potential station locations from existing and past station locations, station locations proposed during project scoping, and preliminary assessments of track and roadway configurations (described in detail in Chapter 8). The identification of potential station locations included both two station combinations and the possibility of having only one station serve the Richmond area.
2. Define the passenger and freight service operational requirements through the Richmond area for each station location option.

3. Identify the rail alignment and infrastructure requirements for each station location option such that passenger and freight service requirements are met.
4. Screen the rail alignment and infrastructure requirements for each station location option using the Stage I, II, and III criteria applied to other rail alignment options.

1.6 RAIL ALIGNMENT SCREENING

Chapter 6 presents the results of the Stage I, II, and III screening and consideration of rail operations and run times, for rail alignment options on a segment by segment basis.

1.6.1 Northern Virginia Area

DRPT eliminated the Maximum Speed alignment options during screening due to their relatively high levels of impacts to the human and natural environment. The three stage process for how elimination determinations are made is further detailed in Chapter 6 of this report. The Improved Speed alignment option (Hold Bridges/Hold Tangents) was advanced as the reasonable and feasible track alignment for most segments in the Northern Virginia Area. The objective of the Improved Speed alignment is to attain a track design speed of 90 mph where practical within the existing right of way. However, there are portions of many segments in the Northern Virginia area where it is not practical to design track for 90 mph, either due to limited right of way, site constraints, or rail operations constraints[4]. In these portions of track, the Improved Speed alignment seeks to improve speed up to the limiting speed on either end. . In some segments in the Northern Virginia Area, a third main track is already available or under construction, and an additional main track may not be needed. In these segments, the No Additional Track Option was advanced. The No Additional Track Option includes shifting track in some curves to improve speed. Overall, between the Improved Speed (Hold Bridges/Hold Tangents) and No Additional Track Improvements, most of the Northern Virginia Area would have track improved for speeds of 79 mph, with some sections designed for up to 90 mph (current track speeds top out at 69 mph.) The Existing Speed East and West alignment options each had one segment that advanced through these screenings. However, the Existing Speed alignments do not accommodate improving speed on the curves in the corridor. Therefore, DRPT advanced the Improved Speed alignment options with modifications to the curves where possible within the existing right-of-way to improve rail operating speed.

In the Fredericksburg area, DRPT selected for further evaluation an east bypass route for a two track through freight and passenger train bypass as an alternative to adding a third track at-grade through the city along the east side of the existing corridor. The bypass would extend east from the main track along the Dahlgren Spur in Stafford County, then south on new alignment across the Rappahannock River and through Spotsylvania County and Caroline County to re-connect with the main track just south of VRE's Crossroads yard.

[4] For example, a section of track with multiple curves and limited tangent track between curves may not be capable of supporting 90 mph train operations, particularly if the limiting speed in the curves is less than 90 mph and there is insufficient distance between curves for a passenger train to accelerate to 90 mph and then de-accelerate to the limiting speed without wasting fuel.

1.6.2 Central Virginia Area

In the Central Virginia area there were more opportunities to increase passenger train speeds to 90 mph within the existing right-of-way. DRPT eliminated the Maximum Speed alignment options during the screening due to their relatively high levels of impacts to the human and natural environment outside the right-of-way. The Improved Speed alignment option was advanced as the reasonable and feasible track alignment for the Central Virginia area. The Existing Speed East and West alignments are eliminated from further consideration because they do not accommodate improving speed and, therefore, are not preferred.

In Ashland, DRPT determined to further evaluate four build alternatives. DRPT advanced an alternative to maintain two tracks through Ashland while adding a third track north and south of Ashland (this alternative is also referred to as the "no additional track" or "minor improvements" alternative). Station options for this alternative include improving the existing downtown station, re-locating the service to a new station just south of Ashcake Road, or discontinuing service to Ashland. DRPT also advanced two alternatives to add a track at-grade through Ashland, placing a third track to the east of the existing two tracks (also with the same station options), and adding a track while centering all three tracks along Center Street with service provided from a new station just south of Ashcake Road. A western bypass route for a two-track freight and through passenger train bypass was selected by DRPT for further evaluation as an alternative to adding a third track through town. The bypass, all in Hanover County, would extend from north of the Town's boundaries in a bell-shaped curve to the west and then re-connect to the main track south of Ashcake Road. Station options for the western bypass include improving the existing downtown station or re-locating the service to a new station just south of Ashcake Road. Details to these alternatives are represented in Chapter 5.

1.6.3. Richmond Area

DRPT identified a range of existing and possible station locations, developed a set of track and rail infrastructure improvements specific to each station location option, and then screened the rail infrastructure improvements following the screening process described above. The screening of Richmond station alignment options did not eliminate any station locations (see Figure 1-8), but did define the rail infrastructure improvements determined to be reasonable for further evaluation.

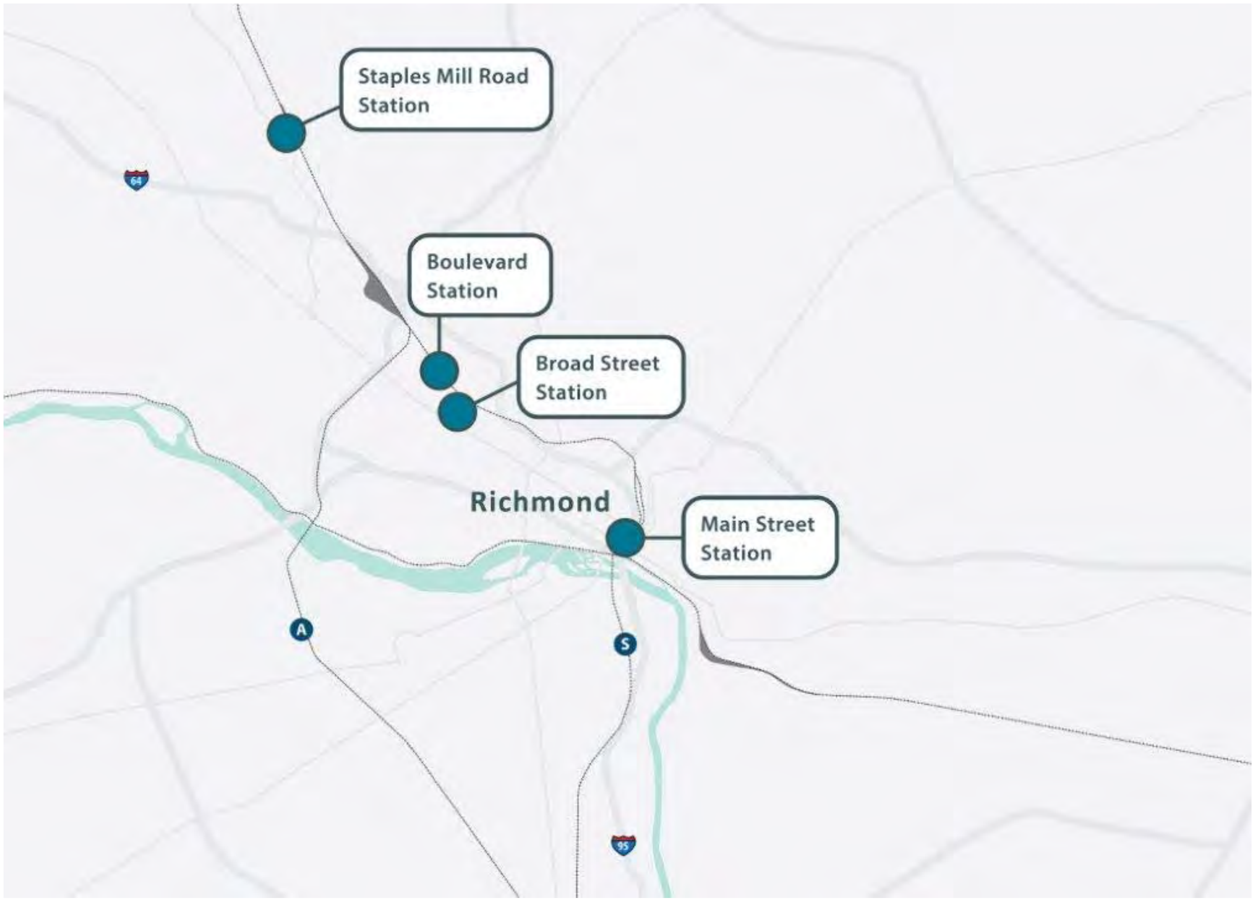


FIGURE 1-8: RICHMOND AREA EXISTING AND PROPOSED STATIONS

The following rail alignment sets (defined by station location options) were selected by DRPT to be carried forward for further evaluation in the Draft Tier II EIS:

<u>**One Station Options**</u>

- **Staples Mill Road Station Only**. All long distance, Interstate Corridor (SEHSR), and Northeast Regional (SEHSR) passenger trains moving north-south through Richmond would be routed through Staples Mill Road Station to Centralia using the A-line; Northeast Regional (Virginia) service to Newport News would continue from Staples Mill Road Station past Main Street Station on the Peninsula Subdivision. Main Street Station would be closed.
- **Boulevard Station Only**. All long distance, Interstate Corridor (SEHSR), and Northeast Regional (SEHSR) passenger trains moving north-south through Richmond would be routed through a new Boulevard Station and then to Centralia using (a) the A-line and an elevated loop track, or (b) the S-line; Northeast Regional (Virginia) service to Newport News would continue from the new Boulevard Station on the Peninsula Subdivision. Both Staples Mill Road Station and Main Street Station would be closed.
- **Broad Street Station Only**. All long distance, Interstate Corridor (SEHSR), and Northeast Regional (SEHSR) passenger trains moving north-south through Richmond would be routed through a new Broad Street station on a loop track and then to Centralia using the A-line; Northeast Regional (Virginia) service to Newport News

would continue from the new Broad Street Station loop track on the Peninsula Subdivision. Both Staples Mill Road Station and Main Street Station would be closed.

- **Main Street Station Only**. All long distance, Interstate Corridor (SEHSR), and Northeast Regional (SEHSR) passenger trains moving north-south through Richmond would route to the west side of Main Street Station and then to Centralia using the S-line; Northeast Regional (Virginia) service to Newport News would continue along the east side of Main Street Station on the Peninsula Subdivision. Staples Mill Road Station would be closed.

Two-Station Options

The two station options include both Main Street Station and Staples Mill Road Station Combined:

- **Split Service (A-Line)**. All long distance, Interstate Corridor (SEHSR), and Northeast Regional (SEHSR) passenger trains moving north-south through Richmond would be routed through Staples Mill Road Station to Centralia using the A-line, bypassing Main Street Station; Northeast Regional (Virginia) service to Newport News would continue from the east side of Main Street Station on the Peninsula Subdivision. This option resembles the existing service pattern.
- **Full Service (S-Line)**. All long distance, Interstate Corridor (SEHSR), and Northeast Regional (SEHSR) passenger trains moving north-south through Richmond would be routed through Staples Mill Road Station to the west side of Main Street Station and then to Centralia using the S-line; Northeast Regional (Virginia) service to Newport News would continue from the east side of Main Street Station on the Peninsula Subdivision.
- **Shared Service (A-Line and S-Line)**. All long distance, Interstate Corridor (SEHSR), and Northeast Regional (SEHSR) passenger trains moving north-south through Richmond would be routed through Staples Mill Road Station either (a) to the west side of Main Street Station and then to Centralia using the S-line, or (b) to Centralia using the A-line; Northeast Regional (Virginia) service to Newport News would continue from the east side of Main Street Station on the Peninsula Subdivision.

The option of a new station at Broad Street or Boulevard to provide Richmond with a single unified station, replacing both Main Street Station and Staples Mill Road Station was included in the evaluation. Neither the Broad Street nor Boulevard station locations were considered in conjunction with either Main Street or Staples Mill Road stations. DRPT determined the relatively close proximity of the stations precludes operating them in tandem (see Chapter 8).

1.7 CROSSING INFRASTRUCTURE OPTIONS

The DC2RVA corridor crosses public and private roads, pedestrian paths, other rail corridors, and major and minor waterways. Corridor crossings include both at-grade crossings of the railroad by roads or pedestrian paths, as well as grade separated crossings with roads going over (overpasses) or under (underpasses) the railroad. Rail bridges carry the track over roads, other rail corridors, and waterways. Major waterways are crossed by bridges or large culverts greater than 6 feet in diameter; minor waterways are crossed by smaller bridges or culverts. DRPT's evaluation of these existing crossings identified potential constraints on rail alignment options for the Project. The evaluation of existing crossings assumed an additional main track is added along the DC2RVA corridor and addressed the following crossings:

Road Crossings

- 146 Grade-Separated Road Crossings
  - 80 Public Road Overpasses
  - 16 Private Road Overpasses
  - 50 Rail Bridges Over Roads (road underpasses)
- 99 At-Grade Road Crossings
  - 68 Public Road At-Grade Crossings
  - 31 Private Road At-Grade Crossings

Pedestrian Crossings

- 6 Pedestrian Overpasses
- 11 Pedestrian At-Grade Crossings
- 2 Pedestrian Underpasses

Rail Crossings

- 4 Rail Bridges Over Railroads
- 1 Rail At-Grade Crossing
- 68 Rail Structures Over Major Waterways, including culverts > 6 feet diameter

DRPT's assessments of constraints on rail alignments for each crossing depended on the location and the specific type of crossing. The evaluation of existing road and pedestrian overpasses addressed spatial limitations that could constrain the ability to add an additional main track beneath the overpass. The evaluation of road underpasses addressed existing road geometry and the configuration of the rail overpass structure for potential constraints on the rail alignment. Two types of evaluation were completed on existing at-grade crossings: physical impacts to the public and private road infrastructure with the addition of a single track either to the east or west of the existing track(s); and, operational impacts to traffic at public at-grade crossings with the addition of a single track and changes in train operations. The operational evaluation of at-grade crossings addressed road geometry, traffic safety, traffic delay, and number of passenger trains per day based on Federal Highway Administration (FHWA) standards. The assessment of at-grade road crossing geometry evaluated the potential for modifications needed if an additional main track is added. In a few cases new highway-rail grade separations were recommended based on the application of the FHWA standard. The locations of rail bridges over roads, rails, and waterways were evaluated for constraints that could limit where an additional bridge to carry the proposed new track could be constructed. Chapter 7 presents the results of these crossing analyses.

In addition to the crossings described above, DRPT identified six public road crossings that are currently closed. These roads will remain closed at their at-grade crossings of the DC2RVA corridor; therefore no further action is required.

The DC2RVA corridor is also crossed by numerous above ground and below ground utilities, including power lines, pipelines, and communication cables. These utility crossings were not evaluated as part of the alternatives screening and development process. Impacts to utilities will be evaluated within the Draft EIS for each alternative.

1.8 STATION LOCATION OPTIONS

Chapter 8 evaluates existing and potential passenger rail stations on the DC2RVA corridor and identifies stations and/or station locations for further evaluation for passenger rail service as part of the DC2RVA project. The DC2RVA project proposes to generally maintain existing intercity passenger rail service patterns while increasing the frequency and reliability of service on the corridor. The Project does not involve wholesale changes in existing station locations or stopping patterns of existing passenger trains, although some new potential stations and service patterns identified during project scoping are considered. Passenger train schedules for new and existing trains will be described in the DC2RVA Service Development Plan, prepared subsequent to the Final EIS.

Stations evaluated in Chapter 8 include existing Amtrak stations and potential new intercity passenger rail stations proposed for consideration during Project scoping. This chapter includes the following:

- Identification of existing and potential intercity passenger rail station locations for intercity passenger rail service in the Washington, D.C. to Richmond corridor
- Development of functional criteria used to evaluate intercity passenger rail station locations and key station characteristics
- Screening of existing and potential intercity passenger rail station locations
- Identification of reasonable intercity passenger rail station options to be considered in the Tier II EIS

The Project does not preclude future changes to service patterns and intercity passenger rail station locations, nor does it preclude development of new stations in the future. VRE commuter rail stations existing and/or under construction are also evaluated for track alignments to accommodate expanded commuter platforms and new island platforms in accordance with the Project's Basis of Design; the Project does not include construction of new platforms for stations that will only be served by VRE.

A screening process was used to identify reasonable station locations for consideration as part of the Project. Stations, including Amtrak stations (existing), VRE stations (existing or under construction), and potential intercity passenger station locations suggested during Project scoping or in prior studies, were compared and evaluated against the Project's Purpose and Need and the screening criteria summarized below. Station Location Options that advanced through the screening process will be further evaluated in the Tier II Draft EIS along with rail alignment options. Station evaluations in the Draft Tier II EIS will include: existing Amtrak stations will be evaluated for facility improvements based on ridership projections and Amtrak station guidelines; new Amtrak stations will be evaluated for facility requirements and potential site layouts; and Amtrak and VRE stations will be evaluated for changes to their platforms based on proposed track realignments and/or construction of new track in accordance with the Project Basis of Design (BOD).

The initial screening of existing and potential passenger rail stations considered the following factors:

- **Station Location**. Characteristics suitable for urban centers (in or near the Central Business District) and suburban locations, per FRA guidelines.
- **Potential Ridership**. Ridership levels and forecasts (if available). Where ridership forecasts have not yet been determined the following measures were used to represent the potential ridership:
  - Population within a 10-mile radius of the station
  - Population within a 25-mile radius of the station
  - Population within a 30-minute driving distance of the station
- **Station Type**. Identify station type (size and desired amenities) based on existing and projected ridership.
- **Multi-Modal Service**. Other modes of transit service available at station
  - Full Range (Fixed guideway transit)
  - Basic (Bus)
  - Minimal (Auto, Taxi)
- **Station Configuration**.
  - Through track at station
  - Minimum 850 feet of platform for Interstate Corridor (SEHSR), Northeast Regional (SEHSR) and/or VRE trains, and 1,200 feet for Long Distance trains.
  - All main tracks with passenger platforms
- **Station Access**. The proximity of each station to major highways. Additional site specific access relating to adequate parking, transit services, car rental, and pedestrian and bicycle facilities will be reviewed further in the Tier II Draft EIS

Based on results from the screening, DRPT recommended the following stations for further evaluation in the Draft EIS for the Northern Virginia area:

- Alexandria Station
- Woodbridge Station
- Quantico Station
- Fredericksburg Station

Based on results from the screening, DRPT recommended the following stations for further evaluation in the Draft EIS for the Central Virginia area:

- Ashland Station
- Ashcake Road Station (new)

Based on results from the screening, DRPT recommended the following stations for further evaluation in the Draft EIS for the Richmond area:

<u>Single Station Options</u>

- Staples Mill Road Station
- Boulevard Station (new)
- Broad Street Station (new)

- Main Street Station

Two Station Options

- Staples Mill Road/Main Street Station – Split Service
- Staples Mill Road/Main Street Station – Full Service
- Staples Mill Road/Main Street Station – Shared Service

1.9 ALTERNATIVES CARRIED FORWARD

Chapter 9 presents a summary of the build alternatives carried forward for further evaluation in the Tier II Draft EIS. The alternatives carried forward represent the potentially reasonable alternatives that could meet the Project's established Purpose and Need, are buildable, cost-effective, and are anticipated to have acceptable levels of impact to the human and natural environments based on the screening process described in Chapter 5. The Tier II EIS will also consider the consequences of not building the Project, i.e., the "do nothing" or No Build Alternative.

The build alternatives are broken out into six project areas in the Draft EIS (Figure 1-9):

- **Area 1:** Arlington Area (approach to Long Bridge), which runs from milepost CFP 110 to CFP 109.3. The potential alternatives for this area include adding 2 tracks on the east, adding 2 tracks on the west, or adding 1-track east & 1-track west.
- **Area 2:** Northern Virginia Area, which runs from milepost CFP 109.3 to CFP 62. The potential alternative for this area includes adding 1 track to existing tack and improving existing track where feasible to increase speeds.

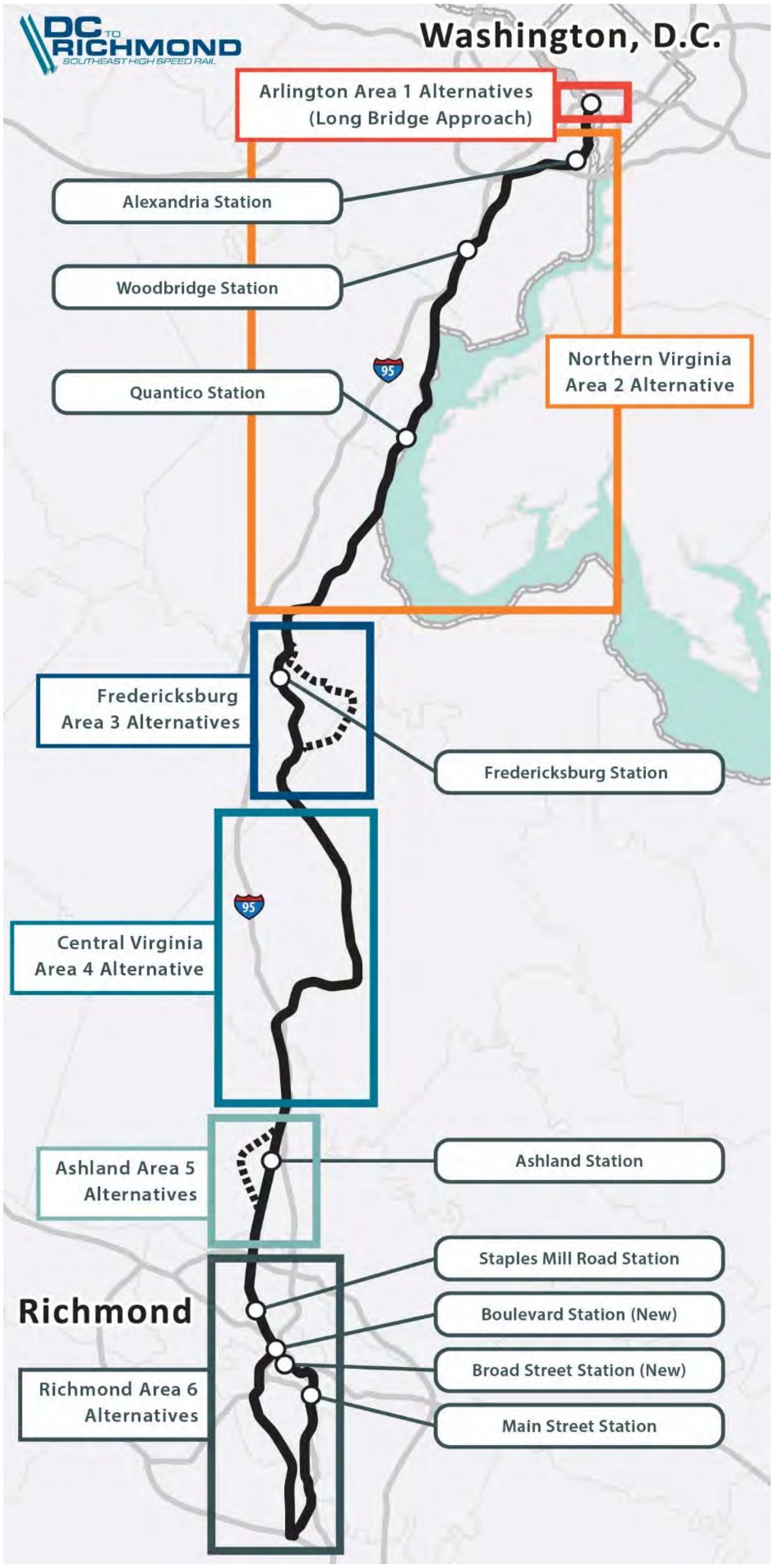


FIGURE 1-9: SEGMENT AREA MAP OF DC2RVA CORRIDOR

- **Area 3:** Fredericksburg Area (Dahlgren Spur to Crossroads), this area runs from milepost CFP 62 - CFP 48. Potential alternatives for this area include no additional track, adding 1-track east of existing, add 2-track bypass east.
- **Area 4:** Central Virginia Area (Crossroads to Doswell), this area runs from milepost CFP 48 - CFP 19. Potential alternatives for this area include adding 1 track and improving existing track.
- **Area 5:** Ashland Area (Doswell to I-295), this area runs from milepost CFP 19 -CFP 09. Potential alternatives for this area include maintaining two tracks through Ashland while adding a track north and south of Ashland, adding 1 track east of existing tracks, adding 1 track and centering all tracks through town, and adding a 2-track west bypass. Station options for these alternatives include improving the existing downtown station, relocating service to a new station south of Ashcake Road, or ceasing passenger rail service to Ashland.
- **Area 6:** Richmond Area (I-295 to Centralia), this area runs from milepost CFP 09 - A 011(Centralia). Potential alternatives for this area include operating from Staples Mill Road Station only, Boulevard Road Station only (two options, A-line or S-line), Broad Street Station only, Main Street Station only, a Split Service option utilizing Staples Mill/Main Street, a Full Service option utilizing Staples Mill/Main Street , and a Shared Service option utilizing Staples Mill/Main Street.

1.9.1 Richmond Area Alternatives

The Richmond area is characterized by several potential rail alignments and multiple station location options. While rail improvements and even additional track can be added within the existing right-of-way in many segments in Richmond, the dense urban environment and potential impacts precluded a focus on higher speed. Instead, station locations were identified and used as the basis for identifying sets of rail improvements for increased capacity to form alternatives. DRPT evaluated station locations against the FRA and Amtrak station guidelines as well as the Project's Basis of Design to determine potential suitability for higher speed passenger service. Rail improvements were identified for both passenger rail and to alleviate freight rail movements and bottlenecks that could adversely affect passenger service. Cumulative results of the screening process for the Richmond Area rail alignments (defined by station location options) are shown in Table 1-3. Seven alternatives for the Richmond area are carried forward for further evaluation in the Tier II Draft EIS:

- Staples Mill Road Station – A-Line / Peninsula Line
- Boulevard Station – A-Line / Peninsula Line
- Boulevard Station – S-Line / Peninsula Line
- Broad Street Station – A-Line / Peninsula Line
- Main Street Station – S-Line / Peninsula Line
- Richmond Two Stations Main Street / Staples Mill – A-Line / Peninsula Line
- Richmond Two Stations Main Street / Staples Mill – S-Line / Peninsula Line
- Richmond Two Stations Main Street / Staples Mill – S-Line / A-Line / Peninsula Line

TABLE 1-3: SUMMARY OF ALTERNATIVES SCREENING FOR RICHMOND SEGMENT

Station Location Options	Build Alternative	No Build Alternative
Richmond Two Stations Main Street / Staples Mill – S-Line / A-Line / Peninsula Line	○	○
Richmond Two Stations Main Street / Staples Mill – S-line with Freight Connector	●	○
Staples Mill Road Station – A-Line/Peninsula Line	○	○
Boulevard Station – A-Line / Peninsula Line	○	○
Boulevard Station – S-Line / Peninsula Line	○	○
Broad Street Station – A-Line / Peninsula Line	○	○
Main Street Station – S-Line / Peninsula Line	○	○
Main Street Station – S-line Freight Connector Bridge	●	○
Richmond Two Stations Main Street / Staples Mill – A-Line / Peninsula Line	○	○
Richmond Two Stations Main Street / Staples Mill – S-Line / Peninsula Line	○	○
Richmond Two Stations Main Street / Staples Mill – S-Line / A-Line / Peninsula Line	○	○

Source: HDR, 2015.
Table Notes: ●= Alignment Dismissed From Further Consideration; O=Alignment Carried Forward for Further Evaluation

Track plans identifying specific improvements are in Appendix QQ. All improvements to rail and road infrastructure and related project elements would be conducted in accordance with the DC2RVA Engineering Basis of Design, and applicable regulations and permits. Detailed descriptions of the alternatives are presented in Chapter 9.

2 PROJECT LOCATION

The Federal Railroad Administration (FRA) and Virginia Department of Rail and Public Transportation (DRPT) propose passenger rail service and rail infrastructure improvements in the north-south travel corridor between Washington, D.C. and Richmond, VA. These passenger rail service and rail infrastructure improvements are collectively known as the Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA) project. The Project will deliver higher speed passenger rail service, increase passenger and freight rail capacity, and improve passenger rail service frequency and reliability in a corridor shared by growing volumes of intercity passenger, commuter, and freight rail traffic, thereby providing a competitive option for travelers between Washington, D.C. and Richmond and along adjacent connecting corridors. The Project is part of the larger Southeast High Speed Rail (SEHSR) corridor (Figure 2-1), which extends from Washington, D.C. through Richmond, VA, and from Richmond east to Norfolk, VA, then south to Raleigh, NC, and Charlotte, NC, then west to Atlanta, GA, and south to Florida[1]. The Project connects to the National Railroad Passenger Corporation (Amtrak) Northeast Corridor (NEC) at Union Station in Washington, D.C.

The purpose of the SEHSR program, as stated in the 2002 Tier I Final Environmental Impact Statement (EIS) completed for the SEHSR corridor from Washington, D.C to Charlotte, NC, is to provide a competitive transportation choice for travelers within the Washington, D.C. to Charlotte travel corridor. The purpose of the Washington, D.C. to Richmond Southeast High Speed Rail project described here is to fulfill the purpose of the SEHSR Tier I EIS within this section of the larger SEHSR corridor. Additional information is provided in the Project's Purpose and Need Statement. The Purpose and Need Statement for this Project can be found on the DC2RVA project website[2] in the Resources section along with the Project's Basis of Design and other related public scoping documents.

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[1] In 1992, the U.S. Department of Transportation designated the Washington, DC to Charlotte, NC corridor as one of the five high speed rail corridors authorized under the Intermodal Surface Transportation Act (ISTEA). Further legislation in TEA-21 authorized the designation of additional corridors or extensions of existing corridors, under which the USDOT designated three extensions of the SEHSR Corridor, including: (1) Raleigh, NC to Columbia, SC, Savannah, GA and Jacksonville, FL; (2) Charlotte, NC to Atlanta, Macon and Jesup, GA connecting to Jacksonville, FL; and (3) Richmond, VA to the Hampton Roads region of Virginia.

[2] DC2RVA Website address: www.dc2rvarail.com/resources/documents/

0 40 80
Miles

1 inch=80 miles
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap Source: 2014
ESRI World Light Gray Base

Southeast High Speed Rail (SEHSR) Segment Status

Washington D.C. to Richmond
Tier II EIS - Underway

Richmond to Raleigh
Tier II EIS - Complete

Raleigh to Charlotte
Tier II EA/CE - Underway

Richmond to Hampton Roads
Tier I EIS - Complete

Washington D.C. to Charlotte
Tier I EIS - Complete

Charlotte to Atlanta
Tier I EIS - Underway

SEHSR Extended
Altanta-Savannah-Jacksonville: Feasibility Study Complete

Figure 2-1
SEHSR Corridor

2.1 PROJECT LOCATION

The Washington, D.C. to Richmond project area spans approximately 123 miles along an existing rail corridor owned by CSX Transportation (CSXT) between Control Point[3] Rosslyn (RO) (milepost [MP] control fixed point [CFP] 110) in Arlington, VA to the CSXT A-Line and S-Line junction at MP A-11 in Centralia, VA (Chesterfield County) (Figure 2-2). At the northern terminus in Arlington, the physical Project limit is located at the southern approach to Long Bridge, a double-track rail bridge over the Potomac River. Union Station in Washington, D.C. is considered the northern terminus for purposes of ridership and revenue forecasting, as well as service development planning within the Project corridor. The southern terminus at Centralia is the junction of two CSXT routes, the "A-line" to the west and the "S-line" to the east; these routes begin in Richmond and rejoin 11 miles south of the city.

Additional sections of the Project include approximately 8.3 miles of the CSXT Peninsula Subdivision CA-Line from Beulah Road (MP CA-76.1) in Henrico County, VA to the AM Junction in the City of Richmond, and the approximately 26-mile Buckingham Branch Railroad (BBRR) from the AM Junction to the RF&P Crossing (MP CA-111.8) in Doswell, VA (Figure 2-2). A description of the specific rail sections included within the Project corridor and Richmond area is provided in Appendix A.

In Arlington, the Project connects to the existing CSXT track extending across the Potomac River on the Long Bridge into Washington, D.C. and Union Station, the southern terminus of Amtrak's NEC. The northernmost 51 miles of the DC2RVA corridor is shared with Virginia Railway Express (VRE), which operates commuter rail service from Union Station to just south of Fredericksburg, VA. North of Alexandria a limited section of the DC2RVA corridor is also shared with the Norfolk Southern (NS) freight service. At Centralia, the Project connects to both the Richmond to Raleigh section of the Interstate Corridor (Southeast High Speed Rail) corridor and the Richmond to Hampton Roads section of the Northeast Regional (Southeast High Speed Rail) corridor. The Washington, D.C. to Richmond section is an integral part of the overall Washington, D.C. to Charlotte Interstate Corridor (SEHSR) corridor and provides a critical link between high speed intercity passenger service from Boston to Washington, D.C. and the southeastern United States.

The DC2RVA corridor is separated into 20 sections based on information available from prior studies and to develop and evaluate potential rail improvements to meet the Project's Purpose and Need. The proposed rail infrastructure and other key attributes of these 20 sections are discussed in Appendix A. These 20 sections have been further grouped into three areas based on common rail operation characteristics and environmental conditions (Figures 2-3 through 2-5). The areas and sections are discussed below.

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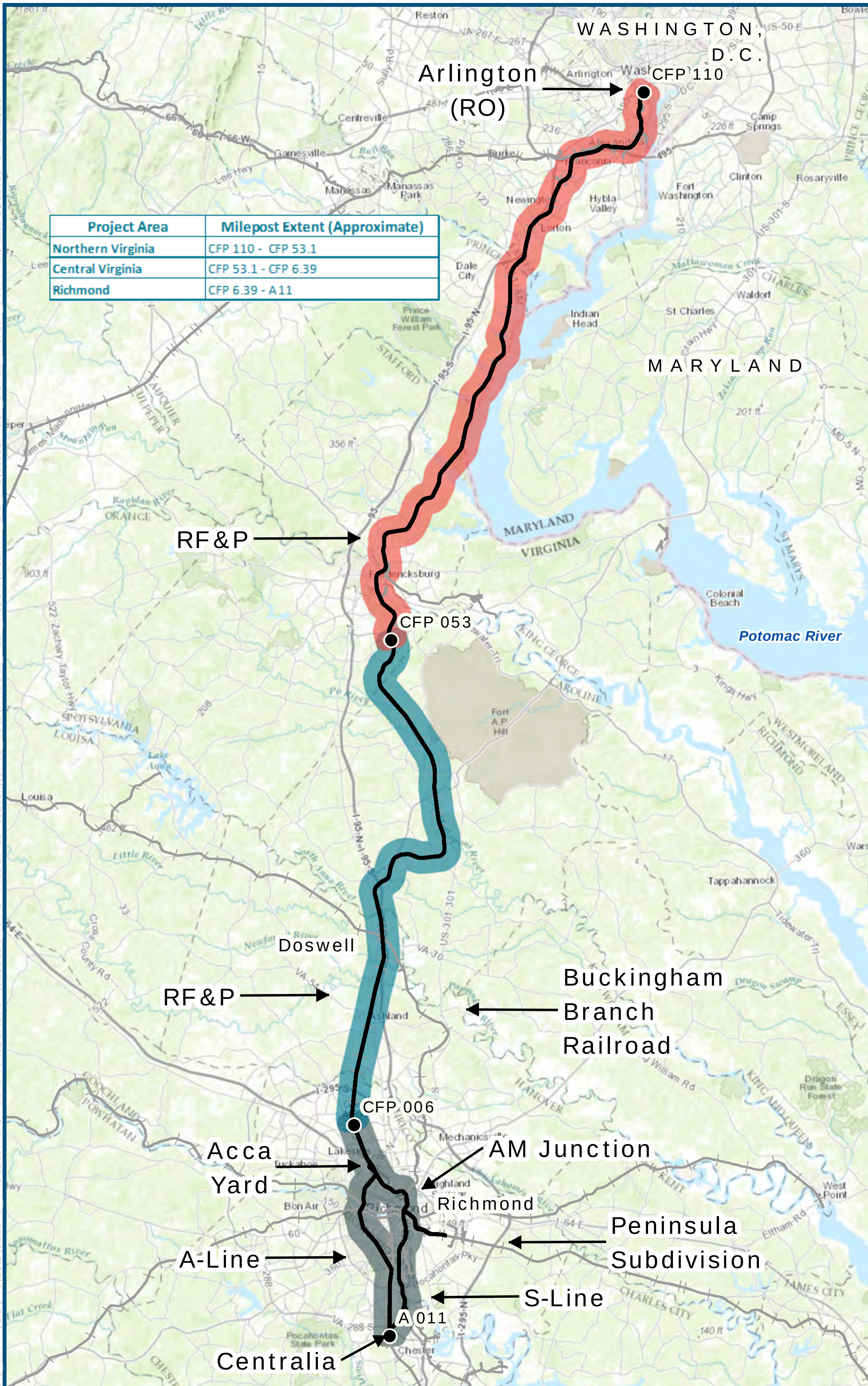
[3]A control point is an interlocking (a switch or crossing between two tracks), location of a signal, or other designated point used by dispatchers in identifying and controlling train movements.



Project Area	Milepost Extent (Approximate)
Northern Virginia	CFP 110 - CFP 53.1
Central Virginia	CFP 53.1 - CFP 6.39
Richmond	CFP 6.39 - A11

0 6 12
Miles

1 inch = 12 miles
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap Source: 2015 USGS Topographic Map

Legend

- CSXT Mileposts
- DC2RVA Project Corridor
- Virginia Rail Lines

DC2RVA Project Segments

- Northern Virginia
- Central Virginia
- Richmond

Figure 2-2

DC2RVA Project Corridor

2.1.1 Northern Virginia Area

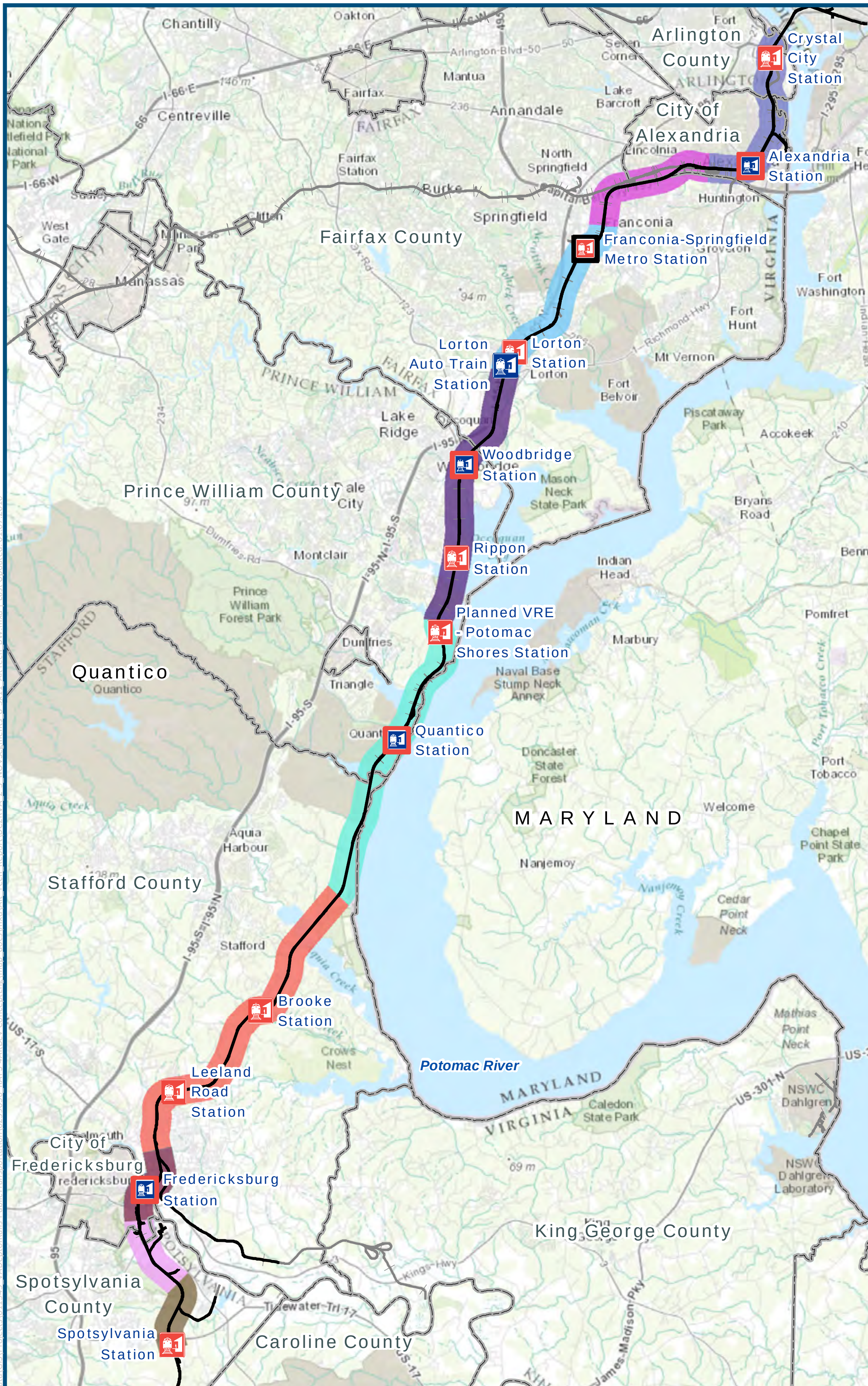
This area extends from the northern terminus of the DC2RVA corridor to Crossroads (XR), the southern terminus of the part of the corridor shared with VRE (Figure 2-3). This area is the most heavily used area of the corridor and includes rail traffic from CSXT, Amtrak, VRE, and NS. Much of the existing right-of-way follows a curving path along the Potomac River. The topography is varied and undulating, with over six major waterway crossings. Land use abutting the right-of-way is relatively intensive, particularly north of Quantico where suburban and urban development occupies much of the land. The DC2RVA corridor passes through numerous jurisdictions including Arlington County, City of Arlington, Fairfax County, Prince William County, Stafford County, City of Fredericksburg, Spotsylvania County, and Quantico. There are nine corridor/rail sections included in the Northern Virginia area, as follows:

- Rosslyn to Alexandria (ROAF)
- Alexandria to Franconia (AFFR)
- Franconia to Lorton (FRLO)
- Lorton to Powells Creek (LOPC)
- Powells Creek to Arkendale (PCAR)
- Arkendale to Dahlgren Junction (ARDJ)
- Dahlgren Junction to Fredericksburg (DJFB)
- Fredericksburg to Hamilton (FBHA)
- Hamilton to Crossroads (HAXR)

2.1.2 Central Virginia Area

This area extends from Crossroads in Spotsylvania County, just below VRE's southern terminus, south to Greendale, just north of Staples Mill Road Station, a suburban Richmond station in Henrico County (Figure 2-4). This part of the corridor is used by CSXT and Amtrak. The existing right-of-way aligns southeast from Crossroads towards Milford, and then curves to the west to Colemans Mill Crossing before running southwesterly towards Doswell. At Doswell the BBRR crosses the corridor at grade on a diamond configuration at a reduced track speed of 25 mph. The tracks then drop to the south through the Town of Ashland towards Greendale. The area contains many small and mid-sized waterways and wetlands. Land use, particularly north of Ashland, is largely rural, while south of Ashland land use becomes more suburban. The DC2RVA corridor passes through several jurisdictions including Spotsylvania County, Caroline County, Hanover County, Town of Ashland, and Henrico County. There are five corridor/rail sections included in the Central Virginia area, as follows:

- Crossroads to Guinea (XRGU)
- Guinea to Milford (GUMD)
- Milford to North Doswell (MDND)
- North Doswell to Elmont (NDEL)
- Elmont to Greendale (ELGN)



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Miles

1 inch = 5 miles
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap: USGS 2015
Topographic Map

Legend

- DC2RVA Project Corridor
- Virginia Rail Lines
- County/City Boundaries
- Amtrak Station
- VRE Station
- Amtrak/VRE Station
- VRE/WMATA Station

DC2RVA Project Segments

- 1: Rosslyn Junction to Alexandria (ROAF)
- 2: Alexandria to Franconia (AFFR)
- 3: Franconia to Lorton (FRLO)
- 4: Lorton to Powells Creek (LOPC)
- 5: Powells Creek to Arkendale (PCAR)
- 6: Arkendale to Dahlgren Junction (ARDJ)
- 7: Dahlgren Junction To Fredericksburg (DJFB)
- 8: Fredericksburg to Hamilton (FBHA)
- 9: Hamilton to Crossroads (HAXR)

Figure 2-3
Northern Virginia Area

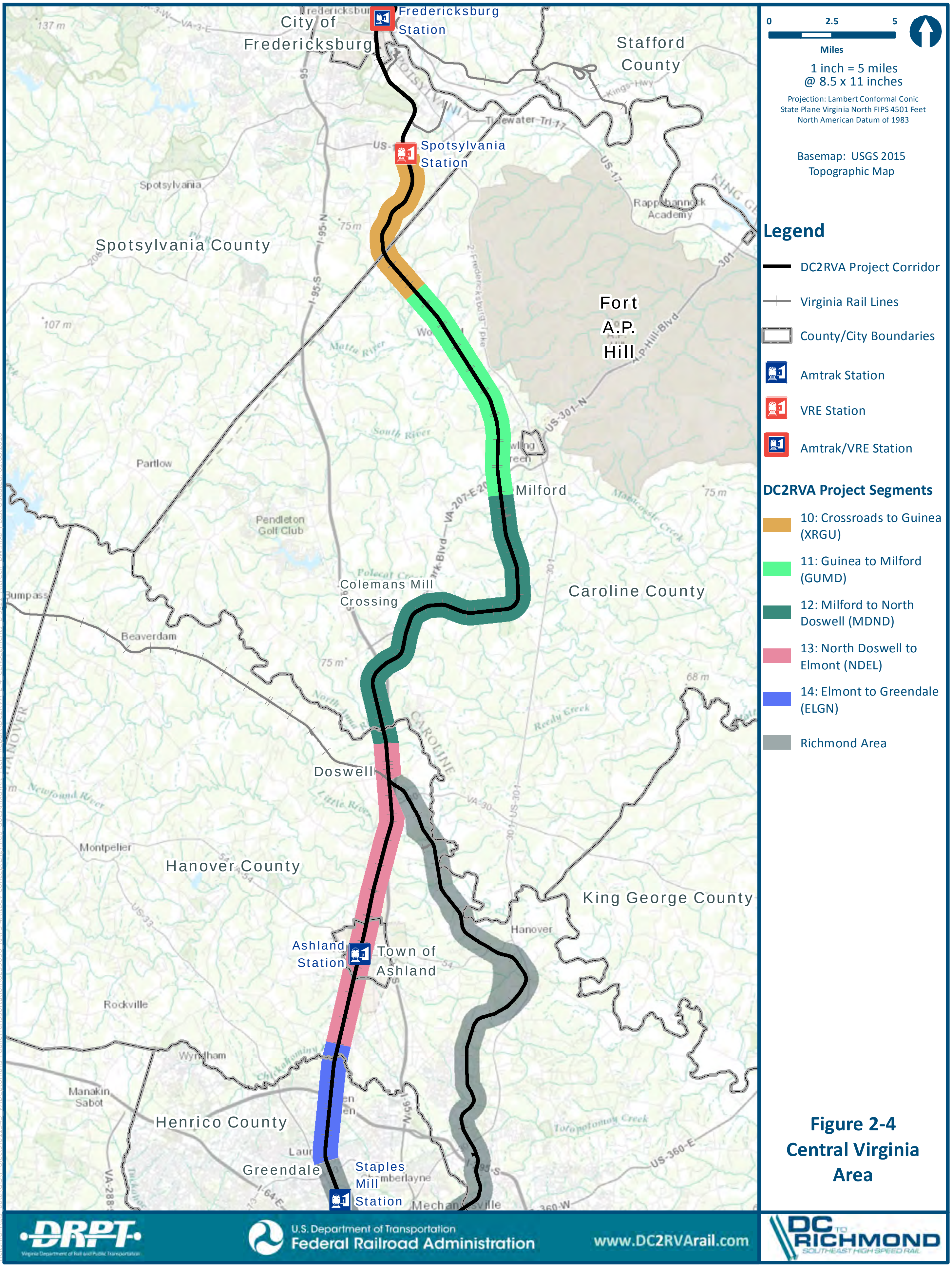
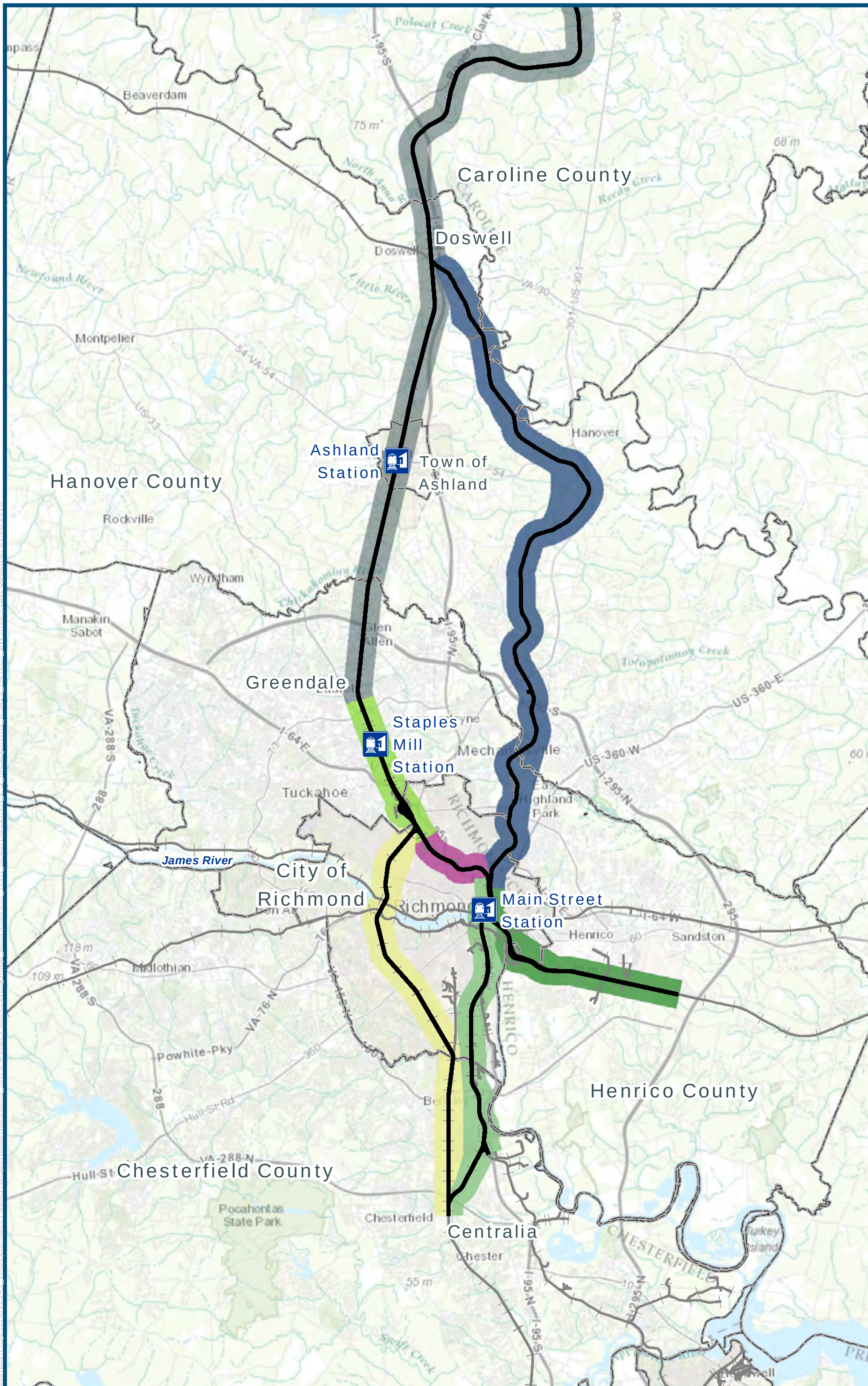


Figure 2-4 Central Virginia Area

2.1.3 Richmond Area

This area extends from Greendale through Staples Mill Road Station and CSXT's Acca Yard to the wye junction where two rail routes run north-south through Richmond: the A-Line, from the west Acca Yard wye (WAY) over the James River to Centralia, and the S-Line, from the south Acca Yard wye (SAY) through AM Junction and then past Main Street Station and over the James River to Centralia (Figure 2-5). The area also includes a portion of the CSXT Peninsula Subdivision and the BBRR, from Richmond to Doswell. This area is heavily used by CSXT and Amtrak and is a critical junction in CSXT's rail system in Virginia. Topography is varied with many hills and slopes, particularly along the James River through Richmond. Land use is mainly urban throughout. The DC2RVA corridor passes through Caroline County, Hanover County, Henrico County, City of Richmond, and Chesterfield County. There are six corridor/rail sections in the Richmond area, as follows:

- Greendale to SAY/WAY (including Acca Yard) (GNSA)
- SAY/WAY to AM Junction (Hermitage Lead) (SAAM)
- AM Junction to Centralia (S-Line) (AMCE)
- WAY to Centralia (A-Line) (WACE)
- AM Junction to Beulah (Peninsula Subdivision) (AMBE)
- Buckingham Branch (Doswell to AM Junction) (BBRR)



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Miles

1 inch = 5 miles
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap: USGS 2015
Topographic Map

Legend

- DC2RVA Project Corridor
- Virginia Rail Lines
- County/City Boundaries
- Amtrak Station

DC2RVA Project Segments

- 15: Greendale to South Acca Yard/West Acca Yard (GNSA)
- 16: SAY/WAY to AM Junction (Hermitage Lead) (SAAM)
- 17: AM Junction to Centralia - S Line (AMCE)
- 18: West Acca Yard to Centralia - A Line (WACE)
- 19: AM Junction to Beulah (Peninsula Sub.) (AMBE)
- 20: Buckingham Branch (BBRR)
- Central Virginia Area

Figure 2-5
Richmond Area

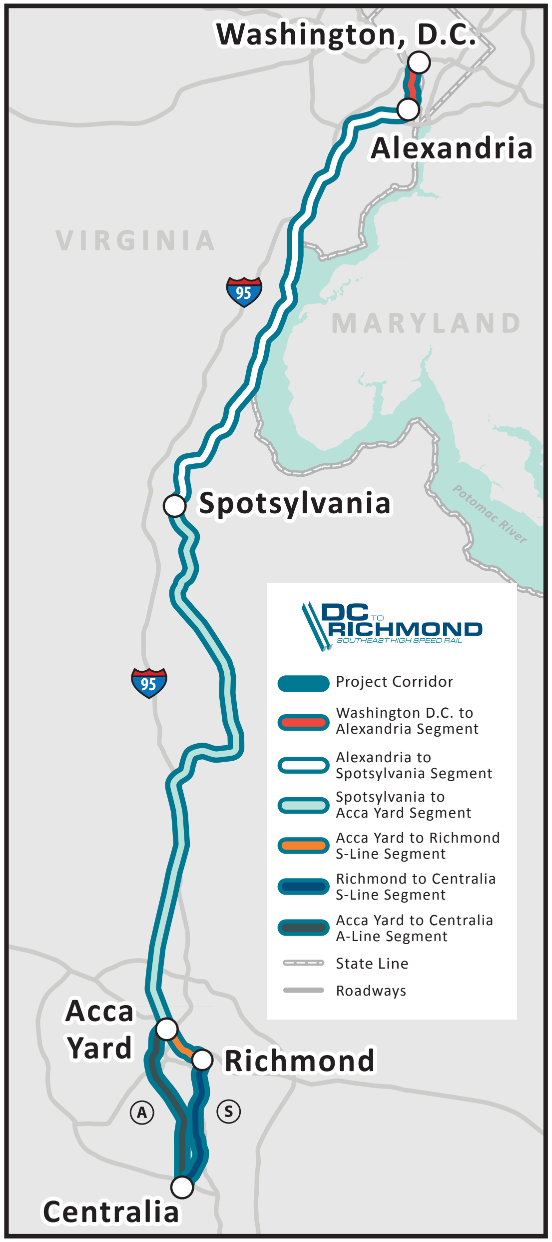
2.2 INTERCITY PASSENGER RAIL SERVICE IN THE DC2RVA CORRIDOR

Amtrak currently operates four types of intercity passenger trains through the DC2RVA corridor, as described below and shown in Figure 2-6:

- **Northeast Regional (Virginia) Service** operating in Virginia is an extension of Northeast Corridor intercity train service from Boston and New York that continues through Washington, D.C. to points in Virginia. These trains, which operate under the Amtrak brand name "Northeast Regional," provide regional passenger rail service along the length of the NEC and make local station stops to board and detrain passengers. As of 2015, Northeast Regional (Virginia) trains provide six daily round trips that use all or part of the DC2RVA corridor. Five of the six Northeast Regional (Virginia) trains operate from Washington, D.C. to Richmond, VA with two terminating in Richmond, two extending to Newport News and one extending to Norfolk. The sixth Northeast Regional (Virginia) train operates from Washington, D.C. to Lynchburg, VA and departs the DC2RVA corridor after serving the Alexandria station. All of the Amtrak stations in the DC2RVA corridor (with the exception of the Auto Train station in Lorton) are served by regional trains. Virginia provides funding for Northeast Regional (Virginia) trains operating in the state under a cost-sharing agreement with Amtrak, as required by the Passenger Rail Investment and Improvement Act of 2008.
- **Interstate Corridor (Carolinian) Service** is similar to the Northeast Regional (Virginia) Service, but with a route length of 750 miles or less, extending through Virginia to North Carolina. The Carolinian makes a daily round trip between New York and Charlotte, NC. This train's operation is solely funded by the state of North Carolina, under the same Federal law that mandates Virginia's funding of Northeast Regional (Virginia) trains. The Carolinian serves several of the Amtrak stations in the DC2RVA corridor.
- **Long Distance Service** includes trains that operate on routes greater than 750 miles. Similar to the Northeast Regional (Virginia) and Interstate Corridor (Carolinian) Services, Long Distance Service operates from New York and continues through Washington, D.C. to Virginia and points south. As of 2015, Amtrak provides Long Distance Service with five round trip trains that use the DC2RVA corridor, as follows:
  - The daily Palmetto, Silver Star, and Silver Meteor trains use the full length of the DC2RVA corridor continuing through Virginia to Georgia and Florida.
  - The daily Crescent, and the Cardinal, which operates three times per week, uses the portion of the DC2RVA corridor between Washington and Alexandria, then diverge onto NS to points west and south.

  Long Distance trains in the DC2RVA corridor currently serve Washington Union Station, Alexandria (suburban Washington), and Richmond's Staples Mill Road Station only. In 2015, the Silver Meteor also served Fredericksburg.
- **Auto Train** is a separate Long Distance service that is unique both among trains in the DC2RVA corridor and the entire Amtrak system. It operates as a daily nonstop, overnight train between dedicated station facilities in Lorton, VA and Sanford, FL. The Auto Train operates with bi-level Superliner passenger equipment (coaches, lounges, diners, and sleepers) and also uses special multi-level aluminum vehicle carrier cars that transport automobiles. The train has a maximum consist length of 50 cars.

Figure 2-6: Number of Daily Trains by Segment



Washington D.C. to Alexandria — Total Trains: 89

Amtrak: 23 VRE: 34 CSX: 30 Norfolk Southern: 2

Alexandria to Spotsylvania — Total Trains: 66

Amtrak: 20 VRE: 16 CSX: 30 Norfolk Southern: 0

Spotsylvania to Acca Yard — Total Trains: 50

Amtrak: 20 VRE: 0 CSX: 30 Norfolk Southern: 0

Acca Yard to Richmond S-Line — Total Trains: 20

Amtrak: 4 VRE: 0 CSX: 16 Norfolk Southern: 0

Richmond to Centralia S-Line — Total Trains: 10

Amtrak: 0 VRE: 0 CSX: 10 Norfolk Southern: 0

Acca Yard to Centralia A-Line — Total Trains: 42

Amtrak: 12 VRE: 0 CSX: 30 Norfolk Southern: 0

2.3 PROJECT DESCRIPTION

The DC2RVA project includes specific rail infrastructure improvements and service upgrades intended to improve the travel time, service frequency, and on-time performance of passenger trains operating between Washington, D.C. and Richmond, VA.

2.3.1 Rail Infrastructure Improvements

Specific improvements proposed for the existing rail infrastructure between Arlington, VA and Centralia, VA include:

- Corridor-wide upgrades to existing track and signal systems to achieve higher operating speeds, including curve realignments, higher-speed crossovers between tracks, passing sidings, and grade crossing improvements.
- Corridor-wide improvements to train operating capacity to achieve higher passenger train service frequency and reliability, including an additional main track along most of the corridor, and additional controlled sidings, crossovers, yard bypasses and leads, and other capacity and reliability improvements at certain locations.
- Station and platform improvements for Amtrak and Virginia Railway Express (VRE) stations.

This Tier II EIS being completed for the Project will assess the environmental impacts of these improvements and identify ways to avoid, minimize, or otherwise mitigate such impacts.

The Project may include locations for new or replacement intercity passenger stations on the Project corridor, and additional rail capacity and other improvements in the Richmond area, including on the CSXT Peninsula Subdivision from AM Junction in Richmond, VA (just north of Main Street Station) east to Beulah Road in Henrico County, and on the BBRR from Doswell, VA east to AM Junction.

Studies in support of the Project will address passenger and freight rail operations and service between Union Station in Washington, D.C. and Richmond and beyond, but the Project does not include physical improvements to the Long Bridge across the Potomac River or to rail infrastructure within Washington, D.C. Other projects will address improvements to the rail infrastructure north of Arlington and south of Centralia along the SEHSR corridor.

2.3.2 Service Upgrades

Future services include Amtrak's existing passenger trains, as well as four new North Carolina Interstate Corridor (Carolinian) passenger trains operating daily roundtrips from Charlotte and Raleigh, NC to Washington, D.C. and New York via the DC2RVA corridor and the NEC. These new Interstate Corridor (Carolinian) trains are anticipated to make limited stops within the DC2RVA corridor. In addition, four new Northeast Regional (Virginia) trains will operate daily roundtrips from Norfolk and Newport News, VA to Washington, D.C. and New York via the DC2RVA corridor and the NEC.

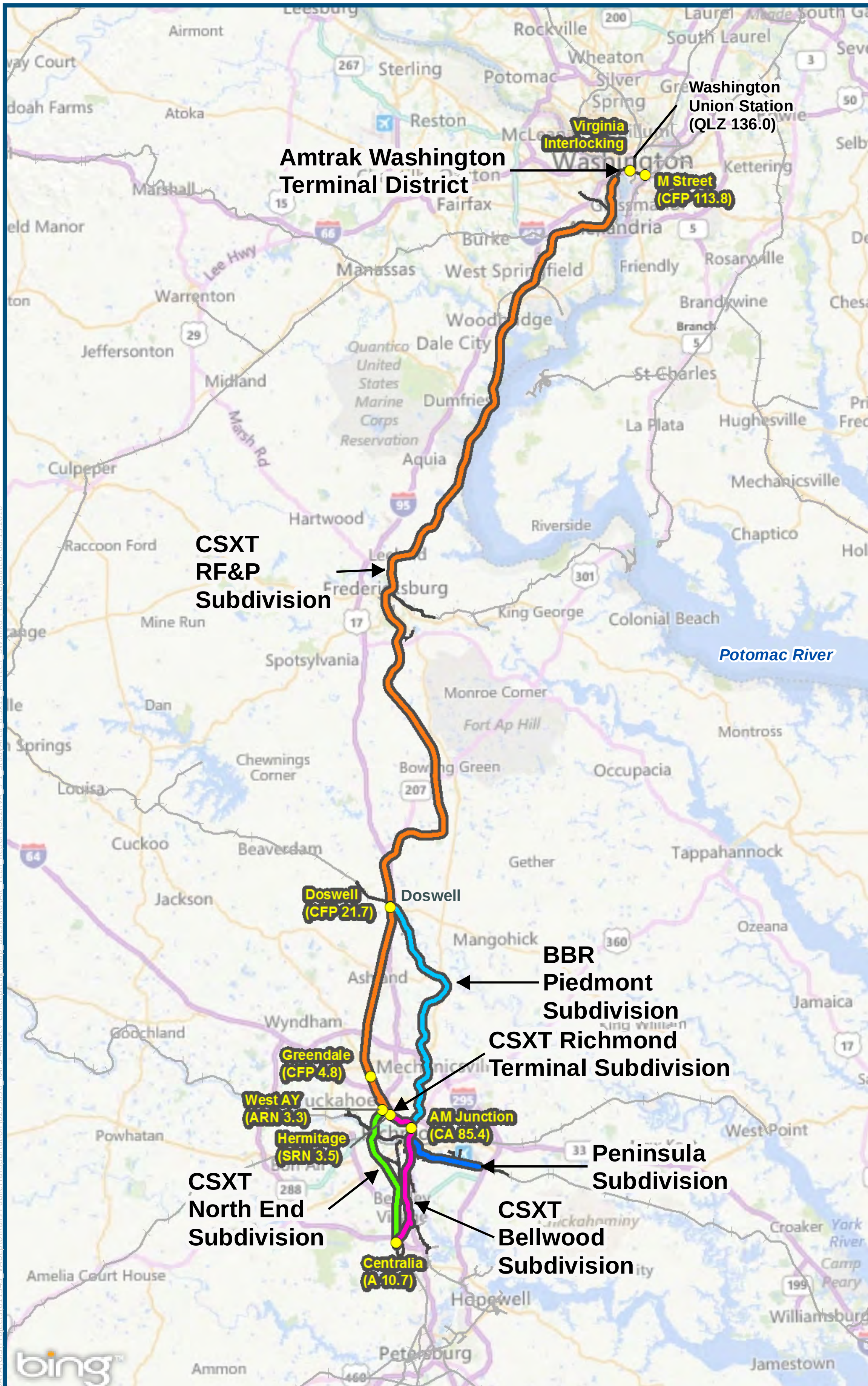
All passenger trains, whether Northeast Regional (Virginia), North Carolina Interstate Corridor (Carolinian), Long Distance, or Auto Train, will benefit from the increased track speeds to be achieved as part of the Project's corridor-wide upgrades to track and signal systems. New and existing passenger trains are anticipated to achieve a maximum allowable speed of 90 mph in the DC2RVA corridor—with the exception of the Auto Train, which operates with a maximum speed of 70 mph. In addition, all trains (intercity passenger, commuter, and freight) will benefit from improvements in reliability and performance resulting from corridor-wide improvements to train operating capacity, as well as corridor-wide upgrades to existing track, signal systems, and stations and platforms.

3 EXISTING CONDITIONS IN THE DC2RVA CORRIDOR

This chapter provides an overview of train operations, track infrastructure, and man-made and natural environmental conditions in the Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA) corridor and includes Appendix B (Geographic Information System [GIS] Data Received for DC2RVA) and Appendix C (DC2RVA Project Corridor Maps).

CSX Transportation (CSXT) is the owner and operator of the tracks in the DC2RVA corridor, and provides freight service. The DC2RVA project limits extend approximately 123 miles from the CSXT control point (CP) RO, milepost (MP) CFP-110, in Arlington, VA south to the CSXT A-Line/S-Line junction at MP A-11 in Centralia, VA (Chesterfield County). Additional segments of the Project include approximately 8.3 miles of the CSXT Peninsula Subdivision CA-Line from Beulah Road (MP CA-76.1) in Henrico County to AM Junction in Richmond, VA, and the approximately 26-mile segment of the Buckingham Branch Railroad (BBRR) from AM Junction to the CSXT Richmond, Fredericksburg, and Potomac (RF&P) Subdivision crossing (MP CA-111.8) in Doswell, VA. Trackage beyond the project limits north of Arlington to Washington Union Station is also included for project activities related to ridership and operations modeling. For operations modeling, the study area encompasses the following seven railroad operating subdivisions (Figure 3-1):

1. Amtrak Washington Terminal District: Washington Union Station (MP 136.0) to CP Virginia interlocking in Washington, D.C. (MP 137.1) — 1.1 miles
2. CSXT RF&P Subdivision: M Street interlocking in Washington, D.C. (MP CFP 113.8) to Greendale, VA (MP CFP 4.8) — 109.0 miles
3. CSXT Richmond Terminal Subdivision: Greendale, VA (MP CFP 4.8) to Hermitage interlocking in Richmond (MP SRN 3.5) — 4.6 miles
4. CSXT Bellwood Subdivision: Hermitage interlocking in Richmond (MP SRN 3.5) to Centralia (MP S 10.9) — 14.4 miles
5. CSXT North End Subdivision: West Acca Yard (AY) interlocking in Richmond (MP ARN 3.3) to Centralia (MP A 10.7) — 14.0 miles
6. CSXT Peninsula Subdivision: AM Junction in Richmond (MP CA 85.4) to Beulah, VA (MP CA 76.2) — 9.2 miles
7. BBRR Piedmont Subdivision: AM Junction in Richmond (MP 85.5) to Doswell (MP 111.8) — 26.3 miles



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Miles

1 inch=14 miles
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap Source: 2015 Bing Maps Road (Microsoft Corporation and its data suppliers)

Legend

CSXT Control Points

Virginia Rail Lines

DC2RVA Project Corridor

Buckingham Branch (Piedmont Subdivision)

RF&P Subdivision

A-Line (North End Subdivision)

Peninsula Subdivision

S-Line (Bellwood Subdivision)

Figure 3-1
Rail Operating Subdivisions

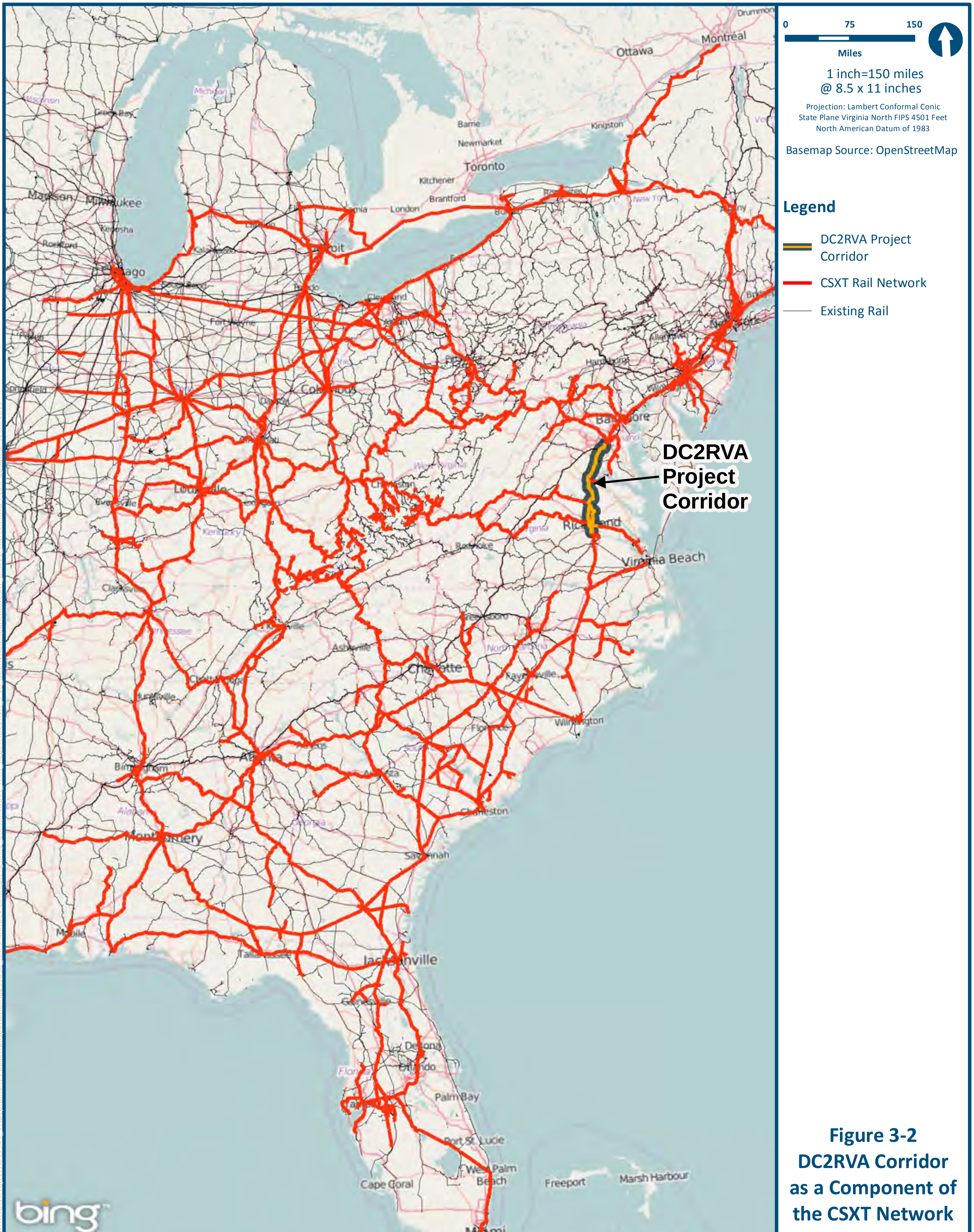

Figure 3-2
DC2RVA Corridor as a Component of the CSXT Network

Three other railroads have operating rights on the corridor: Amtrak provides Northeast Regional (Virginia), Interstate Corridor (Carolinian), and Long Distance passenger service along the length of the corridor; Virginia Railway Express (VRE) provides commuter service from Crossroads (Spotsylvania County) north to Washington Union Station; and Norfolk Southern (NS) provides freight service north of Alexandria, VA. The BBRR controls one segment of trackage within the project area through a lease from CSXT (over which both BBRR and CSXT operate freight service).

While the existing track and signals and communication systems in the DC2RVA corridor have been modernized to meet current standards, the rail alignments and available rights-of-way are those of a mid–19th century railroad. The current system's operations and infrastructure pose constraints and limitations to achieving the DC2RVA Purpose and Need of improved intercity passenger rail service with added frequency, improved reliability, and reduced travel time. Table 3-1 summarizes some of the rail network conditions that potentially affect the Project and are shown on Figure 3-2.

TABLE 3-1: RAIL NETWORK CONDITIONS POTENTIALLY AFFECTING DC2RVA PROJECT

Operating Subdivision[1]	Condition and Potential Effect to DC2RVA
Amtrak Washington Terminal District	▪ Amtrak Passenger trains to/from the north wait 25-50 minutes at Washington, D.C.'s Union Station while swapping electric and diesel locomotives and boarding passengers. ▪ Only 8 lower level platform tracks of the 23 active platform tracks are capable of serving Virginia-bound trains. ▪ The two-track First Street Tunnel limits the ability to expand track capacity between Washington Union Station and the CSXT main line at Virginia interlocking.
CSXT RF&P Subdivision (north – Virginia Interlocking to AF interlocking)	▪ L'Enfant and Crystal City VRE stations: Platforms are on west side only, confining commuter and certain Northeast Regional (Virginia) trains serving VRE commuters to the use of just one track between Washington, D.C. and Alexandria, VA. ▪ Long Bridge: Three tracks from the north and south narrow to two tracks to cross the Potomac River on a speed-restricted bridge, creating a significant operating bottleneck on the portion of the DC2RVA corridor with the heaviest volume of rail traffic. ▪ Arlington: Numerous tight curves between Arlington, VA and Alexandria reduce passenger train speeds from 70 mph down to as slow as 40 mph. ▪ Alexandria Union Station: Station platform on the east side (Track 2) is half the length of the west side (Track 3) platform, requiring long passenger trains at the east platform to make a time-consuming "double stop" so all patrons can board and disembark. Track 1 has no platform access at all. ▪ AF interlocking: Junction with NS rail line from Manassas, VA. Passenger and commuter rail traffic to Washington, D.C. increases by more than 50 percent at this location, jumping from 34 passenger and commuter trains south of AF to between 56 and 58 to the north.

TABLE 3-1: RAIL NETWORK CONDITIONS POTENTIALLY AFFECTING DC2RVA PROJECT

Operating Subdivision[1]	Condition and Potential Effect to DC2RVA
CSXT RF&P Subdivision (middle – AF Interlocking to Crossroads)	▪ Franconia-Springfield: Three tracks from Arlington narrow to two main tracks continuing south to Richmond, limiting capacity for passenger and freight trains. ▪ Lorton: Terminal for Amtrak's 50-car Auto Train from Florida. Scheduled arrivals and departures occur at the shoulder of commuter rush hours, but fluctuations in operations or on-time performance cause conflicts with other passenger and commuter trains as the Auto Train enters/exits its terminal. ▪ Lorton/Rippon/Brooke/Leeland Road VRE stations: All VRE station platforms between Franconia and Fredericksburg, VA are on the east side only, confining commuter trains to the use of just one track for nearly 40 miles, limiting operating flexibility. ▪ Quantico: Curves and a station stop restrict train speeds to 55 mph through the area. This is classified as a civil speed restriction. The current project to add approximately 11 miles of third track from Powells Creek to Arkendale will add additional capacity, but will not increase speed. ▪ Fredericksburg: A sharp S-curve and station stop restrict train speeds through the area to 40 mph. The corridor is built on a two-track embankment through the historic downtown area. Local freight trains enter/exit the corridor at a yard south of downtown. ▪ Crossroads: Southern limit of VRE Fredericksburg Line commuter operations. Weekday passenger/commuter traffic to Washington, D.C. increases by more than 40 percent at this location during peak commuter periods.
CSXT RF&P Subdivision (south – Crossroads to Staples Mill Road Station)	▪ Doswell: Passenger and freight trains must slow down to 60 mph for the at-grade diamond crossing of the BBRR; some CSXT freights use low-speed connecting tracks and sidings on the west of the main line to access BBRR trackage or interchange freight cars. ▪ Ashland: Double-track right-of-way is located in the median of Center Street, restricting train speeds to 35 mph through the historic community in Ashland, VA.
CSXT Richmond Terminal Subdivision	▪ Staples Mill Road Station: Primary Richmond-area passenger rail station with the highest ridership in Virginia (361,996 passengers in 2015) with two low level platforms serving three tracks (Tracks 3-5). One platform track occupies CSXT main line Track 3. Access from station Track 4 to Track 5 is by hand-operated turnouts only, which can delay passenger and freight operations. ▪ Acca Yard: A major freight classification yard where freight trains enter and exit the main line at low speed. Through freight trains stop and change crews, sometimes on main line also used by passenger trains. Northbound freights may wait here until commuter rush-hour windows are over, occupying track space intended for switching activities. ▪ AY interlocking: Diverging point for two CSXT rail lines that rejoin at Centralia, VA 15 miles south. Passenger trains headed to/from Newport News, VA via the Bellwood Sub cross the southern throat of Acca Yard at AY interlocking, operating at a low speed, creating opportunities to delay other freight and passenger operations. ▪ Acca Wye: Passenger trains terminating at Staples Mill Road turn around on a wye track south of Acca Yard, which may create additional passenger/freight train conflicts at the yard's south entrance.

TABLE 3-1: RAIL NETWORK CONDITIONS POTENTIALLY AFFECTING DC2RVA PROJECT

Operating Subdivision[1]	Condition and Potential Effect to DC2RVA
CSXT North End Subdivision	▪ I-195: The double-track right-of-way is in the median of I-195, with no room available to construct additional rail capacity. Northbound freight trains occasionally stop and occupy one of the main line tracks, waiting for space to open up in Acca Yard or for a crew change.
CSXT Bellwood Subdivision	▪ S-Line (Bellwood Subdivision): Slow track speed, limited track capacity, heavy grades, and complex freight movements affect passenger and freight train operations and reliability between Acca Yard and Main Street Station. Passenger trains average 17 mph between Staples Mill Road and Main Street stations. ▪ Hermitage: Location of the only switch between two main line tracks that run parallel for 3 miles. Passenger trains face delays because there is no place between Acca Yard and Main Street Station where two passenger trains can meet/pass. ▪ AM Junction: Passenger/freight line to Newport News (CSXT Peninsula Subdivision) diverges, but only one of two S-Line tracks provides access to the junction. Freight trains stop north of the junction for extended periods of time to detach helper locomotives or reverse their direction of operation. ▪ Main Street Station: The single track S-Line passes the west side of Main Street Station and through the Triple Crossing on an elevated viaduct. Freight trains stop north of Main Street Station for extended periods of time to change crews, blocking the track on the west side. ▪ Triple Crossing: Low-clearance bridges (16 feet, 10 inches) form a complex, three-level rail crossing that restricts double-stacked container trains from operation on the Bellwood Subdivision (the middle of the three levels). The auto rack cars and bi-level passenger cars used on Amtrak's Autotrain, which have a height of approximately 20 feet are also restricted by these low-clearance bridges. James River Bridge: Trains cross the James River on a single-track bridge with a restricted speed of 10 mph. ▪ Bellwood: Local freight yard and junction of a branch line with daily freight activity. Refer to Figure 3-1.
CSXT Peninsula Subdivision	▪ Main Street Station: A single track passes the station's east side on an elevated viaduct designed for two tracks. The platform for Amtrak trains to/from Newport News occupies space where the second main line track used to be. Only one track remains in operation between AM Junction and Rivanna Junction north of the station. ▪ Fulton Yard: Staging yard for freight traffic and location where locomotives run-around trains to reverse direction. Also a crew change point and base for helper locomotives that assist trains up heavy grades to Acca Yard. Passenger trains share limited main line tracks with freights entering and exiting the yard at low speed. ▪ Beulah: East end of double-track route from Richmond. Line continues as single track east toward Newport News. The next opportunity for trains to pass is 15 miles farther east.

TABLE 3-1: RAIL NETWORK CONDITIONS POTENTIALLY AFFECTING DC2RVA PROJECT

Operating Subdivision[1]	Condition and Potential Effect to DC2RVA
Buckingham Branch Railroad	▪ A single-track, low-speed, non-signaled rail line between AM Junction, just north of Main Street Station, and Doswell, characterized by sharp curves and steep grades. Operated by a shortline railroad. Used mainly by empty bulk trains returning to loading points in the Appalachians and Great Lakes regions.

Source: HDR, 2015.

Table Notes: 1. For consideration of infrastructure improvements the DC2RVA project limits do not extend north across the Potomac River; therefore, conditions north of CSXT Control Point RO at milepost CFP 110 (Arlington), while affecting train operations in the corridor, are not addressed by the Project.

In addition to the rail operations and infrastructure conditions noted above (and described in greater detail in Sections 3.1 and 3.2 below), there are many sensitive natural and man-made resources along the DC2RVA corridor that could be affected by the Project or pose limitations to how the Project is developed. Existing information on the type and extent of corridor environmental resources has been compiled and assembled in a GIS, described in Section 3.3 (Appendix C). Some of the key resources of concern to the Project identified within the GIS system include:

- Waterways – The corridor runs north-south, while most waterways drain from west to east towards the Chesapeake Bay. As a result, the corridor crosses numerous large, moderate and small waterways using a combination of bridges and culverts. The potential need for additional bridge capacity over large waterways such as the Occoquan River, Neabsco Creek, Powells Creek, Aquia Creek, Potomac Creek, Rappahannock River, Chickahominy River, and James River can add substantial design constraints, permitting, and construction costs to the Project.
- Wetlands – Along with the numerous waterways are extensive areas of wetlands, protected by federal and state regulations. Any Project activities proposed within these protected areas must satisfy regulatory agency requirements. The central portion of the corridor, in particular, has extensive areas of wetlands bordering the corridor.
- Floodplains – Floodplains are identified alongside most of the waterways, and could restrict Project design.
- Endangered & Threatened Species – If found within the area affected by the Project, endangered and threatened species could be a concern, and could restrict project design and/or construction.
- Urban/suburban land uses – The corridor travels through heavily developed urban and suburban areas, particularly in Northern Virginia and near Richmond. There are many areas where residential neighborhoods and commercial/industrial development abut the right-of-way, and in Fredericksburg, VA and Ashland, VA, the corridor travels through the historic central business districts.
- Existing infrastructure – The corridor is crossed by 99 roads at grade, and another 96 overpasses carrying highways crossings over or under the tracks. The Project must be compatible with this infrastructure, or include improvements to the road/rail crossings.

In addition, sections of the corridor right-of-way are shared with utilities, including fiber optic and power transmission lines, and petroleum pipelines.

- Minority and low-income populations – Minority and low-income populations exist throughout the 123-mile corridor, including distinct areas along the corridor in Northern Virginia, Fredericksburg, Richmond, and Chesterfield County. The Project's alternatives will be evaluated to ensure they do not have disproportionately high and adverse human health or environmental effects on minority and low-income populations along the corridor.
- Historic resources – The corridor runs through some of the oldest-settled portions of Virginia. From early Native American tribes seeking food supplies from the area waterways to Civil War soldiers seeking respite from the battlefields, the area has been the locale of historic activities for millennia – activities that resulted in the presence of thousands of historic buildings and archaeological sites which could restrict project design and construction.
- Parks and playgrounds – Publicly-owned parks, playgrounds, and other recreation areas are generally protected against use for transportation projects unless no other prudent or feasible alternative exists; many such parks and other recreation areas are near the corridor.
- Wildlife/waterfowl Refuges – Wildlife and waterfowl refuges are also protected from use for transportation projects, and can restrict project design.
- Conservation lands – Lands purchased or developed under the Land and Water Conservation Fund program or otherwise protected through easements can impose limitations on project design.
- Cemeteries – Cemeteries, whether community facilities or family plots that are no longer maintained, are sensitive resources and can impose limitations on project design.
- Hazardous waste sites – The corridor travels through many industrial and commercial areas with sites listed on the National Priority List (NPL), Resource Conservation and Recovery Act (RCRA) Corrective Action Facility list, or Comprehensive Environmental Response, Compensation, and Liability Information System list, or other state or local list of potential hazardous materials or wastes that may post a health or safety risk during construction or operation of the Project.

3.1 RAILROADS OPERATING IN THE CORRIDOR

The DC2RVA corridor is used by several different types of railroads that operate multiple types of trains. The corridor is a "shared use" multimodal corridor, meaning that it carries freight trains operated by the host railroad (CSXT) and freight tenant NS, passenger trains operated by Amtrak, and commuter trains operated by VRE. This shared use multimodal arrangement means freight, passenger, and commuter trains are commingled on the same tracks. A shared use multimodal corridor introduces a level of operating complexity because Amtrak and VRE's passenger trains operate at a higher speed than freight trains, have different acceleration and braking characteristics, and are expected to adhere to published schedules. This shared use multimodal situation imposes a hierarchy on trains operating in the corridor that generally gives passenger and commuter trains a priority status. The nature of VRE's train service, with frequent service during main morning and evening commuting hours during the Monday through Friday work week, and less frequent service outside of the main commute periods, adds to the operating complexity. One segment of the corridor, operated by BBRR, only sees freight trains; it crosses the CSXT RF&P Subdivision at Doswell and connects to CSXT track at AM Junction in Richmond.

During peak commuter periods, CSXT's main lines north and south of Washington, D.C., are, in effect, operated as two side-by-side single-track directional railroads, one for passenger or commuter and one for freight. The tracks in the DC2RVA corridor are assigned to passenger, commuter, and freight rail by a dispatcher based on rail traffic present on any given day. Operation of passenger or commuter trains requires the use of certain tracks based on the configuration of platforms at passenger stations. Most of the commuter rail stations between Spotsylvania, VA and Alexandria have platforms that serve only the easternmost of the DC2RVA corridor's two tracks, meaning the commuter trains must use this track. Between Alexandria and Washington, D.C., the commuter station platforms at Crystal City and L'Enfant only serve the westernmost of the line's three tracks, so commuter trains must use this track. Thus, VRE trains must cross between the east and west tracks from Washington, D.C. to Spotsylvania to serve commuter travel needs. All Amtrak passenger stations along the corridor have platforms that serve at least two tracks; however, certain Northeast Regional (Virginia) passenger trains also supplement VRE as express service and call at L'Enfant, Alexandria, Woodbridge, Quantico and Fredericksburg.

3.1.1 CSX Transportation

CSXT is the principal operating subsidiary of CSX Corporation. It is the track owner of all segments of the DC2RVA corridor, and the primary operator in all segments except for one segment leased to BBRR (over which both BBRR and CSXT operate freight service). CSXT operates a freight rail network that spans 20,769 miles (as of year-end 2014) and serves 23 states located east of the Mississippi River, as well as the District of Columbia and the Canadian provinces of Quebec and Ontario. CSXT owns 761 miles of railroad in Virginia (roughly 25 percent of Virginia's total rail network) and has operating rights via lease or trackage rights over an additional 293 miles in the state. CSXT's RF&P Subdivision between Washington, D.C. and Richmond makes up the majority of the DC2RVA corridor, and provides a critical link in CSXT's freight rail network between routes in the Southeast built by CSXT predecessor companies and routes in the Northeast inherited from CSXT predecessors. The RF&P Subdivision was formerly the RF&P Railroad, which CSXT purchased in 1991.

3.1.1.1 The DC2RVA Corridor as a Component of the CSXT Network

The DC2RVA project limits include components of three critical rail corridors in the larger CSXT freight rail network: the I-95 Corridor, National Gateway, and Coal Network. The CSXT freight rail network is shown on Figure 3-2.

- **I-95 Freight Rail Corridor.** The Interstate 95 (I-95) Freight Rail Corridor is a 1,400-mile rail line running the length of the eastern seaboard between New York and Miami, FL that includes as a component the RF&P Subdivision. The I-95 Freight Rail Corridor serves the major cities and seaports of the Northeast, Mid-Atlantic, and Southeastern United States, linking 10 states (New York, New Jersey, Pennsylvania, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, and Florida) and the District of Columbia. It is the only rail corridor along the eastern seaboard south of Washington, D.C. The CSXT rail corridor roughly parallels the I-95 highway between

New York and Miami and serves many urban, port, industrial, and rural areas along the eastern seaboard. CSXT primarily transports food and consumer products, as well as metals, chemicals, agricultural products, and building materials along this line.

- **National Gateway.** The National Gateway is a public-private partnership to improve the transportation of shipping containers between Mid-Atlantic seaports and population centers in the Midwestern United States. The $850 million initiative is funding the construction of new intermodal container transfer facilities and raising clearances on approximately 1,000 miles of CSXT main line between North Carolina and Ohio to allow containers to be transported two-high (double-stacked) in railcars, improving operating efficiency and lowering costs. Upgrades to three corridors comprise the major focus of the National Gateway program: the I-70/I-76 Corridor between Washington, D.C. and northwest Ohio via Pittsburgh, PA; the I-95 Corridor between Baltimore, MD, Washington, D.C., and North Carolina, along with a branch to Portsmouth, VA; and the Carolina Corridor between Wilmington, NC and Charlotte, NC. As part of the National Gateway project, CSXT in 2015 began reconstruction of the Virginia Avenue Tunnel in Washington, D.C., which will add a second main track through the tunnel and raise clearances to accommodate double-stacked intermodal trains. The project will eliminate one of CSXT's largest network bottlenecks on the East Coast, which affects not only CSXT freight trains but passenger and commuter rail operations on the DC2RVA corridor. The Commonwealth of Virginia's Rail Enhancement Fund has contributed funds to this project.
- **Coal Network.** In Richmond, the DC2RVA project area includes a small component of the CSXT Peninsula Subdivision east to Beulah. This subdivision is part of CSXT's Coal Network, which connects coal mines in the Appalachian Mountains with industrial areas and seaports in the Mid-Atlantic. The Coal Network carries export coal bound for marine terminals at Newport News, VA and domestic coal for power plants and industrial customers across the CSXT network. The Project area's BBRR trackage between Richmond and Doswell also supports the CSXT Coal Network by providing a route for empty coal trains to return to Appalachian region mines. This keeps westbound empty trains from conflicting with eastbound loaded movements on CSXT's single-track Coal Network between Clifton Forge, VA and Richmond.

3.1.1.2 Types of CSXT Freight Trains

The types of freight trains operated by CSXT can be summarized in four classes, in order of dispatching priority:

- **Intermodal Trains.** CSXT operates daily intermodal trains on the DC2RVA corridor. These trains carry truck trailers and shipping containers and operate between New York (northern New Jersey), Philadelphia, PA, and Jacksonville, FL. In addition, CSXT operates intermodal container trains between Chicago, IL and the deepwater container port at Portsmouth, VA. Intermodal trains typically carry time-sensitive cargo, often on expedited schedules to compete with trucks, and as such are given the highest dispatching priority among freight trains. Intermodal trains on the DC2RVA corridor between Washington, D.C. and Richmond can operate at a higher maximum allowable speed (60 mph) than other types of freight trains (55 mph).

- **Scheduled Manifest Trains.** Manifest trains carry multiple goods and commodities in individual carloads for multiple shippers between multiple origin and destination pairs. Manifest trains carry a variety of commodities, including food products, lumber, metals, chemicals, auto parts, paper products, waste, and scrap using different car types, such as boxcars, gondolas, tank cars, covered hopper cars, and other specialized rail equipment. Most manifest traffic moves door-to-door, although customers without direct rail access or who need less-than-carload quantities use transload facilities, where products can be transferred from railcars to trucks for further shipment. Manifest trains are usually classified (i.e., sorted) at originating and terminating yards and may set out or pick up cars at intermediate yards en route.
- CSXT operates several daily scheduled manifest trains on the DC2RVA corridor between major yards in the Northeast and Southeast. Acca Yard in Richmond performs some manifest classification work, handles pickups and set-outs made by manifest trains with different originations and destinations, and supports the rail-served industrial operations present in the region. Some manifest freight trains may be scheduled as "priority" or "expedited" and be given a higher dispatching priority. The DC2RVA corridor hosts one of the most unique and well-known priority manifest trains in the United States: a trainload of Tropicana orange juice products that CSXT runs from a production facility in Bradenton, FL to a distribution center in Jersey City, NJ.
- **Bulk Freight Trains.** Bulk freight trains, often called unit trains, carry one single commodity and generally originate, operate, and terminate as intact trainsets between one shipper and one receiver. Bulk trains do not require intermediate switching en route. Bulk freight trains do not usually operate on set schedules, but rather are dispatched at times when they do not interfere with the operation of intermodal freight, scheduled manifest freight, or passenger and commuter trains, and in a timely manner to meet customer requirements. Bulk freight trains operating in the DC2RVA corridor carry coal, grain, rock, and other commodities.
- **Local Freight Trains.** Local freights pick up and drop off cars at businesses, bulk transfer facilities, industrial parks, and other locations requiring rail service. Local trains are based out of rail yards, where the cars for local customers are picked up or set out by long-haul manifest freight trains. Local freights usually operate on schedules designed to meet individual customer needs and requirements. These trains generally have the lowest dispatching priority, except at times when the train crew's hours available to work (hours of service) may be close to running out, in which case dispatchers will expedite the train's return to its home terminal. Depending on the track space and configuration of a rail customer's spur, a local freight may occupy a main track while switching a customer, especially if the train crew has to leave cars on the main track while switching because of a lack of track capacity on the spur. On the DC2RVA corridor, CSXT bases local freights out of multiple yards in the Richmond metropolitan area and at Fredericksburg. CSXT's local freight operations also include manned helper locomotives that assist by pushing or pulling through freight trains that operate on lines with heavy grades north and east of Fulton Yard in Richmond. NS bases a local freight train at Alexandria that has trackage rights on the DC2RVA corridor. BBRR bases local freights at its yard in Doswell that operate on BBRR trackage.

3.1.1.3 Cab Signaling and Automatic Train Control on the RF&P Subdivision

CSXT's RF&P Subdivision is equipped with an automatic train control (ATC) system[1] to stop trains that exceed the authorized speed indicated by the line's signaling system. In the 1920s, the RF&P Railroad installed an ATC system with cab signals on its main line between Arlington and Richmond.

Cab signaling, which works together with ATC on the corridor, displays a line's signal status directly to the engineer in the locomotive cab, transmitting the line's fixed wayside signals to provide continuous information on the track conditions ahead. A sensor installed beneath the front of a locomotive or cab car receives the signal code through the rails and displays it in a readout in the cab. When a signal changes, the engineer is alerted and can respond immediately, rather than having to wait until the appearance of the next wayside signal before taking action. On lines with heavy passenger traffic, this feature helps increase track capacity by allowing trains to follow each other more closely. On the RF&P Subdivision, cab signal readouts display the following four signal aspects: Clear (proceed at maximum authorized track speed), Approach Medium, Approach, and Restricting.

ATC is a form of speed control based on the cab signaling system. If the train speed exceeds the maximum allowed, an overspeed alarm sounds in the cab. If the engineer fails to reduce the train's speed, the brakes are automatically applied and the train is stopped. All trains, including Amtrak and VRE passenger trains, operating on the RF&P Subdivision are required by FRA to have a locomotive or cab car from which the train's brakes are being controlled with cab signaling and ATC equipment (49 CFR Rule 236.509).

CSXT converted the RF&P Subdivision's cab signal frequency in the late 1990s from the RF&P system's 60-Hertz operating cycle to the more common 100-Hertz cycle used on the adjacent Amtrak Northeast Corridor (NEC) and Conrail freight lines. This eliminated the need for a dedicated pool of locomotives equipped with the RF&P's unique cab signal equipment to lead freight trains on the I-95 Corridor, improving operational efficiency. In 2009, CSXT completed a project with funding from VRE through Virginia's Rail Enhancement Fund to extend the Cab Signal System and Automatic Train Control north of RO interlocking in Arlington to the Virginia interlocking in Washington, D.C., allowing trains to operate across the Long Bridge at higher speeds and at closer spacing distances.

3.1.1.4 Freight Train Crew Hours of Services

An important consideration for determining when freight trains operate is the ability of a train crew to complete its portion of the train's trip within the federally prescribed 12-hour window of on-duty time. CSXT's freight train crew districts are longer than the DC2RVA corridor, so crews must cover territory not just within the DC2RVA corridor, but beyond it.

Trains operating north from Richmond face a particular challenge getting through Washington, D.C., because every CSXT freight line leading to and from the city is shared with passenger and commuter trains. Commuter trains from Washington, D.C. operate on CSXT trackage south to

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[1] ATC is similar to Positive Train Control (PTC). Both systems are designed to automatically stop a train that exceeds the speed permitted by the signal system. ATC is an existing technology that was installed by CSXT predecessor Richmond, Fredericksburg & Potomac Railroad in the 1920s. PTC is a federal mandate for all rail systems throughout the country.

Fredericksburg and Alexandria, VA, north to Baltimore, and northwest to Brunswick, MD, Frederick, MD, and Martinsburg, WV.

Although the commuter traffic runs primarily to Washington, D.C. in the morning and away from Washington, D.C. at night, CSXT's freight operations are bidirectional at all hours. During peak commuter periods, when only one track can be used for freight operations, there are limited opportunities for CSXT freight trains traveling in opposing directions to pass one another. As a result, CSXT may hold trains as far away as Richmond, Baltimore, or Brunswick to wait for times when interference from commuter trains will be minimal or nonexistent, in order to optimize its use of train crews and allow a crew to complete its entire journey within the federally allotted time. However, holding trains for additional time at major yards prevents that yard track space from being used for switching or receiving inbound trains, which then may require inbound trains to wait elsewhere on the main line for space to open up in the yard. Given the extensive commuter territories within and north of the DC2RVA corridor, there are few freight trains that can avoid both commuter windows.

3.1.2 Norfolk Southern Railway

NS operates approximately 20,000 route miles in 22 states and the District of Columbia, serves every major container port in the eastern United States, and provides connections to other rail carriers. NS owns 1,897 route-miles in Virginia (about 60 percent of the state's total rail network), including a rail line from Manassas that connects to the DC2RVA corridor at AF interlocking in Alexandria.

NS has trackage rights from Alexandria north on the DC2RVA corridor and CSXT track through the Virginia Avenue Tunnel to a connection with Amtrak's NEC at Landover, MD, and then north on the NEC from Landover to Philadelphia. However, NS does not currently operate any freight trains over this track. NS has used its CSXT trackage rights for a local freight train based out of the NS freight yard in Alexandria that entered the DC2RVA corridor at AF interlocking and operated 2 miles north to a junction called Slaters Lane. There, the NS local train accessed a branch line to switch customers located south of Reagan National Airport. However, no active freight shippers are currently located on the branch, obviating the need for regular NS freight operations on the DC2RVA corridor. (In years past, NS had operated coal trains on the branch line to serve a PEPCO power plant in Alexandria; however, that plant shut down in 2012.) Despite the closing of the plant, NS rights to operate on the corridor remain in effect.

3.1.3 Buckingham Branch Railroad

The BBRR is a family-owned short line railroad that operates 275 miles of railroad in central Virginia. BBRR was founded in 1988 by Robert and Annie Bryant and ran its first train on March 6, 1989. Since then, it has grown from a 17-mile line with two employees to its current size of 275 miles with 88 employees.

In 2004, BBRR signed a lease with CSXT to operate and maintain a 200-mile CSXT main line between Richmond and Clifton Forge. The leased property includes a segment of track in the DC2RVA project area between AM Junction in Richmond (the east end of BBRR's line) and

Doswell (where BBRR's line crosses CSXT's DC2RVA corridor main line at a diamond[2]). CSXT retains trackage rights over the route and uses them on a daily basis. BBRR serves local industries on its main line between Richmond and Clifton Forge, as well as a branch to the NS main line at Orange, VA. CSXT operates unit bulk trains of empty cars westbound from Richmond to Clifton Forge several times per day on an as-needed basis. Doing so allows CSXT to send eastbound loaded unit bulk trains on its own single-track line along the James River between Clifton Forge and Richmond without conflicts from opposing westbound traffic. CSXT also originates unit trains of granite rock on the BBRR at a Martin Marietta facility in Verdon (near Doswell) that operate to Richmond and points east.

3.1.4 Amtrak

Amtrak operates passenger rail service throughout the United States and has done so since May 1, 1971, when it took over passenger operations previously provided by private railroads. Amtrak generally operates over the tracks of the private freight railroads, with a few exceptions, the most notable being the NEC, which is all in public ownership. Amtrak trains are operated by Amtrak crews using Amtrak-owned equipment. Amtrak operates 24 daily trains and two tri-weekly trains in Virginia. Operations are more frequent north of Alexandria, where Amtrak passenger trains, using an NS rail line from Lynchburg and Manassas, VA, join the DC2RVA corridor for the trip into Washington Union Station and the NEC.

The 2013 *Virginia State Rail Plan* notes that Amtrak ridership in Virginia jumped 77 percent from 2004 to 2012, a much higher rate than the 24 percent increase the state rail plan says was recorded on Amtrak's overall system during that time. In 2015, Amtrak's Virginia fact sheet reported that more than 1 million passengers boarded or disembarked at Amtrak stations in the DC2RVA corridor, and five million Amtrak passengers began or ended their trips at Washington Union Station.

3.1.4.1 Types of Amtrak Service in the DC2RVA Corridor

Amtrak trains operating in the DC2RVA corridor can be divided into four types: Northeast Regional (Virginia), Interstate Corridor (Carolinian), Long Distance, and Auto Train.

Northeast Regional (Virginia) Service. Northeast Regional (Virginia) service operating in Virginia is an extension of NEC intercity train service from Boston, MA and New York, NY that continues through Washington, D.C. to points in Virginia. These trains, which operate under the Amtrak brand name "Northeast Regional (Virginia)," provide regional passenger rail service along the length of the NEC and make frequent stops to board and detrain passengers. Northeast Regional (Virginia) trains provide a travel alternative to driving I-95. A Northeast Regional (Virginia) train can carry approximately 300 to 600 passengers, depending on the number of cars in the train's consist.

As of 2015, Northeast Regional (Virginia) trains provide six daily round trips that used all or part of the DC2RVA corridor. Five of the six Northeast Regional (Virginia) trains operate from Washington, D.C. to Richmond, VA with two terminating in Richmond, two extending to Newport News and one extending to Norfolk. The sixth Northeast Regional (Virginia) train

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[2] In railroad parlance, a "diamond" is an at-grade or level crossing of two or more tracks; the diamond refers to the shape inside the crossing tracks.

operates from Washington, D.C. to Lynchburg, VA and departs the DC2RVA corridor after serving the Alexandria station.

Northeast Regional (Virginia) trains are powered by P42 diesel locomotives south of Washington, D.C. (one per trainset) and consist of Amfleet coaches (four to seven per trainset), an Amfleet Business class car, and an Amfleet all-table dinette (food-service car). One trainset (an overnight train between Boston and Newport News) also operates with a Viewliner II baggage car. Amfleet equipment is capable of operating at speeds of up to 125 mph where the track classification and signaling permits. Operation in the DC2RVA segment (Richmond-Washington) is currently limited to 70 mph maximum allowable speed (MAS).

Northeast Regional (Virginia) trains serve all Amtrak passenger rail stations located in the DC2RVA corridor with the exception of the Auto Train terminal at Lorton, VA (see Chapter 8 for a description of Amtrak passenger stations in the corridor). Virginia provides funding for Northeast Regional (Virginia) trains operating in the state under a cost-sharing agreement with Amtrak, as required for trains operating less than 750 miles by the Passenger Rail Investment and Improvement Act (PRIIA) of 2008.

Interstate Corridor (Carolinian) Service. Interstate Corridor (Carolinian) Service is similar to Northeast Regional (Virginia) Service; however, with a route length of 750 miles or less, extending through Virginia to North Carolina. This train's operation is solely funded by the state of North Carolina under PRIIA, the same Federal law that mandates Virginia's funding of Northeast Regional (Virginia) trains.

The Carolinian is powered by a single P42 diesel locomotive and consists of a Viewliner II baggage car, four Amfleet coaches, an Amfleet Business class car, and an Amfleet dinette. The Carolinian serves Alexandria, Quantico, Fredericksburg, Richmond Staples Mill Road, and Petersburg in Virginia (see Chapter 8).

Long Distance Service. Long Distance Service includes trains that operate on routes greater than 750 miles. States are not required to provide operating support for long distance service. Most Long Distance Amtrak trains operating in the East have a capacity of 200 to 400 passengers. As of 2015, Amtrak provides Long Distance Service with five round trip trains that use the DC2RVA corridor: three use the full length of the DC2RVA corridor continuing through Virginia to Georgia and Florida, including the daily Palmetto, Silver Star, and Silver Meteor trains; and two use the portion of the DC2RVA corridor between Washington and Alexandria, then diverge onto NS to points west and south, including the daily Crescent train, and Cardinal which operates three times per week.

Most Long Distance trains with journeys that require overnight operation are powered by two P42 diesel locomotives. These trains have a Viewliner II baggage car, Viewliner sleeping cars (one to three per trainset), a Heritage dining car, an Amfleet diner-lounge, and three to five Amfleet II leg-rest coaches (with greater seat pitch). The daytime-only Palmetto operates between New York and Savannah, GA with one P42 locomotive, one baggage car, and six Amfleet cars. Long Distance equipment is capable of operating at speeds of up to 110 mph where the track classification and signaling permits higher operating speeds. Long Distance trains in the DC2RVA corridor serve Washington Union Station, Alexandria, Fredericksburg, and the Richmond area's Staples Mill Road Station. All but one of these trains operates nonstop between Alexandria and Richmond.

Auto Train. Amtrak's Auto Train is a separate Long Distance service that is unique both among trains in the DC2RVA corridor and the entire Amtrak system. It exclusively serves passengers with an accompanying motor vehicle and operates as a daily nonstop, overnight train between dedicated station facilities in Lorton, VA and Sanford, FL. The Auto Train operates with bi-level Superliner passenger equipment (coaches, lounges, diners, and sleepers), and specialized multi-level aluminum vehicle carrier cars that transport automobiles. The train is typically powered by two P40 diesel locomotives and has a maximum consist length of 50 cars (17 Superliner cars and 33 vehicle carriers).

3.1.4.2 Amtrak Train Frequencies in DC2RVA Corridor

Effective September 2015, Amtrak passenger train frequencies in the DC2RVA corridor (Figure 3-3) consisted of:

- Northeast Regional Service (Virginia)

- Two round trips daily (one daytime, one overnight) between Boston and Newport News.
- One round trip daily between Boston and Richmond (Staples Mill Road Station). On Friday afternoon only, the southbound train continues operating south of Staples Mill Road to Newport News.
- One round trip six days per week between Boston/New York and Richmond (Staples Mill Road Station).
- One round trip daily between Boston/Springfield, MA/New York and Norfolk.
- One round trip daily between Boston/Springfield/New York and Lynchburg, operating in the DC2RVA corridor between Washington, D.C. and AF interlocking in Alexandria.

- Interstate Corridor (Carolinian) Service (North Carolina)

- Carolinian: One round trip daily between New York and Charlotte.

- Long Distance Trains

- Palmetto: One round trip daily between New York and Savannah via Charleston, SC.
- Silver Meteor: One round trip daily between New York and Miami via Charleston, SC.
- Silver Star: One round trip daily between New York and Miami via Raleigh, NC and Columbia, SC.
- Crescent: One round trip daily between New York and New Orleans, LA, operating in the DC2RVA corridor for only 6.5 miles between Washington, D.C. and AF interlocking in Alexandria.
- Cardinal: One round trip tri-weekly (Sunday/Wednesday/Friday in each direction) between New York and Chicago, operating in the DC2RVA corridor only between Washington, D.C. and AF interlocking in Alexandria.

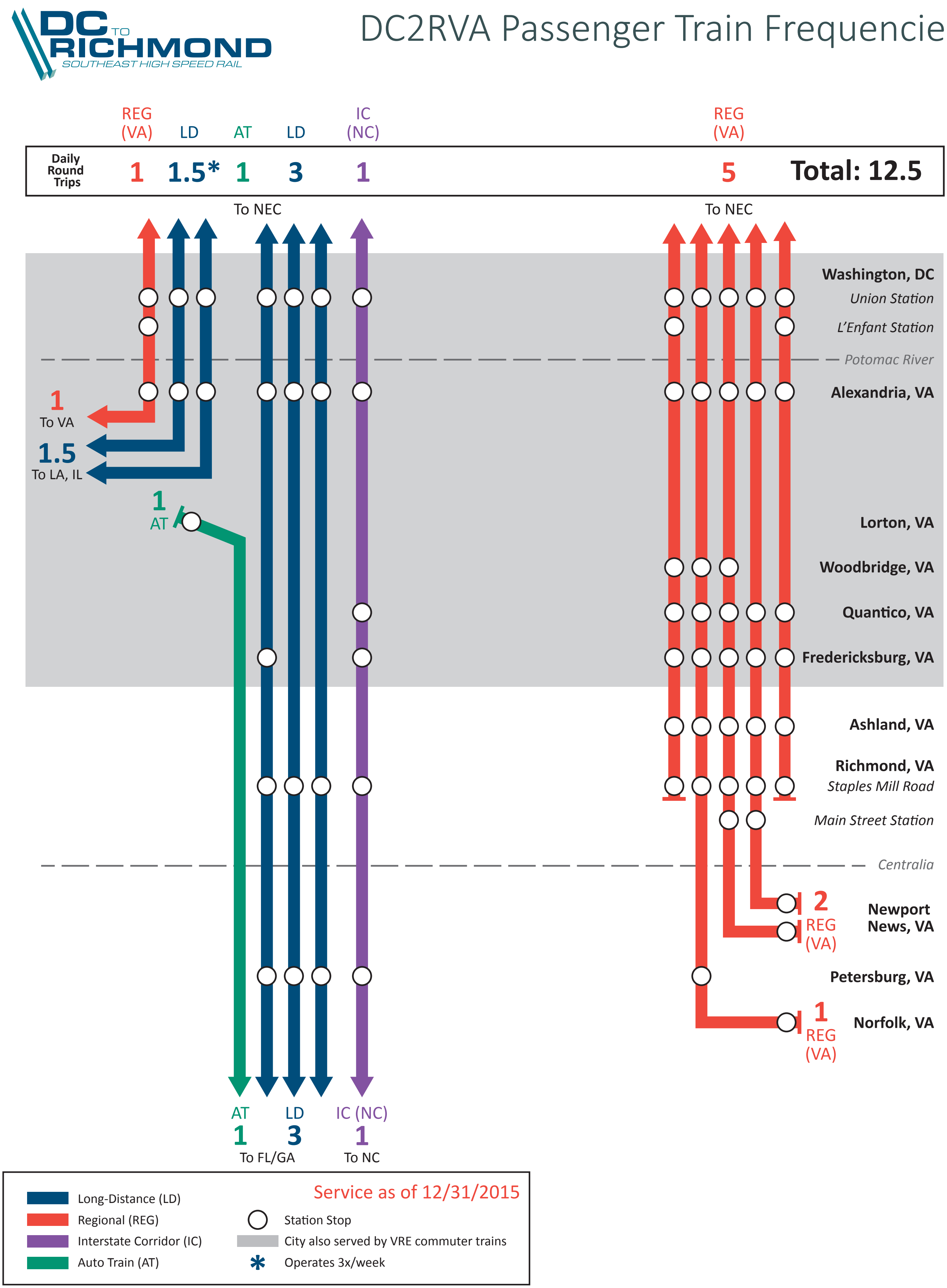
- Auto Train

- Auto Train: One non-stop round trip daily between Lorton and Sanford.

3.1.4.3 Amtrak Stations

Amtrak trains serve eight stations in the DC2RVA corridor (see Figure 3-3). Additional detail on stations in the DC2RVA corridor is provided in Chapter 8.

DC2RVA Passenger Train Frequencies



3.1.5 Virginia Railway Express

VRE is a transportation partnership of the Northern Virginia Transportation Commission and the Potomac & Rappahannock Transportation Commission and has been providing commuter rail service to the residents of northern Virginia since 1992.

VRE commuter trains operate on two lines, the Fredericksburg Line and the Manassas Line, which join at Alexandria and continue into Washington Union Station. VRE commuter trains are operated under contract with Keolis Rail Services America, using Keolis train crews and VRE-owned equipment. Ridership has grown about 6 percent per year between 2002 and 2012, according to the 2013 *Virginia State Rail Plan*, and currently averages approximately 19,000 passenger trips per day, making it the tenth largest commuter rail service in the country.

3.1.5.1 VRE Operations and Train Frequencies

VRE trains operate Monday-Friday only, with most trips timed to bring passengers to Washington, D.C. for work in the morning and from Washington, D.C. back home in the evening. As of 2015, operations on each line are as follows:

- Fredericksburg Line: Eight weekday-only round trips between Washington, D.C. and Spotsylvania (60 miles)
- Manassas Line: Eight weekday-only revenue round trips and one weekday-only non-revenue round trip between Washington, D.C. and Broad Run/Airport Station (36 miles), operating in the DC2RVA corridor between Washington, D.C. and AF interlocking in Alexandria (9 miles). VRE operates one of its daily round trips as a mid-day train, and a second daily round trip as reverse-peak southbound in the morning and northbound in the evening.

VRE commuter trains operate as push-pull trainsets, with the locomotive always on the south end, either pulling or pushing the train depending on the direction of operation. VRE trainsets are powered by a single MP36 diesel locomotive and consist of bi-level Gallery cars (four to eight cars per trainset). The end car of each trainset is a cab car equipped with an operating cab for the engineer to operate the train when the locomotive is running in the "push" mode (normally northbound).

VRE's fleet is made up of 20 MP36PH-3C diesel locomotives capable of 90 mph that were built in Idaho by MotivePower Inc. in 2010-2011. The majority of VRE's commuter cars are bi-level Gallery cars that seat 123-144 passengers, and were built by Nippon Sharyo in two orders, one 71-car order with deliveries from 2006 to 2009, and a second order with deliveries that began in 2014 and will run through 2016. VRE supplements this fleet with a handful of 1950s-era Gallery cars purchased in 1999 from Chicago commuter agency Metra. Gallery cars have two levels of seating, with an open space running the length of the center aisle that divides the upper level seats into two sections. This design allows conductors to check passenger tickets on both levels from the bottom level of the car.

VRE has two maintenance facilities where trains are stored, cleaned, serviced, and inspected during the night:

- Crossroads (south of Fredericksburg in Spotsylvania County 6.2 miles south of the Fredericksburg Station, on the DC2RVA corridor): Eight trainsets stored overnight

- Broad Run (west of Manassas, on the NS Piedmont main line): Five trainsets stored overnight
- During the day, VRE trains layover at Amtrak's Ivy City Coach Yard north of Washington Union Station, except for one trainset that returns to Broad Run in the morning and stays there until the afternoon commuter rush.

3.1.5.2 VRE Stations and Their Effect on DC2RVA Corridor Operations

In order to expedite a cost-effective startup of VRE service, new commuter stations were built on the DC2RVA corridor with platforms on just one side of the right-of-way (see Chapter 8 for additional detail on VRE stations in the DC2RVA corridor). This has created an operational condition that restricts VRE commuter trains to the use of just one track over 60 miles of the DC2RVA corridor between Washington, D.C. and Spotsylvania. The situation effectively creates two parallel single-track railroads during the commuter peaks, one for VRE and one for all other freight and passenger services. Amtrak passenger trains traveling with the peak flow of VRE commuter trains can, and do, use the VRE commuter track, but may be subject to delays if they catch up to, or follow too closely behind, the frequently stopping commuter trains.

The existing VRE platform configuration has the potential to delay VRE commuter trains as well, if slow-moving or stopped Amtrak trains or CSXT freight trains are occupying the track where the VRE station platforms are located. Additional delays can ensue when track maintenance work is being performed on the track that serves VRE station platforms. Finally, the lack of platforms on both sides is one impediment to an expansion of VRE service, since commuter trains would not be able to make mid-route station stops in both directions during peak periods. Table 3-2 lists the VRE commuter rail stations in the DC2RVA corridor and indicates the location of station platforms.

TABLE 3-2: PLATFORM LOCATIONS OF VRE COMMUTER STATIONS IN THE DC2RVA CORRIDOR

VRE Commuter Rail Station	Platform on West Side Only	Platforms on Both Sides	Platform on East Side Only
Washington Union Station		*	
L'Enfant	*		
Crystal City	*		
Alexandria		*	
Franconia-Springfield		*	
Lorton			*
Woodbridge		*	
Rippon			*
Potomac Shores (under construction)		*	
Quantico		*	
Brooke			*
Leeland Road			*

TABLE 3-2: PLATFORM LOCATIONS OF VRE COMMUTER STATIONS IN THE DC2RVA CORRIDOR

VRE Commuter Rail Station	Platform on West Side Only	Platforms on Both Sides	Platform on East Side Only
Fredericksburg		*	
Spotsylvania			*

In addition, the original VRE commuter platforms are approximately 400 feet in length, long enough to serve a five-car trainset but inadequate for many of the commuter train consists that operate today on the Fredericksburg Line. VRE deploys the following trainsets and the following lengths to cover scheduled service on the Fredericksburg Line:

- Four cars (340 feet without locomotive): one set
- Five cars (425 feet without locomotive): one set
- Six cars (510 feet without locomotive): three sets
- Seven cars (595 feet without locomotive): two sets
- Eight cars (680 feet without locomotive): one set

Because most of the trainset lengths used in the Fredericksburg Line service exceed the station platform lengths, extra dwell time at stations is required to allow passengers to walk through cars before reaching a car with an open door at the platform. A 2007 VRE analysis indicated that the lack of longer platforms was adding time to each trip covered by a trainset longer than six cars. VRE indicated that travel time could decrease by three to four minutes per trip for longer consists if platforms of 650 feet or longer were available.

Of the 13 VRE stations served by Fredericksburg Line commuter trains, six stations have platforms approximately 400 feet long. VRE plans to lengthen platforms to 650 feet, enough to accommodate an eight-car trainset, at five Fredericksburg Line stations (Franconia, Rippon, Lorton, Brooke, and Leeland Road). The work is also expected to allow for future platform extensions to 850 feet to accommodate the 10-car trainsets, which VRE plans to run in the future. The station improvement plans also include adding second platforms to stations where only one platform currently exists, improving operational flexibility in the northern portion of the DC2RVA corridor.

3.2 RAIL INFRASTRUCTURE AND OPERATIONS BY SUBDIVISION

While the existing track and signals and communication systems have been modernized, the rail alignments and available rights-of-way are those of a mid–19th century railroad, and in many areas are not able to efficiently support the increased levels of passenger rail service that the DC2RVA project contemplates without substantial improvements in rail infrastructure. The primary trackage in the DC2RVA corridor is the CSXT-owned RF&P Railroad line, which was established in the 1830s to connect Richmond to Fredericksburg, extended north to Aquia Harbor, and then later extended to the Potomac River in Alexandria. In the mid-1800s, Richmond was a railroad hub, served by five railroads extending outward like spokes from a wheel – however, typical of the time, these railroads were not originally laid out to connect or operate jointly. As the railroads continued to develop in the late 1800s and early 1900s, connections were made between different lines to serve the passenger and freight needs of the day. However, Richmond's topography and development limited the ability to connect the existing railroads. CSXT's acquisition of four of the five Richmond area railroad lines, and the subsequent joint operation of these lines, is a relatively recent development. Current rail operations in the Richmond area, and particularly transitions between trains moving north-south and those moving east-west, experience greater opportunities for slow or delayed operations as a result of the limited connecting tracks available between main lines.

The DC2RVA project limits extend approximately 123 miles from the CSXT control point (CP) RO, milepost (MP) CFP-110, in Arlington south to the CSXT A-Line/S-Line junction at MP A-11 in Centralia (Chesterfield County). Additional segments of the Project include approximately 8.3 miles of the CSXT Peninsula Subdivision CA-Line from Beulah Road (MP CA-76.1) in Henrico County to AM Junction in Richmond, and the approximately 26-mile BBRR from AM Junction to the CSXT RF&P Subdivision crossing (MP CA-111.8) in Doswell.

A description of rail infrastructure and operations in each subdivision appears below. Districts adjacent to the project limits are also described due to the influence of Districts on infrastructure and service options for the DC2RVA corridor.

3.2.1 Amtrak Washington Terminal District

Owner/Operator: Amtrak

Subdivision Route/Mileage: Washington Union Station (MP 136.0) – CP Virginia interlocking in Washington, D.C. (MP 137.1) (Figure 3-4)

Distance: 1.1 miles

Line Heritage: Washington Terminal Company

Number of Main Tracks: Two main tracks

Maximum Allowable Speed-Passenger: 25 mph

Maximum Allowable Speed-Freight: 10 mph

Limiting Passenger Speed[3]: 10 mph

Signals: Interlocking Signals and NORAC Rules 600-616

Operational Authority: Train Director, K Tower

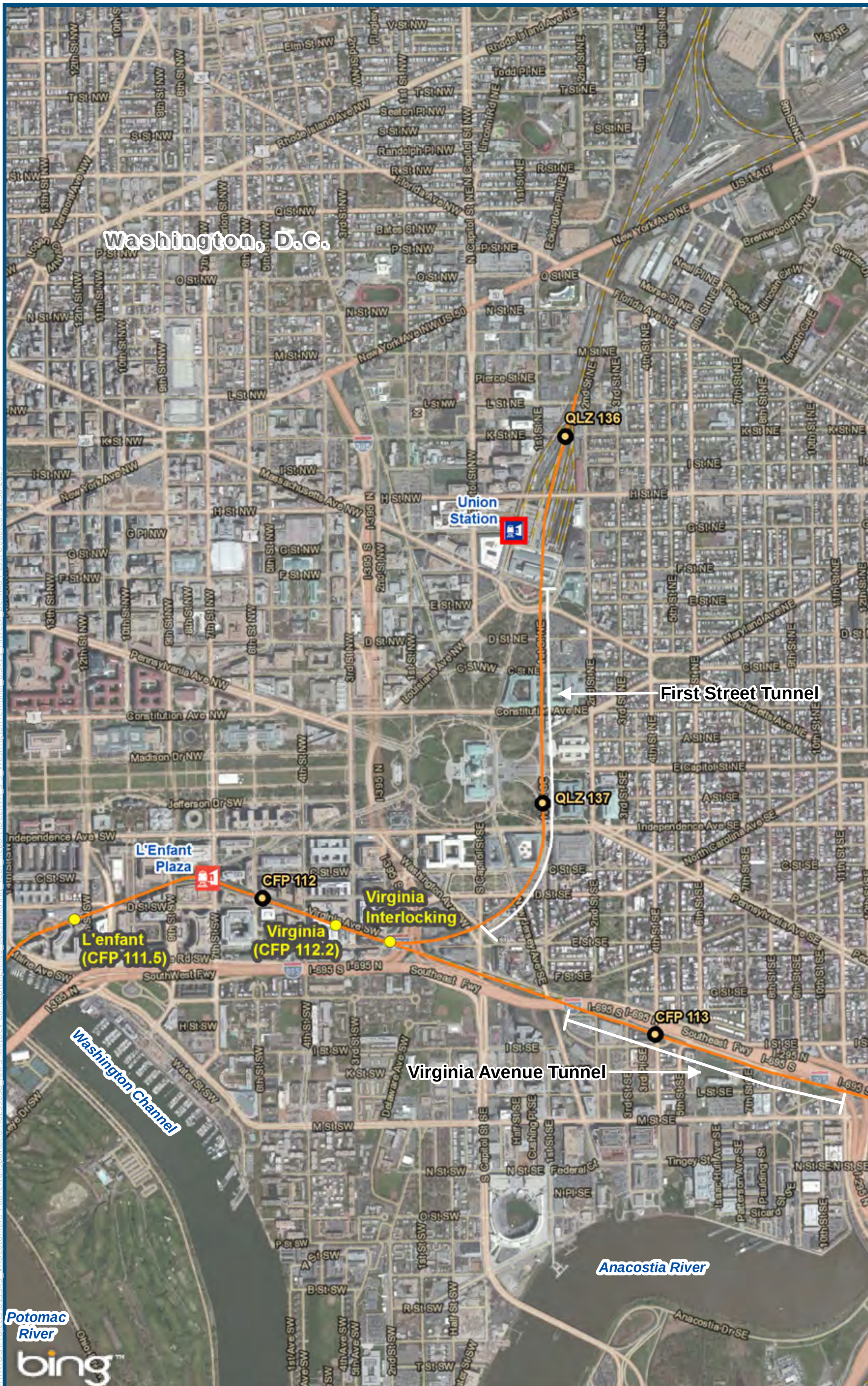
Maximum Allowable Gross Weight: n/a

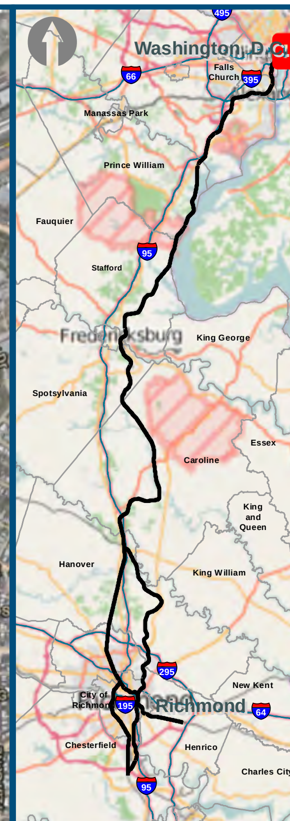
Clearances: Superliner compliant (16'2" ATR)

Trains per Day:

- 21-24 Passenger (Amtrak)
- 34 Commuter (VRE, weekdays only)

[3] Limiting speeds are identified within segments along the corridor where the train may not be able to operate at its MAS for the full length between station stops. Limiting speeds can be implemented for various reasons to include; civil speed restriction purposes, track curvature, geometrical reasons and station proximity.





0 1,000 2,000
Feet

1 inch = 2,000 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap: Bing Aerial Imagery, Microsoft Corporation and its data suppliers

Legend

- Existing Track
- CSXT Mileposts
- CSXT Control Point
- Amtrak/VRE Station
- VRE Station

Figure 3-4
Amtrak Washington Terminal District

3.2.1.1 Station Activity and Train Volumes

Washington Union Station is the southern anchor of Amtrak's NEC from New York and Boston, and the hub for three Maryland Area Regional Commuter (MARC) rail lines serving Maryland and two VRE commuter rail lines serving Virginia. The station was partially opened in 1907, completed in 1908, and renovated in 1988. In 2015, approximately 70,000 people per day visited Union Station, including more than 13,000 Amtrak passengers a day, making Union Station the second-busiest station on the Amtrak system.

On weekdays, more than 200 revenue trains serve Union Station. North of Washington, D.C., Amtrak's limited-stop, high-speed Acela Express trains operate once an hour on the NEC. Amtrak Northeast Regional (Virginia) trains, which operate at slower speeds and make more stops on the NEC, also operate approximately once an hour. All Amtrak train service on the NEC between Washington and Boston is powered by electric locomotives. MARC operates daily electrified Penn Line commuter trains on the NEC, with frequent service during the weekday morning and afternoon rush hours. MARC Brunswick Line and Camden Line diesel-electric commuter trains operate weekdays only during morning and evening commuter periods.

VRE diesel-electric commuter trains operate on weekdays, with most service bunched to arrive at Union Station during the morning peak periods and depart in the evening peak periods. VRE train activity at Union Station ranges from three to five trains per hour between 6 a.m. and 9 a.m., and between 3 p.m. and 6 p.m. Table 3-3 summarizes Union Station's revenue train activity, as of September 2015.

TABLE 3-3: REVENUE TRAINS SERVING WASHINGTON UNION STATION

Trains	Monday-Friday	Saturday	Sunday
Total Trains	**214-219**	**73**	**80**
Amtrak Total	**87-91**	**55**	**68**
Acela Express	32	8	18
Northeast Regional (Virginia)	41-43	33	34
Intercity Corridor	4	4	4
Long Distance	10-12	10	12
MARC Total	**95-96**	**18**	**12**
Penn Line	56	18	12
Camden Line	21	0	0
Brunswick Line	18-19	0	0
VRE Total	**32**	**0**	**0**
Fredericksburg Line	16	0	0
Manassas Line	16	0	0

Note: Train counts shown in the table are one-way revenue trips

In addition to the trains shown above, station activity also includes a multitude of non-revenue moves, including VRE commuter trains operating between Union Station and Amtrak's Ivy City Coach Yard, where the trains lay over during the day.

3.2.1.2 Platform Configuration Limits Operations

Washington Union Station has 20 active platform tracks. Fourteen platform tracks (Nos. 7-20) are located on an upper level and are stub-ended, meaning trains that enter the station from the north must reverse direction to exit the station. The station's lower level has nine tracks (Nos. 22-30), six of which serve three platforms and funnel southward into the First Street Tunnel (Nos. 23-28), which leads toward Virginia and points south. Track No. 21 has been removed and three lower level tracks that currently do not serve passenger platforms (Nos. 22, 29 and 30) do not extend south of Union Station.

As of fall 2015, 21 to 24 Amtrak passenger trains per day and 34 VRE weekday-only commuter trains (including two nonrevenue turnback trains) serve Union Station. These trains represent one-quarter of Union Station's weekday train activity and are relegated only to the six lower-level platform tracks that lead to Virginia. Because all Amtrak trains and VRE commuter trains to/from Virginia must use the six lower-level platform tracks, a late-running train may potentially have to be held out of the station to wait for a lower-level platform track to open up, or may itself delay another train that was scheduled to occupy its platform track at that time.

3.2.1.3 Extended Station Dwell Times Caused by Locomotive Changes

Since the RF&P Subdivision is not electrified, trains operating south of Union Station are all powered by diesel-electric locomotives. Amtrak trains operating to/from stations to the north of Union Station on the NEC are powered by electric locomotives. Thus, Amtrak passenger trains using the lower-level platforms at Washington Union Station require extended dwell times, as a result of the need to change locomotives. The change of locomotives is also complicated by the track arrangement of the station's lower level. The lower level's six platform tracks narrow to two main line tracks that enter the First Street Tunnel. Locomotive changes for southbound trains require use of the interlocking where the tracks narrow from six to two. This temporarily blocks other trains from entering or exiting the First Street Tunnel.

All Amtrak trains operating to and from Virginia change train crews at Union Station. In addition, all trains which handle checked baggage (which includes all Long Distance trains, plus the Interstate Corridor (Carolinian) and one Northeast Regional (Virginia) train), require additional station dwell time to load and unload checked bags.

In May 2015, Amtrak trains operating to and from Virginia had a scheduled dwell time at Union Station that ranged from a minimum of 24 minutes to a maximum of 55 minutes. Most trains had a scheduled dwell time between 25 and 35 minutes. Although changing engines at Union Station does add extra dwell time to a train's schedule, trains may also be given longer scheduled dwell times for other reasons, such as to allow for recovery time on a Long Distance trip, or to occupy a specific slot on the tightly scheduled NEC or DC2RVA corridor.

3.2.1.4 First Street Tunnel

After departing Washington Union Station, southbound trains proceed through the First Street Tunnel to reach CP Virginia, the junction with CSXT's RF&P Subdivision. The tunnel is 4,108 feet long and contains two tracks in separate bores. The tracks can be operated bi-directionally. Amtrak and VRE shared the cost of a clearance improvement project for the First Street Tunnel that was completed in 1995, allowing VRE to operate bi-level commuter equipment, which hold more passengers per car than older single-level equipment, and allowed Amtrak's bi-level

Superliner cars to operate south of Union Station. The tunnel is signaled to only allow one train through at a time, owing to ventilation issues within the tunnel.

3.2.2 CSXT RF&P Subdivision, North Segment: Washington, D.C.-Alexandria, VA

Owner/Operator: CSXT

Subdivision Route/Mileage: M Street interlocking in Washington, D.C. (CFP 113.8) – AF interlocking in Alexandria (CFP 104.3) (Figure 3-5)

Distance: 9.5 miles

Line Heritage: Pennsylvania Railroad; RF&P Railroad

Number of Main Tracks: Alternating sections of two and three main tracks

Maximum Allowable Speed-Passenger: 70 mph

Maximum Allowable Speed-Intermodal: 60 mph

Maximum Allowable Speed-Freight: 55 mph

Limiting Passenger Speed: 30 mph between milepost CFP 112.1-CFP111.2 due to horizontal geometry and station proximity.

Signals: Cab Signal System (CSS) with Wayside Intermediate Signals and Automatic Train Control

Operational Authority: Centralized Traffic Control (CTC)

Maximum Allowable Gross Weight: 286,000 lbs.

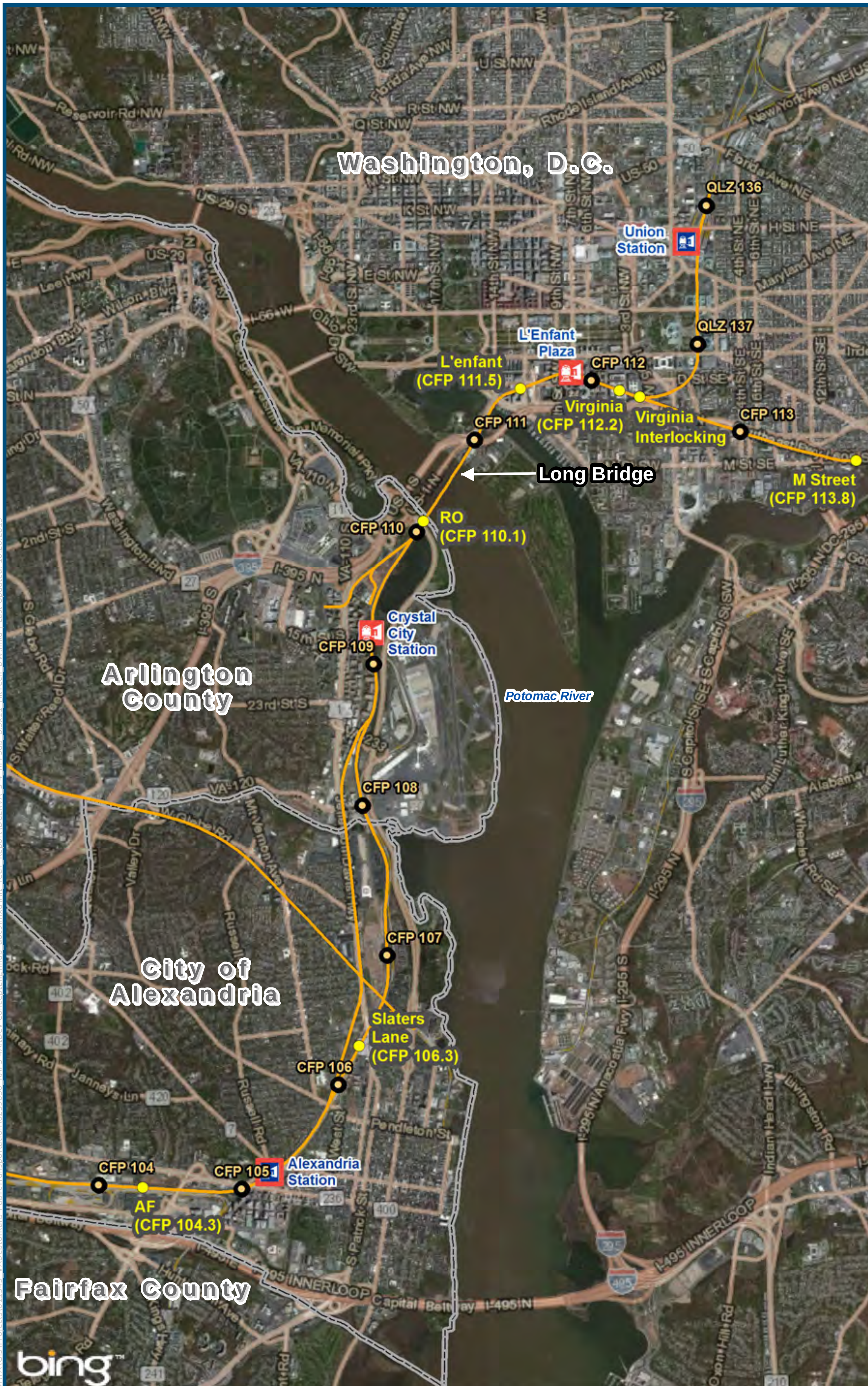
Clearances: Less than 18'2" (Virginia Avenue Tunnel); a project to increase these clearances is in progress

Trains per Day:

- 21-24 Passenger (Amtrak)
- 34 Commuter (VRE, weekdays only)
- 15-25 Freight (CSXT)

Crossover locations:

- Virginia (CFP 112.2): Passenger Tracks 2 and 3 only. Not universal.
- L'Enfant (CFP 111.5): Three tracks become two to cross Long Bridge. Not universal.
- RO (CFP 110.1): Two tracks on Bridge become three. Universal
- Slaters Lane (CFP 106.3): One southbound crossover from Track 3 to 2
- AF-universal (CFP 104.3): Universal, with additional turnouts to govern exit/entry to NS's Washington District



0 0.5 1

Mile

1 inch = 1 mile
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: 2015 Bing Aerial Imagery,
Microsoft Corporation
and its data suppliers

Legend

- Existing Track
- CSXT Mileposts
- CSXT Control Point
- VRE Station
- Amtrak/VRE Station

Figure 3-5
CSXT RF&P Subdivision, North Segment: Washington, D.C. to Alexandria, VA

Notes:

- Mileposts on the RF&P Subdivision are preceded by the CSXT prefix 'CFP', and are measured from the former Broad Street Station in Richmond.

Track numbering on the RF&P Subdivision is as follows:

- Track 1 (east track)
- Track 2 (center track, or east track if no Track 1)
- Track 3 (west track)

3.2.2.1 Overview of Conditions Affecting Operations

The northernmost segment of the DC2RVA corridor, between Washington, D.C. and Alexandria, has the highest volume of passenger and freight trains, yet also contains several infrastructure conditions that constrain the corridor's overall operation, including:

- The Long Bridge over the Potomac River, the only freight rail bridge over the Potomac, carries all freight and passenger trains on the corridor at limited speed. The three-track corridor on either side of the bridge squeezes to two tracks to cross the river. The nearest freight rail bridges across the Potomac River are at Harpers Ferry, WV, 55 rail miles west of Washington Union Station, where CSXT's main line between Washington, D.C. and Chicago, crosses, and Shepherdstown, WV, about 67 rail miles west of Washington, D.C., where the NS freight-only main line from Harrisburg, PA to Atlanta, GA crosses. Neither bridge can provide an effective alternate route for rail traffic that currently uses the Long Bridge.
- The CSXT Virginia Avenue Tunnel is a single-track, slow-speed tunnel that all freight trains must use. The multiple-track rail line approaching the tunnel narrows to a single track through the tunnel. Because there are limited spaces to hold trains north and south of the tunnel, any lengthy wait by freight trains for track space to clear in the tunnel has the potential to produce ripple effects up and down the DC2RVA corridor. In addition, the tunnel does not have adequate clearance for double-stack container trains at this time, although CSXT has recently initiated a construction project at the Virginia Avenue Tunnel that will both install a second track and raise the clearance to allow for double-stack trains.[4]
- The VRE commuter platforms at L'Enfant Station in Washington, D.C. and Crystal City Station in Virginia are located on the west side of the right-of-way only, which limits all VRE commuter trains making stops to the use of just one track (Track 3) between Washington, D.C. and Alexandria. The lack of universal crossovers at the north end of the Long Bridge further restricts operating flexibility in this area.
- Some of the tightest curves on the entire DC2RVA corridor can be found between Washington, D.C. and Alexandria, limiting train speeds to as low as 30 mph in some areas, less than half the maximum allowable on other segments of the line.

[4] For more information on the Virginia Avenue Tunnel project, see http://www.virginiaavenuetunnel.com/index.php

3.2.2.2 Long Bridge

The Long Bridge across the Potomac River is a double-track bridge 2,529 feet long. Three tracks on either side of the bridge reduce to two tracks over the bridge, reducing available track space (Figure 3-6). Trains also slow down to cross the bridge, further reducing available capacity; passenger trains are held to 45 mph and freight trains to 25 mph.

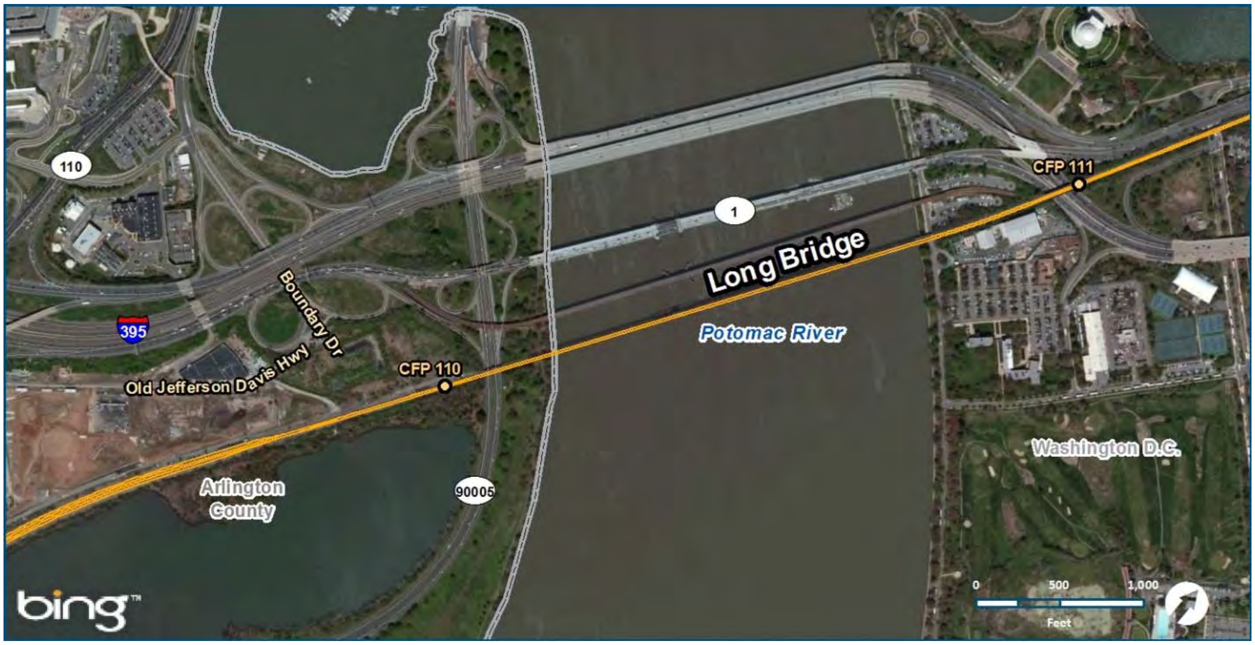


FIGURE 3-6: LONG BRIDGE

Long Bridge was built in 1904 (the third incarnation of a Potomac River rail crossing in Washington, D.C.) and consists of 22 through girder spans and a double swing truss span, totaling 24 spans. The current girder and truss spans were installed in 1942 (only the center swing span and 12 piers remain from the original 1904 structure), and the bridge was last opened for river traffic in 1969. North of the Long Bridge, a second CSXT-owned two-span bridge known as Tidal Basin Bridge continues over Washington Channel at Potomac Park. Neither the Tidal Basin Bridge nor the Long Bridge is wide enough to accommodate additional main tracks.

The DC2RVA corridor's track layout and station platform configurations north and south of the bridge serve to segregate rail traffic across the Long Bridge. VRE commuter trains and three Amtrak weekday Northeast Regional (Virginia) round trips must use the westernmost track, Track 3, in order to make station stops at L'Enfant and Crystal City. That pushes all other Amtrak passenger trains, reverse-direction VRE commuter trains, and all CSXT freight traffic onto just Track 2 during commuter periods.

As a result, CSXT freight trains must sometimes wait on the freight bypass track north of the bridge (Track 1) at CP Virginia until an opportunity opens up to proceed across the Long Bridge. During peak commuter periods, this wait may be extensive. Long CSXT freight trains that do receive clearance to proceed south across the Long Bridge must operate at a low speed coming out of the Virginia Avenue Tunnel's speed restriction, which can delay passenger and commuter trains waiting to use the tracks across the bridge.

The 2015 *Long Bridge Study Final Report* (District Department of Transportation [DDOT], 2015) documented that CSXT freight trains accounted for just over one-fourth of weekday train activity. Freight trains that cross Long Bridge during peak commuting periods typically travel northbound in the opposite direction of peak commuter travel and operate on Track 2. Results of the DDOT 2015 study indicated the demand for additional freight and passenger traffic in the region will exceed the existing capacity of the bridge, and additional tracks or rail crossings of the Potomac River will be required. FRA and DDOT are in the process of initiating an environmental review to evaluate the potential to construct additional capacity over the Long Bridge in 2016.

3.2.2.3 Virginia Avenue Tunnel

As part of the $850 million National Gateway project, CSXT in 2015 began a major construction project that will replace the current Virginia Avenue bore with two new single-track tunnels, each having a sufficient vertical clearance to accommodate double-stacked intermodal container trains to allow for forecasted increases in freight tonnage.

The Virginia Avenue Tunnel is approximately 3,800 feet long and is used by CSXT freight trains on the I-95 Freight Corridor and CSXT National Gateway passing through Washington, D.C. The tunnel was built in two phases between 1872 and 1904. The tunnel is located approximately a half-mile north of the CP Virginia interlocking, where passenger trains diverge from the DC2RVA corridor onto Amtrak track to access Washington Union Station.

The Virginia Avenue Tunnel is freight-only, with a MAS of 15 mph. There is only one track through the tunnel, which currently limits the number of trains per day that the tunnel can accommodate, since only one train at a time can pass through it. The CSXT main line on either end of the tunnel consists of two main tracks, allowing trains moving in opposite directions to pass each other, with higher track speeds. Its clearances do not currently permit operation of trains with double-stacked containers. The project to expand the tunnel's clearance envelope and add a second track will improve freight efficiency and operational fluidity in the corridor by removing a single-track bottleneck and providing a location to stage freight trains headed south to Richmond without impacting passenger and commuter train operations.

3.2.2.4 VRE Commuter Stations at L'Enfant and Crystal City

In the 8-mile stretch between the CP Virginia interlocking (CFP 112.2) in Washington and AF interlocking (CFP 104.3) in Alexandria, VRE commuter trains make three intermediate stops: at L'Enfant Station in Washington, D.C., Crystal City in Arlington, and Alexandria Station in Alexandria. The L'Enfant and Crystal City stations have only one platform, located on the west side of the right-of-way serving Track 3, meaning that VRE commuter trains making all stops are restricted to just one of the three tracks (Track 3) for nearly 6 miles, from the CP Virginia interlocking (CFP 112.2) across the Long Bridge to the Slaters Lane crossover (CFP 106.3) north of the Alexandria Station. The lack of additional platforms at L'Enfant and Crystal City prevents all tracks from being interoperable at the corridor's busiest point.

During each morning and afternoon rush hour, VRE operates several reverse-peak Manassas Line trains between Broad Run Station and Washington Union Station. These trains run in the opposite direction of the prevailing commuter traffic. Although market opportunities exist for accommodating reverse-peak commuter traffic, these trains use Track 2 and do not stop at Crystal City and L'Enfant — two of VRE's busiest stations — in order to keep Track 3 open for VRE peak-direction commuter trains serving those stations. On weekdays, three Amtrak

Northeast Regional (Virginia) round trips also make stops at L'Enfant to board or detrain VRE commuter passengers holding extra-fare "step-up" tickets that permit them to ride Amtrak. These trains are also confined to the use of only Track 3 between Washington, D.C. and Arlington.

North of the L'Enfant Station is a stub-ended spur connected to Track 3. VRE is in the midst of a $4.3 million project that will rebuild the spur as a double-ended storage track for VRE trains, with signals and power switches at each end connecting to Track 3. Since VRE has maximized its midday storage capacity at Amtrak's Ivy City yard north of Washington Union Station, the L'Enfant storage track will allow VRE to operate additional service by providing a second Washington, D.C.-area layover site.

Between the CP Virginia interlocking and the north end of the Long Bridge, the right-of-way is either on an elevated fill or in a cut. Sharp curves and the constrained right-of-way north of Long Bridge hold passenger train speeds to 30-40 mph and freight trains to 25 mph. The three main tracks from CP Virginia reduce to two main tracks at the L'Enfant interlocking (CFP 111.5) before crossing the double-track Long Bridge. The embankment through central Washington, D.C. also reduces to two tracks in the section between L'Enfant interlocking and the Long Bridge. The L'Enfant interlocking is not a universal interlocking; southbound trains cannot cross from Track 3 to Track 2, meaning that any train on Track 3 north of the Long Bridge must stay on Track 3 across the Long Bridge, preventing full use of both tracks across the bridge.

3.2.2.5 Arlington and Crystal City Constraints

The DC2RVA project area begins at RO interlocking (CFP 110.1) in Arlington. RO has a universal crossover just south of the Long Bridge, where a third main track (Track 1) resumes and runs for 12.1 miles from Arlington south through Alexandria to Franconia Station (CFP 98.0).

Track 1 does not provide access to station platforms at Crystal City or Alexandria and has no crossovers linking it to the other tracks between RO and AF interlocking (CFP 104.3) south of Alexandria Station. Track 1 is essentially a freight bypass track allowing freight operations to continue while passenger and commuter trains serve the stations at Crystal City and Alexandria. During peak commuter periods, Track 1 is one of the few sections where northbound freight trains can wait for track space to open up across the Long Bridge or through the Virginia Avenue Tunnel, and southbound freight trains can wait for the VRE commuter period to end, while still allowing for uninterrupted two-way passenger and commuter rail traffic on adjacent Tracks 2 and 3.

The current 3.8 miles of right-of-way from Arlington south through Crystal City to Slaters Lane contains eight curves of 2 degrees or more, including two 5-degree curves and two 3-degree curves. This series of undulating S-curves limits train speeds on this triple-track section to as low as 40 mph for passenger and freight trains north of Crystal City, where the sharpest curves are encountered, to 45 mph south of Crystal City. Farther south, the curves are gentler and train speeds increase to 60 to 65 mph for passenger trains, still below the line's 70 mph MAS.

3.2.2.6 Slaters Lane Interlocking

Slaters Lane interlocking (CFP 106.3) is the junction of a branch line that used to be accessed by NS local freights based in Alexandria. NS local freights can use the DC2RVA corridor for approximately 2.0 miles between AF interlocking and Slaters Lane interlocking to access the branch. The junction to the branch line is located off of main Track 1, and no crossovers exist to allow trains on other tracks to access the branch line. When NS freights accessed the branch they had to use Track 1 exclusively between Slaters Lane and AF interlocking (CFP 104.3) in Alexandria. In 2015, NS had no active local freight customers along the branch line, which prevents the regular appearance of NS trains on the DC2RVA corridor.

Slaters Lane also contains a crossover that allows southbound trains to cross from main Track 3 to main Track 2. This allows passenger trains with station stops at Crystal City and L'Enfant to use either of the two platform tracks at Alexandria Station. Slaters Lane is currently not a universal crossover. Southbound trains on Track 2 cannot cross to Track 3, and there is no connection to Track 1 at this point. As part of the work associated with station improvements at Alexandria Station (see the following section), VRE has submitted a funding request for the construction of an additional crossover at Slaters Lane that will allow passenger and commuter trains to access a new platform at Alexandria Station serving Track 1. The tracks of the Washington Metropolitan Area Transit Authority (WMATA) Yellow and Blue Metrorail lines follow the east side of the CSXT rail line for approximately 3 miles through Alexandria.

3.2.2.7 Alexandria Station

Alexandria Station[5] is a full-service station stop for all Amtrak passenger trains and VRE commuter trains operating in the DC2RVA corridor. The historic station, built in 1905, is located on the west side of the right-of-way with a platform serving Track 3 and a center island platform that serves Track 2 only. Track 1 on the east side does not currently have a station platform and is used as a freight bypass track, although VRE has funding in place to extend the width of the island platform to provide access to Track 1. Alexandria Station is staffed and operated by Amtrak. VRE and Amtrak share maintenance responsibilities for the facility.

The station platforms at Alexandra Station are of different lengths, which affects the station dwell times of Amtrak passenger trains. The island platform serving Track 2 is approximately 460 feet long, which is half the length of the platform serving Track 3. This short platform creates delays any time a Northeast Regional (Virginia), Interstate Corridor (Carolinian), or Long Distance train stops at Alexandria Station on Track 2, because the train will typically be longer than the platform. Therefore, the trains make a time-consuming "double stop" to allow all cars to have access to the platform and enable all ticketed passengers to board or detrain. Amtrak train crews will not let passengers detrain without a platform, and having passengers walk through the train from one car to another with luggage would consume an inordinate amount of time and cause an inconvenience to travelers. When repositioning the train between "double stops" the train must move slowly on account of the large numbers of people and luggage occupying the platform that have either just disembarked or are waiting to get on the train. A "double stop" can take 6 minutes or more, which reduces track and station capacity.

In addition, passenger access to the island platform serving Track 2 is made using an at-grade pedestrian crosswalk. The crosswalk is protected by a chain. Immediately prior to a train's arrival on Track 2, an Amtrak employee must unlock the chain and escort passengers with

[5] Alexandria Union Station is typically referred to as Alexandria Station to avoid confusion with Washington Union Station. Naming a station "Union" station was a common theme during the development of railroads, particularly when stations joined two different rail lines. Alexandria Union Station was opened in 1905, and served passenger trains of the Chesapeake and Ohio, Washington Southern Railway, and RF&P Railroad.

luggage from the station building across both main Tracks 3 and 2 to reach the Track 2 platform. An underpass also exists that connects Alexandria Station's two platforms; however, access is provided only by stairs. The underpass is not accessible to persons with disabilities. When Long Distance trains are assigned to arrive on Track 2, an Amtrak employee must drive a baggage cart over the pedestrian grade crossing to serve the train. Once the train departs, the Amtrak employee will escort disembarked passengers across both main tracks to the station building, then make space for the baggage cart to get across the tracks, and finally relatch the chain.

VRE has funded a project to construct an Americans with Disabilities Act (ADA)-compliant pedestrian tunnel that will connect the island platform serving Track 2 with the main station building serving Track 3 and also with the mezzanine of the King Street Metro Station next door. This $7.4 million project will eliminate regular use of the at-grade pedestrian crossing by rail passengers. The Amtrak baggage cart will continue to use the pedestrian crossing, since the new stairways and elevators will not be wide enough to accommodate a motorized vehicle. As part of the project, VRE is extending the width of the island platform so that it will be able to serve Track 1, which is currently only used as a freight bypass track. Providing station access at Alexandria Station for all three tracks of the DC2RVA corridor, which sees more than 50 passenger and commuter trains per day, will improve station capacity and operational flexibility on the line in its most heavily used segment.

A pair of 2-degree curves, one immediately north and one immediately south of the Alexandria Station, restrict passenger and freight trains to 40 mph. Beyond the south curve, Tracks 2 and 3 are posted for operation at MAS, but trains on Track 1 are held to a slower authorized speed of 45 mph as far as AF interlocking, a distance of 0.8 miles.

3.2.2.8 AF interlocking

AF interlocking (CFP 104.3) is located 0.8 miles south of Alexandria Station. AF is the junction where NS's Washington District main line branches off the DC2RVA corridor toward Manassas and Lynchburg. AF is a grade-separated "flying junction" where NS tracks diverge on either side of the CSXT main line, then drop down a ramp, allowing the NS track on the east side of the CSXT right-of-way to swing under the CSXT main line and join the NS track on the west side of the main line. A $12.5 million project completed in October 2001, with funding from the Commonwealth and VRE, reconfigured AF interlocking, widened it from two tracks to four, and installed higher-speed turnouts that boosted diverging passenger train movements from 10 mph to 45 mph. Amtrak passenger trains and VRE Manassas Line commuter trains entering and exiting the DC2RVA corridor at AF interlocking use the "Horn Track," which is accessed from Track 3 on the west side of the corridor.

Two CSXT bridges carry the RF&P Subdivision over NS's tracks, one bridge supporting two main tracks and the second bridge supporting just Track 1. Both tracks are curved as they cross over the NS line. The CSXT tracks continue on an embankment that crosses a body of water called Holmes Run.

South of AF interlocking, weekday passenger traffic on the DC2RVA corridor drops by approximately 40 percent, from 56-58 trains per day to 34 trains. There is no change in the freight traffic levels at AF interlocking since there is currently no NS freight service here.

3.2.3 CSXT RF&P Subdivision, Middle Segment: Alexandria, VA-Crossroads, VA

Owner/Operator: CSXT

Subdivision Route/Mileage: AF interlocking in Alexandria (CFP 104.3)-Crossroads, VA (CFP 53.2) (Figure 3-7)

Distance: 51.1 miles

Line Heritage: RF&P

Number of Main Tracks: Alternating sections of two and three main tracks

Maximum Allowable Speed-Passenger: 70 mph

Maximum Allowable Speed-Intermodal: 60 mph

Maximum Allowable Speed-Freight: 55 mph

Limiting Passenger Speed: 40 mph between milepost CFP 105.2-CFP 104.8 due to horizontal geometry and station proximity.

Signals: Cab Signal System (CSS) with Wayside Intermediate Signals and Automatic Train Control

Operational Authority: Centralized Traffic Control (CTC)

Maximum Allowable Gross Weight: 286,000 lbs.

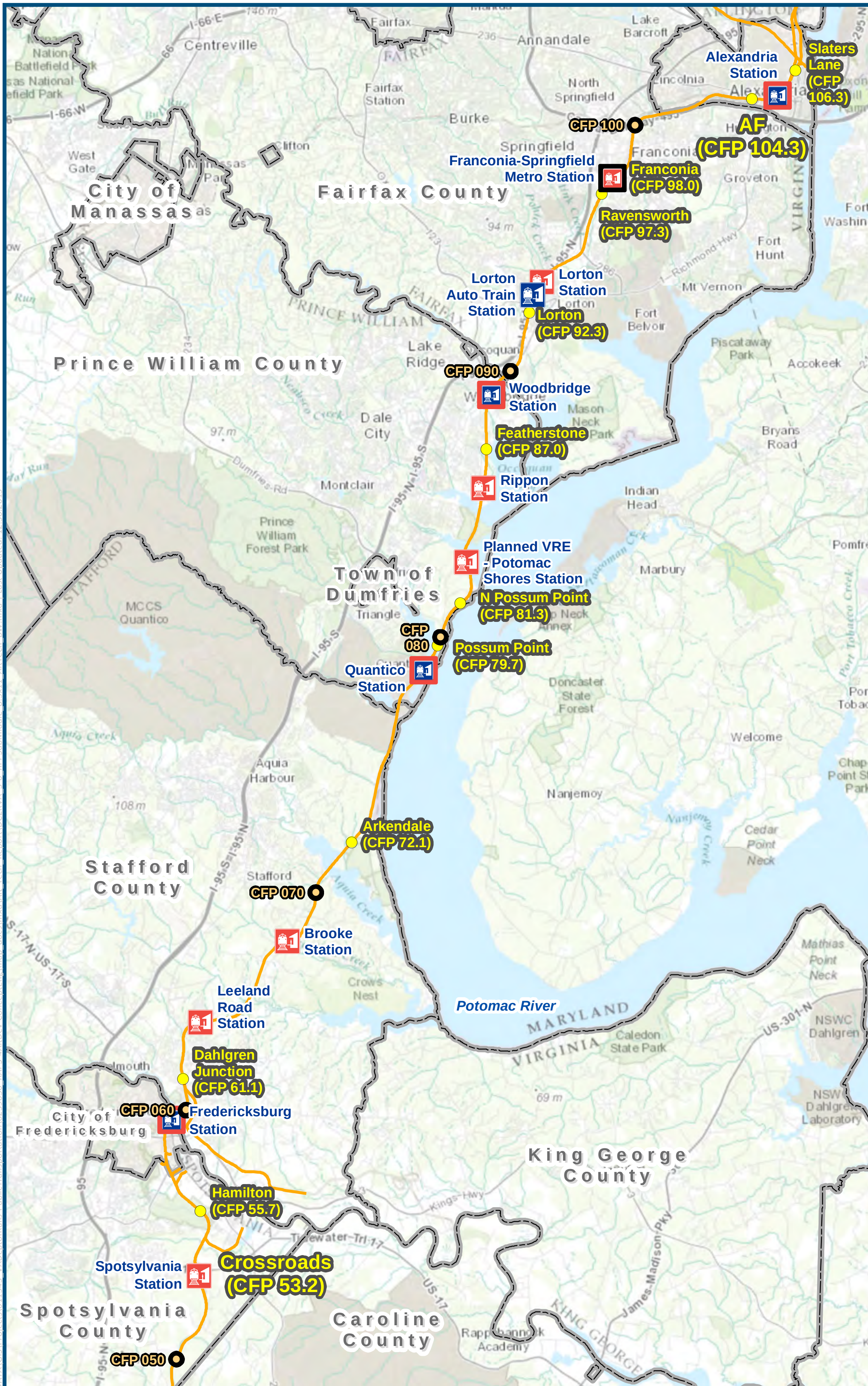
Clearances: 18’2” (double-stack), 18’6” (auto rack)

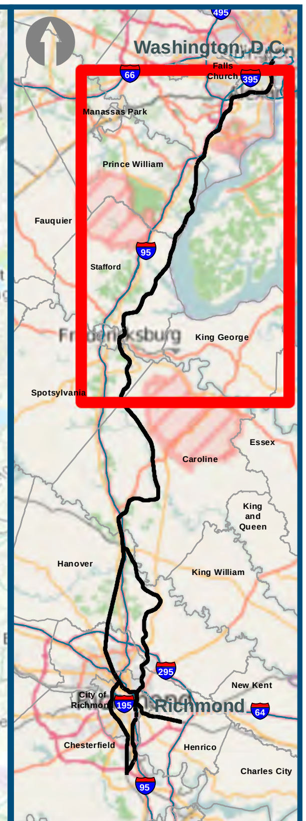
Trains per Day:

- 19-20 Passenger (Amtrak)
- 16 Commuter (VRE, weekdays only)
- 15-25 Freight (CSXT)

Crossover locations:

- AF (CFP 112.2): 4-Track Universal
- Ravensworth (CFP 97.3): 2-Track Universal
- Featherstone (CFP 87.0): 2-Track Universal
- North Possum Point (CFP 81.3): Track 3 to 2 southbound
- South Possum Point (CFP 79.7): Track 2 to 3 southbound
- Arkendale (CFP 72.1): 2-Track Universal
- Dahlgren Junction (CFP 61.1): 2-Track Universal
- FB (CFP 58.9):
- Track 2 to 1 southbound. North end of Track 1, a third main track that diverges from Track 2 at FB and extends 5.7 miles to Crossroads.
- Track 3 to 4 southbound. North end of 1-mile siding and yard on west side of right-of-way.





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Miles

1 inch = 5 miles
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap: 2015 ESRI Topograhic Map. DeLorme, Intermap, USGS, and other data suppliers.

Legend

- Existing Track
- CSXT Mileposts
- CSXT Control Point
- Amtrak Station
- VRE Station
- Amtrak/VRE Station
- VRE/WMATA Station
- County/City Boundaries

Figure 3-7
CSXT RF&P Subdivision, Middle Segment: Alexandria, VA to Crossroads, VA

- Hamilton (CFP 55.7): Track 1 to 2 and 2 to 3 southbound
- Crossroads (CFP 53.2): Track 1 terminates south of the turnout for VRE Spotsylvania station. Additional crossovers south of the VRE turnout allow for parallel moves in one direction.

3.2.3.1 Franconia Hill and Franconia-Springfield Station

South of AF interlocking, southbound trains on CSXT's RF&P Subdivision climb Franconia Hill on a 0.8 percent grade. The southbound grade begins at AF interlocking and extends approximately 5 miles. It is the longest and steepest grade on the RF&P Subdivision (although steeper grades exist on other CSXT subdivisions in downtown Richmond.) Northbound trains here have a gentler climb for 6 miles on grades ranging between 0.2 percent and 0.6 percent.

The DC2RVA corridor has three main tracks in the 6.3 miles between AF interlocking (CFP 104.3) and Franconia interlocking (CFP 98.0), located at the north platform end of the Franconia-Springfield VRE Station. Track 1, added in 2009, allowed slower freights to negotiate Franconia Hill without creating conflicts with passenger operations on Tracks 2 and 3. Track 1 also provides one of the few holding points in the area where southbound CSXT freights can wait for VRE commuter rush hours to end, and northbound freights can wait for track space to become available across the Long Bridge or through the Virginia Avenue tunnel while still allowing for uninterrupted two-way passenger traffic on adjacent Tracks 2 and 3.

A pair of 2 degree curves between Alexandria and Franconia stations (at approximately MP CFP 103 and MP CFP 100) requires passenger trains on Track 3 to slow to 65 mph. VRE commuter trains on all main tracks must slow to 60 mph at CFP 102.8 for the northern of the two curves.

South of AF interlocking, the Metrorail Blue Line follows the east side of the DC2RVA corridor and then crosses over the line at approximately MP CFP 101.7. The Metrorail line then follows the DC2RVA corridor's west side south for more than 2 miles to a staging yard at the end of track just south of the joint WMATA-VRE Franconia-Springfield Station.

VRE opened the Franconia-Springfield Station (CFP 97.9) in 1995 and added a second platform in 1997, with the arrival of connecting Metrorail service at the facility. The platform on the east side serving Track 2 is approximately 400 feet long, whereas the platform serving Track 3, with direct access to the Metrorail station, is only approximately 135 feet long, and thus has limited utility. Franconia-Springfield served as a stop for a handful of Amtrak passenger trains until 2010. In 2015, VRE's board approved programmed funding to lengthen both platforms at Franconia-Springfield to 650 feet in order to serve eight-car VRE trains.

3.2.3.2 Lorton

There are two separate stations in Lorton, one serving VRE commuters and the other serving Amtrak's Long Distance Auto Train. The configuration of these stations, combined with limited space for an additional track beneath a highway overpass north of the Lorton VRE Station and the abutting I-95 right-of-way immediately west of the main line, poses constraints on the Project.

The VRE commuter rail station at CFP 93.3 has one 400-foot platform on the east side of the right-of-way serving Track 2. Lorton is the first of four VRE stations south of Franconia-Springfield with platforms only on the east side of the main line. The other three are Rippon at

CFP 85.7, Brooke at CFP 68.0, and Leeland Road at CFP 63.4. During peak commuter travel periods, this essentially turns the DC2RVA corridor into a single-track commuter railroad alongside a single-track shared freight and passenger line for 36 miles between Ravensworth (south of Franconia Station) and Dahlgren (north of Fredericksburg). In 2015, VRE's board approved programmed funding to add a second platform at Lorton and lengthen the existing platform by 250 feet to serve eight-car trains, which will help add operating flexibility to the DC2RVA corridor in the VRE commuter territory. Immediately south of the Lorton VRE Station, there is a 2-degree curve through which VRE trains are limited to an authorized speed of 65 mph; Amtrak passenger trains continue to operate at the MAS of 70 mph through the curve.

Less than a mile south of VRE's Lorton Station is the Amtrak Auto Train station and yard at Lorton. This facility is dedicated solely to Amtrak's Auto Train and is adjacent to, but separate from, the CSXT main line. The Auto Train is the only passenger train in the United States that carries both people and their personal vehicles. Amtrak crews board passengers at a station facility built in 2000 and load vehicles onto auto carriers at a yard north of the station building. The train is assembled on a lead track adjacent to the CSXT main line on the west side. (The Auto Train has an authorized length of up to 50 cars, stretching more than 4,550 feet.) Funding from the Virginia Department of Transportation helped extend the lead track approximately three-fourths of a mile in 1999, allowing Amtrak to perform all Auto Train switching, assembly, and air-brake testing off the CSXT main line. The lead track feeds into CSXT Track 3 at the Lorton interlocking (CFP 92.3). The northbound Auto Train is scheduled to arrive in Lorton at 8:59 a.m., but given the recovery time built into the schedule, an "on-time" train may often appear up to an hour earlier or more, putting the Auto Train right in the middle of the northbound VRE commuter train schedule. Because the Auto Train does not make any intermediate stops, it must either file in line with the northbound VRE trains on Track 2 and operate slowly north to Lorton, or use adjacent Track 3 and operate at track speed, overtaking VRE trains but blocking the CSXT main line to any opposing southbound passenger or freight traffic. Amtrak does have a morning southbound, train 67, scheduled to operate through the area at that time, which creates the potential for one or more passenger trains to be delayed south of Lorton. A similar situation may occur in the evening. The Auto Train's scheduled southbound departure from Lorton is 4:00 p.m., which is just ahead of the VRE commuter rush but close to the time that southbound Amtrak trains 91 (Silver Star) and 125 (Northeast Regional [Virginia]) and northbound train 80 (Carolinian) are scheduled to pass through the area. Any delay to the Auto Train's departure may impact other scheduled passenger operations.

3.2.3.3 Woodbridge and Rippon

Approaching the Woodbridge Amtrak/VRE Station, the DC2RVA corridor crosses the Occoquan River (approximately CFP 89.7) on a double-track truss bridge 908 feet long that was built in 1914. South of the river bridge is the joint Amtrak/VRE Woodbridge passenger rail station (CFP 88.9). The station was built in 1992, with an approximately 400-foot platform on the east side of the right-of-way. In 2010, VRE completed a $6.7 million project to construct a 600-foot station platform on the west side, adding operational flexibility for the Northeast Regional (Virginia) passenger trains that stop there. VRE local commuter trains can only use the 400-foot east platform that serves Track 2, however, since the Lorton Station 3 miles north only has an east side platform, and there is no crossover between the two stations that would allow trains to switch tracks.

Three miles south of Woodbridge is VRE's Rippon Station (CFP 85.7). It is the second of four VRE stations with a single 400-foot platform on the east side of the right-of-way. In 2015, VRE's board approved programmed funding to add a second platform at Rippon and lengthen the existing platform by 250 feet to serve eight-car trains, which will help add operating flexibility to the DC2RVA corridor in the VRE commuter territory.

3.2.3.4 Powells Creek and Potomac Shores

Near Leesylvania State Park, the DC2RVA corridor crosses two substantial bodies of water about 1 mile apart. The line crosses Neabsco Creek (approximately CFP 84.8) on a double-track metal pier bridge 651 feet long that was built in the 1940s. The corridor then passes through the state park and crosses Powells Creek (approximately CFP 83.7) on a 1,053-foot-long, double-track concrete pier bridge also built in the 1940s.

South of the Powells Creek Bridge, work has begun on an 11-mile stretch of third main track extending from the new Powells Creek interlocking at milepost CFP 83.4 to the Arkendale interlocking at milepost CFP 72.1. Funding for the third track came from a $75 million Federal Railroad Administration (FRA) grant under the American Recovery and Reinvestment Act of 2009. The new third main will provide additional operating flexibility in this segment of the corridor by providing capacity for meet or overtake of freight, intercity passenger, or commuter trains midway between Alexandria and Fredericksburg.

Design work has begun on the new Potomac Shores VRE commuter station just south of the Powells Creek interlocking at approximately milepost CFP 83.0. The station is the focal point of a 1,920-acre transit-oriented community with nearly 4,000 residential properties. The development is being built atop a river bluff, while the station and CSXT main line occupy a narrow strip of land between the foot of the bluff and the Potomac River. The station is expected to open in 2017.

South of the Potomac Shores Station, the DC2RVA corridor runs close to the Potomac River's west bank for approximately 2 miles. A series of 2-degree curves between Potomac Shores and Possum Point limit the authorized speed of VRE commuter trains to 65 mph; Amtrak passenger trains continue to operate at the MAS of 70 mph through the curves.

3.2.3.5 Possum Point

Possum Point has a controlled siding with a clear length of 8,010 feet (Figure 3-8). The adjacent Dominion Resources power plant once received unit coal trains, which were staged on a two-track railroad yard next to the controlled siding. The power plant's coal-burning generating units were converted to burn natural gas in 2003, ending unit coal train service. The Possum Point siding is used today by coal trains serving the Birchwood Power plant near Sealston, VA, located on the CSXT Dahlgren Branch north of Fredericksburg. These coal trains enter the DC2RVA corridor at Richmond from the CSXT James River Subdivision, and then turn north past Main Street Station and onto the RF&P. However, the Dahlgren Branch turnout can only be accessed from the north. Therefore, any coal train from Richmond destined for Sealston must continue operating north past Dahlgren Junction for 20 miles to reach the Possum Point siding. Once the train is in the siding, the locomotives run around the coal train, then back onto the south end of the consist. After the train is back together again, it proceeds south from Possum Point 20 miles to Dahlgren Junction, where it diverges eastward onto the Dahlgren Branch.

0 300 600
Feet

1 inch = 600 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap: BING Aerial Imagery, Microsoft Corporation and its data suppliers

Legend

- Possum Point Siding
- Existing Track
- Mileposts
- County/City Boundaries

Figure 3-8
Possum Point Siding

Empty coal cars are taken from Dahlgren Junction back north to the Possum Point siding before repositioning the locomotives to return south, exiting the corridor at Doswell onto the BBRR line heading west.

3.2.3.6 Quantico

Approaching the Marine Corps Base at Quantico, the CSXT main line crosses the wide expanse of Quantico Creek (approximately CFP 79.3). Track 2 crosses the waterway on a single-track bridge 1,950 feet long built in 1988. A newer 1,768-foot bridge was completed in 2007 to carry Track 3 across the creek, parallel to the existing bridge. The new bridge was built wide enough to accommodate an eventual second track, laying the foundation for a triple-track main line across Quantico Creek. Both bridges are curved at their north ends, and passenger and freight trains alike are held to 55 mph through these curves and across the Quantico Creek bridges, through the town of Quantico, and beyond to the south end of a 1-degree curve south of the station, for a total speed-restricted distance of 1.2 miles.

The town of Quantico has a joint Amtrak/VRE station (CFP 78.9) built in the 1950s and remodeled in 2005. The station is adjacent to Track 2 on the east side of the right-of-way and has a platform approximately 460 feet long. A second platform approximately 440 feet in length and a concrete shelter serves Track 3 on the west side. Both the platform and shelter are in a state of disrepair. As part of the third track project under construction between Powells Creek and Arkendale, the platform and shelter serving Track 3 will be demolished and replaced with a new island platform between Tracks 2 and 3. Pedestrian overpasses serving the new platforms, station facility, and a parking area on the west side of the right-of-way will eliminate the need for passengers to unsafely cross the tracks to access the second platform. South of the town of Quantico, the tracks come close to the west bank of the Potomac River for approximately 2 miles near Wide Water (CFP 74.4).

3.2.3.7 Arkendale

A universal crossover at Arkendale (CFP 72.1) was installed in 2005. Arkendale is at the south end of the 11-mile segment of third main track from Powells Creek that is currently under construction. As part of this project, the Arkendale interlocking will receive additional crossovers that will allow trains on all tracks to access the new third track, while also permitting parallel crossing moves between tracks, adding operating flexibility.

South of Arkendale, the DC2RVA corridor crosses Aquia Creek (approximately CFP 70.9) on a 1,321-foot-long, double-track deck bridge resting on concrete piers that was built in 1946 (the fourth railroad bridge to cross the creek at that location).

3.2.3.8 Brooke and Leeland Road VRE Stations

At Brooke Road, a 2-degree curve (approximately CFP 68.5) limits passenger train speeds to 60 mph and all freight trains to 55 mph. (The curve marks the point where the RF&P built a branch to the town of Quantico off its original main line out of Richmond, which ended at a steamship transfer pier on Aquia Creek. The "branch" ultimately became the main line, and the trackage to the pier was abandoned.) At the south end of the curve is VRE's Brooke commuter rail station (CFP 68.0). This station has just one platform on the east side of the right-of-way, serving Track 2. South of Brooke, at Ross, a 2-degree curve (approximately CFP 67.0) limits VRE commuter trains to an authorized speed of 65 mph; Amtrak passenger trains continue to operate at the MAS of 70 mph through the curve.

VRE's Leeland Road Station (CFP 63.4), located 4.6 miles south of Brooke, also has just one platform, approximately 400 feet long, on the east side of the right-of-way. Because platforms at Brooke and Leeland Road exist only on the east side of the right-of-way, VRE commuter trains making stops at these stations are restricted to the use of just Track 2 between the Arkendale and Dahlgren interlockings, a distance of 11 miles. In 2015, the VRE board programmed funds to add a second platform at Brooke and Leeland Road stations and lengthen the existing platforms by 250 feet to serve eight-car trainsets.

3.2.3.9 Dahlgren Junction

Just north of Dahlgren Junction, a 2-degree curve (approximately CFP 61.5) limits all passenger trains on Track 2 to 65 mph.

Dahlgren Junction (CFP 61.1) marks the beginning of the 9.9-mile Dahlgren Branch to Sealston. This branch is served by a bulk freight train that makes a nightly round trip between Jessup, MD, and a landfill at Sealston. The branch is also served by a CSXT local freight based in Fredericksburg, VA, as well as irregular coal trains destined for the Birchwood power plant.

The branch line switch at Dahlgren Junction is aligned to the north (Figure 3-9). This requires trains from the south to operate north past the junction, then reverse direction to head south onto the branch line. Coal trains from Richmond actually proceed 20 miles north to the Possum Point siding before reversing, as described in Section 3.2.3.5. A similar situation occurs for any train exiting the Dahlgren Branch that wants to proceed south on the CSXT RF&P Subdivision; it must pull north onto the CSXT main line, then stop and reverse direction. Reversing a train's direction, and running locomotives from one end of a train to the other, adds time to operations and introduces the potential for delaying other passenger and freight trains on the corridor.

3.2.3.10 Fredericksburg

Fredericksburg has several operating constraints in close proximity (Figure 3-10). North of the city, a 2-degree curve at the north end of the Rappahannock River Bridge limits all trains to 55 mph. The DC2RVA corridor crosses the Rappahannock River (approximately CFP 59.5) on a double-track concrete arch bridge 650 feet long that was built in 1927, with no room available for additional tracks. South of the river, the corridor passes through the historic city center on an embankment that was completed in 1927 to complete RF&P's double-track main line and elevate the rail corridor above city streets through the historic downtown area. Historic structures are located on both sides of the double-track embankment in this area.

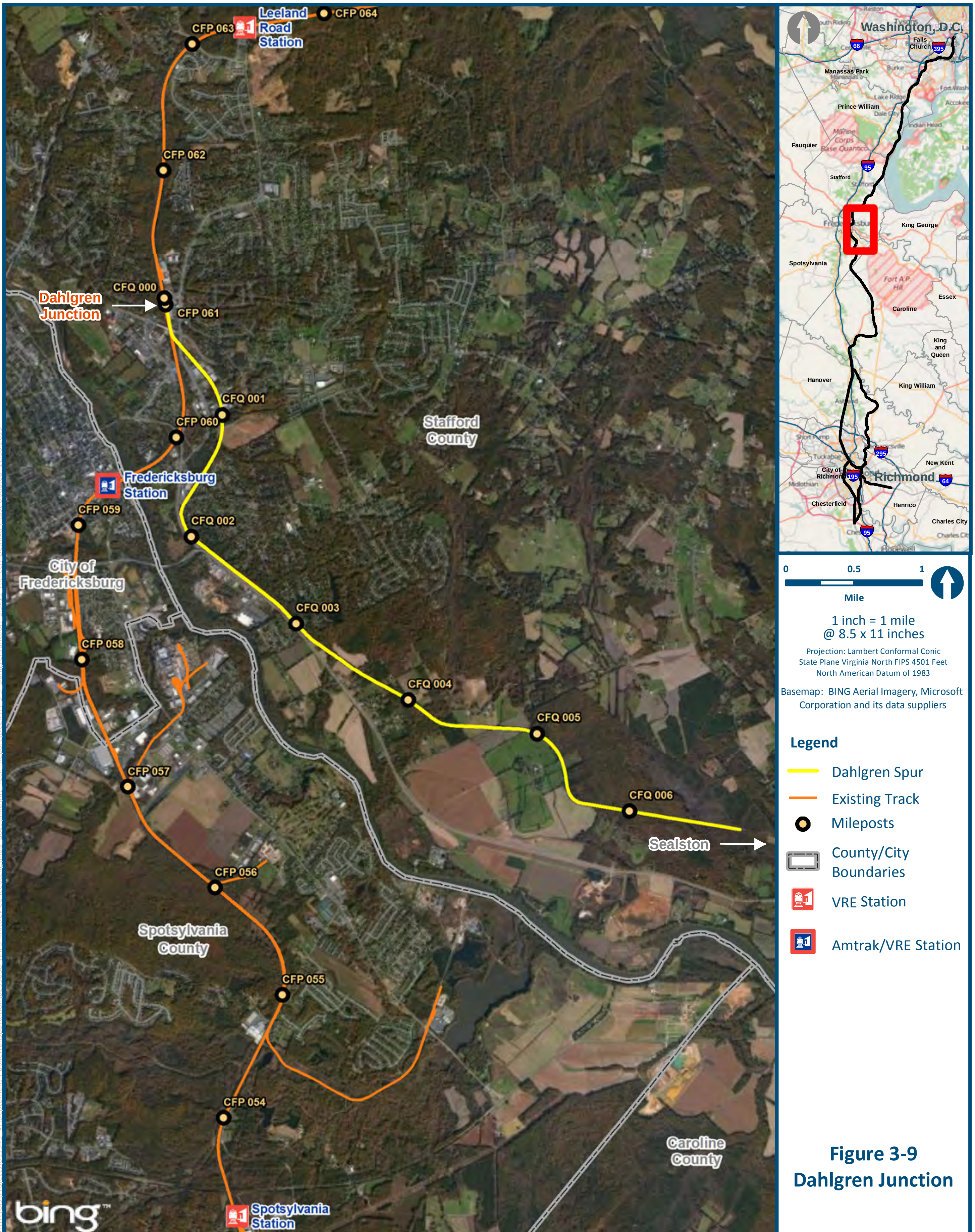


Figure 3-9
Dahlgren Junction

FIGURE 3-10: FREDERICKSBURG

The Fredericksburg Station (CFP 59.3) is also located in this elevated section. The historic station, built in 1910 and expanded in 1927 during the track elevation project, is served by all Northeast Regional (Virginia) trains, Amtrak's Interstate Corridor (Carolinian) and long-distance Silver Meteor, and all VRE Fredericksburg Line commuter trains. The station has two platforms exceeding 500 feet in length that allows both main tracks to be served; however, the platform on Track 3 is in disrepair, and VRE trains primarily service the platform on Track 2. All trains are limited to 40 mph passing through the Fredericksburg Station and around a tight 3-degree curve just south of the station.

Operating flexibility south of Fredericksburg has improved with the completion of 5.7 miles of third main track between Fredericksburg and Crossroads. A new crossover at the Fredericksburg interlocking permits VRE commuter trains to use either platform of the Fredericksburg Station, and access the new Spotsylvania commuter station at Crossroads.

South of downtown Fredericksburg, the main line widens to three tracks at Fredericksburg interlocking (CFP 58.9).Track 1 between FB and Hamilton was converted from a 10-mph siding to a main track with higher-speed turnouts at each end in 2009. The construction of third main track between (Track 1) Hamilton to Crossroads (CFP 53.2) was completed and opened for revenue service on May 17, 2016.

The three-track main line goes through the middle of the local rail yard. The yard tracks are used for freight car switching, local freight train car and locomotive staging, and providing access to freight shippers located west of the main line so local trains do not have to venture onto the main line to reach shippers. Track 1 on the east side is a main line track that is also used as a staging track for freight trains setting out or picking up cars, and additionally provides access to a wye and the CSXT yard office. South of the yard area, Track 1 also provides access to industrial leads serving many of the city's freight rail customers, including an ethanol transload facility. The west yard track closest to the westernmost RF&P main track (Track 3) is also the longest of the three yard tracks, and stretches approximately 1.3 miles. It is the access track between the main line and the freight yard, and has connections at each end to main line Track 3. This yard track is used for holding cars that are set out or picked up by main line freight trains occupying the adjacent main track (Track 3), and can also be used by main line freight trains making setouts or pickups on other yard tracks. Is it also used as a lead track to access a freight customer south of the yard area without occupying the main line, and as a drill track where a local crew can assemble a complete local freight train without occupying the main line.

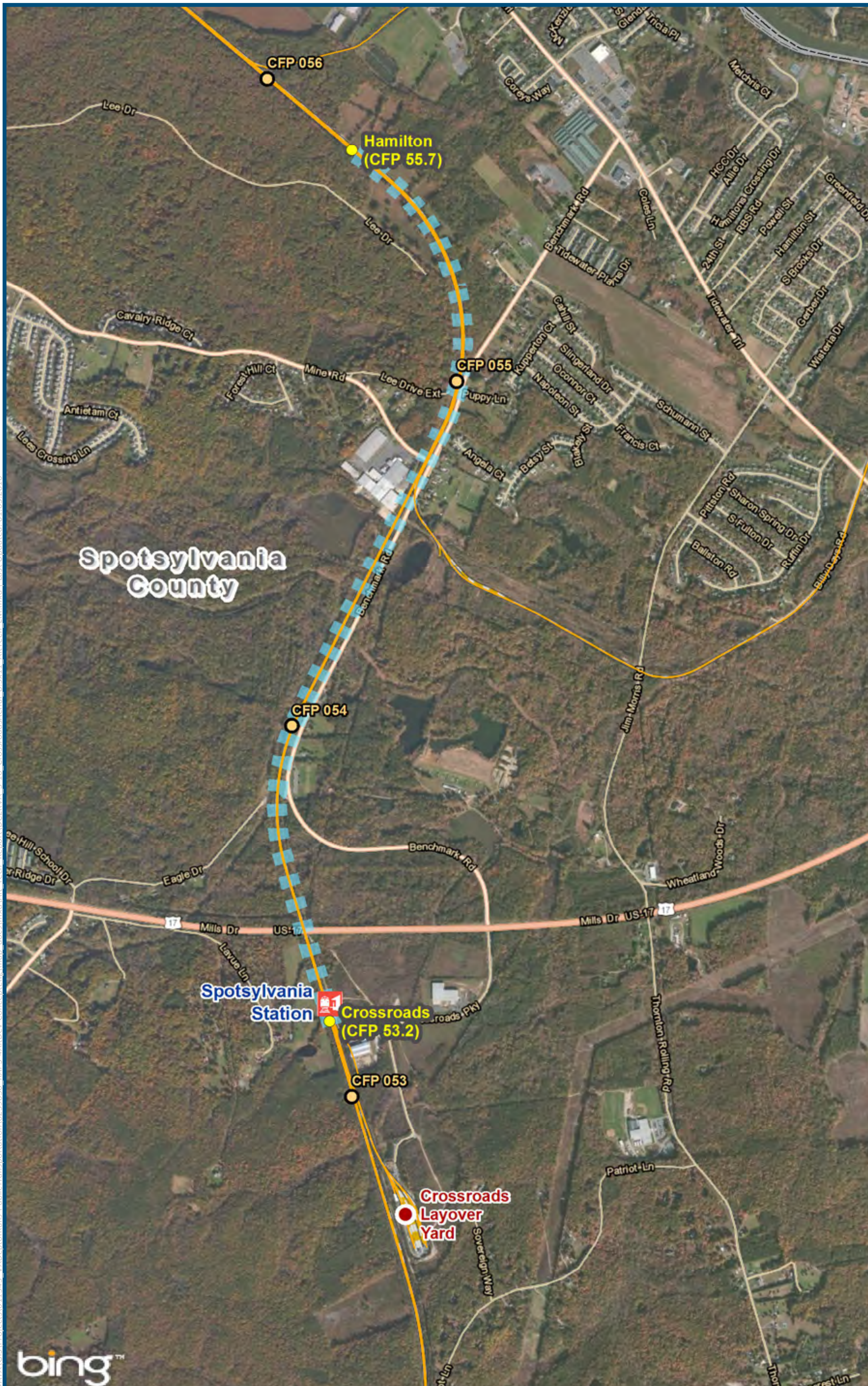
The yard configuration at Fredericksburg requires local train crews to walk across the main line from the yard office on the east side of the tracks to reach the local engines on the west side of the tracks, and requires local freights to cross all main line tracks in order to serve local rail customers on the east side of the right-of-way Servicing individual freight customers and switching cars occurs with minimal interference to main line passenger or freight operations, since all of the freight customers in Fredericksburg are accessed from leads that extend off one of the tracks in Fredericksburg Yard or off of Main Track 1.

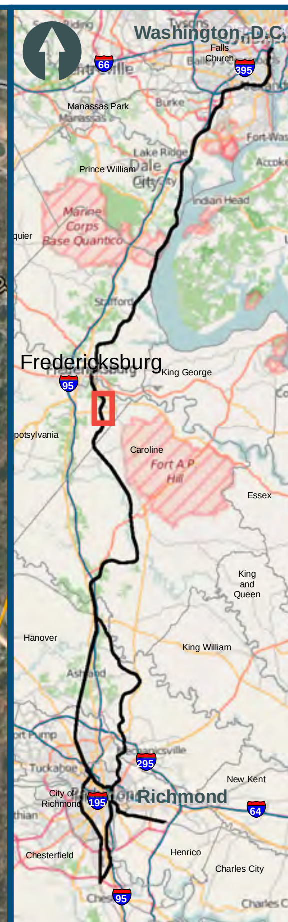
South of downtown Fredericksburg and CSXT's local freight yard, the DC2RVA corridor passes through the Fredericksburg and Spotsylvania National Military Park. The Hamilton interlocking (CFP 55.7) is located adjacent to a stone pyramid built by the RF&P Railroad to commemorate the 1862 Battle of Fredericksburg and memorialize the site's significance for riders aboard passenger trains. Between the Fredericksburg freight yard and Hamilton, VRE trains are held to an authorized speed limit of 65 mph on two 0.3-mile sections of 2-degree curved track; Amtrak passenger trains continue to operate at the MAS of 70 mph through the curves.

3.2.3.11 Crossroads

Track 1 from Hamilton (CFP 55.7) south an additional 2.5 miles to Crossroads (CFP 53.2), which is the site of VRE's Fredericksburg Line layover and maintenance facility (Figure 3-11) opened for revenue service May 17, 2016.

At Crossroads (CFP 53.2), a lead track to VRE's Spotsylvania station and Crossroads storage and maintenance facility diverges from the RF&P Subdivision. The Crossroads interlocking also marks the southern limit of the 5.7-mile section of three main tracks that began at FB interlocking in Fredericksburg. VRE's Spotsylvania station opened in November 2015. The station has one platform on the east side, served only by the lead track to the VRE Crossroads maintenance facility. This allows VRE commuter trains to load or unload passengers without





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Feet

1 inch = 2,000 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Control Point
- CSXT Mileposts
- Yards
- Existing Track
- 3rd Track Construction Underway
- VRE Station
- County/City Boundaries

Figure 3-11
Hamilton to Crossroads

interfering with operations on any existing or planned main line tracks, reducing the potential for delays to other traffic. The Crossroads interlocking was rebuilt to permit moves between the two main tracks continuing south (Tracks 2 and 3) while VRE commuter trains are entering and exiting the corridor from Track 1, adding operating flexibility.

3.2.4 CSXT RF&P Subdivision, South Segment: Crossroads, VA-Greendale, VA

Owner/Operator: CSXT

Subdivision Route/Mileage: Crossroads (CFP 53.2)-Greendale (CFP 4.8) (Figure 3-12)

Distance: 48.4 miles

Line Heritage: RF&P Railroad

Number of Main Tracks: Two main tracks

Maximum Allowable Speed-Passenger: 70 mph

Maximum Allowable Speed-Intermodal: 60 mph

Maximum Allowable Speed-Freight: 55 mph

Limiting Passenger Speed: 35 mph between milepost CFP 14.8-CFP 13.4 due to horizontal geometry and station proximity.

Signals: Cab Signal System (CSS) with Wayside Intermediate Signals and Automatic Train Control

Operational Authority: Centralized Traffic Control (CTC)

Maximum Allowable Gross Weight: 286,000 lbs.

Clearances: 18′2″ (double-stack), 18′6″ (auto rack)

Trains per Day:

- 19-20 Passenger (Amtrak)
- 15-25 Freight (CSXT)

Crossover locations:

- Crossroads (CFP 53.2): Universal
- Milford (CFP 37.6): Track 3 to 2 southbound
- South Milford (CFP 35.8): Track 2 to 3 southbound
- North Doswell (CFP 23.1): Track 2 to 3 southbound
- Doswell (CFP 21.7): Track 3 to 2 southbound
- Elmont (CFP 11.4): Universal
- Greendale (CFP 4.8): Universal (controlled by adjacent operating division and dispatcher)

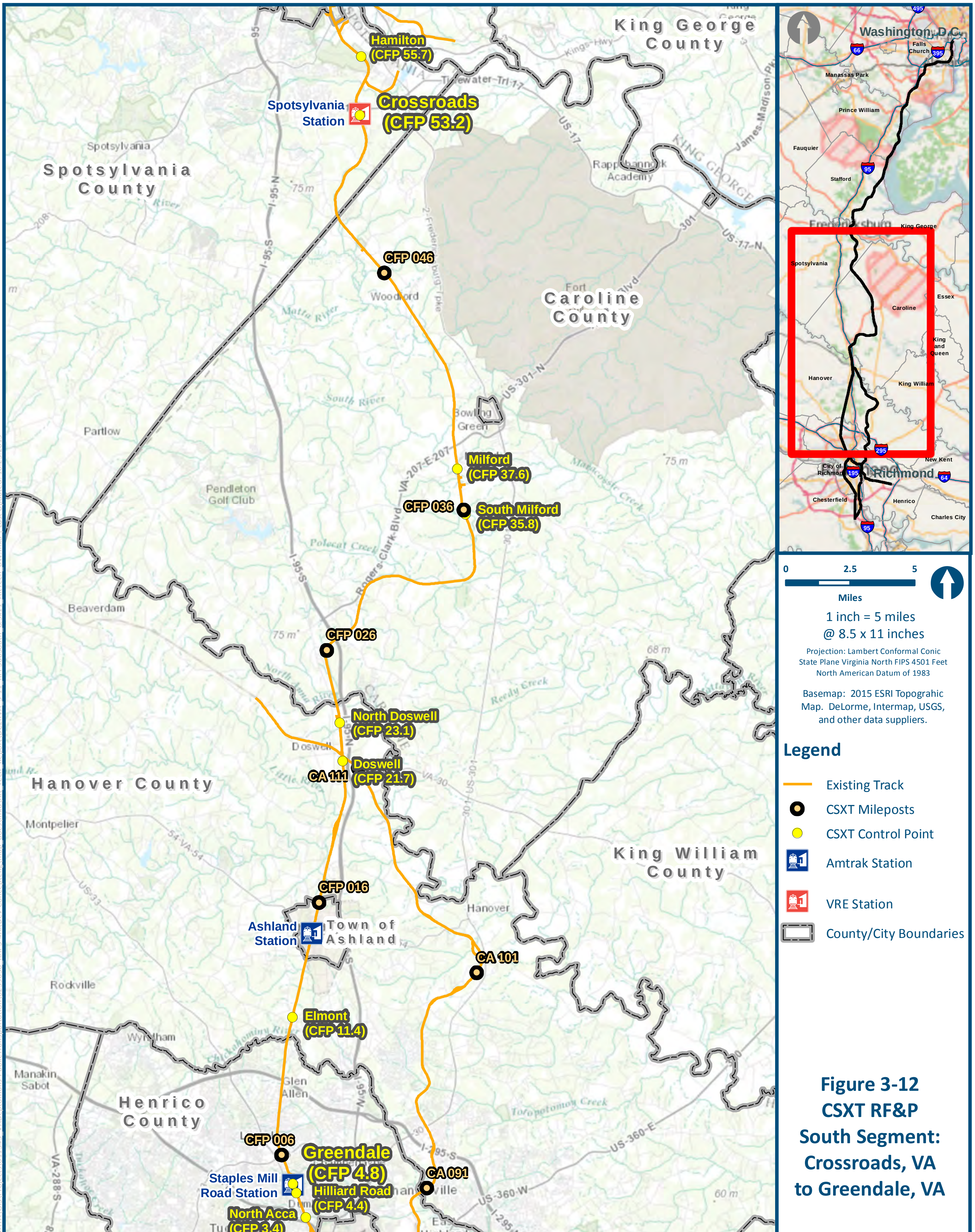


Figure 3-12
CSXT RF&P South Segment: Crossroads, VA to Greendale, VA

3.2.4.1 Reduced Crossover Spacing South of Crossroads

South of Crossroads, the absence of commuter rail traffic lowers train activity on the DC2RVA corridor by 25 percent. However, there are also fewer crossovers that allow trains to move from one main track to another. North of Crossroads, in the commuter territory, crossovers allowing interoperability between main tracks are spaced an average of approximately 7.6 miles apart. South of Crossroads, crossovers are spaced an average of approximately 12 miles apart. Crossovers improve flexibility and capacity, and reduce delays when trains have to stop and wait for another train to pass before continuing on the same track.

3.2.4.2 Summit

Crossroads marks the beginning of a southbound grade of approximately 3.5 miles at 0.8 percent, the ruling grade of the RF&P Subdivision. The grade ends at Summit (CFP 51.5). Northbound trains have a gentler climb from Guinea to Summit of approximately 4 miles with grades ranging between 0.1 percent and 0.6 percent. The grade has the potential to temporarily slow heavy southbound freight trains.

3.2.4.3 Milford

Milford (CFP 37.6) has a small freight yard and several local industries east of the DC2RVA corridor, accessed from a lead track off of Track 2 (Figure 3-13). The yard and shippers are served by the local freight train that transfers cars between Richmond's Acca Yard and Fredericksburg.

FIGURE 3-13: MILFORD

3.2.4.4 Doswell

North of Doswell, the DC2RVA corridor crosses the North Anna River (CFP 23.9) on a double-track bridge 315 feet long. Doswell is the location of an at-grade diamond crossing of two rail lines: CSXT's double-track RF&P subdivision and the single-track BBRR's Piedmont

Subdivision between Richmond and East Gordonsville, VA (Figure 3-14). The BBRR trackage is part of a former CSXT line between Richmond and Clifton Forge now leased by CSXT to BBRR, over which both BBRR and CSXT operate freight service. The route is operated by BBRR for local freights and westbound empty CSXT unit trains on trackage rights from Richmond to Clifton Forge. CSXT also operates a unit rock train from a granite quarry west of Doswell on the BBRR to receivers on the Peninsula Subdivision between Richmond and Newport News. The volume of trains crossing the DC2RVA corridor on the diamond at Doswell varies depending on CSXT requirements but can typically range between 4 and 7 trains per day. BBRR operates a weekday local freight that originates in Doswell and operates east to Richmond to serve local shippers.

FIGURE 3-14: DOSWELL

BBRR has a freight yard in Doswell on the northwest side of the diamond with the DC2RVA corridor. BBRR bases local freights at the yard and serves customers on the property. BBRR uses the historic Doswell Union Station (built circa 1928) as an office to support the yard and other operations and maintenance activities on its leased CSXT trackage. Just north of the diamond, Doswell Road crosses the tracks to access the community of Doswell on the east side of the rail line.

Trains on the DC2RVA corridor must slow to cross the BBRR diamond at Doswell. Passenger trains must reduce speed from 70 mph to 60 mph across the diamond, and freight trains are restricted to 40 mph across the diamond. Trains on the BBRR maintain their MAS of 25 mph across the diamond. CSXT's BD dispatcher in charge of the RF&P Subdivision has control of the diamond, and trains on the DC2RVA corridor have priority at the crossing.

Two low-speed connection tracks exist on the northwest and southwest quadrants of the diamond. In addition, north of the diamond, CSXT has a 5,808-foot controlled siding and a shorter yard track on the west side of the DC2RVA corridor. These tracks allow CSXT to serve local shippers on the west side of the right-of-way, interchange cars with BBRR, or allow southbound CSXT trains to exit the DC2RVA corridor and operate west on the BBRR. CSXT freights working at Doswell will typically occupy the controlled siding. On occasion, CSXT freights with work at Doswell may also use one of the main tracks north of the diamond as a location to temporarily leave cars while making a set-out or pickup.

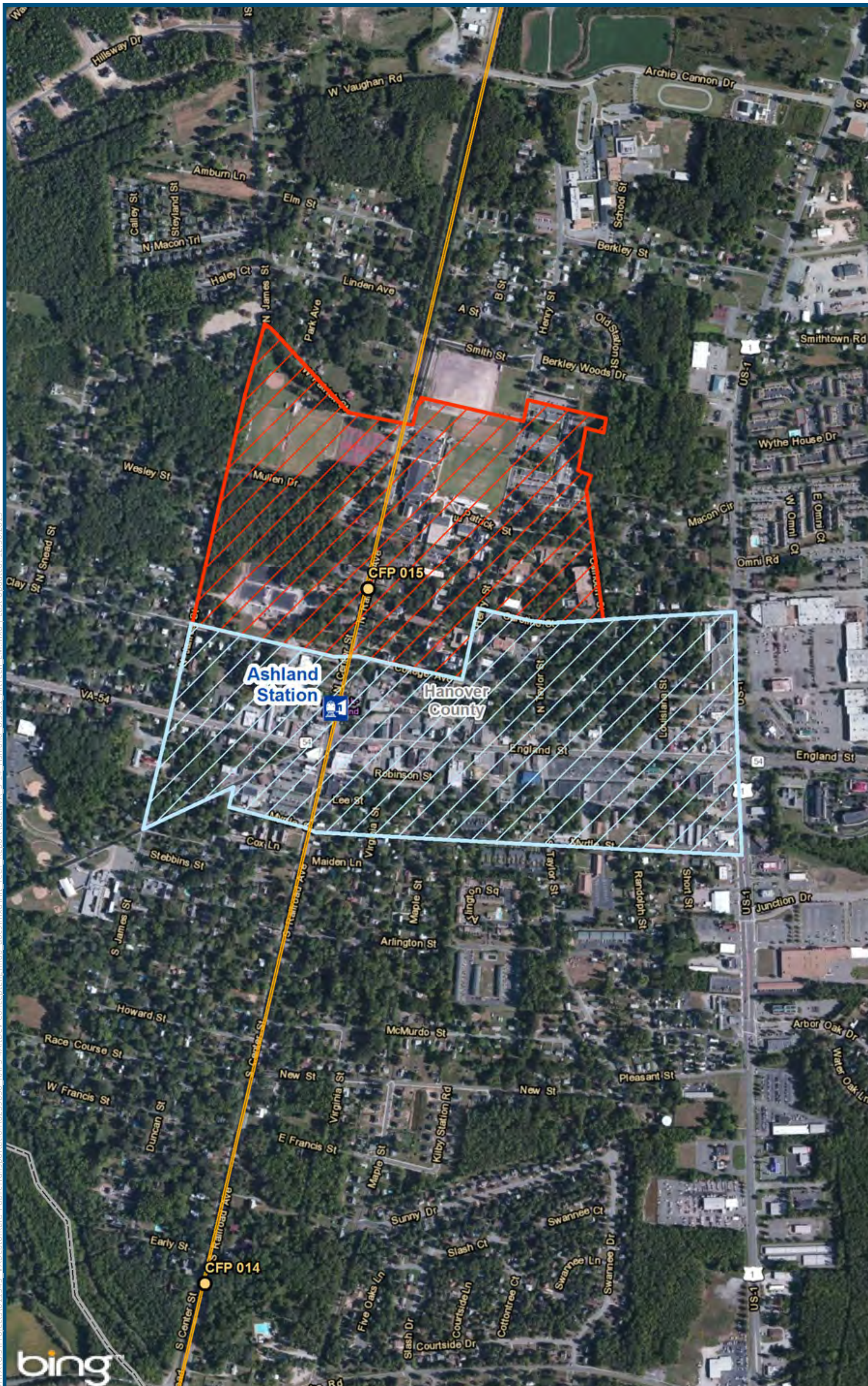
Crossovers north of the diamond (at approximately CFP 23.1) allow southbound trains only to cross from east to west (from Track 2 to 3 southbound) and onto the controlled siding (providing access to Doswell yard and the BBRR via the North Wye connecting track). Crossovers south of the diamond (at approximately CFP 21.7) allow northbound trains only to cross from east to west (from Track 2 to 3 northbound) and onto the South Wye connecting track to access the BBRR main line.

South of Doswell, the RF&P Subdivision crosses two waterways in close succession near Taylorsville. The line crosses the Little River (CFP 19.5) on a double-track, steel deck bridge approximately 243 feet long. The line then crosses the South Anna River (CFP 18.7) on a double-track, steel deck plate girder bridge 499 feet long.

3.2.4.5 Ashland

The RF&P Subdivision forms a tangent alignment more than 5 miles long (one of the longest sections of straight track between Washington, D.C. and Richmond) through northern Hanover County, where it passes through the town of Ashland (Figure 3-15). The line’s two main tracks are situated on a ballasted right-of-way at-grade in the median of Center Street (Figure 3-16). This condition exists for a length of approximately 1.3 miles, and passes through the downtown commercial area, as well as the campus of Randolph-Macon College and residential areas north and south of the commercial district. Houses in these areas face Center Street and the railroad tracks and are considered some of the most prized in the community. The lanes of Center Street (one lane for parking, one for through traffic) are operated one-way on either side of the rail line, with southbound traffic to the west of the tracks and northbound traffic to the east. Within the 1.3-mile stretch of median operation, there are 6 at-grade road crossings, each with active protection devices consisting of lights, bells, and gates, and 11 unprotected pedestrian crossings, placed in the downtown commercial district and at locations where cross streets end at the tracks without crossing them. Visibility for approaching trains within the town is very good, although some vertical curves do exist. The town of Ashland also has a quiet zone, meaning trains may not blow their horn (except in an emergency), though they must still ring the bell as they pass through. The quiet zone is in effect for 1.2 miles, from CFP 15.2 to CFP 14.0.

As a safety measure, all trains operating through the town of Ashland must adhere to a civil speed restriction of 35 mph through town between 7 a.m. and 7 p.m. On Fridays the 35-mph restriction is extended to remain in effect through 10 p.m. Freight and passenger trains are restricted to a speed of 45 mph through town between 7 p.m. (10 p.m. on Fridays) and 7 a.m. The speed restriction is in effect for a segment of the DC2RVA corridor that is 2.2 miles long, from CFP 15.6 to CFP 13.4, and includes a seventh grade crossing at Vaughan Road a half-mile north of downtown Ashland. The Vaughan Road grade crossing is a location where southbound freight trains are held for crew changes on occasions when a CSXT train crew cannot complete its southbound trip to Richmond within the federally mandated 12-hour duration.



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Feet

1 inch = 1,000 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- Amtrak Station
- Mileposts
- Existing Rail Line Corridor
- Downtown Ashland
- Randolph Macon College
- County/City Boundaries

Figure 3-15
Ashland

FIGURE 3-16: ASHLAND

The town of Ashland is also a station stop for the five Northeast Regional (Virginia) round trips that operate daily between Richmond and Washington, D.C. The historic station, built in 1923 and restored in 1985, is not staffed by Amtrak, but has a caretaker that also staffs a visitor center and museum inside the building. The Amtrak station includes two side platforms facing Tracks 2 and 3. These platforms are insufficient to serve the full length of the trains stopping in Ashland. Both platforms fail to meet accessibility requirements due to heights that are below the top of rail, narrow in width, and have a rough brick surface. Ashland's historic district, which includes the downtown and train station area, encompasses 159 acres and was listed on the National Register of Historic Places in 1983.

Three miles south of the town of Ashland is a universal crossover at Elmont (CFP 11.4). Elmont is 6.6 miles north of Greendale, the dividing line between the CSXT Baltimore Division (which controls the RF&P Subdivision) and the CSXT Florence Division (which controls all DC2RVA Corridor trackage from Greendale south to Centralia). The Elmont crossover is the first location north of the division point where the CSXT dispatcher for the RF&P Subdivision can control which trains use which tracks.

3.2.5 CSXT Richmond Terminal Subdivision: Greendale, VA-West Acca (A-Line: North End Subdivision) and Hermitage (S-Line: Bellwood Subdivision)

Owner/Operator: CSXT

Subdivision Route/Mileage: Greendale (CFP 4.8)-West AY (ARN 3.3) and Hermitage (SRN 3.5) (Figure 3-17)

Distance: Greendale-West AY (North End Sub): 3.4 miles; Greendale-Hermitage (Bellwood Sub): 4.6 miles

Line Heritage: RF&P Railroad; Seaboard Air Line Railroad

Number of Main Tracks: One and two main tracks

Maximum Allowable Speed-Passenger: 40 mph

Maximum Allowable Speed-Intermodal: 25 mph, due to signal spacing, multiple curves, and road crossings.

Maximum Allowable Speed-Freight: 25 mph, due to signal spacing, multiple curves, and road crossings.

Limiting Passenger Speed: 15 mph between ARN 3.6-ARN 3.3 due to horizontal geometry and yard limits.

Signals: Wayside Control Point Signals (CPS)

Operational Authority: Centralized Traffic Control (CTC)

Maximum Allowable Gross Weight: 286,000 lbs.

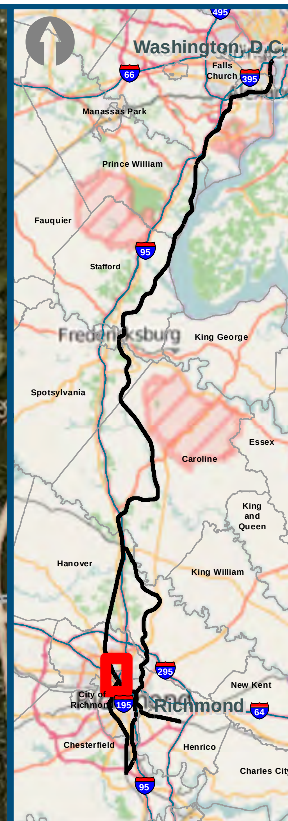
Clearances: 18'2" (double-stack), 18'6" (auto rack)

Trains per Day:

- 19-20 Passenger (Amtrak)
- 15-30 Freight (CSXT)

Crossover locations:

- Greendale (CFP 4.8): Universal, plus connection to north end of Staples Mill Road Station tracks
- Hilliard Road (CFP 4.4): Connection to south end of Staples Mill Road Station tracks from Track 3 only
- North Acca (CFP 3.4): Universal, plus connection to Passenger Main (through west side of Acca Yard) off Track 3 only
- AY (CFP 1.7/ARN 3.6): Universal for S-Line; Passenger Main (through west side of Acca Yard) becomes Track 1 (A-Line) with southbound turnout only to Track 4 (S-Line); Track 2 (A-Line) only connections to/from Acca Yard and South Leg wye track
- West AY (ARN 3.3): Universal (A-Line), plus access to South Leg wye track
- South AY (CFP 1.3): Double-track S-Line from Acca Yard becomes single track headed south to the Bellwood Subdivision; connection to South Leg wye track



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Mile

1 inch = 0.5 mile
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: 2015 Bing Aerial Imagery, Microsoft Corporation and its data suppliers

Legend

- CSXT Mileposts
- CSXT Control Point
- Amtrak Station
- County/City Boundaries

Figure 3-17
CSXT
Richmond Terminal Subdivision

3.2.5.1 Greendale

The Richmond Terminal Subdivision (of the CSXT Florence Division) governs movements through the Richmond-area passenger terminal and freight terminal facilities on the DC2RVA corridor. The north end of the subdivision is Greendale (CFP 4.8), the location of a universal crossover and a turnout for the north end of the station tracks serving the Amtrak's Richmond Staples Mill Road passenger rail station.

Greendale also marks the boundary between two CSXT operating divisions. North of Greendale, the DC2RVA corridor is part of CSXT's Baltimore Division and controlled by dispatchers in the Baltimore Division dispatching center in Halethorpe, MD. The Greendale interlocking and all trackage south of Greendale through Centralia is part of CSXT's Florence Division and controlled by dispatchers in the Florence Division dispatching center in Florence, SC. To optimize operations on the DC2RVA corridor through Greendale and ensure that passenger and freight trains receive the most favorable signal indications possible, the two dispatchers must communicate with each other, in addition to communicating with trains approaching and departing the Richmond Terminal.

CSXT has plans to improve operations for northbound passenger trains in this area by installing a signal controlled by the Baltimore Division near the Staples Mill Road train station. This will provide northbound passenger trains with more opportunities to proceed north from Staples Mill Road at the maximum authorized track speed under a signal controlled by just one dispatcher in the short distance between the Staples Mill Road Station and the Greendale interlocking. This work is expected to be done as part of CSXT's Main Line Relocation Project for Acca Yard, which is underway.

3.2.5.2 Staples Mill Road Station

Amtrak's Staples Mill Road Station (CFP 4.6) is the Richmond area's primary passenger rail station, and the busiest passenger rail station in Virginia. In 2015, more than 360,000 passengers boarded or disembarked there. The station is located in a suburban area of Richmond approximately 8 miles north of the Central Business District (Figure 3-18). The station was built in 1975 to serve as the primary Richmond train station, replacing Broad Street Station. The suburban location was inconvenient to serve downtown, but afforded available space for a station facility, crew base, and platforms. It is situated north of the rail junction where passenger trains from Florida and from Newport News begin to share a common alignment. The station's location near the intersection of Interstates 95, 195, and 64 provides access for residents of the Richmond metropolitan area located north, east, and west of the city center.

Staples Mill Road Station is currently served by 18 passenger trains (9 round trips), including 4 Northeast Regional (Virginia) trains (2 round trips) that originate and terminate there. All Amtrak trains operating through Richmond on the DC2RVA corridor stop at Staples Mill Road, with the exception of the nonstop Auto Train. The station is a full-service Amtrak stop and has a staffed ticket counter and checked baggage service. (Additional information on Staples Mill Road Station is provided in Chapter 8).

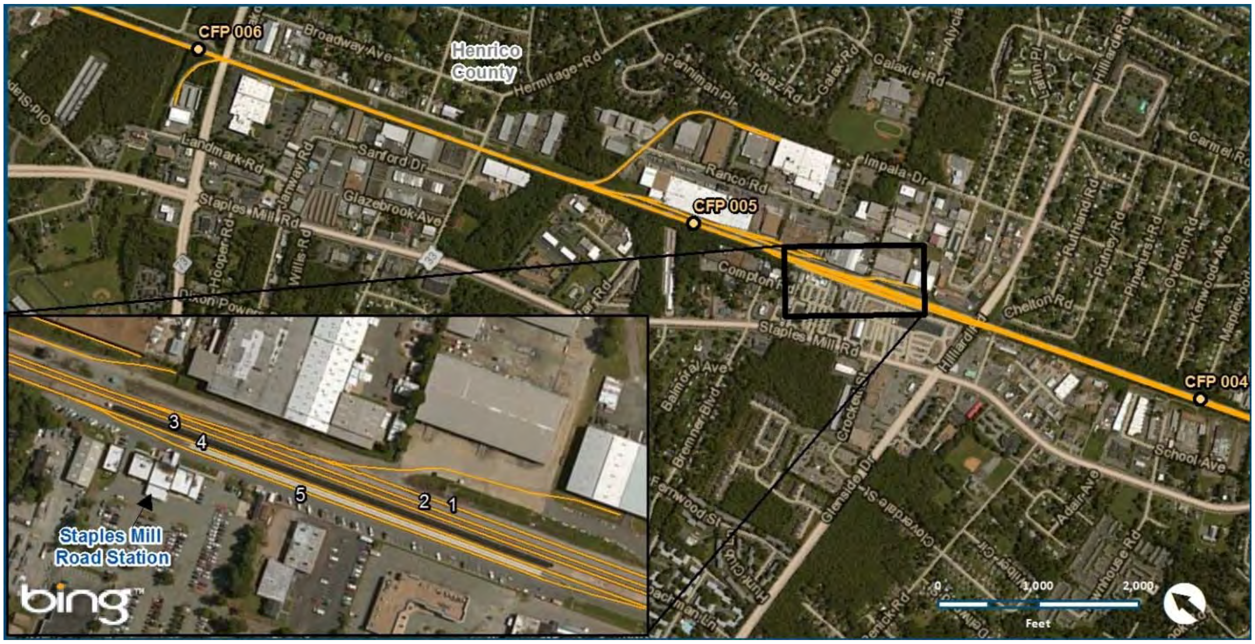


FIGURE 3-18: STAPLES MILL ROAD STATION

Staples Mill Road Station also houses an Amtrak crew base where engineers and conductors on certain Amtrak passenger trains change crews. Because of this additional station activity, some passenger trains have longer dwell times at Staples Mill Road than at other stations in Virginia. Long Distance trains have scheduled dwell times ranging between 9 minutes and 12 minutes. Northeast Regional (Virginia) trains from Norfolk and the Interstate Corridor (Carolinian) train from Charlotte have scheduled dwell times of 7 minutes. Northeast Regional (Virginia) trains from Newport News have scheduled dwell times of 5 minutes.

Staples Mill Road Station has three platform tracks and two low-level platforms. One of the platform tracks is Main Track 3 of the DC2RVA corridor. Trains stopping on this track to perform station work are occupying the main line. Main Track 3 is served by an island platform approximately 1,750 feet long it shares with Station Track 4. The north end of Track 4 connects to Track 3 at the Greendale interlocking; the south end of Track 4 connects to Track 3 at the Hilliard Road interlocking (CFP 4.4). Each end of Station Track 4 has powered turnouts controlled by the Richmond Terminal Sub dispatcher. Coming off of Track 4 is Station Track 5, the closest track to the station building. Track 5 has an island platform approximately 850 feet long. Track 5 is connected to Track 4 on each end by hand-throw turnouts. Thus, any train arriving or departing Staples Mill on Track 5 needs an Amtrak employee available to manually line the turnouts connecting Tracks 5 and 4. This operating condition adds to the travel time of a train using Station Track 5 (Figure 3-18).

Two Northeast Regional (Virginia) trains originate at Staples Mill Road Station in the morning, bound for Washington, D.C., and points north on the NEC. One train operates daily, and the other operates six days per week (excluding Sunday). These trains have southbound counterparts that arrive in the evening and end their trips at Staples Mill Road Station. Once all passengers have disembarked, these trains perform a non-revenue move south of the station to turn around on a wye at the south end of Acca Yard, and then return northbound to the Staples Mill Road Station, pointed in the right direction for the next morning's departure. During the night, the trains are stored, cleaned, serviced, and inspected on station tracks 4 and 5 at Staples Mill Road Station.

3.2.5.3 Acca Yard

Richmond's Acca Yard serves as a classification terminal for CSXT, and is CSXT's busiest freight yard in Virginia (Figure 3-19). Trains bound to and from locations east and west of Richmond originate and terminate at Acca Yard, and their cars may be transferred to trains traveling north and south of Richmond on the DC2RVA corridor.

FIGURE 3-19: ACCA YARD

Acca Yard contains physical and operational constraints that have the potential to contribute to congestion in the terminal area, some of which will be addressed under a planned main line relocation project that began in 2015. When through freight or passenger trains operate in the yard, a partial shutdown of switching operations may occur. Many of the yard tracks have hand-throw switches. Freight trains entering a track in Acca Yard that does not have a powered turnout may be required to stop so that the train's conductor can dismount from the locomotive and manually line the turnout in order for the train to proceed into the yard. Depending on the train's length, this activity could block tracks or interlockings and prevent other trains from moving in or out of the yard.

Acca Yard is approximately 1.7 miles long and covers approximately 250 acres. However, the classification tracks are far shorter, ranging from less than a quarter-mile to approximately 1 mile in length. Many manifest freight trains exceed one mile in length, which means that trains being built in Acca Yard or that have work to do there may require more than one yard track. In those situations, a departing train will have to "double," meaning two sections of the train stored on two separated tracks will have to be combined, followed by an air-brake test of the entire train. Depending on the train's length, the doubling procedure could block access to other tracks in the yard or prevent those tracks from further use. When necessary, Acca Yard also functions as a holding point for northbound trains during VRE's peak commuter periods. This practice limits the amount of track space available at Acca Yard for car classification and other yard activities.

Acca Yard is also a CSXT crew change location. Richmond is the boundary for train crew seniority districts that are holdovers from CSXT predecessor railroads south of Richmond (Seaboard Coast Line), north of Richmond (Baltimore & Ohio), and east and west of Richmond (Chesapeake & Ohio). All freight trains passing through Richmond must change crews at Acca Yard, regardless of whether or not they have to stop to add or cut cars. Trains making a crew change at Acca Yard may occupy a yard track, a main line track, or the Passenger Main bypass track that skirts the yard's west side. Depending on operating conditions, the crew change may occur at a location outside of Acca Yard itself, which can cause additional delay. Freight trains may also change locomotives at Acca Yard to ensure that they traverse the RF&P Subdivision led by a locomotive outfitted with working cab signaling and Automatic Train Control equipment.

Acca Yard also has physical constraints that make expanding or rebuilding the yard to better handle today's longer manifest freight trains difficult. Warehouses, industrial operations, and Interstate highways surround the terminal. Interstate 64 crosses over the north throat of the yard, while Interstate 195 and Westwood Avenue cross over the south throat of the yard.

Most passenger trains operate through Acca Yard on the Passenger Main that skirts the yard's west side. The MAS on the Passenger Main is 40 mph, provided the signals permit it. However, the Passenger Main also has several turnouts providing access to the Bryan Park Terminal (a maintenance facility for railcars and locomotives) and an industry spur north of Acca Yard, which has the potential to slow or delay operations. (Figure 3-19). The Passenger Main is the only track that provides access to the Bryan Park terminal, which means the bypass track is also used by yard jobs serving the facility. Passenger trains destined to and from Newport News are also occasionally routed on one of the main tracks through the center of Acca Yard, since these tracks lead directly to the Bellwood Sub and Main Street Station; movement through the yard on the main tracks is limited to 25 mph, although a main line relocation project (described below) will eliminate this operation.

3.2.5.4 Main Line Relocation

To improve freight and passenger operations through the Richmond terminal, CSXT in 2015 began a Main Line Relocation Project at Acca Yard. The project is part of Phase 1 of the CSXT Framework Agreement with DRPT. The project will separate the main line tracks from the yard by relocating them parallel to the west side Passenger Main, allowing through freight trains and passenger trains to move through the yard area more smoothly without interfering with switching activities inside the yard. The project will also add a fourth main track between Staples Mill Road Station and North Acca, creating one double-track route for through traffic bypassing the yard and one double-track route directly into the north end of the yard. This will provide passenger and freight trains with more operating flexibility between Greendale and Acca Yard. In addition, a new pocket track will be constructed north of the Staples Mill Road Station that can be used to hold passenger trains waiting for platform space without blocking the main line tracks.

3.2.5.5 Two Routes Through Richmond

At the south end of Acca Yard, the DC2RVA corridor diverges at the south Acca yard wye,[6] forming two routes through Richmond (Figure 3-20). The westward of the two routes arcs around Richmond as the double-track North End Subdivision, CSXT's principal freight route between Richmond and points south toward North Carolina. It is referred to as the A-Line, named for the predecessor railroad Atlantic Coast Line. The eastward of the two lines passes through the center of Richmond as the single-track Bellwood Subdivision, used primarily by local freights to serve industries and Northeast Regional (Virginia) service to Newport News. It is referred to as the S-Line, named for the predecessor railroad Seaboard Air Line. The A-Line and the S-Line reconnect at Centralia, approximately 14 miles south of the south Acca Yard wye.

- **A-Line**: The North End Subdivision is a high-density main line used by the majority of northbound and southbound passenger and freight trains on the DC2RVA corridor (Figure 3-20). The subdivision bypasses downtown Richmond and consists of a double-track main line over which passenger and freight trains can travel efficiently. Amtrak passenger trains operating south of Richmond to Norfolk, North Carolina, and Florida use the North End Subdivision. This subdivision also has the fastest passenger train MAS on the DC2RVA corridor: 79 mph. However, Amtrak passenger trains using the A-Line (bound for Florida, North Carolina, and Norfolk) do not reach the MAS of 79 mph, as most of the A-Line from Acca Yard to Centralia operates under speed restrictions due to curves, bridges, or other conditions. The A-Line route from AY interlocking to Centralia is approximately 14.3 miles.
- **S-Line**: The S-Line heads south to Centralia through downtown Richmond, passing on the west side of Main Street Station (Figure 3-20). The line is primarily single-track, with some sections double track, and is speed-restricted, with trains in most sections held to 25 mph. The single track S-Line bridge across the James River has a 10-mph speed restriction. The line passes through industrial areas in south Richmond and has several grade crossings with heavy truck traffic. There is local freight service on the line, daily coal trains to and from a power plant (Dominion's Chesterfield Power Station) near Bellwood, and numerous empty bulk trains traveling north to Richmond and a connection to the BBRR. Northeast Regional (Virginia) passenger trains between Boston and Newport News use the S-Line for approximately 4 miles between Acca Yard and AM Junction (just north of Main Street Station in downtown Richmond). The S-Line route from the AY interlocking to Centralia is approximately 15.6 miles.

[6] Mileposts on CSXT lines south of Richmond have a prefix beginning with either A (former ACL, now A-Line routes) or S (former SAL routes, now S-Line routes). However, both the ACL and SAL main lines end south of Acca Yard. ACL's milepost 0 was south of the James River, so mileposts from that point north to Acca Yard have the prefix ARN (for ACL Richmond North). Seaboard's milepost 0 was at Main Street Station, so mileposts between Main Street and Acca Yard have the prefix SRN (for Seaboard Richmond North).

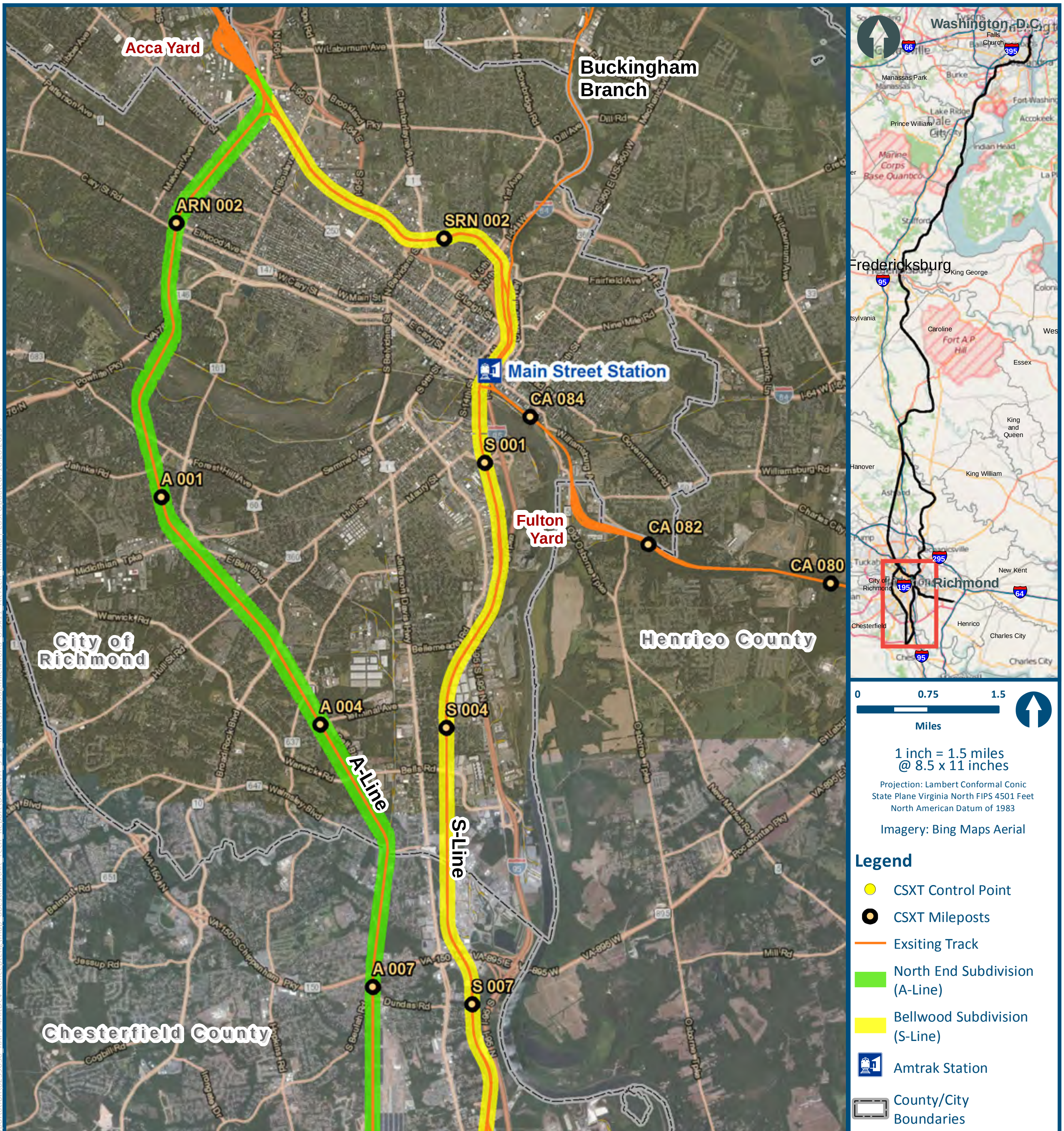


Figure 3-20 Two Routes Through Richmond

The tracks leading into and out of the wye south of Acca Yard are served by three interlockings (Figure 3-21):

- AY – North of the wye, between the wye and Acca Yard
- West AY – Southwest of the wye, along the A-Line
- South AY – Southeast of the wye, along the S-Line

3.2.5.6 AY Interlocking

AY interlocking (CFP 1.7) is located at the south end of Acca Yard where the two CSXT main lines split: the double-track A-Line and the single-track S-Line (Figure 3-21). The existing track and turnout configuration at AY interlocking restricts movement through the interlocking to just the one train at a time that can enter, exit, or cross the south throat of the yard, at speeds of no more than 15 mph. This has the potential to create an operating bottleneck. Most passenger trains avoid blocking the yard entrance by using the Passenger Main that skirts the west side of the yard. These trains have a direct move that does not interfere with operations inside of Acca Yard or at its throat. However, Northeast Regional (Virginia) trains to and from Newport News must use a low-speed crossover to cross the southern throat of Acca Yard when moving between the Passenger Main and the S-Line. If the Passenger Main is occupied, passenger trains also have the option of being routed on one of the main tracks through the middle of Acca Yard. Interstate 195 and Westwood Avenue also cross over the south throat of Acca Yard and AY interlocking on bridges, creating an additional constraint to expansion in this area.

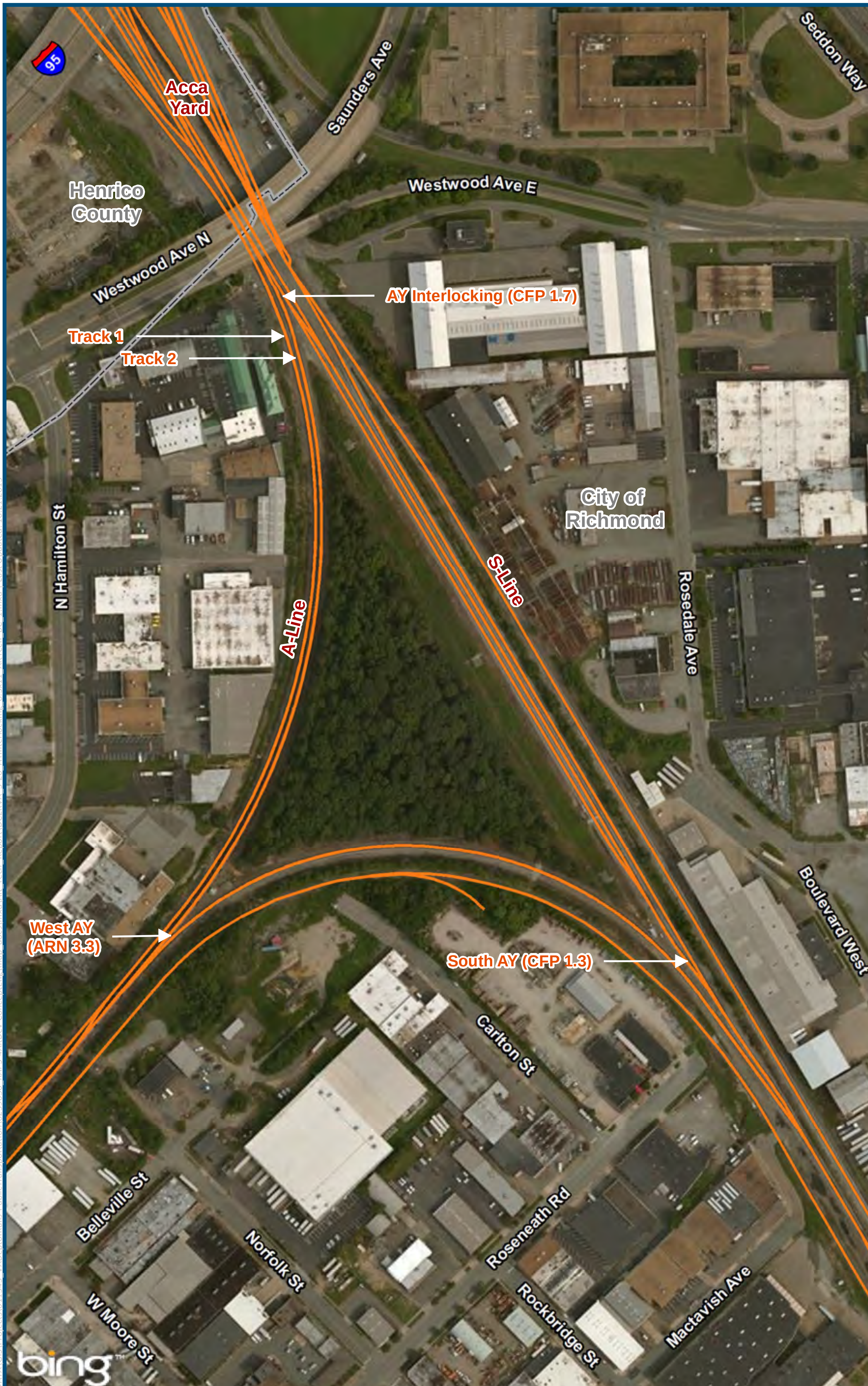
3.2.5.7 West AY Interlocking

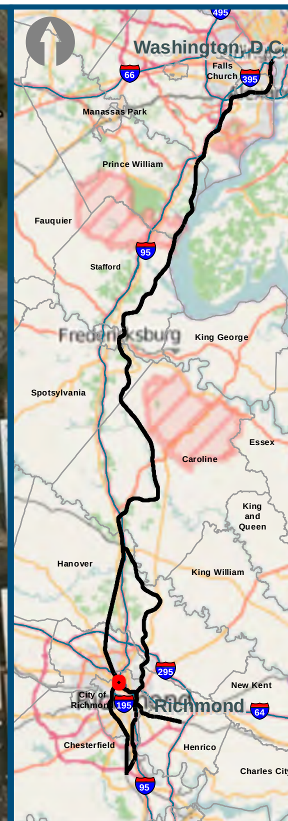
West AY is a universal interlocking on the A-Line 0.3 miles south of AY interlocking (Figure 3-21). West AY marks the point where double-track A-Line transitions from the Richmond Terminal Subdivision to the North End Subdivision headed south to Rocky Mount, NC.

At West AY (ARN 3.3) the South Leg wye track diverges and turns east to join the southward S-Line to Richmond. This wye track is used to turn empty southbound Northeast Regional (Virginia) passenger trains from Washington, D.C. that will begin their next northbound trip at the Staples Mill Road Station. The wye track is also used by CSXT freight trains operating from downtown Richmond on the S-Line that are destined to locations in the Southeast via the A-Line. In addition, the wye track is used to turn locomotives equipped with cab signal and ATC equipment so that they may lead northbound trains on the RF&P Subdivision. Passenger and freight trains using the South Leg wye track block all other through train movements into or out of the south end of Acca Yard and do so for an extended period of time, since track speed on the wye is 15 mph for passenger trains and 10 mph for freight trains.

3.2.5.8 South AY Interlocking

South AY (CFP 1.3) is located on the S-Line (Figure 3-21). At this interlocking, the two main tracks coming south from AY converge into one track to continue 0.8 miles south to Hermitage (the beginning of the Bellwood Sub and a section of two main tracks). Just south of the turnout where the double-track line becomes single, the South Wye track from West AY interlocking joins the Bellwood Sub. The wye track is used to turn nonrevenue Northeast Regional (Virginia) trains that terminate and originate at Staples Mill Road Station. The track is also used by northbound freight trains on the Bellwood Sub destined for points south of Virginia via the A-





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Feet

1 inch = 300 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap: BING Aerial Imagery, Microsoft Corporation and its data suppliers

Legend

Existing Track

County/City Boundaries

Figure 3-21
AY Interlocking

Line (North End Subdivision). These movements are bulk trains that can run at any time. Running parallel east of the main track is the Hermitage Lead, a lead track used by Acca Yard switch crews. The Hermitage Lead extends south from Acca Yard and runs parallel to the Richmond Terminal Subdivision past South AY to the Hermitage interlocking. The northern portion of the lead track is part of a designated Remote Control Zone for switch crews, from Acca Yard as far south as the Boulevard Bridge.

CSXT's Main Line Relocation Project at Acca Yard (described in Section 3.2.5.4) will relocate the A-Line's main line tracks from the center of the yard to the west side of the yard, which will enable more freight trains to pass through AY interlocking without blocking switching activities or other yard operations. As part of the project, CSXT will rebuild the AY and West AY interlockings so that through moves on either track will have an authorized speed of 40 mph for passenger trains and 25 mph for freight trains, improving operational flexibility and reducing the potential for delays.

3.2.6 CSXT North End Subdivision (A-Line): West AY in Richmond, VA-Centralia, VA

Owner/Operator: CSXT

Subdivision Route/Mileage: West AY (ARN 3.3)-Centralia (A 10.7) (Figure 3-22)

Distance: 14.0 miles

Line Heritage: Atlantic Coast Line Railroad; RF&P Railroad

Number of Main Tracks: Two main tracks

Maximum Allowable Speed-Passenger: 79 mph; 70 mph for Auto Train

Maximum Allowable Speed-Freight: 60 mph

Limiting Passenger Speed: 40 mph between ARN 0.9-ARN 0.7 due to horizontal geometry.

Signals: Wayside Intermediate and Control Point Signals (CPS)

Operational Authority: Centralized Traffic Control (CTC)

Maximum Allowable Gross Weight: 286,000 lbs.

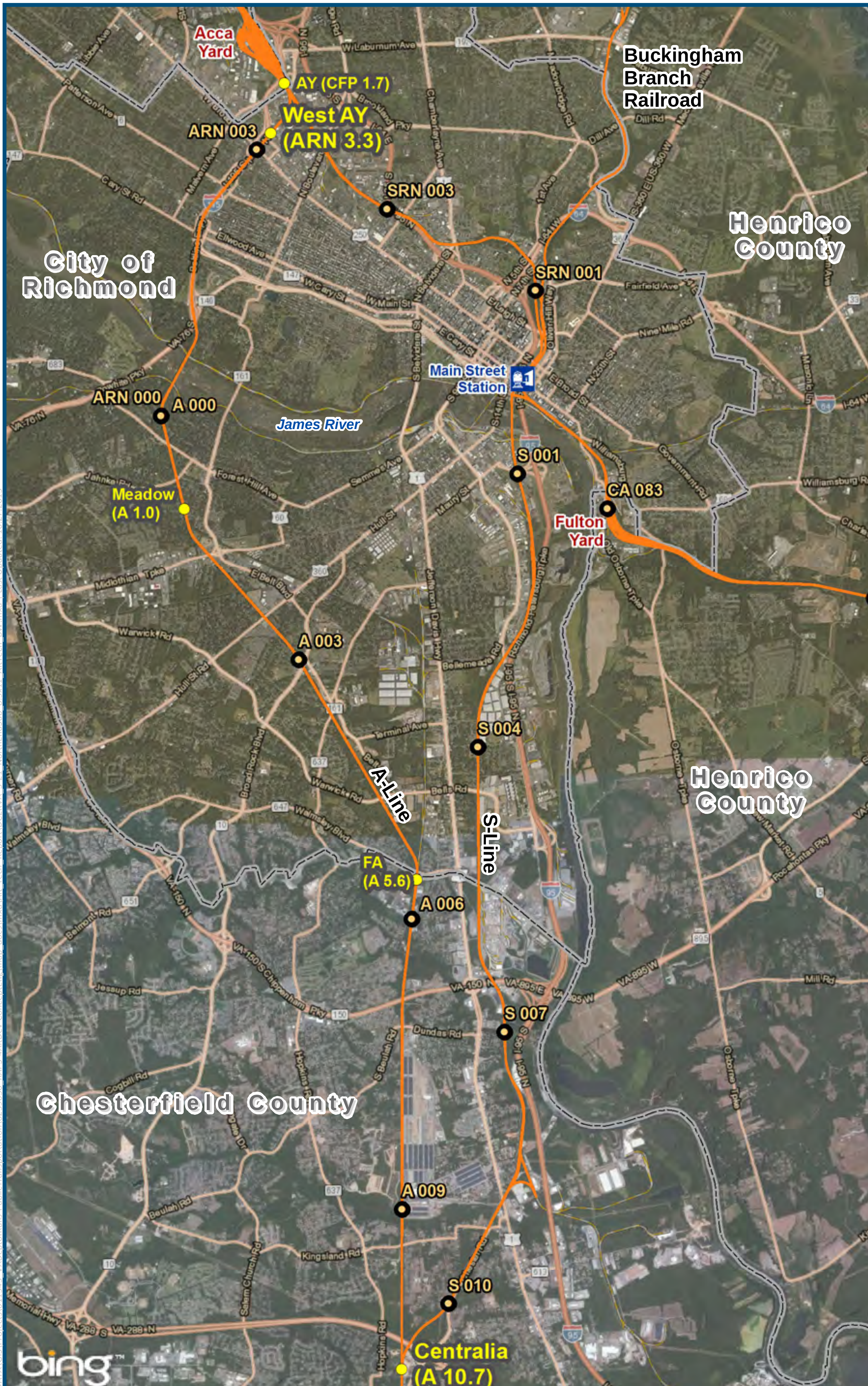
Clearances: 18'2" (double-stack), 18'6" (auto rack)

Trains per Day:

- 12 Passenger (Amtrak)
- 15-25 Freight (CSXT)

Crossover locations:

- West AY (ARN 3.3): Universal (A-Line), plus access to South Leg wye track; interlocking controlled by Richmond Terminal Subdivision
- Meadow (A 1.0): Track 1 to 2 southbound
- FA (A 5.6): Track 2 to 1 southbound, plus northbound turnout to Clopton Lead
- Centralia (A 10.7): Universal, plus northbound turnout to single-track Bellwood Subdivision (S-Line)



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Mile

1 inch = 1.5 mile
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: 2015 Bing Aerial Imagery,
Microsoft Corporation
and its data suppliers

Legend

- CSXT Mileposts
- CSXT Control Point
- Exsiting Track
- Amtrak Station
- County/City Boundaries

Figure 3-22
CSXT
North End
Subdivision

3.2.6.1 General Description

The North End Subdivision is a high-density main line used by the majority of passenger and freight trains operating south of Richmond on the DC2RVA corridor. The subdivision bypasses downtown Richmond, and consists of a double-track main line over which passenger and freight trains travel. Amtrak passenger trains operating south of Richmond to Norfolk, North Carolina, and Florida use the North End Subdivision. Passenger trains on the North End Subdivision have a MAS of 79 mph, with the exception of the Auto Train, which is limited to 70 mph. However, operating speed restrictions limit the actual speeds along most of the route.

3.2.6.2 Powhite Parkway and James River Crossing Limits Potential Expansion

The North End Subdivision begins at West AY interlocking, just south of Acca Yard. Approximately 1,000 feet south of West AY, the DC2RVA corridor enters a trench within the median of I-195, the Powhite Parkway (Figure 3-23). The right-of-way contains two tracks and is at various points protected from the highway lanes flanking it by a low concrete retaining wall and/or fencing. The tracks remain in the median of I-195 for approximately 2 miles. The Powhite Parkway in this area is located within a cut that is lined with substantial retaining walls on both sides.

FIGURE 3-23: POWHITE PARKWAY

When track space in Acca Yard is congested or a train has stopped for a crew change at West AY, northbound trains hold or line up on the tracks in the median of I-195 to take turns to continue northward. Typically these trains hold on Track 2, which provides entry to Acca Yard, and leaves just Track 1 available for other main line passenger and freight movements. The Acca Yard main line relocation project described above is intended to move these crew changes north into the terminal area, reducing the potential for main line congestion south of Acca Yard.

Passenger trains are restricted to 50 mph and freight trains are restricted to 40 mph when traveling in the median of I-195. South of the median, the corridor bends to the southwest on a 4-degree curve that restricts all freight and passenger trains to 40 mph.

The A-Line crosses the James River on a concrete arch bridge built in 1919. The 2,278-foot-long bridge has 18 arches and was built wide enough to carry two tracks across the waterway. The track speed across the bridge is 50 mph for passenger trains and 45 mph for freight trains and remains so through a 3-degree curve south of the bridge. The middle of this 3-degree curve contains the North End Subdivision's Milepost 0, marking the transition from former RF&P trackage from Acca Yard to former Atlantic Coast Line (ACL) trackage southward to Rocky Mount.

3.2.6.3 Meadow

Once south of the curve, southbound trains out of Acca Yard have the first opportunity to operate at the North End Subdivision's MAS of 79 mph for passenger trains and 60 mph for freight trains. That opportunity only lasts for a mile, however, before another curve that limits passenger train speeds to 60 mph and freight trains to 50 mph. This curve is located just south of the Meadow interlocking (A 1.0), a single crossover that permits northbound trains to cross from Track 2 to Track 1, and to potentially pass around stopped trains farther ahead waiting for space to open up in Acca Yard. The Commonwealth of Virginia is working with CSXT on the North End Crossover project, which will install an additional crossover to make Meadow a universal interlocking. The project will increase operational fluidity and expand opportunities to meet and pass trains between Richmond and Centralia.

3.2.6.4 FA interlocking

The FA interlocking (A 5.6) is located 4.6 miles south of Meadow, and consists of a single crossover in the opposite configuration of the one at Meadow, permitting northbound trains to cross from Track 1 to Track 2. The Commonwealth of Virginia is working with CSXT on the North End Crossover project, which will install an additional crossover to also make FA a universal interlocking. The project will increase operational fluidity and expand opportunities to meet and pass trains between Richmond and Centralia.

Just north of the crossover a northbound turnout provides a connection to CSXT's Clopton Lead track, an industrial track that serves local industries and provides access to Clopton Yard, a small yard used to stage cars for freight shippers along the Clopton Lead. (The Clopton Lead was the original ACL main line to downtown Richmond before the current A-Line was built around the city in 1919.) A local freight based at Acca Yard operates weekdays southward on the North End Subdivision, then reverses direction at FA to enter the Clopton Lead and serve customers on it. Passenger trains are held to 50 mph and freight trains to 45 mph through FA on account of a curve just north of the interlocking.

3.2.6.5 Centralia

Centralia (A 10.7) is the southern limit of the DC2RVA project area. At Centralia, the single-track Bellwood Subdivision from downtown Richmond connects southbound into Track 2 of the North End Subdivision. There is also a universal crossover at this location.

Northbound trains that diverge from the North End Subdivision and onto the Bellwood Subdivision at Centralia are primarily empty bulk trains headed to Richmond for a crew change, and then on to the BBRR to operate west to Clifton Forge, bound for destinations in the Appalachians or eastern Great Lakes. The connection to the Bellwood Subdivision has a track speed of 25 mph.

3.2.7 CSXT S-Line North: Bellwood Subdivision, Hermitage-Brown Street in Richmond, VA

Owner/Operator: CSXT

Subdivision Route/Mileage: Hermitage (SRN 3.5)-Brown Street (SRN 0.4) (Figure 3-24)

Distance: 3.1 miles

Line Heritage: Seaboard Air Line

Number of Main Tracks: One and two main tracks

Maximum Allowable Speed-Passenger: 30 mph

Maximum Allowable Speed-Freight: 25 mph, signal spacing, control points in between, and stopping distances.

Limiting Passenger Speed: 10 mph between SRN 0.4-SRN 0.0 due to track condition and station proximity.

Signals: Wayside Control Point Signals (CPS)

Operational Authority: Centralized Traffic Control (CTC)

Maximum Allowable Gross Weight: 286,000 lbs.

Clearances: 16’10” (multi-levels prohibited)

Trains per Day:

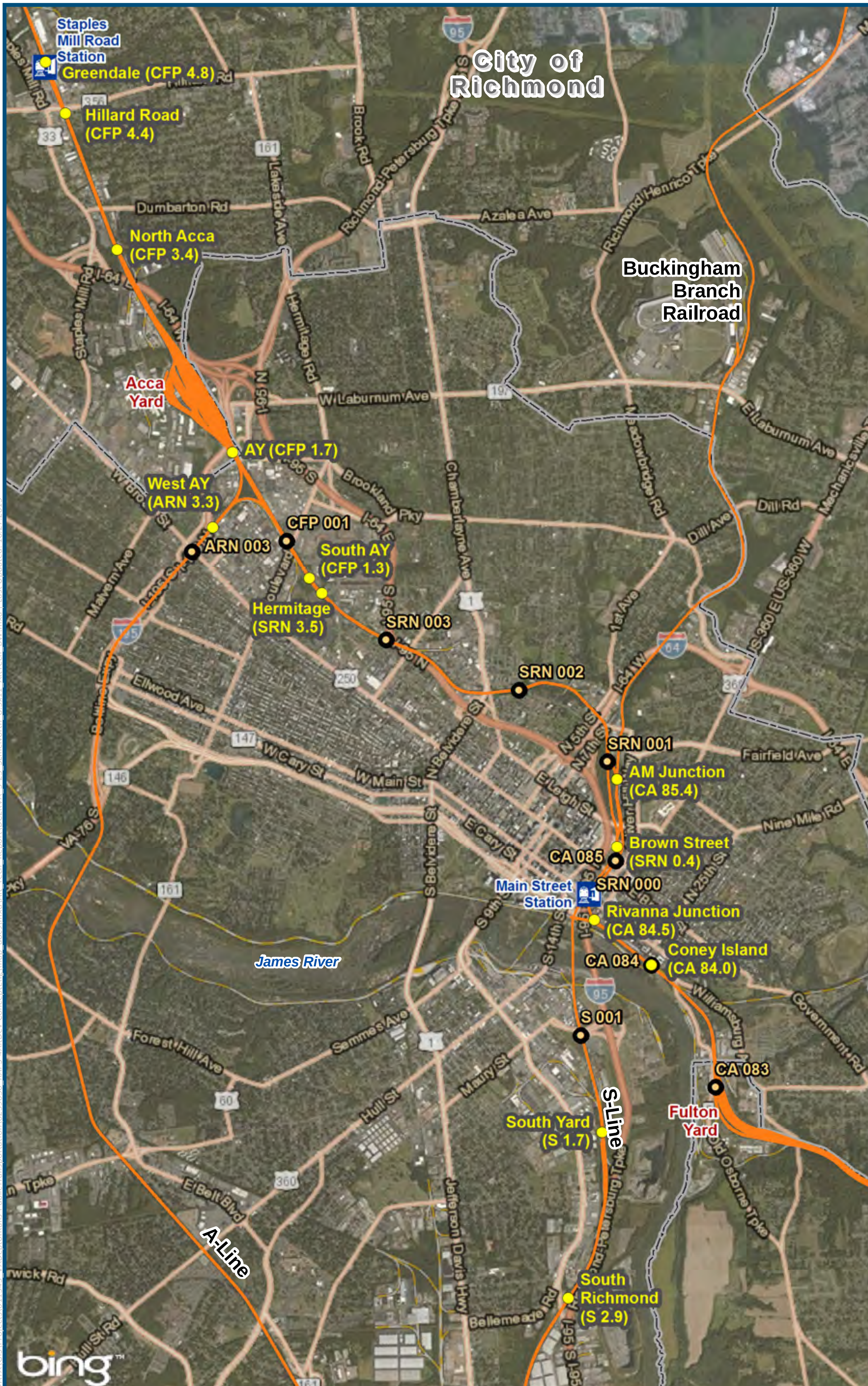
- 4 Passenger (Amtrak)
- 10-20 Freight (CSXT)

Crossover locations:

- Hermitage (SRN 3.5): North end of two main tracks
- AM Junction (Track 2 only): Connections to the Piedmont Sub and BBRR
- Brown Street (SRN 0.4): South end of two main tracks

3.2.7.1 Overview and Operational Requirements

CSXT’s Bellwood Subdivision is a continuation of the S-Line that began as part of the Richmond Terminal Subdivision from Acca Yard (CP AY) to the Hermitage interlocking. At Hermitage, the S-Line becomes the Bellwood Subdivision, which runs east and then south through the center of Richmond past Main Street Station (west side), crosses the James River on a single-track bridge, passes through the industrialized South Richmond area, and joins the North End Subdivision (A-Line) at Centralia, approximately 15 miles south of Acca Yard. The Bellwood Subdivision alignment follows an old stream channel from Hermitage downhill at a comparatively steep grade toward Main Street Station before passing the station on the west side on a raised viaduct. Local freight trains use the Bellwood Sub to shuttle cars between Acca Yard and freight customers south of Richmond as far as Hopewell, VA (Hopewell Subdivision). The Bellwood Sub between Hermitage and an interlocking just north of Main Street Station called AM Junction is also used by Northeast Regional (Virginia) passenger trains providing



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Mile

1 inch = 1 mile
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: 2015 Bing Aerial Imagery, Microsoft Corporation and its data suppliers

Legend

- Existing Track
- CSXT Mileposts
- CSXT Control Point
- Amtrak Station
- County/City Boundaries

Figure 3-24
CSXT
S-Line North

two daily round trips between Boston and Newport News. The entire Bellwood Sub was once a double-track freight and passenger main line, but the line was downgraded and single-tracked in places south of the AM Junction during the 1960s and 1970s. Hermitage is the north end of a section of two main tracks approximately 3 miles long, ending at Brown Street interlocking just north of Main Street Station.

The Bellwood Sub's north end plays a strategic role in CSXT's overall Richmond-area operations by providing access to the only connecting track between CSXT's main lines running north-south and east-west through the city. Historically, CSXT's routes through Richmond were part of four different predecessors. North-south traffic through Richmond funneled north on the former RF&P, and moved south via either the former Atlantic Coast Line (today's North End Sub/A-Line) or the former Seaboard Air Line (today's Bellwood Sub/S-Line). CSXT's two east-west routes through Richmond were historically part of the Chesapeake & Ohio Railroad and comprised two parallel routes between the Appalachian Mountains at Clifton Forge and Richmond. Both lines were physically separated from the north-south routes except for some limited connection and interchange tracks north of Main Street Station. Today, the only connection that exists to link CSXT's east-west and north-south routes in Richmond is at AM Junction.

3.2.7.2 Hermitage

One mile south of Acca Yard is Hermitage interlocking (SRN 3.5), which marks the point where the S-Line changes from the Richmond Terminal Subdivision to the Bellwood Subdivision. At Hermitage, the single-track line from South AY becomes a two-track line. Southbound trains are either lined on Track 1 (the westernmost of the two main tracks) to continue south on the Bellwood Sub past the west side of Main Street Station and across the James River to Centralia or lined on Track 2 to AM Junction, where a connecting track (part of CXST's Peninsula Subdivision) diverges for Fulton Yard and Newport News. The Bellwood Sub's two main tracks parallel each other south of Hermitage for approximately 3 miles to AM Junction. However, there is no crossover between Track 1 and Track 2 at AM Junction that would permit the interoperable use of both main tracks in this 3-mile stretch. This condition puts the majority of the traffic on Track 2, including four daily Northeast Regional (Virginia) trains, since most trains are entering or exiting the line at AM Junction, and prevents opposing trains from using Track 1 for meet/pass events.

3.2.7.3 AM Junction

AM Junction (CA 85.5) is located just north of Main Street Station on the Bellwood Subdivision, and approximately 5 miles south of Acca Yard. At AM Junction, the east-west former C&O route between Richmond's Fulton Yard and Clifton Forge comes side by side with the north-south former Seaboard Air Line Route (today's Bellwood Subdivision) from Centralia to Acca Yard. At the junction, a connection exists that allows westbound trains on the former C&O route (known today as the Peninsula Subdivision) to proceed north onto Track 2 of the Bellwood Subdivision. The junction between the two lines was constructed as part of the introduction of Amtrak passenger rail service between the NEC and Newport News on June 15, 1976. (AM Junction is an abbreviation of Amtrak Junction). Today, the junction is used by four Northeast Regional (Virginia) passenger trains and multiple CSXT freight trains.

Less than 100 feet north of where the CSXT Peninsula Sub joins the Bellwood Sub, the BBRR leaves the Bellwood Sub to head north to Doswell and then west to Clifton Forge. The straight, or "normal," move for this turnout is lined from the Bellwood Sub onto the BBRR going north. Trains that want to continue north on the Bellwood Sub, including Northeast Regional (Virginia) trains, must take the diverging switch at a lower speed. BBRR leased the trackage between Richmond and Clifton Forge from CSXT (a continuation of the former C&O route) and provides local freight service on it. CSXT retains trackage rights on the BBRR between Richmond and Clifton Forge, and sends several westbound empty bulk trains over it each day, leaving its own line from Clifton Forge to primarily handle loaded eastbound trains. At Clifton Forge, the BBRR rejoins the second CSXT east-west main line from Richmond, which follows the James River between those two cities.

CSXT's use of the Peninsula/Bellwood Subdivision connection at AM Junction to change a train's primary direction of travel from east-west to north-south brings with it some time-consuming, complex operational requirements, including:

- **The connection between east-west and north-south routes through Richmond is not configured for the primary flow of rail traffic**. The connection allows trains moving from east to north to operate as a progressive move. However, the primary flow of traffic is from west to south and secondarily from west to north. Because no direct connection exists that allows trains from the west to turn south or north, these trains must first move east through Richmond to Fulton Yard, then reverse direction and enter the Peninsula Subdivision to pass the connection at AM Junction, then reverse direction again to operate south on the Bellwood Subdivision. Alternatively, trains can continue north on the Bellwood Subdivision past Hermitage and around the wye at Acca Yard to head south on the A-Line. Trains from west to north must have their locomotives run-around to the opposite end at Fulton Yard before proceeding west to AM Junction and north on the Bellwood Subdivision. These trains may also change crews at Fulton Yard.
- **A northbound ruling grade of approximately 1 percent**. The climb out of the James River valley for northbound trains on the Bellwood Subdivision averages approximately 1 percent from Main Street Station as far as Hermitage. Many trains entering the Bellwood Subdivision at AM Junction have helpers to assist them up this grade. These helpers tie onto trains at Fulton Yard east of Richmond and stay with the train until the South Acca interlocking. At that point, the helpers will cut off, and operate light back to Fulton Yard.
- **Limited opportunities to switch tracks**. The Bellwood Subdivision is a two-track railroad from the Hermitage interlocking near Acca Yard south to Brown Street interlocking in downtown Richmond, a distance of 3.1 miles. However, the connections to east-west lines at AM Junction occur only on the easternmost of the two tracks (Track 2), just north of Brown Street. There is no crossover at AM Junction that provides trains the option of using either Track 1 or Track 2 between Hermitage and AM Junction. As a result, the complex reversals of direction and uncoupling of helpers described above can only occur on Track 2, constraining operations.
- **Slow train speeds**. The steep grade and several tight curves (between 3 and 6 degrees) limit train speeds on the Bellwood Subdivision to less than half the allowable speed on the RF&P Subdivision. Passenger trains operate between 15 and 30 mph between AY Junction and AM Junction. Freight train speeds are held to a maximum of 25 mph.

- **Multiple dispatcher territories**. Train movements through Richmond involve communication with two and possibly three different dispatchers, depending on the route being used. Trains must contact and receive permission from the respective dispatcher to operate over a rail line prior to their movement on it.

Amtrak operates two daily round trip Northeast Regional (Virginia) passenger trains between Boston and Newport News. These trains use the RF&P Subdivision south of Washington, D.C., to Acca Yard, and operate south on the S-Line to AM Junction, where they access the connection to CSXT's east-west Peninsula Subdivision to Newport News. The trains make a stop at Richmond's Main Street Station (east side platform), which is located on the Peninsula Sub. The two round trips provide a morning departure and evening departure in each direction at Main Street Station.

The two trains are scheduled to meet on the Peninsula Subdivision east of Main Street Station and Rivanna Junction, the interlocking east of Main Street Station where two main tracks begin heading eastward. However, if one of the trains is running behind schedule, the delay will also impact the opposing passenger train because there is no place where passenger trains can pass each other on the Bellwood Subdivision or at any point between Acca Yard and Rivanna Junction. The lack of interoperable main track and crossovers creates conflicts for Northeast Regional (Virginia) trains to and from Newport News over a distance of approximately 8 miles between Richmond's Staples Mill Road Station past Acca Yard and Main Street Station to Rivanna Junction. Particular chokepoints include the track configuration at AY interlocking, where only one train can cross at a time; the restricted use of just one track on the S-Line between South AY and AM Junction; the single-track connection to the Peninsula Subdivision at AM Junction; and the slow track speeds between Staples Mill Road and Rivanna Junction.

The two Northeast Regional (Virginia) train-pairs to and from Newport News also experience the slowest average speeds of any passenger train on the DC2RVA corridor. Northeast Regional (Virginia) passenger trains have scheduled times between Staples Mill Road and Main Street Station of 25 to 35 minutes, an average speed of approximately 15 mph. The low average speed is caused by the slow speeds associated with passing Acca Yard, crossing the throat of Acca Yard at AY interlocking, traversing the slow-speed Bellwood Subdivision, and some recovery time built into the schedule to account for delays from conflicts with opposing Amtrak trains on single-track sections or potential freight train delays.

3.2.8 CSXT S-Line South: Bellwood Subdivision, Brown Street in Richmond, VA-Centralia, VA

Owner/Operator: CSXT

Subdivision Route/Mileage: Brown Street (SRN 0.4)-Centralia (S 10.9) (Figure 3-25)

Distance: 11.3 miles

Line Heritage: Seaboard Air Line

Number of Main Tracks: One and two main tracks

Maximum Allowable Speed-Passenger: 25 mph

Maximum Allowable Speed-Freight: 25 mph

Limiting Passenger Speed: 10 mph between S 0.0-S 0.7 due to track condition and station proximity.

Signals: Wayside Control Point Signals (CPS)

Operational Authority: Centralized Traffic Control (CTC)

Maximum Allowable Gross Weight: 286,000 lbs.

Clearances: 16'10" (multi-levels prohibited)

Trains per Day:

- 0 Passenger
- 10 – 20 Freight (CSXT)

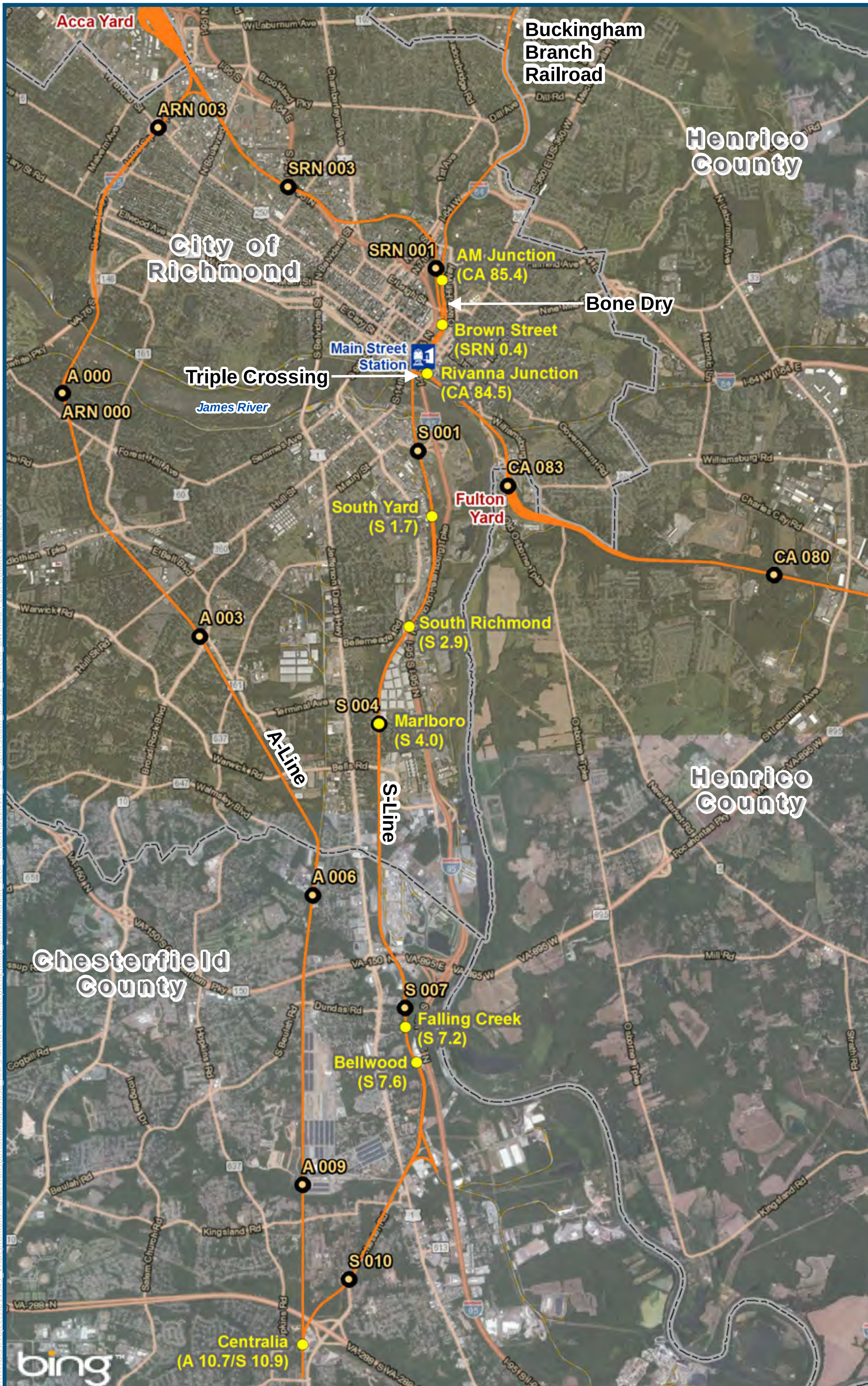
Crossover locations:

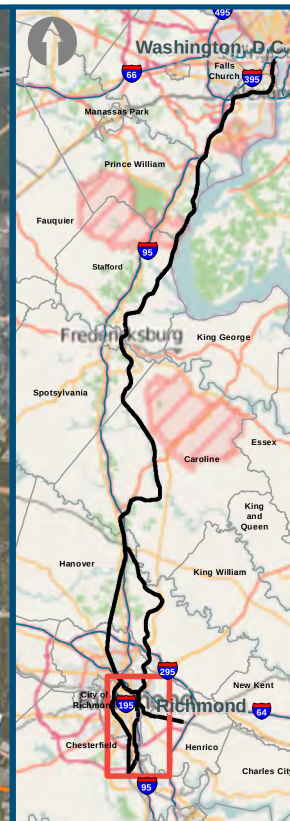
- South Richmond (S 2.9): North end of two main tracks
- Marlboro (S 4.0): Crossover from Track 2 to 1 southbound
- Falling Creek (S 7.2): South end of two main tracks

3.2.8.1 Overview

The Bellwood Subdivision (S-Line) continues south from Brown Street interlocking (the south end of a double-track section from Hermitage). The line passes the west side of Main Street Station in downtown Richmond, then continues south across the James River on a single-track, 10-mph bridge, headed to industrial South Richmond and a junction with the North End Subdivision (A-Line) at Centralia. Passenger trains do not use this section of the Bellwood Subdivision. The line is primarily used by three types of freight trains:

1. Local trains shuttling cars between Acca Yard and customers and local freight yards south of Richmond.
2. Loaded bulk trains of coal and sulfur headed to destinations in South Richmond and Hopewell, VA (Hopewell Subdivision).
3. Empty bulk trains cycling north from Centralia, Hopewell, and other points, headed for AM Junction to operate west on the BBRR.





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1 inch = 1.5 miles
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Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
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Legend

- CSXT Control Point
- CSXT Mileposts
- Exsiting Track
- Amtrak Station
- County/City Boundaries

Figure 3-25
CSXT
S-Line South

3.2.8.2 Brown Street and Bone Dry

Brown Street interlocking (SRN 0.4) is the south end of a section of double track that begins 3.1 miles north at the Hermitage interlocking. However, the utility of the double-track section between Hermitage and Brown Street is lessened because the connections to and from east-west lines at AM Junction (described in Section 3.2.7.3) occur only on the easternmost of the two main tracks, Track 2. Because the majority of Bellwood Sub trains are entering or exiting the line at AM Junction, most of the Bellwood Sub's train movements can only occur on Track 2, limiting the opportunities for more than one train at a time to pass through this area.

AM Junction is located just north of Brown Street. Between Brown Street and AM Junction on Track 2 is a location called Bone Dry. This location is the point where northbound empty bulk trains stop and change crews. The crew change occurs before the empty bulk trains enter the BBRR at AM Junction to operate west to Clifton Forge. A bulk train stopped at Bone Dry for a crew change will block the Brown Street interlocking and extend south past Main Street Station toward the James River bridge. If an outbound crew is not ready, the inbound crew will tie down the train at Bone Dry, blocking the S-Line, and wait for a crew van to pick them up.

Going south from Brown Street, the Bellwood Subdivision is elevated on a steel viaduct with concrete piers. The viaduct extends past the west side of Main Street Station to the James River bridge. At one time, this viaduct had two tracks that converged to one track just before the James River crossing. Today, only the easternmost of the tracks is in service.

3.2.8.3 The Triple Crossing and James River Bridge

Just before crossing the James River, the Bellwood Subdivision bridges over a NS rail line while also crossing beneath CSXT's east-west James River line (Rivanna Subdivision) (Figure 3-26). This location is Richmond's famed "Triple Crossing," one of the few places in the United States where three railroad lines cross each other at three different levels. The Bellwood Subdivision is the middle part of this crossing. However, the rail bridges over and under the Bellwood Subdivision have clearance restrictions of 16 feet 10 inches. This prevents the Bellwood Subdivision from being used by double-stack container trains or Amtrak's double-deck auto rack cars used on Amtrak's Auto Train, which have a height of approximately 20 feet.

FIGURE 3-26: TRIPLE CROSSING

South of the Triple Crossing, the Bellwood Subdivision passes through a notch in a flood control wall, and then crosses the James River on a single-track bridge. The track speed on the elevated viaduct in Richmond and across the James River Bridge is 10 mph. Trains are held to this restricted speed for a distance of 1.1 miles.

At the south end of the James River bridge, the Bellwood Subdivision passes through another flood wall. South of the bridge and flood wall, the Bellwood Subdivision crosses an NS spur at grade on a diamond at a location called Rockets (S 0.7). This crossing is remotely controlled by the CSXT Bellwood Subdivision dispatcher. The NS spur runs from NS's Belle Isle Yard in South Richmond east to the Richmond Wastewater Treatment Facility. NS train movements across the Bellwood Sub reportedly no longer take place, although NS maintains the trackage rights. The southwest corner of the diamond has an NS quadrant track that comes parallel to the CSXT Bellwood Sub. The NS and Bellwood Sub tracks run parallel on a shared alignment southward for approximately 1 mile to CSXT's South Yard. The NS track is used by NS local freights interchanging cars with CSXT at South Yard.

3.2.8.4 South Yard

South Yard (S 1.7) is a local support yard for customers in South Richmond, including at the Port of Richmond. CSXT bases a local freight at South Yard. The yard contains six tracks approximately 2,000 to 2,200 feet long, in addition to the main line track. The yard is stub-ended, and can only be accessed from the main line at the north end. South Yard is located west of the Bellwood Sub main track, separated by the remains of a former second main track located in between the yard and the main line. A 5-mile-long spur diverges from the east side of the

Bellwood Sub main track to serve the Port of Richmond's Deepwater Terminal. Several rail shippers are located on this spur.

3.2.8.5 South Richmond to Falling Creek

A 4.3-mile section of double track exists between South Richmond (S 2.9) and Falling Creek (S 7.2). There is a mid-section crossover at Marlboro (S 4.0) to allow southbound trains to cross from the easternmost main track (Track 1) to the westernmost track (Track 2), and avoid any potential switching activity associated with Fanshaw Yard (S 4.7). Fanshaw Yard is a four-track facility on the east side of the main line. It supports rail service to the Cogentrix Energy power plant. South of Fanshaw Yard, the Bellwood Subdivision crosses Falling Creek on two parallel steel deck bridges.

3.2.8.6 Bellwood

Bellwood (S 7.6) is the junction of the 14.4-mile Hopewell Subdivision, which runs southeast to Hopewell, a chemical and manufacturing center on the James River. A wye at Bellwood allows trains on the Bellwood Subdivision from either direction to enter the Hopewell Subdivision. In the middle of the wye is a 5-track yard where CSXT bases a local freight. There is also a two-track staging area north of the wye in an area where the Bellwood Subdivision and the north wye track of the Hopewell Subdivision run parallel before joining. Most trains operating on the Hopewell Subdivision are unit bulk trains and local trains from Richmond that access the line by operating southbound on the Bellwood Subdivision, including unit coal trains bound for Dominion's Chesterfield Power Station located in Chesterfield County off Coxendale Road, southwest of the James River. (Their counterparts leave the Hopewell Subdivision and operate north on the Bellwood Subdivision to Richmond.)

3.2.8.7 Centralia

At Centralia (S 10.9), the single-track Bellwood Subdivision (S-Line) connects to the double-track North End Subdivision (A-Line). Most of the trains that diverge from the North End Sub at Centralia to access the Bellwood Sub are empty bulk trains with destinations in the Appalachian Mountains or Great Lakes region. These trains will operate north on the Bellwood Subdivision to Richmond, then enter the BBRR AM Junction to operate west toward their final destinations.

3.2.9 CSXT Peninsula Subdivision: AM Junction in Richmond, VA-Beulah, VA

Owner/Operator: CSXT

Subdivision Route/Mileage: AM Junction (CA 85.4)-Beulah (CA 76.2) (Figure 3-27)

Distance: 9.2 miles

Line Heritage: Chesapeake & Ohio Railroad

Number of Main Tracks: One and 2 main tracks

Maximum Allowable Speed-Passenger: 79 mph

Maximum Allowable Speed-Freight: 50 mph

Limiting Passenger Speed: 15 mph between CA 84.8-CA 84.5 due to track condition and station proximity.

Signals: Wayside Control Point Signals (CPS) and Automatic Blocks Signals (ABS)

Operational Authority: Centralized Traffic Control (CTC)

Maximum Allowable Gross Weight: 286,000 lbs.

Clearances: 19’2” (double-stack), 19’1” (auto rack)

Trains per Day:

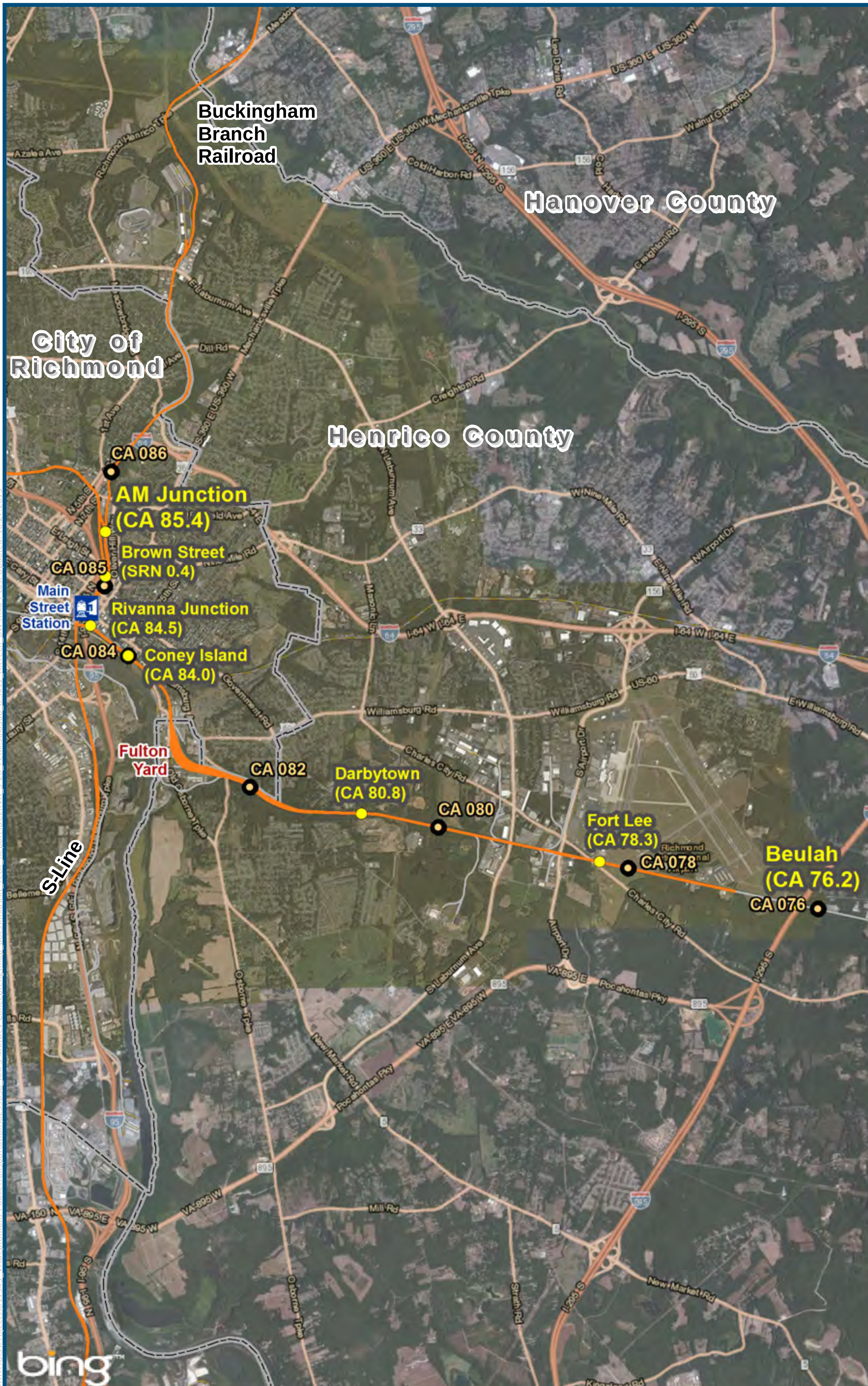
- 4 Passenger (Amtrak)
- 10-20 Freight (CSXT)

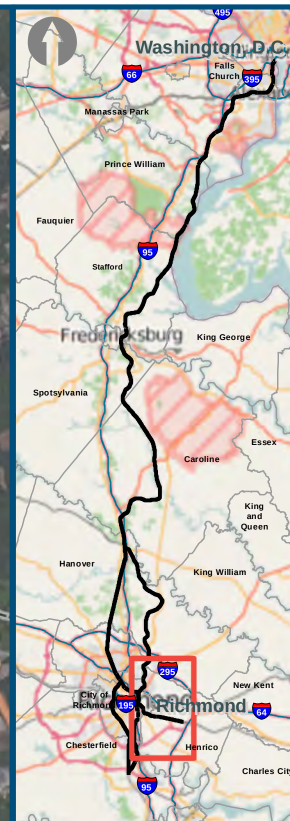
Crossover locations:

- Rivanna Junction (CA 84.5): Track 1 to 2 eastbound
- Coney Island (CA 84.0): Track 2 to 1 eastbound
- Darbytown (CA 80.8): Track 2 to 1 eastbound
- Fort Lee (CA 78.3): Track 2 to 1 eastbound
- Beulah (CA 76.2): East of end of two main tracks

3.2.9.1 Overview

CSXT’s Peninsula Subdivision forms part of the original Chesapeake & Ohio main line (BBRR north of Richmond) between the Appalachian Mountains and the Atlantic Coast at Newport News. The line became an important conduit for transporting coal to Eastern consumer markets and tidewater export piers. Owing to the line’s tight curves and steep grades, Chesapeake & Ohio ultimately acquired a second route between the mountains and Richmond that followed the James River on a low-grade alignment. The two routes joined at Rivanna Junction near downtown Richmond.





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Legend

- CSXT Mileposts
- CSXT Control Point
- Exsiting Track
- Virginia Rail Lines
- Amtrak Station
- County/City Boundaries

Figure 3-27 CSXT Peninsula Subdivision

The CSXT Peninsula Subdivision, begins at AM Junction and runs east to Rivanna Junction, as a single-track line used primarily as CSXT's only connecting track between its east-west (James River line and BBRR) and north-south routes (CSXT North End Subdivision [A-Line] and Bellwood Subdivision [S-Line]) in Richmond. From Rivanna Junction, the Peninsula Subdivision continues east as an alternating single- and double-track main line between Richmond and Newport News to the east and double-track James River line (Rivanna Subdivision) to the west. It is used primarily by coal trains headed between the James River line and the tidewater export piers, Northeast Regional (Virginia) passenger trains serving Newport News, and unit rock trains bound for stone yards. Just east of Rivanna Junction is Fulton Yard, where CSXT trains are staged or held for crew changes, locomotive run-arounds, helper attachments, or other rail activities depending on destination.

CSXT uses its two former Chesapeake & Ohio main lines in a directional running operation for coal and other bulk trains between the Appalachian Mountains and Richmond. Loaded bulk trains operate from Clifton Forge east to Richmond on the low-grade James River line. Empty bulk trains cycle from Richmond back west to Clifton Forge on the BBRR, which has steeper grades. This operating pattern minimizes freight train delays caused by meets with opposing traffic on either single-track line. Exceptions to this general rule will occur, however, depending on CSXT traffic conditions and operating requirements.

3.2.9.2 AM Junction

AM Junction (CA 85.4) marks the west end of the Peninsula Subdivision, where it connects to CSXT's Bellwood Subdivision (described in Sections 3.2.7 and 3.2.8). Although the Bellwood Subdivision has two main tracks in the vicinity of AM Junction, the connection with the Peninsula Subdivision can only be made to the easternmost Bellwood Subdivision main track (Track 2). There is no crossover at that point that would allow a train on Bellwood Subdivision Track 1 to access the Peninsula Subdivision.

Less than 100 feet north of the connection where the Peninsula Sub joins the Bellwood Sub, another turnout exists for the connection to the BBRR. CSXT operates empty coal and bulk trains west on the Peninsula Subdivision to head west on the BBRR. Prior to the reconfiguration of AM Junction, the BBRR trackage was a continuation of the Peninsula Sub trackage and trains had a continuous uninterrupted route between the two lines. Today, however, these trains (controlled by the Peninsula Sub dispatcher between Newport News and AM Junction) must receive permission from the Bellwood Sub dispatcher to enter the Bellwood Sub at AM Junction to use that small section of trackage before exiting onto the BBRR.

3.2.9.3 Main Street Station

Less than a half-mile east of AM Junction, the Peninsula Subdivision curves through downtown Richmond on an elevated steel viaduct approximately a half-mile long that passes the east side of Main Street Station and ends at Rivanna Junction. The steel viaduct was built at the beginning of the twentieth century, concurrent with the construction of Main Street Station, and at one time held two main tracks. Today, there is only one track in place on the viaduct. At Main Street Station, the space on the viaduct once occupied by the second main track is now used for a platform to board and detrain Northeast Regional (Virginia) passengers. Rather than access the tracks from the train shed, passengers exit the headhouse and board from this new platform on top of the elevated rail viaduct. Two Northeast Regional (Virginia) daily round trips, operating between Boston and Newport News, currently serve the historic station. Additional detail on Main Street Station is provided in Chapter 8.

3.2.9.4 Rivanna Junction

At Rivanna Junction (CA 84.5), the eastern end of CSXT's James River line, called the Rivanna Subdivision, joins the Peninsula Subdivision. The junction is located atop an elevated steel viaduct. The Rivanna Subdivision passes through downtown Richmond on a double-track railroad steel viaduct. (It forms the top railroad of Richmond's Triple Crossing.) At Rivanna Junction, the double track continues eastward as part of the Peninsula Subdivision. (Historically, when both the Peninsula Subdivision and Rivanna Subdivision were double-tracked, a specialized turnout component called a movable point frog[7] existed at Rivanna Junction that allowed two of the main tracks to cross at grade on the viaduct.) Today, a single crossover allows trains using the single-tracked portion of the Peninsula Subdivision from AM Junction to use either main track east of Rivanna Junction. The elevated viaduct continues east for another half-mile to Coney Island (CA 84.0), where a rise in the land allows the Peninsula Subdivision to be on solid ground for approximately 200 feet. Another crossover, built in the opposite configuration of Rivanna Junction's, is located at Coney Island. Then the double-track line continues east on another steel viaduct for approximately 0.6 miles to Nicholson Street (CA 83.4), the western end of Fulton Yard.

Northeast Regional (Virginia) passenger trains travelling between Main Street Station and Newport News are scheduled to meet in this double-track section east of Rivanna Junction. Because of the lack of multiple track and crossovers between Rivanna Junction and Staples Mill Road Station, if an eastbound Northeast Regional (Virginia) train from Richmond is delayed, the impact will cascade to the westbound Northeast Regional (Virginia) train it is scheduled to meet. Conflicts occur throughout the 8 miles of rail line between Rivanna Junction and Staples Mill Road Station, since only one train at a time can operate in this section, and must do so at slow speed. Particular chokepoints include the track configuration at AY interlocking, where only one train can cross at a time; the single-track S-Line between South AY and AM Junction, and the single-track connection to the Peninsula Sub at AM Junction.

3.2.9.5 Fulton Yard

Fulton Yard is located just east of downtown Richmond. The 12-track yard is approximately 2.6 miles long and serves primarily as a staging point for bulk trains operating to and from the export piers at Newport News, located approximately 70 miles east of Richmond. Loaded coal trains bound for Newport News may be held for space at Fulton Yard. Empty bulk trains may be combined, reclassified, or held for space at Fulton Yard before returning to reloading points in the Appalachian Mountains (generally via the BBRR). Fulton Yard also provides a holding point for trains operating through Richmond that use the Peninsula Subdivision as a connecting track to reach CSXT's north-south lines (the Bellwood Sub, North End Sub, and RF&P Sub). Fulton Yard is a crew change point for trains operating east or west on the Peninsula Sub, Rivanna Sub, or BBRR. Trains destined to operate north or south on the Bellwood, North End, or RF&P subdivisions (accessed via the Peninsula Sub connection with the Bellwood Sub at AM

[7] A frog is a device at the intersection of two running rails to permit the flange of a wheel moving along one rail to cross another rail.

Junction) typically also receive a new crew at Fulton Yard, though that crew will likely be taxied down from Acca Yard, in accordance with labor union operating agreements.

Fulton Yard is the base of operations for a round-the-clock pusher, which helps push loaded coal trains east on the Peninsula Sub up a steep 0.8 percent grade from Richmond to Beulah. The pushers also push westbound trains on the Peninsula Sub destined for the Bellwood Subdivision (S-Line) or North End Subdivision (A-Line); these trains encounter grades of approximately 1 percent on the Peninsula and Bellwood Subs between Rivanna Junction and Acca Yard.

Fulton Yard is located in between the Peninsula Subdivision's two main tracks. However, only one of the main tracks (Track 2) is signaled for movement in both directions. The northern of the main tracks, Track 1, is only signaled for westbound movement (i.e., movement with the current of traffic). Any train moving eastbound on Track 1 (against the current of traffic) must call the train dispatcher to receive verbal authorization and a signal indication before proceeding.

This signaling configuration has the potential to affect Northeast Regional (Virginia) passenger train movements. Northeast Regional (Virginia) trains are currently scheduled to meet twice a day on the double-track section of the Peninsula Sub between Rivanna Junction and Beulah. Without having both main tracks signaled in both directions, a meet between passenger trains, or a conflict between passenger and freight trains in the vicinity of Fulton Yard, may require the eastbound passenger train to slow down or stop in order to receive permission to move eastward on Track 1 past Fulton Yard.

3.2.9.6 Darbytown and Fort Lee

Darbytown (CA 80.8) is the eastern limit of Fulton Yard. A crossover exists that allows eastbound trains confined only to Track 2 past Fulton Yard to continue operation on Track 1 east of that point. East of Darbytown, the Peninsula Subdivision is lined with railroad freight customers on both the north and south side of the alignment as far east as Fort Lee (CA 78.3), by the Richmond airport. Fort Lee also contains a crossover that allows eastbound trains to switch from Track 2 to Track 1.

3.2.9.7 Beulah

At Beulah interlocking (CA 76.2), the two-track Peninsula Subdivision from Richmond continues east toward Newport News as a single-track main line. The next opportunity for trains to pass east of Beulah is the controlled siding at Providence Forge, approximately 15 miles to the east.

3.2.10 Buckingham Branch Railroad: AM Junction in Richmond, VA-Doswell, VA

Owner/Operator: BBRR

Subdivision Route/Mileage: AM Junction (85.5)-Doswell (111.8) (Figure 3-28)

Distance: 26.3 miles

Line Heritage: Chesapeake & Ohio Railroad

Number of Main Tracks: One main track with passing sidings

Maximum Allowable Speed-Passenger: 25 mph

Maximum Allowable Speed-Freight: 25 mph

Limiting Passenger Speed: 25 mph

Signals: None

Operational Authority: Track Warrant Control (TWC); Interlocking Limits at Doswell

Maximum Allowable Gross Weight: 286,000 lbs.

Clearances: n/a

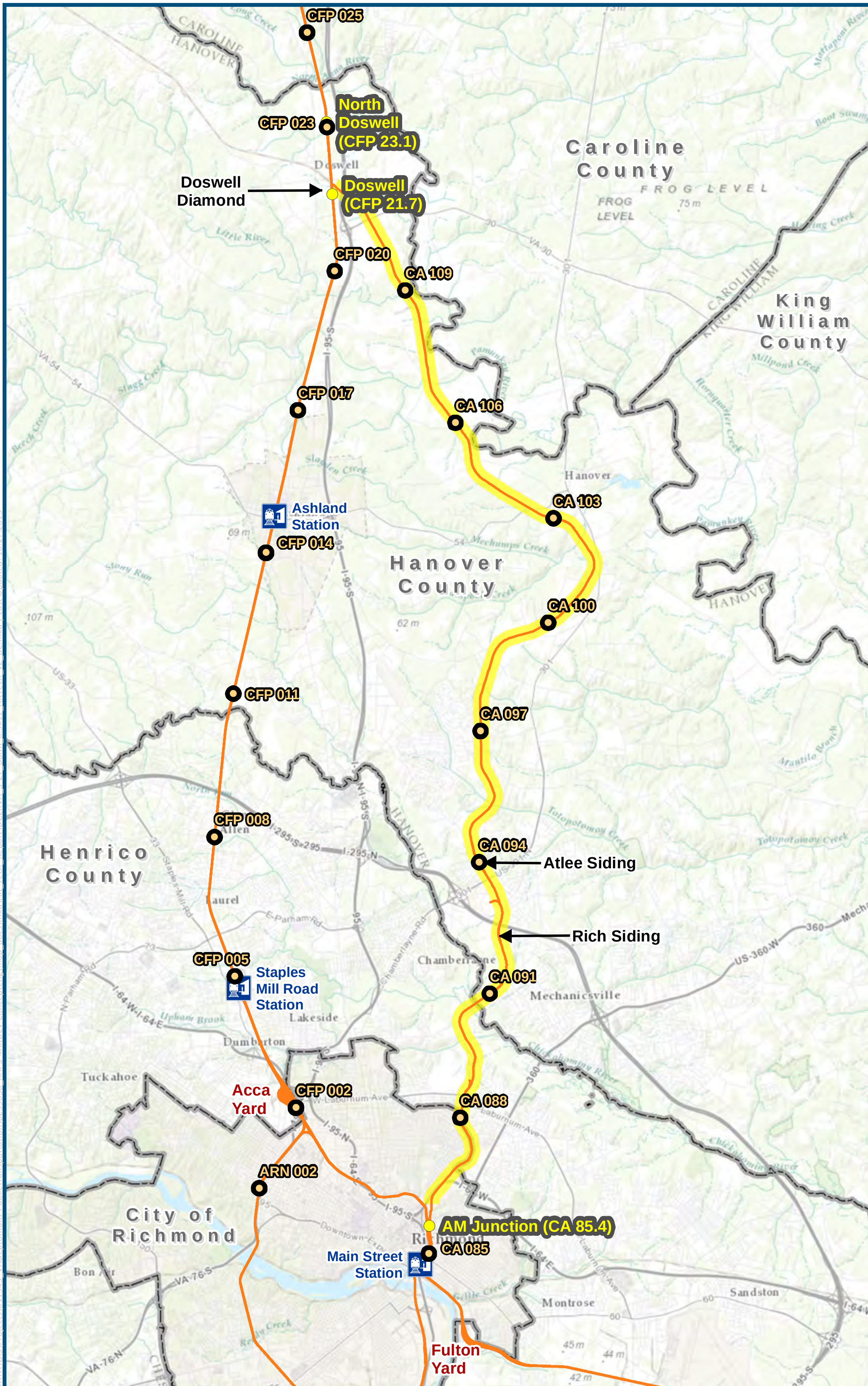
Trains per Day:

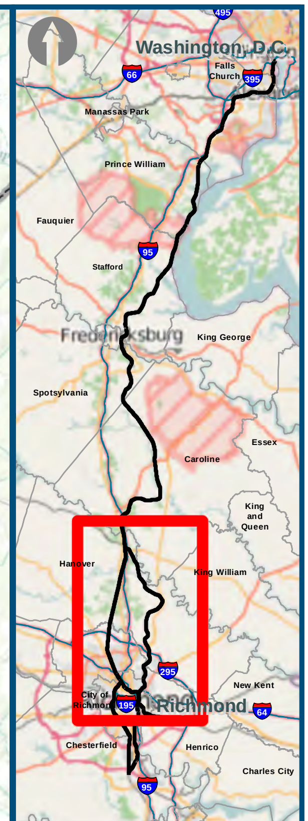
- 0 Passenger (Amtrak)
- 1-10 Freight (CSXT, BBRR)

3.2.10.1 Overview

The BBRR is a short line that leases from CSXT and operates a 200-mile rail line between Richmond and Clifton Forge. The eastern segment of the route is called the Piedmont Subdivision, running from AM Junction (MP 85.5) in Richmond across CSXT's RF&P Subdivision at Doswell to control point Bob (MP 159.3) near Gordonsville. BBRR operates local freight trains over the line to serve local freight shippers. CSXT has trackage rights on BBRR and operates bulk freights over the line with its own crews as needed. These trains are primarily empty coal, grain, and sulfur trains operating from Richmond west to Clifton Forge, where the trains will continue west on CSXT trackage to locations for reloading. (Routing westbound empty trains over the BBRR back to Clifton Forge keep the trains out of the way of loaded eastbound bulk trains, which use CSXT's single-track, low-grade James River line between Clifton Forge and Richmond.) CSXT also operates loaded bulk trains of stone on the BBRR from a quarry near Doswell east to receiving points on the Peninsula Subdivision between Richmond and Newport News. The volume of CSXT trains operating on the BBRR varies by day, depending on CSXT operational requirements, but can typically range between four and seven trains per day.

The BBRR is a low-speed (25 mph), single-track railroad with passing sidings less than a mile in length. The line between Richmond and Doswell also has a multitude of tight curves between 2 and 5 degrees, and grades as steep as 1.3 percent. The railroad is not signaled. Trains must receive verbal permission from the train dispatcher before operating over BBRR trackage.





0 1.5 3
Miles

1 inch = 3 miles
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap: ESRI
Topographic Map, 2015.

Legend

- CSXT Control Point
- CSXT Mileposts
- Existing Track
- Buckingham Branch Railroad
- Amtrak Station
- County/City Boundaries

**Figure 3-28
Buckingham
Branch Railroad:
AM Junction to
Doswell**

West of Gordonsville (outside of the DC2RVA project area), Amtrak's long distance Cardinal between New York and Chicago operates on the BBRR as far as Clifton Forge. This passenger train operates three days per week in each direction, traversing the BBRR on Sunday, Wednesday, and Friday. The two passenger trains are scheduled to meet on BBRR trackage. Because of the BBRR's short siding lengths, passenger trains must operate through the sidings while long CSXT bulk freights hold the main, an operating condition that has the potential to lengthen the running time of the passenger trains and cause delays. In addition, BBRR needs to keep a siding clear for the meet between opposing Amtrak trains. As a result, BBRR will often hold freight trains east of Gordonsville until both passenger trains have cleared. This practice has the potential to produce cascading delays for freight trains on the BBRR as far east as Doswell or Richmond.

3.2.10.2 AM Junction

AM Junction (MP 85.5) in Richmond is the eastern boundary of the BBRR. The BBRR begins at a turnout with CSXT's Bellwood Subdivision Track 2. The straight, or "normal," move for this turnout is lined from the Bellwood Sub onto the BBRR going north; trains that want to continue north on the Bellwood Sub, including Amtrak trains, must take the diverging move.

CSXT trains entering the BBRR at AM Junction will have previously received a new crew and received permission to proceed onto the BBRR from the BBRR dispatcher. BBRR local freights operate as fareast as Ruffin siding (MP 88.5), located approximately 3 miles west of AM Junction. Ruffin siding is 945 feet long and used by BBRR local freights working the Fairground Industry Track.

3.2.10.3 Rich and Atlee Sidings

Rich and Atlee are two sidings located one mile apart. Rich siding (MP 92.4) is 2,090 feet long and used by BBRR local freights to hold cars while switching the Rich Industry Track and the Richmond Times Dispatch printing plant. Atlee siding (MP 94.0) is 3,670 feet long and used for trains to pass. Atlee siding is a common location where a loaded eastbound stone train will meet an empty CSXT bulk train operating west.

3.2.10.4 Doswell Diamond Crossing

At Doswell (MP 111.8), the BBRR crosses CSXT's RF&P Subdivision at grade on a diamond. Track speed across the diamond on the BBRR is 25 mph (north south traffic on the RF&P subdivision travels at 60 mph for passenger trains and 40 mph for freight trains). CSXT controls the diamond, and trains on the BBRR must radio the CSXT RF&P Subdivision dispatcher to receive permission to proceed across it. There are connection tracks in the northwest and southwest quadrants of the diamond between the BBRR main line and the CSXT RF&P Subdivision. The northwest quadrant track is used by empty coal trains from the Sealston power plant on the Dahlgren Branch headed west on the BBRR to the Appalachian Mountains for reloading.

BBRR has a local freight yard just west of the diamond, and also serves several rail shippers in the immediate vicinity, including a bentonite transload facility adjacent to the yard. BBRR bases two local freights at the Doswell yard, each operating Monday through Friday. One freight train switches customers between Doswell and Ruffin siding in Richmond; the other freight operates west to Gordonsville, where it exchanges cars with a local freight based at Staunton, VA. BBRR also interchanges cars with CSXT at Doswell, on a set of tracks paralleling the RF&P Sub north of the diamond. BBRR uses the historic Doswell Union Station (built circa 1928) as an office to support the yard and other operations and maintenance activities on its leased CSXT trackage. Just north of the diamond Doswell Road crosses the tracks to access the community of Doswell on the east side of the rail line.

3.3 ENVIRONMENTAL CONDITIONS

Data on existing infrastructure, land use, environmental resources and characteristics, historic resources, topography, and socio-economic characteristics were collected from state agencies, federal agencies, and state and local governments to establish a baseline for known existing conditions within the corridor. After compiling GIS data from a multitude of sources, data layers were edited and processed for use in developing maps showing the corridor and its resources and conditions. Data layers were converted to computer aided design software (CAD) for use in developing potential rail alignments and other rail infrastructure improvements. In addition, geoprocessing models were developed to assist in determining reasonable and feasible alignments to carry forward in the alternatives development and screening process. The software used to process the information was ESRI's ArcGIS for Desktop Advanced, current version 10.3.

GIS data layers were collected from organizations in the federal, state, and local sectors, as well as private sources. The data outlined in this section were requested, provided, and/or downloaded from the following sources:

- CSXT
- FRA
- United States Environmental Protection Agency (EPA)
- Federal Emergency Management Agency (FEMA)
- United States Census Bureau
- United States Geological Survey (USGS)
- Bureau of Transportation Services
- National Oceanic and Atmospheric Administration (NOAA)
- National Wetlands Inventory (NWI)
- The Nature Conservancy (TNC)
- Virginia Department of Conservation and Recreation (VDCR)
- Virginia Department of Game and Inland Fisheries (VDGIF)
- Virginia Department of Forestry (VDOF)
- Virginia Department of Transportation (VDOT), including its Comprehensive Data and Reporting System (CEDAR)
- Virginia Economic Development Partnership (VEDP)
- Virginia Geographic Information Network (VGIN), Virginia Base Mapping Program (VBMP)
- Washington Metropolitan Area Transit Authority (WMATA)

- Twelve municipalities: Arlington County, City of Alexandria, Fairfax County, Prince William County, Stafford County, City of Fredericksburg, Spotsylvania County, Caroline County, Hanover County, Henrico County, City of Richmond, and Chesterfield County.

This collection of data was assembled to create the existing conditions layers to be used in developing and screening potential rail alignments and other improvements, and to identify sensitive resources to be avoided, and/or as a baseline to determine potential impacts of alternate alignments. The data acquired/obtained details of various resources within the DC2RVA corridor. A full list of the organizations that provided data and the accompanying data layers and details are included in Appendix B.

4 PREVIOUS STUDIES AND DESIGNS

The following provides an overview of some of the previous and ongoing rail planning studies in the Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA) corridor and adjacent sections of the larger Southeast High Speed Rail (SEHSR) corridor. The following section documents the National Environmental Policy Act (NEPA) status of different areas of the SEHSR and the current plans and projects underway in the area. A detailed list of previous and ongoing studies reviewed for the DC2RVA project is provided as Appendix D.

4.1 SEHSR AND NEPA STATUS

In 1991 the Intermodal Surface Transportation Efficiency Act (ISTEA) permitted Congress to authorize the United States Department of Transportation (U.S. DOT) to designate the original five High Speed Rail (HSR) corridors, which included the SEHSR corridor. In 1992, the Federal Railroad Administration (FRA) initially designated the SEHSR corridor to extend from Washington, D. C. to Charlotte, North Carolina via Richmond, Virginia and Raleigh, North Carolina. The U.S. DOT designated an extension of the SEHSR from Richmond to Hampton Roads in 1996. In 1998, the U.S. DOT further extended the corridor into South Carolina, Georgia, and Florida. Further extensions in 2000 added corridor connections in Georgia and Florida. FRA, in partnership with Virginia and North Carolina, initiated a Tier I Environmental Impact Statement (EIS) for the section of the SEHSR corridor from Washington, D.C. to Charlotte, NC in 1999, for which FRA completed a Final EIS and issued a Record of Decision (ROD) in 2002. The Tier I EIS selected an incremental approach to develop the SEHSR between Washington, D.C. and Charlotte, NC which is inclusive of the DC2RVA corridor. Key elements of the selected incremental approach are:

- Upgrade existing rail corridors (instead of developing new corridors).
- Utilize fossil-fuel burning equipment rather than electric-powered equipment.
- Add service as market demand increases and/or when funding is available.

The incremental approach seeks to minimize cost and potential impacts to the environment by utilizing existing railroad tracks and rail rights-of-way as much as possible. The components of the SEHSR corridor, shown in Figure 2-1, are in different stages of the planning and NEPA process based on need and funding. The following summary lists the status of major components of the SEHSR corridor:

- Washington, D.C. to Charlotte, NC
    - Tier I Final EIS and ROD completed in 2002
    - Richmond to Raleigh Tier II Final EIS signed in September 2015; ROD anticipated in 2016

  - Washington, D.C. to Richmond Tier II Final EIS and ROD anticipated in 2017
- Richmond, VA to Hampton Roads, VA
  - Tier I Final EIS and ROD completed in 2012
- Raleigh, NC to Charlotte, NC
  - FRA, in partnership with the North Carolina Department of Transportation (NCDOT), has completed multiple Tier II level environmental reviews for individual projects along the section of the SEHSR corridor between Raleigh and Charlotte. In total, these projects will increase passenger service to five daily round trips on this section of the corridor along with improved safety, reliability, and upgraded facilities.
- Charlotte, NC to Atlanta, GA to Jacksonville, FL
  - The Georgia Department of Transportation (GDOT) is leading a study to extend high speed rail into Georgia. The Charlotte to Atlanta Passenger Rail Corridor Investment Plan is being conducted in tiers. The Tier I EIS identifies potential corridor route alternatives, station locations, and levels of service. The Charlotte to Atlanta Final Tier I EIS and ROD are anticipated to be completed in 2017.
  - In 1998, the U.S. DOT extended the SEHSR corridor from Atlanta, GA through Macon, GA to Jacksonville, FL. FRA, in partnership with GDOT, completed a feasibility study for this section of the corridor in 2012[1].
  - In 1998, U.S. DOT extended the SEHSR corridor from Raleigh to Columbia to Savannah to Jacksonville. This section of the corridor has not yet been studied.

4.2 WASHINGTON, D.C. TO RICHMOND SOUTHEAST HIGH SPEED RAIL CORRIDOR SECTION

Over the past two decades, various passenger and freight rail studies and improvement projects have been completed for the Virginia sections of the SEHSR corridor above and beyond the NEPA documentation described above. These addressed rebuilding aging infrastructure; accommodating demand; increasing connectivity and capacity; and improving service to provide a better and more reliable freight/passenger rail system. A timeline of the previous corridor studies and other actions which included the Washington, D.C. to Richmond rail section is as follows:

- 1994—Virginia, North Carolina, South Carolina, and Georgia formed a four-state coalition (Southeast Rail Coalition) to facilitate the development of the SEHSR corridor.
- 1996—The Virginia Department of Rail and Public Transportation (DRPT) conducted an initial concept and feasibility study addressing the feasibility of implementing fast, frequent, and reliable passenger rail service in the Washington, D.C. to Richmond section of the SEHSR corridor.

[1] Georgia Department of Transportation—High Speed Rail Planning Services, Final Report. March, 2012.

- 1998—FRA, the Federal Highway Administration (FHWA), DRPT, and NCDOT signed a Memorandum of Understanding to jointly develop environmental documentation (Tier I EIS) for the SEHSR in Virginia and North Carolina.
- 1999—FRA and Amtrak conducted an operational analysis and preliminary engineering study, submitted to Congress in May 1999. The operational analysis evaluated then current facilities, services and operating conditions, and simulated the performance of future services over multiple configurations of infrastructure improvements. The study resulted in a set of recommended necessary improvements that would enable the Washington, D.C. to Richmond corridor to reliably accommodate the mix and volume of higher speed intercity passenger, commuter, and freight services that the line's operators (CSX Transportation [CSXT], Amtrak, and Virginia Railway Express [VRE]) and public partners (FRA and DRPT) envisioned for 2015.
- 2002—FRA and FHWA completed the SEHSR Washington, D.C. to Charlotte, NC Tier I EIS and jointly issued the ROD.
- 2003—DRPT completed the *Richmond Area Rail Master Plan – Phase I* document in which near-term improvements were identified supporting the redirection of passenger trains terminating at Staples Mill Road Station to a refurbished Main Street Station in downtown Richmond. Several earlier studies formed the basis of the document, including the range of proposed improvements that was identified by Amtrak in the May 1999 Report to Congress titled the "*Potential Improvements to the Washington – Richmond Railroad Corridor,*" and considered to be a living document that would continue to evolve over time. At about the same time, the "*Interim Phase Improvements – Staples Mill Rd. Station to Main Street Station*" and "*Final Phase Improvements – Staples Mill Rd. Station to Centralia*" reports were prepared by FRA. Both of these reports identified potential improvements required to support various levels of future passenger and freight traffic in the Washington, D.C. to Richmond rail corridor, and more specifically, within the metro Richmond area.
- 2004—DRPT conducted a *Third Track Conceptual Location Study* in which a third main line track was proposed for the 92.7-mile-long corridor between the Richmond Staples Mill Road Station and the Ravensworth Interlocking, a crossover between main line tracks that is located south of Franconia in the Northern Virginia suburbs of Washington, D.C. Additionally, DRPT released the Virginia Statewide Rail Plan.
- 2005—In 2005, the Virginia General Assembly created the Rail Enhancement Fund and dedicated 3 percent of the 10 percent tax on car rentals to finance rail infrastructure and Amtrak operations that expand service within Virginia. Since then, Virginia has invested public funds to upgrade privately owned rail lines in order to increase the competitive status of its ports, to reduce truck traffic on state highways, and to increase passenger rail service capacity. All Rail Enhancement Fund investments must meet a public benefit test showing a return on the investment of public funds and require a minimum of 30% matched funds from non-state sources.
- 2006—DRPT conducted a more detailed *Third Track Feasibility Study* in which an 8.1-mile-long rail corridor connecting Richmond's Main Street Station to Staples Mill Road Station via Acca Yard was studied in conjunction with the 92.7-mile-long corridor of the

previous (2004) study. This study, like the 2004 *Third Track Conceptual Location Study*, did not include parts of the corridor through Fredericksburg and Ashland, VA.

- 2008—On May 3, 2008, FRA issued a Finding of Infeasibility from the Americans with Disabilities Act, and waived the requirements for level boarding passenger platforms at Main Street Station.
- 2008—The Passenger Rail Investment and Improvement Act (PRIIA) established the initial guidance for the high speed rail corridors throughout the United States. In January 2008, Amtrak published its short-term action plan, *Part I for Advancing Passenger Rail in the Commonwealth of Virginia*. Additionally, DRPT released the updated rail plan *Virginia Statewide Rail Plan* and a *Rail Resource Allocation Plan* in July 2008.
- 2009—On May 29, 2009, FRA issued a letter to DRPT stating that it had considered but dismissed the Buckingham Branch Route between Doswell, VA and Main Street Station from further consideration for passenger service in the SEHSR corridor.
- 2009—Virginia and Amtrak partnered to provide state-subsidized regional intercity passenger rail service under the name "Amtrak Virginia," also referred to as Northeast Regional (Virginia) in the DC2RVA project. Amtrak Virginia assumed responsibility for five Amtrak Northeast Regional trains traveling the Project corridor from Washington, D.C. to Richmond (Staples Mill Road Station). Two of these Northeast Regional (Virginia) trains continued to Richmond's Main Street Station and on to Newport News. In 2010, this partnership introduced the following three new Northeast Regional service expansions by extending trains that had previously terminated at Union Station in Washington, D.C. south to Virginia, including:
  - One round-trip extending to Lynchburg, VA
  - A new round-trip extending to Richmond Staples Mill Road Station
  - A future extension of one round-trip train from Richmond to Norfolk (implemented in 2012)
- 2009—As part of the SEHSR program, DRPT conducted a comprehensive study of the Virginia I-95 High Speed Rail Corridor and formulated a *Service Development Plan*.
- 2010—Amtrak completed the *NEC Infrastructure Master Plan* that identified investment needed to maintain the current Amtrak Northeast Corridor (NEC) system so that it could be easily integrated into future freight/passenger service plans.
- 2010—Amtrak presented a high speed rail concept for the NEC - *A Vision of High-Speed Rail in the Northeast Corridor* (the 2010 HSR Vision).
- 2011—The Virginia-North Carolina High Speed Rail Compact was authorized by Congress and established through legislation enacted by the Virginia and North Carolina General Assemblies. The purpose of the Compact is to examine and discuss strategies to advance multi-state high speed rail initiatives. The development of the SEHSR corridor is the primary multi-state high speed rail initiative advanced by the Compact.
- 2011—Virginia's General Assembly established the Intercity Passenger Rail Operating and Capital Fund, providing a mechanism for the Commonwealth Transportation Board (CTB) and General Assembly to allocate transportation funds to intercity passenger rail operations and development projects.

- 2011—On September 23, 2011, FRA and DRPT executed Grant/Cooperative Agreement No. FR-HSR-0093-11-01-00, which allotted $44,308,000 in federal funding to develop a Tier II EIS and conduct preliminary engineering for the DC2RVA project. This grant was supplemented by $11,077,000 in state matching funds, including $8,101,000 from DRPT and $2,976,000 from CSXT.
- 2012—FRA initiated a NEC comprehensive planning effort to study, assess, and prioritize the investments in the NEC from Washington, D.C. to Boston. The NEC FUTURE Tier I EIS and Service Development Plan are to be completed in 2016. In July 2012, Amtrak also released its plans for the NEC, *The Amtrak Vision for the Northeast Corridor—2012 Update Report*.
- 2012—DRPT joined with CSXT in a Joint Corridor Planning and Investment Agreement to promote planning for high speed intercity passenger rail in the Washington, D.C. to Richmond corridor. The Agreement calls for CSXT to invest no less than $15 million in projects that benefit high speed intercity passenger rail in the corridor, including improvements to track, signals and communications, and other infrastructure. The Agreement stands in addition to various other agreements between CSXT and the Commonwealth of Virginia regarding state funded freight and passenger rail improvements and commitments, and among CSXT, the Commonwealth of Virginia, and the Potomac and Rappahannock Transportation Commission and the Northern Virginia Transportation Commission pertaining to VRE's commuter operations.
- 2013—DRPT updated Virginia's *Statewide Rail Plan* that identified passenger and freight rail improvements within this corridor along with various other corridors. An accompanying *Virginia Rail Resource Allocation Plan* was also released.

DRPT maintains a framework agreement with CSXT that defines the organizations' respective roles and responsibilities in developing and improving the efficiency of CSXT-owned rail lines in Virginia. Through various state rail improvement programs, such as Virginia's Rail Enhancement Fund, DRPT and CSXT continue to advance incremental capacity improvements along the Project corridor and other CSXT-owned rail lines to improve intercity passenger, commuter and freight service.

In addition to the high speed intercity passenger rail studies and projects listed above, DRPT, working with FRA, CSXT, Norfolk Southern (NS), VRE, Amtrak, and others, has also completed several track and system upgrades to address system bottlenecks and improve passenger rail service along the corridor in recent years, including

- Adding a double-track rail bridge over Quantico Creek.
- Adding a third track between Virginia Avenue and 10th Street in Washington, D.C. and between rail points SRO (Crystal City) to RO (Potomac River), AF (Alexandria) to RW (Ravensworth), and FB (Fredericksburg) to XR (Crossroads) in Virginia.
- Adding crossovers at Arkendale and Elmont in Virginia.

DRPT, in cooperation with the Virginia Department of Transportation (VDOT), has been working to improve safety at crossings by constructing highway and pedestrian bridges over rail lines; expanding the use of protection devices at private crossings; and installing constant warning time protection devices. Section 1103(c) of the Transportation Efficiency Act for the

21st Century (TEA-21) provided funds to improve highway-rail crossings and accommodate high speed rail in designated high speed rail corridors, including the SEHSR corridor.

4.3 RICHMOND TO RALEIGH SOUTHEAST HIGH SPEED RAIL CORRIDOR SECTION

A Tier II Final EIS for the Richmond to Raleigh section of the SEHSR corridor was signed by FRA in September 2015. It is anticipated that FRA will issue the ROD for the Final EIS in 2016, and that it will identify specific improvements to the Richmond to Raleigh corridor in support of the earlier SEHSR Tier I EIS. The corridor studied in the Richmond to Raleigh Tier II EIS overlaps with that of the Washington, D.C. to Richmond Tier II EIS, for 11 miles along the CSXT S-Line from Centralia in Chesterfield County north to Main Street Station in Richmond, which is the designated northern terminus for the Richmond to Raleigh study. The Richmond to Raleigh section will achieve maximum operating speeds up to 110 mph between Petersburg, VA and Norlina, NC on dedicated right-of-way.

4.4 RICHMOND TO HAMPTON ROADS SOUTHEAST HIGH SPEED RAIL CORRIDOR SECTION

In 2012, FRA, in partnership with DRPT, completed a Tier I EIS and ROD for the Richmond to Hampton Roads Passenger Rail Project, defining the route and service for the extension of the SEHSR corridor from Richmond Main Street Station south and east to Hampton Roads. The preferred alternative endorsed by FRA, DRPT, and the CTB would provide higher-speed passenger rail service from Richmond Main Street Station to the south side of Hampton Roads (Richmond to Norfolk) while improving conventional speed passenger rail service on the Peninsula (Richmond to Newport News). The Richmond to Norfolk higher speed service would utilize the CSXT S-Line from the west side of Main Street Station south for 10.9 miles to Centralia, where it would join the CSXT A-Line for 16 miles through Petersburg to a junction with the east-west NS line to Norfolk. The Richmond to Norfolk section will achieve maximum operating speeds up to 90 mph. The Richmond to Newport News conventional service would follow the existing route for Northeast Regional (Virginia) to Newport News at speeds up to 79 mph, which utilizes CSXT tracks (Peninsula Subdivision) from the east side of Main Street Station through Fulton Yard to Newport News.

In 2012, Amtrak Virginia initiated conventional speed passenger service from Richmond Staples Mill Road Station to Norfolk, which runs from Staples Mill Road Station south through Acca Yard and then along CSXT's A-Line to Centralia and on to Petersburg, and then east along NS's Norfolk District line from Petersburg to Norfolk.

4.5 NORTHEAST CORRIDOR FUTURE PLANS

In August 2015, the FRA released the NEC FUTURE *Tier I EIS Alternatives Report* that outlines the No Action and Action Alternatives that will be presented in the NEC Futures Tier I Draft EIS, completed at the conclusion of 2015. The NEC FUTURE *Tier I EIS Alternatives Report* includes analysis of travel markets, conceptual service plans, ridership modeling, and cost estimating, in addition to extensive responses from the public, agencies, and railroad stakeholders. The NEC FUTURE Final Tier I EIS and Service Development Plan are expected to be completed in 2016.

In July 2012, Amtrak also released its plans for the NEC, *The Amtrak Vision for the Northeast Corridor—2012 Update Report*.

4.6 VIRGINIA AVENUE TUNNEL

In June of 2014, the District of Columbia Department of Transportation (DDOT) and FHWA prepared a Final EIS for the re-construction of the Virginia Avenue Tunnel in Washington, D.C., for which FHWA issued a ROD for the project in November of 2014. The purpose of the project is two-fold; first, to provide CSXT with the ability to operate double-stack intermodal container freight trains on CSXT's National Gateway, and second, to eliminate a chokepoint caused by the Virginia Avenue Tunnel's single track. Owned and maintained by CSXT, the tunnel is located in southeast Washington, D.C. beneath the eastbound lanes of Virginia Avenue. The existing tunnel is approximately 4,000 feet long, contains a single railroad track, lacks sufficient vertical clearance for double-stack freight, and is more than 100-years old. The project will also re-establish a second set of tracks (the tunnel was originally constructed with two tracks), eliminating a chokepoint that currently delays all trains traveling through the Washington region, including passenger trains on the DC2RVA corridor.

In May 2015, CSXT began the major construction phase of the Virginia Avenue Tunnel Project. Construction activities to date include obtaining the proper permits, conducting preconstruction surveys and inspections, installing erosion and sediment control measures, relocation of utility infrastructure, mobilizing construction staging area, securing the construction site by temporarily closing Virginia Avenue and installing fencing, and building supports for a temporary retaining wall necessary to construct the permanent tunnel elements.

4.7 LONG BRIDGE

DDOT, in partnership with FRA, prepared the Long Bridge Study to determine the feasibility of alternative options for expanding or replacing Long Bridge, CSXT's double-track rail bridge that carries freight, Amtrak and VRE service across the Potomac River from Washington, D.C. into Arlington, VA. The Long Bridge Study considered improvements to rail infrastructure from L'Enfant Interlocking in Washington, D.C. across the Potomac River to RO Interlocking in Arlington, a major consideration being whether to replace or rebuild the Long Bridge. The Long Bridge Study (Phase I) was completed in May 2015. Most of the project alternatives that advanced through initial screening recommended placing four tracks across the Potomac River, either by building a new four-track bridge or a new two-track bridge while keeping the existing bridge in service. DDOT is currently conducting Phase II of the Long Bridge study to develop additional baseline data, including integrating the 2040 service plans of all the bridge users, and further screening the eight alternatives that were presented in Phase I. The Phase II "pre-NEPA" study will be used to draft a scope of work for the planned NEPA evaluation of project alternatives. DDOT in conjunction with FRA, DRPT, VRE, CSXT, and other stakeholders has begun the NEPA evaluation of expanding or replacing Long Bridge in 2016.

4.8 WASHINGTON UNION STATION MASTER PLAN

In July 2012, Amtrak and other stakeholders, including the Union Station Redevelopment Corporation (USRC), U.S. DOT, Maryland Transit Administration (MTA), DRPT, and the Washington Metropolitan Area Transit Authority (WMATA), developed a Master Plan that addresses existing deficiencies and future growth. The Master Plan envisions a phased construction effort to be implemented over a 15 to 20 year period, so as to minimize disruption to station users and surrounding neighborhoods.

The August 2015 Master Plan Concept Comparison Analysis and Report presented three master plan concepts. All three concepts meet Amtrak's anticipated needs for 2030 to varying degrees; the major concepts include relieving both passenger and train congestion, reconstruction of the rail yard to include new tracks and platforms, and renovation and expansion of existing tracks and platforms. A NEPA evaluation of project alternatives, led by FRA in conjunction with USRC and other stakeholders, is anticipated to begin in 2016.

Construction will be implemented in four phases:

- Phase 1 includes early action projects to facilitate subsequent construction phases and relieve existing passenger and train congestion and significant improvements to Concourse A.
- Phase 2 includes reconstruction of the east side of the rail yard, providing all new tracks, platforms (with two new tracks added), new passenger concourses, and replacement parking below.
- Phase 3 includes the renovation of the west side of the rail yard, including the terminal stub end tracks and construction of the train shed that will be the centerpiece of the passenger experience and the urban development above.
- Phase 4 provides for further expanded tracks and platforms on a lower level and the creation of a new Amtrak lower level concourse.

4.9 VIRGINIA RAILWAY EXPRESS CAPITAL IMPROVEMENTS

4.9.1 3rd Track Project, Hamilton to Crossroads

The Hamilton to Crossroads VRE third track project on the CSXT right-of-way was constructed from the VRE Crossroads Yard north to Hamilton in 2015. This project involved the installation of approximately 2.5 miles of third track and a longer yard lead to accommodate the VRE Spotsylvania Train Station that opened in November 2015.

4.9.2 New Spotsylvania Station

VRE constructed a new station in Spotsylvania, Virginia. The station opened in November 2015. The new terminal extends VRE service south of Fredericksburg to potentially draw several hundred new riders, and will include the addition of a new train on VRE's Fredericksburg Line. The new Spotsylvania station is located on the lead track to the VRE Crossroads Yard, which is parallel to but separate from the CSXT main line tracks.

4.9.3 New Potomac Shores Station

VRE is finishing the design phase for the Potomac Shores Station project, which will be located at CFP 82.6 on the CSXT main line. The Potomac Shores Station is intended to serve a new transit-oriented development by California-based developer SunCal. Construction of the Potomac Shores station is anticipated to begin in 2016. SunCal will cover half of the cost of the construction and public monies from the Rail Enhancement Fund will cover the other half. The new station service was made possible as a result of the Arkendale to Powells Creek Third Track project (see Section 4.15)

4.9.4 Station Assessments (Penta Platforms Project)

VRE is conducting preliminary station assessments for station improvements at five stations on the Fredericksburg line. The stations included in VRE's study are: Lorton, Rippon, Quantico, Brooke, and Leeland Road stations. Proposed improvements in the assessment include recommendations for: extending platforms, placing island platforms, providing for ADA access to the platforms, preferred side for a third track, and ways to integrate the stations with existing or proposed development in the surrounding areas.

4.10 RICHMOND'S BUS RAPID TRANSIT

In partnership with the U.S. DOT, DRPT, the City of Richmond, and Henrico County, are continuing activities with the Greater Richmond Transit Company (GRTC) to implement the GRTC Pulse Bus Rapid Transit (BRT) project. The BRT project is currently in the design phase and is anticipated to open to the public in 2018. It will use a mix of dedicated curbside bus lanes and a median busway through the busiest sections of the central city, with mixed-traffic operation on either end. The planned route will include stops in front of Main Street Station and the Virginia Science Museum (housed in the historic Union Station on Broad Street). It is projected that the BRT line will carry approximately 3,300 riders per day.

4.11 TRI-CITIES AREA MULTIMODAL STATION STUDY

The Tri-Cities Area Metropolitan Planning Organization and the Crater Planning District Commission completed a Tri-Cities Area Multimodal Station Study in August 2012 and are now in the process of performing a NEPA study to select a location for a Tri-Cities Area Multimodal Passenger Station. The Tri-Cities station location recommendation and a draft Environmental Assessment are anticipated to be completed in 2016. Potential station locations will be evaluated based on their relative accessibility to the greater transportation network, the ability of the site to accommodate the necessary amenities and services, and the impacts to the human, historical, or natural environment. A requirement for all station options is to accommodate the high speed rail operational requirements.

4.12 RICHMOND'S RENOVATION OF MAIN STREET STATION

Main Street Station reopened to passenger train travel in December 2003 after a $51.6 million renovation. This initial renovation included the acquisition and restoration of the Main Street Station headhouse, allowing for restoration of train service to downtown. The second phase of the renovation included acquisition of the train shed, Seaboard Building, and the remaining land. Through land leases, the construction of a plaza directly across from the station and beneath I-95 created an improved passenger drop off and tourism origination point.

In April 2014, Richmond Mayor Dwight Jones announced the advancement of the third and final phase of the renovation of Main Street Station. This phase includes the rehabilitation of the 100,000 square foot train shed that was acquired in the second phase. The rehabilitation of the train shed is currently underway. The City anticipates a portion of the rehabilitated train shed would provide additional space to expand intercity passenger rail services. The City is considering multiple plans for future use of the remainder of the train shed, including: a tourism welcome center, an indoor market with locations for eateries and culinary demonstrations, an event space, and a space that could accommodate Shockoe Bottom's history and the city's arts and outdoor scenes. The City anticipates that the renovated train shed could function similarly to Washington's Eastern Market or Philadelphia's Reading Terminal Market.

4.13 VIRGINIA PORT AUTHORITY 2040 MASTER PLAN

The Port of Virginia, in order to stimulate maritime commerce in the Commonwealth, is planning to expand the terminal capacity at the Port of Virginia facilities to keep up with the growing demand. By 2040, the demand for terminal capacity is forecasted to be over three times the existing demand; existing capacity at the six ports in Virginia will need to double to meet the forecasted demand. Four of the six ports are located in the Hampton Roads region of Virginia, including: Newport News Marine Terminal, Norfolk International Terminals, Portsmouth Marine Terminal, and Virginia International Gateway. Much of the freight traffic from the Hampton Roads ports interfaces with the rail network through Richmond and along the DC2RVA corridor. A fifth port, the Richmond Marine Terminal, is located on the CSXT Bellwood Subdivision (CSXT S-Line) within the DC2RVA corridor. The sixth port, Virginia Inland Port, is located in Front Royal, Virginia, approximately 75 miles west of the DC2RVA corridor.

In conjunction with the Commonwealth of Virginia's Statewide Long-Range Plan (*VTrans*), Virginia's Office of Intermodal Planning and Investment has developed a *Master Rail Plan for the Port of Virginia* to accommodate the growing terminal infrastructure needs. The *Master Rail Plan for the Port of Virginia* includes expansion of rail access to support increased freight truck to rail diversion and provide economic benefits to the Commonwealth by reducing transportation costs for both domestic and international trade. In Hampton Roads, planned improvements include:

- Doubling the on-dock rail capacity at Norfolk International Terminals with an on-dock rail yard.
- Adding yard capacity improvements to enhance highway grade crossing safety and reduce highway delays at grade crossings.
- Developing the proposed Craney Island marine terminal, anticipated to transport 50 percent of the projected 1.43 million rail containers entering Port of Virginia facilities.

Within the DC2RVA corridor, the Port of Richmond includes an approximately 3.5 mile long single rail lead that connects the port to CSXT's South Rail Yard. Additionally, there is a 1,500 foot siding and a 2,850 foot siding located along the lead, but both leads are in need of rehabilitation. The 2,850 foot siding includes an additional siding, which is currently abandoned. The *Master Rail Plan for the Port of Virginia* includes four areas of proposed improvements, including options for the rehabilitation of sidings, rail improvements inside the terminal perimeter, off-terminal improvements along the City-owned rail lead, and extending the existing rail lead to the north of its connection to CSXT's rail yard at Goode Street to provide additional rail access to an industrial site as well as connect to an existing NS rail spur (Rocketts Spur).

4.14 CSXT FRAMEWORK AGREEMENTS PHASE I PROJECTS

CSXT has proposed a series of infrastructure projects, known as the Phase I Projects, under a 2015 Framework Agreement with DRPT. Three of those proposed projects—a Main Line Relocation (West Acca Yard Bypass) and two universal crossovers on the A-line south of the James River at Meadow (A 1.0) and FA (A 5.6)—are within the DC2RVA corridor. Other Phase I projects are located on the CSXT North End Subdivision south of Centralia, and include extending a second main line track for 7.8 miles north from Carson (CSXT CFP A-37.8) to Reams (CSXT CFP A-30.0) with two universal crossovers and a new universal crossover at Petersburg. Another project will extend the Branchville siding (CSXT CFP SA-56.7-57.8) on the Portsmouth Subdivision east of the CSXT A-Line, which will reduce congestion near the Virginia/North Carolina border. The West Acca Yard Bypass consists of adding a bypass track around the yard adjacent to the existing passenger main track, moving the freight main through track from the center of the yard to the west side of the yard, and extending four main tracks from North Acca to Staples Mill Road Station, extending a main line track to Hermitage Road alongside the existing double track and adding a universal crossover. CSXT commenced the design work necessary to develop estimates on the total costs of the Phase I Projects.

4.15 ARKENDALE TO POWELLS CREEK THIRD TRACK

FRA awarded Virginia a $74.8 million grant to build 11 miles of third track adjacent to the existing CSXT main line and related improvements from Arkendale in Stafford County to Powells Creek in Prince William. The project includes addition of a third main track, sidings, turnouts, a new platform at Quantico Station, and improvements to the station at Marine Corps Base in Quantico. All upgrades are ADA compliant and include a new island platform to allow all three main tracks to host both intercity passenger and commuter service. A bus facility and enhanced parking will also be included in the station upgrades. These upgrades will require relocation of utilities, earthworks, drainage structures, retaining walls, and upgrades to all associated signals and communications. This third track project is currently under construction. The third main track is being built to Class 4 standards, and the track alignment and design speed matches the existing double-track main line. However, the project includes an expanded track bed in some areas to allow subsequent shifting of the track alignment to achieve greater speed.

4.16 POTOMAC YARD METRORAIL STATION

The Federal Transit Administration and other stakeholders, including the City of Alexandria, WMATA, and the National Park Service, have prepared a Draft EIS for the proposed Potomac Yard Metrorail Station. Four alignment options for the Metrorail station location were evaluated in the Draft EIS. Although one of the proposed alternative options included realigning the Metrorail track and CSXT track from Four Mile Run to East Glebe Road in the City of Alexandria, the preferred alternative does not affect the CSXT track or right-of-way. Construction would include a new Metrorail station, associated track improvements, and pedestrian bridges at Potomac Yard within the City of Alexandria. The station would be located along the existing Metrorail Blue and Yellow lines. The Draft EIS was completed in April 2015, with the Final EIS anticipated to be completed in 2016 with a ROD to follow.

5 ALTERNATIVES DEVELOPMENT AND SCREENING PROCESS

This chapter presents an overview of the alternatives development and screening process for the Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA) project. The process establishes a range of alternatives for consideration and then systematically evaluates and screens the range of alternatives down to only the more reasonable alternatives for detailed analysis in the Draft Environmental Impact Statement (EIS). Reasonable alternatives are those that meet the Project's Purpose and Need, are buildable and cost-effective compared to other similar alternatives, and are anticipated to have acceptable levels of impact to the human and natural environments.

The SEHSR Tier I EIS and 2002 ROD, and prior corridor studies cited in Chapter 4 recognized the need for an additional main track on the corridor to provide capacity for more passenger trains, improve reliability of passenger train service, and improve travel time. The alternatives development process for DC2RVA therefore began with DRPT developing preliminary rail alignments. These preliminary rail alignments define the general location and configuration of the existing and any additional main line tracks to meet the Project's Purpose and Need. DRPT developed these preliminary rail alignments, including improving existing track and any new track, in accordance with the Project's Basis of Design, which was developed to incorporate applicable engineering elements and design criteria supporting the Purpose and Need into the Project's track and roadway designs.

Preliminary rail alignments are the initial basis for project build alternatives, recognizing that adding a main line track and/or the potential realignment of the existing main line tracks is the driver for many of the other project-related improvements and potential impacts. Preliminary rail alignments including the addition of a new main track were developed by DRPT from the Potomac River in Arlington, VA to the Staples Mill Road Amtrak station in Richmond. The rail alignments developed for the DC2RVA project generally include the addition of a main track following the existing CSXT RF&P corridor and improvements to existing track to increase potential speed, accommodate platform improvements, improve roadway crossings, or make room for additional track. From Staples Mill Road Station south through Richmond to Centralia, VA, DRPT also developed preliminary rail alignment options – however, these Richmond area rail alignment options were based on multiple station location options along two primary alignments through the city. Design standards for the rail alignments and related infrastructure alternatives are identified in the DC2RVA Basis of Design.

Rail alignments were then screened by DRPT for possible impacts to key environmental resources, effects on other infrastructure, and existing and future rail operations. The rail alignments were also used to identify potential modifications to associated highway and rail crossing infrastructure and existing and potential stations. Developing potential rail alignments was an iterative process. Rail alignment modifications were made to avoid or minimize adverse effects on environmental resources and existing infrastructure, while preserving the ability of that alignment to meet the Project's Purpose and Need. The process focused on each rail alignment's ability to increase capacity to support increased passenger service, improved operating speeds, reduced trip times and improved reliability. DRPT determined which of the rail alignment, highway crossing modifications, and station improvements appeared reasonable and in support of the Purpose and Need. The reasonable options were then combined as Project alternatives for further evaluation in the EIS (Figure 5-1).

The overall development and screening process for rail alignments is described below; details on the actual rail alignments, highway and rail crossing options, and station location options are presented in subsequent chapters of this report, including:

- Chapter 6: Rail Alignment Screening
- Chapter 7: Corridor Crossing Options
- Chapter 8: Station Location Options
- Chapter 9: Alternatives Carried Forward to the Draft EIS

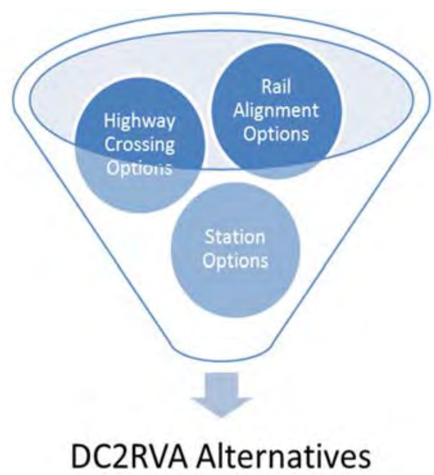


FIGURE 5-1: DEVELOPMENT OF ALTERNATIVES

5.1 RANGE OF ALTERNATIVES

A range of alternatives was developed for consideration, including a No Build Alternative (also referred to as the "no action alternative"), a No Additional Track Alternative (to include minor improvements), and multiple Build Alternatives featuring additional tracks. As described in Chapter 2, the DC2RVA corridor was divided into 20 segments, based on prior studies and for the purposes of developing and evaluating possible rail improvements to meet the Project's Purpose and Need. The rail infrastructure and other key attributes of these 20 segments are summarized in Appendix A. These 20 segments, plus 2 additional bypass segments, have been further grouped into three areas based on common rail operation characteristics and environmental conditions: Northern Virginia, Central Virginia, and Richmond (Figures 2-3 through 2-5). The rail alignment options, highway crossing options, and station location options were evaluated individually by segment (see Chapters 6, 7, and 8, respectively), and then assembled into six areas based on number of build alternatives (see Chapter 9).

5.1.1 No Build Alternative

The No Build Alternative, also referred to as the no action alternative in some documentation, represents the conditions in the corridor if the Project were not implemented, both now and projected into the future. It does include other reasonable and foreseeable projects that may be implemented independent of DC2RVA. The specific characteristics of the No Build Alternative will be defined and described further in the Draft EIS. While the No Build alternative by definition does not meet the Project's Purpose and Need, it is a required part of the National Environmental Policy Act of 1969 (NEPA) process and is carried forward into the Draft EIS for detailed analysis at the segment, area, and corridor level. The No Build Alternative provides a baseline against which to compare the benefits and impacts of the build alternatives.

5.1.2 No Additional Track Alternative

This build alternative includes improvements to signals and communications systems, at-grade crossing safety systems, the addition of crossovers between existing main line tracks, additional sidings, improvements to existing track and other minor rail infrastructure improvements. The No Additional Track Alternative does not include additional main line track. At the full corridor level, this alternative does not meet the Project's Purpose and Need because it does not provide sufficient improvements to increase passenger service capacity, frequency, or performance; however, it could be a viable alternative in some segments or sub-segments of the corridor. For example, the No Additional Track Alternative could serve as connector between two build alternatives at the segment or sub-segment level where there are viable build alternatives on either side of the segment needing only minor improvements, and build alternatives for that segment have unacceptable levels of impact to the human and natural environments. The No Additional Track Alternative could also be a reasonable alternative for segments where the existing numbers of track provides sufficient capacity, and no additional track is necessary.

5.1.3 Additional Track Alternatives

These build alternatives include:

- Segment-wide upgrades to existing track and signal systems to achieve higher operating speeds, including curve realignments, higher-speed crossovers between tracks, passing sidings, and grade crossing improvements.
- Segment-wide improvements to train operating capacity to achieve higher passenger train service frequency and reliability, including an additional main track along most of the corridor, and additional controlled sidings, crossovers, yard bypasses and leads, and other capacity and reliability improvements at certain locations.
- Station and platform improvements for Amtrak and Virginia Railway Express (VRE) stations (see Chapter 8).

The Additional Track Alternatives are primarily based on adding an additional main line track and/or shifting existing rail alignments to gain additional capacity and reduced trip time. The alternatives were first defined at the segment level by determining the need for and possible alignment of additional main track. The segment-level additional track options were evaluated and screened, and if determined by DRPT to be reasonable, assembled with adjoining segments into area options. Project segments and areas are defined in Chapter 2 of this report and include:

- Northern Virginia Area

  Segments

  1. Rosslyn to Alexandria (ROAF)
  2. Alexandria to Franconia (AFFR)
  3. Franconia to Lorton (FRLO)
  4. Lorton to Powells Creek (LOPC)
  5. Powells Creek to Arkendale (PCAR)
  6. Arkendale to Dahlgren Junction (ARDJ)
  7. Dahlgren Junction to Fredericksburg (DJFB)
  8. Fredericksburg to Hamilton (FBHA)
  9. Hamilton to Crossroads (HAXR)

- Central Virginia Area

  Segments

  10. Crossroads to Guinea (XRGU)
  11. Guinea to Milford (GUMD)
  12. Milford to North Doswell (MDND)
  13. North Doswell to Elmont (NDEL)
  14. Elmont to Greendale (ELGN)

- Richmond Area

  Segments

  15. Greendale to SAY/WAY (includes Acca Yard) (GNSA)
  16. SAY/WAY to AM Junction (Hermitage Lead) (SAAM)
  17. AM Junction to Centralia – S-Line (AMCE)
  18. WAY to Centralia – A-line (WACE)
  19. AM Junction to Beulah – Peninsula Subdivision (AMBE)
  20. Buckingham Branch, Doswell to AM Junction (BBRR)

During the rail alignment alternatives development and screening process, potential bypass alignments were developed for Fredericksburg and Ashland. The Fredericksburg Bypass became segment #21 FBBP. The Ashland Bypass became #22 ASBP.

5.2 DEVELOPMENT OF RAIL IMPROVEMENTS TO MEET PROJECT PURPOSE AND NEED

A number of different resources were used to identify rail improvement alternatives in the DC2RVA corridor. Previous studies such as the Tier I EIS for the Washington, D.C. to Charlotte Southeast High Speed Rail (SEHSR) program were referenced, as was feedback received during agency and public scoping conducted for the DC2RVA Tier II EIS. An Engineering Basis of Design (BOD) for track and station improvements was also adopted to inform the development of potential improvements. The BOD was approved by the FRA; for more details refer to Section 5.2.3. The rail improvement alternatives developed add new track capacity, realign track to allow greater speeds, modify highway crossings to accommodate the new rail infrastructure, and improve stations and platforms to meet the Project's Purpose and Need.

5.2.1 Previous Studies and Design

Various studies and improvement projects have been completed for the Virginia segments of the SEHSR corridor in the past two decades to address aging infrastructure, accommodate increased demand, improve connectivity, increase capacity, and improve the service and reliability of the multimodal rail corridor. These previous studies and projects were reviewed to identify potential alternatives, including new track alignments, location/placement of additional track (including main line track, sidings, and crossovers), potential new stations, and improvements to existing stations. A full summary of the referenced studies is included in Chapter 4 of this Alternatives Technical Report.

Several prior studies identified the need for an additional main line track along most of the DC2RVA corridor, including:

- **1999 Report to Congress—Potential Improvements to the Washington—Richmond Railroad Corridor**. This Amtrak study recommended corridor improvements considered necessary to enable the Washington, D.C. to Richmond corridor to reliably accommodate the mix and volume of higher speed intercity passenger, commuter, and freight services that the line's operators (CSXT, Amtrak, and VRE and public partners FRA and DRPT) foresaw for the year 2015.
- **2003 Richmond Area Rail Master Plan—Phase I.** This document identified near-term improvements that would support the movement of passenger trains that terminated at Staples Mill Road Station to a refurbished Main Street Station in downtown Richmond.
- **2003 Interim Phase Improvements—Staples Mill Rd. Station to Main Street Station and Final Phase Improvements—Staples Mill Rd. Station to Centralia**. These two FRA reports identified potential improvements required to support various levels of future passenger and freight traffic in the Washington, D.C. to Richmond rail corridor, and more specifically, within the metro Richmond area.
- **2004 Third Track Conceptual Location Study**. DRPT conducted this study in which a third main line track was proposed in the 92.7-mile corridor between Richmond's Staples Mill Road Station and the Ravensworth Interlocking, a crossover between main line tracks located south of Franconia in the Northern Virginia suburbs of Washington, D.C.
- **2006 Third Track Feasibility Study**. DRPT conducted an additional study in which an 8.1-mile rail corridor connecting Richmond's Main Street Station to Staples Mill Road Station via Acca Yard was studied in conjunction with the 92.7-mile corridor that was studied in 2004. This 2006 study provided greater detail on the corridor than the 2004 Third Track Conceptual Location Study. However, the 2006 study, like the 2004 study, did not include parts of the corridor through Fredericksburg and Ashland, VA.

Previous studies also identified potential new Amtrak station locations at Crystal City in Arlington County, Carmel Church in Caroline County, and Parham Road (replacing Staples Mill Road Station) in Henrico County.

In 2009, DRPT evaluated the potential use of the Buckingham Branch Railroad (BBRR) segment between Doswell and AM Junction for high speed intercity passenger rail, comparing the BBRR segment to the existing Amtrak service route along the CSXT's RF&P corridor. DRPT's evaluation of the BBRR segment, titled *Decision Brief: Alternative Considered but Dismissed, Richmond to Doswell, VA* was submitted to FRA for consideration as supplemental documentation for the 2002 SEHSR Tier I EIS. DRPT's 2009 Decision Brief evaluated the potential environmental impacts and capital costs associated with the two alternative alignments, and presented the following findings concerning the BBRR segment:

- The segment would be expected to have greater historical resource impacts, including crossing three Civil War battlefields, with potential adverse effects to protected resources under Section 4(f) of the DOT act (49 U.S.C.§303).
- The segment would have greater water and biological impacts with 50 percent more stream crossings, greater floodplain crossings, and an extensive crossing of the Chickahominy Swamp.
- The segment would have almost twice the capital cost to implement, compared to the existing route.
- The segment's use for intercity passenger rail service was inconsistent with local plans and was opposed by Henrico County, Hanover County, and the Town of Ashland.

DRPT concluded that the BBRR segment from Doswell to AM Junction failed as a reasonable alternative for high speed intercity passenger rail; in a letter to DRPT dated May 13, 2009, FRA stated its concurrence with DRPT's conclusion. Although DRPT and FRA have dismissed the BBRR as the preferred alignment for passenger service on the SEHSR corridor, the DC2RVA project includes consideration of potential improvements to the BBRR route to supplement the capacity required to support the expansion of freight and passenger operations along the SEHSR corridor between Doswell and Richmond. Details pertaining to potential improvements to the BBRR are provided in Section 5.3.3.

More recently, the 2012 Joint Corridor Planning and Investment Agreement between DRPT and CSXT was enacted to promote planning for intercity high speed passenger rail in the Washington, D.C. to Richmond corridor. The Agreement calls for CSXT to invest no less than $15 million in projects that benefit high speed passenger rail in the corridor, including improvements to track, signals and communications, and other infrastructure. The Agreement stands in addition to various other agreements between CSXT and the Commonwealth of Virginia regarding state funded freight and passenger rail improvements and commitments, and among CSXT, the Commonwealth of Virginia, and the Potomac and Rappahannock Transportation Commission and the Northern Virginia Transportation Commission pertaining to VRE's commuter operations.

5.2.2 Scoping/Public Input

The DC2RVA Tier II EIS is being prepared pursuant to the requirements of NEPA. As per the Council of Environmental Quality (CEQ) regulations (40CFR part 1500 et seq.) for implementing NEPA and FRA's Procedures for Considering Environmental Impacts (64 FR 28545, May 26, 1999), FRA and DRPT conducted scoping to guide the development of the Tier II EIS for the Project. The scoping process invites comments from interested agencies and the public to ensure the full range of issues related to the Project are addressed, reasonable alternatives are considered, and significant issues are identified. To ensure an early and open scoping process, DRPT and FRA employed many forms of outreach to engage diverse audiences, inform interested parties of the

Project, and enable them to provide input. These efforts included one agency scoping meeting on November 3rd, four in-person public scoping meetings; Ashland on November 5th, Richmond on November 6th, Quantico (Fredericksburg area) on November 12th, and Arlington on November 13th, and one self-guided online meeting that was available live from October 27th to December 14th of 2014. In total, 3,307 parties participated in the scoping process, providing 1,625 scoping comments. A scoping summary report (DRPT 2015b) was prepared following the outreach activities and delivered on May 15, 2015.

Agency and public input during the scoping process identified several alternatives for consideration. Comments that were potentially consistent with the Project's Purpose and need were considered and incorporated into development of Project alternatives. Others that were inconsistent with the Project's Purpose and Need were considered but not carried further for evaluation.

Suggested alternatives and infrastructure options that were potentially consistent with the Project's Purpose and Need included: new track alignments along the corridor (including a bypass at Ashland), various operating modes or service levels (to be addressed as part of the service planning effort for the Project), the concept that the Richmond area be served by only one rail station, and the potential for a new station in the vicinity of the former Broad Street Union Station (now housing the Science Museum of Virginia) in Richmond.

Additional alternatives that were suggested and determined inconsistent with the Project's Purpose and Need included: extending passenger rail service to Bristol, VA, or developing a bicycle trail or greenway along the corridor. DRPT, along with Amtrak and Norfolk Southern, is exploring the possibility of new passenger service between Bristol, Roanoke, and Washington, D.C. along the Norfolk Southern Heartland Corridor; however, this service would exist largely outside the DC2RVA corridor[1], and therefore was considered inconsistent with the Project's Purpose and Need to provide improved passenger rail service between Washington, D.C. and Richmond on the existing CSXT alignment. Public comment received in support of establishing a bicycle/walking path or greenway alongside the DC2RVA corridor also was considered, but likewise determined to be inconsistent with the Project's Purpose and Need. CSXT does not allow recreational use of its right-of-way, and therefore any greenway would require additional right-of-way to be acquired along the 123-mile corridor. Developing a greenway on new right-of-way would create impacts to historical resources, wetlands and waterways, neighborhoods, road crossings, and other natural and man-made resources. Providing a greenway does not support or enhance passenger rail service, nor does it provide a reasonable transportation choice for corridor travel, and therefore this suggestion was not evaluated further.

[1] Norfolk Southern's rail line carrying intercity passenger service from Washington, D.C. to Charlottesville and Lynchburg, and potentially to Roanoke and Bristol, Virginia, is not part of this Project. However, the Norfolk Southern line connects to the DC2RVA corridor in Alexandria, Virginia, and passenger trains traveling to Washington Union Station from Lynchburg and Charlottesville travel on the CSXT track across the Long Bridge into the city. Extending passenger service on the Norfolk Southern line to Bristol, or adding new passenger service on the Heartland Corridor, would potentially affect train frequencies on that short section of the DC2RVA corridor, and will be addressed in the Project's rail operations modeling analyses and service development planning.

5.2.3 Engineering Basis of Design

The engineering Basis of Design (BOD) Report presents the technical criteria to be followed for conceptual and preliminary engineering on the DC2RVA project (DRPT 2015a). The BOD was developed in coordination with the major project stakeholders: FRA, DRPT, Virginia Department of Transportation (VDOT), CSXT, Amtrak, and VRE.

The basic requirement for railroad geometric design for the Project is to provide safe, economical, and efficient rail passenger transportation on a freight rail corridor. The railroad geometric design must maintain CSXT freight operation neutrality while providing adequate factors of safety with respect to overall operation, maintenance, and rolling stock stability. Improvements should also have no adverse effect on existing or planned Amtrak passenger operations and/or VRE commuter operations.

The BOD establishes technical criteria to be used for infrastructure concept design and preliminary engineering in the DC2RVA corridor. A separate document will be developed by DRPT to establish the rolling stock criteria, service assumptions and projections, and operating criteria that will be used to develop operating plans and simulation models. These operating plans and models will assist in determining the magnitude of infrastructure improvements required to support future operations, but are not part of this conceptual engineering/alternatives development phase.

The BOD for rail components of the project emphasizes safety and follows accepted engineering practices used by CSXT, Amtrak, and VRE and as indicated in the FRA track safety standards and in the AREMA Manual for Railway Engineering. The BOD for roadway components follows VDOT standards.

Key features of the BOD include the following:

- Both new and existing main line track will be designed for a maximum allowable speed of 90 mph, where practicable.
- New main line track centers shall be 15 feet between centerlines of adjacent tracks.
- Both new and existing main line tracks shall be designed for interoperability between all passenger and freight service.
- Passenger station improvements shall include side or center island platforms serving all main line tracks in accordance with USDOT[2], FRA, Amtrak, and VRE standards. Platform length should be 850 feet for platforms serving Northeast Regional (Virginia) and Interstate Corridor (SEHSR) service and VRE commuter trains, and 1,200 feet for platforms serving Amtrak Long Distance trains[3].

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[2] The 2011 ADA accessibility guidelines require level boarding platforms at all passenger stations, with the option for low level (top of rail) platforms where tracks are used by freight trains. DRPT has assumed low level platforms would be required for all platforms located on main line freight tracks.

[3] Platform lengths were developed by DRPT based on the length of the trains they will serve per Amtrak's Station Program and Planning Guide (2013).

- Utilization to the extent feasible and practicable of ongoing and previously completed studies, concept development, and rail improvement designs in the corridor.

5.2.4 Preliminary Rail Alignment Development

Determining the location and configuration of any additional track capacity is the first step in determining the rail alignment in the Project alternatives. The alignment of any additional track capacity or other track adjustments is also the basis for determining the impacts of the Project to environmental resources, other infrastructure, and existing and planned passenger and freight rail operations. DRPT developed preliminary rail alignments to show a range of track alignment options from maximizing speed of passenger trains to minimizing impacts outside of existing right-of-way or to existing rail operations and track. In addition, the range of track alignment options considered rail alignments proposed or considered in prior corridor studies or identified during Project scoping.

DRPT identified three specific areas along the corridor where additional consideration was warranted – Fredericksburg, Ashland, and Richmond. In Fredericksburg and Ashland there are challenges due to limited space within the existing CSXT right-of-way for additional track, adjacent population density and land use, station/platform location options, and sensitive historical and cultural resources. In Richmond, there are two potential alignments through the city and multiple station location options identified during project scoping. Preliminary rail alignments developed for Fredericksburg, Ashland, and Richmond were focused less on improving passenger train speed and more on improving capacity and reliability of the passenger service. Development of preliminary rail alignments for Fredericksburg, Ashland, and Richmond are discussed in Section 5.3.4.

DRPT also identified a fourth area where additional consideration of preliminary rail alignments was necessary. The DC2RVA project limit ends at RO, just south of the George Washington Parkway and the Potomac River. The CSXT track continues north from RO across the river into Washington, D.C. over the Long Bridge, a 2-track rail bridge. The District's Department of Transportation is currently working with FRA, DRPT, VRE, and CSXT to evaluate alternatives to expand the bridge capacity, including construction of 1 or more new rail bridges at the same general location. Although the Long Bridge Capacity project is separate from DC2RVA, it is important for the two projects to connect at the southern approach to the bridge. Therefore, DRPT identified and is evaluating several alignments approaching the Long Bridge.

All preliminary rail alignments were developed at the conceptual level, using available GIS or aerial photographs of the corridor. The base premise of these rail alignments is the need, established from previous studies, to add one main line track the length of the corridor (regardless of the number of existing main line tracks) and redesign the existing main line tracks to provide a co-mingled set of at least three main line tracks.[4] Crossovers between tracks were assumed, but not shown for this level of conceptual design. Train operations, ridership, or capacity needs were not assessed at this time beyond the addition of one main track on the corridor to ensure a minimum of three main tracks. Alignment option conceptual designs were based on the BOD,

[4] A comingled set of tracks is one in where, through signaling and crossovers, both passenger and freight trains may use any of the available parallel tracks in either direction.

including track spacing, allowable track curvature and other design features, unless otherwise noted.

Three initial alignments were developed to represent the range of potential Additional Track Alternative alignments along the existing DC2RVA corridor:

- Maximum Speed Alignment—adds one new track and realigns existing track to achieve the maximum allowable speed of 90 mph unconstrained by existing right-of-way.
- Improved Speed Alignment—adds one new track and realigns existing track to improve speed up to 90 mph to the extent possible while constrained to stay within the right-of-way.
- Existing Speed Alignment—adds one new track to either side of the existing track while maintaining existing speed.

5.2.4.1 Maximum Speed Rail Alignment Unconstrained by Existing Right-of-Way

The Maximum Speed Alignment was designed to show what the rail alignment would look like if the primary criteria were to design track capable of the maximum allowable speed for passenger trains of 90 mph along the entire corridor, without being constrained by the limits of the existing right-of-way. Track alignment would generally follow the line of the existing rail corridor, but would include areas outside of the existing right-of-way where required to achieve a 90mph track design speed. While optimizing track design speed, the unconstrained alignment would require substantial acquisition of new right-of-way, and would generally have greater impacts to environmental resources and infrastructure. The Maximum Speed Alignment includes the following characteristics:

- Addition of a main track designed to allow 90 mph for passenger trains.
- Reconfiguration of existing main line tracks to allow 90 mph for passenger trains.
- Replacing most, if not all, of the existing rail bridges over roads and waterways; existing rail bridges would not be used unless they fit the design alignment for 90 mph.
- Replacing most, if not all, of the existing road overpasses; existing road overpasses would not be used unless the design alignment for 90 mph fit underneath them.

There are two versions of the Maximum Speed Alignment for the corridor:

1) **Maximum Speed Unconstrained Base Alignment**: This alignment generally follows the existing rail corridor but goes outside the right-of-way to ensure a three-track co-mingled alignment designed for passenger trains to achieve and maintain 90 mph.
2) **Maximum Speed Unconstrained Central Area Greenfield Alignment**: Suggested during project scoping, the aim of this alignment option is to shorten the corridor with a new greenfield alignment in the central section of the corridor. This alignment option includes a relatively straight two-track co-mingled passenger bypass alignment from just south of Crossroads in Spotsylvania County to just north of Carmel Church in Caroline County, and maintains the existing CSXT two-track alignment to the east for most freight service. North of Crossroads and south of Carmel Church, the Maximum Speed Unconstrained Central Section Greenfield Alignment is the same as the Maximum Speed Unconstrained Base Alignment, e.g., a three-track co-mingled alignment. This alignment option would

reduce the distance traveled by passenger trains. Some freight trains may also use the shorter alignment.

In addition, there are also two special study areas; Fredericksburg and Ashland, where bypass alignment options for either passenger or freight rail service were identified. The bypass alignment options are unconstrained by the existing right-of-way and were developed for these two special study areas independent of the other alignments because of the difficulties identified in these segments of adding a third main track. The bypass alignment options were subject to the same screening processes as the other alignments. The development of bypass alignment options for these two areas is discussed in greater detail in Sections 5.4 and 5.5 below.

5.2.4.2 Improved Speed Rail Alignment Constrained to Stay Within Existing Right-of-Way

The Improved Speed Alignment was designed to maximize passenger train speed up to 90 mph where possible while keeping all tracks (new and reconfigured) within the limits of the existing right-of-way. A track design to reach 90 mph is not achievable within all sections of existing right-of-way due to existing curves and limited distances of straight (tangent) track between curves. The Improved Speed Alignment includes the following characteristics:

- Addition of a main track within the existing right-of-way that is designed to allow the maximum possible speed up to 90 mph for passenger trains where possible.
- Reconfiguration of existing main line tracks to allow the maximum possible speed up to 90 mph for passenger trains where possible.
- Track alignment for the redesigned tracks is constrained to fit within the existing right-of-way.

This constrained option would increase track design speed for many segments and partial segments on the corridor, while limiting impacts and property acquisition outside of the right-of-way.

A variation on the Improved Speed Alignment was also developed that optimizes use of existing rail infrastructure while also seeking to achieve the maximum possible speed up to 90 mph—the Improved Speed Alignment (Hold Bridges/Tangents). The Improved Speed Alignment (Hold Bridges/Tangents) maintains existing tangent (e.g., straight) tracks and continues to use the existing rail bridges and alignment over roads and waterways. New bridges would be required alongside the existing rail bridges to carry the additional main track, and the existing track would be realigned through some curves to increase track design speed. Where the potential environmental effects of the two improved speed alignments are comparable, the Improved Speed Alignment (Hold Bridges/Tangents) is preferred due to lower infrastructure impacts and anticipated cost savings from continuing use of existing rail bridges and tangent track alignments.

5.2.4.3 Existing Speed on Existing Alignment

The Existing Speed Alignment adds one additional main line track to the existing alignment, and matches the existing track alignment's curvature and design speed. The Existing Speed Alignment would add capacity to the system, but would not increase design speed. This alignment includes the following characteristics:

- Addition of a main track that matches the existing track alignment's curvature and design speed.
- No change to existing main line track alignment.
- Addition of a main track could require additional right of way.
- Existing track would continue use of existing rail bridges over roads or waterways; and new rail bridges would be added to carry the additional main track.

The addition of a new main track and associated track bed would generally fit within the existing right-of-way. However, there may be some areas where the slope of the track bed and associated cut/fill line, utility relocations, replacement of existing access roads, or other related improvement extends outside the existing right-of-way.

There are two versions of the Existing Speed Alignment option:

1) **West Track Addition** adds one new track to west side of existing main line, leaving existing tracks as is.
2) **East Track Addition** adds one new track to east side of existing main line, leaving existing tracks as is.

The Existing Speed Alignment would add track capacity, but does not attempt to achieve a track design capable of supporting passenger trains at 90 mph Maximum Allowable Speed (MAS).

5.2.4.4 Alignment Options Based on Prior Studies

In addition to the rail alignments described above, several rail alignments were identified in prior corridor studies (See Section 5.2.1), and were considered in the alternatives development process. These alignments include DRPT's 2004 Third Track Conceptual Location Study and 2006 Third Track Feasibility Study, and CSXT's 2009 conceptual designs for a third track between Hamilton (just south of Fredericksburg) and Richmond that included the addition of a main line track along parts of the corridor following the alignment recommendations from the 2004 and 2006 studies.

The third track plans developed in 2004, 2006, and 2009 follow the existing track alignment, with some sections adding a new main line track to the west of the existing alignment, and some adding a new main line track to the east of the existing alignment. The studies and track plans did not include parts of the corridor through Fredericksburg and Ashland. These prior third track designs did not attempt to increase train speed. These prior rail alignment options primarily occur within the right-of-way or with limited additional right-of-way needs.

The rail alignments developed in prior studies used varying design criteria; therefore, these alignment options were reconfigured at the conceptual level following the DC2RVA BOD. Once reconfigured to match the DC2RVA BOD, the prior rail alignment options generally overlap with the East Addition or West Addition versions of the Existing Speed Alignment, and in many segments, are indistinguishable from the Existing Speed Alignments.

5.3 RAIL ALIGNMENT SCREENING

Rail alignment screening analyzes the ability of potential rail alignments to meet the Project's Purpose and Need. Its ultimate goal is to identify reasonable rail alignments that can be carried forward for further design and review, while quickly eliminating unreasonable alignments. A reasonable rail alignment meets the Purpose and Need, is buildable, has acceptable impacts as determined by the screening criteria, and is cost-effective. DRPT identified reasonable rail alignments on a segment and sub-segment basis.

The overall rail alignment screening process is summarized in Figure 5-2 and explained in further detail below.

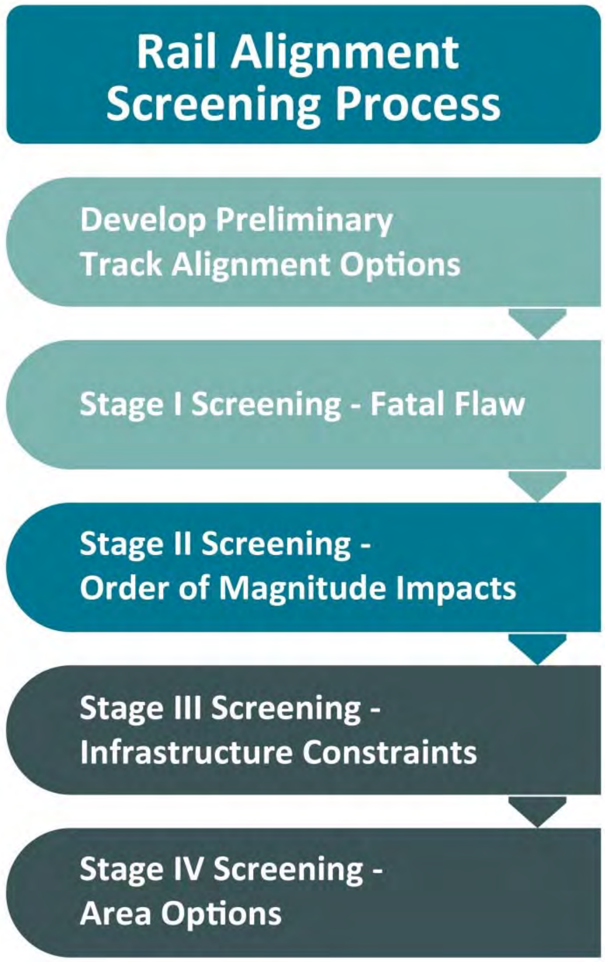


FIGURE 5-2: DC2RVA RAIL ALIGNMENT SCREENING PROCESS

5.3.1 Stage I: Screening Rail Alignments for Fatal Flaws

First stage screening identifies rail alignment options with direct effects on key environmental resources. Alignment options with direct effects—or the segment or sub-segment portion of the alignment option with the direct effect—on the following key environmental resources are not considered reasonable[5] and were eliminated from further consideration:

[5] The list of key environmental resources designated as "fatal flaws" was derived from existing federal and state regulatory requirements as well as comments received from federal, state, and local agencies and other stakeholders.

- Historic resources listed on or eligible for listing on the National Register of Historic Places
- Federal, state, or local parks and recreation areas
- Federal or state wildlife/waterfowl refuges
- Military bases

For screening purposes, direct effects are defined as those effects that occur where proposed new right-of-way would overlay a protected resource according to available GIS data and existing conditions mapping. As an example, a new rail alignment requiring additional right-of-way through an existing wildlife refuge would be a direct effect, whereas a new or existing rail alignment that only abuts the wildlife refuge but does not require additional right-of-way from the refuge would not be a direct effect for purposes of screening. Use of existing right-of-way, even where abutting a key resource, is not considered a direct effect for purposes of screening. Subsequent analyses in the Draft EIS will evaluate the potential for other impacts to the resource from any Project-related changes inside the right-of-way, including changes in rail operations. Federal and state regulations and guidance affords these Stage I resources special protection, and while there is no absolute prohibition against impacting these resources, alternatives without direct effects to these resources are generally preferred over alternatives with direct effects. Additional details on determination of potential direct effects are provided in Chapter 6.

A standard width was developed by DRPT for various types of rail alignments for use in establishing approximate right-of-way requirements and to screen the alignments for potential impacts. Standard track centers were discussed in Section 2.7.1 and shown in a typical track section in Figure 2-1 of the BOD; however, the typical section in the BOD did not include ROW limits since they would vary throughout the Project. Establishment of proposed ROW is discussed in Chapter 7 of the BOD in general terms, but does not include specific dimensions. The typical widths shown in Figures 5-3 and 5-4 were developed for screening purposes to evaluate the potential maximum environmental impacts associated with new track alignment alternatives in greenfield areas. The proposed typical widths used for screening new track alignments are in accordance with industry practices and were based on representative track centers, cross slopes, drainage ditches, utility corridors adjacent to the track, and an allowance for cost-effective cut/fill side slopes for the steep and varying terrain that exists in the project corridor (not relatively expensive special retaining walls to reduce right-of-way requirements). Right-of-way limits determined during the Project's final design phase may differ – and are anticipated by DRPT to be less in many areas – from those used for the initial environmental screening once site-specific constraints have been established during subsequent design phases of the project.

Where rail alignments were designed outside the existing right-of-way, a new projected right-of-way/alignment width was determined as follows[6]:

[6] The maximum widths used for screening (150 feet or 135 feet) can potentially be reduced as low as 60 feet during subsequent design phases of the project depending on site conditions and site specific constraints.

- Maximum Speed Alignment with Three Tracks = 150 feet width for a new three-track co-mingled passenger and freight alignment outside existing right-of-way (measured 75 feet each side from center track centerline) (see Figure 5-3)
- Maximum Speed Alignment and/or new Greenfield Bypass Alignment with Two Tracks = 135 feet width for a new two-track co-mingled passenger and freight alignment outside existing right-of-way (measured 67.5 feet each side from track centerline) (see Figure 5-4)
- Improved Speed Alignment with Three Tracks = 80 feet width for a new three-track co-mingled passenger and freight alignment inside existing right-of-way (measured 40 feet each side from center track centerline) (see Figures 5-5 and 5-6)
- Existing Speed Alignment with Three Tracks = 40 feet width for a new main track on the east or west side only (measured 40 feet from center track centerline); undisturbed side bound by existing right-of-way line (see Figure 5-7).

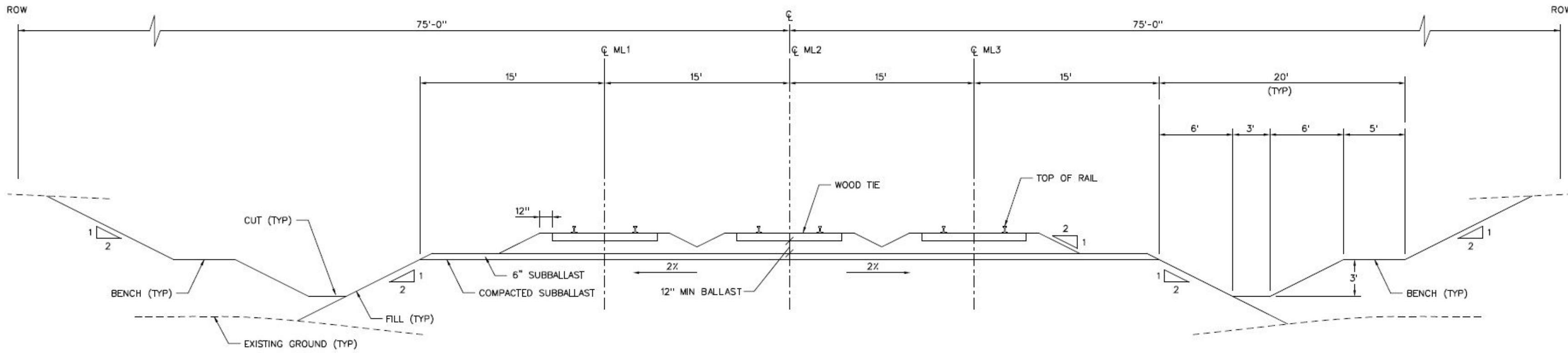


FIGURE 5-3: TRIPLE-TRACK STANDARD PROFILE (MAXIMUM SPEED ALIGNMENT)

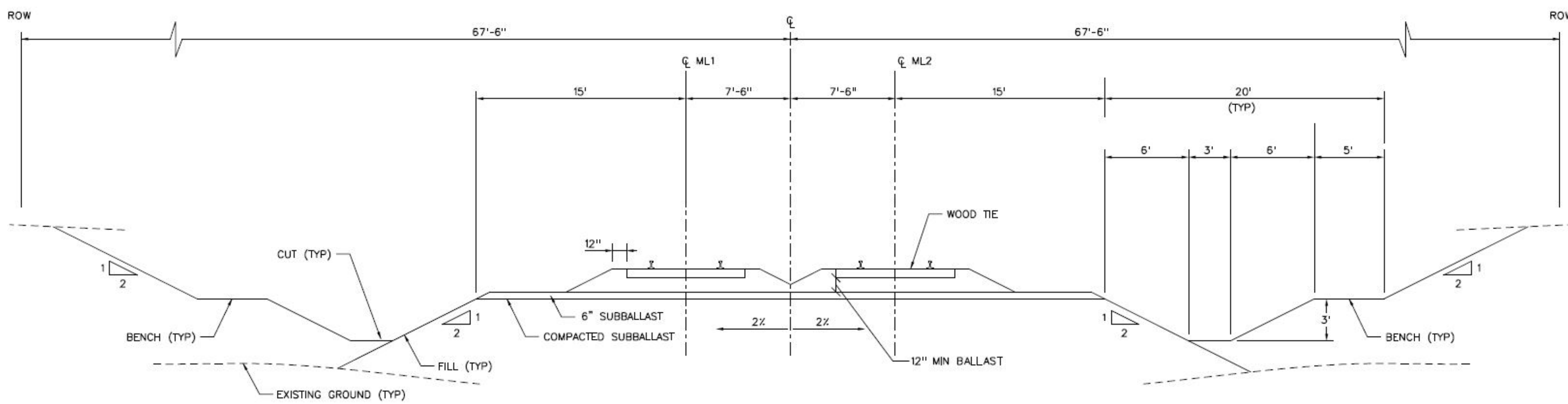


FIGURE 5-4: DOUBLE-TRACK STANDARD PROFILE (MAXIMUM SPEED ALIGNMENT)

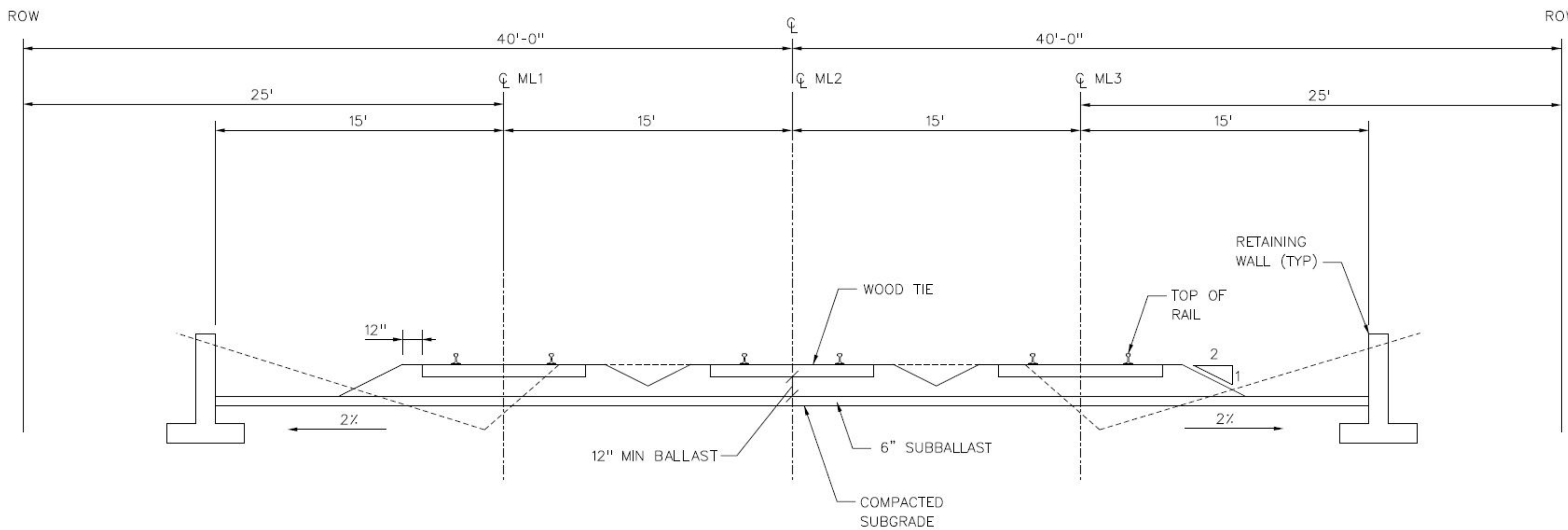


FIGURE 5-5: TRIPLE TRACK PROFILE (IMPROVED SPEED ALIGNMENT)

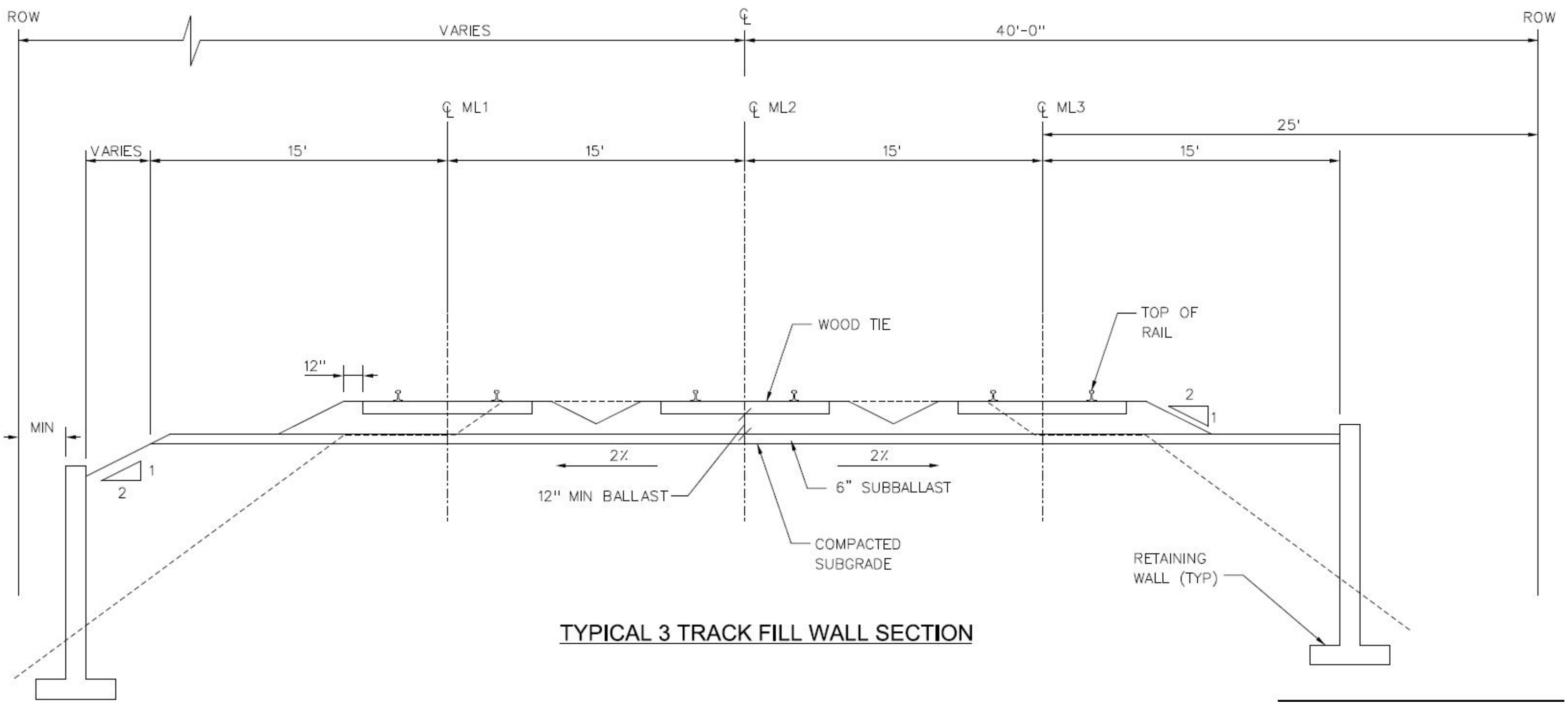


FIGURE 5-6: TRIPLE TRACK PROFILE (IMPROVED SPEED ALIGNMENT)

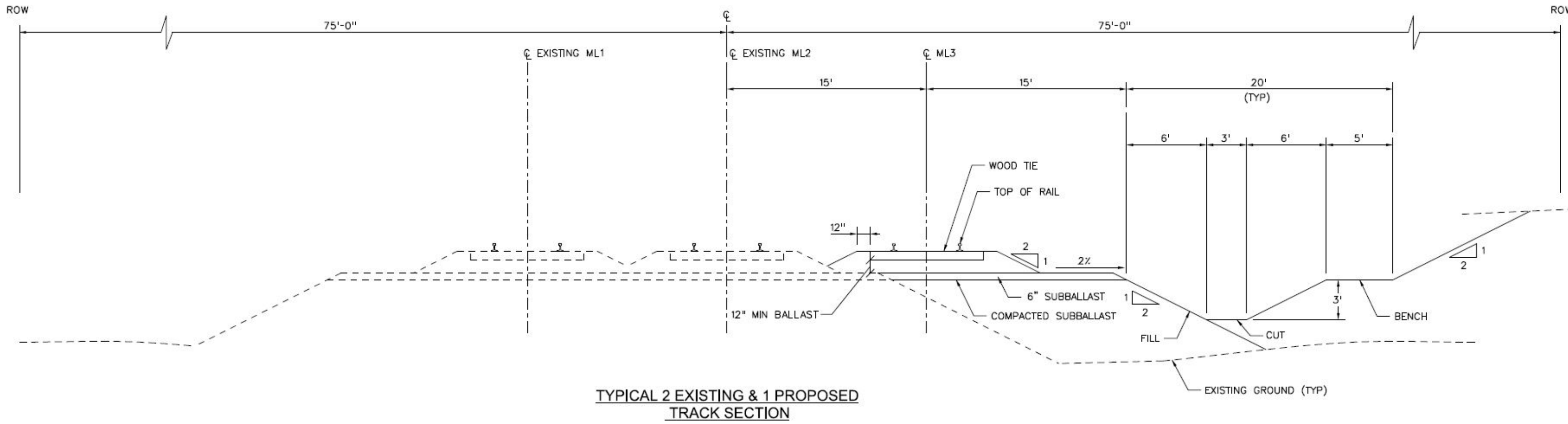


FIGURE 5-7: TRIPLE TRACK PROFILE (EXISTING SPEED ALIGNMENT)

Screening for each alignment option was conducted by overlaying the alignment width (as described above) on the base mapping showing the key resources. In recognition of the scale, precision, and accuracy of information available on the GIS system, impacts were determined to one tenth of an acre (0.1 acre), and impacts less than half acre (0.5 acre) were considered minimal, or no-impact, for the purpose of screening. The alternatives with the least amount of impacts were carried forward into the next screening stage.

5.3.2 Stage II: Screening Rail Alignments for Order-of-Magnitude Environmental Impacts

The second stage screening further evaluates alignment options for order-of-magnitude impacts on readily identifiable environmental characteristics not addressed in the first stage screening. Alignment segments or sub-segments were evaluated using an overlay of the alignment on available GIS and existing conditions mapping. The alignment encroachment was measured in acres, and determined using the appropriate cross-sections and distances from track centerline noted above. Impacts were assessed for the following environmental conditions:

- Area outside of right-of-way
  - Urban/developed land use
  - Agricultural land use
- Registered site(s) under Superfund
- Registered site(s) under CERCLIS[7]
- State-listed agricultural or forestal districts
- Areas on the National Wetlands Inventory or other known wetland areas
- Cemeteries

In recognition of the scale, precision, and accuracy of information available on the GIS system, impacts were determined to one tenth of an acre (0.1 acre), and impacts less than half acre (0.5 acre) were considered minimal, or no-impact, for the purpose of screening. Alignments that are outside the right-of-way are not considered unreasonable per se, but may be eliminated or less favored due to the additional potential for impacts compared to alignment options that occur largely within the right-of-way. Use of existing right-of-way, even where the above environmental characteristics are recognized within the right-of-way, is not considered as disruptive to the environment for purposes of screening as acquiring new right-of-way. Subsequent analyses in the Draft EIS will evaluate the potential for other impacts to the environment from any Project-related changes in use of the right-of-way. Alternative alignments with the least amount of comparative impacts were carried forward into the next screening stage. Generally, where Stage II impacts were similar, maximum speed alignments are favored over improved speed alignments and improved speed alignments are favored over existing speed alignments.

[7] CERCLIS = Comprehensive Environmental Response, Compensation and Liability Information System

5.3.3 Stage III: Existing Infrastructure Issues

The third stage considered possible constraints posed by existing infrastructure on each rail alignment alternative by segment/sub-segment. It also considered the potential for adverse effects to the existing infrastructure within and crossing the corridor as a result of rail alignments under consideration. Potential infrastructure issues are described below, along with the adjustments to the alignments or infrastructure that could alleviate the constraints:

- **Infrastructure Issue: Existing Rail Bridges:** Most CSXT-owned rail bridges on the corridor are double-tracked, although there are some bridges—notably the bridge over the James River on the CSXT S-Line south of Main Street Station—that remain single track. To replace these existing rail bridges with new bridges while maintaining rail operations in the busy corridor would be a difficult and expensive process. The existing bridges are owned and maintained by CSXT, and are presumed to meet applicable federal, state, and CSXT standards.

  Alignment Adjustment: In order to have alignment options that do not unnecessarily replace existing rail bridges, the Improved Speed Alignment, Existing Speed Alignments (west and east), and other alignments using the existing right-of-way are assumed to continue to use the existing rail bridges for the tracks the bridges currently carry. Any new tracks added as part of the DC2RVA Project would be on a separate but parallel alignment that includes a separate but parallel rail bridge or structure.

- **New Rail Bridges**: New rail bridges to carry the new main track would be necessary at each location where there is an existing bridge. DRPT conducted a review at each bridge location to determine if there are engineering or design constraints that eliminates or favors an upstream or downstream (typically west side or east side) location for a new rail bridge for each alignment. New rail bridges over major waterways would typically be designed to accommodate one track.[8] The preferred location of new rail bridges at each waterway or road crossing could constrain the rail alignment options at that location.

- **Existing Roadway Overpasses:** There are 95 public roads crossing over the existing rail corridor on roadway overpasses. The undersides of these overpasses were evaluated for sufficient vertical and horizontal clearance to add an additional track. Available vertical and horizontal clearance may constrain the alignment to the east or west of existing track or require realignment of all tracks beneath the overpass. Where there is insufficient clearance for an additional track, the roadway overpass was assumed to require replacement. Any new or replacement roadway overpass would be designed to meet

[8] The DC2RVA alternatives development process assumes the Project will add one new main track along the corridor, although a final determination of the number of new main line tracks necessary to meet Purpose and Need, if any, has not been made. New rail bridges are being designed with a superstructure to support one track and a substructure to accommodate a second track in the future under the DC2RVA project. The additional substructure will allow for future expansion of the bridge with minimal impacts, if or when additional tracks may be necessary. There may also be cases where the existing bridge is not practical for future use, and a replacement bridge for all tracks crossing the waterway would be required.

VDOT bridge specifications and traffic needs in accordance with the Project's approved BOD[9].

- **Existing Roadway At-Grade Crossings**: There are 112 at-grade crossings along the existing rail corridor, including 68 public roadway/railroad crossings (the balance are private crossings). These 68 public road crossings were evaluated as follows:
  - Traffic Delay and Safety – At-grade road crossings were evaluated for safety using Federal Railroad Administration (FRA) Risk Model for at-grade crossings, comparing existing conditions with projected traffic and rail levels. At-grade crossings that exceed FRA safety criteria will be evaluated in greater detail in the Draft EIS for potential improvements, consolidation or closure, or replacement with a grade-separated crossing. At-grade crossings were also evaluated for existing and projected traffic delay in accordance with Federal Highway Administration standards.
  - Roadway Geometry – At-grade road crossings were evaluated for changes to road geometry based on new rail alignments; improvements to the road designs will be considered where new rail alignments adversely affect the road geometry.
- **Existing Station Platforms:** The corridor includes passenger rail and commuter rail stations with existing platforms. Ongoing and planned station improvement projects include extending existing platforms and adding platforms at many stations; in addition, the DC2RVA Project includes improving passenger rail platforms to meet the Project's Basis of Design. The rail alignment options were developed to be compatible with existing and planned platforms where feasible.

Potential alignment segments/sub-segments were adjusted as described above in consideration of infrastructure issues. Typically, the alignment adjustments were relatively minor and localized to a specific infrastructure issue. The revised alignments were compared to one another to determine the relative ability to reduce passenger train trip time based on track design speed for the segment, area, and corridor. Passenger train track design speed was calculated for each alignment by segment or sub-segment and used to develop a potential trip time for the corridor from Arlington to Centralia, assuming no stops[10] and no speed restrictions[11] beyond that of the track design. The revised alignment options were also reviewed for effects on rail operations, including the co-mingling of passenger, commuter, and freight train movements through the corridor.

It is anticipated that some segments may have multiple potential alignment options or combinations of options. Generally, where the impacts identified during the screening process are similar across multiple potential alignment options, preference is given to those options that achieve greater track design speed up to the 90 mph MAS – e.g. maximum speed alignments are

[9] The Project's Basis of Design calls for a 23 feet vertical clearance for existing bridges, and a 24 feet 3 inch vertical clearance for new bridges.

[10] Design speed was calculated from endpoint to endpoint without any stops. This was done to provide a neutral basis of comparison for track alignment options.

[11] Operating speed restrictions may be imposed on sections of track by CSXT to reflect track design, weather-related issues, track maintenance activity, or other safety factors.

preferred over improved speed alignments, and improved speed alignments are preferred over existing speed alignments.

5.3.4 Stage IV: Screening Areas with Additional Alignment Options

There are three areas of the DC2RVA corridor where DRPT developed additional rail alignments, above and beyond adding an additional track along the existing corridor. These additional alignments were developed in the following areas to address specific area concerns, including limited right-of-way, adjacent land uses, adjacent historic resources, roadway crossings, topography, and multiple station and alignment options:

- Fredericksburg
- Ashland
- Richmond

Additional rail alignment options identified by DRPT in these areas, including bypasses and alignments outside existing right-of-way were subjected to the same Stage I, II, and III screening as described above for the corridor rail alignments.

In addition to the three areas above, DRPT also developed additional rail alignments in Rosslyn, where the DC2RVA corridor approaches the CSXT Long Bridge over the Potomac River into Washington, D.C. DRPT developed multiple alignments for the southern approach to the bridge in coordination with DDOT's study of expanding rail capacity across the river through construction of one or more additional bridges. The development of multiple alignments ensures that a DC2RVA alignment would be available to coordinate with any of the three alternatives being considered in the study of the potential Long Bridge improvements. The additional rail alignments in Rosslyn were subjected to the same Stage I, II, and III screening as described above for the corridor rail alignments.

5.4 FREDERICKSBURG AREA

The City of Fredericksburg sits on the south bank of the Rappahannock River and was once the northern terminus of the Richmond, Fredericksburg, and Potomac (RF&P) Railroad. The rail corridor through Fredericksburg currently consists of two main tracks crossing the Rappahannock River on a concrete arch bridge into the city and the Fredericksburg Station, and then continuing south to the CSXT Fredericksburg yard, just south of the Blue and Grey Parkway. Due to higher elevations on the north bank of the river, the track is elevated on a trestle as it passes the station and then runs on an embankment south towards the yard. The west side platform extends over the historic station building, now used as a restaurant. Passengers moving between the platforms pass underneath the tracks. South of the CSXT Fredericksburg yard, there are three main line tracks extending past the new VRE Spotsylvania Station to the VRE train storage and maintenance facility at Crossroads. South of Crossroads, there are two main line tracks. The right-of-way width through Fredericksburg varies from 50 to 215 feet. The track alignment through Fredericksburg has multiple curves, both north and south of the station. Due to the horizontal geometry of the track and the relative proximity to the Fredericksburg station, CSXT has set an operating speed limit of 40 mph for all trains through Fredericksburg. Fredericksburg Station is served by Amtrak Long Distance (Sliver Meteor), Interstate Corridor (Carolinian), and Northeast Regional (Virginia) trains and VRE's commuter trains. There are numerous historic resources abutting the rail corridor through the city and on the north bank of the Rappahannock River, including historic districts, the Fredericksburg National Civil War Battlefield Park, George Washington's childhood home (Ferry Farm), and other sensitive resources. Both the old station building and the rail bridge over the river are historic resources as well.

DRPT, based on prior corridor studies as reported in Chapter 2, 3 and 4, has assumed an additional main track is necessary on the corridor to meet the Project's Purpose and Need. In the Fredericksburg area, this would mean adding a third track on a new bridge across the Rappahannock River, continuing the third track past the station and south to the yard, and then continuing a third track south of Crossroads. DRPT evaluated the Maximum Speed, Improved Speed, and Existing Speed additional track alignments in Fredericksburg; however, it was recognized that all of these alignments that add a main track would affect some historic or other resources in the area. In these three-track alignment options, the Fredericksburg Station would be improved with extended platforms (one side platform and one island platform), dedicated parking, and a new station building. Therefore, DRPT considered two additional options in lieu of adding an additional main track through Fredericksburg and adding a new rail bridge across the Rappahannock River adjacent to the existing bridge.

- No Additional Track – this option would not add any additional track between the junction of the Dahlgren Spur and the main line north of the Rappahannock River to Crossroads. There would be minor improvements to existing crossings and upgrades to signals and communications systems. Future train traffic, including all passenger, commuter, and freight trains, would continue through the City on the existing corridor. The Fredericksburg Station would be improved with extended platforms (two side platforms), dedicated parking, and a new station building.
- Fredericksburg Two-track Bypass – this option would add a two-track bypass around Fredericksburg, either east or west of the existing rail corridor. These bypass alignments were anticipated to be used primarily by freight trains, the Auto Train, and possibly passenger trains not serving Fredericksburg; intercity passenger trains and VRE commuter trains serving Fredericksburg Station would continue to pass through the existing tracks/station. The Fredericksburg Station would be improved with extended platforms (two side platforms), dedicated parking, and a new station building.

These local alignment options were then evaluated using the Stage I, II, and III screening criteria described above. The local alignment options for Fredericksburg are summarized below.

5.4.1 No Additional Track in Fredericksburg

This option includes minor improvements to signals and communications systems, at-grade crossing safety systems, the addition of crossovers between existing and new main line tracks north and south of Fredericksburg, and other minor rail infrastructure improvements. There would be no additional track added through Fredericksburg between the Dahlgren Spur and the Fredericksburg yard and no new rail bridge over the Rappahannock River; a third main track would be added to the corridor north of the Dahlgren Spur and south of Crossroads as described in Section 5.4.3.1.2 (Figure 5-8). The CSXT train speed restriction for trains entering Fredericksburg would remain in place. Fredericksburg would maintain its train station and continue to receive service from existing Northeast Regional (Virginia) and proposed additional

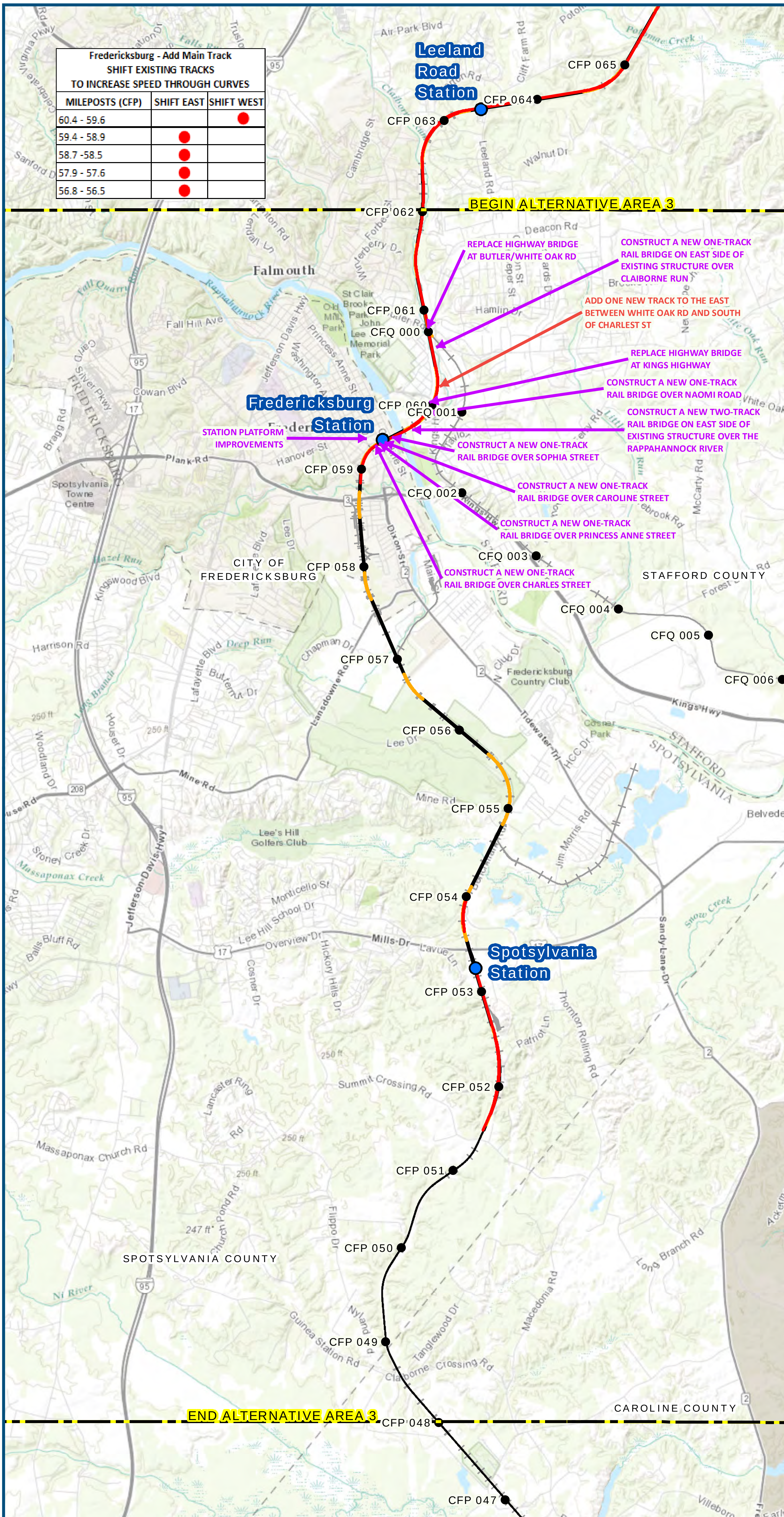
Northeast Regional (SEHSR) trains, as well as Interstate Corridor trains (the Carolinian and SEHSR), and possibly Amtrak's Long Distance service. The Fredericksburg station and platforms would require improvement and expansion in accordance with the DC2RVA Basis of Design to meet FRA guidelines, Amtrak safety standards, and ADA requirements (discussed in greater detail in Chapter 8 of this document). These improvements would include expanding the platform length and width, provision of safe grade-separated access between platforms, a station building, and parking. The existing road and pedestrian at-grade crossings in Fredericksburg would be subject to detailed evaluations for safety (see Chapter 4 of the Draft EIS) and may require additional safety measures (see Chapter 7 of this document and Chapter 4 of the Draft EIS).

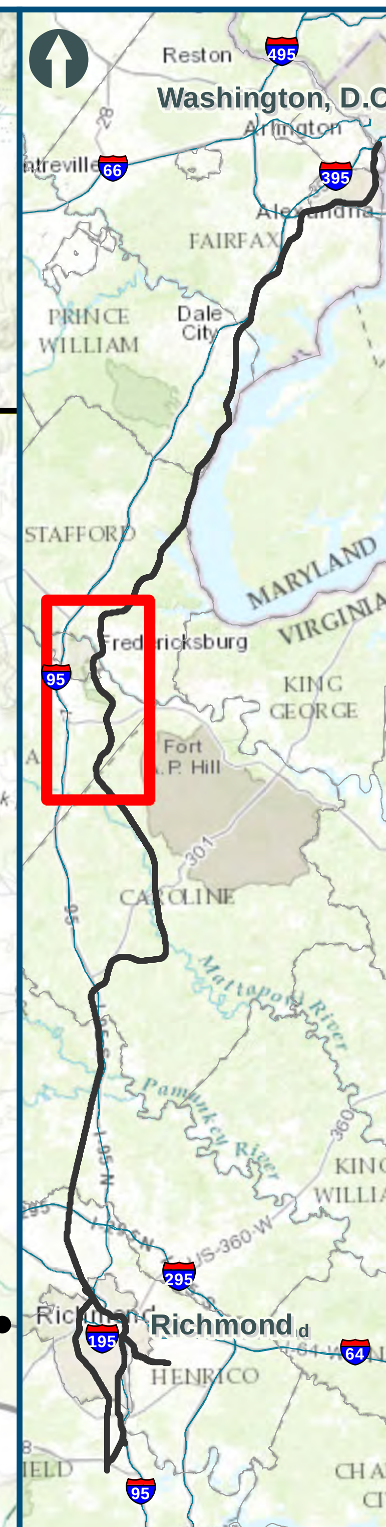
The ability of this option to support the Project's Purpose and Need by providing sufficient capacity, reliability, and frequency of passenger train service is not yet determined. Pending completion of rail operations modeling and other analyses, DRPT determined this option would be evaluated further in the Draft EIS.

5.4.2 Adding a Track Through Fredericksburg Along the Existing Corridor

DRPT evaluated the possibility of adding a third track through Fredericksburg along the existing CSXT right-of-way in those areas where there are two tracks currently. Sections with three or more tracks currently would not receive an additional track. The Maximum Speed Alignment, Improved Speed Alignment, and Existing Speed Alignments (east and west) were evaluated to add a third track through Fredericksburg. All of these options would include a new rail bridge over the Rappahannock River. These optional alignments were screened following the Stage I, II and III process used by DRPT along the entire corridor (see Chapter 6 of this report). Given the restricted CSXT right-of-way bounded by parks and historic resources, and the speed restriction for trains moving through the city, DRPT determined that the Maximum Speed Alignment and Improved Speed Alignments were not feasible or practical. DRPT recognized that these third track alignments would require additional right of way, affect historic and community resources in the area, and be ineffective given the speed restriction. DRPT evaluated adding a third main track on the east or west of the existing two track corridor (Existing Speed Alignment). Adding a track on the west side of the existing corridor would impact the historic train station building. Adding a track on the east side of the existing corridor does not directly affect any buildings, although the new main track would be in close proximity to at least two historic buildings on the east side (Figure 5-8). Therefore, DRPT concluded the addition of a third track through Fredericksburg along the east side of the existing tracks should be evaluated in greater detail in the Draft EIS.

DRPT considered and dismissed the concept of an elevated track above the existing right-of-way due to the height, length, and cost of such a structure, and the visual impacts of such a rail structure on historic districts, parks, and the community. DRPT also considered and dismissed as impractical the concept of adding a track belowground through Fredericksburg due to the length and cost of such a structure, the difficulties in tunneling beneath National Parks, the City, and the Rappahannock River, and potential impacts to historic resources and the community.





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Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery Source: ESRI World Topographic Map

Legend

- CSXT Mileposts
- Existing Stations
- Track Improvements
- Station and Structure Improvements
- Track - Existing
- Track - Shift
- Track - Proposed
- Virginia Rail Lines

**Figure 5-8
Fredericksburg
Alternative 3B:
Add Main Track**

5.4.3 Fredericksburg Bypass Alignments

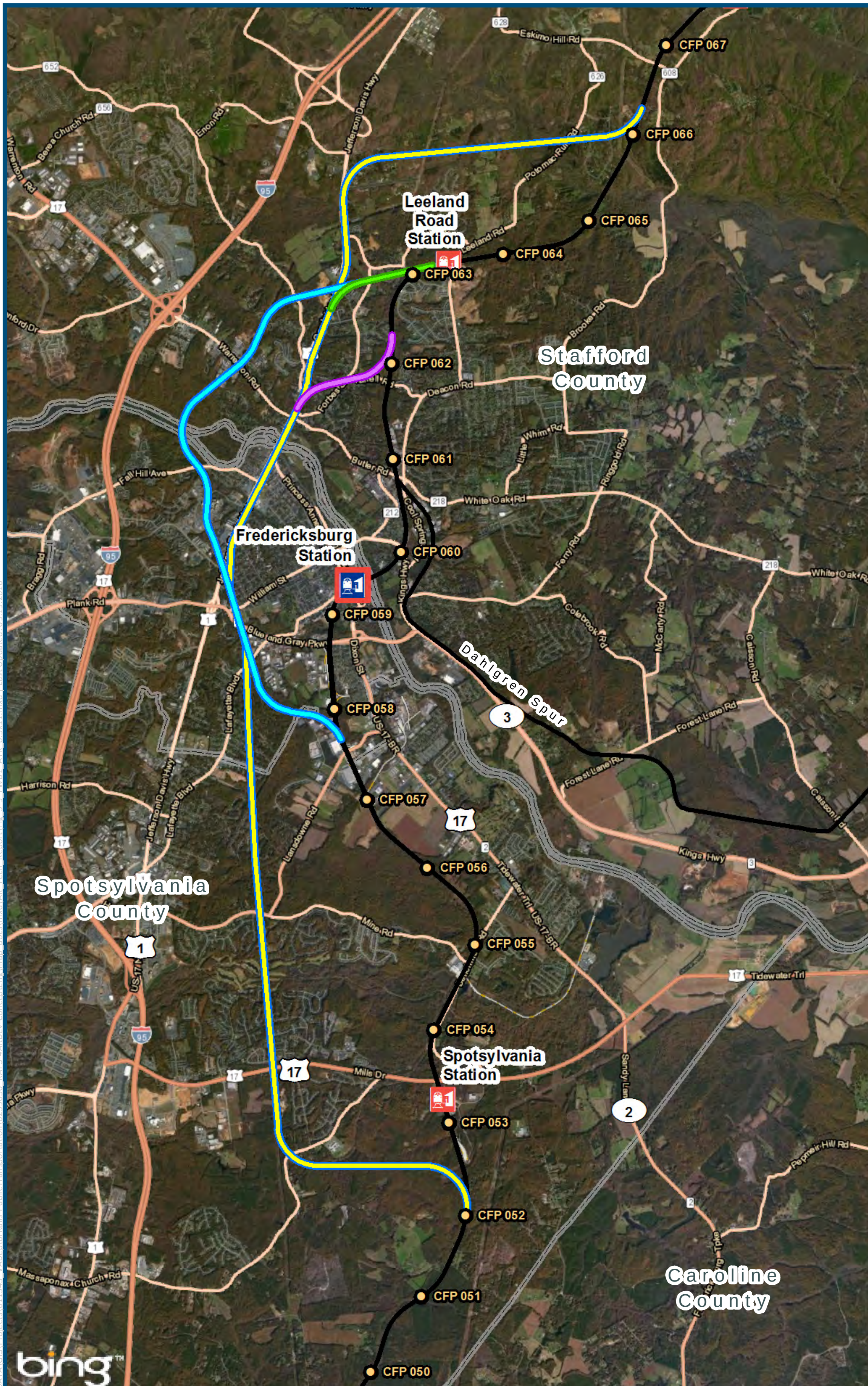
DRPT considered potential bypass options as potential alternatives to adding an additional main track through Fredericksburg. As the existing CSXT main line runs through Fredericksburg in a general north-south alignment, bypass alignments were considered to the east and west of the existing main line. These bypass options were anticipated to be used primarily by freight trains, and possibly the Amtrak Auto train and through passenger trains that do not service the Fredericksburg Station. Amtrak's passenger trains and VRE's commuter trains that serve the Fredericksburg Station would continue to pass through the existing tracks/station. The Fredericksburg bypass options developed by DRPT included the following common design elements:

- Two-track bypass alignments designed for co-mingled passenger and freight trains, with a design speed of 60 mph or greater for passenger trains.
- Existing track and station in Fredericksburg to remain, potentially with minor improvements including upgrade and extension of station platforms and at-grade crossing improvements possibly including some grade separations.

DRPT identified a 60 mph design speed for the bypass to reduce potential impacts to natural and human resources, including minimizing acquisition of new right-of-way, and in recognition of the existing and likely future train speed restrictions due to track geometry and rail operations through the city and on track immediately north and south of Fredericksburg. Where feasible, some bypass alignments were designed for improved speeds greater than 60 mph, however none of the bypass alignments reach the 90 mph MAS. DRPT considered and dismissed from further consideration a single-track bypass as it would not provide sufficient additional operational reliability and capacity to route all trains not serving the Fredericksburg station around the town. DRPT also considered and eliminated a 3-track bypass as it would create greater capacity and impacts than warranted assuming passenger and commuter trains continue to serve the Fredericksburg station.

5.4.3.1 West Bypass Alignments

Bypass alignments to the west of the CSXT main line have several potential conflicts, as shown on Figure 5-9. Most of the land use between the CSXT main line and U.S. 1 is a heavily developed mixture of commercial, industrial, institutional, and residential land use with little available vacant land. Possible bypass alignments were investigated to parallel either an existing power line easement or U.S. 1, as those corridors were some of the few areas of less developed land west of the CSXT main line that could allow for a bypass. However, the power line easement is bisected by the Pratt Medical Center, so a potential rail corridor following the power line easement would have impacts to the hospital campus, including potential impacts to multiple road crossings. Many other existing residential structures, recreational facilities, and the Fredericksburg National Battlefield would also be impacted by a bypass along the power line easement or U.S. 1. To avoid those impacts would require moving the bypass alignment farther west, which would require crossing I-95 and possibly U.S. 1 twice. Plus, heavy commercial and residential development continues west of I-95 to such an extent as to preclude any reasonable western bypass. A bypass alignment utilizing the I-95 median was considered and dismissed due to the need to cross the northbound lanes twice, the limited space within the median, topographic and grade challenges, and conflicts with existing structures. Therefore, the western bypass alignments were dismissed from further consideration.



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1 inch = 8,000 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- VRE Station
- Amtrak/VRE Station
- Fredericksburg West Bypass (FWB 1) Alignment
- Fredericksburg West Bypass (FWB 2) Alignment
- Fredericksburg West Bypass (FWB 3) Alignment
- Fredericksburg West Bypass (FWB 4) Alignment
- Existing Track
- County Boundaries

Figure 5-9: Fredericksburg West Bypass Alignments

5.4.3.2 East Fredericksburg Bypass Alignment Options

Land on the east of the CSXT main line is also developed, and includes residential, commercial, and industrial land uses, extensive historic resources, parks, property protected with conservation easements, and other sensitive resources. North of the Rappahannock River, DRPT determined the most likely connection to the main line is the Dahlgren Spur. The Dahlgren Spur diverges from the existing CSXT main line at Dahlgren junction near milepost (MP) 61, just north of the Rappahannock River and extends east parallel to the State Route (SR) 3, a major east-west four-lane state highway, bypass to service a quarry and a power plant. This existing single-track spur is in good condition and could allow for a connection as part of an eastern bypass alignment. There are two existing rail spurs south of Fredericksburg extending to the east, the Deep Run (Bowman) spur and the Massaponax Spur. These spurs were considered by DRPT as potential starting points for a bypass to connect across the Rappahannock River. In addition, the potential for a bypass track to diverge from the CSXT main line farther south was also considered. Developing possible east bypass alignments was an iterative process; as alignments were developed and evaluated, DRPT identified possible impacts with historic and cultural resources, protected lands, existing development, and other sensitive resources. DRPT, seeking to avoid or reduce the possible impacts to these resources, continued to develop additional bypass alignments by shifting the alignments farther eastward and southward, while continuing to connect to the Dahlgren Spur north of the Rappahannock River. However, shifting the bypass alignments to the east requires longer bypass alignments, and thereby increases the potential impacts, including the number of adjacent and affected properties, the amount of new right-of-way required, costs to construct, and trip time.

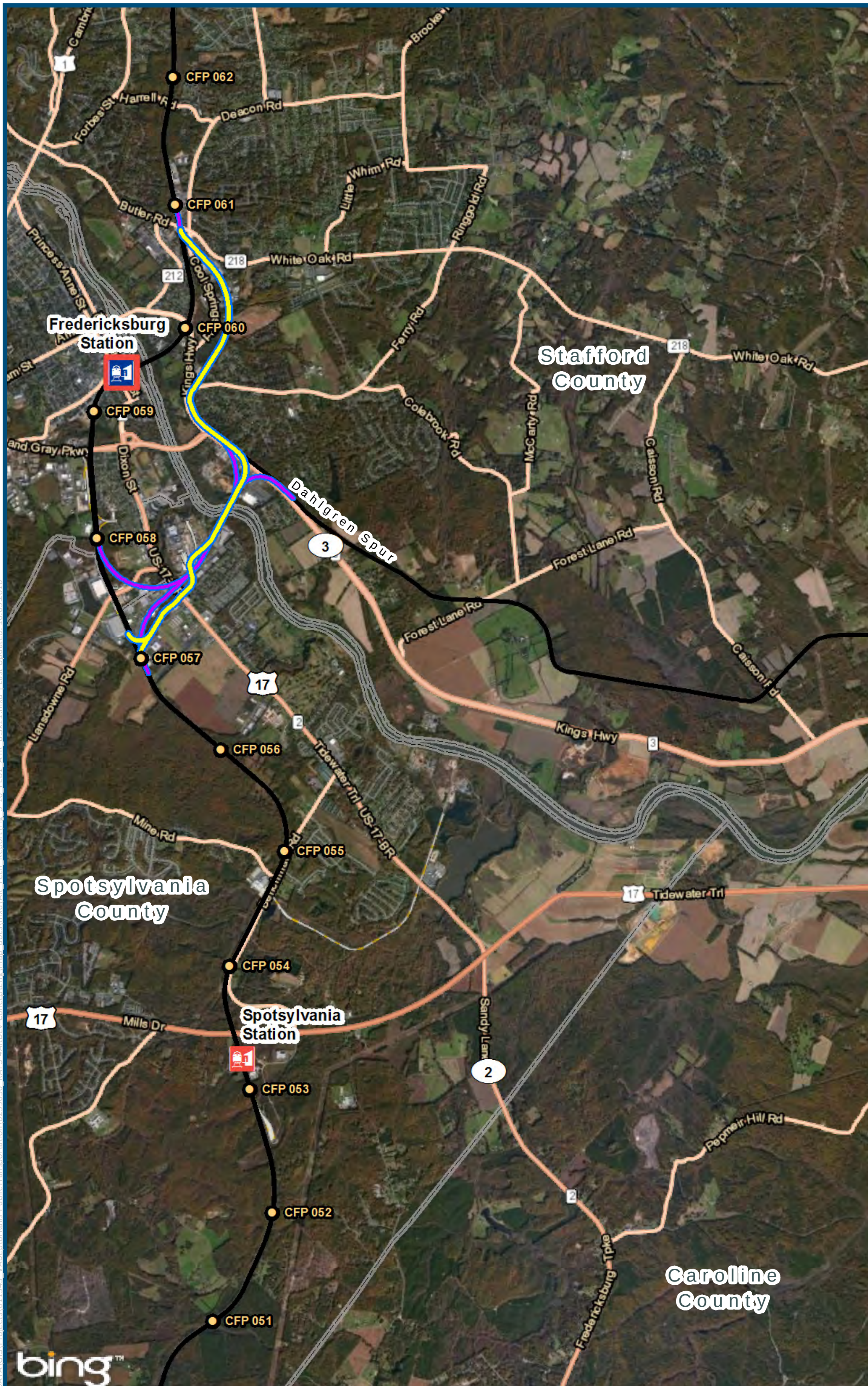
Each east bypass alignment includes adding a main track and improving the existing track on the Dahlgren Spur from the CSXT mainline to the point where the bypass turns south on a greenfield alignment, adding a connecting wye track to allow north-bound trains on the bypass to head east head-first on the Dahlgren Spur and a wye track to allow south-bound trains on the bypass to head north on the main line to access the rail-served industries and CSXT yard in Fredericksburg. The bypass alignments would also include new 2-track greenfield alignments from the Dahlgren Spur south across the Rappahannock River to a point of connection with the CSXT main line or other track. All of the eastern bypass alignments would require a new bridge across the Rappahannock River to connect to the Dahlgren Spur and then to the CSXT main line to the north. The new rail bridge would likely require a 50-foot clearance over the Rappahannock River. According to United States Coast Guard (USCG) information included on National Oceanic and Atmospheric Administration (NOAA) navigational charts, the Rappahannock River is considered navigable as far inland as Fredericksburg. While the channel is not marked between Fredericksburg and Port Royal, 100-foot wide, 10-foot deep channels are maintained across sandbars in this stretch of the river. The U.S. 301 Bridge in Port Royal and the SR 3 bridge in Fredericksburg both provide a minimum of 50 feet of vertical clearance; therefore, DRPT has assumed this minimum height clearance over the river would be included for the new railroad bridge. At-grade crossings on existing track would be improved, re-routed/closed, or grade-separated. All at-grade crossings on new greenfield alignment would be re-routed/closed or grade separated.

5.4.3.3 Deep Run (Bowman) Spur Bypass

The Deep Run (aka Bowman) Spur extends northeast from the CSXT main line at approximately MP 57 to serve the Bowman industrial park. The spur includes an at-grade crossing of SR 2, a main east-west route. The Deep Run spur is limited in speed to just 15 mph due to existing curvature and several switches and at-grade crossings with no active safety systems in the Bowman industrial park.

- **Fredericksburg East Bypass 1A (FEB 1A)**, as shown on Figure 5-10, leaves the Dahlgren Spur near MP 2 and turns south across SR 3, through a quarry site, and across the Rappahannock River to connect to an existing branch track within the Bowman Industrial Park, then leaves the Industrial Park and connects to the CSXT mainline to the south using the Deep Run Spur. The Deep Run Spur is used by a CSXT ethanol transload facility and other rail customers located within the Bowman Industrial Park. Due to the alignment geometry and multiple tight curves required to connect the Dahlgren Spur to the Deep Run Spur, the design speeds are low for this bypass route, approximately 10 to 15 mph.
- **Fredericksburg East Bypass 1B (FEB 1B)**, follows the same general alignment as FEB 1 however the track design/alignment was adjusted to reduce the curves and improve train design speed for most of the new alignment. This results in a 4.11 mile long bypass that bisects the Bowman Industrial Park and several industrial properties. However, due to the slower speeds required for the connections to the Dahlgren Spur and the CSXT main track to the south, trains using the bypass would not be able to operate at speeds above 40 mph.

DRPT reviewed FEB 1A and 1B and determined the bypass curvature on both bypass alignments is too tight and unrealistic to support the efficient operation of mainline freight traffic. Additionally, these bypass options would have impacts to efficient passenger, commuter, and freight train movements on the corridor, because they would require slow-moving freight trains on the bypass to enter and exit the mainline south of Fredericksburg in the VRE commuter territory between the Crossroads station and the Fredericksburg station. These bypass alignments would create cross-traffic conflicts as slow-moving freight trains from the bypass would be entering the east side of the main line to head south or leaving the main line to move north on the bypass while VRE trains moving north or south would also be seeking to use the east side of the corridor. The curving main line corridor between the Deep Run Spur and VRE's station at Spotsylvania, does not provide sufficient space or tangent track for suitable crossovers to alleviate the cross-traffic conflicts. Therefore, DRPT dismissed FEB 1A and 1B from further consideration.



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Feet

1 inch = 6,000 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- VRE Station
- Amtrak/VRE Station
- Fredericksburg East Bypass (FEB 1) Alignment
- Fredericksburg East Bypass (FEB 1B) Alignment
- Existing Track
- County Boundaries

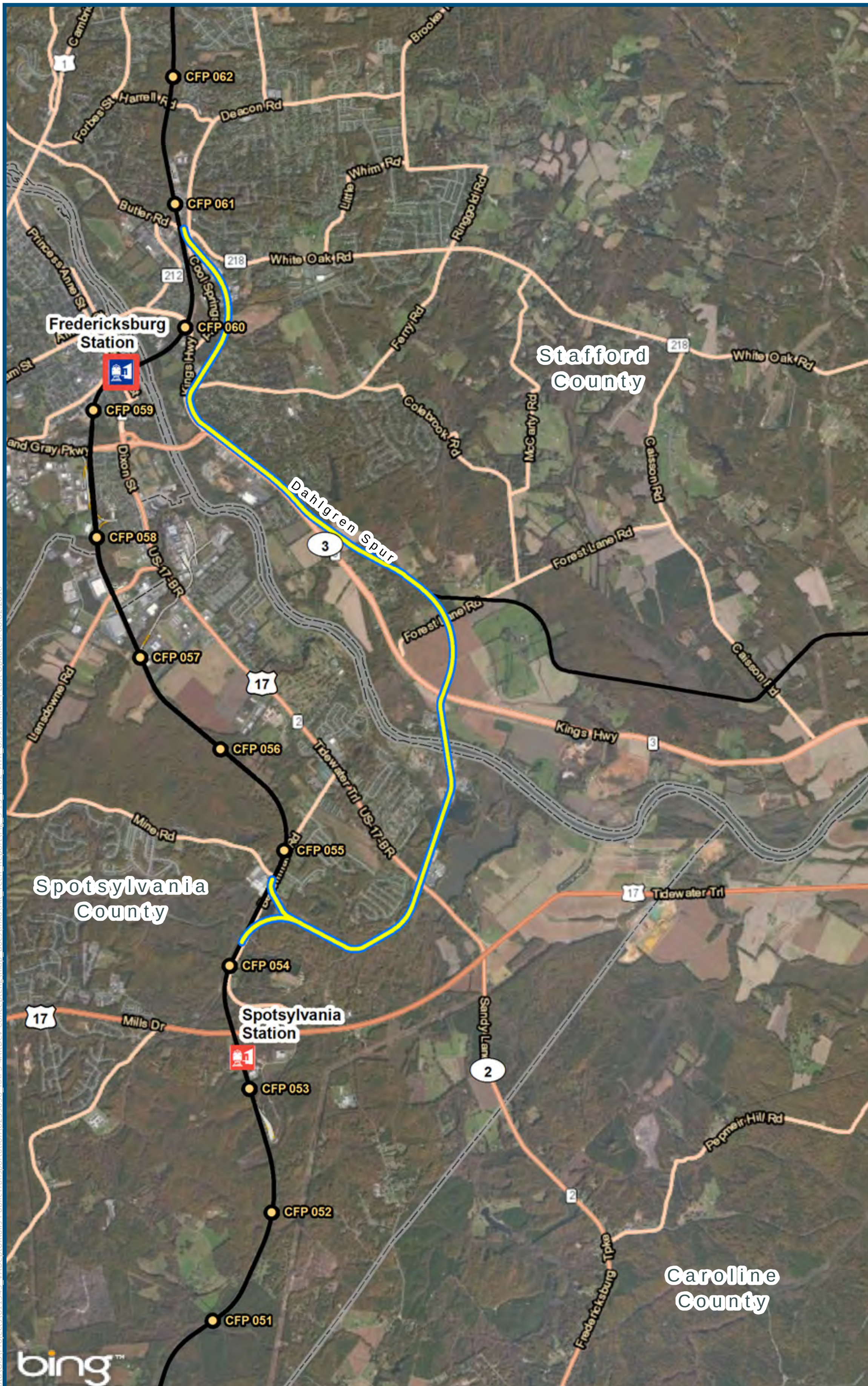
Figure 5-10: Fredericksburg East Bypass (FEB 1) Alignments

5.4.3.4 Massaponax Spur Bypasses

The Massaponax Spur extends southeast and then northeast from the CSXT main line near MP 55, just north of the VRE Spotsylvania Station (under construction) and VRE's train maintenance and storage facility at Crossroads. The spur served a quarry and other industrial facilities along Billy Days Road, just south of the Rappahannock River. The existing spur is in poor condition, and some of the existing track leading into the quarry site has been removed. Bypass alignments using the Massaponax Spur would reconstruct the spur track and would also construct a southbound wye connection to the main line.

- **Fredericksburg East Bypass 2 (FEB 2)**, as shown on Figure 5-11, was developed to extend from the end of the existing Massaponax Spur north across the Rappahannock River and SR 3 and connect to the Dahlgren Spur near MP 4. The crossing of the Rappahannock River on the north side would occur between a wastewater treatment plant and a parcel with a conservation easement and would likely require some property currently within the conservation easement. FEB 2 would be 8.66 miles long.
- **Fredericksburg East Bypass 2A (FEB 2A)**, as shown in Figure 5-12, was developed to avoid acquiring land under conservation easement on the north side of the Rappahannock River that is clipped by FEB 2. FEB 2A diverges from the Massaponax Spur just north of SR 2 and runs along the northwest side of Ruffin's Pond before crossing the Rappahannock River and SR 3, and connects to the Dahlgren Spur near MP 6. FEB 2A would be 9.7 miles long.
- **Fredericksburg East Bypass 3 (FEB 3)**, as shown in Figure 5-13, was developed to avoid or reduce impacts to Ruffin's Pond, the Spotsylvania Soccer Complex, and the Belvedere conservation easement. East Bypass 3 diverges from the Massaponax Spur just east of Jim Morris Road, then crosses U.S. 17 and parallels U.S. 17 and Belvedere Drive before crossing the Rappahannock River and SR 3 and connecting with the Dahlgren Spur near MP 7. FEB 3 would be 10.34 miles long.

Similar to the Deep Run Spur alignments (FEB 1A and 1B), the Massaponax Spur alignments would create cross-traffic conflicts as slow-moving freight trains from the bypass would be entering the east side of the main line to head south while VRE trains moving north or south would also be seeking to use the east side of the corridor. Northbound freights seeking to use the bypass would need to be on the east track and slow down to move from the main line to the bypass, blocking VRE train movements to their Spotsylvania station and maintenance yard. The curving main line corridor between the Deep Run Spur and VRE's station at Spotsylvania, does not provide sufficient space or tangent track for suitable crossovers to alleviate the cross-traffic conflicts. Therefore, DRPT dismissed FEB 2, 2A, and 3 from further consideration.



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1 inch = 6,000 feet
@ 8.5 x 11 inches

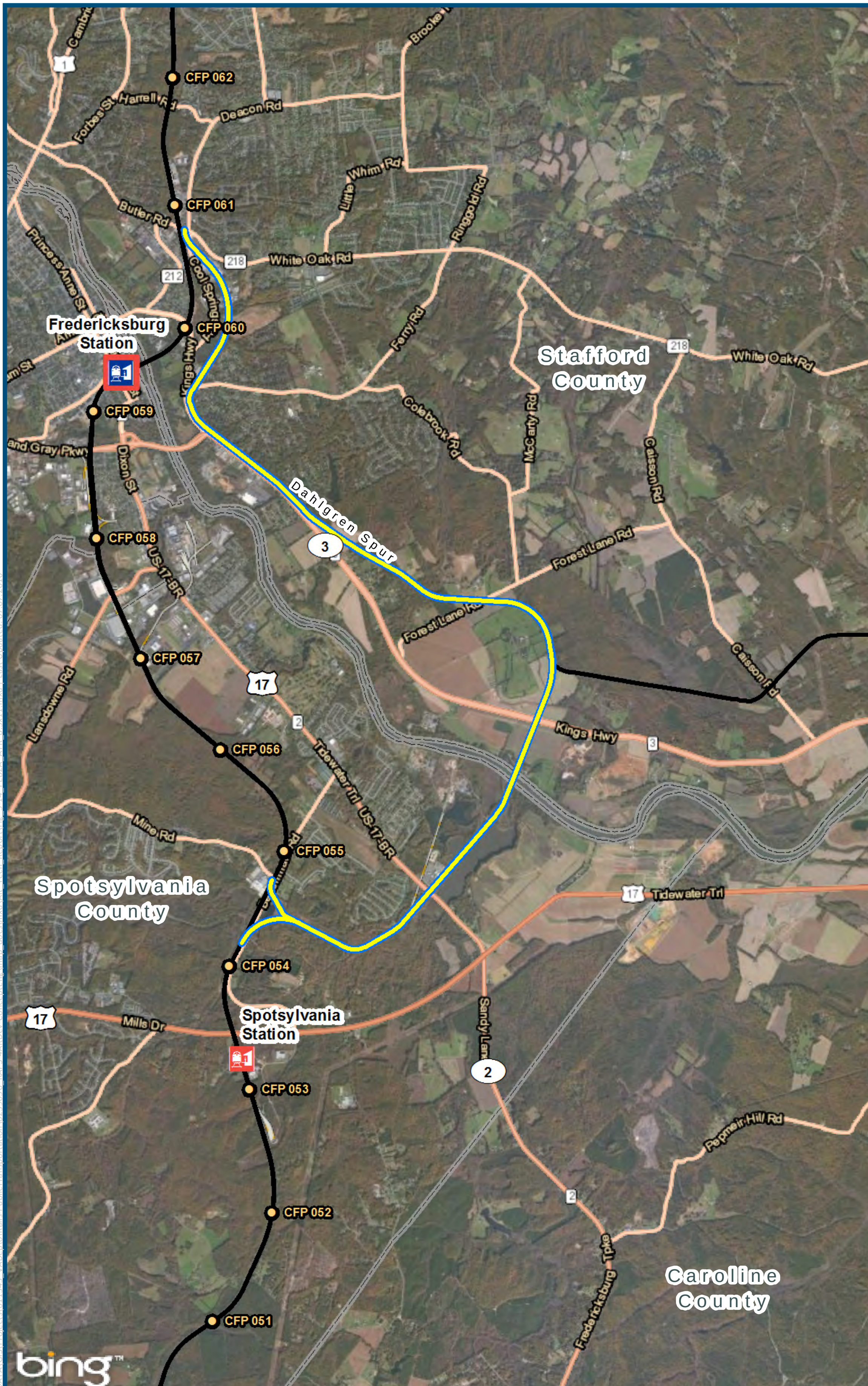
Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- VRE Station
- Amtrak/VRE Station
- Fredericksburg East Bypass (FEB 2) Alignment
- Existing Track
- County Boundaries

Figure 5-11: Fredericksburg East Bypass (FEB 2) Alignment



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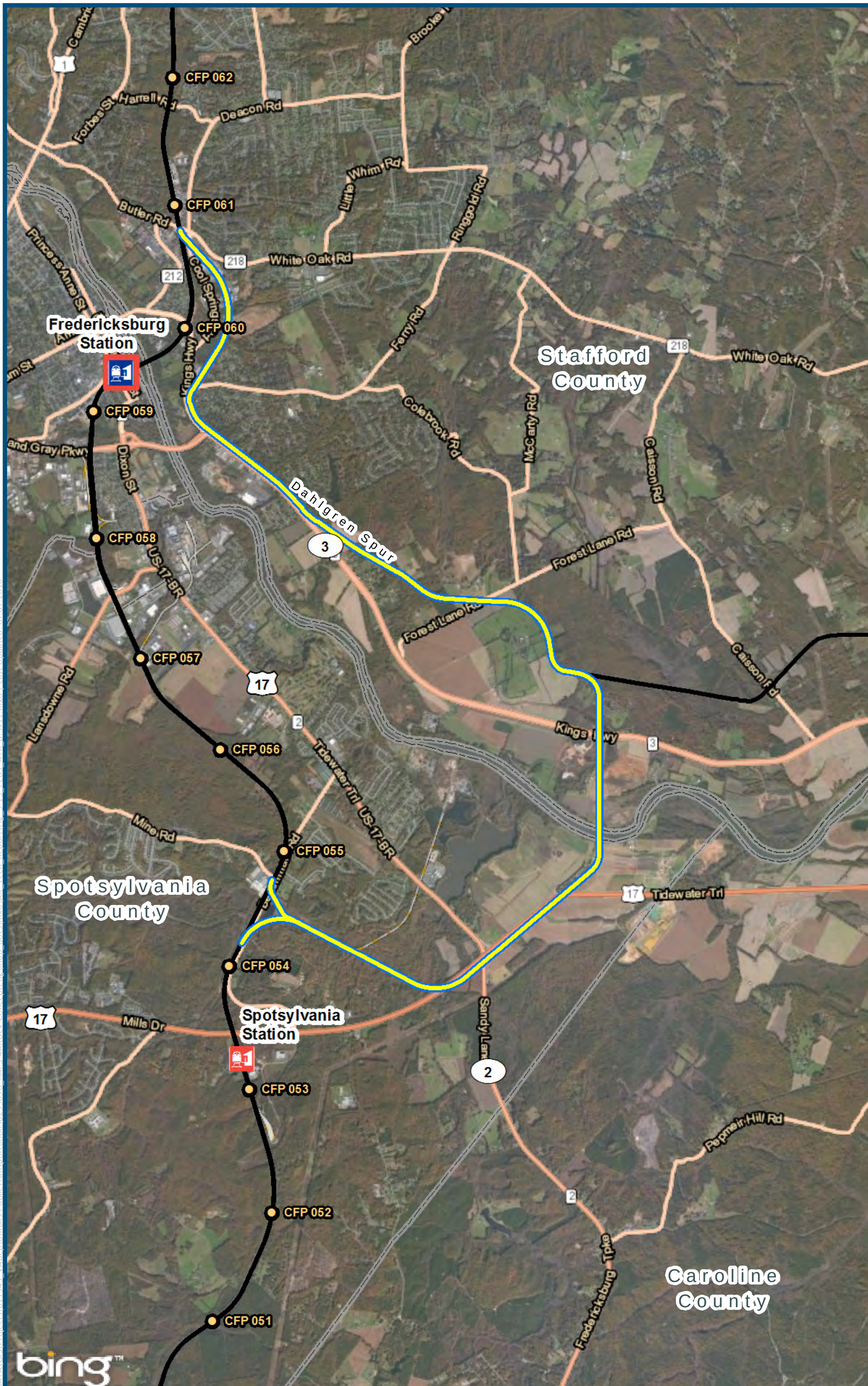
Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- VRE Station
- Amtrak/VRE Station
- Fredericksburg East Bypass (FEB 2A) Alignment
- Existing Track
- County Boundaries

Figure 5-12: Fredericksburg East Bypass (FEB 2A) Alignment



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Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- VRE Station
- Amtrak/VRE Station
- Fredericksburg East Bypass (FEB 3) Alignment
- Existing Track
- County Boundaries

Figure 5-13: Fredericksburg East Bypass (FEB 3) Alignment

5.4.3.5 Additional Eastern Bypass Alignments

DRPT determined that alignments that use the Massaponax Spur could impact VRE train movements entering /leaving the VRE Spotsylvania Station and the VRE train maintenance and storage facility at Crossroads near MP 53, as slow-moving freight trains entering or leaving the Deep Run Spur or Massaponax Spur to/from the south would temporarily block trains from entering or leaving the VRE facilities. To avoid this impact to VRE's commuter rail operations, DRPT developed additional alignments joining from the main line south of the VRE Crossroads facility near MP 52.

- **Fredericksburg East Bypass 4A (FEB 4A)**, as shown in Figure 5-14, diverges south of the VRE Crossroads facility and heads north on new alignment to connect to the Massaponax Spur, and then cross the Rappahannock River in the same manner as FEB 2 to connect to the Dahlgren Spur. FEB 4A would be 9.08 miles long. The crossing of the Rappahannock River on the north side is shifted slightly from FEB 2 to reduce potential impacts to a parcel with a conservation easement north of the river. FEB 4A has a slow speed wye connection at the southern end for south-bound trains on the bypass entering the main line to head north.
- **Fredericksburg East Bypass 4B (FEB 4B)**, as shown in Figure 5-15, diverges from the main line south of the VRE Crossroads facility the same as FEB 4A and then runs on new alignment parallel to an existing power line easement and across the Rappahannock River in the same manner as FEB 3 to connect to the Dahlgren Spur. The wye connection at the southern end for south-bound trains on the bypass entering the main line to head north would occur between the VRE Spotsylvania Station and the Crossroads yard. FEB 4B would be 12.85 miles long.
- **Fredericksburg East Bypass 5 (FEB 5),** as shown in Figure 5-16, diverges from the main line near Summit, south of MP 52, and then heads northeast on new alignment to parallel the Spotsylvania County line, crossing the Rappahannock River in the same manner as FEB 4B to connect to the Dahlgren Spur. FEB 5 would be 12.12 miles long.

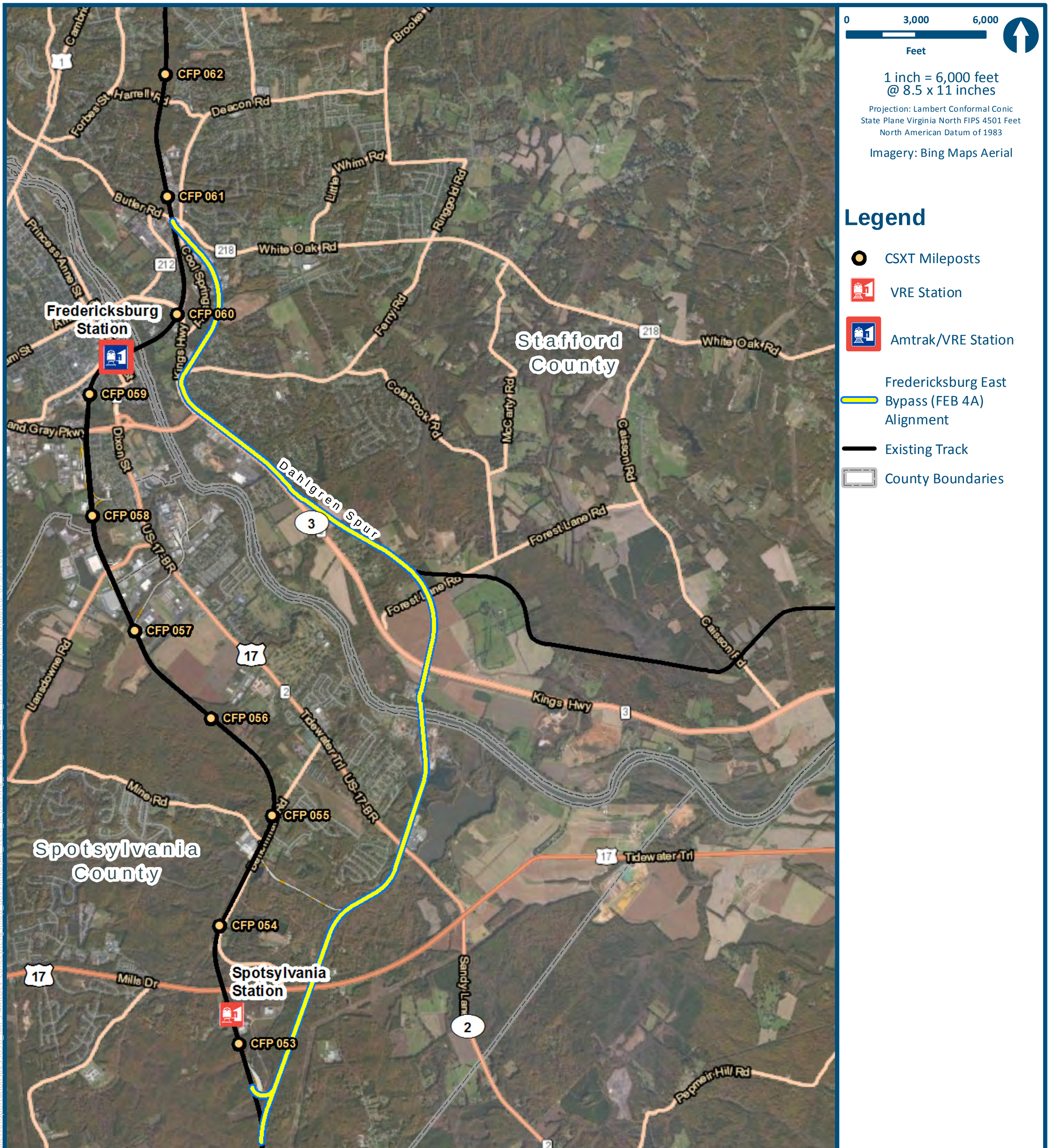
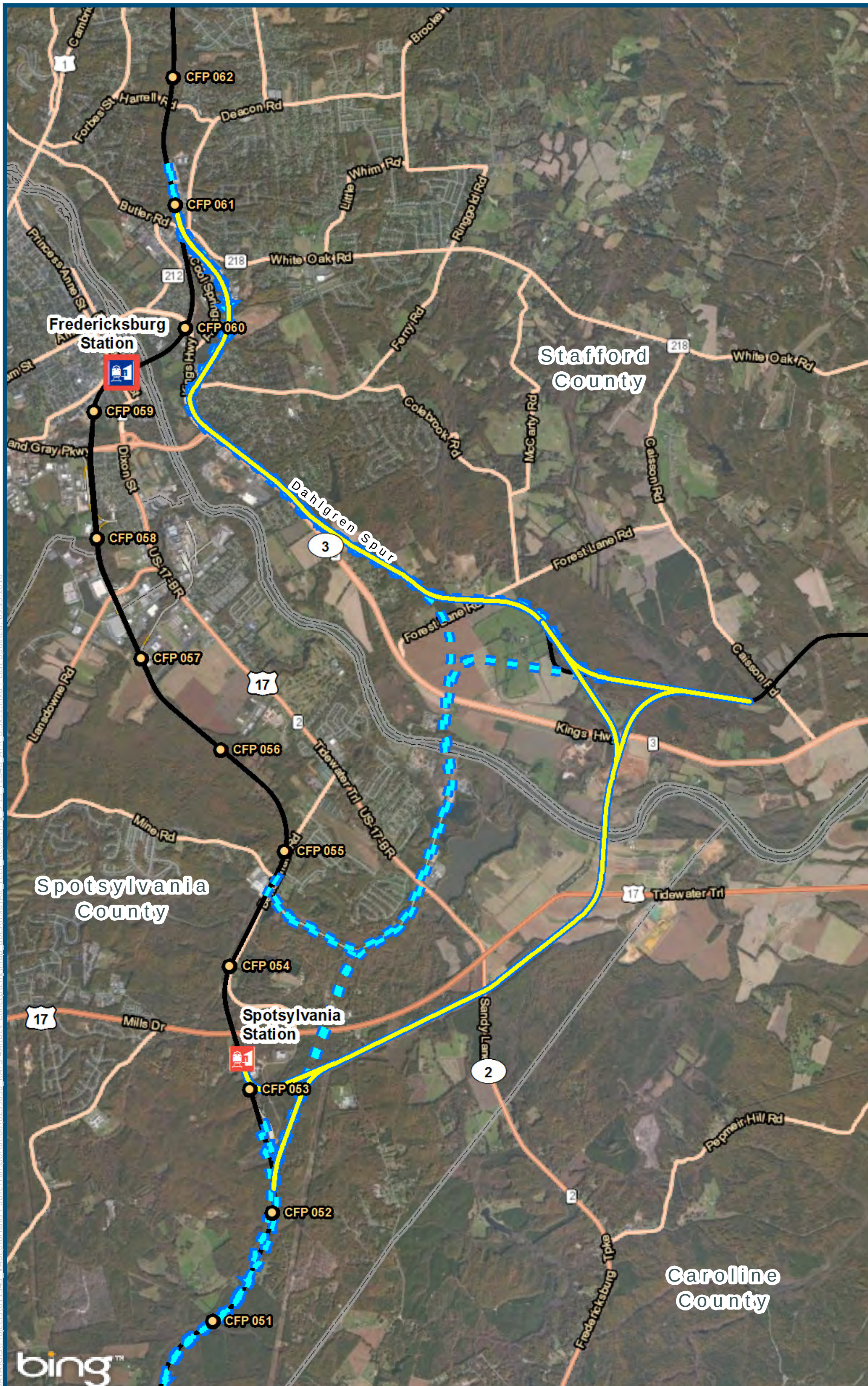


Figure 5-14: Fredericksburg East Bypass (FEB 4A) Alignment



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1 inch = 6,000 feet
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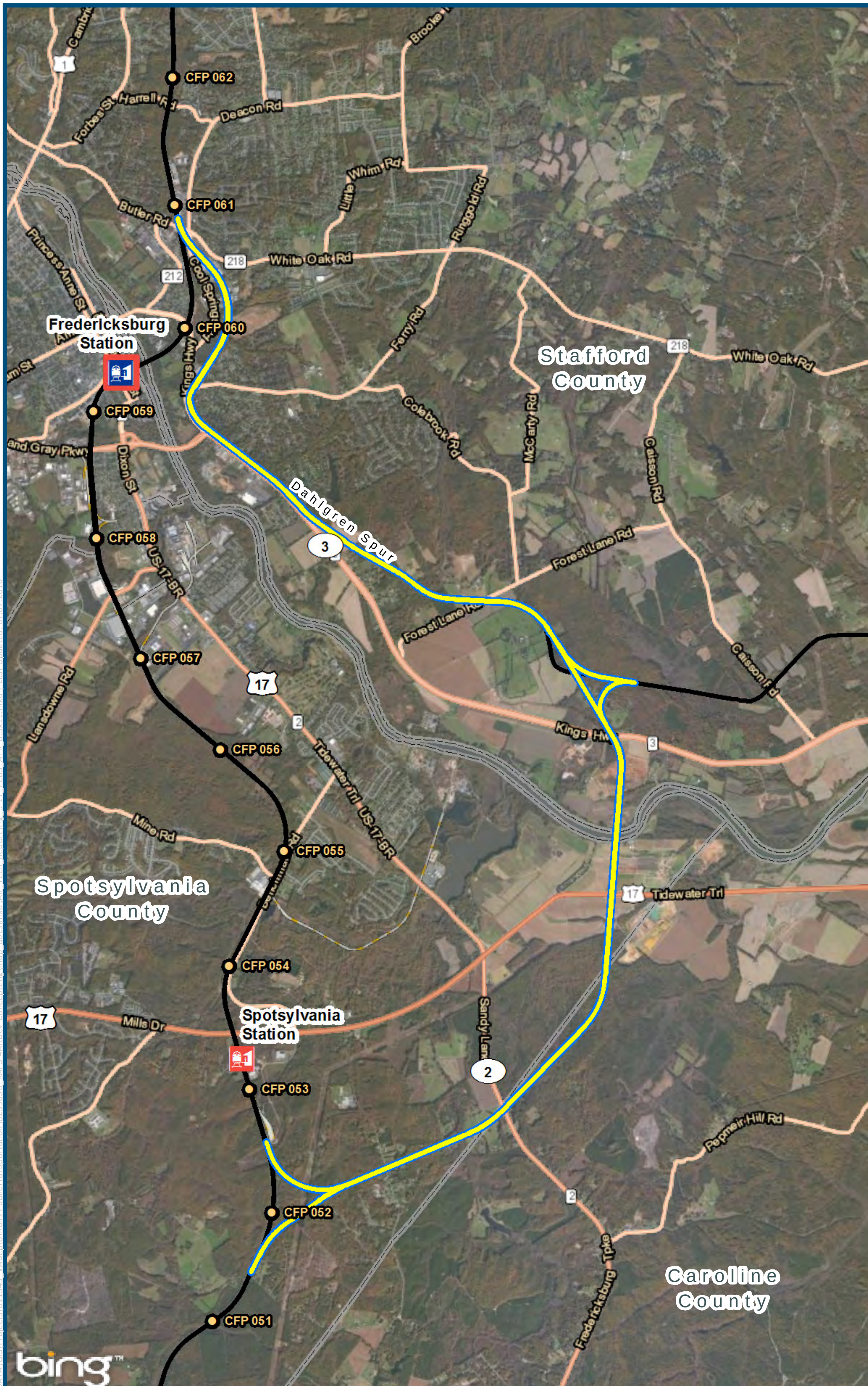
Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT
- VRE
- Amtrak/VRE
- Fredericksburg East Bypass (4B) Alignment
- Fredericksburg East Bypass (4C) Alignment
- Existing
- County

Figure 5-15: Fredericksburg East Bypass (FEB 4B and FEB 4C) Alignments



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Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- VRE Station
- Amtrak/VRE Station
- Fredericksburg East Bypass (FEB 5) Alignment
- Existing Track
- County Boundaries

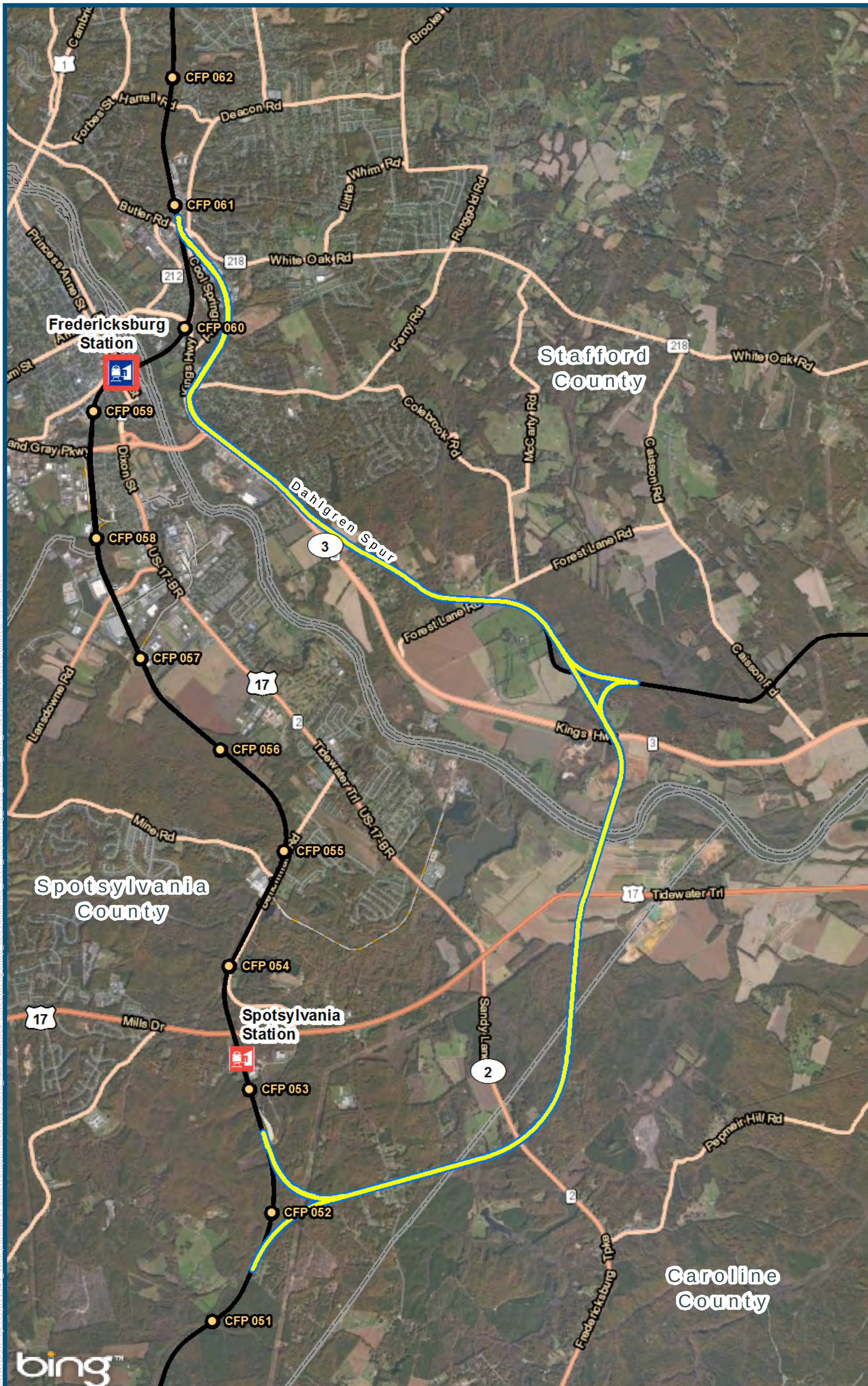
Figure 5-16: Fredericksburg East Bypass (FEB 5) Alignment

5.4.3.6 Additional East Bypass Options Developed After December 2015

DRPT held public information meetings in December 2015 that included descriptions of the preceding Fredericksburg eastern bypass options. Based on public comments and review of additional information, DRPT determined FEB 5 would cross conservation lands, developed lands, and potentially impact historic and cultural resources. DRPT subsequently developed additional east bypass alignments, seeking to reduce potential impacts. DRPT also increased the design speed of these additional east bypass alignments as they were less constricted by existing rail spurs, development and protected lands compared to bypass alignments closer to Fredericksburg.

- **Fredericksburg East Bypass 4C (FEB 4C),** also shown in Figure 5-15, was developed in response to public comments received on bypass options 4A and 4B, and to address potential issues with the wye connections at the southern end. FEB 4C follows the alignment of FEB 4A from the main line south of the VRE Crossroads facility to the Dahlgren Spur. There is no wye connection at the southern end of the bypass allowing trains to move from the bypass north onto the main corridor. Rather southbound bypass trains would access the existing Massaponax Spur to move north onto the main track. FEB 4C is 13.14 miles long, not including the Massaponax Spur connection.
- **Fredericksburg East Bypass 5A (FEB 5A),** as shown in Figure 5-17, was developed by DRPT to diverge from the Dahlgren Spur in the same manner as FEB 5, then shift slightly west to cross the Rappahannock River west of Belvidere Plantation, then running southerly into Caroline County before turning westerly to connect to the CSXT main line just slightly south of the FEB 5 connection. The alignment has a passenger design speed of 70 mph on the greenfield portion of the alignment; the bypass portion is 11.91 miles long.
- **Fredericksburg East Bypass 5B (FEB 5B)**, also shown on Figure 5-18, is similar to FEB 5A, with a wider curve to the southeast. The wider curve allows for a passenger train design speed of 80 mph on the greenfield portion of the alignment. FEB 5B would be 12.10 miles long.
- **Fredericksburg East Bypass 6A (FEB 6)** shifts farther east to reduce possible impacts to conservation lands and potential historic resources; the bypass alignment uses the southerly connection to the CSXT mainline used in FEB 5A and 5B, but shifts the connection to the Dahlgren Spur eastward. Three options were developed for crossing the Rappahannock River and connecting to the Dahlgren Spur, shown in Figure 5-19, and labeled Fredericksburg East Bypass 6A, 6B, 6C, and 6D.

As previously mentioned, Western Bypass Alignments were considered but eliminated by DRPT from further consideration due to large numbers of impacts to existing historic resources and existing land use and infrastructure. DRPT also determined that eastern bypass alignments FEB 1A, FEB 1B, FEB 2, FEB 2A, and FEB 3 had rail operational inefficiencies and would not meet the Project's purpose and need. The remaining Fredericksburg eastern bypass alignments – FEB 4A, FEB 4B, FEB 5, FEB 5A, FEB 5B, FEB 6A, FEB 6B, and FEB 6C, were carried forward for Stage I, II, and III screening. The results of screening these bypass alignments are presented in Chapter 6.



0 3,000 6,000
Feet

1 inch = 6,000 feet
@ 8.5 x 11 inches

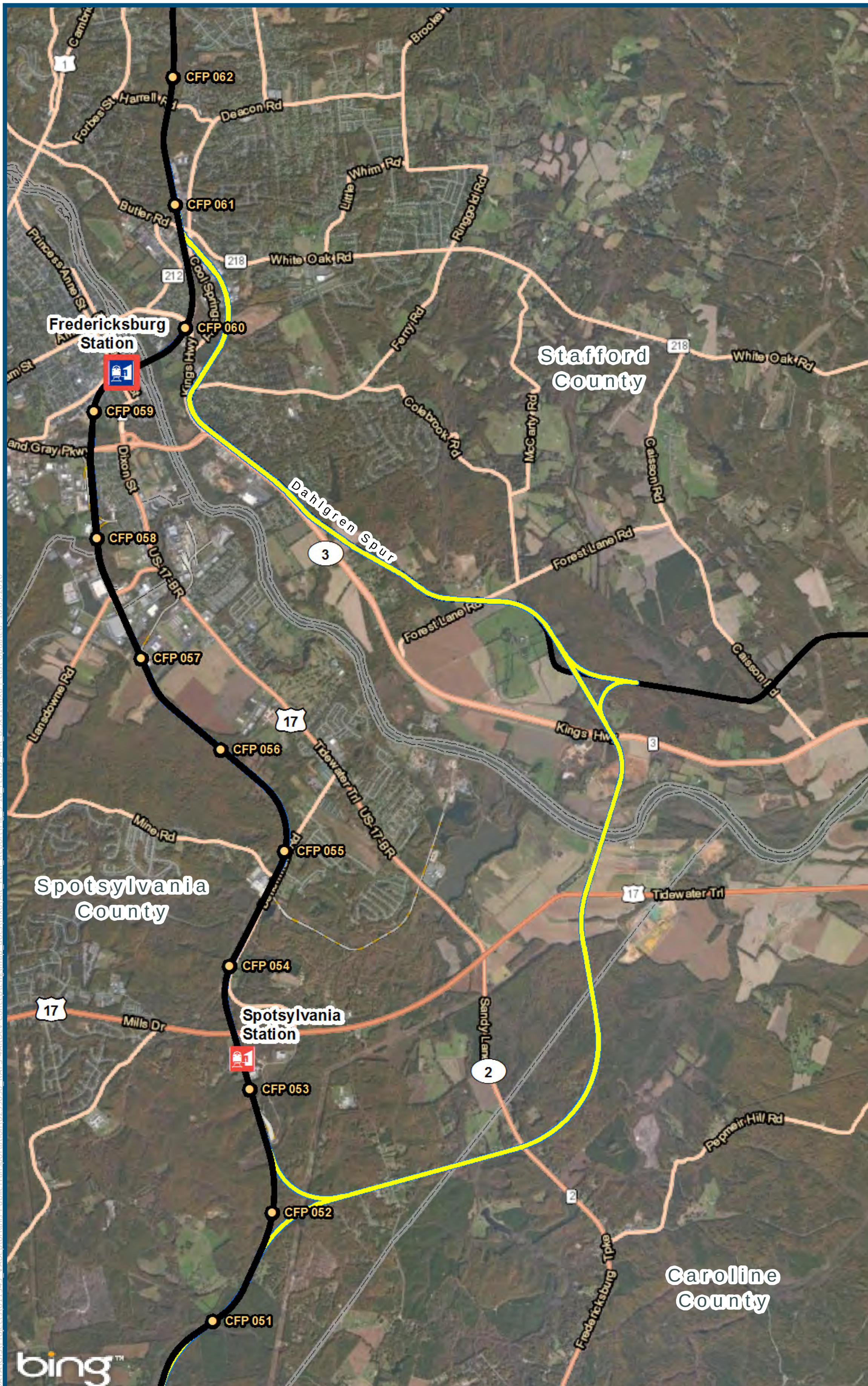
Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- VRE Station
- Amtrak/VRE Station
- Fredericksburg East Bypass (FEB 5A) Alignment
- Existing Track
- County Boundaries

Figure 5-17: Fredericksburg East Bypass (FEB 5A) Alignment



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1 inch = 6,000 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- VRE Station
- Amtrak/VRE Station
- Fredericksburg East Bypass (FEB 5B) Alignment
- Existing Track
- County Boundaries

Figure 5-18: Fredericksburg East Bypass (FEB 5B) Alignment

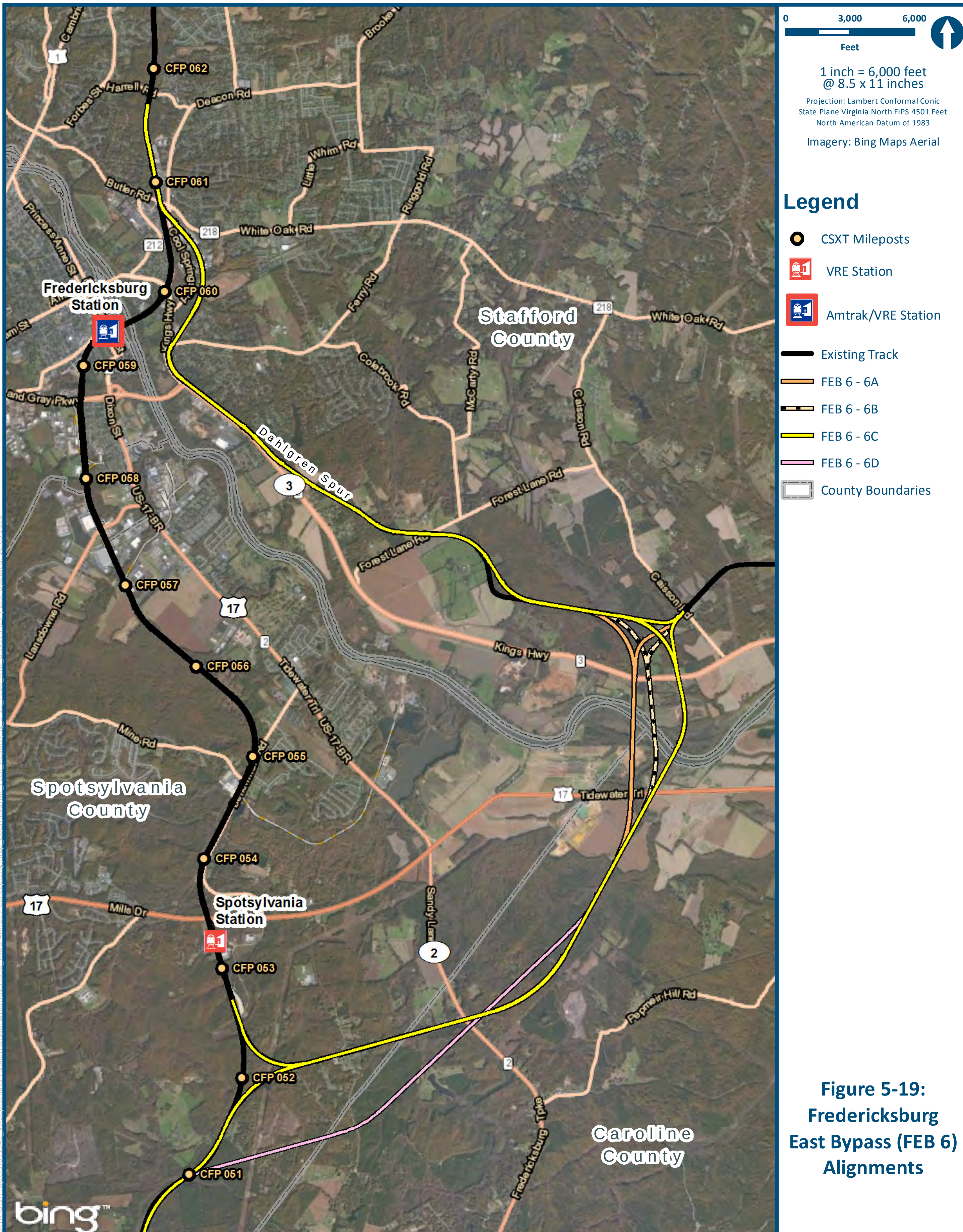

Figure 5-19: Fredericksburg East Bypass (FEB 6) Alignments

5.5 ASHLAND AREA

The Town of Ashland, in Hanover County, is approximately 17 miles north of Richmond. The rail corridor through Ashland consists of two main tracks extending at-grade through the historic center of Ashland, bisecting Center Street (also known as Railroad Avenue for a portion of its length) lengthwise for 1.77 miles between Vaughan Road/Archie Cannon Road[12] (north) and Ashcake Road (south). This area is part of an essentially straight stretch of track several miles long. CSXT has set civil speed restrictions through town of 35 mph daytime and 45 mph nighttime and weekends. The CSXT right of way through town narrows to approximately 25 feet wide; the edge of the right of way is marked by concrete curbs abutting the north and south travel lanes of Center Street. On the outside of the travel lanes for most of Center Street is a lane used for parallel parking; in some blocks, no parallel parking is available due to insufficient space, driveway access, or landscaping. Land use abutting the rail corridor includes Randolph Macon College and single family residential on the north end of town, the historic commercial center, and multi-family residential and historic single-family housing south of the commercial center. Ashland's passenger station sits between the college and the Town's commercial center, just north of SR 54, and consists of two irregular brick platforms extending from the old station building north to College Avenue; there are no other station amenities. The west side platform is approximately 500 feet in length and varies in width between approximately 4.5 feet on the south end and 12 feet in the center and north end. The east side platform is approximately 500 feet in length and is approximately 4 to 6 feet in width. Platform height is approximately top of rail tie. A single 3 feet wide at-grade pedestrian crossing connects the two platforms at the old station building. The train station building adjacent to the west platform is currently used as the Town's visitor center and provides no passenger amenities. Center Street has one travel lane and one parallel parking lane each direction through most of the college and commercial center, and drops in width to a single travel lane in each direction with no street parking at the southern end of town, just north of Ashcake Road. There is a main east-west roadway (SR 54) crossing the rail corridor at-grade in the center of town immediately south of the station, plus at-grade road intersections at Vaughan Road, W. Patrick Street, College Avenue, Myrtle Street, Francis Street, and Ashcake Road. In addition, there are eleven pedestrian at-grade crossings consisting of platforms three feet wide placed perpendicular between the rails and generally placed mid-block. The pedestrian crossings do not have crossing warning devices.

DRPT, based on prior corridor studies as reported in Chapter 2, 3 and 4 of this document, has assumed an additional main track is necessary on the corridor, including through Ashland, to provide needed capacity, improve reliability, and improve travel time. DRPT explored multiple local alignment options to meet the Project's capacity, reliability, and travel time needs through Ashland. DRPT also evaluated multiple station options (described in Section 8 of this report) in concert with the alignment options, including improving the existing downtown station, relocating the station to just outside of Ashland, and closing the station. The local alignment options are summarized below:

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[12] Vaughan Road crosses the CSXT rail corridor at-grade just north of the developed portion of Ashland and extends westerly. The road is known as Archie Cannon Road on the east side of the tracks, and extends to U.S. Route 1. Hereinafter, this at-grade crossing is referred to as the Vaughan Road crossing.

5.5.1 No Additional Track (Minor Improvements) in Ashland

This option includes improvements to signals and communications systems, at-grade crossing safety systems, the addition of crossovers between existing and new main line tracks north and south of Ashland, and other minor rail infrastructure improvements. There would be no additional track added through Ashland; a third main track would be added to the corridor north of Vaughan Road and south of Ashcake Road as described in Chapter 9. The CSXT train speed restriction for trains entering Ashland would remain in place. The existing road and pedestrian at-grade crossings in Ashland would be subject to detailed evaluations for safety (see Chapter 4 of the Draft EIS) and may require additional safety measures (see Chapter 7 of this document and Chapter 4 of the Draft EIS).

The ability of this option to support the Project's Purpose and Need by providing sufficient capacity, reliability, and frequency of passenger train service is not yet determined. Pending completion of rail operations modeling and other analyses, DRPT determined this option would be evaluated further in the Draft EIS.

5.5.2 Adding a Track Through Ashland

DRPT evaluated the possibility of adding a third track through Ashland along the existing CSXT right-of-way, i.e. continuing the proposed third track north of Ashland through the town and connecting to the third track continuing south to Richmond. The Maximum Speed Alignment, Improved Speed Alignment, and Existing Speed Alignments (east and west) were evaluated to add a third track through Ashland. These optional alignments were screened following the Stage I, II and III process used by DRPT along the entire corridor (see Chapter 6 of this report). Given the straight track alignment through and immediately beyond Ashland, there is no substantive difference in these alignments within the Town beyond evaluating an east, west, or centered additional track.

DRPT recognized that all of these third track alignments would require additional right of way, change vehicle and pedestrian travel patterns in the town and would also affect historic and community resources in the area. The existing right-of-way through town is occupied by the two existing tracks, and any addition of a third main track would occupy space already used by roadway and/or parking (Figures 5-20 and 5-21), as well as occur within a Historic District and in proximity to other historic resources. If track is added at-grade, and the existing roadway and/or parking converted to track is replaced, additional right of way would be required, potentially affecting historic resources. The DC2RVA Project also includes improvements to the existing Ashland Station platforms, including expanding the platforms on both sides of the track to meet the BOD; if a third track is added, the track would need to shift outward at the station to accommodate an island platform requiring additional right or way. DRPT considered the following options for adding a track at-grade with station improvements through the Town of Ashland:

- Adding one track on the west side – A single track would be added on the west side of the existing corridor. This option would impact the train station building (a possible historic resource now used as a visitor's center) and occupy the travel lane of southbound Center Street. The adjacent parking lane would be converted into a travel lane.
- Adding one track on the east side – A single track would be added on the east side of the existing corridor. This option does not directly affect any buildings, but would occupy the

travel lane of northbound Center Street. The adjacent parking lane would be converted into a travel lane, with the exception of the area between Route 54 and Maiden Lane, where access to Center Street would be closed and access to parcels fronting on Center Street provided from side streets.

- Adding one track and shifting the existing two tracks to center the three tracks – This option would impact the train station building and occupy a portion of both the north-bound and south-bound travel lanes of Center Street. The adjacent parking lanes would be converted into north and southbound travel lanes.

DRPT recommended that the addition of a third track through town along the east side of the existing tracks should be evaluated in greater detail as it was the only at-grade option that did not impact the train station building, and presented this recommendation to the public along with other potential alternative screening results in December 2015. DRPT received comments addressing potential impacts of adding a third track along the east side of the existing tracks, including concerns about impacts to parking, business access along northbound Center Street, and the need for additional right of way. Comments were also received regarding potential impacts from expanding the station platforms at their current location, including effects on parking, access, traffic patterns, and the need for additional right of way. In response to these comments, DRPT developed a modified option for adding a track at-grade through Ashland:

- Adding one track and shifting the existing two tracks to center the three tracks AND remove the station – similar to the center three track option above, this option would impact the train station building while maintaining travel lanes along Center Street, with reduced additional right of way required.

DRPT therefore decided to advance both at-grade options – adding one track along the east with station improvements and adding one track and centering three tracks without a station – into further screening and evaluation.

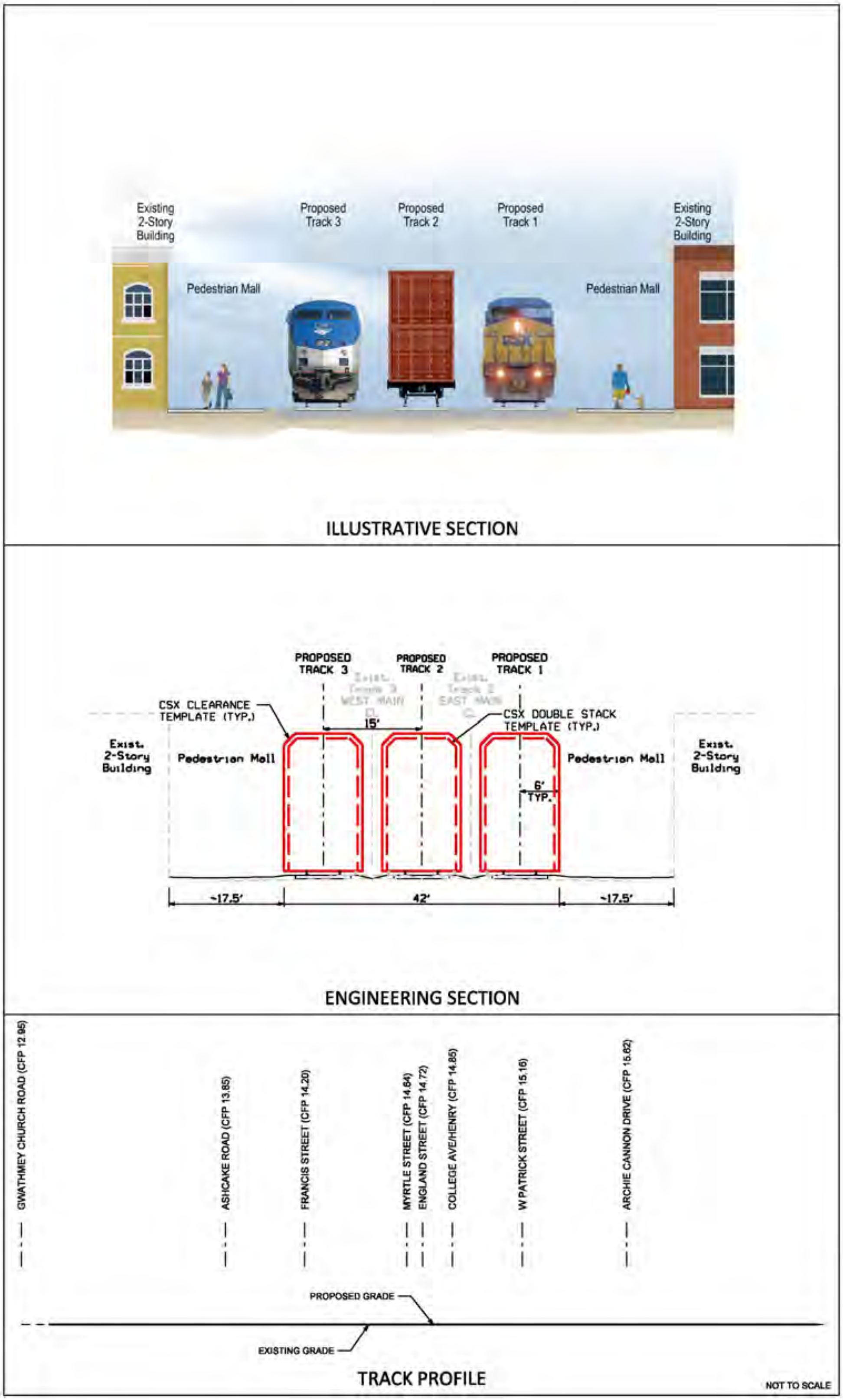

Figure 5-20 Ashland Track Option: At Grade Centered

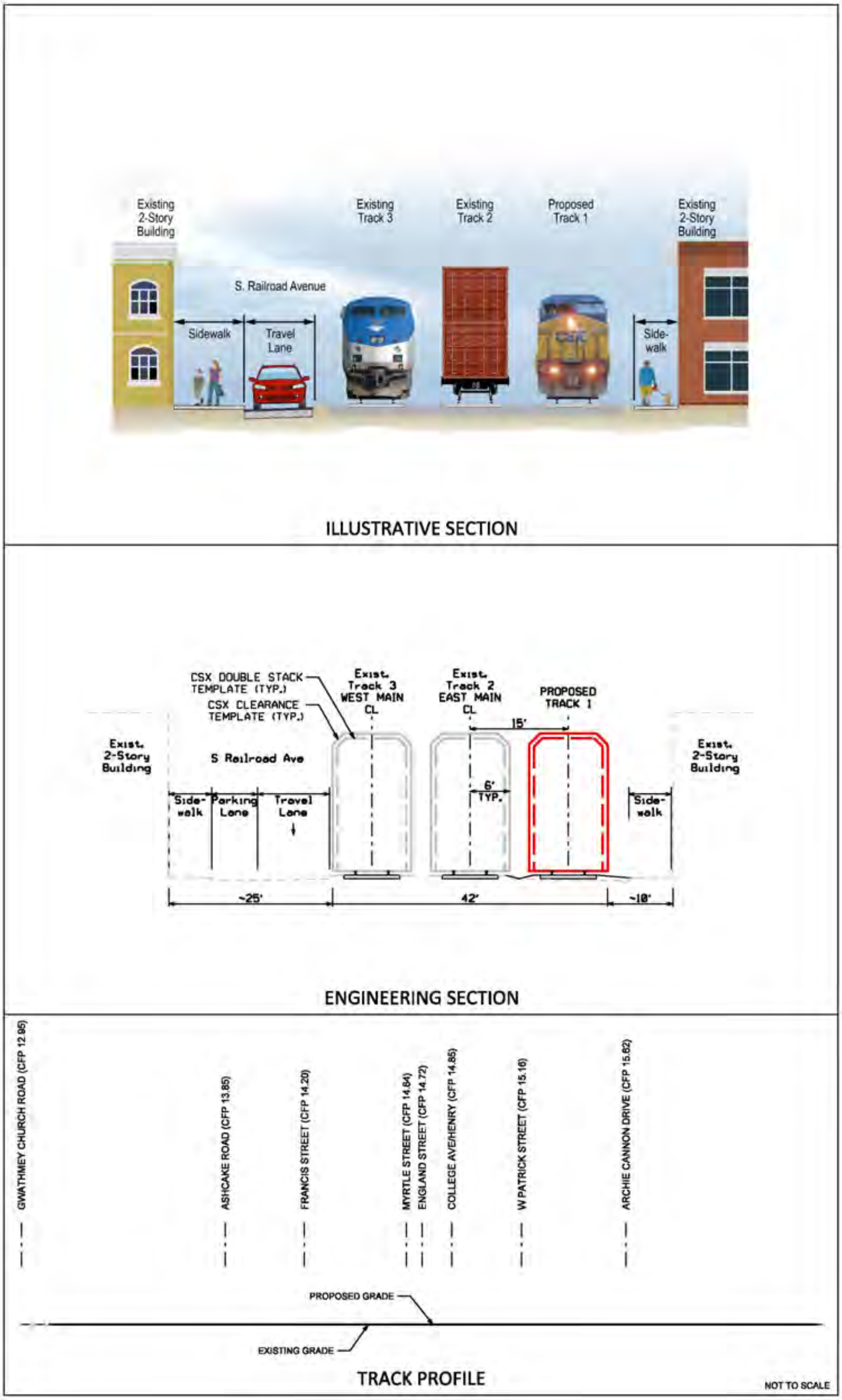

Figure 5-21
Ashland Track Option:
At Grade
Off Center

During DC2RVA scoping, several additional alignment options through Ashland were suggested by the public in lieu of adding a third track at-grade through town:

Ashland Elevated Options: Raise 1, 2, or all 3 track(s) on an elevated structure along the current alignment through Ashland. The elevated structure would extend from approximately just north of Vaughan Road to just south of Ashcake Road. The raised track would extend almost another mile north and south along a raised berm before joining the existing at-grade rail corridor in order to maintain an acceptable gradient.

- **Elevate 1 Track** – Elevate 1 track above the existing 2 at-grade tracks from Vaughan Road to Ashcake Road (Figure 5-22). Passenger trains serving the Ashland Station and some freight trains would continue through town on the existing 2 tracks. The elevated structure would need to have 24 feet 3 inches clearance over the existing tracks, be approximately 64 feet wide to span the existing tracks, and be 9,500 feet long to clear both Vaughan and Ashcake Roads. Ramps up to the structure north and south would be approximately 4,000 feet long at each end to maintain a grade suitable for passenger trains.
- **Elevate 2 Tracks** – Elevate 2 tracks above the existing 2 at-grade tracks from Vaughan Road to Ashcake Road (Figure 5-23). The track would serve as a bypass for both through freight and passenger trains, allowing passage through Ashland without speed restriction. The existing 2 tracks at-grade would remain in service and be used by passenger trains serving the Ashland Station. A 2-track elevated structure would also need to have 24 feet 3 inches feet clearance over the existing tracks, be approximately 64 feet wide and 9,500 feet long. Ramps up to the structure north and south would be approximately 4,000 feet long at each end to maintain a grade suitable for freight and passenger trains.
- **Elevate 3 Tracks** – Elevate 3 tracks above the existing right of way, and remove the 2 at-grade tracks (Figure 5-24). The elevated 3 tracks would be co-mingled passenger and freight. This option would require an elevated station, a relocated station outside of the elevated alignment, or no station. The structure would need to have 24 feet 3 inches clearance over the existing tracks, and be approximately 64 feet wide and 9,500 feet long. Ramps up to the structure north and south would be approximately 4,000 feet long to maintain a grade suitable for freight and passenger trains.

The elevated structure to carry a freight or passenger train above the existing at-grade right of way would require a fairly substantial system of support columns. If a single track elevated structure is constructed using a standard H-pattern of support columns over the existing tracks, the support columns would occupy portions of both travel lanes of Center Street, adversely affecting travel capacity and/or parking along Center Street (see Figure 5-22). Alternatively, if the elevated structure is supported by support columns in a T-pattern placed between the existing tracks, then the tracks must be shifted outward to maintain a safe distance from the support structures, again resulting in loss of most of the travel capacity and/or parking along Center Street. If a 2-track or 3-track elevated structure is built, the support columns and structure become larger, and would likely close both travel lanes of Center Street, although some parking or other use may be possible between the columns. A 3-track structure would include the removal of the 2 existing at-grade tracks, potentially making the space occupied by the tracks available for replacement travel lanes. It is possible a temporary rail bypass around

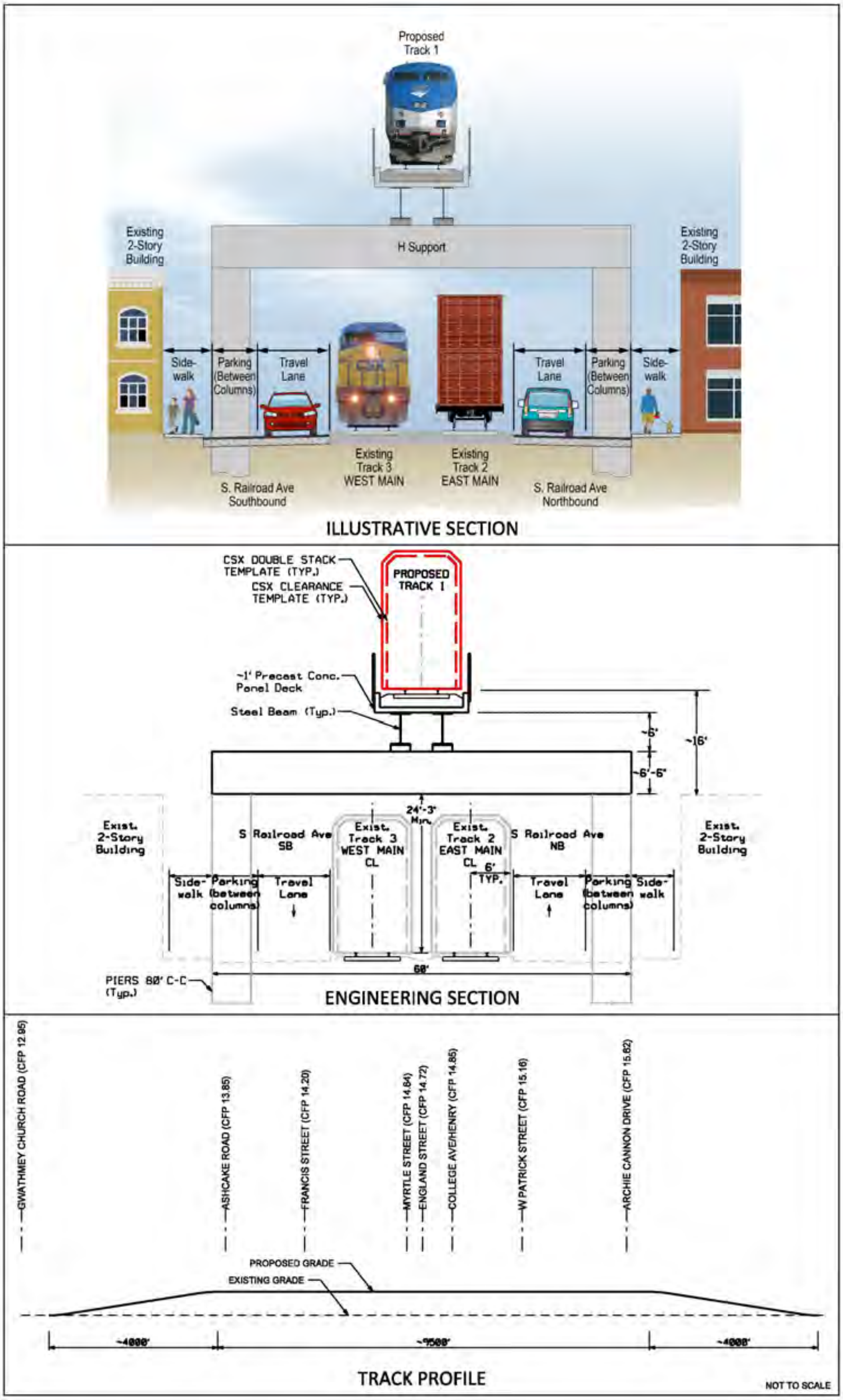

Figure 5-22 Ashland Track Option: Above Grade 1

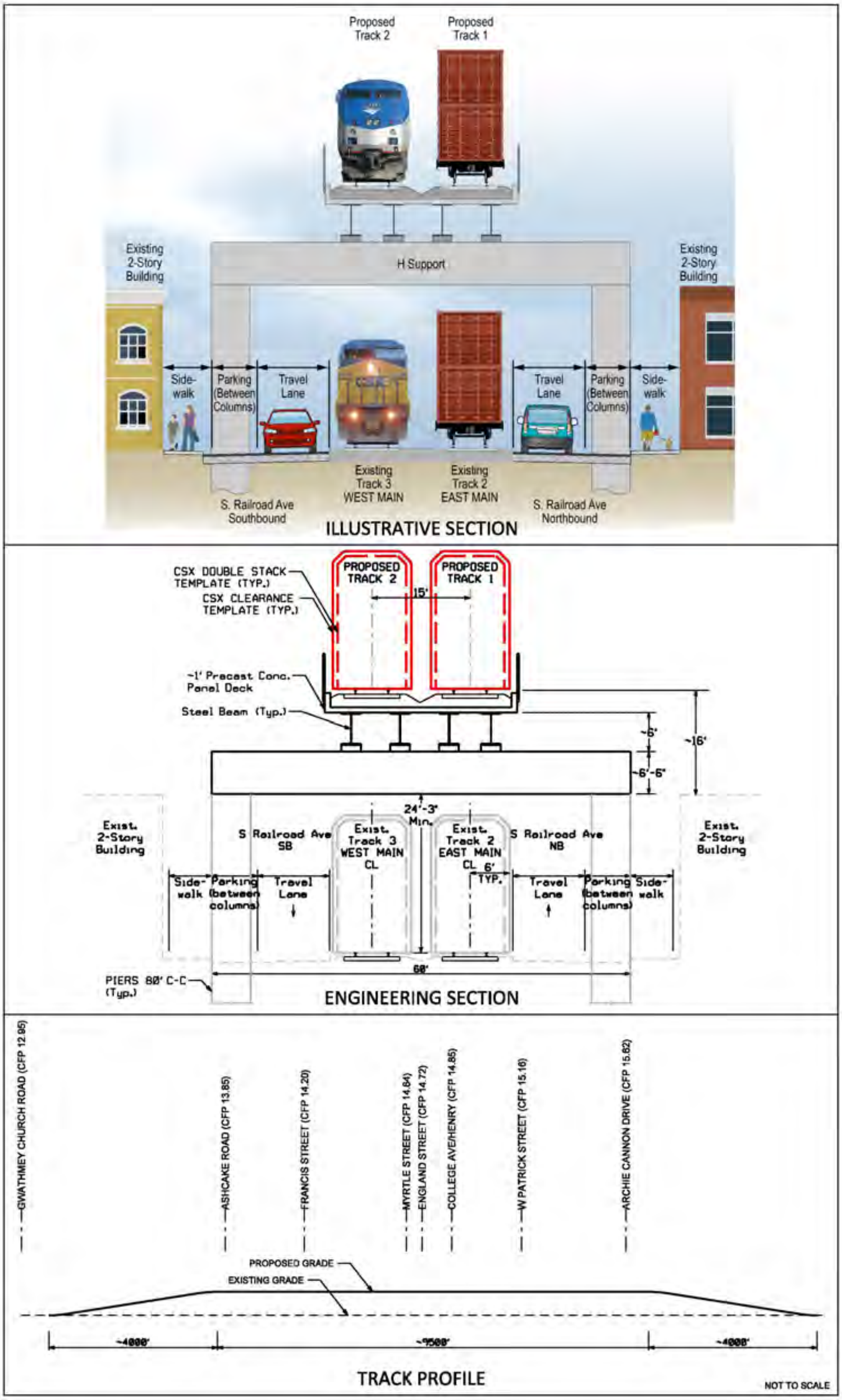

Figure 5-23 Ashland Track Option: Above Grade 2

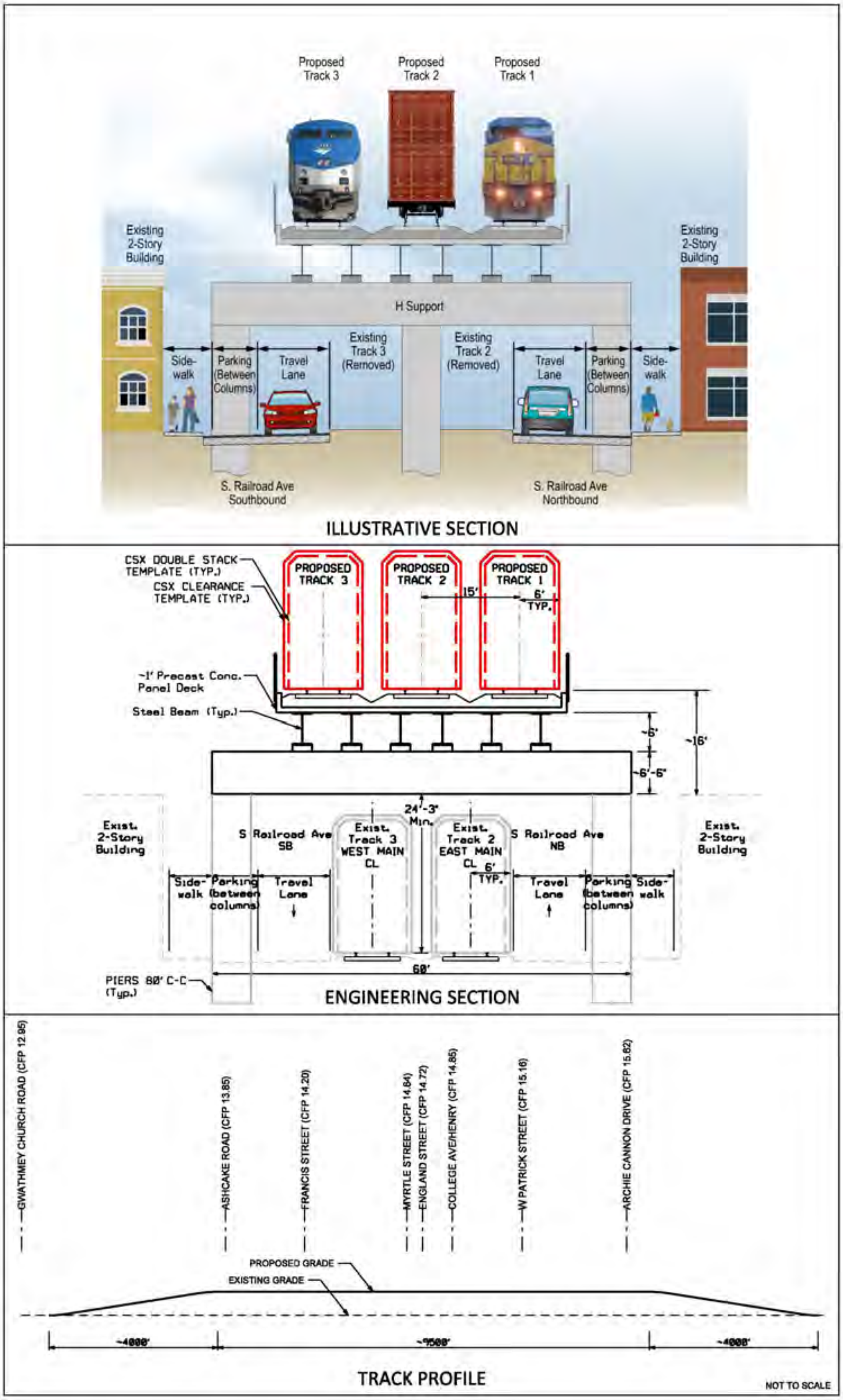

Figure 5-24
Ashland Track Option: Above Grade 3

Ashland would be required during construction of a 3-track elevated structure to avoid impacts to the existing rail system. An elevated train increases the potential for visual and noise impacts. Elevated structures are more expensive to build, maintain, and operate than at-grade track systems. Therefore, based on likely temporary/construction and permanent impacts to rail and road traffic, historic resources, the community, and potential costs, DRPT determined that an elevated rail structure through Ashland was not practical or feasible, and would be eliminated from further consideration and will not be carried forward into the screening process described in Chapter 6.

Ashland Below Grade Options: Bury 1, 2, or 3 track(s) in a tunnel along the current alignment through Ashland. The tunnel structure would extend from approximately north of Vaughan Road to south of Ashcake Road, and ramps back to the surface would extend even farther north and south in order to maintain an acceptable track gradient for passenger and/or freight trains. The tunnel structure and roof would be robust enough to support the overburden and existing track and/or roadway on top. The tunnel would require lighting, emergency access including in-tunnel walkways and stairs to the surface, ventilation systems, and drainage systems (Figures 5-25 and 5-26). DRPT considered two types of tunnel structure: a cut and cover tunnel, in which a deep trench is excavated from the surface, tunnel walls, floor and ceiling constructed, and then the ground cover replaced over the tunnel roof; and a deep bore tunnel, in which a tunnel boring machine excavates a much deeper tunnel end to end while walls, floor and ceiling are constructed as the tunnel bore progresses.

Tunnel options include:

- **1-Track Tunnel –** Bury 1 track on the east of the existing 2 at-grade tracks from Vaughan Road to Ashcake Road (Figure 5-27). The tunnel track would be for through freight and/or passenger trains not serving Ashland; this would allow the through trains to proceed through (beneath) town at greater speed, reducing their travel time. Passenger trains serving the Ashland Station and some freight trains would continue through town on the existing 2 tracks, and be subject to the existing speed restriction.
- **2-Track Tunnel** – Bury 2 tracks – one east and one centered - from Vaughan Road to Ashcake Road (Figure 5-28). The tunnel track would serve as a bypass for both through freight and passenger trains, allowing passage through (beneath) Ashland without speed restriction. The existing 2 tracks at-grade would remain in service and be used by passenger trains serving the Ashland Station.
- **3-Track Tunnel** - Bury 3 tracks below the existing right of way, and remove the 2 at-grade tracks (Figure 5-29). The 3 tunnel tracks would be co-mingled passenger and freight. This option would require an underground passenger station, relocation of the station outside of the tunnel and ramp alignment, or closure of the station.

A railway tunnel is costly to construct and maintain, particularly in comparison to a surface rail corridor. A single-track tunnel provides similar capacity to the corridor through Ashland as adding one track at-grade. A two-track tunnel provides additional capacity and operational flexibility for trains moving between the surface corridor and tunnel. A three-track tunnel would basically replace the existing at-grade corridor, and greatly exceeds the infrastructure necessary to meet the Purpose and Need. Given the likely high costs of a tunnel option, DRPT determined to evaluate a single-track tunnel.

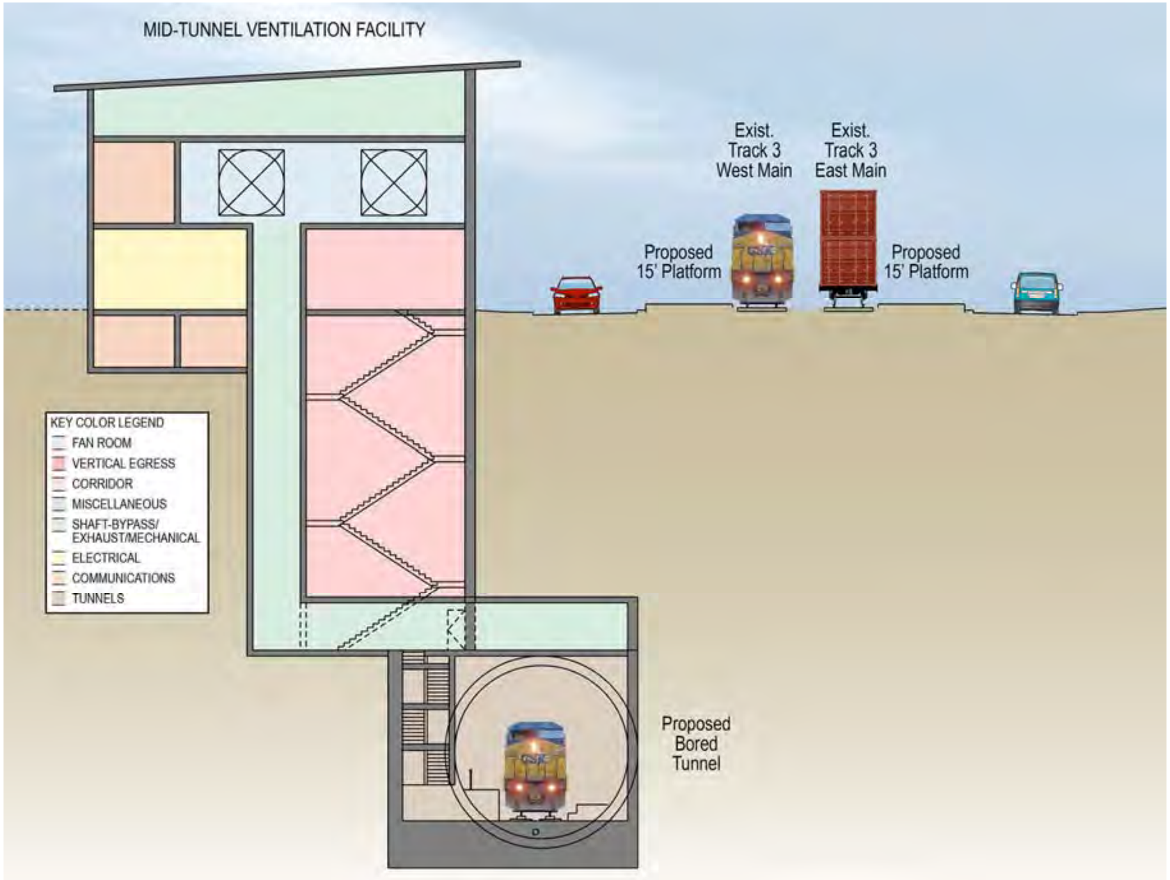

FIGURE 5-25: EXAMPLE OF VENTILATION BUILDING

FIGURE 5-26: EXAMPLE OF EMERGENCY ACCESS GRATE

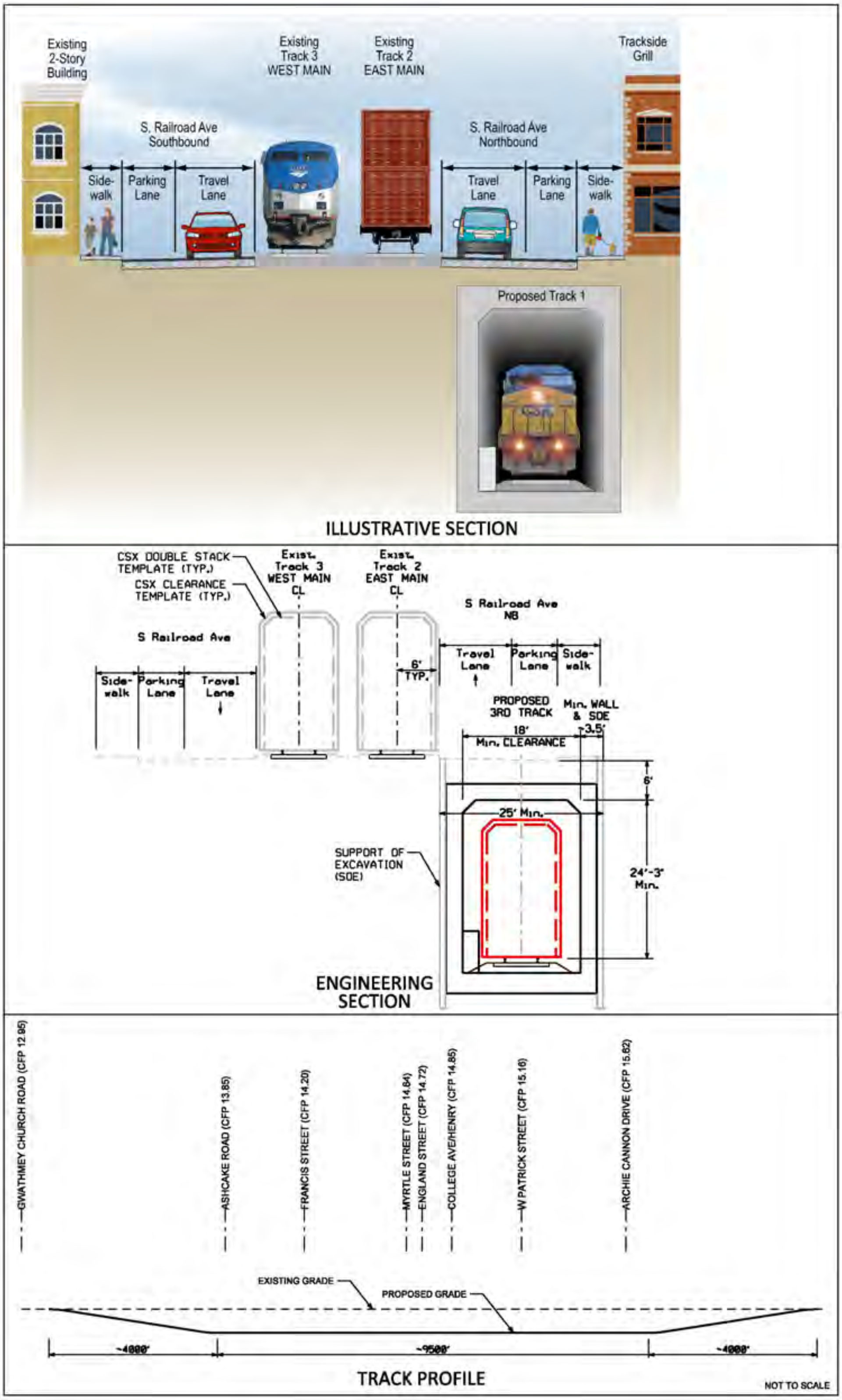

Figure 5-27 Ashland Track Option: Below Grade 1

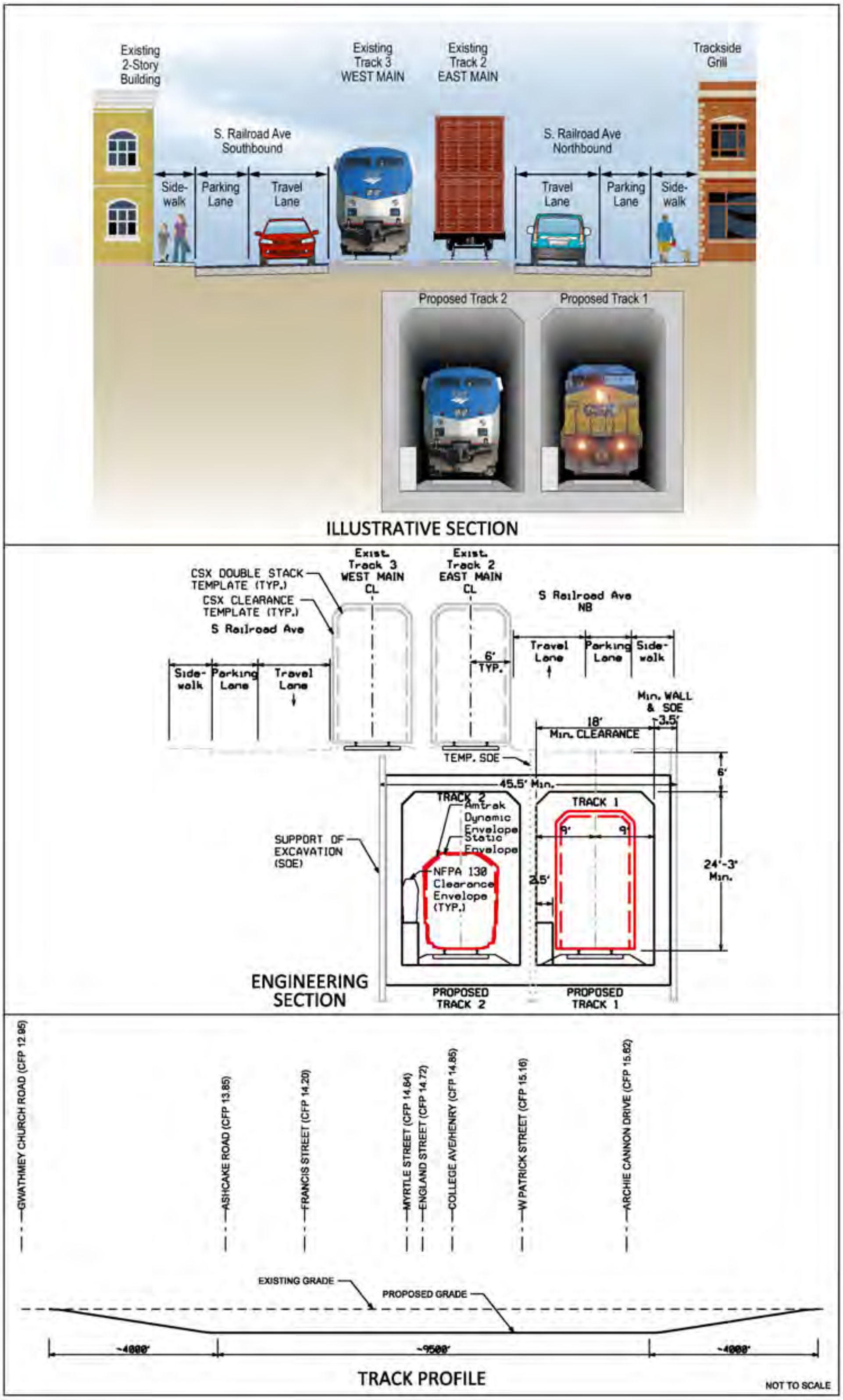

Figure 5-28 Ashland Track Option: Below Grade 2

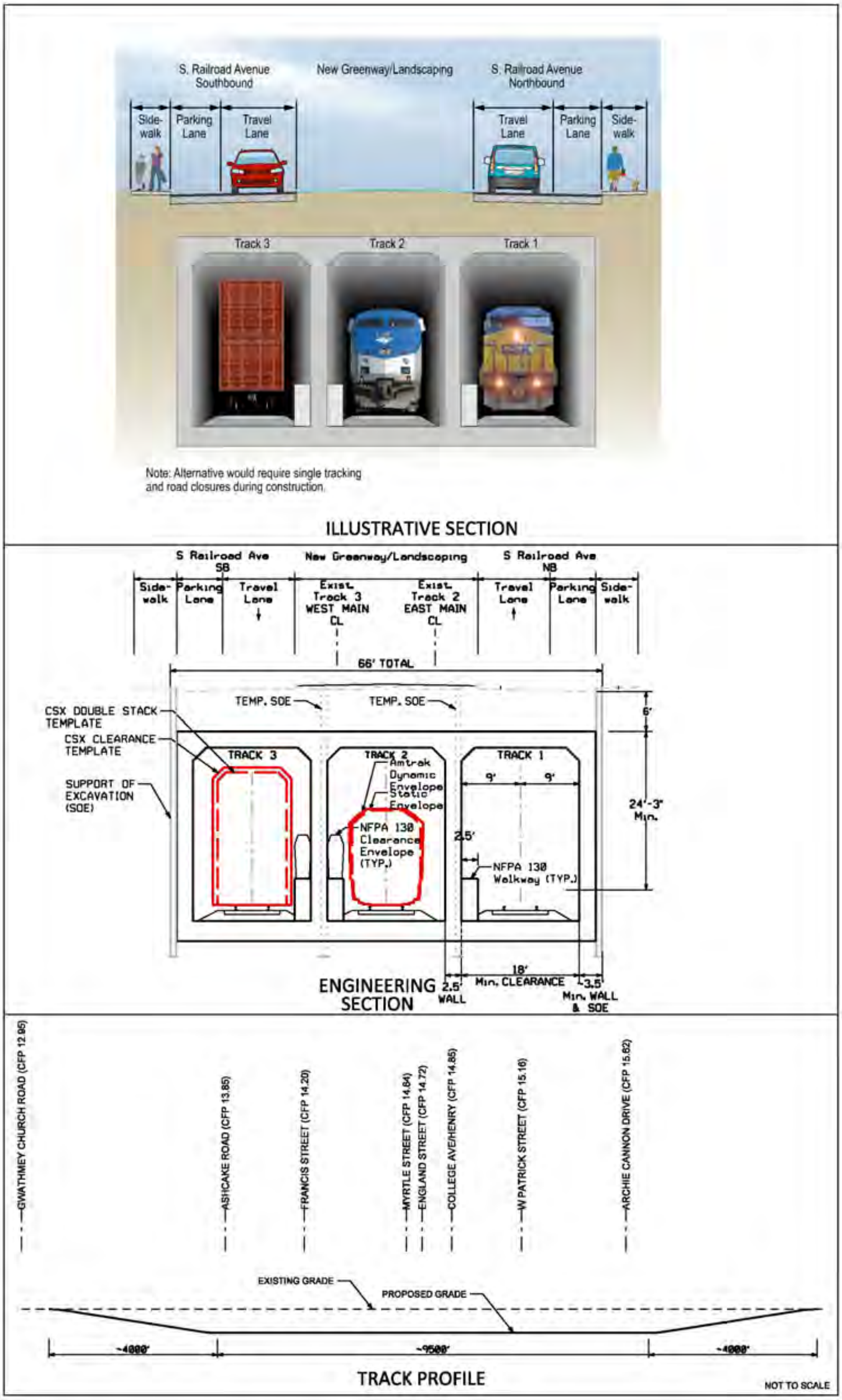

Figure 5-29 Ashland Track Option: Below Grade 3

Ashland Cut and Cover Tunnel

The cut and cover tunnel structure would be constructed on the east of the existing alignment, underneath the northbound travel and parking lane of Center Street (Figure 5-30). The tunnel would extend approximately 12,800 feet in length from just north of Vaughan Road to just south of Stony Run, approximately 3,300 feet south of Ashcake Road. The additional distance south of Ashcake Road is necessary to avoid placing the southern portal of the tunnel in a designated floodplain from the tributary of Stony Run. In addition to the covered portion of the tunnel, there would be an open cut with ramps extending back to the surface extending approximately 5,000 feet north and south at each end to maintain an acceptable gradient for freight trains[13]. The tunnel structure and roof would be robust enough to support the existing track and/or roadway on top. The tunnel structure would be approximately 22 feet wide by 30 feet tall, and be a minimum of 5 feet below existing surface grade. The interior opening would be 18 feet wide by 25 feet tall, with 2-foot walls and 2.5-foot floors and ceilings. The tunnel would be provided with ventilation and drainage, as well as emergency access portals located periodically along Center Street.

The tunnel would require an approximately 25 to 30-foot-wide trench for construction, which would close northbound Center Street/Railroad Avenue for the duration of construction. Once the tunnel has been constructed, Center Street/Railroad Avenue above would be reconstructed and reopened for vehicular traffic. Cross streets can be maintained open for traffic during most of the construction, although periodic delays and closures would be required at certain stages of construction.

At each end of the tunnel would be an open cut approach section of approximately 5,000 feet length, where the track drops in grade from the surface to the tunnel floor. The majority of this transition area will be lined with retaining walls of ever increasing depth, until the point where adequate clearance is reached for trains to enter the tunnel. The tunnel roof must be deep enough to support the loads (roadway, railroad, buildings) that are transmitted to the new tunnel. There must also be sufficient space between the tunnel and the surface for utilities to pass.

The tunnel would require periodic access to the surface for emergency stairways and ventilation systems. Emergency access from the tunnel must be provided every 2,500 feet per requirements set forth in NFPA 130 *Standard for Fixed Guideway Transit and Passenger Rail Systems*, Section 6.3 Emergency Egress. The 12,800-foot tunnel would require 4 to 5 emergency access shafts, each slightly offset from the main tunnel alignment – the emergency access shafts would join the main tunnel along its east side. Each emergency access shaft would be sized to fit a stairwell from the tunnel to the surface; the emergency access shaft would open at the surface into a small building or other portal cover (see Figure 5-26).

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[13] The ruling grade of the CSXT rail corridor is 0.8%; tunnel ramps and gradients were designed to match the ruling grade.

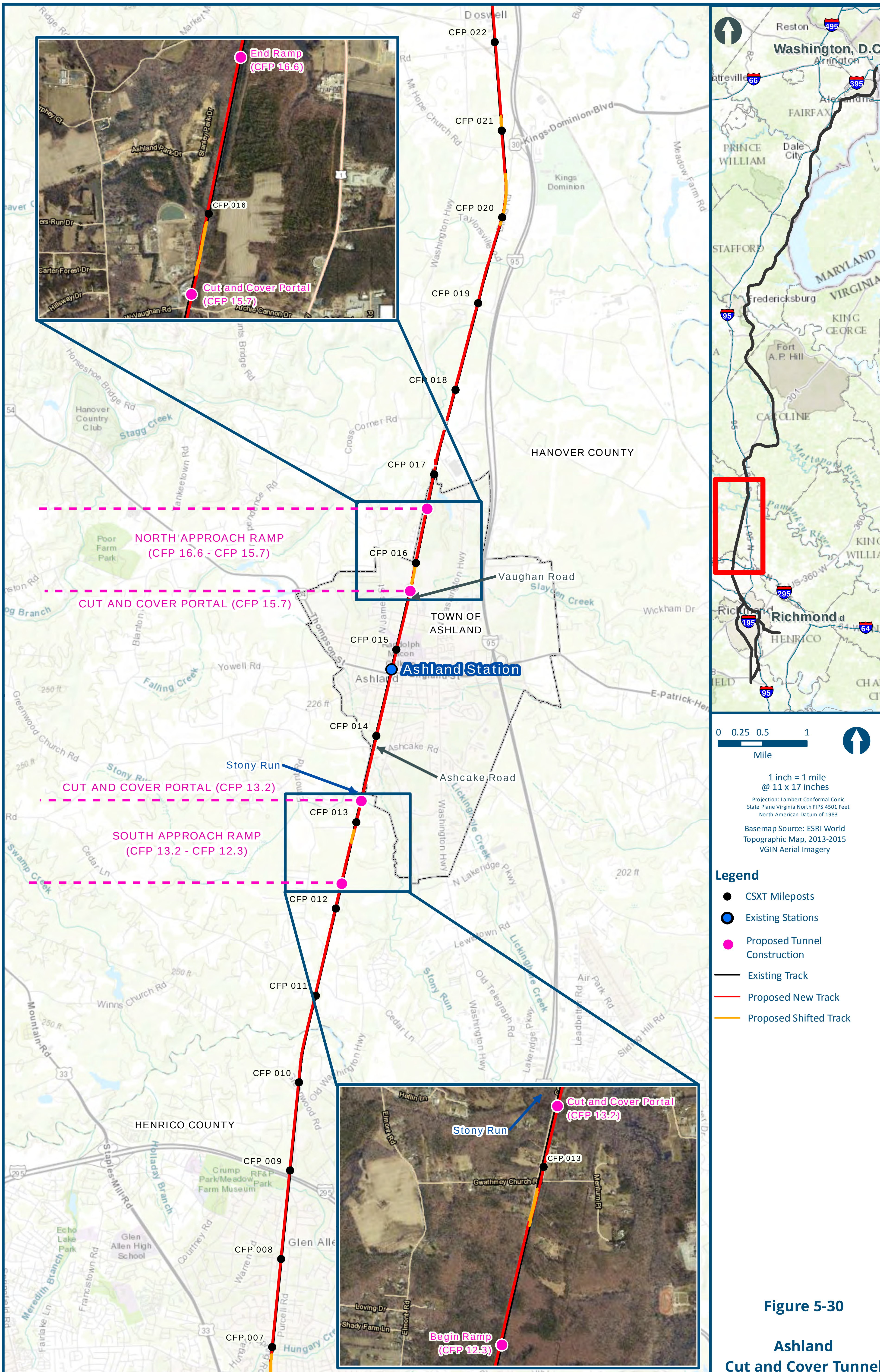


Figure 5-30

Ashland Cut and Cover Tunnel

The tunnel would also require sufficient ventilation to clear the tunnel of train exhaust; this would likely require multiple ventilation shafts to allow for multiple vent zones. At a minimum, ventilation facilities would be needed near the ends and midpoint of the tunnel. The ventilation facilities would consist of a separate building housing fans and an exhaust system. The midpoint of the tunnel would be located approximately underneath the center of town near the Randolph-Macon College campus.

Constructing a cut and cover tunnel through Ashland would adversely impact rail operations and the town during construction. The tunnel would require an approximately 25 to 30-foot-wide cut and cover trench. In order to dig the trench adjacent to the existing tracks and buildings, support of excavation walls will be required. Piles for the walls will likely need to be driven or drilled immediately adjacent to the nearest track, requiring a temporary track outage, leaving only one operating track during construction activities. Utilities would need to be re-routed around the construction zone during excavation. An area of approximately four acres would be required at the tunnel portal for construction staging. Approximately 435,000 cubic yards (CY) of earthen material would be removed from the tunnel; this material would likely expand upon excavation by 30% or more, requiring transport and placement (reuse or disposal) of approximately 566,000 CY of material. The cut and cover tunnel would likely be constructed in sections to reduce impacts on the town; however, such a phased approach would still require closure of the nearest track for the duration of construction, creating a bottleneck for rail traffic. Construction could last two years or longer.

Although the potential impacts from constructing a cut and cover tunnel through Ashland could be substantial, most of the impacts would be temporary for the duration of construction only. Permanent impacts would occur from the areas occupied by the north and south entry portals, and the presence and operation of the ventilation facilities and emergency access structures or grates. DRPT therefore decided to carry a cut and cover tunnel option into the screening process for further evaluation.

Bore Tunnel

DRPT evaluated two approaches to a bore tunnel through Ashland: a tunnel located at or just above bedrock and a tunnel through the underlying rock layer. A minimum 33 feet 4 inch diameter tunnel would be bored for double stack freight train clearance with additional clearance for catenary above the freight train. Available geotechnical information indicates bedrock is approximately 50 feet below the surface; the material above the rock is unconsolidated soil mixed with rock. Developing a bore tunnel through unconsolidated materials can be problematic, as the material is more prone to sifting and settling than tunneling through rock. Bore tunnels typically require a depth of cover material above top of tunnel equal to a minimum of 1 to 1.5 times tunnel diameter to avoid surface settling; a bore tunnel through Ashland should therefore have approximately 33 to 50 feet of cover above the top of tunnel. A bore tunnel through the unconsolidated material on top of the bedrock would therefore not be practical, as cover over the tunnel (approximately 16 to 17 feet) would be substantially less than the minimum. DRPT therefore decided to eliminate a bore tunnel through the unconsolidated material and consider a tunnel through the underlying rock layer.

The bore tunnel into rock would begin north of Vaughan Road with an open cut ramp section descending into a cut and cover tunnel and then into the bored mid-section through the underlying rock layer beneath the town (Figure 5-31). At the south end, there would be a similar open cut ramp descending to a cut and cover section leading into the bore tunnel mid-section. The total length of the structure (ramps and tunnel) would be approximately 21,420 feet, as follows:

- North tunnel approach ramp @ 1,360 feet
- North cut & cover tunnel @ 3,070 feet
- Bore tunnel in rock @ 12,600 feet
- South cut & cover tunnel @ 1,840 feet
- South tunnel approach ramp @ 2,550 feet

The north cut and cover tunnel portion would be north of Vaughan Road, the bore tunnel in rock would extend from north of Vaughan Road to just north of Stony Run, and the south cut and cover section would continue from north of Stony Run to Gwathmey Church Road. The total tunnel length (cut & cover and bored) would be approximately 17,510 feet long. The south tunnel approach ramp is located in a 100-year floodplain along a tributary to Stony Run, and would require either floodgates at the south tunnel portal, an extension of the tunnel to the south beyond the floodplain, or re-routing the tributary slightly north over the cut and cover section where it crosses the rail corridor.

The top of the bore tunnel in rock would have approximately 10 feet of rock cover for ease of tunneling and stabilization for the tunnel boring machine. This would provide approximately 60 feet of total cover for the center section of the tunnel.

The tunnel would require periodic access to the surface for emergency stairways and ventilation systems. Emergency access from the tunnel must be provided every 2,500 feet per requirements set forth in NFPA 130 *Standard for Fixed Guideway Transit and Passenger Rail Systems*, Section 6.3 Emergency Egress. The 17,510-foot tunnel would require 7 emergency access shafts, each slightly offset from the main tunnel alignment – the emergency access shafts would join the main tunnel along its east side. Each emergency access shaft would be sized to fit a stairwell from the tunnel to the surface; the emergency access shaft would open at the surface into a small building or other portal cover.

The tunnel would also require sufficient ventilation to clear the tunnel of train exhaust; this would likely require multiple ventilation shafts to allow for multiple vent zones. At a minimum, ventilation facilities would be needed near the ends and midpoint of the tunnel. The ventilation facilities would consist of one or more separate buildings housing fans and an exhaust system, connected to the tunnel by a ventilation shaft. The midpoint of the tunnel would be located approximately underneath the center of town near the Randolph-Macon College campus.

A bore tunnel in rock would require a construction zone of 3 to 4 acres at each end of the tunnel where the boring machine could be assembled/disassembled, plus additional space for equipment and materials staging. Approximately 565,900 CY of material will be bored from the tunnel boring machine, with an additional 180,700 CY of material excavated for the cut and cover and ramp portions of the tunnel. With a swell factor of 30% for earthen material, and 50% for rock, 1,083,760 CY of materials will be produced from the excavation for the tunnel.

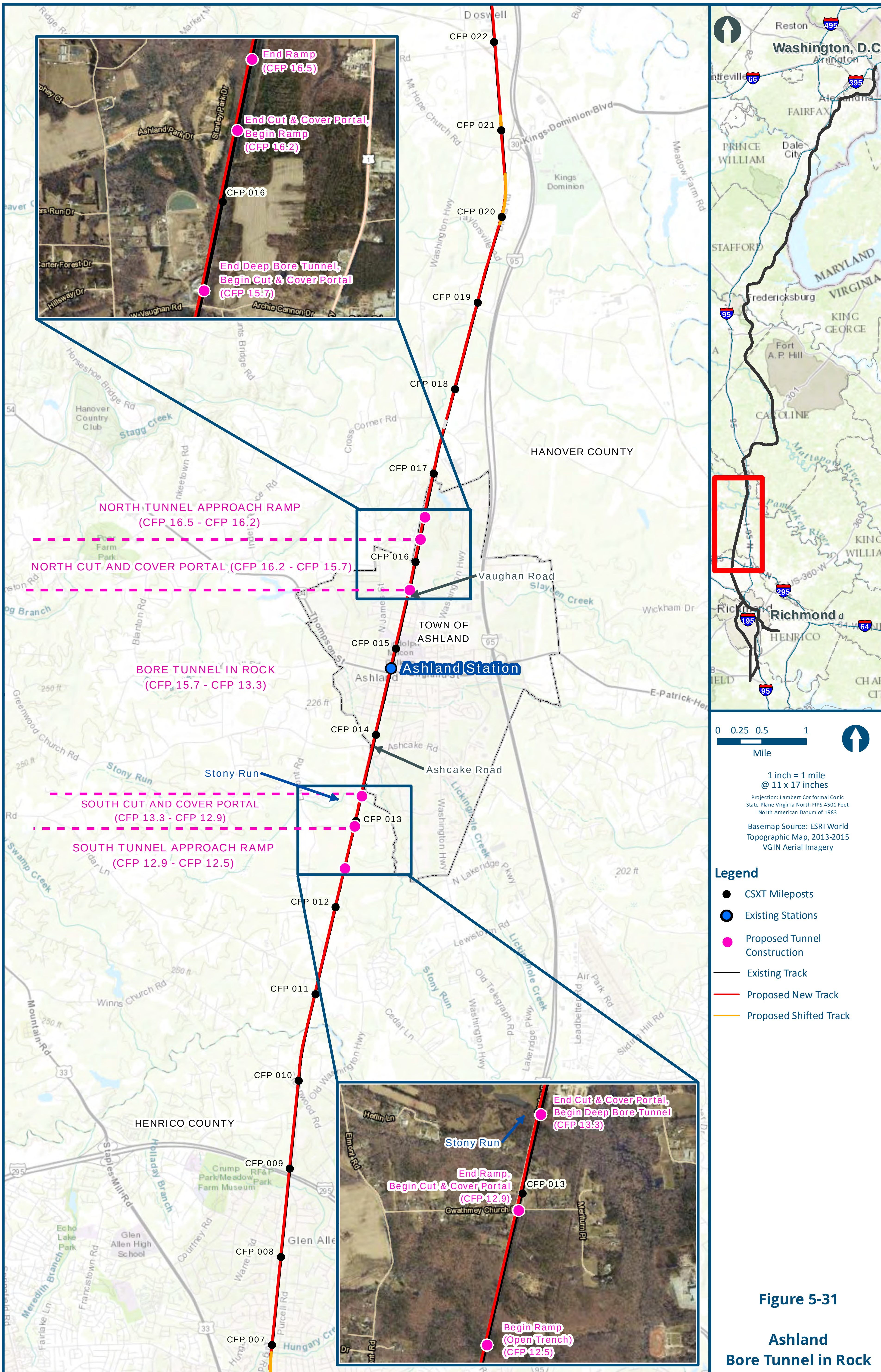


Figure 5-31

Ashland Bore Tunnel in Rock

A tunnel boring machine (TBM) would be assembled at one portal and construction would then progress toward the other portal. The size and length of the machines used for mined tunnels are substantially larger than those used for cut-and cover, so the staging areas at each portal will need to be much larger; three to four acres are required at each portal for assembly and disassembly of the TBM. All waste material is brought out through the starting portal, and all tunnel lining material is brought into the tunnel through the same portal. The majority of visible activities are concentrated in one place.

A bore tunnel in rock would have fewer construction impacts within the Town of Ashland as the length of cut and cover tunnel sections are reduced in comparison to an all cut and cover tunnel. The construction impacts would be temporary for the duration of construction only. Permanent impacts would be from widened or offset tracks approaching/departing the tunnel ramps and from the presence and operation of the ventilation facilities and emergency access structures. DRPT therefore decided to carry a bore tunnel in rock option into the screening process for further evaluation.

5.5.3 Ashland Bypass Alignments

DRPT considered potential bypass options as potential alternatives to adding an additional main track through Ashland at-grade or below grade. As the existing CSXT main line runs through Ashland in a general north-south alignment, bypass alignments were considered to the east and west of the existing main line. These bypass options were anticipated to be used primarily by freight trains, the Auto Train, and through passenger trains that do not serve the Ashland Station. Amtrak's passenger trains that serve Ashland Station would continue to pass through the existing tracks/station. The Ashland bypass options developed by DRPT included the following common design elements:

- Two-track bypass alignments designed for co-mingled passenger and freight trains, with a MAS of 90 mph for passenger trains and 60 mph for freight trains.
- A bypass right-of-way width of 135 feet to include track, signals, cut and fill slopes, drainage, and an access road as identified in Section 5.3.1.
- Existing track and station in Ashland to remain, potentially with minor improvements including upgrade and extension of station platforms and at-grade crossing improvements possibly including some grade separations.

DRPT considered and dismissed from further consideration a single-track bypass as it would not provide sufficient additional operational reliability and capacity to route all trains not serving the Ashland station around the town. DRPT also considered and eliminated a 3-track bypass as it would create greater capacity and impacts than warranted assuming some passenger trains continue to serve an Ashland station.

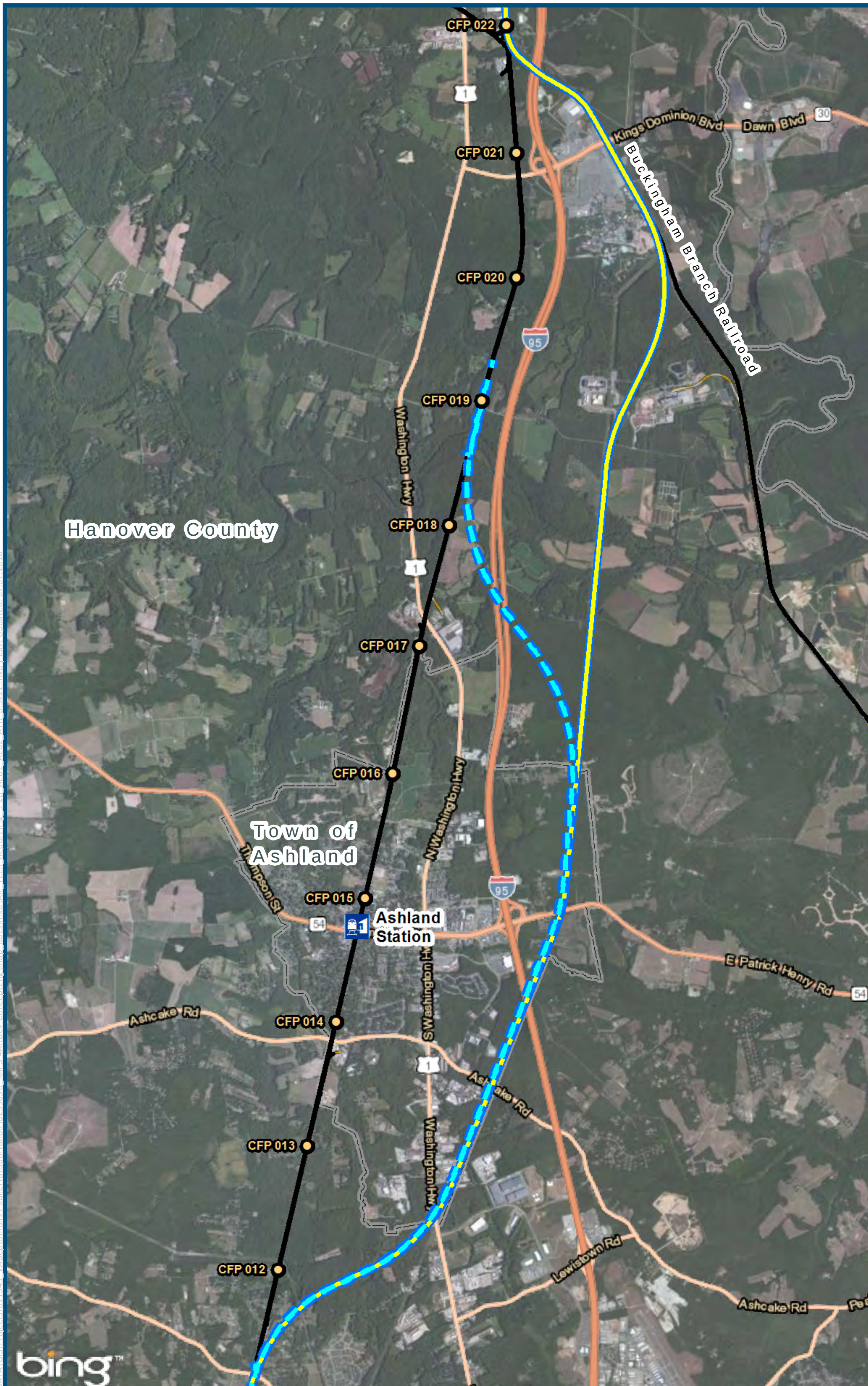
DRPT conducted Stage I, II, and III screening of the Ashland east and west bypass alignments in Section 6.7.2.

5.5.3.1 Ashland East Bypass Alignments

Located east of Ashland are the primary north-south corridors of North Washington Highway (U.S. 1) and I-95. U.S. 1 parallels the rail corridor to the east before crossing over the tracks north of town. Slightly farther east is I-95, which crosses over the tracks to the north at Carmel Church in Caroline County. The Buckingham Branch Railroad (BBRR) is several miles farther east and also approximately parallel to the rail corridor and I-95. The BBRR alignment shifts to the northwest, crossing under I-95 and then crossing the CSXT corridor at-grade at Doswell, an unincorporated historic hamlet in Hanover County, north of Ashland. The area between Ashland and U.S. 1 and I-95 is relatively heavily developed with commercial and industrial land uses extending up to the I-95 right of way, particularly along the Route 54 corridor and to the south between Route 1 and I-95 towards I-295. East of I-95 are single-family residential developments, mainly along Route 54 and Ashcake Road, several parks and recreational areas, historic and cultural resources including multiple Civil War battlefield sites, and extensive wetlands. North of Route 54 and east of I-95 the area is less heavily developed until near Doswell and Kings Dominion, a large amusement park complex. South of Ashcake Road and east of I-95, the area is comparatively heavily developed with single-family residential. North and west of Ashland, the land is a mixture of farms and rural residential, with some single-family residential neighborhoods. South and west of Ashland, the land is developed with more single family residential.

Two potential east bypass alignments were identified and presented to the public in June 2015 (Figure 5-32):

- **Ashland East Bypass (AEB 1):** This bypass route begins at CFP 019 (near Old Ridge Road) just north of U.S. 1, and proceeds south and east across I-95, then southerly before following a Dominion Power electric transmission corridor (the rail alignment would be adjacent to the electric transmission corridor). The bypass crosses I-95 again and then U.S. 1 before reaching the main line at CFP 011 in the vicinity of Cedar Lane. This bypass would be an 8.5-mile alignment, 0.9 miles longer than the existing route, but without the existing speed restrictions through downtown Ashland.
- **Ashland East Bypass to Buckingham Branch Railroad (AEB 2):** This bypass option matches AEB 1 above, except for an alternate tie-in location to the north. To avoid two crossings of I-95, the north connection would connect to the BBRR south of Kings Dominion. This alignment passes adjacent to a Dominion Power substation and would also require a new wye track connecting the BBRR to the CSXT main line at Doswell, which currently does not have a northbound connection on the east side. DRPT identified several potential Doswell wye alignments, presented below. The BBRR railroad is single track; a second (and possible third) track would have to be introduced to the corridor between Doswell and the bypass connection, creating a larger crossing at Kings Dominion Boulevard and potentially improvements to the I-95 crossing over the track. This bypass would be a 12.7-mile alignment, 1 mile longer than the existing route, through downtown Ashland.



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1 inch = 6,000 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

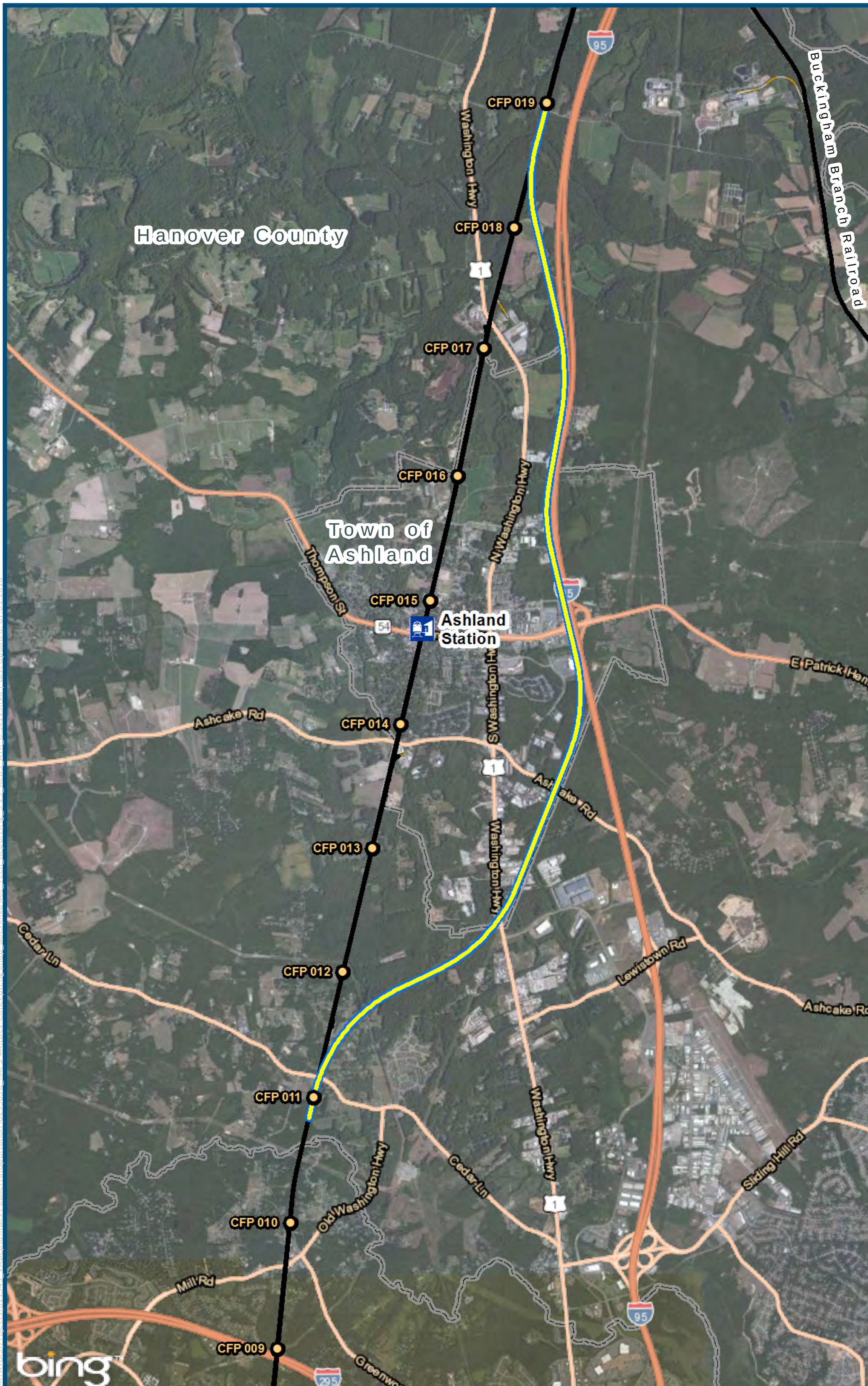
Legend

- CSXT Mileposts
- Amtrak Station
- Ashland East Bypass (AEB 1) Alignment
- Ashland East Bypass to Buckingham Branch Railroad (AEB 2) Alignment
- Existing track
- County Boundaries

Figure 5-32: Ashland East Bypass (AEB 1) & Ashland East Bypass to Buckingham Branch Railroad (AEB 2) Alignments

Subsequent to the June 2015 and December 2015 public information meetings, additional east bypass alignments were suggested by members of the public, including an east bypass that did not cross I-95, an east bypass that ran within the I-95 median, and an east bypass route suggested by the Hanover Chamber of Commerce in a white paper:

- **Ashland East Bypass That Does Not Cross I-95 (AEB 3) (Figure 5-33):** In response to public comment, DRPT developed an east Ashland bypass that does not cross I-95. This bypass route, similar to AEB 1, begins at CFP 019 (near Old Ridge Road) and proceeds south and east towards I-95, then southerly along the western boundary of the I-95 right of way before running southwest adjacent to a Dominion Power electric transmission corridor. The bypass crosses U.S. 1 before reaching the main line at CFP 011 in the vicinity of Cedar Lane. This bypass would be an 8.8-mile alignment, 0.7 miles longer than the existing route, but without the existing speed restrictions through downtown Ashland.
- **Ashland East Bypass in the I-95 Median (AEB 4) (Figure 5-34):** In response to public comment, DRPT developed an east bypass route that runs in the I-95 median past Ashland. This bypass route, similar to AEB 1, begins at CFP 019 (near Old Ridge Road) and proceeds south and east towards I-95, where it crosses the south-bound lanes and then continues within the I-95 median southerly before again crossing the south-bound lanes and following alongside a Dominion Power electric transmission corridor. The bypass crosses U.S. 1 before reaching the main line at CFP 011 in the vicinity of Cedar Lane. This bypass would be a 9-mile alignment, 1 mile longer than the existing route, but without the existing speed restrictions through downtown Ashland. This bypass within the median would use retaining walls to maintain its grade independent of the interstate grade, and would have a reduced right-of-way width within the median of approximately 45 to 50 feet for a 2-track corridor. Portions of the interstate would need to be shifted to fit the bypass track within the median while maintaining acceptable grades and curves as defined in the Basis of Design.



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@ 8.5 x 11 inches

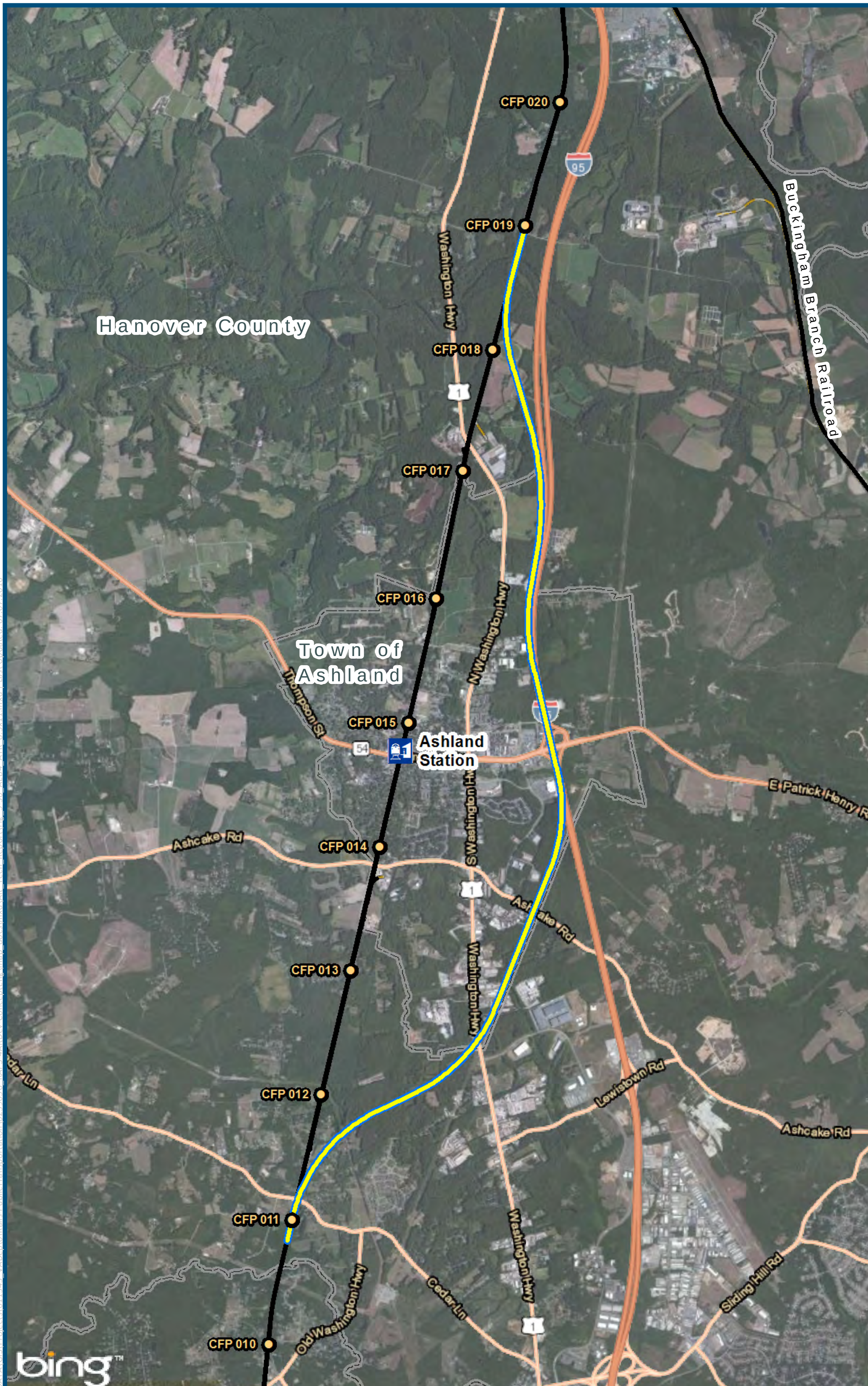
Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- Amtrak Station
- Ashland East Bypass That Does Not Cross I-95 (AEB 3) Alignment
- Existing Track
- County Boundaries

Figure 5-33: Ashland East Bypass That Does Not Cross I-95 (AEB 3)



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1 inch = 6,000 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

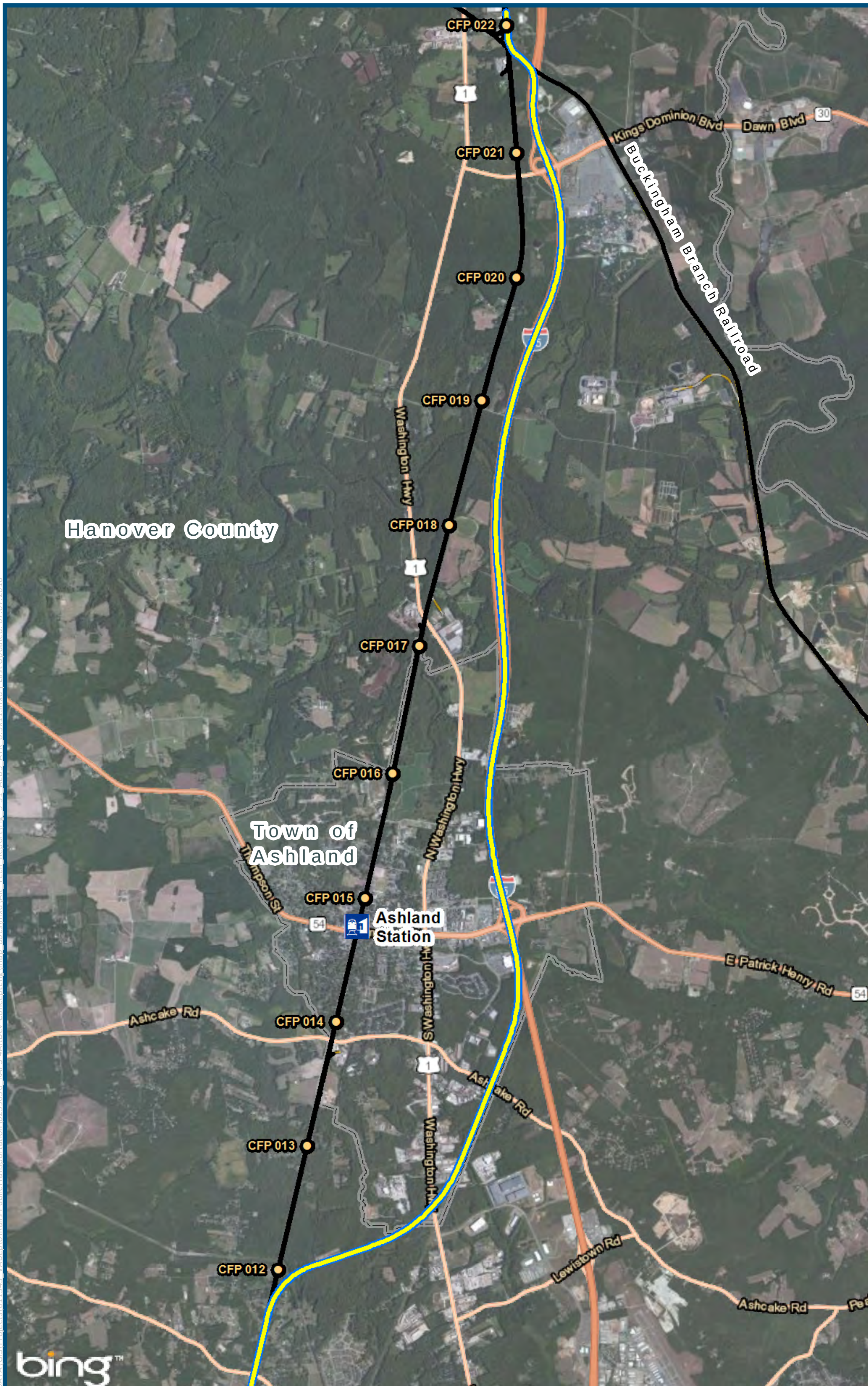
- CSXT Mileposts
- Amtrak Station
- Ashland East Bypass in the I-95 Median (AEB 4) Alignment
- Existing Track
- County Boundaries

Figure 5-34: Ashland East Bypass in the I-95 Median (AEB 4) Alignment

- **Ashland East Bypass White Paper Route (AEB 5) (Figure 5-35)**: The Hanover Chamber of Commerce, in a White Paper released in June 2016, proposed a specific east bypass route for DRPT consideration. The White Paper bypass route begins on the CSXT line and then moves southward:
  - At Doswell, intersect with the Buckingham Branch rail line along Doswell Road to divert the bypass rail line southeastward under southbound I-95.
  - Transition the bypass between the north and south bound lanes of I-95 around interstate mile marker 98.5.
  - Follow the 1-95 median under the S.R. 54 overpass.
  - Intersect with the Dominion Power right of way around mile marker 91.2 by going under the southbound lane of I-95.
  - Proceed in a southwesterly direction along the Dominion Power right-of way crossing under Route 1.
  - Deviate to the west staying north of Boxwood Farm Lane to reconnect with the main CSXT line about 0.5 mile north of where Elmont Rd crosses the CSX tracks.

  DRPT modified the White Paper alignment by applying the Project's Basis of Design for curves and track alignment to the suggested alignment path. Similar to AEB 2, this bypass would require a new Doswell wye track. Similar to AEB 4, this bypass within the median would use retaining walls to maintain its grade independent of the interstate grade, and would have a reduced right-of-way width within the median of approximately 45 to 50 feet for a double track. This bypass would be an 11.9-mile alignment, 0.8 mile longer than the existing route, but without the existing speed restrictions through downtown Ashland. Portions of the interstate would need to be shifted to fit the bypass track within the median while maintaining acceptable grades and curves as defined in the Basis of Design.

AEB 2 and AEB 5 both require a new connecting track, known as a "wye," between the CSXT north-south main line and the BBRR line towards Richmond at Doswell, where the single BBRR track crosses the two CSXT tracks at-grade. However, there is currently no rail connection between these rail lines that would allow a passenger train moving south on CSXT track to switch directly onto BBRR track to the southeast for a bypass route. Possible constraints to siting new connecting track include I-95 running parallel to the CSXT tracks to the east and Route 1 parallel to the west, several historic structures in Doswell within the northeast quadrant of the track intersection, industrial sidings and freight rail connections along the west side of the CSXT tracks north and south of the rail intersection, and the BBRR rail yard in the northwest quadrant. South and east of the rail intersection is the I-95 interchange with S.R. 30 and Kings Dominion, a regional amusement park.



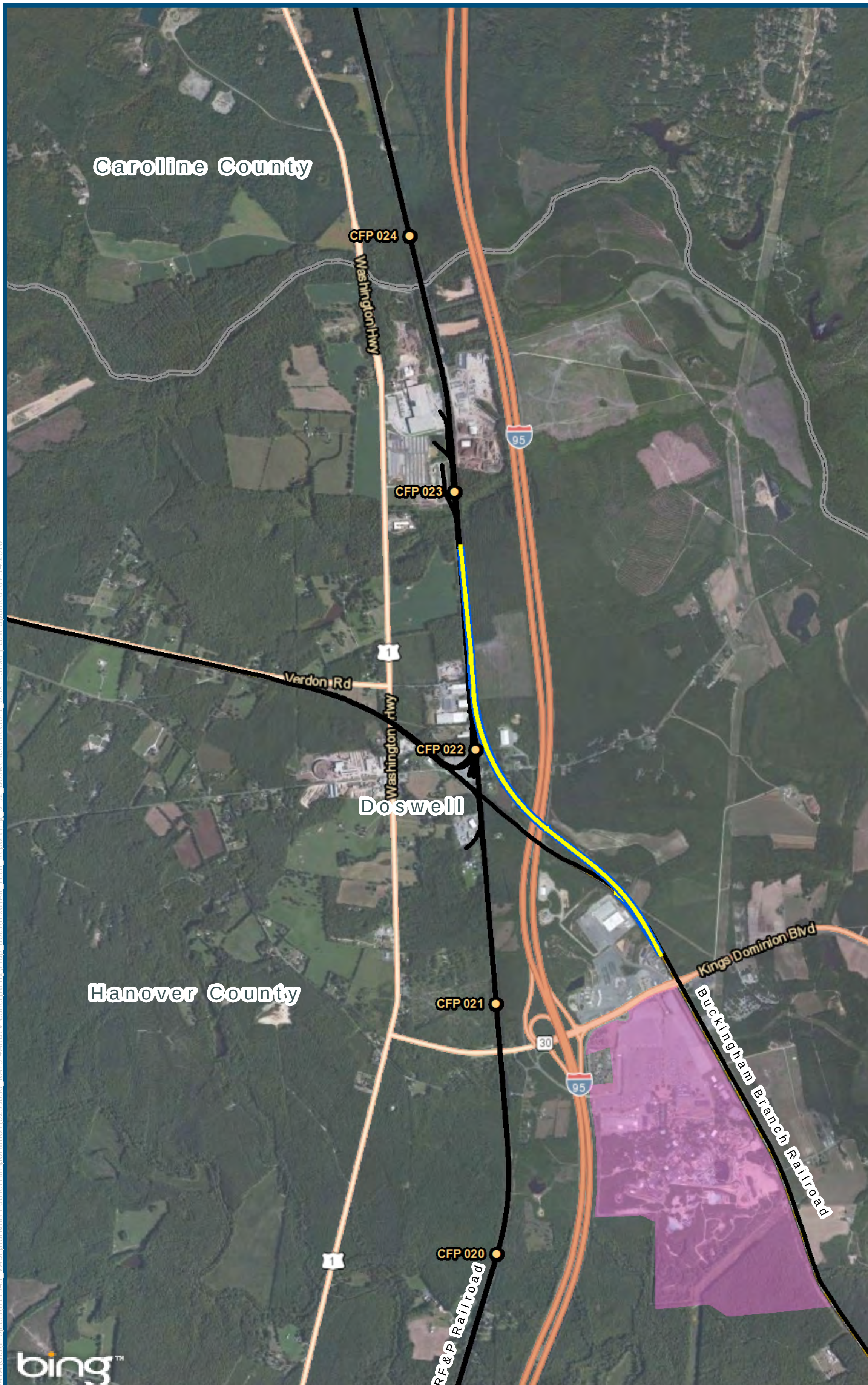
Legend

- CSXT Mileposts
- Amtrak Station
- Ashland East Bypass White Paper (AEB 5) Alignment
- Existing Track
- County Boundaries

Figure 5-35: Ashland East Bypass White Paper (AEB 5) Alignment

DRPT evaluated several options for a new 2-track wye connecting the CSXT north-south main line and the BBRR track at Doswell (Figures 5-36 through 5-40), including:

- **Wye Option #1**: An at-grade connection in the northeast quadrant of the CSXT and BBRR crossing would curve southeasterly through the historic hamlet of Doswell and align along the BBRR track beneath the I-95 overpass. The wye connecting track has a passenger train speed of 90 mph and a freight train speed of 60 mph to meet the MAS for the bypass track. This wye option would require a new I-95 overpass to accommodate the additional track beneath the highway.
- **Wye Option #2**: An at-grade connection in the northeast quadrant of the CSXT and BBRR crossing would curve southeasterly through the historic hamlet of Doswell and align along the BBRR track beneath the I-95 overpass. Designed to minimize property acquisition and impacts to historic resources in Doswell, the wye connecting track has a passenger train speed of only 45 mph and a freight train speed of 40 mph.
- **Wye Option #3:** This wye option also occurs in the northeast quadrant, curving southeasterly above Doswell and crossing I-95 on a new raised structure to align with the BBRR track just before crossing S.R. 30 just east of Kings Dominion. The wye connecting track has a passenger train speed of only 60 mph and a freight speed of 55 mph at the connection to CSXT main track.
- **Wye Option #4**: This connecting track curves away from the CSXT main track to the southwest, crossing Route 1, then turns southerly before curving easterly to align with the BBRR track west of the rail crossing. Passenger trains would be limited to 40 – 45 mph speeds through the curves, while freight trains would be limited to 35 to 40 mph.
- **Wye Option # 5**: This connecting track leaves the CSXT main track south of the BBRR rail crossing, curving to the west and then back north before turning east to connect to the BBRR track west of the rail crossing. Passenger trains would be limited to 40–45 mph speeds and freight trains to 35–40 mph through the curves.



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1 inch = 3,000 feet
@ 8.5 x 11 inches

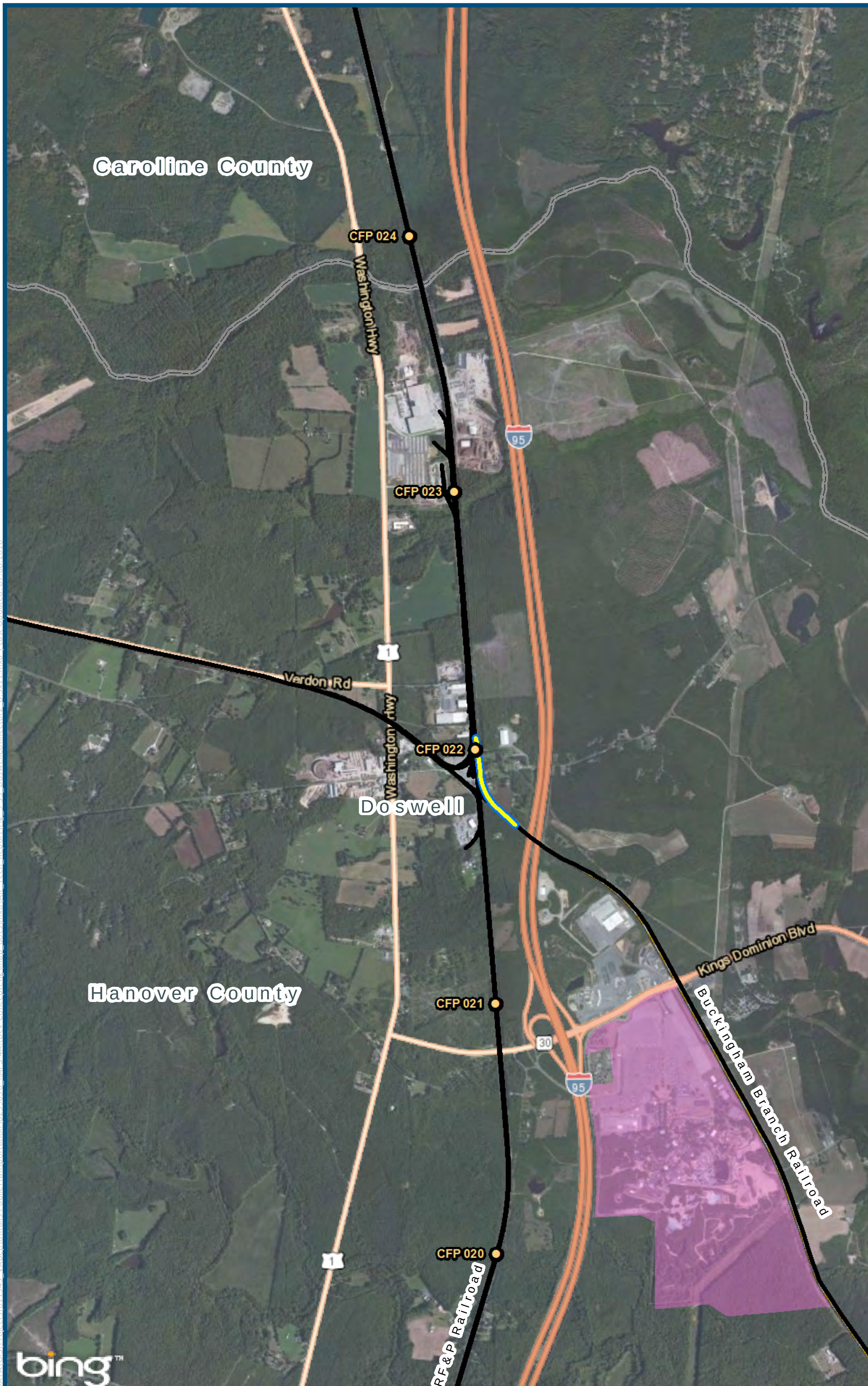
Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- Doswell Connector - Northeast Wye Option 1
- Existing Track
- Kings Dominion Amusement Park
- County Boundaries

Figure 5-36: Doswell Wye Option #1



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@ 8.5 x 11 inches

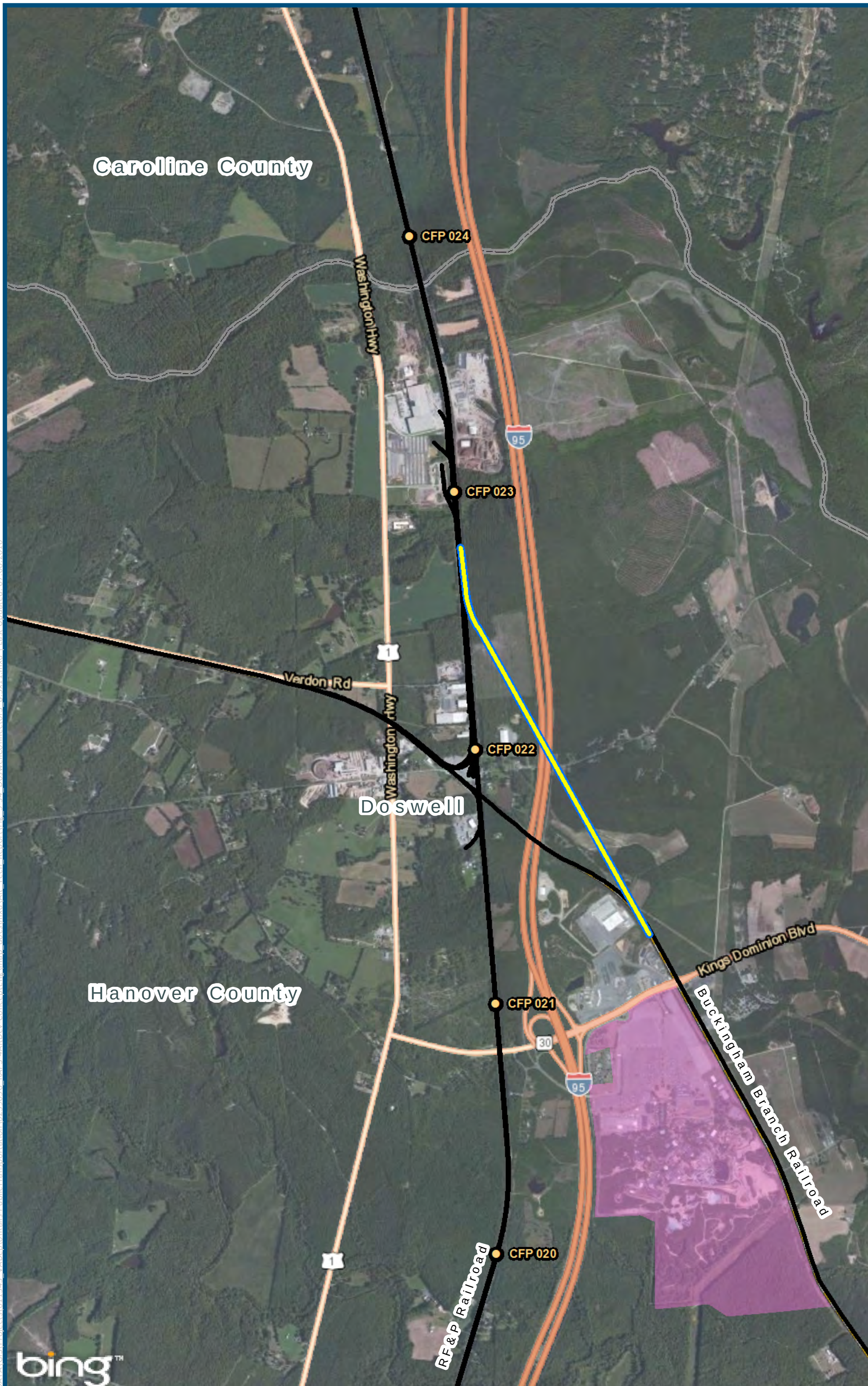
Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- Doswell Connector - Northeast Wye Option 2
- Existing Track
- Kings Dominion Amusement Park
- County Boundaries

Figure 5-37: Doswell Wye Option #2



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@ 8.5 x 11 inches

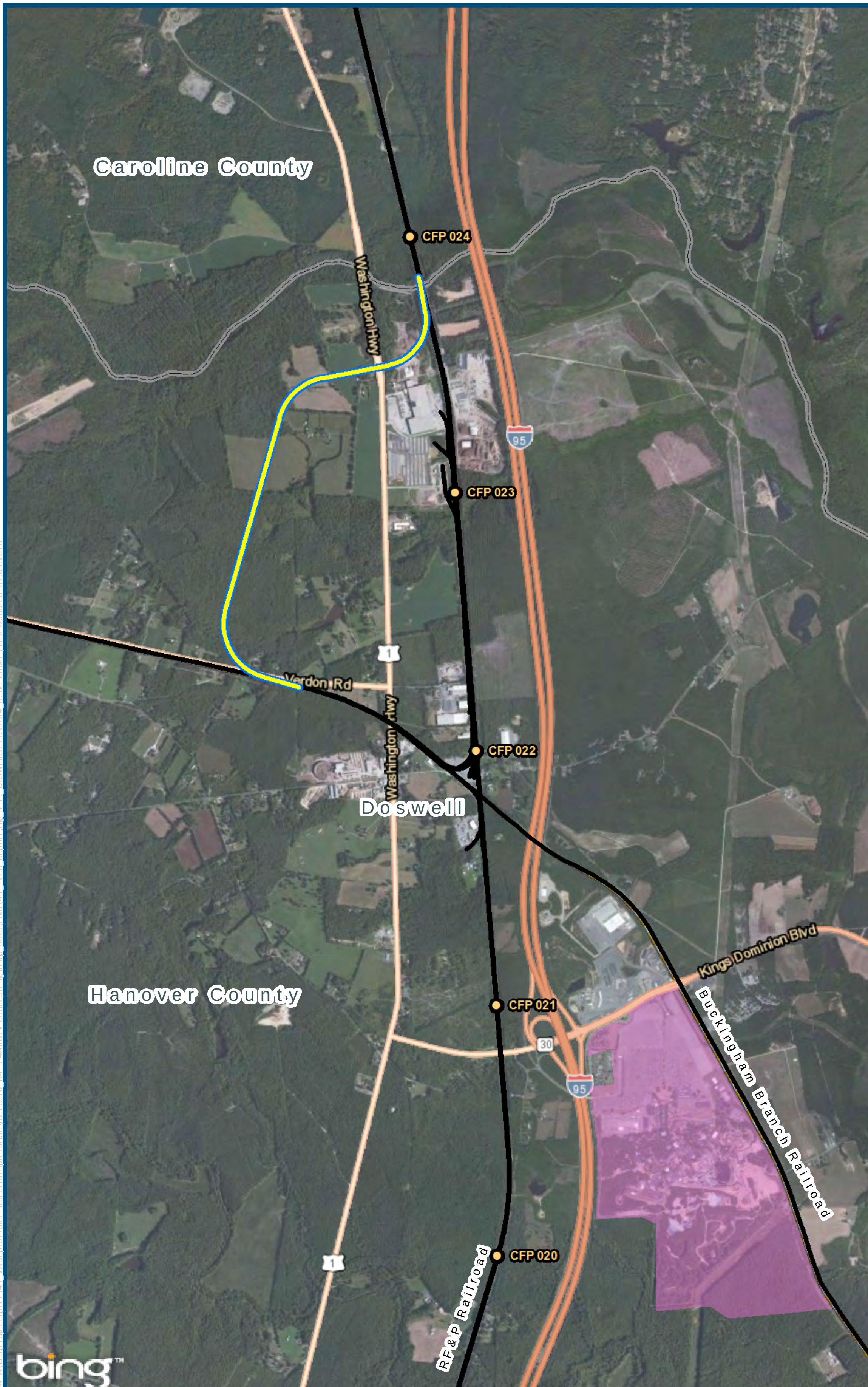
Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- Doswell Connector - Northeast Wye Option 3
- Existing Track
- Kings Dominion Amusement Park
- County Boundaries

Figure 5-38: Doswell Wye Option #3



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1 inch = 3,000 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- Doswell Connector - Northwest Loop Option 4
- Existing Track
- Kings Dominion Amusement Park
- County Boundaries

Figure 5-39: Doswell Wye Option #4

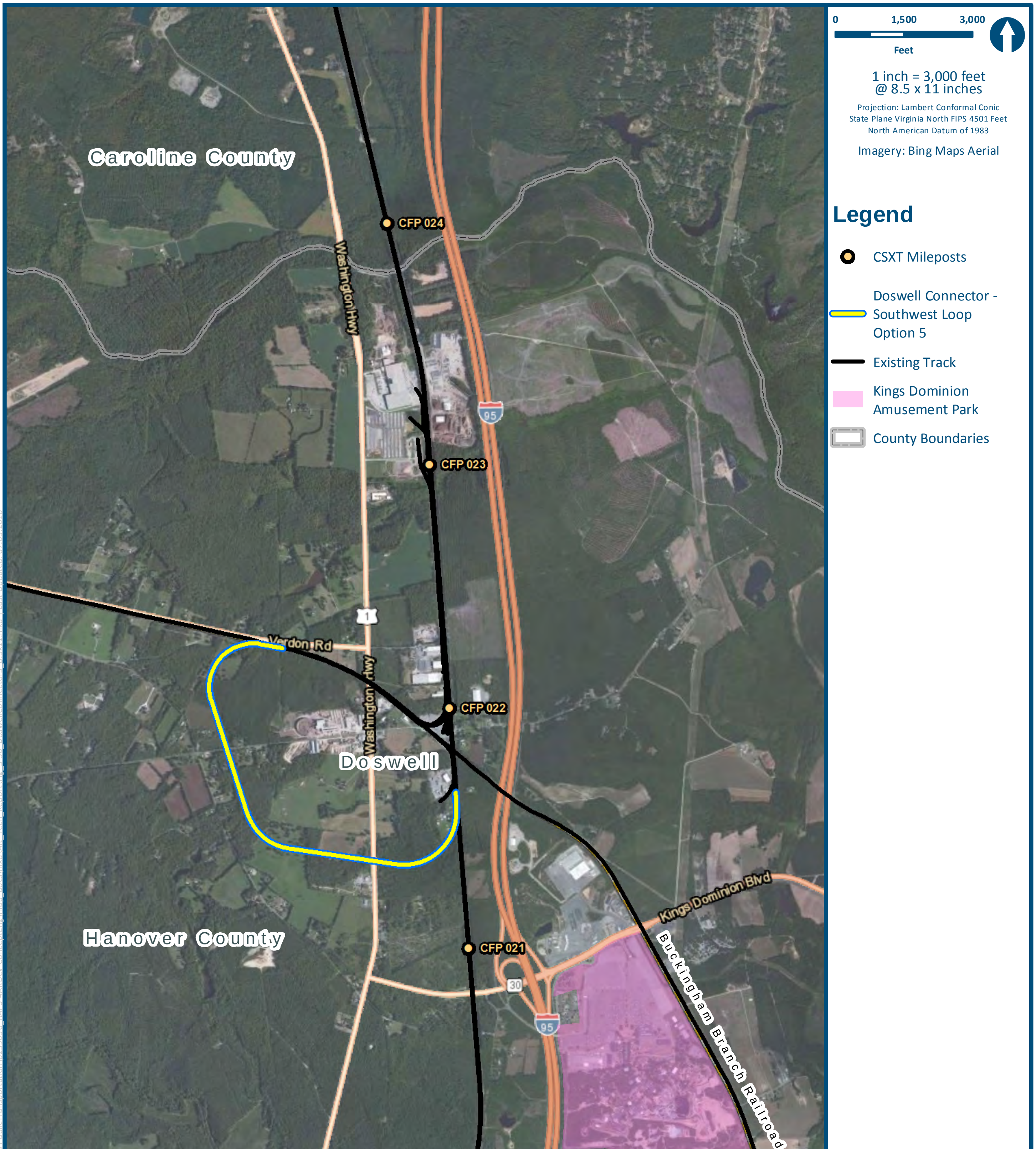


Figure 5-40: Doswell Wye Option #5

5.5.3.2 Ashland West Bypass Alignments

West of Ashland's town limits the land is less densely developed. Land use is primarily rural residential, with areas of residential subdivisions, rural residential (single-family homes on large lots) and farmland. Route 54 and Ashcake Road are the primary east-west alignments connecting Ashland to western Hanover County. Cedar Lane south of Ashland also provides an east-west travel corridor. Residential development generally occurs along these roads and secondary feeder roads. The area north and west of Ashland is less densely developed than the area south and west.

A potential west bypass alignment was identified and presented to the public in June 2015:

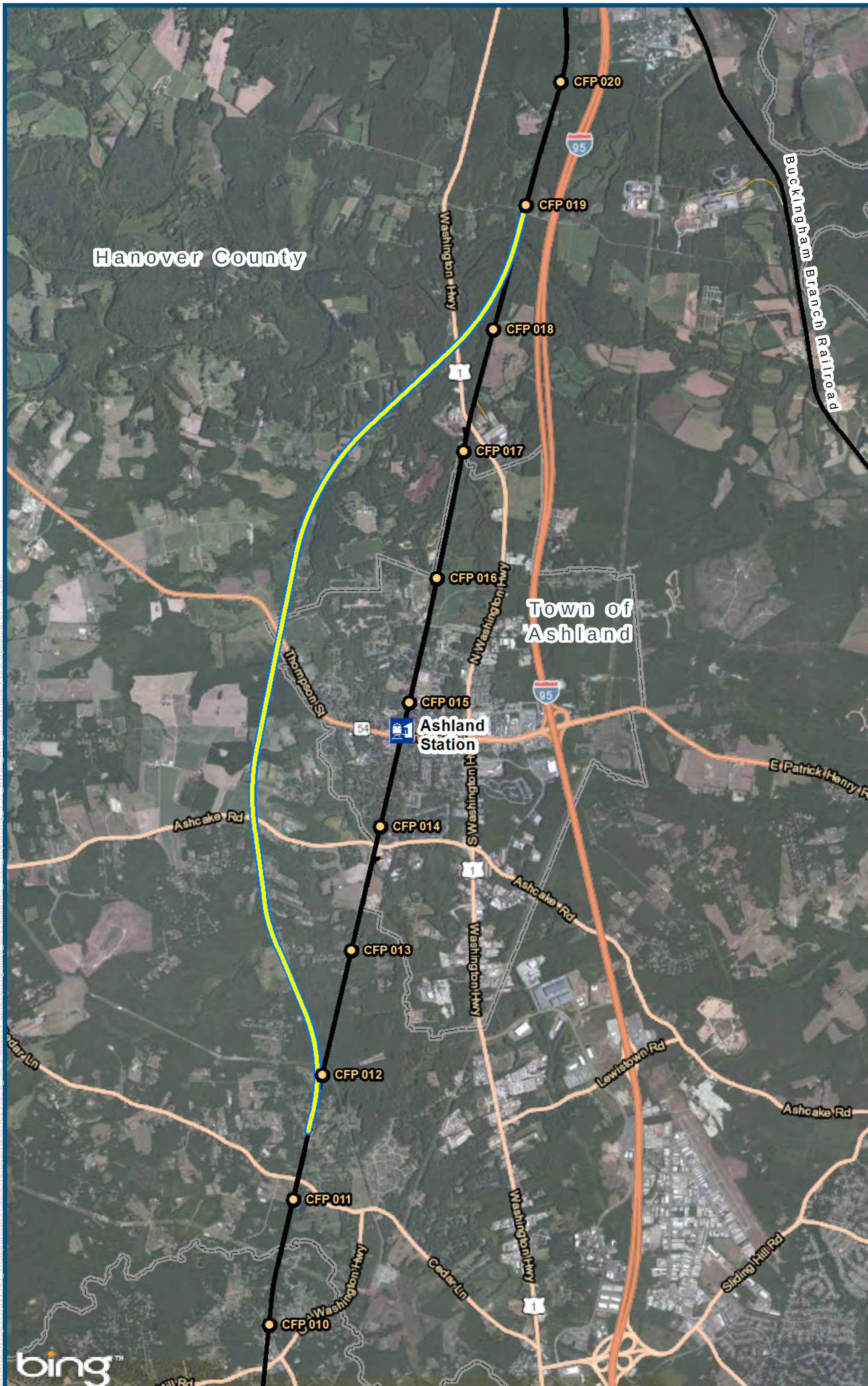
- **Ashland West Bypass (AWB 1) (Figure 5-41):** The alignment of AWB 1 was designed to follow the shortest route through the least developed land, while achieving a 90 mph design speed for passenger trains in accordance with the BOD. AWB 1 leaves the main rail corridor at Old Ridge Road and re-connects to CSXT track in the south at Elmont Road. The bypass route is primarily in the County but does include a small portion of the westernmost area of Ashland. This bypass would be an 8-mile alignment, 0.6 miles longer than the existing route.

After meeting with the Town of Ashland and Hanover County, and receiving public comments following the June 2015 meeting, this conceptual west bypass route was revised to avoid planned residential development in an area that has already been rezoned by the town and County. To avoid this planned residential development, the west bypass alignment was routed farther west.

- **Ashland West Bypass Revision #1 (AWB 2) (Figure 5-42):** The AWB 2 bypass forms a bell curve shape, leaving the main rail corridor at Old Ridge Road and re-connecting to the south at Elmont Road. The revised AWB 2 corridor would introduce a new crossing of existing Dominion Power high-power lines and a number of roadway crossings. The AWB 2 west bypass would be an 8.75-mile corridor, 1.25 miles longer than the existing route through town.

AWB 2 was presented to the public in December 2015. Among the concerns about AWB 2 expressed during the comment period following the December 2015 meeting were potential impacts to local property owners, agricultural fields, natural and cultural resources, and the Holy Cross Lutheran Church at the intersection of Ashcake Road and Wildwood Boulevard. DRPT developed two additional modifications to Ashland West Bypass AWB 2 seeking to reduce the potential impacts.

- **Ashland West Bypass Revision #2 (AWB 3) (Figure 5-43):** This initial modification maintains the north/south end points while moving the western most point of the alignment slightly east. The modification was largely based on reducing impacts to local roads crossing the bypass alignment. Impacts to local property owners are reduced, although this alignment remains in proximity to the Holy Cross Lutheran Church. The AWB 3 west bypass would be an 8.4-mile corridor, 1 mile longer than the existing route through town.



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1 inch = 6,000 feet
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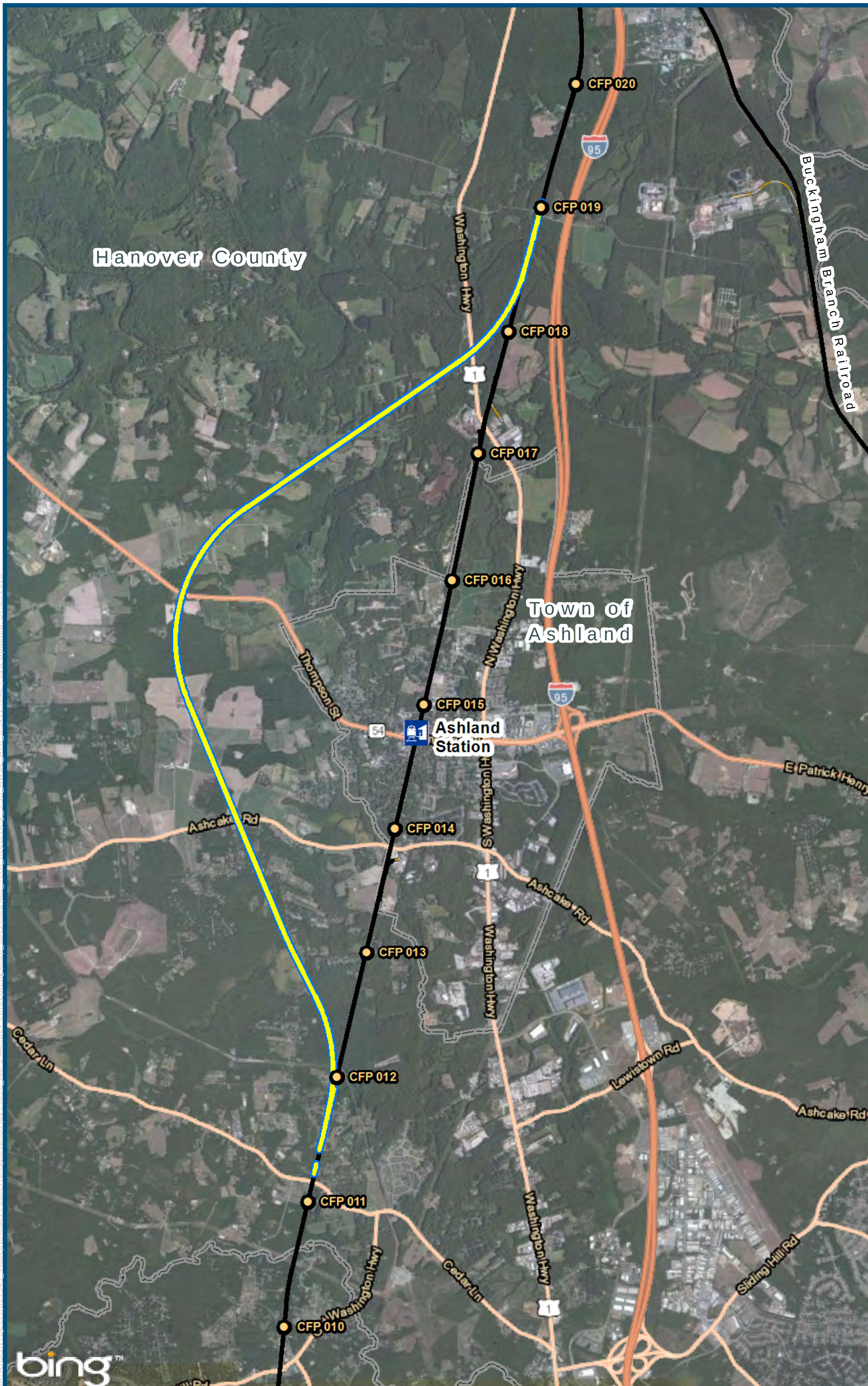
Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- Amtrak Station
- Ashland West Bypass (AWB 1) Alignment
- Existing Track
- County Boundaries

Figure 5-41: Ashland West Bypass (AWB 1) Alignment



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Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: Bing Maps Aerial

Legend

- CSXT Mileposts
- Amtrak Station
- Ashland West Bypass Revision #1 (AWB 2) Alignment
- Existing Track
- County Boundaries

Figure 5-42: Ashland West Bypass Revision #1 Per Public Comment (AWB 2) Alignment

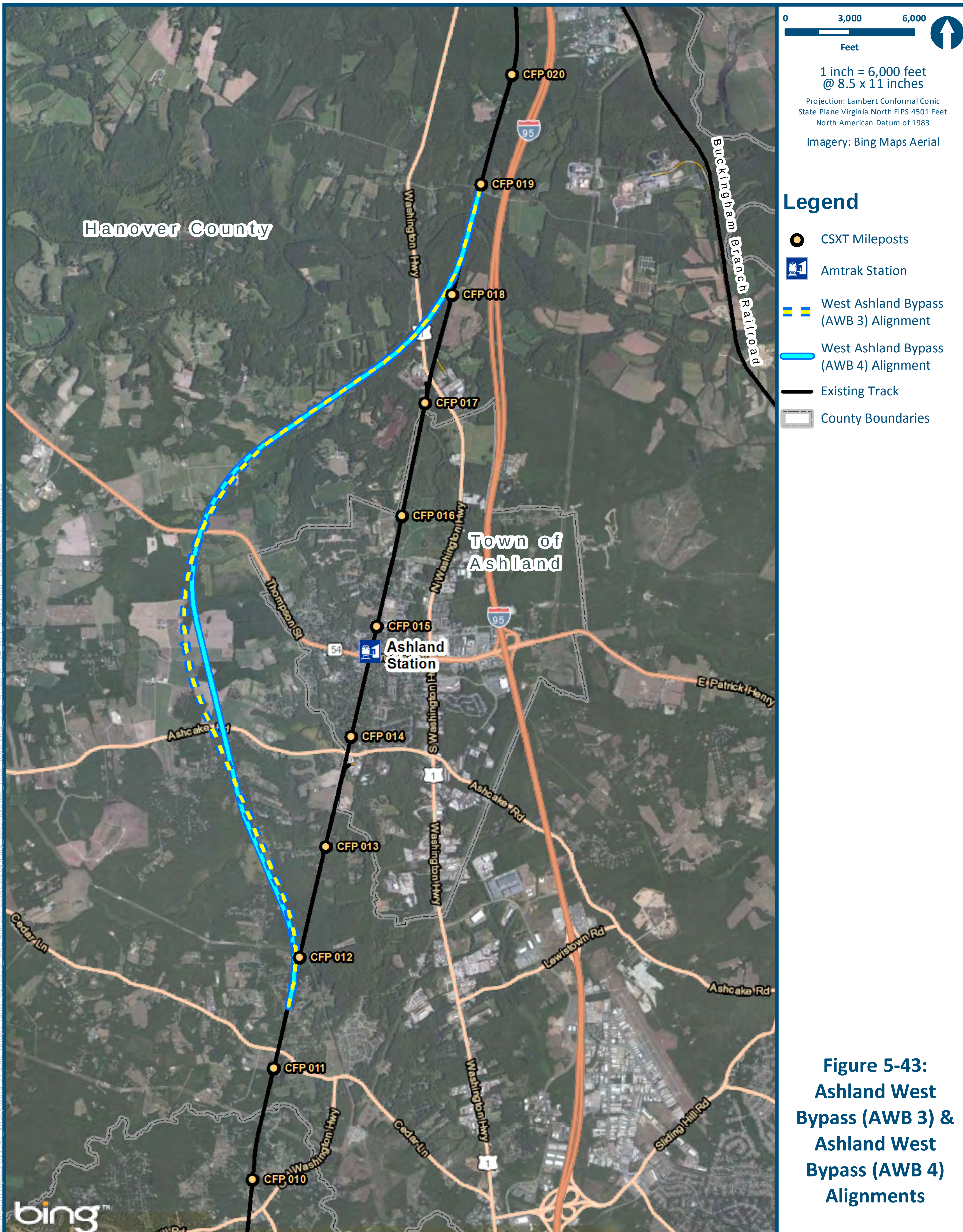


Figure 5-43: Ashland West Bypass (AWB 3) & Ashland West Bypass (AWB 4) Alignments

- **Ashland West Bypass Revision # 3 (AWB 4) (Figure 5-43):** This alignment shifts slightly southeast at U.S. 1 and shifts east at Yowell and Ashcake Roads. The north/south end points remain the same as the other west bypass alignments. The distance between the alignment centerline and the Holy Cross Lutheran Church is increased, while continuing to maintain a 90 mph design speed for passenger trains. The AWB 4 west bypass would be an 8.4-mile corridor, 1 mile longer than the existing route through town.

5.5.3.3 Buckingham Branch Freight Diversion Alternative for Ashland

DRPT evaluated the possibility of diverting some freight trains from the CSXT main line onto the Buckingham Branch Railroad (BBRR) in an effort to reduce the volume of freight traffic through Ashland, and thereby open sufficient capacity on the CSXT main line through Ashland to support additional passenger service without an additional main track through Ashland. This BBRR Freight Diversion Alternative would shift north-south freight trains that do not have scheduled work or crew change events at Acca Yard and are tolerant of greater travel times and distance onto the BBRR between Doswell and AM Junction, thereby reducing freight traffic on the existing two-track main line through Ashland and potentially reducing the requirement for a third main track through Ashland.

At Doswell, the north end of the BBRR Freight Diversion Alternative, freight trains using the CSXT main line (the RF&P Subdivision) from Washington traveling south would operate on a new double track connection to enable use of the BBRR between Doswell and Richmond. The existing single-track BBRR would be substantially improved to increase both capacity and train speed, including the addition of a new main track from Doswell to AM Junction. Improvements would include upgraded track, reconfiguration of curves to increase speed, new signaling and communications, new connections to sidings and industrial access tracks, and grade crossing improvements. At AM Junction in Richmond, the south end of the BBRR, two potential routes through Richmond could be used to enable freight trains to regain access to the CSXT main line:

- **The A-Line Option:** This routing would require construction of a double-track wye at Hospital Street that would enable freight trains to use the northern section of the CSXT S-Line between AM Junction and a connection to the CSXT main line (A-Line) at AY interlocking near Acca Yard. This routing, however, includes a grade with segments exceeding 1 percent between AM Junction and AY interlocking. Some of the Richmond area alternatives also require a single wye track at Hospital Street to turn passenger trains; however, the wye track required for the freight diversion alternative would be both larger and double-track to accommodate the movements of longer freight trains. The freight diversion wye track could also accommodate passenger train turning movements.
- **The S-Line Option:** Using this routing, freight trains would use the southern section of the Bellwood Subdivision (S-Line) between AM Junction and the CSXT main line at Centralia. This routing passes Main Street Station on the west side, proceeds through the Triple Crossing and across the James River to Centralia, and would require a double-track line from AM Junction to Centralia. The Triple Crossing structure, can be retrofitted with a double track, however, there is not sufficient clearance for double-stack or autorack cars, limiting the utility of this route for some freight trains.

DRPT estimates that in 2025, the proposed implementation year of the DC2RVA project, approximately 28 CSXT freight trains per day on average would be operating between Washington, D.C. and Richmond. Of those 28 trains, approximately 18 may not require work in Acca Yard and could potentially be diverted onto the BBRR. However, of the 18 trains that could potentially be diverted onto the BBRR, 9 of the trains are double-stacked intermodal trains that would not be able to use the S-Line option, due to the clearance restrictions at the Triple Crossing.

The BBRR Freight Diversion Alternative includes the following common design elements consistent with the DC2RVA BOD:

- Two-track alignment on the CSXT main line designed for co-mingled passenger and freight trains, with a MAS of 90 mph for passenger trains and 60 mph for freight trains.
- Two-track alignment on the BBRR designed for freight only, with a MAS of 60 mph for freight trains.
- A right-of-way width of 135 feet to include track, signals, cut and fill slopes, drainage, and an access road as identified in Section 5.3.1 assumed for new two track alignments.
- Existing track and station in Ashland may remain with minor improvements including upgrade and extension of station platforms and at-grade crossing improvements possibly including some grade separations, or the station may be relocated to a site near Ashcake Road, or closed.

The BBRR between Doswell and AM Junction is currently a single-track line used only by freight trains, with no wayside signaling system authorizing or governing train movements, and a maximum authorized speed of 25 mph (train movement is authorized by a train dispatcher's verbal instructions delivered by radio or electronically transmitted written form to the train crew). At Doswell, the BBRR crosses the CSXT mainline at-grade; however, there currently is no direct connection track that allows southbound trains on the CSXT main line at Doswell to access the BBRR track heading south toward Richmond. At Richmond, track connections exist at AM Junction that allow trains leaving the BBRR to proceed directly south, either onto the S-Line and past the west side of Main Street Station or onto the Peninsula Subdivision and past the east side of Main Street Station. However, there currently is no wye connection allowing trains on the BBRR at AM Junction to operate northward onto the S-Line toward Acca Yard and the AY interlocking connection to the A-Line.

Infrastructure Requirements. DRPT determined that the following improvements would be required to divert freight trains away from the Ashland area and onto the BBRR:

- Construction of a new two-track connection at Doswell, allowing freight trains on the CSXT mainline to access the BBRR toward AM Junction.
- Construction of a second main track on the BBRR between Doswell and AM Junction to create a two-track main line with MAS of 60 mph for freight trains.
- Improvements to the existing BBRR alignment and track, including reducing the sharpness of curvature between Doswell and AM Junction, to enable an increase in track speed.
- Installation of wayside signaling and communications systems consisting of Centralized Traffic Control and Positive Train Control on the BBRR from Doswell to AM Junction.

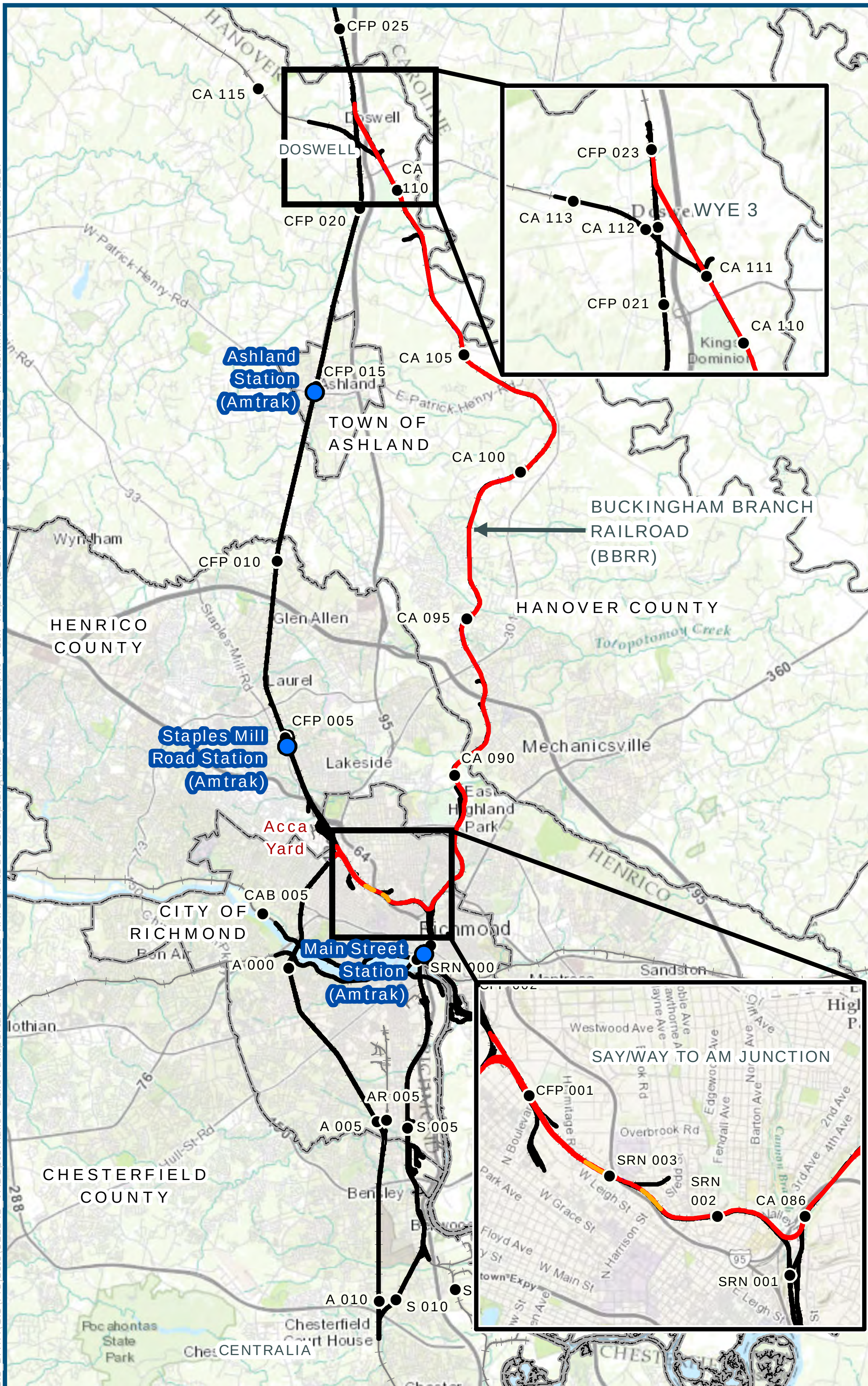
- A-Line Option – Construction of a new two-track connection at AM Junction (Hospital Street Wye), allowing freight trains on the BBRR to access the S-Line and operate northward to AY interlocking (A-Line Option). This option would also require the construction of two main tracks from AM Junction to AY for use by freight trains, running parallel to tracks used by passenger trains operating between Main Street Station and Staples Mill Road (Figure 5-44).

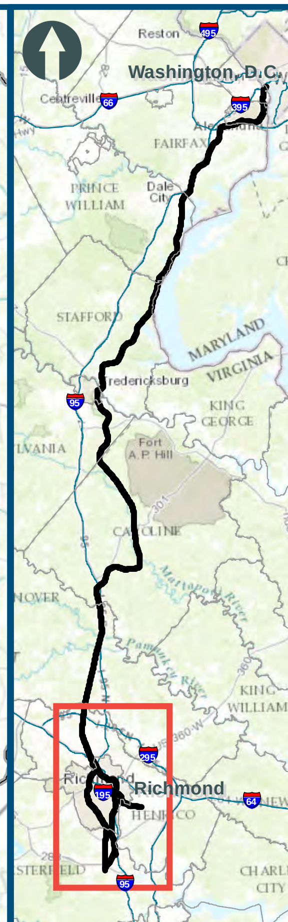
  Additional construction is required if the BBRR A-Line Option is selected in conjunction with a Richmond passenger rail station option that incorporates use of the S-Line by passenger trains operating between Washington, DC and destinations in Norfolk, North Carolina, or Florida. To allow for conflict-free operation between freight and passenger trains, a separation via flyover, tunnel, or trench would be required to enable the two-track passenger line required under the Richmond passenger station S-Line options to shift from one side of the two-track freight line to the other, providing an unimpeded route for passenger trains between the East Acca bypass at AY interlocking and the west platforms of Main Street Station south of AM Junction.

- S-Line Option – Construction of a second main track from AM Junction to Centralia on the S-Line along the west side of Main Street Station. This option would include a new rail bridge across the James River, and improvements to the existing S-Line between Main Street Station and Centralia (Figure 5-45).

Doswell Infrastructure Considerations. DRPT evaluated several options for developing a new two-track connection at Doswell to provide direct access between the CSXT main line from Washington, DC and the BBRR main line heading south toward Richmond. Options that add the connection in the northeast quadrant of the existing at-grade crossing of the CSXT mainline and the BBRR impact several historic structures in Doswell and require a new I-95 road overpass. Options in the northwest or southwest quadrants that use a loop track have less impacts, but create a system bottleneck. Speeds would be restricted through the at-grade crossing and on the loop track. Freight trains on the connection would block both the CSXT main line and the BBRR, potentially causing delays to passenger and freight trains operating north-south on the CSXT main line through Doswell. DRPT also considered constructing a new two-track grade separated crossing of I-95 north and east of Doswell. Although necessary for the BBRR freight diversion alternative to function, a new grade-separated rail crossing of I-95 would add substantial infrastructure impacts and cost and increase property acquisition and other impacts to human and natural resources.

BBRR Infrastructure Considerations. DRPT determined that two main tracks would be required on the BBRR between Doswell and AM Junction to accommodate up to 18 newly diverted freight trains in addition to the BBRR's existing freight traffic. The existing single main track would need to be upgraded, curves straightened, and a new second main track added to improve capacity and speed. Existing sidings and spur tracks would need to be maintained or replaced. All grade crossings on the BBRR between Doswell and AM Junction would require reconstruction, including new grade-crossing signaling systems, to accommodate the second main track and increased track speeds.





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Miles

1 inch = 4 miles
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap Source: 2015 USGS Topographic Map

Legend

- CSXT Mileposts
- Existing Stations
- Track - Existing
- Track - Shift
- Track - Proposed
- Virginia Rail Lines
- County/City Boundary

Figure 5-44

Buckingham Branch Railroad Freight Diversion Alternative for Ashland (A-Line Option)

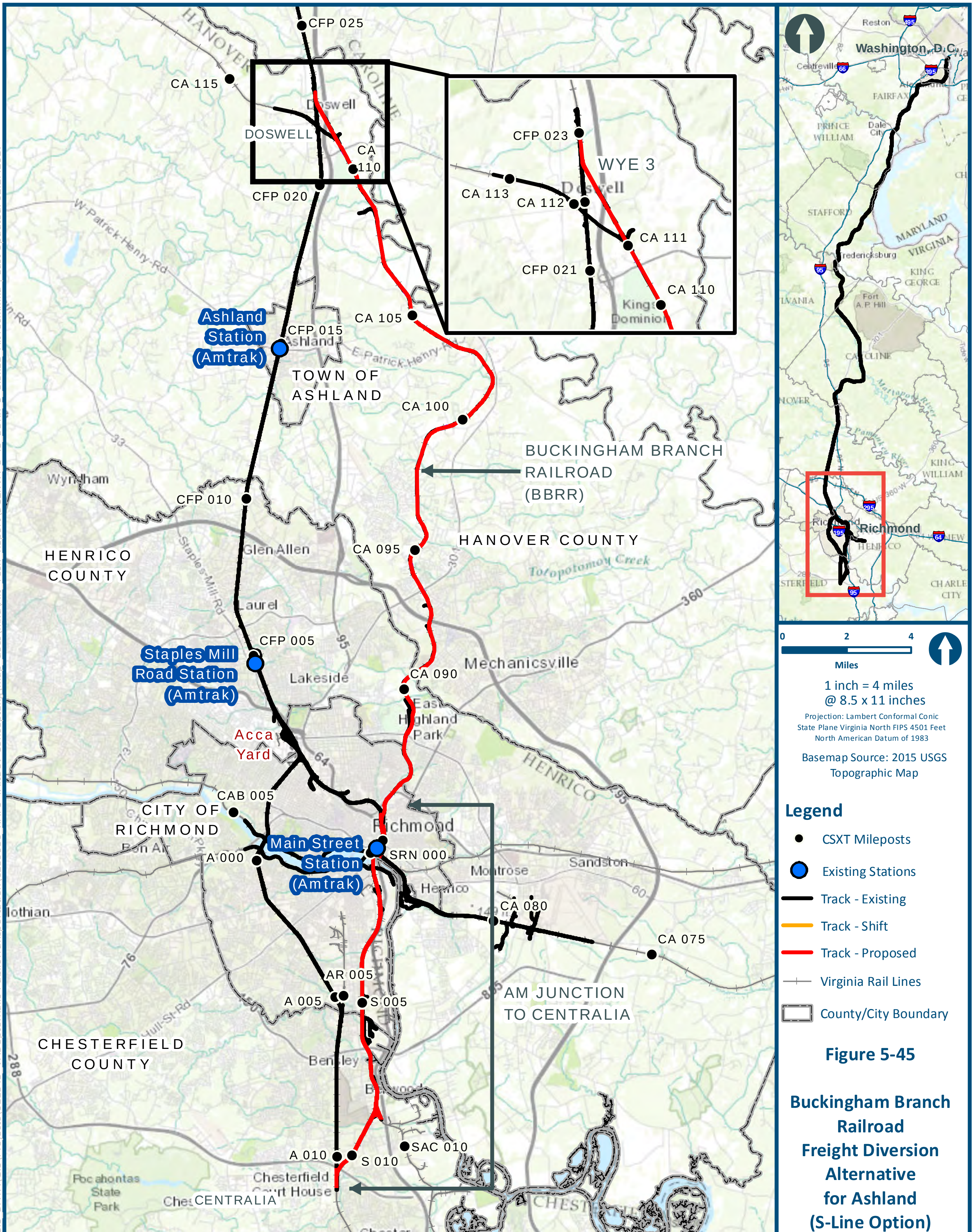


Figure 5-45

Buckingham Branch Railroad Freight Diversion Alternative for Ashland (S-Line Option)

A-Line Option Infrastructure Considerations. The BBRR Freight Diversion Alternative A-Line Option would require the construction of a second main track on the CSXT Bellwood Subdivision (S-Line) between Hospital Street and AY interlocking, to enable freight trains to operate between the BBRR at Hospital Street and the CSXT main line at AY interlocking. As part of this project, a two-track wye connection at Hospital Street would need to be constructed to connect the BBRR main line to the Bellwood Subdivision, and a second wye track at AY interlocking would also need to be constructed.

Additional improvements would be required on this section of the S-Line if, as under several of the Richmond area station options (including Main Street Station Only, Boulevard Station Only via S-Line, Staples Mill/Main Street Full Service, and Staples Mill/Main Street Shared Service) additional passenger trains are using the S-Line from Centralia past the west side of Main Street Station. Under a BBRR Freight Diversion A-Line Option that is combined with a Richmond Area alternative whereby passenger trains are using the S-Line to Centralia, the S-Line alignment between AY interlocking and AM Junction would need to accommodate a double-track passenger route for passenger trains operating between Main Street Station and Staples Mill Road Station via the East Acca bypass, and a double-track freight route for freight trains operating between AY interlocking and a new BBRR connection at Hospital Street. However, these combined options create an operational condition where the route of freight trains operating from AM Junction to the A-Line intersects and crosses over the route of passenger trains operating from the S-Line to the new East Acca Bypass, creating a substantial bottleneck. Because of the gradient and relatively slow track speeds in this area, waiting for slow-moving freight trains to clear the crossing before proceeding is not feasible, owing to the long clearance times. Therefore, a grade separation would be required to shift the double-track passenger route from the east side of the S-Line alignment by AY interlocking, to the west side of the S-Line alignment at Hospital Street, to eliminate conflicting operations with mainline freight movements. A grade separation of the S-Line alignment would allow for conflict-free moves on the double-track passenger line adjacent to (and crossing under or over) the double-track freight line. Without that grade separation, given that up to 2 passenger trains per hour in each direction would be operating on the S-Line, the opportunities to cross freights onto the S-Line and BBRR would likely restrict use of the BBRR for freight trains to late night hours to avoid conflicts with passenger trains. This would significantly restrict the utility of the BBRR Freight Diversion option.

Accommodating four tracks between AY and the Hospital Wye would require the following infrastructure modifications in addition to those recommended under Richmond station options incorporating use of the S-Line:

- Addition of crash walls to existing N. Boulevard bridge
- Grade separate Hermitage Road (5 tracks and additional trains)
- Reconstruct I-95/I-64 bridge (openings for 3 tracks only)
- Reconstruct Lombardy Street bridge
- Grade separate Brook Road (4 tracks and additional trains)
- Reconstruct N. Belvidere Street bridge
- Reconstruct Chamberlayne Avenue bridge
- Reconfigure Brook Road, N. Belvidere Street and Chamberlayne Avenue interchange and intersections

- Addition of crash walls to existing N. 1st Street bridge
- Reconstruction of existing N. 5th Street bridge
- Addition of crash walls to I-64 bridges

In addition to the four tracks required between AY and the new Hospital Wye, the BBRR Freight Diversion Alternative A-Line Option requires:

- A two-track south wye connection at AY interlocking between the S-Line and the A-Line
- No additional tracks along the A-Line (Note some Richmond Area alternatives do include additional main tracks along the A-Line to accommodate increased passenger service).

S-Line Option Infrastructure Considerations. The BBRR Freight Diversion Alternative S-Line Option would require construction of a second main track on the S-Line from AM Junction to Centralia, including a new bridge across the James River parallel to the existing bridge to accommodate the second main track. Some of the Richmond Area alternatives already include planned improvements to this section of the S-Line, including a second main track and a new rail bridge across the James River. Existing physical constraints in the area, including the elevated track structure between Main Street Station and the James River bridge, the location of I-95 overpass support columns, and the clearance envelope of the Triple Crossing, limit the S-Line to a maximum of two tracks along the west side of Main Street Station and south to the James River. The Triple Crossing's vertical clearances also prevent use of the S-Line by freight trains hauling double-stack container cars and autorack cars.

Operations and Feasibility Analysis. DRPT has performed TPC calculations of intermodal-type freight trains comparing estimated running times between common points on the existing CSXT's main line routing through Ashland and Acca Yard with the BBRR Freight Diversion Alternative A-Line Option. This option assumes the track and signal improvements to the BBRR described above are constructed. Estimates for both southbound and northbound trains were calculated. The estimated running time for intermodal trains operating on the CSXT main line between Doswell and West AY was approximately 33 minutes in each direction. The estimated running time for intermodal trains operating via the BBRR between Doswell and West AY varied between approximately 60 minutes southbound and 64 minutes northbound. Thus, diverting a freight train onto the BBRR at Doswell and then onto the S-Line to AY interlocking would add approximately 9 miles of distance to the route, and is estimated to add, at a minimum, approximately 30 minutes of travel time to freight train operations between Richmond and Washington. Bulk trains would likely need even more time, given their typically higher tonnages and resulting lower horsepower-per-ton.

DRPT evaluated the feasibility of providing a grade-separated "crossover" for passenger and freight trains between AM Junction and AY Interlocking to avoid creating a bottleneck for the BBRR Freight Diversion A-Line Option. There are several constraints in the area: the existing S-Line:

- Slopes down from AY to AM Junction following the course of a pre-existing drainage way
- Has limited tangent track

- Is crossed by several major road bridges
- Is within a developed urban area

A trench or underpass would require a portal at the south end that would likely daylight south of AY. For any crossover maneuver, flyover or trench/tunnel, to work, it will require four (4) tracks up/down the hill; two tracks for passenger operations and two tracks for freight operations. It may also require reconstruction of bridges that are undisturbed by other alternatives.

The longest opening between overpasses is approximately 1 mile between N. Boulevard and I-95 overpasses. A passenger only flyover beginning at N. Boulevard would require a two percent approach/departure grade at approximately 3,400 feet to attain sufficient vertical clearance above the freight tracks and accommodate the relative geometry required to allow a curve for the parallel tracks in order to cross each other and return to parallel. There is little available space at this intersection to construct this structure, and closing surrounding roadways and the major rerouting of related traffic would be required for construction purposes.

Another option that DRPT analyzed was the potential for a passenger rail flyover across the I-95 overpasses. Such a flyover structure would require another 30 feet of height for a total height above the existing tracks of approximately 60+ feet, requiring approximately 4,400 feet at 2% to return to the starting grade, plus the additional distance due to the existing grade descending downhill. The distance between N. Lombardy Street and N. Belvidere Street is approximately 0.6 mile (3,200 feet).

After evaluating the complexities of this alternative, DRPT concluded that a two-track flyover is not feasible on the hill between Acca Yard and the Hospital Wye. There is insufficient distance to extend the flyover without compromising existing major roadways.

Further analysis, similar to that for the Ashland tunnel alternative, involved analyzing the possibility of a tunnel or trench to accommodate the BBRR Freight Diversion Alternative. The results of this analysis also indicated impacts and infrastructure complexities similar to the flyover option.

Additional Buckingham Branch Options. DRPT considered use of the BBRR segment from Doswell to AM Junction for two potential rail operations scenarios in addition to the Freight Diversion option:

The first scenario would add one main line track to the existing single track segment, and realign the existing track to create a double track main line segment in keeping with the DC2RVA Engineering BOD and the Maximum Speed, Improved Speed and Existing Speed alignments described in Section 5.2.4. The Ruffin freight siding scenario would add a siding track at Ruffin between MP 87 and MP 90 capable of holding a CSXT freight train for crew change so as not to block AM Junction. These BBRR Operational Scenarios are described below.

- **Intercity Passenger Rail Route:** The intercity passenger rail option would improve the BBRR segment to allow passenger trains to travel between Doswell and AM Junction, bypassing Acca Yard, and the Amtrak stations at Staples Mill Road and Ashland. This scenario assumes Main Street Station is the only Richmond rail station, and that all passenger train traffic traveling south from Main Street Station uses the CSXT S-line to Centralia. Passenger train traffic traveling north from Main Street Station would use the improved BBRR to Doswell, connect to the CSXT main line via a new wye track, and then continue north. CSXT would likely move some or all of its freight traffic off the BBRR segment and onto its RF&P subdivision to ensure adequate capacity for the intercity passenger service on the BBRR segment.

As previously stated in Section 5.2.1, improving the BBRR between Doswell and AM Junction to serve as an intercity passenger rail route was considered and dismissed in prior studies due to high potential for historical and natural resources impacts, the inability to provide passenger service to Ashland and Staples Mills Road Stations, and the additional distance and travel time the BBRR segment would add to intercity passenger trains. DRPT concluded that the BBRR segment from Doswell to AM Junction failed as a reasonable alternative for high speed intercity passenger rail; in a letter to DRPT dated May 13, 2009, FRA stated its concurrence with DRPT's conclusion.

- **Freight Siding Option at Ruffin:** The freight siding option would construct an approximately two-mile siding at Ruffin, between MP 87 and MP 90; CSXT would use the siding for crew changes. Current practice is to stop freight trains requiring crew changes at AM Junction. Freight trains traveling north stopped at AM Junction extend well past Main Street Station, blocking either the west side or east side track for the duration of the crew change. Taking the freight trains north onto the Ruffin siding for crew change would cease the blocking of Main Street Station. However, trains that move north onto the Ruffin siding would then need to continue north on the BBRR to reconnect to the CSXT main line at Doswell – this would also require a new wye track at Doswell, as described above in Section 5.5.

  The freight siding option at Ruffin does not meet the Purpose and Need for this project, as it does not add capacity or accommodate freight rail operations. As an alternative option to address the blocking of track at Main Street Station during crew changes, DRPT has identified an option for a new freight siding south of the James River adjacent to the CSXT South Yard; this siding option is discussed below in Section 5.6.

5.6 RICHMOND AREA OPTIONS

The Richmond area has multiple rail alignment options for carrying additional passenger service or additional freight service, thereby opening capacity for passenger trains on other lines. North of Richmond, the Buckingham Branch Railroad (BBRR) segment from Doswell to AM Junction offers an alternate route from the CSXT main line to Main Street Station. Moving south from Staples Mill Road Station through Richmond to Centralia, there is a choice between the current main line west of the central part of the city on the CSXT A-line, and the CSXT S-line through downtown Richmond. The multiple rail alignment options through Richmond create the potential for various station and service options, and the choice of an alignment option can preclude service to one or more station options (and vice versa).

The Richmond rail network is a legacy of the initial development of railroads in Richmond in the 1800s, Richmond's challenging topography (particularly on the north bank of the James River), and the city's development patterns. At one time, Richmond was served by five unconnected railroads, each with their own passenger stations or freight depots. Over time, the railroads were consolidated and connected, although train movements between north-south and east-west corridors were (and still are) often time-consuming and inefficient. As the railroads were consolidated, two stations were developed in the early 1900s to serve competing rail lines: Main

Street Station and Broad Street (Union) Station. Broad Street Station, historically used by the Atlantic Coast Line (A-Line) for its service to the south, closed in 1975 and was subsequently repurposed as the Science Museum of Virginia. Main Street Station, used by the Seaboard Airline Railroad (S-Line) and the Chesapeake and Ohio Railroad (along what is now the BBRR), also closed in 1975. At that time, Amtrak began serving Richmond area passengers at Staples Mill Road Station in Henrico County; with its trains bypassing downtown Richmond via the CSXT A-Line between Acca Yard and Centralia. Main Street Station reopened, limited to Northeast Regional (Virginia) service to/from Newport News, in December 2003.

Richmond Station Alignments. In Richmond, DRPT identified multiple alternatives based on combinations of the two rail alignments through the city (the A-line and the S-Line) and existing and potential station locations. Potential station locations were identified by DRPT based on review of existing stations, past stations, prior studies, locations suggested during scoping, and a review of rail geometry for potential new locations with sufficient tangent (straight) track to accommodate a 1,200-foot long station platform in accordance with the DC2RVA Engineering BOD (See Section 5.6 for alignment images). These potential station locations were then evaluated based on their ability to meet the Project's Purpose and Need by applying FRA guidelines on station location[14] (see Chapter 8 for detail on station evaluations). DRPT's evaluation of potential station locations in Richmond identified four station locations for further consideration as either part of a single station or two station option, including:

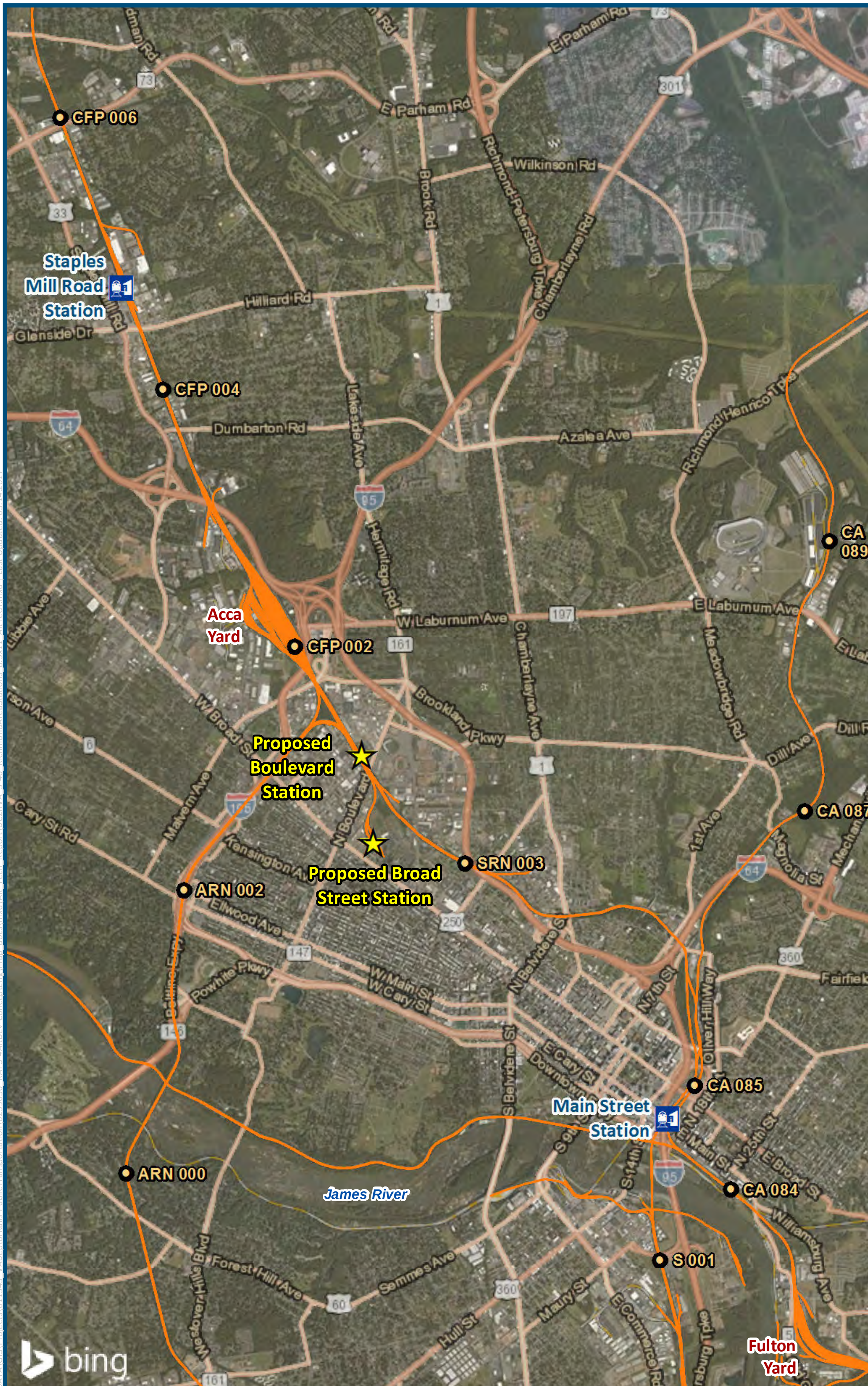
- **Staples Mill Road Station** – existing Amtrak station in Henrico County
- **Boulevard Station** – new station location adjacent to the Boulevard Street overpass and north of the CSXT track in Richmond.
- **Broad Street Station** – new station location near the historic Broad Street Station building (now the Science Museum of Virginia) in Richmond.
- **Main Street Station** – existing Amtrak station in downtown Richmond.

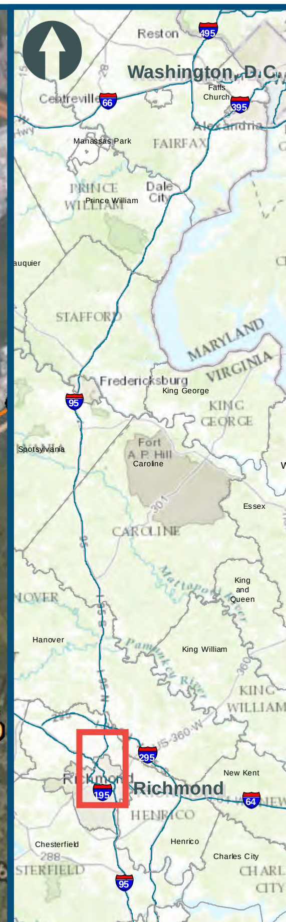
Specific rail improvements based on the DC2RVA BOD were identified for each of these station location options; these rail improvements were then screened following the Stage I, II, and III process as described above for rail alignments. In addition, for station locations relying on the CSXT S-Line for passenger train access, an optional freight connector bridge over the James River was evaluated. This freight connector bridge would have permitted trains operating eastbound on the James River line to make a progressive move and operate southbound on the Bellwood Subdivision, thus avoiding the current operating practice that requires trains to make a "three-point turn" through the city of Richmond passing both sides of Main Street Station. Currently, trains must operate east on the James River line as far as Fulton Yard, where they reverse direction and operate west and north onto the Bellwood Sub past the east side of Main Street Station as far north as Hermitage or Acca Yard, then reverse direction again to operate south on the Bellwood Sub past the west side of Main Street Station.

[14] Railroad Corridor Transportation Plans, A Guidance Manual. Office of Railroad Development, RDV-10, Federal Railroad Administration, Washington, D.C. 20590, Revised July 8, 2005; and Station Area Planning for High-Speed and Intercity Passenger Rail, Office of Railroad Policy and Development, Federal Railroad Administration, Washington D.C., June 2011.

Amtrak's Auto Train does not stop in Richmond (it operates with no passenger stops between the auto loading/unloading stations in Lorton, VA and Sanford, FL), and was not included in the assessment of station location options.

Stage I, II, and III screening for the Richmond area rail alignment options, similar to the other alignments and bypass options in the DC2RVA corridor, are presented in Chapter 6. DRPT determined the potential for sharing service between a new Broad Street station and either Main Street or Staples Mill Road stations, or between a new Boulevard Street Station and either Main Street or Staples Mill Road stations, is not a preferred option due to the proximity between the stations—they are too close (within 4 miles of each other) for efficient rail operations and intercity passenger service. The other station location options were carried forward for further consideration through the screening process. Figure 5-46 represents the Richmond station alternatives in reference to the DC2RVA corridor.





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Mile

1 inch = 1 mile
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: 2015 Bing Aerial,
Microsoft and its Data Suppliers

Legend

- CSXT Mileposts
- DC2RVA Project Corridor
- Amtrak Stations
- Proposed Stations

**Figure 5-46
Richmond Area
Existing & Proposed
Stations**

5.6.1 Single Station Alternatives

DRPT identified four possible single station alternatives. In these alternatives, Richmond is served by only one station, and all passenger service is routed through that station.

Existing Staples Mill Road Station (Figure 5-47): All Amtrak trains with the exception of the Auto Train serve Staples Mill Road Station only. Trains traveling to/from Norfolk and the Carolinas continue using the CSXT A-Line through Centralia. Trains traveling to/from Newport News continue to use the Peninsula Subdivision. The existing Main Street station is closed. The figure below references this service alternative.

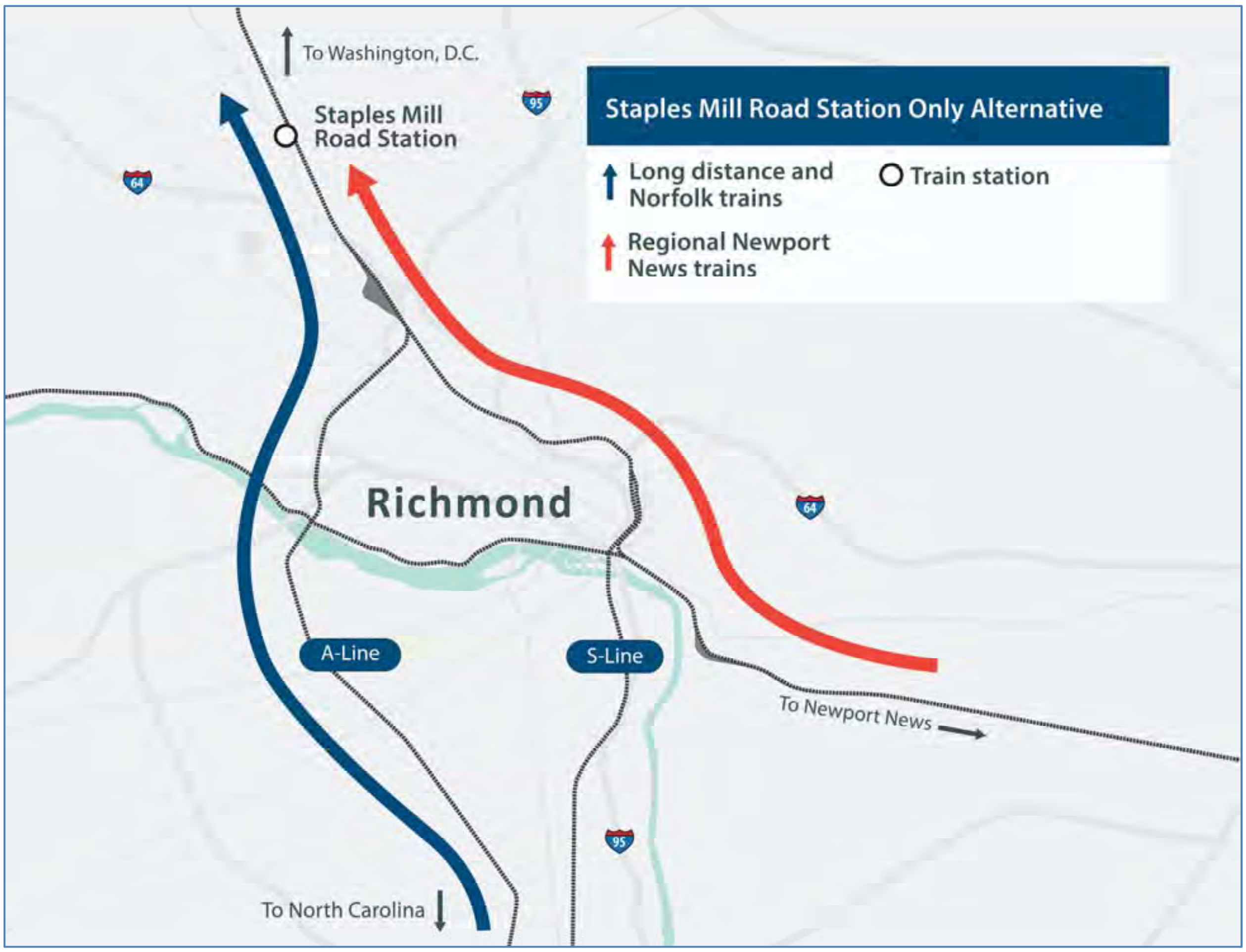


FIGURE 5-47: STAPLES MILL ROAD STATION ONLY ALTERNATIVE

New Boulevard Street Station (Figure 5-48 and 5-49) All Amtrak trains with the exception of the Auto Train serve the new Boulevard Station only. DRPT considered two alignment options for this station. In the Boulevard A-Line option, the station would be arranged with a passenger only elevated loop track crossing over the CSXT S-Line. Trains traveling to/from Norfolk and the Carolinas continue using the CSXT A-Line through Centralia. Trains traveling to/from Newport News continue to use the Peninsula Subdivision. In the Boulevard S-Line option, the station is arranged on the north side of the S-Line without the loop track. Trains traveling to/from Norfolk and the Carolinas use the CSXT S-Line through Centralia. Trains traveling to/from Newport News continue to use the Peninsula Subdivision. Both Boulevard station options require a two-track bypass around the east side of Acca Yard. The existing Main Street and Staples Mill Road stations are closed in both options.

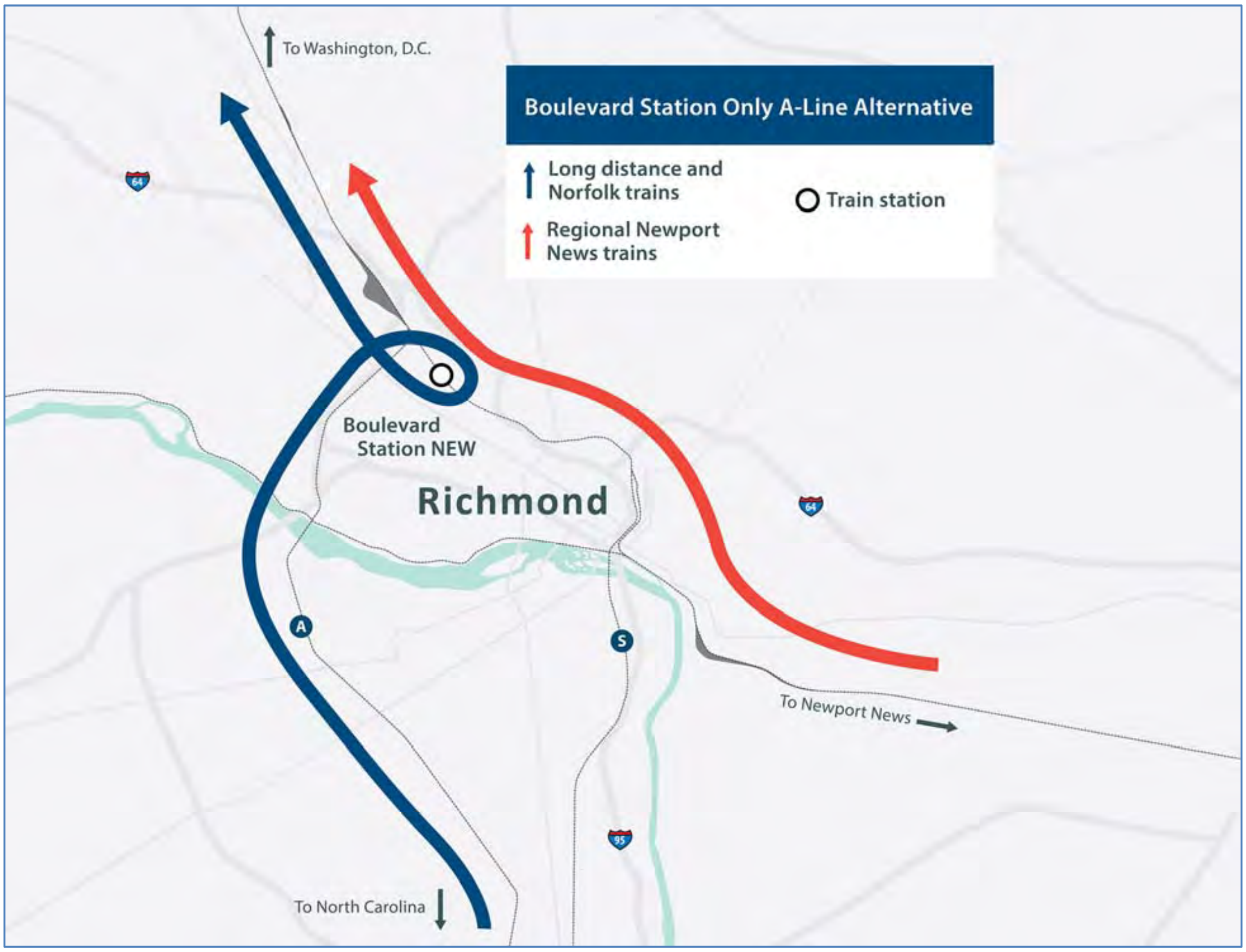


FIGURE 5-48: BOULEVARD STATION ONLY A-LINE ALTERNATIVE

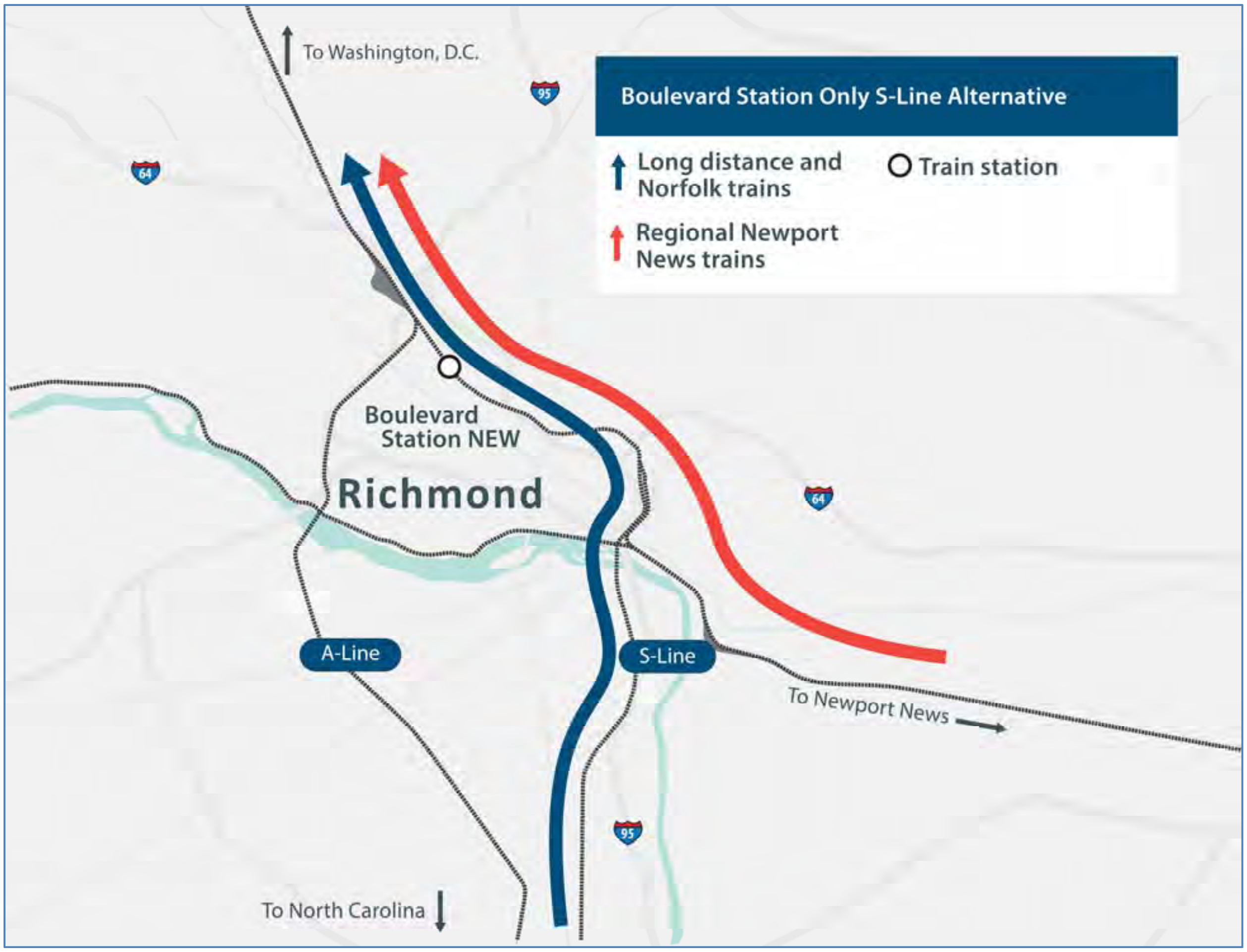


FIGURE 5-49: BOULEVARD STATION ONLY S-LINE ALTERNATIVE

<u>New Broad Street Station (Figure 5-50):</u> All Amtrak trains with the exception of the Auto Train serve the new Broad Street Station only. The station would be arranged with a passenger only at-grade loop track south of the CSXT S-Line. Trains traveling to/from Norfolk and the Carolinas continue using the CSXT A-Line through Centralia. Trains traveling to/from Newport News continue to use the Peninsula Subdivision. This alternative requires a two-track bypass around the east side of Acca Yard. The existing Main Street and Staples Mill Road stations are closed. The figure below references this service alternative. DRPT considered and dismissed the option of routing passenger trains from Broad Street Station traveling to/from Norfolk and the Carolinas on the CSXT S-Line through Centralia due to potential rail operation concerns, notably the need for passenger trains to cross over the CSXT S-Line south of Acca Yard to enter/exit the station loop.

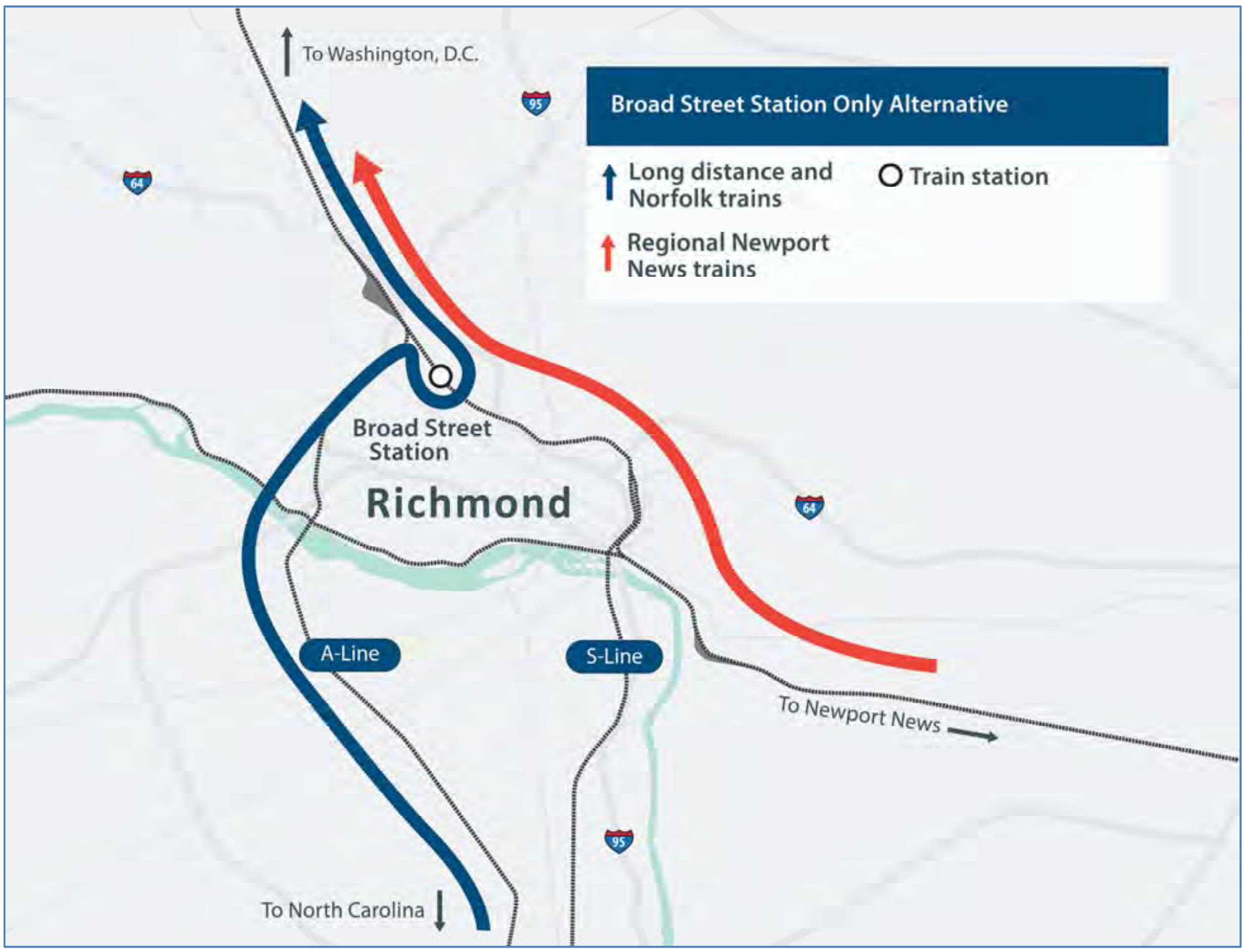


FIGURE 5-50: BROAD STREET STATION ONLY ALTERNATIVE

Existing Main Street Station (Figure 5-51): All Amtrak trains with the exception of the Auto Train serve Main Street Station only. Trains traveling to/from Norfolk and the Carolinas use the CSXT S-Line from Main Street Station through Centralia. Trains traveling to/from Newport News continue using the Peninsula Subdivision. This alternative requires a two-track bypass around the east side of Acca Yard. The existing Staples Mill Road Station is closed. The figure below references this service alternative.

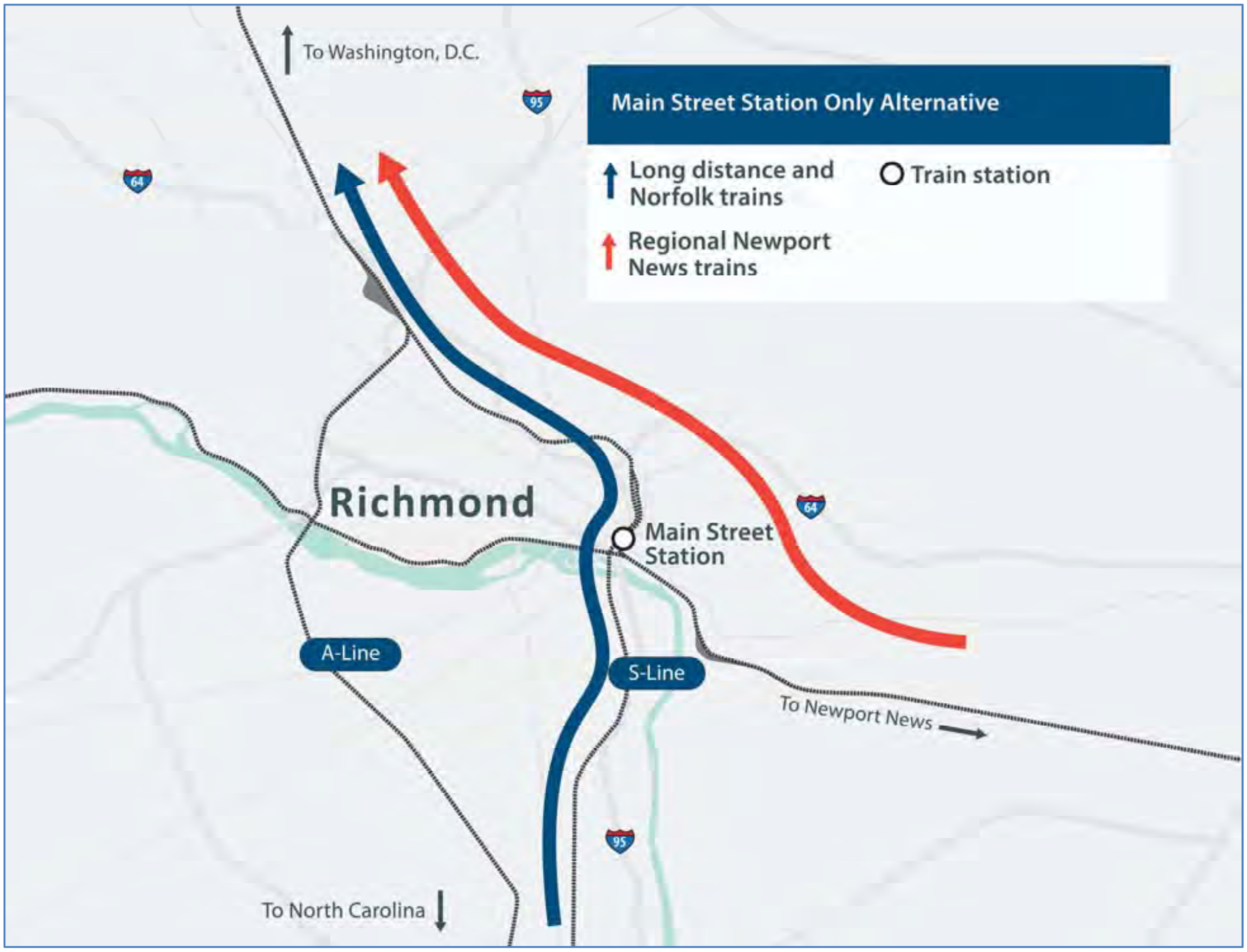


FIGURE 5-51: MAIN STREET STATION ONLY ALTERNATIVE

5.6.2 Two Station Alternatives

DRPT identified three possible two station alternatives. In these alternatives, Richmond is served by both Staples Mill Road station and Main Street Station, with varying levels of service and passenger trains traveling on different alignments.

Main Street and Staples Mill Road - Split Service (Figure 5-52): Trains traveling to/from Norfolk and the Carolinas serve Staples Mill Road Station only, traveling the CSXT A-Line from Staples Mill Road Station through Centralia. Trains traveling to/from Newport News continue to serve Main Street Station using the Peninsula Subdivision. This is the same as the current arrangement except that trains to/from the north that originate at Richmond would originate at Main St. Station rather than their current origin/terminus at Staples Mill Road Station. The figure below references this service alternative.

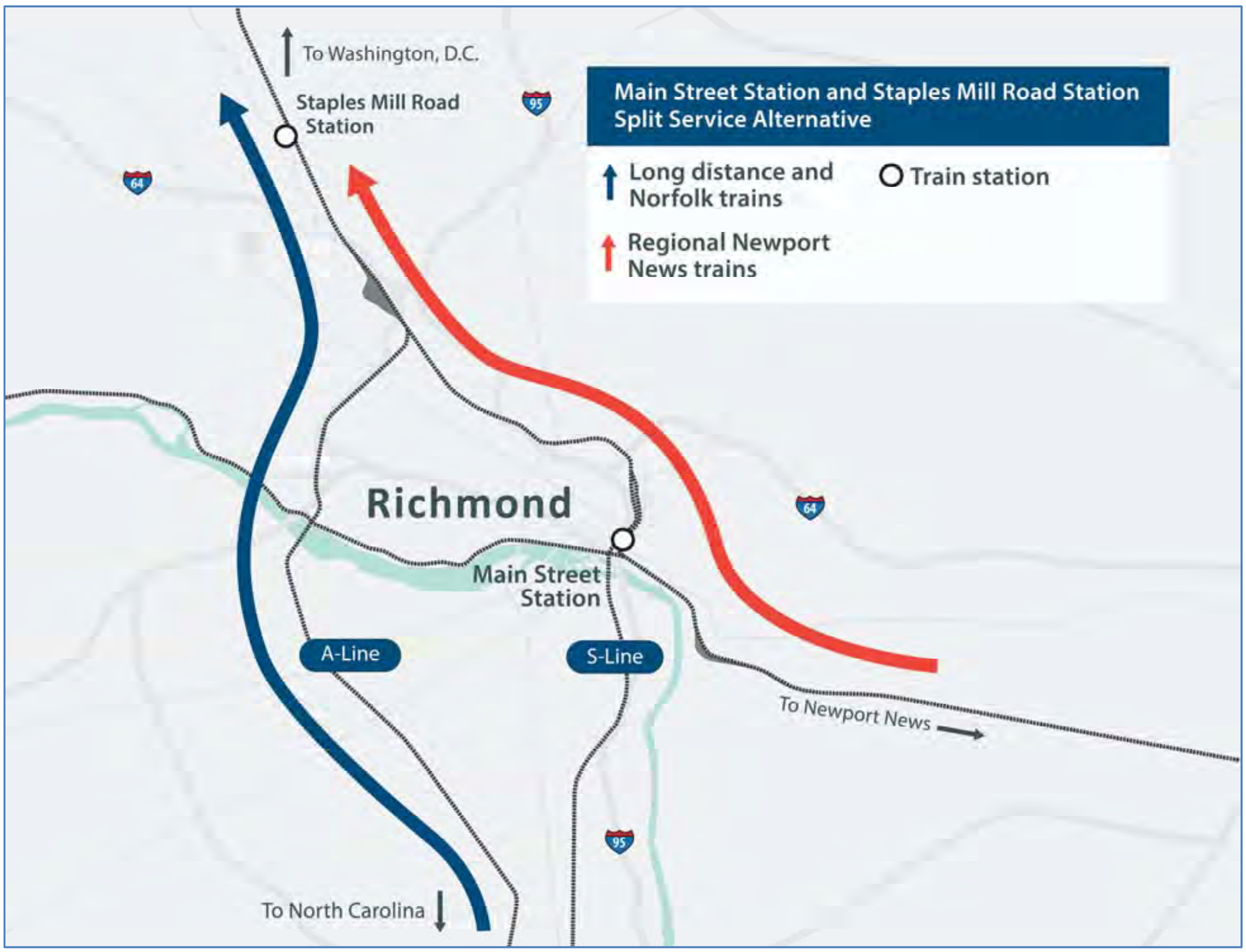


FIGURE 5-52: MAIN STREET AND STAPLES MILL ROAD - SPLIT SERVICE ALTERNATIVE

Main Street and Staples Mill Road - Full Service (Figure 5-53): All Amtrak trains serve both stations. Trains traveling to/from Norfolk and the Carolinas use the CSXT S-Line from Main Street Station through Centralia (stopping on the west side of Main Street Station). Trains traveling to/from Newport News continue using the Peninsula Subdivision, stopping on the east side of Main Street Station. This alternative requires a two-track bypass around the east side of Acca Yard. The figure below references this service alternative.

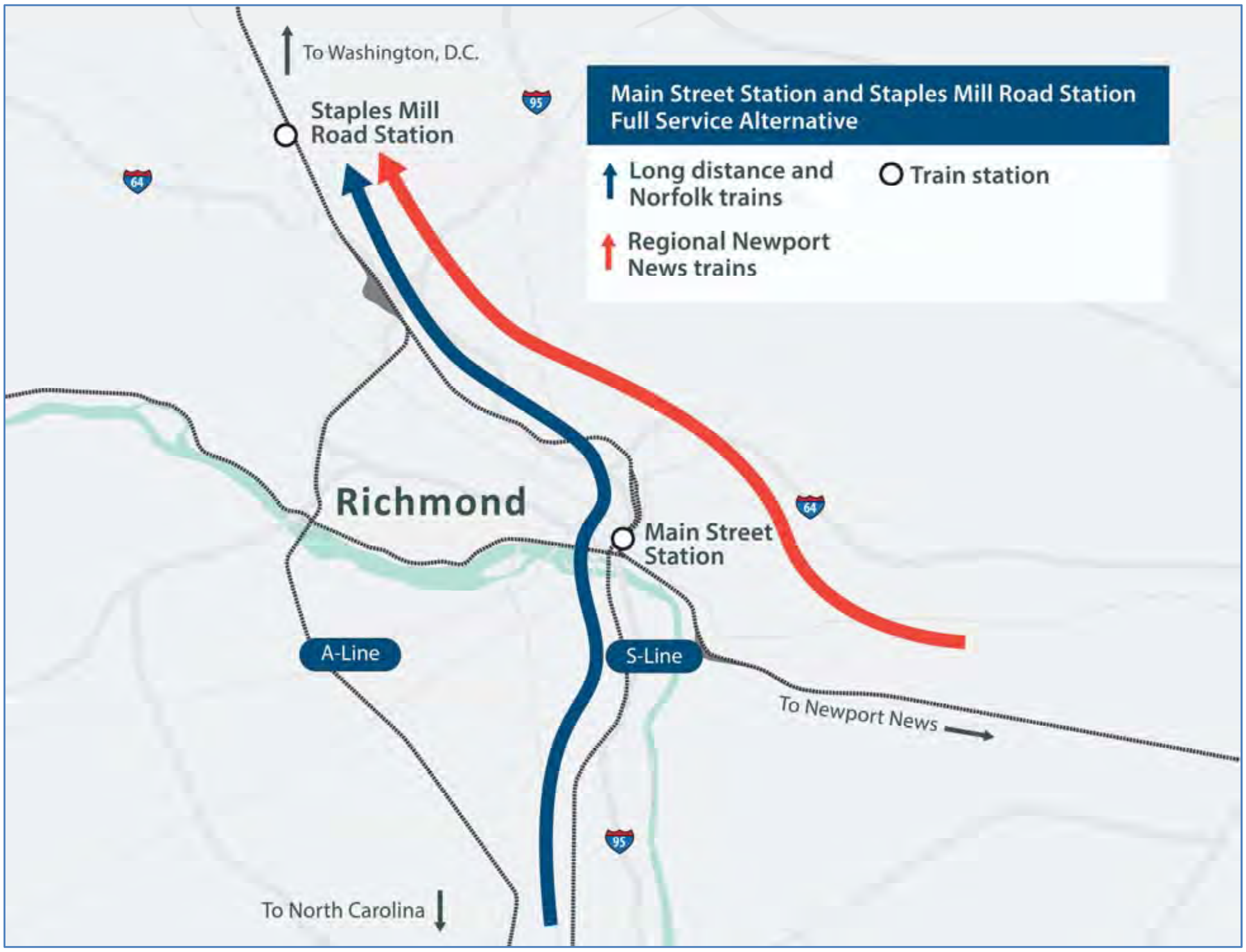


FIGURE 5-53: MAIN STREET AND STAPLES MILL ROAD - FULL SERVICE ALTERNATIVE

Main Street and Staples Mill Road - Shared Service (Figure 5-54): Trains traveling to/from Norfolk and the Carolinas use either the CSXT A-Line or the CSXT S-Line through Centralia. Trains serving Main Street Station or Main Street Station and Staples Mill Road Station in combination use the CSXT S-Line. Trains using the CSXT A-Line would only be served by Staples Mill Road station. Trains traveling to/from Newport News continue using the Peninsula Subdivision and would serve both stations. This alternative requires a two-track bypass around the east side of Acca Yard. The figure below references this service alternative.

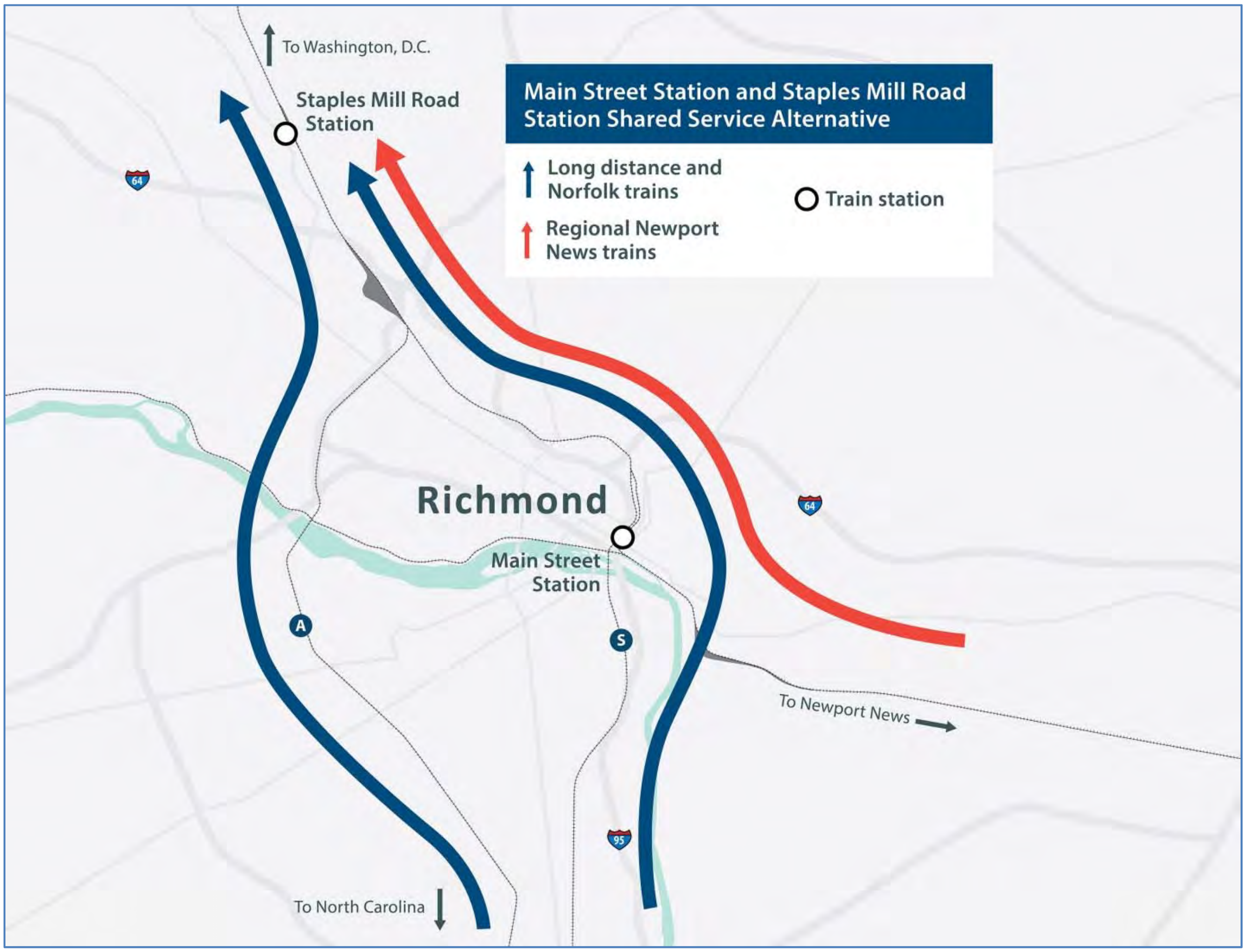


FIGURE 5-54: MAIN STREET AND STAPLES MILL ROAD – SHARED SERVICE ALTERNATIVE

5.7 CONSIDERATION OF INFRASTRUCTURE CONSTRAINTS

As discussed above in Section 5.3.3, the potential constraints of existing infrastructure on rail alignments were evaluated in Stage III of the screening process. Examples of infrastructure posing potential constraints on new rail alignments include roadway overpasses, at-grade road crossings, and rail bridges over waterways, roads, and other railroads. Evaluations of the constraints potentially imposed by the infrastructure were conducted (see Chapter 7 for details) and are described briefly below.

5.7.1 Road Overpass Constraints

The DC2RVA corridor includes 80 public road overpasses and 16 private road overpasses, where a road passes over the rail corridor. The area beneath each overpass was evaluated for sufficient space to safely fit an additional main track within the existing rail corridor opening (both vertical and horizontal clearance); the road overpass evaluations are described in greater detail in Chapter 7 of this report. An overpass may be unconstrained, with space to add another track on either side of the existing tracks, or it may have space only on one side, leaving the opposite side constrained. These constraints, if any, were used to evaluate and adjust potential alignment options. In some cases, the arrangement of tracks and bridge piers is such that there is no room for an additional track; in these cases, a replacement for the road overpass would be required for any of the build alternatives within the right-of-way.

5.7.2 At-Grade Road Crossing Constraints

The DC2RVA corridor includes 68 public and 31 private at-grade road crossings, where a road crosses the rail corridor at grade. These at-grade road crossings were evaluated for road geometry and physical conditions that could be affected by adding an additional track on one side or the other of the existing tracks. These evaluations are described in greater detail in Chapter 7 of this report. At-grade crossings that could readily accommodate an additional track without requiring more than minor roadwork were considered unconstrained; at-grade crossings requiring more extensive roadwork to achieve/maintain a safe road geometry or relocation of driveways or adjoining roads were considered constrained, and the constraint considered in evaluating and adjusting rail alignments. To comply with ADA guidelines pertaining to crossing improvements and accommodations, the BOD states that "All publicly accessible at-grade crossings, public or private, shall have train activated warning systems."

5.7.3 Rail Bridge Constraints

The DC2RVA corridor includes 50 rail bridges over roads, 4 rail bridges over other railroads, and 68 rail crossings over waterways including large culverts over 6 feet in diameter. There are also numerous culverts less than 6 feet in diameter along the rail corridor. The corridor south of Franconia is double track, and the existing bridges and large culvert crossings are double track with two exceptions: a single-track bridge and an adjacent double track bridge over Quantico Creek, and the single-track S-Line crossing of the James River south of Main Street Station. The corridor also includes track on raised structure or viaduct, notably at Fredericksburg Station, Main Street Station, and portions of the James River and Peninsula Subdivisions in Richmond.

Adding new track along the corridor in any of the build alignments would require new bridges over the roads, railroads, and waterways. DRPT assumed the existing double track structures were adequate and that new bridges would be required only for the new track, with the exception of bridges over major waterways. Major waterways are those where the bridge requires one or more sets of piers between the bridge abutments. Due to the potential costs, impacts, and permitting requirements for new bridges over major waterways, DRPT determined new bridges would be assumed for planning purposes to have a substructure sufficient to accommodate a second track in the future even if only one track is being considered for the Project. The additional width will be preserved for use for right-of-way maintenance and will allow for future expansion, if or when additional tracks may be necessary. Where culverts are in place beneath the rail, DRPT assumed the culvert would be extended a sufficient distance to place the new track on top.

The build alignments share the following common elements for these new bridges across major waterways:

- New bridges would be located alongside existing rail bridges.
- New bridges would be assumed for planning purposes to have a substructure sufficient to accommodate a second track for future system expansion; however, only one track is being considered for the Project.
- Existing rail bridges would continue to be used by either one or two tracks.

The use of existing bridges constrains the rail alignments as they approach waterway crossings; to address this potential issue, a preliminary siting review of the bridge locations was conducted to determine if there were any readily apparent site constraints that would limit the location of the new bridge either west (upstream) or east (downstream) of existing bridges. Chapter 6 of this report provides additional detail and the results of these preliminary siting reviews of rail bridge locations.

5.8 CONSIDERATION OF STATION LOCATIONS

Existing and potential intercity passenger rail stations on the DC2RVA corridor are identified and evaluated in Chapter 8 of this report. Stations evaluated in this effort include existing stations used by Amtrak for intercity passenger rail service; existing, planned and/or under construction VRE commuter rail stations; and potential new stations for intercity passenger rail proposed for consideration during Project scoping. Stations have a considerable bearing on the Project, and in many cases drive alignment alternatives. Below is a list of station-related improvements that are being considered in the corridor:

- Existing passenger stations may be improved or expanded to meet Amtrak's station facility guidelines and ridership service requirements, including new station buildings, parking, and other facilities.
- New passenger stations may be established to meet ridership demand and/or to improve passenger service and rail operational efficiency.
- Amtrak station platforms may be reconfigured and new island platforms added to meet new track alignments and the Project's BOD. Track alignments at VRE stations will accommodate expanded platforms and new island platforms in accordance with the Project's BOD. The Project does not include construction of new platforms for VRE stations.
- Future passenger service frequency and schedules may change; stations may receive more or less Long Distance, Interstate Corridor, or Northeast Regional (Virginia) train services than they do now; or stations may receive more or less funding from public or private sources.

Functional criteria were developed for the station evaluations by identifying key characteristics of stations that drive demand for intercity rail service, including existing site conditions, surrounding population density and commercial activity, intermodal connectivity, and distance between station stops. These criteria are based on guidelines from the FRA and standards developed by Amtrak, the American Railway and Maintenance of Way Association (AREMA), and other local and national studies of rail stations. Stations that meet these criteria support the

Project's Purpose and Need by providing a safe and efficient passenger experience, thereby making intercity passenger rail travel in the DC2RVA corridor and beyond a competitive choice.

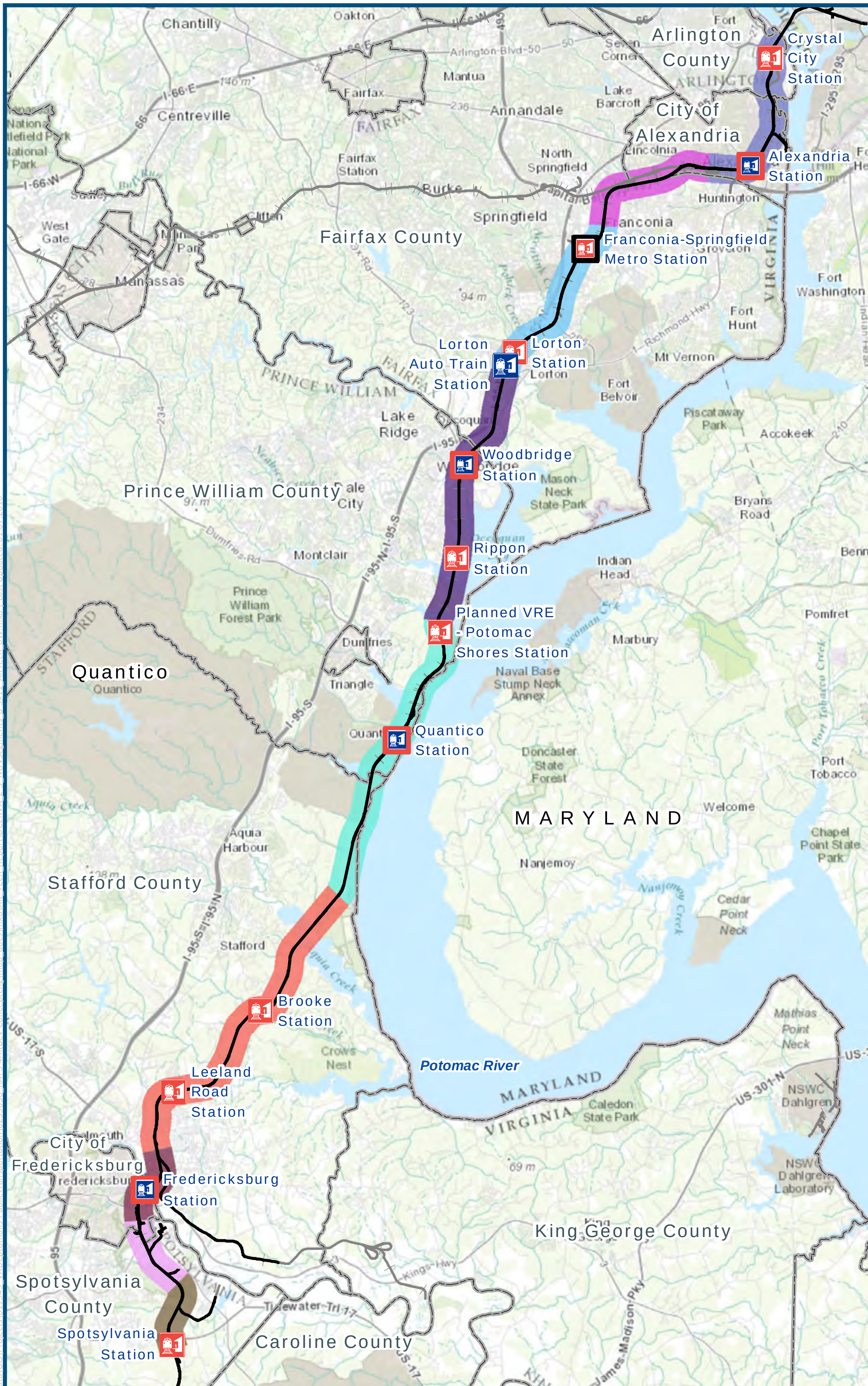
Stations may also affect the Project by potentially constraining the alignment. The DC2RVA BOD includes standards for track alignments at stations and platforms, including provision for center island platforms where there are 3 or more tracks. A track alignment that meets the existing or future needs of a station for platform access would have fewer impacts to the station than an alignment that requires station platform replacement. However, treating existing or planned station platforms as fixed constraints that the alignment must accommodate could require the alignment north or south of the station to shift and affect other resources. Track alignments were evaluated for their potential to impact existing station platforms and planned station platform expansions, as well as for the effects on the alignments of meeting the existing or planned platform constraints.

6 RAIL ALIGNMENT SCREENING

6.1 INTRODUCTION

This chapter presents the rail alignment screening results by segment for three areas: Northern Virginia, Central Virginia, and Richmond, representing areas of similar existing conditions, issues, and railroad operating characteristics (Figures 6-1, 6-2, and 6-3). This chapter also presents the screening results for additional local options identified for Arlington, Fredericksburg, and Ashland, including bypass alignments. The alternative development process for DC2RVA began with the development of preliminary rail alignments as the initial basis for project build alternatives, recognizing that adding a main line track and/or the potential realignment of the existing main line tracks would be the driver for many of the other project-related improvements and potential impacts. Rail alignments—i.e., the location and configuration of the new and/or existing main line track—were developed by DRPT using previous studies, suggestions received from the public and other stakeholders during project scoping, and the findings of the SEHSR Tier I EIS and ROD. All preliminary alignments were developed to a similar conceptual design level using the precepts of the DC2RVA Basis of Design. DRPT recognizes there is a trade-off between meeting the Project's Purpose and Need and impacts to human and natural resources. Adding a main track to the existing rail corridor adds capacity to the system. The additional capacity removes or reduces system bottlenecks and improves passenger train performance and reliability. Improving travel time requires some combination of faster train operating speeds and/or fewer stops or delays. Designing an alignment for faster train speeds typically means straightening curves and reducing grade changes—a relatively straight level track can support faster train speeds than a curving track with steeper grades[1]. The existing rail corridor has acceptable grades in most segments, but many curves that restrict the track speed. Straightening the curves while adding new track can require additional right of way and create impacts to human and natural resources - while not improving the rail corridor or not adding track would have less impacts, but provide less improvement to the existing passenger rail system and may not satisfy the Project's Purpose and Need. Generally, where two or more alignment options exist with comparative levels of impacts, DRPT has advanced the alignment option that maximizes speed and capacity. Additional details pertaining to the Project's Purpose and Need are specified in Chapter 1 of the Draft EIS.

[1] Train speed can also be improved by upgrading the class of track, making signal improvements, and use of more powerful locomotives.



1 inch = 5 miles
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap: USGS 2015 Topographic Map

Legend

- DC2RVA Project Corridor
- Virginia Rail Lines
- County/City Boundaries
- Amtrak Station
- VRE Station
- Amtrak/VRE Station
- VRE/WMATA Station

DC2RVA Project Segments

- 1: Rosslyn Junction to Alexandria (ROAF)
- 2: Alexandria to Franconia (AFFR)
- 3: Franconia to Lorton (FRLO)
- 4: Lorton to Powells Creek (LOPC)
- 5: Powells Creek to Arkendale (PCAR)
- 6: Arkendale to Dahlgren Junction (ARDJ)
- 7: Dahlgren Junction To Fredericksburg (DJFB)
- 8: Fredericksburg to Hamilton (FBHA)
- 9: Hamilton to Crossroads (HAXR)

Figure 6-1 Northern Virginia Area

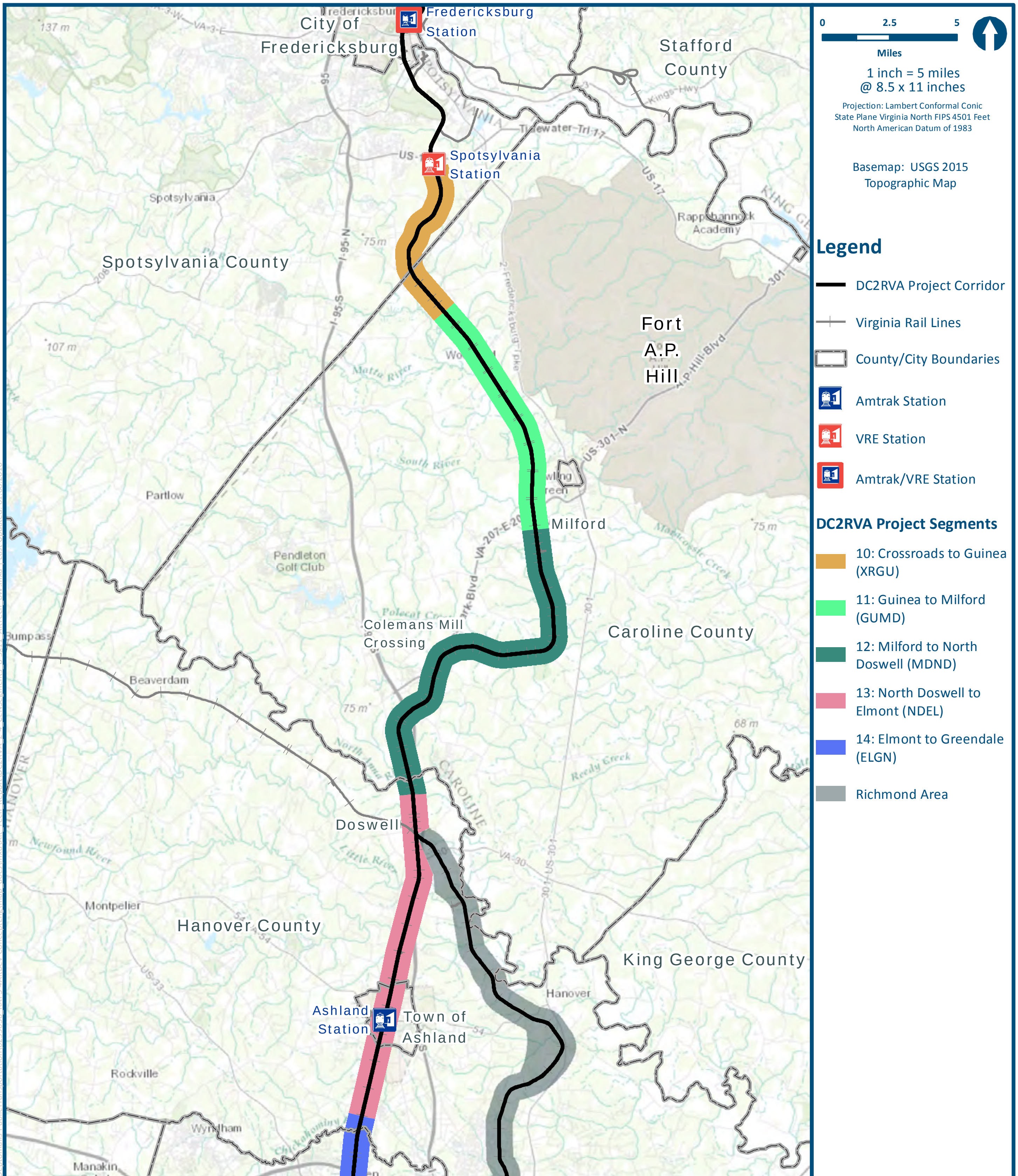
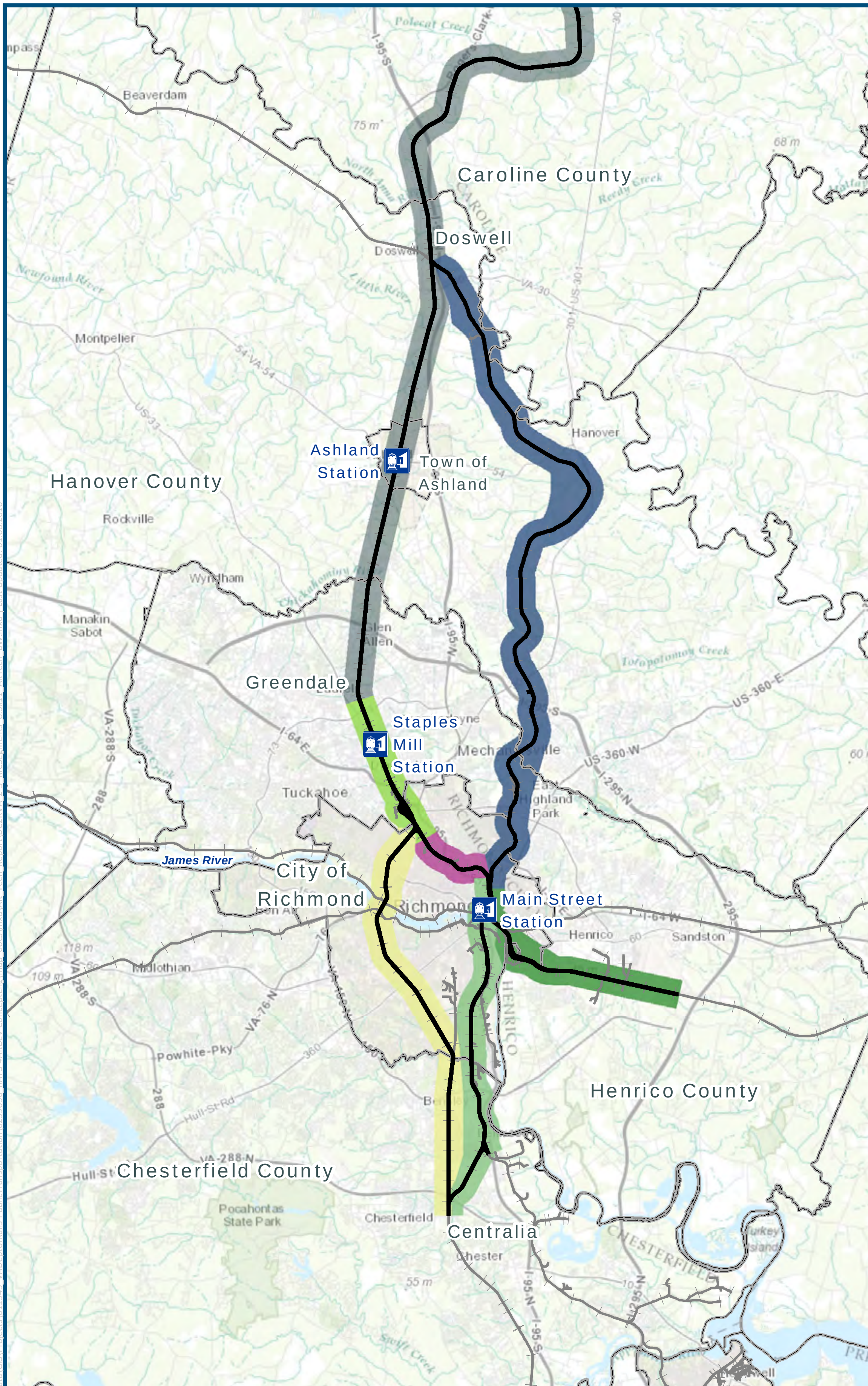


Figure 6-2
Central Virginia Area



0 2.5 5
Miles

1 inch = 5 miles
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap: USGS 2015
Topographic Map

Legend

- DC2RVA Project Corridor
- Virginia Rail Lines
- County/City Boundaries
- Amtrak Station

DC2RVA Project Segments

- 15: Greendale to South Acca Yard/West Acca Yard (GNSA)
- 16: SAY/WAY to AM Junction (Hermitage Lead) (SAAM)
- 17: AM Junction to Centralia - S Line (AMCE)
- 18: West Acca Yard to Centralia - A Line (WACE)
- 19: AM Junction to Beulah (Peninsula Sub.) (AMBE)
- 20: Buckingham Branch (BBRR)
- Central Virginia Area

Figure 6-3
Richmond Area

Rail alignments were screened for potential impacts to key environmental resources and used to identify potential modifications to associated highway infrastructure and existing and potential stations. Determining potential rail alignments was an iterative process, with alignment modifications made to avoid or minimize adverse effects on environmental resources and existing infrastructure while meeting the Project's Purpose and Need. The process also considered each rail alignment's potential ability to reduce trip times while providing increased capacity and reliability based on track design speed and rail operations. All alignment options, including bypass options, were designed to conform to the DC2RVA Basis of Design. The Alternatives Technical Report addresses only build alternatives for this Project. The No Build Alternative will be explained in detail in the Tier II Draft EIS.

Northern Virginia and Central Virginia rail alignment options are identified based on their abilities to improve track design speed, capacity, and reliability. Northern and Central Virginia alignment options and screening evaluations are presented in the following sections; for more information on the overall screening process refer to Section 5.3:

- 6.2 Rail Alignment Options
- 6.3 Rail Alignment Screening Process
- 6.4 Stage I Screening
- 6.5 Stage II Screening
- 6.6 Stage III Screening
- 6.7 Stage IV Screening

In Richmond, the existing dense urban development, grade changes, and historic rail configuration limit opportunities to improve travel time; additionally, there are multiple rail lines (CSXT A-Line and S-Line) to consider. Due to these factors, preliminary rail alignments and other improvements for the Richmond area were developed based on serving potential station locations and passenger train routes. The potential improvements aim to increase capacity, reliability and largely stayed within existing right-of-way. Richmond rail alignments and improvements are therefore identified based on adding capacity and reliability to existing and future rail operations determined by potential station locations. Richmond alignment options and screening evaluations are presented in a similar process in Section 6.7.3, comparing rail improvements against Stage I, II, and III resources:

- 6.7.3.1 Station Location Options
- 6.7.3.2 Freight Connector Bypass Options
- 6.7.3.3 Rail Infrastructure Alternatives by Station Location
- 6.7.3.4 Richmond Area Rail Infrastructure Options—Screening Results
- 6.7.3.5 Rail Operations Review

6.2 RAIL ALIGNMENT OPTIONS

The evaluation of rail alignments included several rail alignment options in Northern Virginia and Central Virginia. Figures 6-1 and 6-2 illustrate the segments in the Northern Virginia and Central Virginia areas. These options include a combination of maximizing train speed, maintaining or improving train speed, and minor improvements within and outside of the right-of-way. The options in the Northern Virginia and Central Virginia areas include:

- **Maximum Speed Option**—add one main track and re-align existing main tracks to increase passenger train speed to 90 mph for most of the corridor, unconstrained by existing right-of-way.
- **Improved Speed Options**—add one main track and re-align existing main tracks to improve passenger train speed (not exceeding 90 mph) where feasible, while staying within existing right-of-way. The improved speed options are categorized by the following design methods:
  - **Constrained**—add one track and realign existing tracks, constrained to right-of-way, to improve speed. This option seeks to maximize track design speed within the right-of-way, but could require replacement of existing rail bridges and tangent (straight) track sections, increasing possible impacts and cost.
  - **Hold Bridges**—add one track and re-align existing tracks similar to Constrained option except at crossings of major/roads, where the alignment of the existing rail bridges continue in use for existing track. This option seeks to improve track design speed within the right-of-way by shifting track in curves and possibly tangent track, while reducing possible impacts and costs by continuing to use existing rail bridges for existing track.
  - **Hold Bridges/Tangents**—add one track and re-align existing tracks similar to Constrained and Hold Bridges except at sections of straight (tangent) track where the current alignment is maintained. This option seeks to improve track design speed within the right-of-way by shifting track in curves while reducing possible impacts and costs by continuing to use existing rail bridges and tangent track.
- Existing **Speed Options**—add one main track, matching existing track design speed (no re-alignment of existing track), including:
  - **East**—add one track east of existing track
  - **West**—add one track west of existing track
- **2006 Study Alignment**—add one track, shifting between east and west as recommended by DRPT's 2004 and 2006 studies[2]
- **No Additional Track Alternative**—includes small shifts of existing curves (less than 10 feet and within existing right-of-way), as well as minor improvements to signals, communications systems, at-grade crossings, crossovers, or sidings. These minor improvements occur in four segments in northern Virginia where the existing number of tracks meets the projected requirements (segments 2 and 8) or on-going construction will

[2] DRPT's 2004 and 2006 corridor studies did not address Fredericksburg or Ashland. In 2004, DRPT conducted a Third Track Conceptual Location Study in which a third mainline track was proposed for the 92.7-mile-long corridor between the Richmond Staples Mill Road Station and the Ravensworth Interlocking, a crossover between mainline tracks that is located south of Franconia in the Northern Virginia suburbs of Washington. This study did not include the corridor through Fredericksburg or Ashland. In 2006, DRPT conducted a more detailed Third Track Feasibility Study in which an 8.1-mile-long rail corridor connecting Richmond's Main Street Station to Staples Mill Road Station via Acca Yard was studied in conjunction with the 92.7-mile-long corridor of the previous (2004) study. This study, like the 2004 Third Track Conceptual Location Study, did not include parts of the corridor through Fredericksburg and Ashland.

provide the projected track requirements (segments 5 and 9). The No Additional Track alternative is represented in detail in Section 5.3.4. As discussed in Chapter 5, the No Additional Track Alternative alone does not meet the Project's Purpose and Need to increase capacity, improve reliability, and reduce travel time; however, minor improvements could be viable in certain areas to connect segments where build alternatives are implemented.

In addition, an evaluation of multiple local options occurred in Arlington, at the approach to Long Bridge[3], to identify approaches to potential new Potomac River bridges and also at Fredericksburg and Ashland as possible options in lieu of adding a third track through the respective towns. These alignment options are discussed in detail in Chapter 5 and summarized below.

- Arlington Area (approach to Long Bridge)
  1. Add 2-tracks east of existing corridor
  2. Add 2-tracks west of existing corridor
  3. Add 1-track east and 1-track west of existing corridor
- Fredericksburg Area
  1. No Additional Track (Minor Improvements) from the Dahlgren Spur to the Fredericksburg Yard
  2. Add one track along the existing corridor from the Dahlgren Spur to the Fredericksburg Yard (two alignment options)
  3. Add a two-track bypass to the east of the city (nine different alignment options)
- Ashland Area (alignment options assume a third main track is added north and south of Town)
  1. No Additional Track (Minor Improvements) for approximately two miles through Town of Ashland
  2. Add one track along the existing corridor through the Town of Ashland (three alignment options)
  3. Add a two-track bypass east of town (five alignment options)
  4. Add a two-track bypass west of the Town (four alignment options)
  5. Add a track in a tunnel beneath Town (two tunnel options)
  6. Buckingham Branch Freight Diversion - Add a track and make other improvements to the Buckingham Branch Railroad between Doswell and AM Junction, including new north and south connections to the CSXT mainline at Doswell and at AM Junction to support a freight diversion around the Town of Ashland (five additional wye connection alignments considered at Doswell).

[3] Long Bridge is the CSXT rail bridge over the Potomac River, connecting the DC2RVA corridor to Washington, D.C. and Washington Union Station. A separate study is underway evaluating options for increasing rail capacity over the Long Bridge.

6.2.1 Rail Operations Review

The rail alignment options carried forward for further screening in Northern Virginia and Central Virginia were evaluated for potential improvements to train operations on the corridor by comparing track design speed and likely train operation speed, which is based on the need for efficient train operations and fuel use. The maximum allowable passenger train speed for the DC2RVA corridor is 90 mph; and one of the goals of the DC2RVA Basis of Design is to design track to support a 90 mph speed where practical. The rail operations review considers the ability for trains to reach and sustain 90 mph relative to locomotive acceleration performance and fuel efficiency. Trains require a considerable distance to accelerate or decelerate during normal operations, which limits the ability for a train to achieve 90 mph in short or varying speed segments. In such a case, improvements to the track design speed may be limited to the likely train operation speed that is practically achievable through the adjoining sections of track, which could be less than 90 mph.

DRPT, taking into account the curvilinear corridor alignment and adjacent urban development in Northern Virginia, determined that the alignment options provide curves suitable for 90 mph operations between mileposts CFP 69.38 (the south end of the curve approximately 1.5 miles north of VRE's Brooke Station) and CFP 90.16 (the south end of the first curve north of the Occoquan River), with curves up to 80 mph in the remainder of the Northern Virginia area. For the entire Central Virginia area, DRPT determined that 90 mph curves are possible.

6.2.2 Run Time Analyses

Run time analyses were conducted to determine the potential running times of the passenger trains along the DC2RVA corridor for different alignment options. This information, when compared to existing conditions, is used to approximate and compare trip time improvement. The Train Performance Calculator (TPC) feature of the Rail Traffic Controller (RTC) operations simulation model estimates running times based on rail alignments, curves, distances, and maximum curve speeds for the DC2RVA project. The following assumptions and inputs are used to create and run the model:

- Curve speeds and curve locations are provided by the DC2RVA project team
- Northbound and southbound runs are recorded
- A one second dwell time is used for modeling all station stops, minimizing station effects on trip time for the purpose of this analysis
- No recovery time is added to any of the schedules
- Existing permanent speed restrictions such as those in Ashland and Fredericksburg (i.e. civil speeds, not strictly related to curvature) are retained in the cases

Table 6-1 shows the estimated Pure Running Time[4] between CP RO (Arlington) and Greendale for four different train types over the five alignment options. The train types include; Interstate Corridor (SEHSR) trains, Interstate Corridor (Carolinian) trains, Northeast Regional (Virginia) trains, and Long Distance trains. The table also includes the changes in running time introduced by potential Fredericksburg and Ashland bypasses. Estimates are calculated for all train types

[4] Pure Running Time is the shortest possible running time between stops.

operating in both the northbound and southbound direction. Running times are measured in hours, minutes, and seconds (00:00:00).

The estimated running times represent pure passenger train trip time only, and are not actual schedule times. The estimated run times do not include station dwell and recovery time, nor do they necessarily reflect contractual on-time performance agreements between the operator, owner, and host railroads at present or agreements that might exist in the future. Additionally, the estimated run times do not reflect the co-mingled operating characteristics of sharing infrastructure with freight traffic. The estimates of pure running times presented in Table 6-1 indicate the following for each alignment option:

- An Improved Speed alignment that enables trains to operate at 90 mph where possible permits trains to save approximately 22 to 23.5 minutes of running time compared with the Existing 70 mph alignment between Arlington and Greendale
- Use of the potential western Ashland bypass route saves 0.77 to 0.9 minutes (46 to 54 seconds) of pure running time compared with the Optimized alignment through downtown Ashland (the Ashland bypass would conceptually be used by through passenger trains and freight trains).
- Use of the potential eastern Fredericksburg bypass adds approximately 2.5 minutes of running time compared with the Optimized alignment through downtown Fredericksburg (the Fredericksburg bypass would conceptually be used by through freight trains).
- Use of both the Ashland and Fredericksburg bypasses adds approximately 1.5 minutes of running time compared with the Optimized alignment

TABLE 6-1: PURE RUNNING TIMES - CP RO (ARLINGTON) TO GREENDALE

Alignment Option	SOUTHBOUND			NORTHBOUND		
	Pure Running Time	Change from Base	Change from Optimized	Pure Running Time	Change from Base	Change from Optimized
INTERSTATE CORRIDOR TRAIN (SEHSR) [1]						
No Build	01:51:17	00:00	n/a	01:51:21	00:00	n/a
Improved Speed Hold Bridges/Tangents	01:27:44	-00:23:33	00:00	01:28:16	-00:23:05	00:00
Improved Speed Hold Bridges/Tangents with Ashland bypass	01:26:52	-00:24:25	-00:00:52	01:27:25	-00:23:56	-00:00:51
Improved Speed Hold Bridges/Tangents with Fredericksburg bypass	01:30:01	-00:21:16	+00:02:17	01:30:50	-00:20:31	+00:02:34
Improved Speed Hold Bridges/Tangents with Fredericksburg and Ashland bypasses	01:29:10	-00:22:07	+00:01:26	01:29:54	-00:21:27	+00:01:38

TABLE 6-1: PURE RUNNING TIMES - CP RO (ARLINGTON) TO GREENDALE

Alignment Option	SOUTHBOUND			NORTHBOUND		
	Pure Running Time	Change from Base	Change from Optimized	Pure Running Time	Change from Base	Change from Optimized
INTERSTATE CORRIDOR TRAIN (CAROLINIAN) [2]						
No Build	01:52:02	00:00	n/a	01:52:02	00:00	n/a
Improved Speed Hold Bridges/Tangents	01:28:27	-00:23:35	00:00	01:28:56	-00:23:06	00:00
Improved Speed Hold Bridges/Tangents with Ashland bypass	01:27:33	-00:24:29	-00:00:54	01:28:05	-00:23:57	-00:00:51
Improved Speed Hold Bridges/Tangents with Fredericksburg bypass	n/a	n/a	n/a	n/a	n/a	n/a
Improved Speed Hold Bridges/Tangents with Fredericksburg and Ashland bypasses	n/a	n/a	n/a	n/a	n/a	n/a
NORTHEAST REGIONAL (VIRGINIA) TRAIN [3]						
No Build	01:53:59	00:00	n/a	01:54:07	00:00	n/a
Improved Speed Hold Bridges/Tangents	01:31:28	-00:22:31	00:00	01:32:09	-00:21:58	00:00
Improved Speed Hold Bridges/Tangents with Ashland bypass	n/a	n/a	n/a	n/a	n/a	n/a
Improved Speed Hold Bridges/Tangents with Fredericksburg bypass	n/a	n/a	n/a	n/a	n/a	n/a
Improved Speed Hold Bridges/Tangents with Fredericksburg and Ashland bypasses	n/a	n/a	n/a	n/a	n/a	n/a
LONG DISTANCE TRAIN [4]						
No Build	01:51:23	00:00	n/a	01:51:25	00:00	n/a
Improved Speed Hold Bridges/Tangents	01:27:51	-00:23:32	00:00	01:28:20	-00:23:05	00:00
Improved Speed Hold Bridges/Tangents with Ashland bypass	01:27:02	-00:24:21	-00:00:49	01:27:34	-00:23:51	-00:00:46

TABLE 6-1: PURE RUNNING TIMES - CP RO (ARLINGTON) TO GREENDALE

Alignment Option	SOUTHBOUND			NORTHBOUND		
	Pure Running Time	Change from Base	Change from Optimized	Pure Running Time	Change from Base	Change from Optimized
Improved Speed Hold Bridges/Tangents with Fredericksburg bypass	01:30:10	-00:21:13	+00:02:19	01:30:53	-00:20:32	+00:02:33
Improved Speed Hold Bridges/Tangents with Fredericksburg and Ashland bypasses	01:29:21	-00:22:02	+00:01:30	01:30:05	-00:21:20	+00:01:45

Table Notes: 1. Trains make one intermediate station stop at Alexandria, VA.
2. Trains make intermediate station stops at Alexandria and Fredericksburg, VA.
3. Trains make intermediate station stops at Alexandria, Woodbridge, Quantico, Fredericksburg, and Ashland, VA.
4. Trains make intermediate station stops at Alexandria, Woodbridge, Quantico, Fredericksburg, and Ashland, VA.

6.2.3 Reasonable and Feasible Track Alignment Options

Based on the Stage I, II, and III screening and consideration of rail operations and run times, the Improved Speed Hold Bridges/Tangents alignment options are advanced as the reasonable and feasible track alignment for the Northern Virginia area where an additional main track is needed. Although the Existing Speed East and West alignment options each had one segment that advanced through these screenings, those alignments do not accommodate improving speed on the curves in the corridor. Therefore, the Improved Speed Hold Bridges/Tangents alignment options advance with modifications to the curves where possible within the existing right-of-way to attain the desired rail operating speed. In segments where there are three existing tracks, DRPT has chosen the No Additional Track as the reasonable option. Although no new track will be added in these segments, curves will be softened and track may be shifted to optimize speed. The No Additional Track option is specific to Segment 2 Alexandria to Franconia (AFFR), Segment 5 Powells Creek to Arkendale (PCAR), Segment 8 Fredericksburg to Hamilton (FBHA) and Segment 9 Hamilton to Crossroads (HAXR). Additional information regarding these segments can be found in Section 6.4.1.

The screening process also advanced the Improved Speed Hold Bridges/Tangents alignment options as the reasonable and feasible track alignment for the Central Virginia area. Given the recommendation to increase speeds to 90 mph throughout the Central Virginia area, the Existing Speed East and West alignments are eliminated from further consideration because they do not accommodate improving speed in curves. A review of the three improved speed options (Constrained, Hold Bridges and Hold Bridges/Tangents) indicates that the impacts are comparable in the MDND (Segment 12), NDEL (Segment 13), and ELGN (Segment 14) segments, although some curves on the options differ. Since these three options are comparable in these segments, the Improved Speed Hold Bridges/Tangents alignment options in Central Virginia advance with modifications to the curves where possible within the existing right-of-way to attain the desired rail operating speed.

6.3 RAIL ALIGNMENT SCREENING PROCESS

Rail alignments were evaluated for potential impacts to key environmental resources, associated highway and rail infrastructure, and the alignment's ability to meet the DC2RVA Purpose and Need. The screening process (described in Chapter 5) was composed of three initial stages as well as a specialized screening for areas with additional alignment options:

- **Stage I**: Evaluates rail alignments outside the existing right-of-way for potential impacts to protected environmental resources.
- **Stage II**: Evaluates rail alignments for order of magnitude impacts on additional environmental resources, within and outside the existing right-of-way.
- **Stage III**: Evaluates rail alignments for effects on existing infrastructure, including at-grade crossings, roadway overpasses, and rail bridges over roads or waterways.
- **Stage IV:** Evaluates rail alignments and other improvements, including bypasses, in areas of special concern (Fredericksburg, Ashland, and Richmond). This stage incorporates the Stage I, II, and III screening steps for additional local alignments. DRPT also conducted rail operations reviews including passenger train run time analyses, station operations, and possible interactions between passenger, commuter, and freight operations for these additional rail alignments.

All of the preliminary alignments were developed by DRPT in accordance with the DC2RVA BOD, and were designed at a conceptual engineering level to address the Project's Purpose and Need while also considering minimizing impacts to human and natural resources. Preliminary alignments were compared on a segment by segment basis. Where the potential for environmental impacts identified in screening are similar, DRPT gave preference to preliminary alignments that better serve the Purpose and Need—the Maximum Speed Alignment was preferred over the Improved Speed Alignments, which in turn were preferred over Existing Speed alignments. In some segments, only one alignment remained to be carried forward to the Draft EIS after Stage I, II, and III screening evaluations. In other segments, two or more alignments remained after screening and are carried forward into the Draft EIS for further detailed analyses. A brief description of the screening stage, the criteria specific to that stage, and the evaluation factors that determine the progression of the alternatives are summarized in Table 6-2.

TABLE 6-2 RAIL ALIGNMENT SCREENING PROCESS

Screening Stage	Screening Criteria	Evaluation Factors
Stage I Direct effects on key environmental resources	Direct effects to: ▪ Historic resources listed on or eligible for listing on the National Register of Historic Places ▪ Federal, state, or local parks and recreation areas ▪ Federal or state wildlife and waterfowl refuges ▪ Military bases	Alignment options eliminated if adding a new main track would have direct effects to key resources outside of existing right-of-way

TABLE 6-2 RAIL ALIGNMENT SCREENING PROCESS

Screening Stage	Screening Criteria	Evaluation Factors

Stage II
Order of magnitude impacts on readily identifiable environmental characteristics not addressed in the first stage screening
	Direct effects to:
	▪ Area outside of right-of-way
	  - Urban/developed land use
	  - Agricultural land use
	▪ Registered hazardous material or waste site(s) under Superfund
	▪ Registered hazardous material or waste site(s) under CERCLIS[5]
	▪ Conservation lands/easements
	▪ State-listed agricultural or forestal districts
	▪ Areas on the National Wetlands Inventory or other mapped wetland areas
	▪ Cemeteries
		Alignment option(s) eliminated if adding a new main track would have direct impacts on environmental characteristics that are substantively greater than options with comparable design speed.

Stage III Infrastructure constraints on rail operations and track design	Direct effects to: ▪ Existing rail bridges over roads, railroads, and waterways ▪ New rail bridges over roads, railroads, and waterways ▪ Existing and new roadway overpasses ▪ Existing roadway at-grade crossings ▪ Existing station platforms ▪ Track design speed/capacity	Alignment option(s) eliminated if adding a new main track would have direct impacts on existing infrastructure or require new infrastructure substantively greater than options with comparable or improved track design speed/capacity.
Stage IV Evaluation of bypass alignments and areas of special concern (Fredericksburg, Ashland, and Richmond)	Direct effects to: ▪ Stage I criteria ▪ Stage II criteria ▪ Stage III criteria	Alignment option(s) eliminated in accordance with Stage I, II and III evaluation factors described above.

The process systematically evaluates and screens the range of alignment options in order to identify rail alignments for detailed analysis in the Draft EIS. Rail alignments carried forward to the Draft EIS are those that meet the established Purpose and Need, are practical and feasible, and are anticipated to have acceptable levels of impact to the human and natural environments. The rail alignments, bypasses, and/or station options that are carried forward by DRPT are indicated in the tables with an open circle (○). Those that DRPT are not carrying through for further evaluation are represented by a closed circle (●). If DRPT's analysis is indeterminate, identified impacts are relatively minor, or could be addressed with minor modifications d to the alignment or option, a half-filled circle is noted (◒). Rail alignments are identified on a segment

[5] CERCLIS = Comprehensive Environmental Response, Compensation and Liability Information System

and sub-segment basis[6]. The segment/sub-segment results are presented for three areas: Northern Virginia, Central Virginia, and Richmond, representing areas of similar existing conditions, issues, and railroad operating characteristics.

The cumulative results of Stages I, II, and III Screening of Alignments in Northern Virginia and Central Virginia are shown in Tables 6-3 and 6-4 respectively. In addition, a no additional track option and a two-track bypass option were considered for Fredericksburg and Ashland. Multiple bypass alignments were identified for each area under Stage IV and then each bypass alignment was evaluated against the Stage I, II, and III screening elements. Tunnel options were also considered for Ashland and screened against the Stage I, II, and II criteria.

Stage IV Screening Summary presents the results for bypasses in Fredericksburg and Ashland. In Fredericksburg, an east bypass route was identified as potentially reasonable in lieu of adding a main track through the city. Other potentially reasonable alternatives identified for Fredericksburg include adding a track through town along the east of the existing corridor, and a no additional track alternative. In Ashland, a west bypass route was identified as potentially reasonable, in lieu of adding a main track in the town. Other potentially reasonable alternatives identified for Ashland include adding a track through town along the east of the existing corridor, and adding a track through town and centering all three tracks. A no additional track alternative and a tunnel alternative for Ashland were also carried forward into the Draft EIS. Stage IV Screening Summary also presents the results of the Richmond area alignment to include station options and preferred alternatives. In Richmond, there are eight alternatives carried forward to the Tier II Draft EIS. These alternatives include all those discussed in Section 6.7.3.

[6] The DC2RVA corridor was initially divided into segments for planning and evaluation purposes. Corridor segments are described in Chapter 2. These segments were later combined to form areas and these areas were then evaluated in the Draft EIS. More information on the formation of these areas in described in Chapter 9.

TABLE 6-3: SUMMARY OF STAGES I, II, AND III SCREENING BY SEGMENT (NORTHERN VIRGINIA)

Segment	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
01: Rosslyn to Alexandria (ROAF)	●	●	●	○	●	●	n/a	n/a
02: Alexandria to Franconia (AFFR)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	○
03: Franconia to Lorton (FRLO)	●	●	●	○	●	●	●	n/a
04: Lorton to Powells Creek (LOPC)	●	●	●	○	●	●	●	n/a
05: Powells Creek to Arkendale (PCAR)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	○
06: Arkendale to Dahlgren Junction (ARDJ)	●	●	●	○	●	○	●	n/a
07: Dahlgren Junction to Fredericksburg (DJFB)	●	●	●	○	○	●	n/a	n/a
08: Fredericksburg to Hamilton (FBHA)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	○
09: Hamilton to Crossroads (HAXR)	n/a	n/a	n/a	n/a	n/a	n/a	n/a	○

Source: HDR, 2015.

Table Notes: ● = Option eliminated from further consideration; O = Option carried forward for further consideration; n/a = not applicable
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents

TABLE 6-4: SUMMARY OF STAGES I, II, AND III SCREENING BY SEGMENT (CENTRAL VIRGINIA)

Segment	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
10: Crossroads to Guinea (XRGU)	●	●	●	○	○	●	●	n/a
11: Guinea to Milford (GUMD)	●	●	○	○	●	○	●	n/a
12: Milford to North Doswell (MDND)	●	○	○	○	●	○	●	n/a
13: North Doswell to Elmont (NDEL)	●	○	○	○	○	○	●	n/a
14: Elmont to Greendale (ELGN)	●	○	○	○	○	○	●	n/a

Source: HDR, 2015.

Table Notes: ● = Option eliminated from further consideration; ○ = Option carried forward for further consideration

^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-5 summarizes the staging process for the bypass options for both Fredericksburg and Ashville. This table also summarizes the staging outcome for the Richmond area options. Additional information related to this process is found in Section 6.7.

TABLE 6-5: STAGE IV SUMMARY SCREENING OF BYPASS OPTIONS FOR ASHLAND AND FREDERICKSBURG

Bypass Option	Stage I	Stage II	Stage III	Eliminating Factor(s)
Fredericksburg Bypass Options				
FEB 1A	○	○	●	Impacts to Existing Infrastructure, inefficient rail operations, possible conflicts with VRE operations
FEB 1B	○	○	●	Impacts to Existing Infrastructure, inefficient rail operations, possible conflicts with VRE operations
FEB 2	●	●	●	Impacts to Historic Resources, inefficient rail operations, possible conflicts with VRE operations
FEB 2A	●	●	●	Impacts to Historic Resources, inefficient rail operations, possible conflicts with VRE operations
FEB 4C	●	●	●	Impacts to Historic Resources, inefficient rail operations, possible conflicts with VRE operations
FEB 5	●	●	●	Impacts to Parks & Public Recreation Areas
FEB 5A	●	●	●	Impacts to Parks & Public Recreation Areas
FEB 5B	●	●	●	Impacts to Parks & Public Recreation Areas

TABLE 6-5: STAGE IV SUMMARY SCREENING OF BYPASS OPTIONS FOR ASHLAND AND FREDERICKSBURG

Bypass Option	Stage I	Stage II	Stage III	Eliminating Factor(s)
FEB 6A	●	●	●	Impacts to Parks & Public Recreation Areas
FEB 6B	●	●	●	Impacts to Parks & Public Recreation Areas
FEB 6C	○	○	○	Option carried forward for further evaluation in the Draft EIS
FEB 6D	○	○	●	Impacts to Existing Infrastructure
Ashland Bypass Options				
AEB1 (Ashland East Bypass)	●	●	●	Impacts to Parks & Public Recreation Areas
AEB 2 (Ashland East Bypass to Buckingham Brand Railroad)	●	●	●	Impacts to Parks & Public Recreation Areas; impacts to I95 infrastructure
AEB 3 (Ashland East Bypass that does not Cross I-95)	○	●	●	Impacts to Wetlands, acquisition of urban/developed lands
AEB 4 (Ashland East Bypass in the I-95 Median)	○	●	●	Impacts to Wetlands, impacts to I95 infrastructure
AEB 5 (Ashland East Bypass White Paper)	○	●	●	Impacts to Wetlands, potential acquisition of urban/developed lands, impacts to I95 infrastructure
Wye 1 (Wye Option #1)	●	●	●	Impacts to Wetlands, impacts to I95 infrastructure
Wye 2 (Wye Option #2)	●	●	○	Impacts to Wetlands
Wye 3 (Wye Option #3)	○	●	○	Impacts to Wetlands
Wye 4 (Wye Option #4)	○	●	○	Impacts to Wetlands
Wye 5 (Wye Option #5)	○	○	○	Option carried forward for further evaluation in the Draft EIS
AWB 1 (Ashland West Bypass)	○	●	●	Impacts to Wetlands, acquisition of urban/developed lands
AWB 2 (Ashland West Bypass Revision #1 per Public Comment)	○	●	●	Impacts to Wetlands and acquisition of agricultural lands and community (church)
AWB 3 (West Ashland Bypass)	○	●	●	Impacts to Wetlands and l acquisition of agricultural lands and community (church)
AWB 4 (West Ashland Bypass)	○	○	○	Option carried forward for further evaluation in the Draft EIS
BBRR Freight Diversion Option	○	●	●	Impacts to wetlands, impacts to I95 infrastructure, and conflicts with rail operations in Richmond.

TABLE 6-5: STAGE IV SUMMARY SCREENING OF BYPASS OPTIONS FOR ASHLAND AND FREDERICKSBURG

Bypass Option	Stage I	Stage II	Stage III	Eliminating Factor(s)
Richmond Area Station Rail Infrastructure Options				
Staples Mill Road Station Only	○	○	○	Option carried forward for further evaluation in the Draft EIS
Boulevard Station Only, A-Line	○	○	○	Option carried forward for further evaluation in the Draft EIS
Boulevard Station Only, S-Line	○	○	○	Option carried forward for further evaluation in the Draft EIS
Broad St. Station Only, A-Line	○	○	○	Option carried forward for further evaluation in the Draft EIS
Main Street Station Only, S-Line	○	○	○	Option carried forward for further evaluation in the Draft EIS
Main Street Station Only, with FC	○	●	●	Impacts to Wetlands
Main St. and Staples Mill SPLIT Service	○	○	○	Option carried forward for further evaluation in the Draft EIS
Main St and Staples Mill FULL Service	○	○	○	Option carried forward for further evaluation in the Draft EIS
Main St. and Staples Mill FULL Service with FC	○	●	●	Impacts to Wetlands
Main St. and Staples Mill SHARED Service	○	○	○	Option carried forward for further evaluation in the Draft EIS
Richmond Freight Connector (FC) Options*				
FC 1	○	○		Option carried forward for further evaluation in the Draft EIS
FC 2	●	●		Impacts to Historic Resources
FC 3	●	●		Impacts to Historic Resources
FC 4	●	●		Impacts to Historic Resources
FC 5	●	●		Impacts to Historic Resources and Parks & Public Recreation Areas
FC 6	●	●		impacts to Historic Resources and Parks & Public Recreation Areas
FC 7	●	●		impacts to Historic Resources and Parks & Public Recreation Areas
FC 8	●	●		Impacts to Parks & Public Recreation Areas
FC 9	●	●		Impacts to Parks & Public Recreation Areas
FC 10	○	●		Impacts to Wetlands and urban/developed land

Source: HDR, 2015.

Table Notes: ● = Option eliminated from further consideration; O = Option carried forward for further consideration

* No Stage III Screening necessary for determination

^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

In Richmond, the existing dense urban development, grade changes, and historic rail configuration limit opportunities to improve travel time; additionally, there are multiple rail lines (CSXT A-Line and S-Line) to consider (Figure 6-3). Because of these factors, preliminary rail alignments and other improvements to improve capacity and passenger service reliability for the Richmond area were developed based on potential station locations and passenger train routes. The preliminary rail alignments and potential improvements would largely occur within existing right-of-way. Richmond's rail alignment options were then evaluated against the Stage I, II, and III screening elements. The potential improvements to the S-Line from Main Street Station across the James River and south to Centralia[7] were screened as part of those preliminary alignments that use the S-Line to ensure a comparable evaluation of the Richmond alternatives. The cumulative results of the Stage I, II, and III Screening for the Richmond Area rail alignments (defined by station location and route options) are shown in Table 6-6. Based on the Stage I, II and III Screening for the Richmond area, the following rail alignment sets (defined by station location and route options) were carried forward for further evaluation and screening:

- Single Station Options
  - Staples Mill Road Station Only (A-Line)
  - Boulevard Station Only (A-Line)
  - Boulevard Station Only (S-Line)
  - Broad Street Station Only (A-Line)
  - Main Street Station Only (S-Line)
- Two Station Options
  - Main Street and Staples Mill Road Stations Combined–Split Service (A-Line)
  - Main Street and Staples Mill Road Stations Combined–Full Service (S-Line)
  - Main Street and Staples Mill Road Stations Combined–Shared Service (A-Line and S-Line)

6.4 STAGE I SCREENING

6.4.1 Stage I Screening Process

Stage I Screening identified rail alignment options with direct effects on protected environmental resources outside of existing CSXT right-of-way. Stage I screening was conducted for all identified alignment options in Northern Virginia, Central Virginia, and Richmond, including possible bypass alignments in Fredericksburg and Ashland. Alignment options with direct effects on the following environmental resources were eliminated from further consideration:

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[7] The 2015 SEHSR Richmond to Raleigh Tier II EIS (R2R EIS) previously evaluated rail improvements on the S-Line between Main Street Station and Centralia. Rail improvements identified in the R2R EIS for this segment of track were modified to meet the DC2RVA basis of design, and new improvements specific to DC2RVA were identified, including a new siding track south of the James River. These DC2RVA-based improvements were then included within the preliminary alignments for options using the S-Line between Main Street Station and Centralia.

- Historic resources listed on or eligible for listing on the National Register of Historic Places
- Military installations
- Federal, state, or local parks and recreation areas
- Federal or state wildlife/waterfowl refuges

These resources are afforded special consideration and protection through various federal and state agency guidance and regulatory programs. While a direct effect on one of these resources is not prohibited, gaining the necessary regulatory and agency approvals for such impacts can be difficult and time-consuming, and typically requires a determination by the appropriate agency that there is no feasible alternative that avoids or reduces the impacts. Therefore, DRPT determined that preliminary rail alignments that impacted these resources would be eliminated if there were other options available that did not impact these resources.

Screening of the alignment options was accomplished by mapping impact areas within the Project's GIS system based on the horizontal track geometry and an approximate proposed limit of work as described in Chapter 5. The impact areas were overlaid on existing maps of these environmental resources to determine potential impacts for each alignment option.

Four segments within the Northern Virginia area were not evaluated for an additional main track because the segments already have a comparable number of main tracks or an additional main track is under construction through another independent project. In these four segments, the existing three or four tracks were evaluated under the No Additional Track (Minor Improvements) alignment option, and screening was limited to the anticipated impacts from re-aligning existing track through the curves to improve design speed. The four segments thus evaluated are:

- Segment 2: Alexandria to Franconia (AFFR) currently has three tracks from the AF to just north of the Springfield-Franconia VRE station.
- Segment 5: Powells Creek to Arkendale (PCAR) is currently undergoing construction to add a third track.
- Segment 8: Fredericksburg to Hamilton (FBHA) currently has three mainline tracks from MP 58.5 to MP 56.
- Segment 9: Hamilton to Crossroads (HAXR) currently has three mainline tracks along with the new Virginia Railway Express (VRE) Spotsylvania Station.

6.4.2 Stage I Screening Results for Northern Virginia

Stage I Screening of alignment options in the Northern Virginia area is shown in Table 6-6 through Table 6-15. Each table represents a specific segment of the Northern Virginia alignments and the range of alternatives evaluated in that segment. This Stage I screening does not include Fredericksburg bypass options. All special bypass and station options are evaluated in Stage IV.

Segment 1, Rosslyn to Alexandria, is a 6.3-mile-long segment that currently includes three mainline tracks for most of its length. It is proposed to add a fourth track in this segment. This segment includes several bridges and curves that restrict speeds in these areas.

The results of the alignment option evaluation for this segment are shown in Table 6-6. Based on analysis, the Maximum Speed option is eliminated due to impacts to historic resources and parks. The Improved Speed Hold Bridges/Tangents alignment option is carried forward because it would result in fewer impacts to parks compared to other Improved Speed options and approximately the same impacts to historic resources as the Improved Speed/Constrained option. The Existing Speed East option is carried forward because it has fewer impacts than the Existing Speed West alignment option (Table 6-6).

This segment has a special section in Arlington where the DC2RVA corridor ends just south of the Potomac River. The CSXT rail corridor continues north across the river on the Long Bridge, a double-track rail bridge. The District Department of Transportation (DDOT), in coordination with FRA, DRPT, VRE, and CSXT, is evaluating options for adding additional capacity to the Long Bridge, including building a new double-track bridge immediately upstream (west) of the existing bridge, building a new double-track bridge immediately downstream (east) of the existing bridge, or building two single-track bridges, one each east and west of the existing bridge. A final alignment for DC2RVA is contingent upon which bridge option is selected in the DDOT study. Therefore, DRPT is evaluating three alignment options specific to the Arlington area, extending from milepost CFP 110 to CFP 109.3:

- Add two tracks west of the existing rail corridor
- Add two tracks east of the existing rail corridor
- Add one track west and one track east of the existing rail corridor

These alignment options were evaluated through Stages I and II of the screening process. Stage III was not applicable as the 0.7 miles of track is not intersected. This section was screened for both temporary and permanent environmental and land use impacts. The screening revealed the following impacts:

- Add two tracks west of the existing rail corridor: 0.88 acres of temporary impacts and 1.45 acres of permanent impacts to the Long Bridge (city/county) Park.
- Add two tracks east of the existing rail corridor: 0.51 acres of temporary impacts and no permanent impacts to the Long Bridge (city/county) Park.
- Add one track west and one track east of the existing rail corridor: 0.65 acres of temporary impacts and 0.36 acres of permanent impacts to the Long Bridge (city/county) Park.

Based on the screening results, adding two tracks east of the existing rail corridor has the least amount of impacts for the approach to Long Bridge in Arlington. Additional analysis of this area will be further detailed in the Draft EIS.

TABLE 6-6: STAGE I SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 1: ROSSLYN TO ALEXANDRIA (ROAF)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	15.1	0.48	1.04	0.52	0	0.92	n/a	n/a
Military Installations	0	0	0	0	0	0	n/a	n/a
Parks & Public Recreation Areas	30.76	2.19	3.33	0.36	0.47	1.53	n/a	n/a
Wildlife or Waterfowl	0	0	0	0	0	0	n/a	n/a
Retain for further screening	No	No	No	Yes	Yes	No	n/a	n/a

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Segment 2 currently includes three tracks from the AF interlocking to south of Franconia Road, a distance of 4.7 miles; there are already three tracks in this segment and DRPT determined no additional track are required for DC2RVA. The resulting evaluation considers minor improvements to the existing tracks, such as modifying curves along the existing track to improve design speed but no additional track. As a result, screening for this segment is limited to evaluating impacts resulting from modifications to curves to improve design speed while holding existing tangents. No impacts to protected environmental resources occur with the Segment 2 alignment option and the No Additional Track alignment option moves forward for further evaluation in the Stage II Screening (Table 6-7).

TABLE 6-7: STAGE I SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 2: ALEXANDRIA TO FRANCONIA (AFFR)

Resource	Max Speed*	Improved Speed*^			Existing Speed*			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Military Installations	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Parks & Public Recreation Areas	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Wildlife or Waterfowl	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Retain for further screening	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Segment 3, between Franconia and Lorton, is approximately 6.4 miles between Franconia Road and just south of the Amtrak Auto Train station. It consists of a three-track section for 1 mile in the northern part of the segment and two mainline tracks with sidings and leads for the remainder of the segment. The existing track alignments include curves that restrict speed. The Maximum Speed, Improved Speed, and Existing Speed alignments were considered by DRPT for this segment from the end of the existing third track south to the end of the segment; no additional track would be added in the northern 1 mile section of third track. DRPT did not consider the No Additional Track alignment for this segment as most of the segment would require an additional track. With only zero or minimal impacts identified, all of the alignment options in Segment 3 are carried forward to the Stage II Screening (Table 6-8).

TABLE 6-8: STAGE I SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 3: FRANCONIA TO LORTON (FRLO)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	0	0	0	0	0	0	0	n/a
Military Installations	0.08	0	0	0	0	0	0	n/a
Parks & Public Recreation Areas	0.28	0	0	0	0	0	0	n/a
Wildlife or Waterfowl	0	0	0	0	0	0	0	n/a
Retain for further screening	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Segment 4, located between the Amtrak Auto Train Station in Lorton and Powells Creek, currently has two mainline tracks for its 9.2-mile length. The existing track geometry includes curves that restrict train speeds. This segment includes rail bridges over three major waterways in the corridor: Occoquan River, Neabsco Creek, and Powells Creek. The Maximum Speed alignment adversely impacts parks and recreational areas, and was eliminated by DRPT from further consideration. None of the Improved Speed and Existing Speed alignment options has identified impacts, and all alignment options except for the Maximum Speed Option in Segment 4 are carried forward to the Stage II Screening (Table 6-9).

TABLE 6-9: STAGE I SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 4: LORTON TO POWELLS CREEK (LOPC)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	0	0	0	0	0	0	0	n/a
Military Installations	0	0	0	0	0	0	0	n/a
Parks & Public Recreation Areas	1.79	0	0	0	0	0	0	n/a
Wildlife or Waterfowl	0	0	0	0	0	0	0	n/a
Retain for further screening	No	Yes	Yes	Yes	Yes	Yes	Yes	No

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

In Segment 5, between Powells Creek and Arkendale, construction to install a third track is underway. As a result, screening for this segment is limited to evaluating impacts resulting from minor improvements to curves under the No Additional Track alignment option. No impacts to protected environmental resources occur with the Segment 5 alignment option, and this alignment option moves forward for further evaluation in the Stage II Screening (Table 6-10).

TABLE 6-10: STAGE I SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 5: POWELLS CREEK TO ARKENDALE (PCAR)

Resource	Max Speed*	Improved Speed*^			Existing Speed*			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Military Installations	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Parks & Public Recreation Areas	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Wildlife or Waterfowl	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Retain for further screening	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes

Table Notes: This segment already includes a third main track and only the Improved Speed Hold/Bridges/Tangents alignment option that improves curves to increase speeds is evaluated.

^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Segment 6 runs between Arkendale and Dahlgren Junction, including two major water crossings over Aquia Creek and Potomac Creek. There are two mainline tracks for the entire length of this 12.2-mile segment, and the existing alignment includes curves that limit train operating speeds. No impacts to the Stage I screening resources were identified for any of the seven alignment options with additional track in Segment 6. All seven alignment options are carried forward for further analysis in the Stage II Screening (Table 6-11). DRPT did not consider the No Additional Track alignment for this segment.

TABLE 6-11: STAGE I SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 6: ARKENDALE TO DAHLGREN JUNCTION (ARDJ)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	0	0	0	0	0	0	0	n/a
Military Installations	0	0	0	0	0	0	0	n/a
Parks & Public Recreation Areas	0	0	0	0	0	0	0	n/a
Wildlife or Waterfowl	0	0	0	0	0	0	0	n/a
Retain for further screening	Yes	Yes	Yes	Yes	Yes	Yes	Yes	n/a

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Segment 7 is approximately 2.5 miles long between Dahlgren Junction and Fredericksburg, including a bridge over the Rappahannock River and the existing Fredericksburg Station. The northernmost portion of this segment has two mainline tracks extending past the station, and there are three mainline tracks with multiple side and industrial lead tracks south of downtown Fredericksburg. This segment was evaluated for options that add an additional track in areas with only two tracks, and for the No Additional Track alignment option (Table 6-12). DRPT eliminated the Maximum Speed alignment due to impacts to historic resources and parks and recreation areas. Of the Improved Speed alignments, the Hold Bridges/Tangents had fewer impacts to historic resources and is carried forward for further evaluation. The Existing Speed East and 2006 alignment options have similar levels of impact to historic resources, and are carried forward to the Stage II Screening (Table 6-12).

TABLE 6-12: STAGE I SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 7: DAHLGREN JUNCTION TO FREDERICKSBURG (DJFB)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	6.84	1.49	1.7	1.17	0.53	1.35	0.51	0
Military Installations	0	0	0	0	0	0	0	0
Parks & Public Recreation Areas	3.41	0.12	0.14	0.04	0	0.04	0	0
Wildlife or Waterfowl	0	0	0	0	0	0	0	0
Retain for further screening	No	No	No	Yes	Yes	No	Yes	Yes

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

In Segment 8, there are currently three mainline tracks in the 2.6 miles between Fredericksburg and Hamilton. The resulting evaluation considers minor realignments of existing track to improve design speed but no alignment options that include additional track. As a result, screening for this segment is limited to evaluating impacts resulting from minor improvements to curves under the No Additional Track alignment option (Table 6-13).

TABLE 6-13: STAGE I SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 8: FREDERICKSBURG TO HAMILTON (FBHA)

Resource	Max Speed*	Improved Speed*^			Existing Speed*			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Military Installations	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Parks & Public Recreation Areas	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Wildlife or Waterfowl	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Retain for further screening	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes

Table Notes: This segment already includes a third main track and only the Improved Speed Hold/Bridges/Tangents alignment option that improves curves to increase speeds is evaluated.

^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Segment 9 is approximately 2.5 miles long, running from Hamilton to Crossroads, near VRE's Crossroads Yard. In this segment, a third track was installed in 2015 in conjunction with the VRE Spotsylvania Station project. No alignment options that include additional track are under consideration for this segment. Minor improvements to curves to improve design speed while holding existing tangents within the No Additional Track alignment are screened in the resulting evaluation (Table 6-14).

TABLE 6-14: STAGE I SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 9: HAMILTON TO CROSSROADS (HAXR)

Resource	Max Speed*	Improved Speed*^			Existing Speed*			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Military Installations	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Parks & Public Recreation Areas	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Wildlife or Waterfowl	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Retain for further screening	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes

Table Notes: This segment already includes a third main track and only the Improved Speed Hold/Bridges/Tangents alignment option that improves curves to increase speeds is evaluated.

^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

6.4.3 Stage I Screening Results for Central Virginia

Stage I Screening of alignment options in the Central Virginia area is shown in Table 6-14 through Table 6-19. Each table represents a specific segment of the Central Virginia alignments and the range of alternatives evaluated in that segment. Although the Ashland area is geographically located within this section of the corridor, alignment options through the Town of Ashland are not discussed in this section. Full details of the screening process for the Ashland area are located in Stage VI of Section 6.7.2.

Segment 10 has two mainline tracks for its 6.2-mile length between Crossroads and Guinea. In this segment, the Maximum Speed alignment option has impacts to parks and recreation areas, and DRPT has eliminated it from further consideration. The remaining Improved Speed and Existing Speed options have minimal impacts and are carried forward to the Stage II Screening (Table 6-15). DRPT did not consider the No Additional Track alignment for this segment.

TABLE 6-15: STAGE I SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 10: CROSSROADS TO GUINEA (XRGU)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	0.74	0.002	0.11	0.11	0	0.63	0.63	n/a
Military Installations	0	0	0	0	0	0	0	n/a
Parks & Public Recreation Areas	1.88	0.02	0.02	0.02	0	0.02	0.02	n/a
Wildlife or Waterfowl	0	0	0	0	0	0	0	n/a
Retain for further screening	No	Yes	Yes	Yes	Yes	Yes	Yes	n/a

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

From Guinea to Milford, Segment 11 has two mainline tracks for its 9.1 miles. In this segment, DRPT determined the Maximum Speed alignment option would not be carried forward due to its impact on wildlife refuges. All of the Improved Speed and Existing Speed alignment options have minimal impacts and were carried forward for further evaluation (Table 6-16). DRPT did not evaluate the No Additional Track for this segment.

TABLE 6-16: STAGE I SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 11: GUINEA TO MILFORD (GUMD)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	0	0	0	0	0	0	0	n/a
Military Installations	0	0	0	0	0	0	0	n/a
Parks & Public Recreation Areas	0	0	0	0	0	0	0	n/a
Wildlife or Waterfowl	4.79	0.2	0.01	0.01	0	0.005	0.006	n/a
Retain for further screening	No	Yes	Yes	Yes	Yes	Yes	Yes	n/a

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Segment 12 is approximately 14.5 miles long, running between Milford and North Doswell. It includes two mainline tracks with a series of industrial lead and spur tracks primarily concentrated at the north end of the segment. The existing track geometry includes curves that limit operating speeds throughout the segment. For all of the seven alignment options in Segment

12, there are no impacts identified to the resources examined in the Stage I Screening (Table 6-16). All of the additional track alignment options move forward to Stage II Screening. DRPT did not evaluate the No Additional Track alignment in this segment.

TABLE 6-17: STAGE I SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 12: MILFORD TO NORTH DOSWELL (MDND)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	0	0	0	0	0	0	0	n/a
Military Installations	0	0	0	0	0	0	0	n/a
Parks & Public Recreation Areas	0	0	0	0	0	0	0	n/a
Wildlife or Waterfowl	0	0	0	0	0	0	0	n/a
Retain for further screening	Yes	Yes	Yes	Yes	Yes	Yes	Yes	n/a

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Segment 13 is approximately 12.2 miles between North Doswell and Elmont. It includes two mainline tracks for the entire length of the segment. A diamond crossing with the BBRR, several industrial leads and sidings, and a stretch of speed-restricted track through Ashland contribute to limited speeds throughout the segment. The Maximum Speed alignment option has high impacts to historic resources and DRPT eliminated it from further consideration. The Improved Speed Constrained, Hold Bridges, and Hold Bridges/Tangents alignment options in Segment 13 include the same general improvements and have the same level of impacts; all three of these options are carried forward for further consideration. The Existing Speed West alignment option has similar historic resource impacts to the East alignment option, and both are carried forward for further consideration. (Table 6-18). DRPT did not consider the No Additional Track for this segment; however, DRPT did consider the No Additional Track option for the sub-segment through Ashland—see Section 6.7.2.

TABLE 6-18: STAGE I SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 13: NORTH DOSWELL TO ELMONT (NDEL)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006*	
	Area of Impact in Acres							
Historic Resources	17.62	7.52	7.52	7.52	4.75	4.88	n/a	n/a
Military Installations	0	0	0	0	0	0	n/a	n/a
Parks & Public Recreation Areas	0.26	0.03	0.03	0.03	0	0.03	n/a	n/a
Wildlife or Waterfowl	0	0	0	0	0	0	n/a	n/a
Retain for further screening	No	Yes	Yes	Yes	Yes	Yes	n/a	n/a

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

*The 2006 Study option is not considered in this segment because it did not include track through Ashland—ending on the south of Ashcake Road and north of Vaughan Road/Henry Street.

Segment 14 is 4.7 miles long between Elmont and Greendale. It includes two mainline tracks throughout the segment. All seven of the alignment options that add a third track in Segment 14 have zero or minimal impacts to the Stage I Screening resources and all are carried forward for analysis in the Stage II Screening (Table 6-19).

TABLE 6-19: STAGE I SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 14: ELMONT TO GREENDALE (ELGN)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Historic Resources	0	0	0	0	0	0	0	n/a
Military Installations	0	0	0	0	0	0	0	n/a
Parks & Public Recreation Areas	0.09	0	0	0	0	0	0.09	n/a
Wildlife or Waterfowl	0	0	0	0	0	0	0	n/a
Retain for further screening	Yes	Yes	Yes	Yes	Yes	Yes	Yes	n/a

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

6.5 STAGE II SCREENING

The following presents the Stage II Screening process and results for segments in Northern Virginia and Central Virginia.

6.5.1 Stage II Screening Process

The Stage II screening further evaluates alignment options for order of magnitude impacts on readily identifiable environmental characteristics not addressed in the first stage screening. Alignment segments or sub-segments are evaluated using an overlay of the alignment on available GIS and existing conditions mapping. The alignment encroachment is determined (measured in acres) using the appropriate cross-sections and distances from track centerline noted in Chapter 5 on the following environmental characteristics:

- Cemeteries
- Virginia Outdoor Foundation (VOF) easements[8]
- Conservation lands
- Natural heritage resources and conservation sites
- Registered site(s) under Superfund or Comprehensive Environmental Response, Cleanup and Liability Information System (CERCLIS)
- Areas on the National Wetlands Inventory or other known wetland areas
- Total area outside of right-of-way in:
  - Urban/developed lands
  - Agricultural lands
- Agricultural or forestal districts

In recognition of the scale, precision, and accuracy of information available on the GIS system, impacts less than half acre (0.5 acre) are considered to be minimal, or no-impact, for the purpose of screening. The identified impact areas for wetlands and regulated waters of the U.S. (including wetland mitigation banks) and sites listed on either the National Priorities List (NPL) or CERCLIS lists include areas within the existing right-of-way and areas outside the existing right–of-way. Impacts to cemeteries, VOF easements, conservation lands, natural heritage resources and conservation sites, urban/developed lands, agricultural lands, and agricultural and forestal districts are only calculated for areas outside existing right-of-way. During the Stage II screening process, DRPT eliminated alignment options with greater impacts and carried forward alignment options with fewer impacts. Where there are two or more alignment options with similar levels of impacts, DRPT has carried forward the option that provides the higher train design speed For example, in Segment 1 (Table 6-20) below, there are two options that have minimal impacts; Improved Speed Hold Bridges/Tangents and Existing Speed East. The Improved Option is

[8] VOF is a public conservation organization created by the Virginia General Assembly in 1966 under Virginia Code § 10.1-1800 to promote the preservation of open-spaced lands. VOF conserved lands account for 16% of all protected acreage in Virginia, which includes federal, state, local, and private conservation lands. More than 550,000 acres in VOF's portfolio lie within the Chesapeake Bay watershed.

DRPT's preferred option as it improves capacity and speed. Refer to Section 5.3 for more information on Stage II screening process.

6.5.2 Stage II Screening Results Northern Virginia

The Stage II Screening results for the Northern Virginia area are shown in Table 6-20 through Table 6-29. Alignments eliminated from further consideration in Stage I Screening were also evaluated in Stage II Screening and are provided with gray shading in the Stage II Screening tables below for comparison purposes.

In Segment 1, the Improved Speed Hold Bridges/Tangents and Existing Speed East alignment options are the only ones carried forward from the Stage I Screening. These alignment options have similar order of magnitude impacts, and are carried forward to the Stage III Screening (Table 6-20).

TABLE 6-20: STAGE II SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 1: ROSSLYN TO ALEXANDRIA (ROAF)

Resource	Max Speed*	Improved Speed*^			Existing Speed*			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006+	
	Area of Impact in Acres							
Cemeteries	0	0	0	0	0	0	n/a	n/a
VOF Easements	0	0	0	0	0	0	n/a	n/a
Conservation Lands	0	0	0	0	0	0	n/a	n/a
Natural Heritage	0	0	0	0	0	0	n/a	n/a
Hazmat: Superfund/CERCLIS/NPL	0	0	0	0	0	0	n/a	n/a
Wetlands	9.20	1.02	0.98	0.98	0.71	0.43	n/a	n/a
Wetland Mitigation Banks	0	0	0	0	0	0	n/a	n/a
Potential Land Acquisition: Urban/Developed	45.61	1.61	4.06	2.21	1.52	1.91	n/a	n/a
Potential Land Acquisition: Agricultural	3.17	0	0	0	0	0	n/a	n/a
Agricultural and Forestal Districts	0	0	0	0	0	0	n/a	n/a
Retain for further screening	No	No	No	Yes	Yes	No	n/a	n/a

Table Notes: *Gray shaded columns represent alignment options eliminated in Stage I Screening for the segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable
+The Existing Speed 2006 alignment does not include alignments different from the Existing Speed East or West alignments and is therefore not included in the evaluation.

No additional track is proposed in Segment 2. The impacts shown under the Improved Speed Hold Bridges/Tangents alignment options are based on minor improvements to curves that would improve operating speeds while maintaining existing tangents and remaining within existing right-of-way; as this is the only alignment option for this segment, it is carried forward to Stage III Screening (Table 6-21).

TABLE 6-21: STAGE II SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 2 ALEXANDRIA TO FRANCONIA (AFFR)

Resource	Max Speed*	Improved Speed*^			Existing Speed*			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
VOF Easements	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Conservation Lands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Natural Heritage	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Hazmat: Superfund/CERCLIS/NPL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Wetlands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Wetland Mitigation Banks	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Potential Land Acquisition: Urban/Developed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Potential Land Acquisition: Agricultural	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Agricultural and Forestal Districts	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Retain for further screening	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

In Segment 3, all seven of the additional track alignment options were carried forward from Stage I screening. Stage II screening results for Segment 3 are shown in Table 6-22. Based on these results, DRPT eliminated the Maximum Speed alignment from further consideration due to potential impacts to wetlands and urban/developed land acquisition. The Improved Speed and Existing Speed alignment options are carried forward for evaluation in the Stage III Screening.

TABLE 6-22: STAGE II SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 3: FRANCONIA TO LORTON (FRLO)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	0	0	0	0	0	0	0	n/a
VOF Easements	0	0	0	0	0	0	0	n/a
Conservation Lands	0	0	0	0	0	0	0	n/a
Natural Heritage	4.2	0	0	0	0	0	0	n/a
Hazmat: Superfund/CERCLIS/ NPL	0	0	0	0	0	0	0	n/a
Wetlands	24.27	3.29	3.49	2.73	2.08	3.31	3.07	n/a
Wetland Mitigation Banks	0	0	0	0	0	0	0	n/a
Potential Land Acquisition: Urban/Developed	35.67	1.30	4.46	3.29	0	2.52	0.02	n/a
Potential Land Acquisition: Agricultural	0	0	0	0	0	0	0	n/a
Agricultural and Forestal Districts	0	0	0	0	0	0	0	n/a
Retain for further screening	No	Yes	Yes	Yes	Yes	Yes	Yes	n/a

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

In Segment 4, the Maximum Speed alignment was eliminated in Stage I and the Improved Speed and Existing Speed alignments were carried forward to Stage II (Stage II screening results are presented in Table 6-23). Based on these results, DRPT determined that Improved Speed Hold Bridges/Tangents and Existing Speed East alignment options result in lowest level of potential impacts for their respective speed groups. These two alignment options are carried forward for further evaluation in the Stage III screening.

TABLE 6-23: STAGE II SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 4: LORTON TO POWELLS CREEK (LOPC)

Resource	Max Speed*	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	0	0	0	0	0	0	0	n/a
VOF Easements	0	0	0	0	0	0	0	n/a
Conservation Lands	0	0	0	0	0	0	0	n/a
Natural Heritage	0	0	0	0	0	0	0	n/a
Hazmat: Superfund/CERCLIS/ NPL	0	0	0	0	0	0	0	n/a
Wetlands	29.85	12.18	9.37	5.43	3.9	8.45	8.89	n/a
Wetland Mitigation Banks	0	0	0	0	0	0	0	n/a
Potential Land Acquisition: Urban/Developed	19.86	3.08	1.42	0.65	0.45	1.43	0.84	n/a
Potential Land Acquisition: Agricultural	0	0	0	0	0	0	0	n/a
Agricultural and Forestal Districts	0	0	0	0	0	0	0	n/a
Retain for further screening	No	No	No	Yes	Yes	No	No	n/a

Table Notes: *Gray shaded columns represent alignment options eliminated in Stage 1 Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

In Segment 5, construction is underway to install a third track. Screening impacts for the No Additional Track alignment option is limited to minor improvements to curves to increase speeds, holding existing tangents and maintaining the existing right-of-way limits. As the No Additional Track is the only alignment option for this segment, it is carried forward to Stage III Screening (Table 6-24).

TABLE 6-24: STAGE II SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 5: POWELLS CREEK TO ARKENDALE (PCAR)

Resource	Max* Speed	Improved Speed*^			Existing Speed*			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
VOF Easements	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Conservation Lands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Natural Heritage	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Hazmat: Superfund/CERCLIS/ NPL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Wetlands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Wetland Mitigation Banks	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Potential Land Acquisition: Urban/Developed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Potential Land Acquisition: Agricultural	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Agricultural and Forestal Districts	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Retain for further screening	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes

Table Notes: *n/a indicates that resource is not present in the alignment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

In Segment 6, all of the additional track alignments were carried forward from Stage I screening into the Stage II evaluation (Table 6-25). The Maximum Speed alignment was eliminated by DRPT due to impacts to wetlands and land acquisition. The Improved Speed Constrained alignment was also eliminated due to higher wetland impacts than other Improved Speed alignments. Both the Improved Speed Hold Bridges and Hold Bridges/Tangents alignments have similar order of magnitude impacts and are advanced to Stage III Screening. The three Existing Speed alignments have similar order of magnitude impacts, and are all carried forward for further analysis in the Stage III Screening.

TABLE 6-25: STAGE II SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 6: ARKENDALE TO DAHLGREN JUNCTION (ARDJ)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	0	0	0	0	0	0	0	n/a
VOF Easements	0	0	0	0	0	0	0	n/a
Conservation Lands	0	0	0	0	0	0	0	n/a
Natural Heritage	0.62	0	0	0	0	0	0	n/a
Hazmat: Superfund/CERCLIS/ NPL	0	0	0	0	0	0	0	n/a
Wetlands	57.97	30.78	23.68	22.6	16.17	15.2	17.17	n/a
Wetland Mitigation Banks	0	0	0	0	0	0	0	n/a
Potential Land Acquisition: Urban/Developed	19.93	0.15	0.09	0.10	0.06	0.07	0.09	n/a
Potential Land Acquisition: Agricultural	6.62	0.02	0.03	0.01	0.07	0.005	0.03	n/a
Agricultural and Forestal Districts	0	0	0	0	0	0	0	n/a
Retain for further screening	No	No	Yes	Yes	Yes	Yes	Yes	n/a

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

In Segment 7, the Improved Speed Hold Bridges/Tangents and Existing Speed East alignment options were advanced from Stage I screening to Stage II screening (Table 6-26). The two alignments have similar levels of impacts, and both are advanced to the Stage III Screening.

TABLE 6-26: STAGE II SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 7: DAHLGREN JUNCTION TO FREDERICKSBURG (DJFB)

Resource	Max Speed*	Improved Speed*^			Existing Speed*+			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006x	
	Area of Impact in Acres							
Cemeteries	0	0	0	0	0	0	n/a	n/a
VOF Easements	0	0	0	0	0	0	n/a	n/a
Conservation Lands	2.85	0	0	0	0	0	n/a	n/a
Natural Heritage	0.20	0.01	0.02	0.005	0	0.0004	n/a	n/a
Hazmat: Superfund/CERCLIS/NPL	0	0.09	0.10	0	0.002	0.00	n/a	n/a
Wetlands	16.83	6.60	5.83	3.33	3.24	3.16	n/a	n/a
Wetland Mitigation Banks	0	0	0	0	0	0	n/a	n/a
Potential Land Acquisition: Urban/Developed	19.23	1.23	1.42	0.92	0.30	1.13	n/a	n/a
Potential Land Acquisition: Agricultural	0.98	0.01	0	0	0	0	n/a	n/a
Agricultural and Forestal Districts	0	0	0	0	0	0	n/a	n/a
Retain for further screening	No	No	No	Yes	Yes	No	n/a	n/a

Table Notes: *Gray shaded columns represent alignment options eliminated in Stage 1 Screening for the Segment

^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

+The Existing Speed 2006 alignment does not include alignments different from the Existing Speed East or West alignments and is therefore not included in the evaluation.

In Segment 8, there are currently three mainline tracks. Minor improvements to curves within existing right-of-way in order to increase design speeds are considered as part of the Improved Speed Hold Bridges/Tangents alignment option in this segment; as this is the only alignment option for this segment, it is carried forward to Stage III Screening (Table 6-27).

TABLE 6-27: STAGE II SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 8: FREDERICKSBURG TO HAMILTON (FBHA)

Resource	Max Speed*	Improved Speed*^			Existing Speed*			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
VOF Easements	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Conservation Lands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.31
Natural Heritage	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.18
Hazmat: Superfund/CERCLIS/ NPL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Wetlands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	3.46
Wetland Mitigation Banks	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Potential Land Acquisition: Urban/Developed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.12
Potential Land Acquisition: Agricultural	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Agricultural and Forestal Districts	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Retain for further screening	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

A third mainline track was installed in 2015 in Segment 9 between Hamilton and Crossroads in conjunction with the VRE Spotsylvania Station project. Minor improvements to curves to allow for greater speeds are considered for analysis within this segment as part of the No Additional Track alignment option; as this is the only alignment option for this segment, it is carried forward to Stage III Screening (Table 6-28).

TABLE 6-28: STAGE II SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 9: HAMILTON TO CROSSROADS (HAXR)

Resource	Max* Speed	Improved Speed*^			Existing Speed*			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
VOF Easements	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Conservation Lands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Natural Heritage	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.03
Hazmat: Superfund/CERCLIS/ NPL	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Wetlands	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4.47
Wetland Mitigation Banks	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Potential Land Acquisition: Urban/Developed	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0.02
Potential Land Acquisition: Agricultural	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Agricultural and Forestal Districts	n/a	n/a	n/a	n/a	n/a	n/a	n/a	0
Retain for further screening	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Yes

Table Notes: * ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

6.5.3 Stage II Screening Results Central Virginia

The Stage II Screening results for the Central Virginia area are shown in Table 6-29 through Table 6-33. Alignments eliminated from further consideration in Stage I Screening were also evaluated in Stage II Screening and are provided with gray shading in the Stage II Screening tables below for comparison purposes.

In Segment 10, the Maximum Speed alignment was eliminated in Stage I screening. DRPT conducted Stage II screening on the Improved Speed and Existing Speed alignments (Table 6-29). The order of magnitude impacts are similar for the Improved Speed alignments, and all three are carried forward for further evaluation in the Stage III screening. The Existing Speed alignments also have impact levels similar to each other, and they too are carried forward for further evaluation.

TABLE 6-29: STAGE II SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 10: CROSSROADS TO GUINEA (XRGU)

Resource	Max Speed*	Improved Speed^			Existing Speed*			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	0	0	0	0	0	0	0	n/a
VOF Easements	0	0	0	0	0	0	0	n/a
Conservation Lands	0	0	0	0	0	0	0	n/a
Natural Heritage	2.12	0.04	0	0	0	0.17	0.17	n/a
Hazmat: Superfund/CERCLIS/NPL	0	0	0	0	0	0.00	0.00	n/a
Wetlands	29.31	10.11	10.91	9.72	6.5	5.86	7.03	n/a
Wetland Mitigation Banks	0	0	0	0	0	0	0	n/a
Potential Land Acquisition: Urban/Developed	1.04	0.03	0.0005	0.0005	0	0.0005	0.0005	n/a
Potential Land Acquisition: Agricultural	5.70	0.02	0.02	0.02	0.0002	0.02	0.02	n/a
Agricultural and Forestal Districts	0	0	0	0	0	0	0	n/a
Retain for further screening	No	Yes	Yes	Yes	Yes	Yes	No	n/a

Table Notes: *Gray shaded columns represent alignment options eliminated in Stage I Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

In Segment 11, the Maximum Speed alignment was eliminated in Stage I screening and the three Improved Speed and three Existing Speed alignments were carried forward to Stage II screening (Table 6-30). DRPT eliminated the Improved Speed Constrained alignment due to greater wetland impacts compared to the Improved Speed Hold Bridges and Hold Bridges/Tangents alignment options. DRPT also eliminated the Existing Speed 2006 alignment due to greater wetland impacts compared to the Existing Speed East and West alignments. The Improved Speed Hold Bridges and Hold Bridges/Tangents and the Existing Speed East and West alignments are carried forward for further evaluation in the Stage III Screening.

TABLE 6-30: STAGE II SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 11: GUINEA TO MILFORD (GUMD)

Resource	Max Speed*	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	0	0	0	0	0	0	0	n/a
VOF Easements	0	0	0	0	0	0	0	n/a
Conservation Lands	0	0	0	0	0	0	0	n/a
Natural Heritage	0	0	0	0	0	0	0	n/a
Hazmat: Superfund/CERCLIS/NPL	0	0	0	0	0	0	0	n/a
Wetlands	105.46	26.8	22.34	22.34	23.69	22.03	26.79	n/a
Wetland Mitigation Banks	0	0	0	0	0	0	0	n/a
Potential Land Acquisition: Urban/Developed	8.09	0.26	0.22	0.22	0.50	0.22	0.22	n/a
Potential Land Acquisition: Agricultural	12.06	0.27	0.23	0.23	0.09	0.23	0.23	n/a
Agricultural and Forestal Districts	0	0	0	0	0	0	0	n/a
Retain for further screening	No	No	Yes	Yes	Yes	Yes	No	n/a

Table Notes: *Gray shaded columns represent alignment options eliminated in Stage 1 Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

All of the additional track alignments were carried forward to Stage II screening (Table 6-31). The three Improved Speed alignment options in Segment 12 have similar levels of impacts to wetlands and minimal impacts for other resources; therefore, all were advanced to Stage III screening. Of the Existing Speed alignment options, the West alignment option has 2.33 to 2.69 acres less impacts to wetlands than the other Existing Speed alignment options, and was therefore carried forward to Stage III Screening.

TABLE 6-31: STAGE II SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 12: MILFORD TO NORTH DOSWELL (MDND)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	0	0	0	0	0	0	0	n/a
VOF Easements	0	0	0	0	0	0	0	n/a
Conservation Lands	0	0	0	0	0	0	0	n/a
Natural Heritage	0.02	0	0	0	0.002	0	0	n/a
Hazmat: Superfund/CERCLIS/ NPL	0	0.01	0.009	0.009	0	0.009	0	n/a
Wetlands	84.68	18.86	18.91	18.91	16.23	13.9	16.59	n/a
Wetland Mitigation Banks	0	0	0	0	0	0	0	n/a
Potential Land Acquisition: Urban/Developed	15.10	0.21	0.37	0.37	0.53	0.14	0.14	n/a
Potential Land Acquisition: Agricultural	16.73	0.03	0.11	0.11	0.15	0.0009	0.0009	n/a
Agricultural and Forestal Districts	0	0	0	0	0	0	0	n/a
Retain for further screening	No	Yes	Yes	Yes	Yes	Yes	Yes	n/a

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

In Segment 13, the Maximum Speed alignment was eliminated in Stage I screening and the Improved Speed and Existing Speed alignments were carried forward from Stage I. The three Improved Speed options have similar levels of impacts, and all are carried forward to Stage III screening. The Existing Speed 2006 option has higher wetland impacts and is eliminated, the existing speed east option has higher urban/developed land acquisition and is eliminated, and the existing speed west option is advanced for further evaluation in the Stage III Screening (Table 6-32).

TABLE 6-32: STAGE II SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 13: NORTH DOSWELL TO ELMONT (NDEL)

Resource	Max Speed*	Improved Speed*^			Existing Speed*			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	0	0	0	0	0	0	0	n/a
VOF Easements	0	0	0	0	0	0	0	n/a
Conservation Lands	0	0	0	0	0	0	0	n/a
Natural Heritage	0	0	0	0	0	0	0	n/a
Hazmat: Superfund/CERCLIS/ NPL	0	0	0	0	0	0	0	n/a
Wetlands	49.27	11.31	11.27	11.27	10.91	10.84	16.67	n/a
Wetland Mitigation Banks	0	0	0	0	0	0	0	n/a
Potential Land Acquisition: Urban/Developed	24.88	2.94	2.93	2.93	6.22	2.94	2.05	n/a
Potential Land Acquisition: Agricultural	0.19	0	0	0	0	0	0	n/a
Agricultural and Forestal Districts	0	0	0	0	0	0	0	n/a
Retain for further screening	No	Yes	Yes	Yes	No	Yes	No	n/a

Table Notes: *Gray shaded columns represent alignment options eliminated in Stage 1 Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

All of the additional track alignments were carried forward from Stage I screening and evaluated for Stage II (Table 6-33). DRPT eliminated the Maximum Speed alignment due to impacts to wetlands. The Improved Speed alternatives in Segment 14 consist of the same track modifications, and have the same level of impacts. Of the Existing Speed alignment options, the East and West alignment options have similar wetland impacts and minimal impact for land acquisitions; the Existing Speed 2006 alignment has an additional 2 acres of wetland impacts. All alignment options except the Maximum Speed and Existing Speed 2006 alignment options are carried forward for further evaluation in the Stage III Screening.

TABLE 6-33: STAGE II SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 14: ELMONT TO GREENDALE (ELGN)

Resource	Max Speed	Improved Speed^			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
	Area of Impact in Acres							
Cemeteries	0	0	0	0	0	0	0	n/a
VOF Easements	0	0	0	0	0	0	0	n/a
Conservation Lands	0	0	0	0	0	0	0	n/a
Natural Heritage	0	0	0	0	0	0	0	n/a
Hazmat: Superfund/CERCLIS/ NPL	0	0	0	0	0	0	0	n/a
Wetlands	49.39	13.64	13.64	13.64	11.03	11.09	13.21	n/a
Wetland Mitigation Banks	0	0	0	0	0	0	0	n/a
Potential Land Acquisition: Urban/Developed	4.86	0.09	0.09	0.09	0.44	0.05	0.05	n/a
Potential Land Acquisition: Agricultural	0.10	0	0	0	0	0	0	n/a
Agricultural and Forestal Districts	0	0	0	0	0	0	0	n/a
Retain for further screening	No	Yes	Yes	Yes	Yes	Yes	No	n/a

Table Notes: ^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

6.6 STAGE III SCREENING

The following presents the Stage III Screening process and results for the Northern Virginia and Central Virginia areas.

6.6.1 Stage III Screening Process

The Stage III Screening considers the effects of crossing infrastructure constraints on each rail alignment by segment/sub-segment and the potential for adverse effects to the existing infrastructure within and crossing the corridor. Infrastructure constraints include the following:

- **Existing Roadway Overpasses**: There are roads crossing over the existing rail corridor on roadway overpasses. These overpasses are evaluated for sufficient vertical and horizontal clearance to add an additional track underneath. Available clearance may constrain the alignment to the east or west of existing tracks or require re-alignment of all tracks beneath the overpass. Where there is insufficient clearance for an additional track, the roadway overpass is assumed to require replacement.
- **Existing Roadway At-Grade Crossings**: There are public and private at-grade roadway/railroad crossings along the existing rail corridor, plus several pedestrian crossings. These are evaluated as follows:
  - Traffic Delay and Safety—At-grade road crossings are evaluated using Federal Highway Administration (FHWA) criteria for at-grade crossings, comparing existing conditions with projected roadway and rail traffic levels[9]. At-grade crossings that exceed FHWA criteria are evaluated in greater detail in the Tier II Environmental Impact Statement for potential improvements, consolidation, or replacement with a grade-separated crossing.
  - Roadway Geometry—At-grade road crossings are evaluated for changes to road geometry based on new rail alignments; improvements to the road designs are considered where new rail alignments adversely affect the road geometry.
- **Existing Rail Bridges**: Replacing existing rail bridges with new bridges while meeting all rail traffic needs is a difficult and expensive process. The existing rail bridges are owned and maintained by CSXT, and DRPT assumes that the CSXT bridges are adequate for existing and future rail service. Therefore, alignment options using existing right-of-way would continue to use the existing rail bridges for the tracks the bridges currently carry, while adding a new track on a separate but parallel alignment and bridge structure. Developing new alignments using the existing right-of-way would also be constrained by the approaches to these existing rail bridges.
- **New Rail Bridges**: New rail bridges to carry the new main track would be necessary at each location where there is an existing bridge. Each bridge location was considered for each alignment to determine if there are engineering or design constraints that eliminate

[9] The Project's BOD identifies a FRA risk model (GradeDec.Net) for at-grade crossing analyses which is not applicable for this particular application and the FHWA criteria were applied instead. FRA developed GradeDec.Net as an investment decision support tool. GradeDec.Net is a web-based application that enables state and local decision makers to prioritize highway-rail grade crossing investments based upon an array of benefit-cost measures. DRPT determined the traffic delay and safety aspects of the FHWA criteria had greater applicability to evaluate potential effects on at-grade crossings.

or favor an upstream or downstream (typically west side or east side) location for a new rail bridge. The preferred location of new rail bridges at each waterway or road underpass crossing could constrain the rail alignment options at that location.

Chapter 7 of this report details the assessment of crossing infrastructure constraints on each rail alignment by segment/sub-segment.

6.6.2 Stage III Screening Results

The Stage III screening results of the Northern Virginia and Central Virginia areas are shown in Tables 6-34 through Table 6-47, respectively. Stage III screening data is shown for all alignments, with those eliminated from further consideration by DRPT in light gray shading, however only those alignments carried forward from Stage II screening are considered in Stage III. The screening results shown are based on the assessment of crossing infrastructure constraints completed as part of Chapter 7. Alignment options carried forward for further evaluation in the Tier II EIS are those that do not have crossing infrastructure constraints or have constraints that can be mitigated with modification to the overpass structure or at-grade crossing. DRPT recognizes that constructing new grade separated crossings and/or overpass structures can increase the project's impacts and costs, particularly where the roadway is a primary four-lane or interstate highway. Therefore, where a segment has multiple alignments with similar crossing infrastructure constraints or new overpass structures, DRPT has determined that the alignment with the faster track design speed is preferred, and where there are multiple alignments with similar design speeds, the alignment with the least crossing infrastructure constraints—particularly to primary roads—is preferred.

Table 6-34 shows Stage III screening results for Segment 1, Rosslyn to Alexandria (ROAF). The Improved Speed Option to hold bridges and tangents is shown to have no constraints and will be considered further in the Draft EIS. The Existing Speed option to the east was found to have some infrastructure constraints, some of which could potentially be mitigated with minor modifications. However, DRPT eliminated this option as it would have slower design speed and greater infrastructure impacts compared to the Improved Speed option.

TABLE 6-34: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA, SEGMENT 1: ROSSLYN TO ALEXANDRIA (ROAF)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
Route 233 (Airport Access Road)	CFP 108.47			○	○		
Route 1 (Jefferson Davis Highway)	CFP 106.43			○	○		
Duke Street (Route 236)	CFP 105.05			○	●		

TABLE 6-34: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA, SEGMENT 1: ROSSLYN TO ALEXANDRIA (ROAF)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Telegraph Road (Route 241)	CFP 104.57			●	●		
Railroad Bridge Over Water							
Four Mile Run	CFP 107.86			O	O		
Other Railroad Bridges							
George Washington Memorial Parkway	CFP 105.05			O	●		
WMATA Metrorail Yellow/Blue Line Tunnel	CFP 109.32			●	●		
Mount Vernon Trail	CFP 108.59			O	O		
East Braddock Road	CFP 105.85			O	O		
Commonwealth Avenue	CFP 105.37			O	O		
King Street (Route 7)	CFP 105.30			O	O		
At-Grade Crossings (N/A)							
Retain for further screening	----			O	●		

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints

*Gray shaded columns represent alignment options eliminated in Stages I and II Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-35 shows Stage III screening results for Segment 2, Alexandria to Franconia (AFFR). This segment of the corridor has three existing tracks. Therefore, the No Additional Track option will be considered further in the Draft EIS.

TABLE 6-35: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 2: ALEXANDRIA TO FRANCONIA (AFFR)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
WMATA Metrorail (Blue Line)	CFP 101.82	n/a	n/a	n/a	n/a	n/a	O
Interstate 95/495	CFP 100.07	n/a	n/a	n/a	n/a	n/a	O
Franconia Road (Route 644)	CFP 99.08	n/a	n/a	n/a	n/a	n/a	O
Railroad Bridge Over Water							
Small unnamed stream that feeds into Lake Cook, culvert	CFP 103.25	n/a	n/a	n/a	n/a	n/a	O
Cameron Run, pipe crossing	CFP 102.72	n/a	n/a	n/a	n/a	n/a	O
Other Railroad Bridges							
Norfolk Southern Railway Tracks	CFP 102.86	n/a	n/a	n/a	n/a	n/a	O
Holmes Run Trail	CFP 102.76	n/a	n/a	n/a	n/a	n/a	O
Eisenhower Avenue	CFP 102.60	n/a	n/a	n/a	n/a	n/a	O
Eisenhower Avenue Connector/Clermont Avenue	CFP 102.15	n/a	n/a	n/a	n/a	n/a	O
South Van Dorn Street	CFP 101.07	n/a	n/a	n/a	n/a	n/a	O
At-Grade Crossings (N/A)							
Retain for further screening	----	----	----	n/a	----	----	O

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints

^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-36 shows Stage III screening results for Segment 3, Franconia to Lorton (FRLO). DRPT selected the Improved Speed option to hold bridges and tangents, with its ability to improve train design speed and add capacity, to be further evaluated in the Draft EIS.

TABLE 6-36: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 3: FRANCONIA TO LORTON (FRLO)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
Franconia-Springfield Parkway (Route 289)	CFP 98.09	●		●	●		
Pedestrian bridge over tracks for Franconia-Springfield VRE Station	CFP 97.87	●		O	O		
Backlick Road (Route 7100)	CFP 95.30	●		●	●		
Fairfax County Parkway (Route 286)	CFP 95.14	●		O	O		
Pohick Road (Route 638)	CFP 93.79	O		O	●		
Railroad Bridge Over Water							
Long Branch, pipe crossing	CFP 98.21	O		O	O		
Long Branch, pipe crossing	CFP 98.02	O		O	O		
Unnamed creek, culvert	CFP 96.04	O		O	O		
Accotink Creek, 90 ft. long bridge	CFP 94.07	●		O	O		
Unnamed creek, culvert	CFP 93.52	O		O	O		
Pohick Creek, 90 ft. long bridge	CFP 93.14	●		O	O		
Other Railroad Bridges							
Newington Road	CFP 95.74	●		O	O		
At-Grade Crossings (N/A)							
Retain for further screening	----	●		O	●		

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints
*Gray shaded columns represent alignment options eliminated in Stages I and II Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-37 shows Stage III screening results for Segment 4, Lorton to Powells Creek (LOPC). DRPT selected the Improved Speed option to hold bridges and tangents, with its ability to improve train design speed and add capacity, to be further evaluated in the Draft EIS.

TABLE 6-37: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 4: LORTON TO POWELLS CREEK (LOPC)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
Railroad Avenue	CFP 89.24			○	○		
Dawson Beach Road (Route 687)	CFP 88.8			○	●		
Pedestrian bridge over tracks at Veterans Memorial Park	CFP 87.82			○	○		
Pedestrian bridge over tracks at Woodbridge Station	CFP 89.10			●	○		
Pedestrian bridge over tracks at Rippon Station	CFP 85.30			●	●		
Railroad Bridge over Water							
Giles Run, pipe crossing	CFP 91.00			○	○		
Occoquan River, 920 ft. double track bridge	CFP 90.00			○	○		
Marumsco Creek, pipe crossing	CFP 88.35			○	○		
Marumsco Acres Lake, pipe crossing	CFP 87.65			○	○		
Farm Creek, 25 ft. double track bridge	CFP 86.80			○	○		
Unnamed Creek, 20 ft. double track bridge	CFP 86.10			○	○		
Neabsco Creek, 740 ft. double track bridge	CFP 84.70			○	○		
Powells Creek, 1,200 ft. double track bridge	CFP 83.50			○	○		
Other Railroad Bridges							
Lorton Road (Route 642)	CFP 92.58			○	○		

TABLE 6-37: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 4: LORTON TO POWELLS CREEK (LOPC)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Jefferson Davis Highway (Route 1)	CFP 90.63			○	○		
Furnace Road (Route 611)	CFP 90.04			○	○		
At-Grade Crossings							
Featherstone Road (Route 636)	CFP 86.85			○	○		
Retain for further screening	----			○	●		

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints
*Gray shaded columns represent alignment options eliminated in Stages I and II Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-38 shows Stage III screening results for Segment 5, Powells Creek to Arkendale (PCAR). A separate project is underway to construct a third track to match existing speeds in this segment. Therefore, DRPT has selected the No Additional Track alternative for this segment. DRPT also reviewed the designs of the third track and determined no track shifts or other track improvements were warranted due to geometric limitations in the track alignment and right-of-way.

TABLE 6-38: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 5: POWELLS CREEK TO ARKENDALE (PCAR)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
Industrial pedestrian bridge	CFP 81.87	n/a	n/a	n/a	n/a	n/a	○
Possum Point Road (Route 633)	CFP 80.02	n/a	n/a	n/a	n/a	n/a	○
Bauer Road	CFP 77.50	n/a	n/a	n/a	n/a	n/a	○
Pedestrian bridge over tracks	CFP 76.68	n/a	n/a	n/a	n/a	n/a	○
Railroad Bridge Over Water							
Quantico Creek, two bridges	CFP 79.20	n/a	n/a	n/a	n/a	n/a	○

TABLE 6-38: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 5: POWELLS CREEK TO ARKENDALE (PCAR)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Little Creek, pipe crossing	CFP 79.08	n/a	n/a	n/a	n/a	n/a	O
Chopawamsic Creek, 170 ft. double track bridge	CFP 77.20	n/a	n/a	n/a	n/a	n/a	O
Tank Creek, culvert	CFP 75.57	n/a	n/a	n/a	n/a	n/a	O
Widewater Creek, 45 ft. double track bridge	CFP 74.20	n/a	n/a	n/a	n/a	n/a	O
Other Railroad Bridges							
Martin Street	CFP 78.60	n/a	n/a	n/a	n/a	n/a	O
Private Street (Wright's Crossing/Osterman)	CFP 74.75	n/a	n/a	n/a	n/a	n/a	O
At-Grade Crossings							
Cherry Hill Road	CFP 82.38	n/a	n/a	n/a	n/a	n/a	O
Potomac Avenue	CFP 78.83	n/a	n/a	n/a	n/a	n/a	O
Epperson Avenue	CFP 78.11	n/a	n/a	n/a	n/a	n/a	O
Flemming Street	CFP 76.70	n/a	n/a	n/a	n/a	n/a	O
Private Crossing	CFP 74.20	n/a	n/a	n/a	n/a	n/a	O
Lee's Crossing	CFP 73.10	n/a	n/a	n/a	n/a	n/a	O
Retain for further screening	----	----	----	n/a	----	----	O

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-39 shows Stage III screening results for Segment 6, Arkendale to Dahlgren Junction (ARDJ). The Improved Speed Option to hold bridges and tangents is shown to have no constraints and will be considered further in the Draft EIS. Additionally, the Existing Speed option to the west was also found to have no constraints and will also be assessed in in the Draft EIS.

TABLE 6-39: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 6: ARKENDALE TO DAHLGREN JUNCTION (ARDJ)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
Courthouse Road (Route 630)	CFP 69.09			○	●	○	
Eskimo Hill Road (Route 628)	CFP 66.77			●	●	●	
Leeland Road (Route 626)	CFP 63.47			●	●	●	
Primmer House Road (Route 624)	CFP 63.02			○	○	○	
White Oak Road (Route 218)	CFP 60.81			○	○	○	
Railroad Bridge Over Water							
Tributary of Boars Creek, pipe crossing	CFP 72.26			○	○	○	
Boars Creek, pipe crossing	CFP 71.86			○	○	○	
Aquia Creek, pipe crossing	CFP 70.78			○	○	○	
Unnamed Creek, pipe crossing	CFP 70.40			○	○	○	
Unnamed Creek, pipe crossing	CFP 70.16			○	○	○	
Accokeek Creek, pipe crossing	CFP 67.69			○	○	○	
Unnamed Creek, pipe crossing	CFP 67.35			○	○	○	
Unnamed Creek, pipe crossing	CFP 65.65			○	○	○	
Potomac Creek, 410 ft. double track wooden bridge	CFP 65.25			○	○	○	
Claiborne Run, culvert	CFP 62.60			○	○	○	

TABLE 6-39: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 6: ARKENDALE TO DAHLGREN JUNCTION (ARDJ)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Claiborne Run/Harrell Road (Route 623), 45 ft. double track bridge	CFP 61.79			○	○	○	
Other Railroad Bridges							
Andrew Chapel Road (Route 629)	CFP 68.01			○	○	○	
At-Grade Crossings							
Brent Point Road (Route 658)	CFP 72.34			○	○	○	
Mount Hope Church Road (Route 677)	CFP 67.57			○	○	○	
Retain for further screening	----			○	●	○	

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
○ = No Major Constraints
*Gray shaded columns represent alignment options eliminated in Stages I and II Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-40 shows Stage III screening results for Segment 7, Dahlgren Junction to Fredericksburg (DJFB). The Improved Speed Option to hold bridges and tangents is shown to have no constraints and will be considered further in the Draft EIS. Additionally, the Existing Speed option to the west was also found to have no constraints, but will not be considered further. These two alignment options are virtually identical in this section.

TABLE 6-40: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 7: DAHLGREN JUNCTION TO FREDERICKSBURG (DJFB)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
Kings Highway (Route 3 Business)	CFP 60.04			●	●		
Blue and Grey Parkway (Route 3)	CFP 58.90			○	○		

TABLE 6-40: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 7: DAHLGREN JUNCTION TO FREDERICKSBURG (DJFB)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Railroad Bridge Over Water							
Claiborne Run, pipe crossing	CFP 60.58			○	○		
Claiborne Run, pipe crossing	CFP 60.00			○	○		
Rappahannock River, 900ft double track bridge	CFP 59.57			○	○		
Hazel Run, pipe crossing	CFP 59.04			○	○		
Other Railroad Bridges							
Old White Oak Road/Claiborne Run	CFP 60.58			○	○		
Naomi Road (Route 607)	CFP 59.98			○	○		
Caroline Street	CFP 59.41			●	●		
Princess Anne Street	CFP 59.35			●	●		
Charles Street (Route 17 Business)	CFP 59.28			●	●		
At-Grade Crossings (N/A)							
Retain for further screening	----			○	○		

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints
*Gray shaded columns represent alignment options eliminated in Stages 1 and II Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-41 shows Stage III screening results for Segment 8, Fredericksburg to Hamilton (FBHA). This segment of the corridor has three existing tracks. Therefore, DRPT selected the No Additional Track option to be considered further in the Draft EIS.

TABLE 6-41: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 8: FREDERICKSBURG TO HAMILTON (FBHA)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses (n/a)							
Railroad Bridge Over Water							
Unnamed Creek, pipe crossing	CFP 57.92	n/a	n/a	n/a	n/a		O
Deep Run, culvert	CFP 57.14	n/a	n/a	n/a	n/a		O
Other Railroad Bridges (n/a)							
At-Grade Crossings							
Lansdowne Road (Route 638)	CFP 57.57	n/a	n/a	n/a	n/a		O
Retain for further screening	----	n/a	n/a	n/a	n/a		O

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure

O = No Major Constraints

*Gray shaded columns represent alignment options eliminated in Stages 1 and II Screening for the Segment.

^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-42 shows Stage III screening results for Segment 9, Hamilton to Crossroads (HAXR). This segment of the corridor has three existing tracks. Therefore, DRPT selected the No Additional Track option to be considered further in the Draft EIS.

TABLE 6-42: STAGE III SCREENING RESULTS—NORTHERN VIRGINIA AREA SEGMENT 9: HAMILTON TO CROSSROADS (HAXR)

Crossing Infrastructure	Milepost	Improved Speed*^+			Existing Speed*+		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
Mills Drive (Route 17)	CFP 53.45	n/a	n/a	n/a	n/a	n/a	O
Railroad Bridge Over Water							
Massaponax Creek, 20 ft. double track bridge	CFP 54.44	n/a	n/a	n/a	n/a	n/a	O
Unnamed Creek, pipe crossing	CFP 53.61	n/a	n/a	n/a	n/a	n/a	O
Other Railroad Bridges							
Unnamed Private Road	CFP 53.80	n/a	n/a	n/a	n/a	n/a	O
At-Grade Crossings							
Mine Road (Route 636)	CFP 54.77	n/a	n/a	n/a	n/a	n/a	O
Retain for further screening	----	n/a	n/a	n/a	n/a	n/a	O

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-43 shows Stage III screening results for Segment 10, Crossroads to Guinea (XRGU). The Improved Speed Option to hold bridges and tangents is shown to have no constraints and will be considered further in the Draft EIS. The Existing Speed option to the east was also shown to have no constraints. Given two options without infrastructure constraints, DRPT selected the Improved Speed option with its ability to meet 90 mph to be further evaluated in the Draft EIS.

TABLE 6-43: STAGE III SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 10: CROSSROADS TO GUINEA (XRGU)

Crossing Infrastructure	Milepost	Improved Speed*^			Existing Speed*		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses (N/A)							
Railroad Bridge Over Water							
Unnamed creek, culvert	CFP 51.84			O	O		
Unnamed creek, culvert	CFP 50.91			O	O		
Unnamed creek, culvert	CFP 50.19			O	O		
Unnamed creek, culvert	CFP 49.75			O	O		
Unnamed creek, culvert	CFP 49.42			O	O		
Unnamed creek, culvert	CFP 48.69			O	O		
Unnamed creek, culvert	CFP 48.42			O	O		
Unnamed creek, culvert	CFP 47.61			O	O		
Other Railroad Bridges (N/A)							
At-Grade Crossings							
Summit Crossing Road (Route 668)	CFP 51.41			O	O		
Claiborne Crossing Road (Route 660)	CFP 48.63			O	O		
Stonewall Jackson Road (Route 606)	CFP 47.24			O	O		
Retain for further screening	----			O	O		

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints
*Gray shaded columns represent alignment options eliminated in Stages I and II Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-44 shows Stage III screening results for Segment 11, Guinea to Milford (GUMD). Both the Improved Speed Option to hold bridges and tangents and to only hold bridges are shown to have no constraints; as there is little substantive difference in these options, and holding bridges and tangents would have less cost and impacts due to reuse of tangent track, therefore only Improved Speed hold bridges/tangents will be considered further in the Draft EIS. Additionally, the Existing Speed option to the west was also found to have no constraints. However, given two options without infrastructure constraints, DRPT selected the Improved Speed option with its ability to meet 90 mph to be further evaluated in the Draft EIS.

TABLE 6-44: STAGE III SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 11: GUINEA TO MILFORD (GUMD)

Crossing Infrastructure	Milepost	Improved Speed*^			Existing Speed*		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
Rogers Clark Boulevard (Route 207) WB	CFP 38.50		O	O		O	n/a
Rogers Clark Boulevard (Route 207) EB	CFP 38.50		O	O		O	n/a
Railroad Bridge over Water							
Meadow Creek, culvert	CFP 46.14		O	O		O	n/a
Meadow Creek, pipe crossing	CFP 46.10		O	O		O	n/a
Unnamed creek, pipe crossing	CFP 44.84		O	O		O	n/a
Unnamed creek, pipe crossing	CFP 44.08		O	O		O	n/a
Unnamed creek, pipe crossing	CFP 43.20		O	O		O	n/a
Campbell Creek, culvert	CFP 42.37		O	O		O	n/a
Unnamed creek, pipe crossing	CFP 41.87		O	O		O	n/a
Unnamed creek, pipe crossing	CFP 41.42		O	O		O	n/a
Unnamed creek, culvert	CFP 39.39		O	O		O	n/a
Unnamed creek, pipe crossing	CFP 38.72		O	O		O	n/a

TABLE 6-44: STAGE III SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 11: GUINEA TO MILFORD (GUMD)

Crossing Infrastructure	Milepost	Improved Speed*^			Existing Speed*		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Other Railroad Bridges (N/A)							
At-Grade Crossings							
Private Road (Jones Crossing)	CFP 45.77		O	O		O	n/a
Woodford Road (Route 626)	CFP 44.50		O	O		O	n/a
Woodslane Road (Route 609)	CFP 43.50		O	O		O	n/a
Rixey Road (Route 666)	CFP 41.70		O	O		O	n/a
Paige Road (Route 605)	CFP 40.43		O	O		O	n/a
Private Road (Rose Crossing/Holly Hill Drive)	CFP 38.99		O	O		O	n/a
Retain for further screening	----		O	O		O	n/a

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints
*Gray shaded columns represent alignment options eliminated in Stages I and II Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-45 shows Stage III screening results for Segment 12, Milford to North Doswell (MDND). Two of the Improved Speed Options (constrained and hold bridges) are shown to have no constraints, and the Improved Speed hold bridges/tangents has only one constraint at Dry Bridge Road. Therefore, DRPT determined to advance the Improved Speed hold bridges for evaluation in the Draft EIS. (For most of the segment there is little difference in the three Improved Speed alignments). Additionally, the Existing Speed option to the west was also found to have no constraints aside from Dry Bridge Road. However, given two options without infrastructure constraints, DRPT selected the Improved Speed option with its ability to meet 90 mph to be further evaluated in the Draft EIS.

TABLE 6-45: STAGE III SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 12: MILFORD TO NORTH DOSWELL (MDND)

Crossing Infrastructure	Milepost	Improved Speed*^			Existing Speed*		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
Nelson Hill Road (Route 722)	CFP 37.80	○	○	○		○	
Dry Bridge Road (Route 684)	CFP 28.37	○	○	●		●	
Ruther Glen Road (Route 652)	CFP 26.96	○	○	○		○	
Interstate 95 NB	CFP 26.54	○	○	○		○	
Interstate 95 SB	CFP 26.54	○	○	○		○	
Railroad Bridge Over Water							
Unnamed creek, pipe crossing	CFP 36.08	○	○	○		○	
Goose Pond, pipe crossing	CFP 35.08	○	○	○		○	
Mattaponi River, 210 ft. double track bridge	CFP 34.76	○	○	○		○	
Mattaponi River tributary, pipe crossing	CFP 34.56	○	○	○		○	
Polecat Creek, 105 ft. double track bridge	CFP 31.95	○	○	○		○	
Polecat Creek, pipe crossing	CFP 30.80	○	○	○		○	
Reedy Creek, pipe crossing	CFP 27.40	○	○	○		○	
Unnamed creek, pipe crossing	CFP 25.79	○	○	○		○	

TABLE 6-45: STAGE III SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 12: MILFORD TO NORTH DOSWELL (MDND)

Crossing Infrastructure	Milepost	Improved Speed*^			Existing Speed*		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Unnamed creek, pipe crossing	CFP 25.01	O	O	O		O	
North Anna River, 330 ft. double track bridge	CFP 23.82	O	O	O		O	
Unnamed creek, pipe crossing	CFP 23.71	O	O	O		O	
Other Railroad Bridges (N/A)							
At-Grade Crossings							
Private Road	CFP 36.95	O	O	O		O	
Private Road	CFP 36.66	O	O	O		O	
Private Road	CFP 34.01	O	O	O		O	
Private Road	CFP 33.50	O	O	O		O	
Penola Road (Route 601)	CFP 33.00	O	O	O		O	
Private Road (Georges Crossing)	CFP 31.20	O	O	O		O	
Colemans Mill Road (Route 656)	CFP 29.72	O	O	O		O	
Private Road	CFP 24.38	O	O	O		O	
Retain for further screening	----	O	O	●		●	

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints
*Gray shaded columns represent alignment options eliminated in Stages 1 and II Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-46 shows Stage III screening results for Segment 13, North Doswell to Elmont (NDEL). The Existing Speed option to the east was found to have no constraints aside from Old Ridge Road and is therefore retained for further screening in the Draft EIS.

TABLE 6-46: STAGE III SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 13: NORTH DOSWELL TO ELMONT (NDEL)

Crossing Infrastructure	Milepost	Improved Speed*^			Existing Speed*		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
Kings Dominion Boulevard (Route 30)	CFP 20.81				○		
Old Ridge Road (Route 738)	CFP 18.95				●		
Washington Highway (Route 1)	CFP 17.22				○		
Railroad Bridge Over Water							
Bull Run, pipe crossing	CFP 22.87				○		
Little River, 250 ft. double track bridge	CFP 19.50				○		
South Anna River, 510 ft. double track bridge	CFP 18.80				○		
Tributary of Falling Creek, pipe crossing	CFP 17.02				○		
Tributary of Falling Creek, pipe crossing	16.52				○		
Stony Run, pipe crossing	CFP 13.27				○		
Unnamed creek, pipe crossing	CFP 12.53				○		
Other Railroad Bridges							
Taylorsville Road (Route 689)	CFP 19.58				○		
Elletts Crossing Road (Route 641)	CFP 17.70				○		
At-Grade Crossings							
Doswell Road (Route 688)	CFP 21.87				○		
Private Road (Excelsior Mill Crossing)	CFP 21.66				○		

TABLE 6-46: STAGE III SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 13: NORTH DOSWELL TO ELMONT (NDEL)

Crossing Infrastructure	Milepost	Improved Speed*^			Existing Speed*		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Vaughan Street	CFP 15.62				○		
West Patrick Street	CFP 15.16				○		
College Avenue/Henry Clay Road	CFP 14.85				○		
England Street (Route 54)	CFP 14.72				○		
Myrtle Street	CFP 14.64				○		
East Francis Street	CFP 14.20				○		
Ashcake Road (Route 657)	CFP 13.85				○		
Gwathmey Church Road (Route 707)	CFP 12.95				○		
Elmont Road (Route 626)	CFP 11.55				○		
Retain for further evaluation	----				○		

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
○ = No Major Constraints
*Gray shaded columns represent alignment options eliminated in Stages 1 and II Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

Table 6-47 shows Stage III screening results for Segment 14, Elmont to Greendale (ELGN). All three of the Improved Speed Options (constrained, hold bridges, and tangents and tangents) are shown to have no constraints. Given three Improved Speed options, DRPT selected the hold bridges/hold tangents option for further evaluation in the Draft EIS as it would have fewer impacts and by reusing existing rail infrastructure. The Existing Speed option to the west was also found to have no infrastructure constraints; however, this option does not achieve increased train speed, and therefore DRPT eliminated it from further consideration.

TABLE 6-47: STAGE III SCREENING RESULTS—CENTRAL VIRGINIA AREA SEGMENT 14: ELMONT TO GREENDALE (ELGN)

Crossing Infrastructure	Milepost	Improved Speed*^			Existing Speed*		No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	
Highway Overpasses							
Greenwood Road	CFP 9.89	O	O	O		O	
Interstate 295 NB	CFP 8.95	O	O	O		O	
Interstate 295 SB	CFP 8.95	O	O	O		O	
Railroad Bridge Over Water							
Chickahominy River, 115 ft. double track bridge	CFP 10.60	O	O	O		O	
North Run, culvert	CFP 8.83	O	O	O		O	
Hungary Creek, culvert	CFP 6.87	O	O	O		O	
Other Railroad Bridges (N/A)							
At-Grade Crossings							
Cedar Lane (Route 623)	CFP 11.15	O	O	O		O	
Mill Road (Route 626)	CFP 9.65	O	O	O		O	
Mountain Road	CFP 8.10	O	O	O		O	
Hungary Road	CFP 6.60	O	O	O		O	
Retain for further screening	----	O	O	O		O	

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints
*Gray shaded columns represent alignment options eliminated in Stages 1 and II Screening for the Segment.
^Hold BR = Hold bridges; Hold BR/Tan = Hold Bridges/Tangents; n/a = not applicable

6.7 STAGE IV SCREENING

Stage IV screening addresses areas of the DC2RVA corridor where additional rail alignments were developed, above and beyond adding an additional track to the existing corridor and straightening curves to improve speed. These alignments are located in Fredericksburg, Ashland, and Richmond and were created to address specific area concerns, including historical resources, limited right-of-way, possible impacts to adjacent land uses, roadway crossings, topography, and multiple alignments and station options. Additional rail alignment options in these areas, including bypasses, tunnels and alignments outside existing right-of-way were subjected to the same Stage I, II, and III screening processes as described for the previously analyzed corridor rail alignments. Rail operations reviews, run time analyses, and reasonable and feasible track alignment options were all the factors considered for these additional rail alignments. Details pertaining to these evaluations are described below.

6.7.1 Fredericksburg Area Alignments

In Fredericksburg, DRPT screened options to add a track on the east or west of the existing corridor, and determined to carry forward in the DEIS the option of adding a track on the east side (with a new rail bridge over the Rappahannock River). DRPT also determined to evaluate the potential for no additional track through Fredericksburg.

DRPT also evaluated possible east and west two track bypass alignments. DRPT determined the denser urban development west of the corridor, including I-95, precluded a west bypass alignment. DRPT then began developing east bypass alignments by first analyzing shorter routes closest to the existing corridor that took advantage of existing rail spurs. As issues were identified through the screening process, DRPT shifted routes eastward to avoid or reduce impacts to human and natural resources. DRPT identified and screened eleven two-track bypass alignments east of Fredericksburg, as described and mapped in Section 5.4[10].

Each Fredericksburg bypass would diverge from the CSXT mainline north of the Rappahannock River at the Dahlgren Spur, run east along the Dahlgren Spur a short distance, turn southerly and cross the Rappahannock River on a new rail bridge, and then continue southerly to reconnect with the mainline south of Fredericksburg (see Figure 6-4 for details). Stage I screening results for the eleven bypass options are shown in Table 6-48. DRPT found no Stage I impacts for FEB 1A and 1B; however, these alignments had been determined by DRPT to not be practical due to rail operations issues and the likelihood of interference with VRE's operations. FEB 2, 4C, 5, 5A and 5B had impacts to historic resources; FEB 5, 5A, 5B, 6A and 6B also had impacts to parks and recreation areas, and all were eliminated from further consideration. DRPT carried FEB 6C and 6D forward for further evaluation.

[10] DRPT identified additional east bypass alignments, but several were eliminated prior to screening due to obvious rail operation flaws, or similarity to other alignments carried forward for screening. Details on all bypass alignments are provided in Chapter 5.

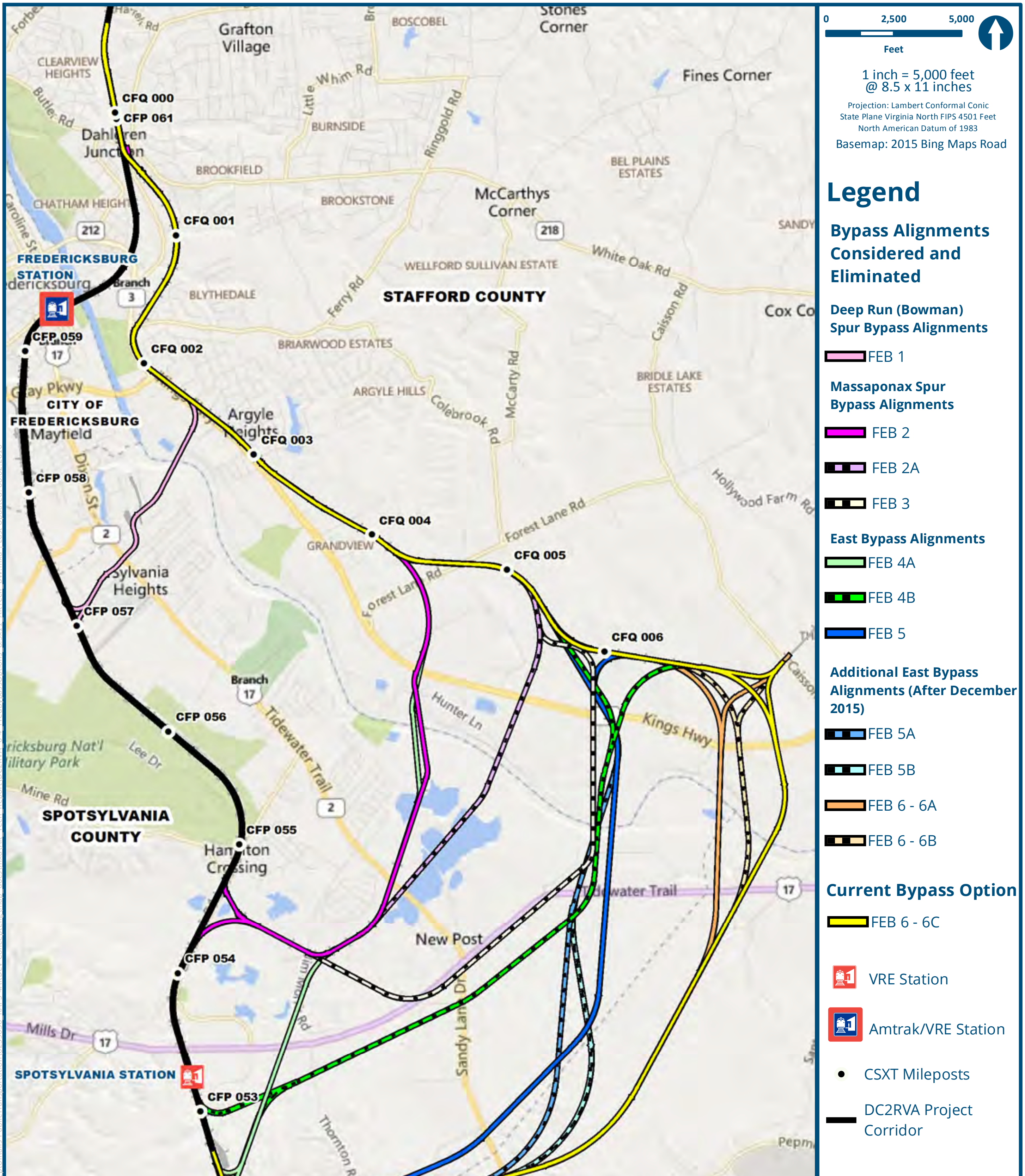


Figure 6-4
Fredericksburg Bypass Options

TABLE 6-48: STAGE I SCREENING RESULTS—NORTHERN VIRGINIA AREA: FREDERICKSBURG BYPASS (SEE APPENDIX E)

Resource	Area of Impact in Acres										
	FEB 1A	FEB 1B	FEB 2	FEB 4C	FEB 5	FEB 5A	FEB 5B	FEB 6A	FEB 6B	FEB 6C	FEB 6D
Historic Resources	0.00	0.00	22.70	220.04	5.67	5.75	5.75	0.00	0.00	0.00	0.00
Military Installations	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Parks & Public Recreation Areas	0.00	0.00	0.47	0.47	23.52	18.15	13.06	5.41	2.58	0.00	0.00
Wildlife or Waterfowl	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Retain for further screening	No	No	No	No	No	No	No	No	No	Yes	Yes

Table Notes: * FEB 1A=Fredericksburg East Bypass 1A; FEB 1B=Fredericksburg East Bypass 1B; FEB 2=Fredericksburg East Bypass 2; FEB 4C=Fredericksburg East Bypass 4C; FEB 5= Fredericksburg East Bypass 5; FEB 5A= Fredericksburg East Bypass 5A; FEB 5B= Fredericksburg East 5B; FEB 6A= Fredericksburg East Bypass 6A; FEB 6B = Fredericksburg East Bypass 6B; FEB 6C= Fredericksburg East Bypass 6C; FEB 6D=Fredericksburg East Bypass 6D

The farthest east bypass options of FEB 6C and 6D have comparatively similar impacts to Stage II resources, with FEB 6C affecting more wetlands while 6D affects more agricultural lands.

TABLE 6-49: STAGE II SCREENING RESULTS—NORTHERN VIRGINIA AREA: FREDERICKSBURG BYPASS

Resource	FEB 1A	FEB 1B	FEB 2	FEB 2A*	FEB 4B	FEB 4C	FEB 5	FEB 5A	FEB 5B	FEB 6A	FEB 6B	FEB 6C	FEB 6D
	Area of Impact in Acres												
Cemeteries	0.00	0.00	Yes^	Yes^	0.00	Yes^	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VOF Easements	0.00	0.00	0.00	0.00	13.78	0.00	0.19	5.65	13.72	27.95	27.95	27.95	27.10
Conservation Lands	0.00	0.00	1.51	1.50	27.82	1.50	23.70	18.20	13.25	5.71	3.90	0.00	0.00
Natural Heritage	0.00	0.00	0.00	0.00	18.33	0.31	14.79	16.85	10.64	4.10	7.13	5.33	5.33
Hazmat: Superfund/CERCLIS/NPL	0.00	0.00	15.02	17.66	0.00	5.34	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Wetlands	4.39	6.58	33.53	35.24	56.34	130.27	51.67	46.09	46.06	44.54	40.77	35.45	30.52
Wetland Mitigation Banks	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

TABLE 6-49: STAGE II SCREENING RESULTS—NORTHERN VIRGINIA AREA: FREDERICKSBURG BYPASS

Resource	FEB 1A	FEB 1B	FEB 2	FEB 2A*	FEB 4B	FEB 4C	FEB 5	FEB 5A	FEB 5B	FEB 6A	FEB 6B	FEB 6C	FEB 6D
	Area of Impact in Acres												
Potential Land Acquisition: Urban/Developed	19.11	24.56	35.27	28.10	17.01	46.15	10.05	11.36	11.43	5.66	5.66	5.66	7.87
Potential Land Acquisition: Agricultural	5.04	8.51	33.72	45.74	48.43	228.95	49.46	48.73	46.94	24.42	44.03	38.35	56.49
Agricultural and Forestal Districts	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Retain for further evaluation	No	No	No	No	No	No	No	No	No	No	No	Yes	Yes

Table Notes: * FEB 1A=Fredericksburg East Bypass 1A; FEB 1B=Fredericksburg East Bypass 1B; FEB 2=Fredericksburg East Bypass 2; FEB 4C=Fredericksburg East Bypass 4C; FEB 5= Fredericksburg East Bypass 5; FEB 5A= Fredericksburg East Bypass 5A; FEB 5B= Fredericksburg East 5B; FEB 6A= Fredericksburg East Bypass 6A; FEB 6B = Fredericksburg East Bypass 6B; FEB 6C= Fredericksburg East Bypass 6C; FEB 6D=Fredericksburg East Bypass 6D

*Gray shaded columns represent alignment options eliminated in Stage 1 Screening for the Segment.

^ Not quantified

With respect to the Fredericksburg bypass options, VRE expressed concern during Project coordination meetings that the options connecting the south end of the bypass to the mainline at the existing Massaponax rail spur (approximate milepost CFP 54.6), would adversely affect VRE operations. Freight trains entering or exiting the mainline from the Massaponax rail spur would be moving comparatively slowly due to the bypass curves and grade. The slow movement of the long freight trains would block trains from entering or leaving the new Spotsylvania VRE station and the VRE maintenance facility at Crossroads. DRPT identified a similar issue with FEB1A and 1B at the Deep Run Spur—these bypass options would place all through freight trains on the east side of the corridor where the Deep Run Spur joins the mainline, only approximately 1.6 miles from the VRE Spotsylvania station, creating a potential for interference with VRE train movements between Fredericksburg Station and Spotsylvania Station.

TABLE 6-50: STAGE III SCREENING RESULTS EVALUATING INFRASTRUCTURE IMPACTS—NORTHERN VIRGINIA AREA: FREDERICKSBURG BYPASS

Bypass Alignment	Roadways			New Bridges	Retain for further screening**
	Improved Grade Crossings on Dahlgren Spur	Potentially Closed	Grade Separated*		
FEB 1A	Debruen Lane - Median Separators Ferry Road - Four Quad Gate/Realignment	n/a	Kings Highway/Route 3 Joseph Mills Drive & Main Street Business Route 2	Rappahannock River	●
FEB 1B	Debruen Lane - Median Separators Ferry Road - Four Quad Gate/Realignment	Joseph Mills Drive & Main Street (Realigned)	Kings Highway/Route 3 (2 crossings) Business Route 2 (2 crossings) Landsdowne Road	Rappahannock River	●
FEB 2A	Debruen Lane - Median Separators Ferry Road - Four Quad Gate/Realignment Federal Drive - Four Quad Gate Little Falls Road - Gates with Median Separators	Michael Scott Lane (Realigned)	Forest Lane Road (new location) Kings Highway/Route 3 Business Route 2 Jim Morris Road (609)	Rappahannock River	●
FEB 4C	Debruen Lane - Median Separators Ferry Road - Four Quad Gate/Realignment Federal Drive - Four Quad Gate Little Falls Road - Gates with Median Separators	Michael Scott Lane (Realigned)	Forest Lane Road (new location) Kings Highway/Route 3 Business Route 2 Jim Morris Road (609) Benchmark Road Jim Morris Road (609) (new location) Mills Drive/Route 17	Rappahannock River	●

TABLE 6-50: STAGE III SCREENING RESULTS EVALUATING INFRASTRUCTURE IMPACTS—NORTHERN VIRGINIA AREA: FREDERICKSBURG BYPASS

Bypass Alignment	Roadways			New Bridges	Retain for further screening**
	Improved Grade Crossings on Dahlgren Spur	Potentially Closed	Grade Separated*		
FEB 5+	Cool Springs Road - TBD Debruen Lane - Median Separators Ferry Road - Four Quad Gate/Realignment Federal Drive - Four Quad Gate Little Falls Road - Gates with Median Separators	n/a	Kings Highway/Route 3 Mills Drive/Route 17 Fredericksburg Turnpike/Route 2 Thornton Rolling Road (609)	Rappahannock River	●
FEB 5A+	Cool Springs Road - TBD Debruen Lane - Median Separators Ferry Road - Four Quad Gate/Realignment Federal Drive - Four Quad Gate Little Falls Road - Gates with Median Separators Forest Lane Road - Gates with Median Separators	n/a	Kings Highway/Route 3 Mills Drive/Route 17 Fredericksburg Turnpike/Route 2 Thornton Rolling Road (609)	Rappahannock River	●

TABLE 6-50: STAGE III SCREENING RESULTS EVALUATING INFRASTRUCTURE IMPACTS—NORTHERN VIRGINIA AREA: FREDERICKSBURG BYPASS

Bypass Alignment	Roadways: Improved Grade Crossings on Dahlgren Spur	Roadways: Potentially Closed	Roadways: Grade Separated*	New Bridges	Retain for further screening**
FEB 5B+	Cool Springs Road - TBD Debruen Lane - Median Separators Ferry Road - Four Quad Gate/Realignment Federal Drive - Four Quad Gate Little Falls Road - Gates with Median Separators Forest Lane Road - Gates with Median Separators	n/a	Kings Highway/Route 3 Mills Drive/Route 17 Fredericksburg Turnpike/Route 2 Thornton Rolling Road (609)	Rappahannock River	●
FEB 6A+	Cool Springs Road - TBD Debruen Lane - Median Separators Ferry Road - Four Quad Gate/Realignment Federal Drive - Four Quad Gate Little Falls Road - Gates with Median Separators Forest Lane Road - Gates with Median Separators	n/a	Kings Highway/Route 3 Mills Drive/Route 17 Fredericksburg Turnpike/Route 2 Thornton Rolling Road (609)	Rappahannock River	●

TABLE 6-50: STAGE III SCREENING RESULTS EVALUATING INFRASTRUCTURE IMPACTS—NORTHERN VIRGINIA AREA: FREDERICKSBURG BYPASS

Bypass Alignment	Roadways			New Bridges	Retain for further screening**
	Improved Grade Crossings on Dahlgren Spur	Potentially Closed	Grade Separated*		
FEB 6B^{+}	Cool Springs Road - TBD Debruen Lane - Median Separators Ferry Road - Four Quad Gate/Realignment Federal Drive - Four Quad Gate Little Falls Road - Gates with Median Separators Forest Lane Road - Gates with Median Separators	n/a	Kings Highway/Route 3 Mills Drive/Route 17 Fredericksburg Turnpike/Route 2 Thornton Rolling Road (609)	Rappahannock River	●
FEB 6C^{+}	Cool Springs Road - TBD Debruen Lane - Median Separators Ferry Road - Four Quad Gate/Realignment Federal Drive - Four Quad Gate Little Falls Road - Gates with Median Separators Forest Lane Road - Gates with Median Separators	n/a	Kings Highway/Route 3 Mills Drive/Route 17 Fredericksburg Turnpike/Route 2 Thornton Rolling Road (609)	Rappahannock River	○

TABLE 6-50: STAGE III SCREENING RESULTS EVALUATING INFRASTRUCTURE IMPACTS—NORTHERN VIRGINIA AREA: FREDERICKSBURG BYPASS

Bypass Alignment	Roadways			New Bridges	Retain for further screening**
	Improved Grade Crossings on Dahlgren Spur	Potentially Closed	Grade Separated*		
FEB 6D	Cool Springs Road - TBD Debruen Lane - Median Separators Ferry Road - Four Quad Gate/Realignment Federal Drive - Four Quad Gate Little Falls Road - Gates with Median Separators Forest Lane Road - Gates with Median Separators	n/a	Kings Highway/Route 3 Fredericksburg Turnpike/Route 2 Mills Drive/Route 17 Macedonia Road (609) Summit Crossing Road (668)	Rappahannock River	●

Table Notes: FEB 1A= Fredericksburg East Bypass 1A; FEB 1B=Fredericksburg East Bypass 1B; FEB 2=Fredericksburg East Bypass 2; FEB 4C=Fredericksburg East Bypass 4C; FEB 5= Fredericksburg East Bypass 5; FEB 5A= Fredericksburg East Bypass 5A; FEB 5B= Fredericksburg East 5B; FEB 6A= Fredericksburg East Bypass 6A; FEB 6B = Fredericksburg East Bypass 6B; FEB 6C= Fredericksburg East Bypass 6C; FEB 6D=Fredericksburg East Bypass 6D; n/a= not applicable

● = Not carried through for further screening in Draft EIS

O = Carried through for future screening in Draft EIS

+ All alignments cross the same roadways at slightly different or exact locations but are equivalent from a public roadway connectivity and accessibility standpoint.

* All bypasses will require new double track bridges at grade separated crossings.

Based on the Stage III screening of the Fredericksburg bypass options, DRPT determined only the East Bypass 6C would be carried forward to further analysis in the Draft EIS. The existing two-track corridor and Amtrak/VRE station would remain in the city, and continue to be served by both passenger and commuter rail.

6.7.2 Ashland Area Alignment Screening

Segment 13 (North Doswell to Elmont) includes the Town of Ashland; as previously described in Section 5.5, the rail corridor runs at-grade in Ashland through the center of Center Street, bisecting Randolph-Macon College, the town's original business district, and residential neighborhoods. The CSXT-owned right of way through town is narrow and barely encompasses the existing two tracks. Train speeds through town are restricted for safety due to the multiple at-grade pedestrian and roadway crossings. After evaluating preliminary rail alignments to add a third main track to Segment 13, DRPT determined that the Improved Speed Hold Bridges/Tangents alignment would be carried forward for further evaluation in the Draft EIS. However, DRPT recognized that the portion of Segment 13 through Ashland warranted additional review due to the limited right of way, train speed restriction, and the many comments received regarding rail alignment alternatives and train impacts in Ashland during project scoping. Therefore, DRPT conducted additional evaluation of alternative rail alignments within and through Ashland; these Ashland alignments would connect to the main corridor north and south of Ashland and combine with the Improved Speed Hold Bridges/Tangent rail alignment for the remainder of Segment 13. The Ashland rail alignments include:

- No Additional Track (Minor Improvements). This option does not include the construction of an additional mainline track through the Town, but incorporates a third track north and south of town. The existing two tracks through Ashland are used by freight and passenger trains similar to current conditions, and connect to three tracks north of Vaughan Road and south of Ashcake Road. DRPT determined to carry this alternative forward to the Draft EIS.
- Adding a Track At-grade. This option adds a third main track parallel to the existing two tracks using one of the following configurations:
  - Add a track on the west of existing tracks.
  - Add a track on the east of existing tracks.
  - Add a track and center all three tracks.
- Adding a Track Below Grade (Tunnel). This option adds a third main track in a tunnel parallel to and below the existing two-track right of way through town using one of the following configurations:
  - Add a track on the east of existing tracks using a cut and cover tunnel.
  - Add a track on the west of the existing tracks using a deep bore tunnel in the bedrock.
- Adding a Two-Track Bypass. This option adds a two-track bypass around the town, leaving the existing two tracks through town. The bypass alignments evaluated by DRPT include five options east of town and four options west of town. Several of the east bypass alignments require a new rail wye connection between the BBRR and the CSXT main line at Doswell; five wye options were also identified and evaluated. (For purposes of screening, bypass alignments are compared to bypass alignments and wye alignments are compared to wye alignments).

DRPT's evaluation of these alignment types through the Stage I, II, and III screening process is described below.

DRPT evaluated the three options for adding a track at grade through Ashland against the Stage I, II and III criteria. The current two-track alignment bisects Center Street through town from Vaughan Road to Ashcake Road. Center Street is one-way (south-bound) on the west of the tracks and one-way (north-bound) on the east of the tracks. There is an additional lane used for parallel parking on the outside of both sides of Center Street for most of its length. Between College Avenue and Route 54, Center Street south-bound makes a slight bump to the west to accommodate the old train station and west station platform. In accordance with the DC2RVA Basis of Design, all of the at-grade alignment options would need to shift outwards slightly north of Route 54 to accommodate station platforms serving all three tracks (one side platform and one island platform, extending north of College Avenue—see Chapter 8 for details on Ashland station options). The station improvements would likely result in closing College Avenue and could require additional right of way. North of Vaughan Road and south of Ashcake Road, the at-grade options would revert to the alignment options already screened for the North Doswell to Elmont segment.

Adding a track at-grade on the west occupies the south-bound travel lane of Center Street and would also displace the old train station building (now the town's Visitor Center). The station building is potentially eligible to be listed as an historic resource. Adding a track on the west would also encroach on a local park/walking trail north of Patrick Street. Adding a track on the east occupies the north-bound travel lane but does not directly affect any historic or park resources. Adding a track and centering all three tracks would shift tracks into both the south-bound and north-bound travel lanes and displace the old train station building, but would not affect the park. No other Stage I resources were affected by the three additional track at grade options.

No Stage II resources are affected by the three track at-grade options in the section between Vaughan Road and Ashcake Road. Similarly, as all road and pedestrian crossings through Ashland are at-grade, there are no Stage III infrastructure constraints. DRPT therefore determined to carry the additional track at-grade on the east alternative into the DEIS for further evaluation. Subsequently, in discussions with the Town of Ashland and Hanover County, and through public comments, concerns were raised over the potential impacts to the Town and Randolph Macon College from the loss of the north-bound travel lane of Center Street and the closing of College Avenue. In response to these comments, DRPT determined to further consider adding a track and centering all three tracks and relocating or closing the Ashland station to avoid closing College Avenue. Adding a track and centering all three tracks (with no station in downtown Ashland) will therefore be evaluated in the DEIS. DRPT will also consider the potential to relocate the station on the east side of the tracks to a site just south of Ashcake Road.

DRPT evaluated two below-grade (tunnel) options—a deep bore tunnel traveling through bedrock beneath the current right-of-way, and a cut and cover tunnel running east of the existing tracks (see Chapter 5.5.2 for a description of these options). These tunnel options would extend beyond Vaughan Road and Ashcake Road; north and south of the tunnel portals, the track alignment would merge with the previously screened at-grade track options for the Doswell to Elmont segment. The bore tunnel in rock is the longer of the two tunnel options and would merge with the previously screened track alignments at MP 16.6 north of Ashland and MP 13.0 south of Ashland. Stage I screening of the Ashland tunnel options is shown below (Table 6-51):

TABLE 6-51: NORTH DOSWELL TO ELMONT (NDEL) —STAGE I SCREENING OF ASHLAND TUNNEL OPTIONS (MP 16.6 TO MP 13.0)

Stage I Resource	Ashland Bore Tunnel in Rock	Ashland Cut and Cover Tunnel
Historic Resources	0.58	0.05
Military Installations	0.00	0.00
Parks	0.00	0.00
Schools and Public Recreation Areas	0.01	0.01
Wildlife Refuges	0.00	0.00
Retain for further screening	Yes	Yes

Both tunnel options would have some minor potential impacts to historic resources in the town of Ashland primarily from three ventilation structures and emergency access structures or grates. Stage II screening of the tunnel options through Ashland are shown below. Refer to Chapter 5.5 for more details pertaining to these structures.

TABLE 6-52: NORTH DOSWELL TO ELMONT (NDEL) — STAGE II SCREENING OF TUNNEL OPTIONS (MP 16.6 TO MP 13.0)

Stage II Resource	Ashland Bore Tunnel in Rock	Ashland Cut and Cover Tunnel
Cemeteries	0.00	0.00
VOF Easements	0.00	0.00
Conservation Lands	0.00	0.00
Natural Heritage	0.00	0.00
Hazmat: Superfund/CERCIS/NPL	0.00	0.00
Wetlands	13.38	3.90
Wetland Mitigation Banks	0.00	0.00
Potential Land Acquisition: Urban/Developed	9.45	3.96
Potential Land Acquisition: Agricultural	1.39	0.00
Agricultural and Forestal Districts	0.00	0.00
Retain for further screening	No	No

Both tunnel options have impacts on wetlands, primarily from the areas occupied by the tunnel portals and ramps to the surface south of Ashland. These wetland impacts, when combined with the wetland impacts from the additional track necessary to complete a third track in Segment 13 between North Doswell and Elmont, are typically greater than other Ashland options for the Segment. DRPT did not conduct Stage III screening of the tunnel options as they would not have infrastructure constraints from aboveground overpasses or bridges. The cut and cover tunnel option and north and south cut and cover sections of the bore tunnel would likely have substantive, albeit temporary, impacts on existing infrastructure in Ashland during construction. Constructing the cut and cover tunnels while maintaining rail operations and ensuring road access through Ashland would be problematic. Overall, the tunnels themselves would be expensive to build and operate compared to developing a new track(s) on the surface. Each tunnel would require multiple surface structures and/or grates for ventilation systems and emergency access along Center Street, adversely affecting historic resources. Due to the impacts summarized above, DRPT dismissed the tunnel options from further consideration.

Nine potential bypass alignments around Ashland were identified and are described in Section 5.5. Of the Ashland bypass alignment options in Table 6-53, parks and recreation area impacts are identified in the Stage I Screening for AEB 1 and AEB 2. The remaining bypass options did not result in impacts to the resources and are carried forward for Stage II Screening. Five wye alignments were identified for a potential rail connection between the BBRR and the CSXT mainline. Of these, two (Wye 1 and Wye 2) have direct impacts to historic resources in Doswell and DRPT eliminated these from further consideration. In addition to the five wye alignments, a Freight Diversion option that utilized the BBRR was also taken into consideration. This option is further explained in detail in Section 5.5. Tables 6-53 through 6-58 represent the screening results of the additional options considered for Ashland.

TABLE 6-53: STAGE I SCREENING RESULTS—ASHLAND EAST AND WEST BYPASSES

Resource	East Bypass*										West Bypass*			
	AEB 1	AEB 2	AEB 3	AEB 4	AEB 5	Wye 1	Wye 2	Wye 3	Wye 4	Wye 5	AWB 1	AWB 2	AWB 3	AWB 4
	Area of Impact in Acres													
Historic Resource	0	0	0	0	0	3.38	2.42	0	0	0	0	0	0	0
Military Installations	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Parks & Public Recreation Areas	13.57	13.99	0	0	0	0	0	0	0	0	0	0	0	0
Wildlife or Waterfowl	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Retain for further screening**	No	No	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table Notes: * AEB 1=Ashland East Bypass; AEB 2=Ashland East Bypass to Buckingham Brand Railroad; AEB 3=Ashland East Bypass that does not Cross I-95; AEB 4=Ashland East Bypass in the I-95 Median; AEB 5=Ashland East Bypass White Paper; Wye 1=Wye Option #1; Wye 2=Wye Option #2; Wye 3=Wye Option #3; Wye 4=Wye Option #4; Wye 5=Wye Option #5; AWB 1= Ashland West Bypass; AWB 2=Ashland West Bypass Revision #1 per Public Comment; AWB 3=West Ashland Bypass; AWB 4=West Ashland Bypass

Stage II Screening of the Ashland east and west bypass alignments and the wye connections are shown in Table 6-53. The east bypasses were found to have comparatively high wetland impacts and high acquisitions of urban/developed lands and were therefore eliminated by DRPT from further consideration. DRPT identified the Wye 5 alignment bypass option as having less wetland impacts compared to other wye connections, however, both wye 4 and 5 create a rail bottleneck by increasing the number of freight trains that cross the CSXT mainline at grade. Wye 3, although having slightly higher wetland impacts than wye 5, does not create a new rail bottleneck. AWB 1 has greater wetland impacts than other west bypasses and is eliminated. Although AWB 2, 3, and 4 have similar levels of wetland impacts, AWB 4 has less impacts to agricultural/forestal districts. DRPT eliminated AWB 2 and 3, and carried AWB 4 forward for further evaluation.

TABLE 6-54: STAGE II SCREENING RESULTS—CENTRAL VIRGINIA AREA ASHLAND BYPASS

Resource	East Bypass*										West Bypass*			
	AEB 1^	AEB 2^	AEB 3	AEB 4	AEB 5	Wye 1^	Wye 2^	Wye 3	Wye 4	Wye 5	AWB 1	AWB 2	AWB 3	AWB 4
	Area of Impact in Acres													
Cemeteries	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VOF Easements	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conservation Lands	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Natural Heritage	0	0.10	0	0	0.07	0	0	0	0	0	0.27	0.11	0.18	0.18
Hazmat: Superfund/CE RCLIS/NPL	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Wetlands	40.49	58.82	43.41	44.06	65.06	7.70	5.18	8.42	14.73	3.77	45.93	42.31	39.23	39.05
Wetland Mitigation Banks	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Potential Land Acquisition: Urban/ Developed	14.46	15.27	20.93	29.97	95.28	8.16	2.76	3.48	3.58	2.88	10.61	12.51	10.11	6.20
Potential Land Acquisition: Agricultural	9.19	21.00	7.45	8.00	0.12	4.40	0.01	4.41	10.91	7.35	22.21	32.90	24.38	30.03
Agricultural and Forestal Districts	0	0	0	0	0	0	0	0	0	0	0	19.23	21.31	13.07
Retain for further screening**	No	No	No	No	No	No	No	Yes	No	No	No	No	No	Yes

Table Notes: * AEB 1=Ashland East Bypass; AEB 2=Ashland East Bypass to Buckingham Brand Railroad; AEB 3=Ashland East Bypass that does not Cross I-95; AEB 4=Ashland East Bypass in the I-95 Median; AEB 5=Ashland East Bypass White Paper; Wye 1=Wye Option #1; Wye 2=Wye Option #2; Wye 3=Wye Option #3; Wye 4=Wye Option #4; Wye 5=Wye Option #5; AWB 1=Ashland West Bypass; AWB 2=Ashland West Bypass Revision #1 per Public Comment; AWB 3=Ashland West Bypass; AWB 4=Ashland West Bypass

*Gray shaded columns represent alignment options eliminated in Stage 1 Screening for the Segment.

^ Alternatives were not retained for further screening after Stage I Screening; however, information regarding Stage II screening impacts for these alternatives has been provided.

The Stage III Screening for the Ashland east and west bypass alignments considers crossing infrastructure relative to the existing at-grade public and private roadway crossings along the proposed rail corridor for each bypass option. As shown in Table 6-55, roadways crossed would either be closed and traffic rerouted or a new grade separated structure would be built. In addition, alignments requiring demolition or relocation of structures (e.g. buildings, etc.) are described.

TABLE 6-55: STAGE III SCREENING RESULTS EVALUATING INFRASTRUCTURE IMPACTS—ASHLAND EAST AND WEST BYPASSES

Bypass Alignment	Roadways		New Bridges	Retain for Further Evaluation**
	Closed	Grade Separated		
East Bypass*				
AEB 1^	Boxwood Farm Lane (Realigned) Success Street (Realigned)	Cedar Lane Elmont Road Tyson Trail Johnson Road Washington Highway Design Road Ashcake Road I-95 Mount Herman Road East Patrick Henry Road Jamestown Road Hickory Hill Road		No
AEB 2^	Boxwood Farm Lane (Realigned) Success Street (Realigned)	Cedar Lane Elmont Road Tyson Trail Johnson Road Washington Highway Design Road Ashcake Road I-95 Mount Herman Road East Patrick Henry Road Jamestown Road Hickory Hill Road Old Ridge Road		No

TABLE 6-55: STAGE III SCREENING RESULTS EVALUATING INFRASTRUCTURE IMPACTS—ASHLAND EAST AND WEST BYPASSES

Bypass Alignment	Roadways		New Bridges	Retain for Further Evaluation**
	Closed	Grade Separated		
AEB 3^	Boxwood Farm Lane (Realigned) Success Street (Realigned)	Cedar Lane Elmont Road Tyson Trail Johnson Road Washington Highway Design Road Ashcake Road East Patrick Henry Road Jamestown Road Hickory Hill Road		No
AEB 4^	Boxwood Farm Lane (Realigned) Success Street (Realigned)	Cedar Lane Elmont Road Tyson Trail Johnson Road Washington Highway Design Road Ashcake Road I-95 southbound East Patrick Henry Road Jamestown Road Hickory Hill Road		No
AEB 5^	Success Street (Realigned)	Johnson Road Washington Highway Design Road Ashcake Road I-95 southbound East Patrick Henry Road Jamestown Road Hickory Hill Road Old Ridge Road Kings Dominion Boulevard I-95 Southbound		No
Wye 1^		I-95 Doswell Road		No
Wye 2^		Doswell Road		No

TABLE 6-55: STAGE III SCREENING RESULTS EVALUATING INFRASTRUCTURE IMPACTS—ASHLAND EAST AND WEST BYPASSES

Bypass Alignment	Roadways		New Bridges	Retain for Further Evaluation**
	Closed	Grade Separated		
Wye 3^		I-95 Doswell Road		No
Wye 4^		Verdon Road Washington Highway		No
Wye 5		Washington Highway Doswell Road		No
West Bypass*				
AWB 1^	Chapman Street	Elmont Road Ashcake Road Yowell Road Thompson Street Blunts Bridges Road Cross Corner Road Washington Highway		No
AWB 2^	Blanton Road	Elmont Road Ashcake Road Yowell Road W Patrick Henry Road Independence Road Blunts Bridges Road Cross Corner Road Washington Highway		No
AWB 3^	Blanton Road	Elmont Road Ashcake Road Yowell Road W Patrick Henry Road Independence Road Blunts Bridges Road Cross Corner Road Washington Highway		No

TABLE 6-55: STAGE III SCREENING RESULTS EVALUATING INFRASTRUCTURE IMPACTS—ASHLAND EAST AND WEST BYPASSES

Bypass Alignment	Roadways		New Bridges	Retain for Further Evaluation**
	Closed	Grade Separated		
AWB 4	Independence Road Cross Corner Road	Elmont Road Ashcake Road Yowell Road West Patrick Henry Road Blunts Bridges Road Washington Highway		Yes

Table Notes: * AEB 1=Ashland East Bypass; AEB 2=Ashland East Bypass to Buckingham Brand Railroad; AEB 3=Ashland East Bypass that does not Cross I-95; AEB 4=Ashland East Bypass in the I-95 Median; AEB 5=Ashland East Bypass White Paper; Wye 1=Wye Option #1; Wye 2=Wye Option #2; Wye 3=Wye Option #3; Wye 4=Wye Option #4; Wye 5=Wye Option #5; AWB 1= Ashland West Bypass; AWB 2=Ashland West Bypass Revision #1 per Public Comment; AWB 3=West Ashland Bypass; AWB 4=West Ashland Bypass

^ Alternatives were not retained for further screening after Stage I and II Screening; however, information regarding Stage III screening impacts for these alternatives has been provided.

*Gray shaded columns represent alignment options eliminated in Stage I and II Screening for the Segment.

Table 6-56 represents the Stage I screening for the BBRR Freight Diversion Alternative, both A-Line and S-Line options. The A-Line option includes improvements to Wye 3 (connecting the CSXT mainline to the BBRR just north of Doswell), BBRR (Doswell to AM Junction), and SAAM (SAY/WAY to AM Junction on the S-Line Hermitage Lead) sections of the corridor. The S-Line option includes improvements to Wye 3, BBRR, and AMCE (AM Junction to Centralia on the S-Line). The AMCE improvements would duplicate improvements being considered for the Richmond alignment alternatives that add passenger trains to the S-Line. The Stage I screening for BBRR Freight Diversion Alternative A-Line and S-Line options identified no impacts and both options were therefore carried forward to Stage II screening.

TABLE 6-56: STAGE I SCREENING RESULTS—BBRR FREIGHT DIVERSION ALTERNATIVE

Resource	Wye 3	BBRR	SAAM	AMCE	BBRR A-Line Option	BBRR S-Line Option
	Area of Impact in Acres					
Historic Resources	0	0	0.38	0	0	0
Military Installations	0	0	0	0	0	0
Parks & Public Recreation Areas	0	0	0	0	0	0
Wildlife or Waterfowl	0	0	0	0	0	0
Retain for further screening	n/a	n/a	n/a	n/a	Yes	Yes

Table Notes: n/a = not applicable

Stage II screening of the BBRR Freight Diversion Alternative A-Line and S-Line options identified substantial potential impacts to wetlands as well as urban and agricultural land acquisition.

TABLE 6-57: STAGE II SCREENING RESULTS—BBRR FREIGHT DIVERSION ALTERNATIVE (DOSWELL TO AM JUNCTION)

Resource	Wye 3	BBRR	SAAM	AMCE	BBRR A-Line Option	BBRR S-Line Option
	Area of Impact in Acres					
Cemeteries	0	0	0	0	0	0
VOF Easements	0	0	0	0	0	0
Conservation Lands	0	0	0	0	0	0
Natural Heritage	0	0	0	0	0	0
Hazmat: Superfund/CERCLIS/NPL	0	0	0	0	0	0
Wetlands	6.95	71.92	19.31	4.04	82.91	98.18
Wetland Mitigation Banks	0	0	0	0	0	0
Potential Land Acquisition: Urban/Developed	2.53	30.79	4.55	0.68	34.0	37.87
Potential Land Acquisition: Agricultural	8.16	19.30	0	0	27.46	27.46
Agricultural and Forestal Districts	0	0	0	0	0	0
Retain for further screening	n/a	n/a	n/a	n/a	No	No

Table Notes: n/a = not applicable

The Stage III Screening for the BBRR Freight Diversion Alternative (Doswell to AM Junction) evaluated infrastructure impacts to existing roadways and bridges. In the 2.5 miles between AY and the Hospital Wye, there are 7 highway overpasses plus 2 additional highway overpasses across the Hospital Wye. These overpasses carry N. Boulevard, I-95, I-64, N. Lombardy Street, US 1 (NB & SB), Chamberlayne Parkway, a new pedestrian overpass, and N. 1st Street. Crossing the Hospital Wye are N. 5th Street and I-64 (EB & WB). See Table 6-58 for a detailed list of crossings related to the BBRR Freight Diversion Alternative.

TABLE 6-58: STAGE III SCREENING RESULTS EVALUATING INFRASTRUCTURE IMPACTS—BBRR FREIGHT DIVERSION ALTERNATIVE

Freight Diversion Alignment	Roadways		Potential New Grade Separations*	Retain for Further Evaluation
	Improved At-Grade Crossings	Grade Separated*		
BBRR S-Line	Bullfield Road Doswell Road Hickory Hill Road Cadys Mill Road Stumpy Road Wyndale Drive Cool Spring Road Industrial Park Road Richmond Henrico Turnpike Dill Road Hospital Street (CA Crossing)	I-95 SB I-95 NB Hospital Street (SRN Crossing)	King Dominion Boulevard E. Patrick Henry Road Peaks Road New Ashcake Road	No
BBRR A-Line	Bullfield Road Doswell Road Hickory Hill Road Cadys Mill Road Stumpy Road Wyndale Drive Cool Spring Road Industrial Park Road Richmond Henrico Turnpike Dill Road Hospital Street (CA Crossing) N. 2nd Street - Closed St. James Street - Closed Brook Road Hermitage Road	I-95 SB I-95 NB N. 1st Street N. 5th Street 64 EB 64 WB E. Leigh St. Hospital Street (SRN Crossing) St. James Street – Pedestrian Overpass Only	Kings Dominion Boulevard E Patrick Henry Road Peaks Road New Ashcake Road	No

Table Notes: * Further studies required
*Gray shaded columns represent alignment options eliminated in Stage I and II Screening for the Segment.

DRPT concluded the BBRR Freight Diversion A-Line option would not be feasible without a grade-separation of two tracks for passenger trains operating between Main Street Station and Staples Mill Road Station via the East Acca bypass, and a double-track freight route for freight trains operating between AY interlocking and a new BBRR connection at Hospital Street. However, due to severe spatial constraints created by terrain and existing infrastructure, including I-95 and I-64 overpasses, DRPT did not identify any practical option to eliminate the potential bottleneck by grade-separating the diverted freight trains going to/from the BBRR from the passenger trains moving between Main Street Station and Acca Yard. Based on the infrastructure constraints, operational concerns, and high wetland and property impacts, DRPT therefore determined the BBRR Freight Diversion A-Line option was not reasonable.

DRPT concluded the BBRR Freight Diversion S-Line option would not be feasible if implemented in conjunction with any of the Richmond Area alignment options that add passenger trains on the S-Line past the west side of Main Street Station. The additional freight train traffic on the S-Line, combined with delays caused by passenger train service to the west side of Main Street Station, would create a bottleneck, impeding train movements. Based on the infrastructure constraints, operational concerns, and high wetland and property impacts, DRPT therefore determined the BBRR Freight Diversion S-Line option was not reasonable.

At Doswell, the single-track Buckingham Branch Railroad crosses the two-track CSXT mainline in an east-west direction at-grade in a double diamond configuration. Passenger trains using the CSXT tracks slow to approximately 60 mph or less to cross through the diamond. The BBRR maintains a rail yard in the northwest quadrant of the rail crossing, with rail served industrial properties north of the rail yard and in the southwest quadrant. The northeast quadrant is occupied by the Doswell Historic District. Immediately to the east of the CSXT mainline is the I-95 interstate corridor. The BBRR passes under I-95. Additional detail on the CSXT through Doswell and the BBRR is provided in Chapter 3 of this Alternatives Technical Report.

Early in the conceptual design process of the project, DRPT considered various options to eliminate this double diamond, specifically the potential for grade separating the rail crossing. The BBRR track is constrained at-grade by the I-95 overpass to the east and the need to maintain surface access to their yard and customers on the west of the CSXT mainline, and was therefore dismissed by DRPT from consideration for a flyover. DRPT also dismissed the concept of taking the CSXT mainline, including a potential third track, up and over the BBRR. A three-track structure carrying passenger and freight trains over the BBRR would necessarily extend for several miles north and south of the BBRR to provide an adequate grade, and would either encroach on to the BBRR rail yard and/or the Doswell Historic District. DRPT also considered the potential for constructing a single-track flyover on the east side of the CSXT mainline to serve as a passenger train only track, allowing intercity passenger trains to pass through the rail crossing without slowing down. However, the reduction in travel time by allowing passenger trains to proceed over the BBRR at 90 mph versus slowing to cross the diamond would be minimal. After considering the minimal reduction in travel time against the potential infrastructure impacts, DRPT determined the concept of grade separating the CSXT and BBRR crossing was not reasonable and would not be evaluated further.

6.7.3 Richmond Area Alignment Options

In the Richmond area, due to two potential routes (CSXT S-Line and A-Line) through the city, the dense urban development adjacent to the rail rights of way, and the complexity of passenger and freight rail movements through the city, the development of preliminary rail alignment alternatives focused on potential station locations and the additional rail infrastructure needed for those potential stations to meet the DC2RVA Purpose and Need as described in Chapter 5. First, station location options were identified based on existing stations, prior corridor and station studies, and public and stakeholder input during project scoping. Station location options were then evaluated based on roadway access, existing land use, property impacts, topography, population density, existing rail operations, and FRA's station guidelines, as well as each location's ability to meet the Project's Purpose and Need (see Chapter 8). For each station location option, a set of rail alignments and other infrastructure improvements required to meet the Project's Purpose and Need were identified. The rail alignments and infrastructure improvements include additional main track, storage tracks, connector wye tracks, crossovers, and new bridges. The combination of infrastructure improvements for each station location was based on engineering and passenger/freight rail operational analyses to identify required improvements to provide the reliability and frequency of passenger service and to facilitate freight service on the DC2RVA corridor through Richmond. The rail improvements and alignment options for the station location options were screened for Stage I, II, and III resources and evaluated for rail operation efficiency, applying the same approach as used for rail alignment options in Northern Virginia and Central Virginia.

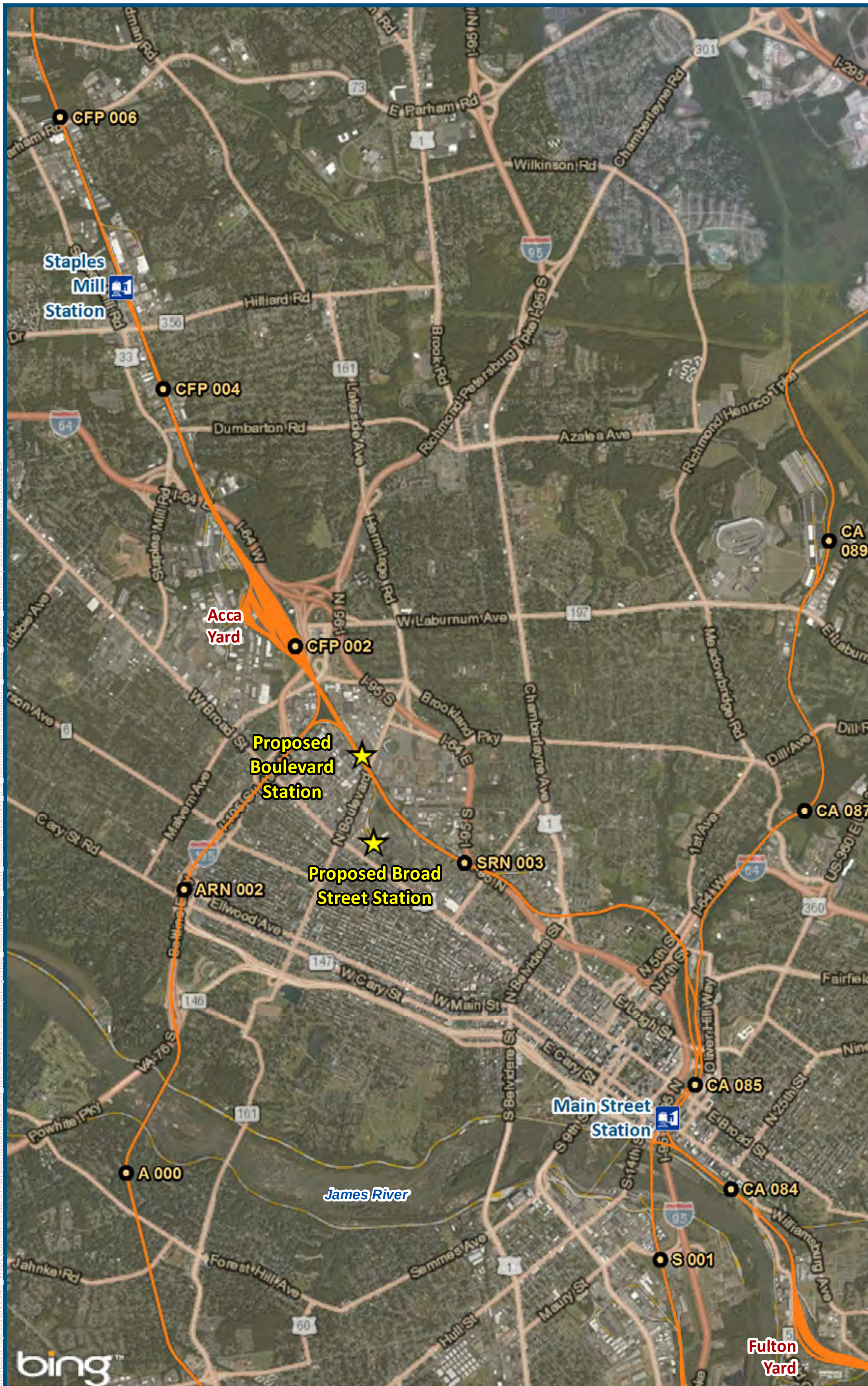
Section 6.7.3.1 presents the range of station location options in Richmond, based on analyses detailed in Chapter 8. Section 6.7.3.2 describes a potential freight connector bypass route across the James River that could be used to provide additional capacity for station configurations relying on the CSXT S-Line for passenger service through Downtown Richmond. This section presents Stage I, II, and III screening of the various freight connector options. Section 6.7.3.3 combines a potentially reasonable freight connector option with other station location and rail improvement options. Section 6.7.3.4 screens those combined station location and freight connector options against potential impacts to Stage I, II, and III resources, and identifies station location and rail infrastructure combinations for further consideration. Section 6.7.3.5 evaluates rail operation efficiency, including pure run time between Greendale and Centralia, for the station location options.

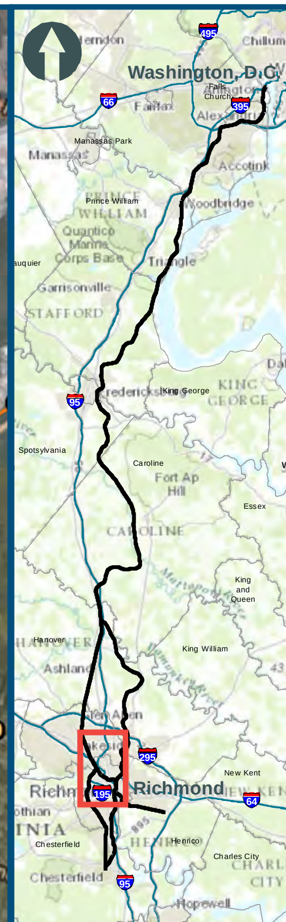
6.7.3.1 Station Location Options

Station location options in Richmond were developed for single station options and two-station options as shown on Figure 6-5 (see Chapter 8 for more details related to station options). In an effort to meet the Purpose and Need for the DC2RVA High Speed Rail Project, considerations for utilization of individual stations as well as multiple combinations of two stations were made and evaluated. Each of the following station location options includes a corresponding set of rail alignments and improvements for screening:

Single Station Options

- **Staples Mill Road Station Only (SMSO)** - All long distance, interstate corridor, and Northeast Regional (Virginia) passenger trains moving north-south through Richmond route through Staples Mill Road Station to Centralia using the CSXT A-Line; Northeast Regional (Virginia) service to Newport News continues from Staples Mill Road Station past Main Street Station on the Peninsula Subdivision. Main Street Station is closed.
- **Boulevard Station Only (BVSO/BSOS)** - All long distance, interstate corridor, and Northeast Regional (Virginia) passenger trains moving north-south through Richmond route through a new Boulevard Station and then to Centralia using) the CSXT A-Line and an elevated loop track just east of the South Acca wye (BVSO or Boulevard A-Line), or routing through to Centralia on the CSXT S-Line without the loop track (BSOS or Boulevard S-Line); Northeast Regional (Virginia) service to Newport News continues from the new Boulevard Station on the Peninsula Subdivision. Both Staples Mill Road Station and Main Street Station are closed.





0 0.5 1
Mile

1 inch = 1 mile
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery: 2015 Bing Aerial,
Microsoft and its Data Suppliers

Legend

- CSXT Mileposts
- DC2RVA Project Corridor
- Amtrak Stations
- Proposed Stations

Figure 6-5 Richmond Area Existing & Proposed Stations

- **Broad Street Station Only (BSSO)** - All long distance, interstate corridor, and Northeast Regional (Virginia) passenger trains moving north-south through Richmond route through a new Broad Street station on a loop track and then to Centralia using the CSXT A-Line; Northeast Regional (Virginia) service to Newport News continues from the new Broad Street Station loop track on the Peninsula Subdivision. Both Staples Mill Road Station and Main Street Station are closed.
- **Main Street Station Only (MSSO)** - All long distance, interstate corridor, and Northeast Regional (Virginia) passenger trains moving north-south through Richmond route to the west side of Main Street Station and then to Centralia using the CSXT S-Line; Northeast Regional (Virginia) service to Newport News continues along the east side of Main Street Station on the Peninsula Subdivision. Staples Mill Road Station is closed.

Two-Station Options

The two station options include both Main Street and Staples Mill Road Stations Combined:

- **Split Service (MSSM-SS) (A-Line) -** All long distance, interstate corridor, and Northeast Regional (Virginia) passenger trains moving north-south through Richmond route through Staples Mill Road Station to Centralia using the CSXT A-Line, bypassing Main Street Station; Northeast Regional (Virginia) service to Newport News continues from the east side of Main Street Station on the Peninsula Subdivision.
- **Full Service (MSSM-FS) (S-Line)**—All long distance, interstate corridor, and Northeast Regional (Virginia) passenger trains moving north-south through Richmond route through Staples Mill Road Station to the west side of Main Street Station and then to Centralia using the CSXT S-Line; Northeast Regional (Virginia) service to Newport News continues from the east side of Main Street Station on the Peninsula Subdivision.
- **Shared Service (A-line and S-Line)** - All long distance, interstate corridor, and Northeast Regional (Virginia) passenger trains moving north-south through Richmond route through Staples Mill Road Station either (a) to the west side of Main Street Station and then to Centralia using the CSXT S-Line, or (b) to Centralia using the CSXT A-Line; Northeast Regional (Virginia) service to Newport News continues from the east side of Main Street Station on the Peninsula Subdivision.

The evaluation included the option of a new station at Broad Street or at Boulevard to provide Richmond with a single unified station that would replace both Main Street and Staples Mill Road Stations. Neither Broad Street nor Boulevard station locations are considered in conjunction with either Main Street or Staples Mill Road stations—the relatively close proximity of the stations precludes operating them in tandem (see Chapter 8).

Table 6-59 shows the rail infrastructure required for each of the station location alignment options. Design engineering concepts developed for each infrastructure requirement were reviewed for compatibility with passenger and freight rail operations, and developed into a set of rail alignments. GIS impact areas for these options were used by DRPT for screening the new rail alignments following the Stage I, II, and III evaluation process described for the Northern Virginia and Central Virginia areas.

TABLE 6-59: RAIL INFRASTRUCTURE IMPROVEMENTS REQUIRED FOR RICHMOND AREA STATION OPTIONS—OPERATIONAL CONSIDERATIONS

Rail Infrastructure Improvement	Staples Mill Station Only (SMSO)	Boulevard Station Only (A-Line) (BVSO)	Boulevard Station Only (S-Line) (BSOS	Broad Street Station Only (BSSO)	Main Street Station Only (MSSO)	Main St and Staples Mill Stations [Split Service] (SSM-SS)	Main St and Staples Mill Stations [Shared Service] (MSSM-SS)	Main St and Staples Mill Stations [Full Service Version] (MSSM-FS)
(a) A single- or double-track bypass on the east side of Acca Yard in order to separate passenger movements from freight. (Without a Staples Mill Road stop, passenger trains do not have to cross all main tracks to reach a station on the west side.)	No	Yes	Yes	Yes	Yes	No	Yes	Yes
(b1) Three interoperable tracks between Main Street and South Acca with universal crossovers at each location to allow passenger trains to meet/pass, while providing capacity for stopped CSXT unit coal, grain, and sulfur trains to cut off helpers, change direction, or run locomotives around train; OR (b2) Two fully interoperable tracks between Main Street and South Acca with universal crossovers at each location to allow for unimpeded passenger and freight operations, plus new freight connector bridge in lieu of separate freight and passenger tracks between Main Street and Acca Yard, e.g. build a James River bridge that will enable eastbound coal, sulfur, and grain loads to head southward on the Bellwood Sub (S-Line) to reach the Hopewell Sub or the North End Sub (A-Line) at Centralia.	No	No	Yes	No	Yes	No	Yes	Yes
(c) A new layover/servicing facility west of the Bellwood Sub near Brown Street Yard, and construction of a wye at Hospital Street for turning trains. (No tail track needed for wye on BBRR leg.) Brown Street Yard is required for Main Street Station options due to all four tracks through the station being both elevated and mainline tracks. Elevated mainline tracks prevent the use of one of the tracks for overnight service and storage of the proposed service originating in Richmond, thus the need for Brown Street Yard. Both Broad Street and Boulevard Stations are completely served by at-grade tracks. None	No	No	No	No	Yes	Yes	Yes	Yes

TABLE 6-59: RAIL INFRASTRUCTURE IMPROVEMENTS REQUIRED FOR RICHMOND AREA STATION OPTIONS—OPERATIONAL CONSIDERATIONS

Rail Infrastructure Improvement	Staples Mill Station Only (SMSO)	Boulevard Station Only (A-Line) (BVSO)	Boulevard Station Only (S-Line) (BSOS	Broad Street Station Only (BSSO)	Main Street Station Only (MSSO)	Main St and Staples Mill Stations [Split Service] (SSM-SS)	Main St and Staples Mill Stations [Shared Service] (MSSM-SS)	Main St and Staples Mill Stations [Full Service Version] (MSSM-FS)
of the tracks through these stations are elevated tracks. Therefore, one of the at-grade tracks will serve for overnight service and storage of the proposed service originating in Richmond.								
(d) Improve track on existing bridge and add a second track across the James River on the Bellwood Sub continuing from Main Street Station to South Yard. (R2R proposed crossing for James River)	No	No	Yes	No	Yes	No	Yes	Yes
(e)Two fully interoperable tracks between Main Street and South Acca with universal crossovers at each location to allow for unimpeded passenger and freight operations (without new freight connector bridge)	Yes	Yes	No	Yes	No	Yes	No	No
(f) One ~12,000-foot staging track at South Yard in order to enable northbound coal trains and grain trains to change crews and receive permission to operate on the BBRR before heading north across the James River and past Main Street Station. (These crew changes currently take place at a location just north of Main Street Station called Bone Dry, which cause long trains to stop on the Bellwood Sub adjacent to Main Street Station, blocking access to a potential platform and the existing James River bridge.)	No	No	Yes	No	Yes	No	Yes	Yes
(g) Convert Peninsula Sub Track 1 (north side) to bidirectional operation between CP Louisiana Street (MP CA-83.3) and CP Darbytown (MP CA-80.8) for more efficient mainline operation.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

TABLE 6-59: RAIL INFRASTRUCTURE IMPROVEMENTS REQUIRED FOR RICHMOND AREA STATION OPTIONS—OPERATIONAL CONSIDERATIONS

Rail Infrastructure Improvement	Staples Mill Station Only (SMSO)	Boulevard Station Only (A-Line) (BVSO)	Boulevard Station Only (S-Line) (BSOS	Broad Street Station Only (BSSO)	Main Street Station Only (MSSO)	Main St and Staples Mill Stations [Split Service] (SSM-SS)	Main St and Staples Mill Stations [Shared Service] (MSSM-SS)	Main St and Staples Mill Stations [Full Service Version] (MSSM-FS)
(i) Sufficient number of platform tracks to provide station capacity for delay tolerance. Required to hold delayed or out-of-slot trains north or south of the station and/or space for a facility for layover and servicing Richmond originating/terminating trains located close to the station site to minimize backup moves through congested main track and yard areas.	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes

Source: HDR, 2015.

6.7.3.2 Freight Connector Bypass Options

During project scoping, DRPT's review of prior studies suggested the potential of constructing a freight connector bypass track across the James River as a means to facilitate freight movements within the Richmond area, which, in turn would relieve congestion and allow more efficient passenger train movements from the Peninsula Subdivision, and between Main Street Station and Acca Yard. Current track configuration, elevation and grade changes, and freight rail operations (described in Chapter 3) can result in freight trains moving between the Rivanna Subdivision (CSXT's track on the north bank of the James River) to destinations to the south the CSXT north-south main line, which frequently blocks tracks in the vicinity of Main Street Station. Building a new freight connector bypass bridge across the James River is one option to address the constraint and facilitate passenger train movements past the west side of Main Street Station on the CSXT S-Line.

The freight connector bypass options would provide for eastbound movements from the Rivanna Subdivision to southbound on the Bellwood Subdivision (S-line). Four overall connection options (with a total of 10 bridge location options) for connecting the Rivanna Subdivision to the Bellwood Subdivision were evaluated (Figure 6-6):

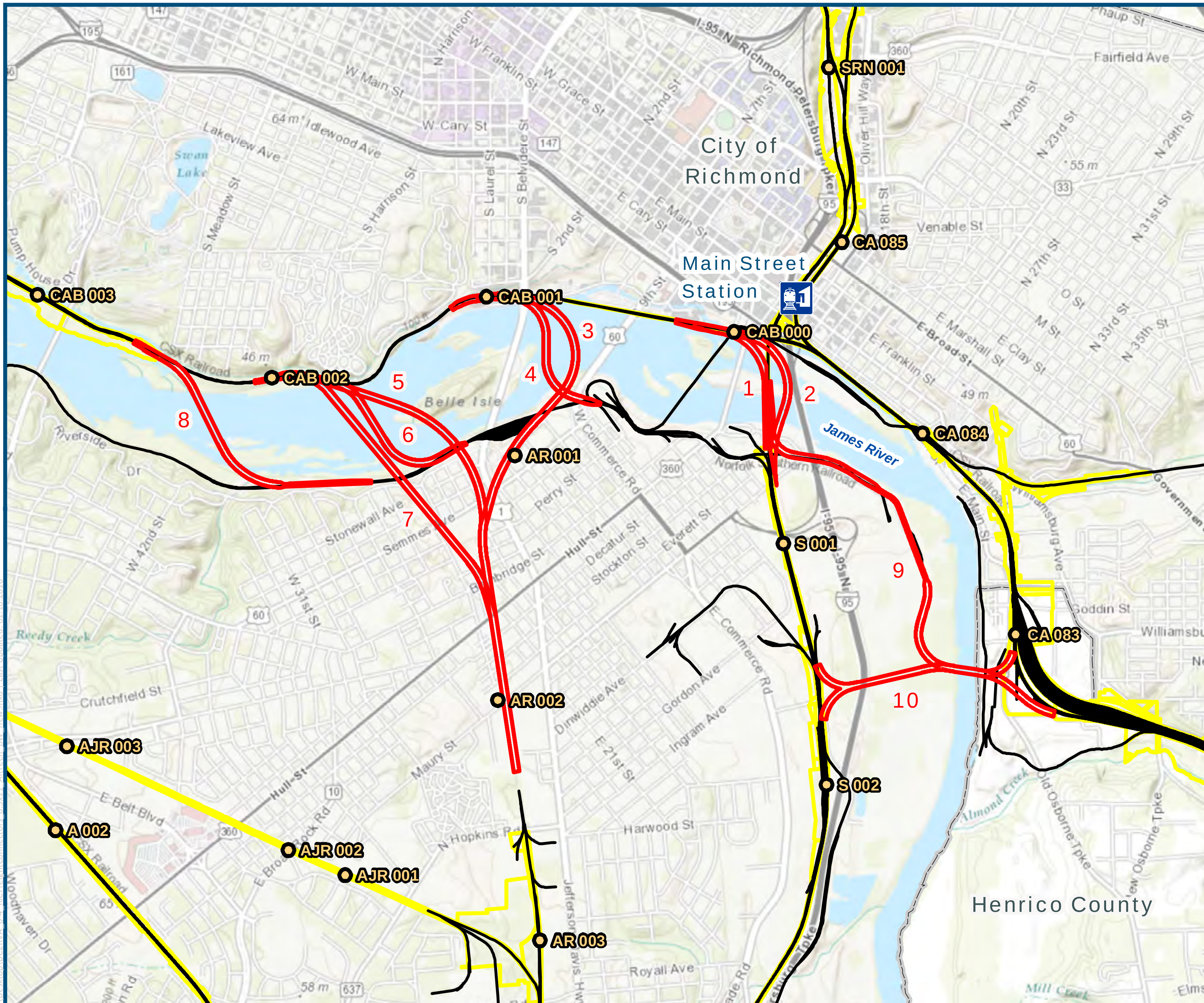
- Rivanna Subdivision to the Bellwood Subdivision
- Rivanna Subdivision to the Clopton Lead to the Bellwood Subdivision
- Rivanna Subdivision to the Norfolk Southern (NS) track along the south bank of the James River to the Bellwood Subdivision
- Peninsula Subdivision (at Fulton Yard) to the Bellwood Subdivision

Freight connector bypass options between the Rivanna Subdivision and the Bellwood Subdivision provide the most direct connection, but they must cross existing bridges before changing elevations to get down to the Bellwood Subdivision. Two crossing locations are identified to connect to the Bellwood Subdivision:

- FC1—West connecting along the west side of the existing Bellwood Subdivision track across the NS track and US 60
- FC2—East connecting along the east side of the existing Bellwood Subdivision track across the NS track and US 60

Freight connector bypass options between the Rivanna Subdivision and CSXT's Clopton Lead required a skewed crossing to provide sufficient track length to accommodate changes in track elevation. Three freight connectors are identified as:

- FC3—East between US 1/US 301 and US 60 bridges upriver from the falls at US 60, across the NS track, and requiring a tunnel under existing businesses
- FC5—Centered between VA 161 and US 1/US 301 bridges across Belle Isle and the NS track, and requiring a tunnel under existing businesses
- FC7—West between VA 161 and US 1/US 301 bridges upriver from the falls at Belle Isle, across the NS track



0 1,500 3,000

Feet

1 inch = 3,000 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap: 2015 USGS
Topographic Map

Legend

- Amtrak Station
- CSXT Mileposts
- DC2RVA Project Corridor
- Freight Connector Alignment Options
- CSXT Right-of-Way
- Parcel Boundaries
- County/City Boundary

Figure 6-6
Richmond Freight Connector Alignment Options

Freight connector bypass options between the Rivanna Subdivision on the north side of the James River and the NS track on the south side of the river all required a skewed bridge crossing to provide sufficient length to accommodate the changes in track elevation north and south of the river. Three freight connector bypass options are identified as:

- FC4—East between US 1/US 301 and US 60 bridges upriver from the falls at US 60
- FC6—Central between VA 161 and US 1/US 301 bridges upriver from the falls at Belle Isle
- FC8—West between VA 161 and US 1/US 301 bridges downriver from the falls at VA 161

Freight connector bypass options between the Peninsula Subdivision (Fulton Yard) and the Bellwood Subdivision require curves with a relatively high degree of curvature (smaller radii) to avoid potential impacts to protected environmental resources and I-95. However, designing the freight connector with curves with a lower degree of curvature (larger radii) creates curved intersecting bridges across the James River, with greater potential impacts to riverfront parks and infrastructure, including requiring two new roadway bridges to carry I-95 over the connecting track(s). Two freight connectors are identified to connect to the Bellwood Subdivision using the maximum degree of curvature for unit trains (the longest and therefore most constraining) in keeping with the purpose of the freight connector bypass concept:

- FC9—Less direct route connecting from the curve in Fulton Yard across the James River where it curves into a NS track and ties into the Bellwood Subdivision just south of the James River
- FC10—Direct route connecting from the curve in Fulton Yard under the curve in I-95 to the Bellwood Subdivision where the widest separation exists between I-95 and the Bellwood Subdivision

Table 6-60 summarizes the results of the Stage I Screening of the freight connector Bypass options. FC1 and FC10 are advanced to Stage II Screening because they had the least impacts to historic resources and parks of the various options.

TABLE 6-60: STAGE I SCREENING SUMMARY OF RICHMOND AREA FREIGHT CONNECTOR BYPASS OPTIONS

Resource	Area of Impact in Acres									
	FC 1	FC 2	FC 3	FC 4	FC 5	FC 6	FC 7	FC 8	FC 9	FC 10
Historic Resources	0.61	2.26	10.66	2.13	12.50	3.41	7.43	2.53	2.62	1.62
Military Installations	0	0	0	0	0	0	0	0	0	0
Parks & Public Recreation Areas	0	1.02	1.65	0.85	2.86	2.68	3.68	7.97	10.00	0
Wildlife Refuges	0	0	0	0	0	0	0	0	0	0
Retain for further screening	Yes	No	No	No	No	No	No	No	No	Yes

Table 6-61 summarizes the results of the Stage II Screening of the freight connector bypass options. FC 10 is dismissed due to higher impacts to wetlands and urban/developed land. FC 1 is advanced for further evaluation and screening as part of rail infrastructure options that identified a need for addressing track congestion issues around Main Street Station.

TABLE 6-61: STAGE II SCREENING SUMMARY OF RICHMOND AREA FREIGHT CONNECTOR BYPASS OPTIONS

Resource	Area of Impact in Acres*									
	FC 1	FC 2	FC 3	FC 4	FC 5	FC 6	FC 7	FC 8	FC 9	FC 10
Cemeteries	0	0	0	0	0	0	0	0	0	0
VOF Easements	0	0	0	0	0	0	0	0	0	0
Conservation Lands	0	0	1.23	0.77	1.91	1.38	1.89	2.04	0	0
Natural Heritage	0	0	2.39	2.66	2.12	2.79	1.34	0	0	0
Hazmat: Superfund/ CERCLIS/NPL	0	0	0	0	0	0	0	0	0	0
Wetlands	8.10	9.37	7.64	6.53	7.05	8.64	9.17	14.78	16.96	11.49
Wetland Mitigation Banks	0	0	0	0	0	0	0	0	0	0
Potential Land Acquisition: Urban/Developed	1.73	2.44	9.46	2.90	7.44	1.50	9.00	3.04	3.88	1.92
Potential Land Acquisition: Agricultural	0	0.02	0	0	0	0	0	0	0	0
Agricultural and Forestal Districts	0	0	0	0	0	0	0	0	0	0
Retain for further screening	Yes	No	No	No	No	No	No	No	No	No

Table Notes: *Gray shaded columns represent alignment options eliminated in Stage I Screening for the Segment.

6.7.3.3 Rail Infrastructure Alternatives by Station Location

The station location options identified in Section 6.7.3.1 were modified to include the freight connector bypass option identified in Section 6.7.3.2 for those station configurations that rely on the use of the CSXT S-Line. An alignment option in lieu of the freight connector bypass was also evaluated. The alignment option in lieu of the freight connector bypass adds another track north of Main Street Station between AM Junction and Acca Yard, combined with upgrading the existing tracks and adding crossovers. This alignment option mitigates the track congestion caused by current freight movements. Station location rail improvement options that include the freight connector bypass have one less track north of Main Street Station to Acca Yard than those options that do not have a freight connector bypass but have included the additional track between AM Junction and Acca Yard.

This resulted in the following station location options (Figures for these options can be referenced in Section 5.3.4.3):

Single Station Options

- Staples Mill Road Station Only (A-Line and Peninsula Subdivision)
- Boulevard Station Only (A-Line and Peninsula Subdivision)
- Boulevard Station Only (S-Line)
- Broad Street Station Only (A-Line and Peninsula Subdivision)
- Main Street Station Only
  - S-Line and Peninsula Subdivision
  - S-Line and Peninsula Subdivision + Freight Connector Bypass

Two-Station Options

- Main Street and Staples Mill Road Combined
  - Split Service—A-Line and Peninsula Subdivision
  - Full Service—S-Line and Peninsula Subdivision
  - Full Service—S-Line and Peninsula Subdivision + Freight Connector Bypass
  - Shared Service—S-Line, A-Line and Peninsula Subdivision
  - Shared Service—S-Line, A-Line and Peninsula Subdivision + Freight Connector Bypass

The following describes the track infrastructure required to meet passenger and freight operational service requirements for each station option.

Staples Mill Road Station Only (SMSO)

All passenger trains stop at Staples Mill Road Station only and discontinue service to or bypass Main Street Station. Passenger service to/from Newport News would bypass Main Street Station and continue to use the current route through Acca Yard to Staples Mill Road Station. Passenger service from points south would continue to use the CSXT A-Line, and any passenger trains originating in Richmond would serve Staples Mill Road Station only. Rail infrastructure improvements include:

- Adding a third main track from the north (RF&P Subdivision) to Acca Yard
- Modifying Staples Mill Road Station to provide one low level island boarding platform and one high-level island platform
- Improving the existing two main tracks from Acca Yard to AM Junction
- Adding a second main track on the existing elevated rail structure on the east side of Main Street Station from AM Junction to Rivanna Junction
- Adding a third main track on the CSXT A-Line from Meadows (south of the James River) to Centralia
- Closing Main Street Station

Boulevard Station Only (BVSO A-Line)

A new Boulevard Station is located east of Acca Yard and north of the tracks crossing underneath Boulevard Road. Passenger trains (with the exception of the Auto Train) traveling to/from the CSXT track north of Acca Yard are routed on a new bypass track east around Acca Yard to the new station, and then onto an elevated loop track to take trains over the CSXT S-Line and back to the A-Line. All passenger trains stop at a new Boulevard Station only and discontinue service to or bypass Main Street and Staples Mill Road Stations. Passenger service to/from Newport News would pass by Main Street Station without stopping and relocate service to a new Boulevard Station. Any passenger trains originating in Richmond would also serve Boulevard Station. The Auto Train, which does not stop in Richmond, would bypass Acca Yard on the west and proceed onto the A-Line without passing the station. Rail infrastructure improvements include:

- Adding a third mainline track from the north (RF&P Subdivision) to Acca Yard
- Adding a two-track bypass on the east side of Acca Yard
- Adding a two-track Boulevard Station rail network with elevated loop tracks for turning trains with one low-level island platform and one high-level island platform
- Improving the two main tracks from Boulevard Station to AM Junction
- Adding a second main track on the existing elevated rail structure on the east side of Main Street Station from AM Junction to Rivanna Junction
- A third main track on the CSXT A-Line from Meadows (south of the James River) to Centralia.
- Closing Staples Mill Road Station
- Closing Main Street Station

Boulevard Station Only with Freight Connector (BVSO S-Line Freight)

All passenger trains would stop at a Boulevard Station only option. The CSXT S-Line would serve as the primary north/south passenger route. Infrastructure improvements are the same as for BVSO S-line, with a new freight connector bridge allowing freight trains from the west to directly travel south across the James River in lieu of adding a third track from Acca Yard to AM Junction.

Boulevard Station Only (BVSO S-Line)

A new Boulevard Station is located east of Acca Yard and north of the tracks crossing underneath Boulevard. All passenger trains stop at a new Boulevard Station only and discontinue service to or bypass Main Street and Staples Mill Road Stations. Passenger service to/from Newport News would bypass Main Street Station and relocate service to a new Boulevard Station. Passenger service from points south would use the CSXT S-Line and bypass Main Street Station and continue to Boulevard Station. Any passenger trains originating in Richmond would also serve Boulevard Station. Rail infrastructure improvements include:

- Adding a third mainline track from the north (RF&P Subdivision) to Acca Yard
- Adding a two-track bypass on the east side of Acca Yard
- Adding a new Boulevard Station adjacent to the mainline tracks with one low-level island platform and one high-level island platform
- Adding a third main track from Acca Yard to AM Junction

- Adding a new wye track near Hospital Street to turn passenger trains
- Adding a new passenger layover/servicing facility near Brown Street Yard with three tracks
- Adding a second main track on the existing elevated rail structure on both the east and west side of Main Street Station from AM Junction to Rivanna Junction with the west track extended to the Triple Rail Crossing
- Adding a new single track rail bridge on the CSXT S-Line across the James River
- Adding a second main track on the CSXT S-Line from the James River to Centralia
- Adding a new 12,000-foot staging track extending south from the South Yard.

Broad Street Station Only (BSSO)

A new Broad Street Station is located adjacent to the existing Science Museum of Virginia (old Broad Street Rail Station), which requires an at-grade rail loop to turn trains. All passenger trains stop at a new Broad Street Station only and discontinue service to or bypass Main Street and Staples Mill Road Stations. Passenger service to/from Newport News would bypass Main Street Station and relocate service to a new Broad Street Station. Passenger service from points south would continue to use the CSXT A-Line to Broad Street Station. Any passenger trains originating in Richmond would also serve Broad Street Station. Rail infrastructure improvements include:

- Adding a third mainline track from the north (RF&P Subdivision) to Acca Yard
- Adding a two-track bypass on the east side of Acca Yard
- Adding a three track Broad Street Station rail network with loop tracks for turning trains with one island platform and one side platform, all platforms with level boarding
- Improving the two mainline tracks from the vicinity of Broad Street Station to AM Junction
- Adding a second mainline track on the existing elevated rail structure on the east side of Main Street Station from AM Junction to Rivanna Junction
- Adding a third mainline track on the CSXT A-Line from Meadows (south of the James River) to Centralia.
- Closing Staples Mill Road Station
- Closing Main Street Station

Main Street Station Only (MSSO)

All passenger trains stop at Main Street Station only and discontinue service to Staples Mill Road Station. Passenger service to/from Newport News would continue to use the east side platform at Main Street Station, and any passenger trains originating in Richmond would also stop at Main Street Station. Passenger service from points south would use the CSXT S-Line and serve Main Street Station (west side platform) as the primary north/south passenger route before rejoining the CSXT A-Line at Acca Yard, and discontinue service to and bypass Staples Mill Road Station. Rail infrastructure improvements in the Richmond area include:

- Adding a third main track from the north (RF&P Subdivision) to Acca Yard
- Adding a two-track bypass on the east side of Acca Yard

- Adding a third main track from Acca Yard to AM Junction
- Adding a new wye track near Hospital Street to turn passenger trains
- Adding a new passenger layover/servicing facility near Brown Street Yard with three tracks
- Adding two low level side platforms on the west side and an additional low level side platform on the east side of Main Street Station
- Adding a second main track on the existing elevated rail structure on both the east and west side of Main Street Station from AM Junction to Rivanna Junction on the east side and to the Triple Rail Crossing on the west side
- Adding a new single track rail bridge on the CSXT S-Line across the James River from the Triple Rail Crossing
- Adding a second main track on the CSXT S-Line from the James River to Centralia
- Adding a new 12,000-foot staging track extending south from the South Yard
- Closing Staples Mill Road Station

Main Street Station Only with Freight Connector (MSSO-Freight)

This set of infrastructure improvements is the same as those for Main Street Station Only, with a new freight connector bridge allowing freight trains from the west to travel directly south across the James River in lieu of adding a third track from Acca Yard to AM Junction.

Main Street and Staples Mill Road Stations—Split Service (MSS-SMS-SS)

Passenger trains from Newport News, and any new passenger trains originating in Richmond, would stop at Main Street Station. These trains and all passenger service from points south would also serve Staples Mill Road Station. Passenger service from points south would continue to use the CSXT A-Line as the primary north/south passenger route. Rail infrastructure improvements include:

- Adding a third mainline track from the north (RF&P Subdivision) to Acca Yard
- Modifying Staples Mill Road Station to provide one low level island platform and one high-level island platform
- Improving the two mainline tracks from Acca Yard to AM Junction
- Adding a new wye near Hospital Street to turn passenger trains
- Adding a new passenger layover/servicing facility near Brown Street Yard with three tracks
- Adding a second low level side platform on the east side of Main Street station
- Adding a second main track on the existing elevated rail structure on the east side of Main Street Station from AM Junction to Rivanna Junction
- Adding a third mainline track on the CSXT A-Line from Meadows (south of the James River) to Centralia.

Main Street and Staples Mill Road Stations—Full Service (MSS-SMS-FS)

All passenger trains stop at both Main Street and Staples Mill Road Stations. Passenger service to/from Newport News would continue to use the east side platform at Main Street Station, and any passenger trains originating in Richmond would also stop at Main Street Station. Passenger service from points south would use the CSXT S-Line and serve Main Street Station (west side platform) as the primary north/south passenger route before rejoining the CSXT A-Line at Acca Yard. Rail infrastructure improvements include:

- Adding a third main track from the north (RF&P Subdivision) to Acca Yard
- Modifying Staples Mill Road Station to relocate boarding platforms to the east side of the existing main with one low level island platform and one high-level island platform
- Adding a two-track bypass on the east side of Acca Yard
- Adding a third main track from Acca Yard to AM Junction
- Adding a new wye track near Hospital Street to turn passenger trains
- Adding a new passenger layover/servicing facility near Brown Street Yard with three tracks
- Adding two low level side platforms on the west side and an additional low level side platform on the east side of Main Street Station
- Adding a second main track on the existing elevated rail structure on both the east and west side of Main Street Station from AM Junction to Rivanna Junction on the east side and to the Triple Rail Crossing on the west side
- Adding a new single track rail bridge on the CSXT S-Line across the James River
- Adding a second main track on the CSXT S-Line from the James River to Centralia
- Adding a new 12,000-foot staging track extending south from the South Yard

Main Street and Staples Mill Stations—Full Service with Freight Connector (MSS-SMS-FS-Freight)

All passenger trains stop at both stations with the CSXT S-Line serving as the primary north/south passenger route. Infrastructure improvements are the same as for MSS-SMS-FS, with a new freight connector bridge allowing freight trains from the west to travel directly south across the James River in lieu of adding a third track from Acca Yard to AM Junction.

Main Street and Staples Mill Road Stations—Shared Service

Passenger trains traveling north-south through Richmond would serve one or both of the stations, with the service levels to be determined based on ridership demand and operational capacity. Passenger service to/from Newport News would continue to use the east side platform at Main Street Station, and any passenger trains originating in Richmond would also stop at Main Street Station. Passenger service from points south would use either the CSXT S-Line and serve Main Street Station (west side platform), then continue on to serve the Staples Mill Road Station - or continue to use the existing CSXT A-Line and serve Staples Mill Road Station only. Rail infrastructure improvements include:

- Adding a third main track from the north (RF&P Subdivision) to Acca Yard

- Modifying to Staples Mill Road Station to add boarding platforms to the east side of the existing main tracks with one low level island platform and one high-level island platform
- Adding a two-track bypass on the east side of Acca Yard
- Adding a third main track from Acca Yard to AM Junction
- Adding a new wye track near Hospital Street to turn passenger trains
- Adding new passenger layover/servicing facility near Brown Street Yard with three tracks
- Adding two low level side platforms on the west side and an additional low level side platform on the east side of Main Street Station
- Adding a second main track on the existing elevated rail structure on both the east and west side of Main Street Station from AM Junction to Rivanna Junction on the east side and to the Triple Rail Crossing on the west side
- Adding a new single track rail bridge on the CSXT S-Line across the James River
- Adding a second main track on the CSXT S-Line from the James River to Centralia
- Adding a new 12,000-foot staging track extending south from the South Yard

6.7.3.4 Richmond Area Rail Infrastructure Options—Screening Results

Table 6-2 shows Stage I Screening results for the Richmond, VA station location rail options. All of the station-based alignments have some impacts to historic resources; station alignments using the A-line had less historic impacts than those using the S-line. Station configurations using the CSXT S-Line all had similar levels of potential impacts to historical resources; options with the freight connector bypass all show greater potential impacts to historical resources than the same station locations without the freight connector. The freight connector park impacts are based on the extension of the freight connector on an elevated structure over existing park land on the south bank of the James River. Because the elevated structure would not preclude use of the park, and because the Richmond to Raleigh Tier II Final EIS[11] accepted similar potential impacts to historical resources associated with use of the CSXT S-Line between Main Street Station and Centralia, all of the Richmond alignment options were advanced forward to Stage II Screening (Table 6-63). The results from the Stage III Screening of Richmond station alignment options are in Table 6-64. Adding FC 1 to the Main Street Station Only and the Main Street and Staples Mill Stations Full Service option would add an impact to the James River floodwall on the south bank of the river. However, this was known and considered acceptable in the development of the freight connector options. Therefore, the addition of FC 1 to these options did not affect the Stage III Screening results. The operational capacity provided with the South Yard staging track sufficiently addresses the capacity constraint at Main Street, allowing for the elimination of the freight connector.

[11] For more information on the Richmond to Raleigh project, see https://www.fra.dot.gov/Page/P0482.

TABLE 6-62: STAGE I SCREENING RESULTS—RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS

Resource	Area of Impact (Acres)										
	Staples Mill Station Only	Boulevard Station only A-Line	Boulevard Station only S-Line	Boulevard Station only S-Line with FC	Broad St. Station only A-Line	Main Street Station Only	Main Street Station Only with FC	Main St. and Staples Mill Split Service	Main St and Staples Mill Full Service	Main St. and Staples Mill Full Service with FC	Main St. and Staples Mill Shared Service
Historic Resources	0.91	2.59	4.66	5.27	3.88	4.19	4.80	0.89	4.19	4.80	4.19
Military Installations	0	0	0	0	0	0	0	0	0	0	0
Parks & Public Recreation Areas	0.01	0.01	0	0	0	0.28	0.28	0.01	0.28	0.28	0.28
Wildlife Refuges	0	0	0	0	0	0	0	0	0	0	0
Retain for further screening	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

A summary of the Stage II Screening results for the Richmond, VA station location rail options is in Table 6-63. All station location alignment options were carried forward from Stage I and are screened in Stage II. The options using the Freight Connector show higher wetland impacts due to the track alignment being along and over the James River. In addition, due to the higher wetland impacts combined with higher historic resource impacts from the Stage I evaluation, plus the existence of an alternative alignment that meets the rail operation needs without building a new freight connector bypass across the James River, the options with a freight connector were eliminated by DRPT from further consideration. The remaining alignments were carried forward for further evaluation in Stage III (see Tables 6-62- through 6-66).

TABLE 6-63: STAGE II SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS

Criteria	Staples Mill Road Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street Station Only with FC	Main Street & Staples Mill Road Stations Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Stations Full Service with FC	Main Street & Staples Mill Rd Stations Shared Service
Cemeteries	0	0	0	0	0	0	0	0	0	0
VOF Easements	0	0	0	0	0	0	0	0	0	0
Conservation Lands	0	0	0	0	0	0	0	0	0	0
Natural Heritage	0	0	0	0	0	0	0	0	0	0
Hazmat: Superfund/CERCLIS/ NPL	0	0	0	0	0	0	0	0	0	0
Wetlands	17.25	20.82	36.07	22.82	36.50	44.6	28.20	37.00	45.1	37.00
Wetland Mitigation Banks	0	0	0	0	0	0	0	0	0	0
Potential Land Acquisition: Urban/Developed and Agricultural	4.08	9.03	9.67	12.62	6.12	7.85	6.38	11.51	13.24	11.51
Agricultural and Forestal Districts	0	0	0	0	0	0	0	0	0	0
Retain for further screening	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes

TABLE 6-64: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS — SEGMENT 15: GREENDALE TO SAY/WAY

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
Highway Overpasses									
East Parham Road	CFP 5.94	○	○	○	○	○	○	○	○
Hilliard Road (Route 356)	CFP 4.45	○	○	○	○	○	○	○	○
Dumbarton Road	CFP 3.71	◒	◒	◒	◒	◒	◒	◒	◒
Interstate 64 Westbound	CFP 3.16	○	○	○	○	○	○	○	○
Interstate 64 Eastbound	CFP 3.16	○	○	○	○	○	○	○	○
Interstate 195 (NB and SB)	CFP 1.84	○	○	○	○	○	○	○	○
Westwood Avenue/Saunders Avenue (Route 197)	CFP 1.71	○	○	○	○	○	○	○	○
Railroad Bridge Over Water									
Rocky Branch, culvert	CFP 5.27	○	○	○	○	○	○	○	○
Upham Brook, pipe crossing	CFP 3.36	○	○	○	○	○	○	○	○
Jordan's Branch, culvert	CFP 2.62	○	○	○	○	○	○	○	○
Other Railroad Bridges (n/a)									
At-Grade Crossings									
Hermitage Road	CFP 5.45	○	○	○	○	○	○	○	○
Retain for further screening	----	○	○	○	○	○	○	○	○

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
○ = No Major Constraints
◒ = Minor Improvements needed to allow for future consideration

TABLE 6-65: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS — SEGMENT 16: SAY/WAY TO AM JUNCTION

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
Highway Overpasses									
North Boulevard (Route 161)	CFP 0.01	○	◒	○	◒	○	○	○	○
Interstate 95/64	SRN 2.91	○	○	○	○	○	○	○	○
North Lombardy Street	SRN 2.82	○	○	◒	○	◒	○	◒	◒
Belvidere Street/Chamberlayne Avenue (Route 1) SB	SRN 2.21	○	○	○	○	○	○	○	○
Belvidere Street/Chamberlayne Avenue (Route 1) NB	SRN 2.21	○	○	○	○	○	○	○	○
Chamberlayne Parkway	SRN 2.18	○	○	○	○	○	○	○	○
North 1st Street	SRN 1.59	○	○	○	○	○	○	○	○
North 5th Street	SRN 1.33	○	○	○	○	○	○	○	○
Interstate 64 WB	SRN 1.28	○	○	○	○	○	○	○	○
Interstate 64 EB	SRN 1.28	○	○	○	○	○	○	○	○
Railroad Bridge Over Water									
James River Bridge	S 0.19	○	○	●	○	●	○	●	●
Other Railroad Bridges									
Triple Crossing	S 0.18	○	○	○	○	○	○	○	○
At-Grade Crossings									
Hermitage Road	SRN 3.45	○	○	○	○	○	○	○	○
W. Leigh Street	New	○	○	○	◒	○	○	○	○

TABLE 6-65: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS — SEGMENT 16: SAY/WAY TO AM JUNCTION

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
Dinneen Street (closed crossing)	SRN 3.07	O	O	O	O	O	O	O	O
Brook Road	SRN 2.30	O	O	O	O	O	O	O	O
St. James Street	SRN 1.69	O	O	O	O	O	O	O	O
North 2nd Street/Valley Road	SRN 1.55	O	O	O	O	O	O	O	O
Hospital Street/North 7th Street	SRN 1.23	O	O	O	O	O	O	O	O
Retain for further screening	----	O	O	O	O	O	O	O	O

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints
◒ = Minor Improvements needed to allow for future consideration. n/a= not applicable

TABLE 6-66: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS: SEGMENT 17: AM JUNCTION TO CENTRALIA — S-LINE

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
Highway Overpasses									
East Leigh Street (Route 33)	SRN 0.56	O	O	O	O	O	O	O	O
Interstate 95 NB ramp to Route 360 SB	SRN 0.43	O	O	O	O	O	O	O	O
Interstate 95 NB and SB	SRN 0.00	O	O	O	O	O	O	O	O
Interstate 95 SB ramp to VA 195	S 0.13	O	O	O	O	O	O	O	O

TABLE 6-66: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS: SEGMENT 17: AM JUNCTION TO CENTRALIA — S-LINE

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
VA 195 (Downtown Expressway) EB ramp to Interstate 95 NB	S 0.14	○	○	○	○	○	○	○	○
VA 195 (Downtown Expressway) EB ramp to Interstate 95 SB and I-95 NB to VA 195WB	S 0.16	○	○	○	○	○	○	○	○
CSXT tracks	S 0.18	○	○	○	○	○	○	○	○
Interstate 95 on/off ramps to Maury Street	S 0.97	○	○	●	○	●	○	●	●
Cogbill Road	S 5.96	○	○	○	○	○	○	○	○
Chippenham Parkway (Route 150)	S 6.43	○	○	○	○	○	○	○	○
Elliham Avenue	S 7.83	○	○	○	○	○	○	○	○
Jefferson Davis Highway (Route 1/301)	S 8.82	○	○	○	○	○	○	○	○
Route 288 NB	S 10.59	○	○	●	○	●	○	●	●
Route 288 SB	S 10.60	○	○	●	○	●	○	●	●
Railroad Bridge Over Water									
Richmond City Canal, 300 ft. single track bridge	S 0.17	○	○	○	○	○	○	○	○
James River (includes Mayo Island), 1900 ft. single track bridge	S 0.28	○	○	○	○	○	○	○	○
Broad Rock Creek, pipe crossing	S 3.50	○	○	○	○	○	○	○	○
Goode Creek, culvert	S 3.88	○	○	○	○	○	○	○	○
Grindall Creek, culvert	S 6.58	○	○	○	○	○	○	○	○
Falling Creek, twin 220 ft. single track bridges	S 6.86	○	○	○	○	○	○	○	○
Unnamed Creek, pipe crossing	S 7.44	○	○	○	○	○	○	○	○

TABLE 6-66: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS: SEGMENT 17: AM JUNCTION TO CENTRALIA — S-LINE

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
Kingsland Creek, culvert	S 8.98	○	○	○	○	○	○	○	○
Proctors Creek, culvert	S 10.56	○	○	○	○	○	○	○	○
Other Railroad Bridges									
Mainline on elevated viaduct two tracks wide	SRN 0.45 - S 0.19	○	○	○	○	○	○	○	○
East Marshall Street	SRN 0.30	○	○	○	○	○	○	○	○
East Broad Street	SRN 0.23	○	○	○	○	○	○	○	○
East Main Street	SRN 0.00	○	○	○	○	○	○	○	○
East Cary Street	S 0.07	○	○	○	○	○	○	○	○
Dock Street	S 0.15	○	○	○	○	○	○	○	○
Norfolk Southern tracks	S 0.18	○	○	○	○	○	○	○	○
East Byrd Street	S 0.19	○	○	○	○	○	○	○	○
ACOE James River floodwall (northbank)	S 0.19	○	○	◒	○	◒	○	◒	◒
ACOE James River floodwall (southbank)	S 0.56	○	○	◒	○	◒	○	◒	◒
Unnamed industrial access road	S 1.27	○	○	○	○	○	○	○	○
Pedestrian underpass at DuPont	S 5.85	○	○	○	○	○	○	○	○
Marina Drive	S 6.87	○	○	○	○	○	○	○	○
At-Grade Crossings									
Maury Street	S 0.77	○	○	○	○	○	○	○	○
Private Crossing (4th Street Expansion)	S 1.19	○	○	○	○	○	○	○	○
Goodes Street	S 1.66	○	○	○	○	○	○	○	○
Private Crossing (Federal Paper)	S 2.38	○	○	○	○	○	○	○	○
Commerce Road	S 2.99	○	○	○	○	○	○	○	○

TABLE 6-66: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS: SEGMENT 17: AM JUNCTION TO CENTRALIA — S-LINE

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
Ruffin Road	S 3.95	○	○	○	○	○	○	○	○
Bells Road (Route 161)	S 4.43	○	○	○	○	○	○	○	○
Dale Avenue	S 4. 97	○	○	○	○	○	○	○	○
Private Crossing (Texaco Road)	S 6.35	○	○	○	○	○	○	○	○
Private Crossing (Station Road)	S 6.70	○	○	○	○	○	○	○	○
Kingsland Road (Route 611)	S 9.16	○	○	○	○	○	○	○	○
Brinkley Road (Route 1622)	S 9.83	○	○	○	○	○	○	○	○
Old Lane (Route 637)	S 10.74	○	○	○	○	○	○	○	○
Retain for further screening	----	○	○	○	○	○	○	○	○

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
○ = No Major Constraints
◒ = Minor Improvements needed to allow for future consideration. n/a= not applicable

TABLE 6-67: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS: SEGMENT 18: WAY TO CENTRALIA — A-LINE

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
Highway Overpasses									
Interstate 195 NB	ARN 3.18	○	○	○	○	○	○	○	○
West Broad Street (Route 33)	ARN 3.02	○	○	○	○	○	○	○	○

TABLE 6-67: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS: SEGMENT 18: WAY TO CENTRALIA — A-LINE

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
Monument Avenue	ARN 2.77	○	○	○	○	○	○	○	○
Patterson Avenue (Route 6)	ARN 2.50	○	○	○	○	○	○	○	○
Grove Avenue	ARN 2.18	○	○	○	○	○	○	○	○
West Cary Street (Route 147)	ARN 1.93	○	○	○	○	○	○	○	○
I-195 southbound ramp to eastbound Downtown Expressway (VA Route 195)	ARN 1.78	○	○	○	○	○	○	○	○
Douglasdale Road	ARN 1.22	○	○	○	○	○	○	○	○
Forest Hill Avenue (Route 683)	A 0.30	○	○	○	○	○	○	○	○
Midlothian Turnpike (Route 60)	A 1.55	◒	◒	○	◒	○	◒	○	○
Hull Street Road (Route 360)	A 2.42	○	○	○	○	○	○	○	○
Hopkins Road (Route 637)	A 3.71	○	○	○	○	○	○	○	○
Warwick Road	A 4.63	○	○	○	○	○	○	○	○
Castlewood Road	A 5.85	○	○	○	○	○	○	○	○
Chippenham Parkway (Route 150) NB	A 6.85	◒	◒	○	◒	○	◒	○	○
Chippenham Parkway (Route 150) SB	A 6.85	◒	◒	○	◒	○	◒	○	○
South Beulah road/Dundas Road	A 7.12	○	○	○	○	○	○	○	○
Route 288 NB	A 10.35	◒	◒	○	◒	○	◒	○	○
Route 288 SB	A 10.37	◒	◒	○	◒	○	◒	○	○

TABLE 6-67: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS: SEGMENT 18: WAY TO CENTRALIA — A-LINE

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
Railroad Bridge Over Water									
East Branch Tuckahoe Creek/CSX Tracks/James River, 2150 ft. double track bridge	ARN 0.66	O	O	O	O	O	O	O	O
Reedy Creek, culvert over concrete lined channel	A 1.37	O	O	O	O	O	O	O	O
Grindall Creek, pipe crossing	A 5.04	O	O	O	O	O	O	O	O
Falling Creek, 325 ft. double track bridge. Cogbill Road crosses under bridge at north end	A 6.37	O	O	O	O	O	O	O	O
Unnamed Creek, pipe crossing	A 6.54	O	O	O	O	O	O	O	O
Kingsland Creek, twin 80 ft. single track bridges	A 9.11	O	O	O	O	O	O	O	O
Proctors Creek, culvert	A 10.54	O	O	O	O	O	O	O	O
Other Railroad Bridges									
Route 146 SB	ARN 1.08	O	O	O	O	O	O	O	O
Powhite Parkway NB (Route 76)	ARN 1.02	O	O	O	O	O	O	O	O
Jahnke Road (Route 686)	A 0.68	O	O	O	O	O	O	O	O
Bassett Avenue	A 1.00	O	O	O	O	O	O	O	O
Broad Rock Boulevard NB/SB (Route 10)	A 3.08	O	O	O	O	O	O	O	O
Terminal Avenue	A 3.87	O	O	O	O	O	O	O	O
Walmsley Boulevard (Route 647)	A 5.52	O	O	O	O	O	O	O	O
Kingsland Road (Route 611)	A 9.38	O	O	O	O	O	O	O	O
Thurston Road (Route 1452)	A 10.01	O	O	O	O	O	O	O	O
Old Lane (Route 637)	A 10.74	O	O	O	O	O	O	O	O

TABLE 6-67: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS: SEGMENT 18: WAY TO CENTRALIA — A-LINE

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
Retain for further screening	----	O	O	O	O	O	O	O	O

Table Notes: ● = Major constraints requiring rebuild of existing infrastructure
O = No Major Constraints
◒= Minor Improvements needed to allow for future consideration

TABLE 6-68: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS: SEGMENT 19: RIVANNA JUNCTION TO BEULAH — PENINSULA SUB

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
Highway Overpasses									
East Leigh Street (Route 33)	CA 85.21	O	O	O	O	O	O	O	O
Interstate 95 NB ramp to Route 360 SB	CA 85.12	O	O	O	O	O	O	O	O
South Laburnum Avenue	CA 79.24	O	O	O	O	O	O	O	O
Airport Drive	CA 78.72	O	O	O	O	O	O	O	O
Railroad Bridge Over Water									
Gillie Creek, tracks on viaduct over creek	CA 83.54	O	O	O	O	O	O	O	O
Cornelius Creek, pipe crossing	CA 79.51	O	O	O	O	O	O	O	O
Other Railroad Bridges									
Mainline on elevated viaduct two tracks wide	CA 85.0 - CA 83.90	O	O	O	O	O	O	O	O
East Marshall Street	CA 84.99	O	O	O	O	O	O	O	O
East Broad Street	CA 84.91	O	O	O	O	O	O	O	O

TABLE 6-68: STAGE III SCREENING RESULTS — RICHMOND AREA STATION RAIL INFRASTRUCTURE OPTIONS: SEGMENT 19: RIVANNA JUNCTION TO BEULAH — PENINSULA SUB

Infrastructure Constraints	Mile Post	Staples Mill Station Only	Boulevard Station Only (A-Line)	Boulevard Station Only (S-Line)	Broad Street Station Only (A-Line)	Main Street Station Only	Main Street & Staples Mill Rd Split Service	Main Street & Staples Mill Rd Stations Full Service	Main Street & Staples Mill Rd Shared Service
East Main Street	CA 84.70	O	O	O	O	O	O	O	O
East Cary Street	CA 84.61	O	O	O	O	O	O	O	O
Dock Street/ South 18th Street	CA 84.55	O	O	O	O	O	O	O	O
Norfolk Southern Tracks	CA 84.05	O	O	O	O	O	O	O	O
Dock Street/ Pear Street	CA 84.00	O	O	O	O	O	O	O	O
Mainline on elevated viaduct two tracks wide with two active tracks	CA 83.90 - CA 83.40	O	O	O	O	O	O	O	O
East Main Street (Route 5)	CA 83.85	O	O	O	O	O	O	O	O
Peebles Street	CA 83.78	O	O	O	O	O	O	O	O
Nicholson Street	CA 83.43	O	O	O	O	O	O	O	O
Private Road	CA 83.36	O	O	O	O	O	O	O	O
Private Road	CA 83.28	O	O	O	O	O	O	O	O
Orleans Street	CA 83.23	O	O	O	O	O	O	O	O
New Osborne Turnpike	CA 82.30	O	O	O	O	O	O	O	O
Darbytown Road	CA 80.97	O	O	O	O	O	O	O	O
At-Grade Crossings									
Brown Street	CA 85.14	O	O	O	O	O	O	O	O
Miller Road	CA 78.99	O	O	O	O	O	O	O	O
Charles City Road	CA 78.40	O	O	O	O	O	O	O	O
Beulah Road	CA 76.87	O	O	O	O	O	O	O	O
Retain for further screening	----	O	O	O	O	O	O	O	O

Table Notes: O = No Major Constraints

TABLE 6-69: STAGE IV SCREENING OF RICHMOND, VIRGINIA BY STATION LOCATION (SUMMARY OF STAGES I, II, AND III)

Station Location Options	Stage I Screening	Stage II Screening	Stage III Screening	Summary
Staples Mill Road Station Only	O	O	O	O
Boulevard Station Only (A-Line)	O	O	O	O
Boulevard Station Only (S-Line)	O	O	O	O
Broad Street Station Only	O	O	O	O
Main Street Station Only	O	O	O	O
Main Street & Staples Mill Rd Stations—Split Service (A-line)	O	O	O	O
Main Street & Staples Mill Rd Stations—Full Service (S-line)	O	O	O	O
Main Street & Staples Mill Rd Stations—Shared Service (A-line and S-line)	O	O	O	O

Table Notes: O = No Major Constraints

6.7.3.5 Rail Operations Review

The rail alignment options for Richmond were evaluated for potential improvements to passenger train operations on the corridor by comparing track design speed, likely train operation speed, and the need for efficient train operations and fuel use. Tables 6-65 and 6-66 present the estimated Pure Running Times between Greendale and Centralia for the four Richmond single station options modeled and the seven two-station options modeled. Estimates are calculated for a proposed 10-car passenger train operating in both the northbound and southbound direction. Running times are measured in minutes and seconds (00:00).

The estimated run times represent pure passenger train trip time only, and are not actual schedule times. The estimated run times do not include station dwell and recovery time, nor do they necessarily reflect contractual on-time performance agreements between the operator, owner, and host railroads at present or agreements that might exist in the future. Additionally, the estimated run times do not reflect the co-mingled operating characteristics of sharing infrastructure with freight traffic.

Single Station Options

Table 6-69 shows the estimated Pure Running Time between Greendale and Centralia for the four Richmond single station options. This table also shows the additional time required for passenger trains using a station option other than the Staples Mill Road Station Only option via the CSXT A-Line. The Staples Mill Road Only running time appears in Table 6-69 in minutes and seconds (00:00), and is used as a baseline for time comparison with the other options.

A review of train operations and the estimates of running times for the single station options presented in Table 6-69 indicate the following[12]:

- The Staples Mill Road Station Only option using the CSXT A-Line offers the fastest running time, but the station location is the greatest distance from the city center.
- Station options for passenger trains using the CSXT S-Line, and making one Richmond stop at either Main Street Station or Boulevard Station are next fastest and are approximately 2 minutes slower than the Staples Mill Road Only option, and provide a station location in or near the city center.
- Station options for passenger trains using the CSXT A-Line and a loop station track to reach Boulevard Station or Broad Street Station are the slowest options and are over 3 and 5 minutes slower, respectively, than operating via the CSXT A-Line directly to Staples Mill Road Station only. Both Boulevard and Broad Street station locations are near the city center.
- Running time estimates for the Broad Street Station option via the West Acca bypass do not take into account potential passenger/freight train conflicts at the AY interlocking.

TABLE 6-69: SINGLE STATION OPTION PURE RUNNING TIMES — GREENDALE-CENTRALIA

Northbound				Southbound			
Station Option	**Running Time**	**Time Differential over Staples Mill Only**	**Alignment Miles**	**Station Option**	**Running Time**	**Time Differential over Staples Mill Only**	**Alignment Miles**
Staples Mill Road Station Only via A-Line	17:46	00:00	19.08	Staples Mill Road Station Only via A-Line	17:57	00:00	19.32
Boulevard Station Only via A-Line	21:30	03:44	21.59	Boulevard Station Only via A-Line	21:35	03:38	21.54
Boulevard Station Only via S-Line	20:34	02:48	20.45	Boulevard Station Only via S-Line	20:14	02:17	20.12
Broad Street Station Only via A-Line and East Acca bypass	22:49	05:03	22.11	Broad Street Station Only via A-Line East Acca bypass	23:13	05:16	22.06
Broad Street Station Only via A-Line and	23:27	05:41	22.02	Broad Street Station Only via A-Line and	23:39	05:42	21.97

[12] All station options for both single station and two-station alternative were modeled for run time at the request of the City of Richmond in response to questions raised during scoping and alternative development.

TABLE 6-69: SINGLE STATION OPTION PURE RUNNING TIMES — GREENDALE-CENTRALIA

Northbound				Southbound			
Station Option	Running Time	Time Differential over Staples Mill Only	Alignment Miles	Station Option	Running Time	Time Differential over Staples Mill Only	Alignment Miles
West Acca bypass				West Acca bypass			
Main Street Station Only via S-Line	20:05	02:19	20.45	Main Street Station Only via S-Line	19:39	01:42	20.12

Source: HDR, 2015.

Two-Station Options

Table 6-70 summarizes the results of the two-station option analysis. The estimated running time represents only the passenger train trip time and not the collective "door-to-door" passenger trip time from origin to destination across multiple modes. For example, although a two-station option may have a longer running time than a single-station option, the overall door-to-door trip time may be less. Additional information on the overall trip time is discussed in Chapter 4 the Draft EIS. Two-station options add approximately 2 to 7 minutes of pure running time between Greendale and Centralia, depending on the alignment and station combination selected. Note that any two-station options have additional dwell time associated with the second station stop; the additional dwell time, although not included in this analysis, would further increase overall travel time through Richmond compared with a single station option. Refer to Chapter 8 for more information on specific stations.

Running time estimates indicate that the fastest of the two-station options are the stations that are also the farthest distance apart — Main Street plus Staples Mill Road — which provides greater passenger access within the Richmond metropolitan area. Running times are slowest for the Broad Street Station options, due to the necessity of a slow-speed loop track required to serve the station facility. Two-station scenarios involving Broad Street add approximately 6 to 7 minutes of pure running time though Richmond, resulting in more delay than any other two-station option.

TABLE 6-70: TWO-STATION OPTION PURE RUNNING TIMES — GREENDALE-CENTRALIA

Station Stops	Running Time	Time Differential	Alignment Miles	Time Between Stops	Miles Between Stops
Northbound					
Boulevard and Staples Mill (via A-Line)	23:07	01:25	21.59	04:42	3.8
Boulevard and Staples Mill (via S-Line)	22:11	00:29	20.45	04:54	4.0
Broad Street and Staples Mill (via A-Line and East Acca bypass)	24:27	02:45	22.11	07:30	4.8

TABLE 6-70: TWO-STATION OPTION PURE RUNNING TIMES — GREENDALE-CENTRALIA

Station Stops	Running Time	Time Differential	Alignment Miles	Time Between Stops	Miles Between Stops
Broad Street and Staples Mill (via A-Line and West Acca bypass)	25:08	03:26	22.06	07:54	4.7
Main Street and Staples Mill (via S-Line)	21:42	00:00	20.45	09:36	7.5
Main Street and Boulevard (via S-Line)	21:46	00:04	20.64	06:42	3.9
Main Street and Broad Street (via S-Line)	26:15	04:33	21.64	08:00	4.0
Southbound					
Boulevard and Staples Mill (via A-Line)	23:14	01:54	21.54	04:42	3.8
Boulevard and Staples Mill (via S-Line)	21:53	00:33	20.12	04:54	4.1
Broad Street and Staples Mill (via A-Line and East Acca bypass)	24:46	03:26	22.06	07:00	4.9
Broad Street and Staples Mill (via A-Line and West Acca bypass)	25:21	04:01	21.97	07:36	4.9
Main Street and Staples Mill (via S-Line)	21:20	00:00	20.17	09:30	7.7
Main Street and Boulevard (via S-Line)	21:32	00:12	20.31	06:42	4.0
Main Street and Broad Street (via S-Line)	25:57	04:37	21.35	08:18	4.0

Based on the Stage I, II and III Screening for Richmond, VA, the following rail alignment sets (defined by station location options) are carried forward into the Draft EIS for further evaluation:

Single Station Options

- Staples Mill Road Station Only (A-Line and Peninsula Subdivision)
- Boulevard Station Only (A-Line and Peninsula Subdivision)
- Boulevard Station Only (S-Line)
- Broad Street Station Only (A-Line and Peninsula Subdivision)
- Main Street Station Only (S-Line and Peninsula Subdivision)
- Two Station Options
- Main Street and Staples Mill Road Stations Combined

- Split Service (A-Line and Peninsula Subdivision) Shared Service (A-line/S-Line and Peninsula Subdivision)
- Full Service (S-Line and Peninsula Subdivision)
- Shared Service (A-line and S-line)

7 CORRIDOR CROSSING OPTIONS

7.1 INTRODUCTION

The Washington, D.C. to Richmond Southeast High Speed Rail project (DC2RVA) corridor crosses public and private roads, pedestrian paths, other rail corridors, and major and minor waterways. Corridor crossings include both at-grade crossings of the railroad by other rail corridors, roads, or pedestrian paths, as well as grade-separated crossings with roads and pedestrian paths going over (overpasses) or under (underpasses) the railroad. Rail bridges carry the track over roads, other rail corridors, and waterways. Major waterways are crossed by bridges or large culverts greater than 6 feet in diameter; minor waterways are crossed by smaller bridges or culverts. Virginia Department of Rail and Public Transportation's (DRPT's) evaluation of these existing crossings identified potential constraints on rail alignment options for the Project. The evaluation of existing crossings assumed an additional main track is added along the DC2RVA corridor, and addressed the following crossings:

Road Crossings

- 146 Grade-Separated Road Crossings
  - 80 Public Road Overpasses
  - 16 Private Road Overpasses
  - 50 Rail Bridges Over Roads (road underpasses)
- 99 At-Grade Road Crossings
  - 68 Public Road At-Grade Crossings
  - 31 Private Road At-Grade Crossings

Pedestrian Crossings

- 6 Pedestrian Overpasses
- 11 Pedestrian At-Grade Crossings
- 2 Pedestrian Underpasses

Rail Crossings

- 4 Rail Bridges Over Railroads
- 2 Rail At-Grade Crossings
- 68 Rail Structures Over Major Waterways, including culverts > 6 feet diameter

DRPT's assessments of constraints on rail alignments for each crossing depended on the location and the specific type of crossing. The evaluation of existing road and pedestrian overpasses addressed spatial limitations that could limit the ability to add an additional main track beneath the overpass. The evaluation of road underpasses addressed existing road geometry and the configuration of the rail overpass structure for potential constraints on the rail alignment. Two types of evaluation were completed on existing at-grade crossings: physical impacts to the public and private road infrastructure with the addition of a single track either to the east or west of the existing track(s); and, operational impacts to traffic at public at-grade crossings with the addition of a single track and changes in train operations. The assessment of at-grade road crossing geometry evaluated the potential need for modifications if an additional main track is added. The operational evaluation of at-grade crossings addressed road geometry, traffic safety, traffic delay, and number of passenger trains per day. The locations of rail bridges over roads, rails, and waterways were evaluated for constraints that could limit where an additional bridge to carry the proposed new track could be constructed. Some examples of constraints include potential disturbance of historical structures, environmental impacts, geographical and geometrical constraints.

The DC2RVA corridor is also crossed by numerous above ground and below ground utilities, including power lines, pipelines, and communication cables. These utility crossings were not evaluated as part of the alternatives screening and development process. Impacts to utilities will be evaluated within Chapter 4 of the Draft EIS for each alternative.

7.2 EVALUATION OF EXISTING ROAD OVERPASSES

There are two types of road and pedestrian path crossing grade separations—overpass and underpass. An overpass is a road or pedestrian bridge over the rail corridor, while an underpass is a rail structure over a road or pedestrian walkway. This section evaluates existing road overpasses to determine whether an additional main track would fit beneath the existing structure. The assessment of road overpasses included a review of information provided by the Virginia Department of Transportation (VDOT), existing data collected from CSX Transportation (CSXT) and other sources, and in some cases, a visual assessment of the overpass. Evaluation of pedestrian crossings and overpasses is discussed in Section 7.4. Evaluation of the underpasses (rail crossings over roads, waterways and other railroads) is discussed in Section 7.5.

The evaluation of existing road overpass structures applied horizontal and vertical clearances stated in the DC2RVA Engineering Basis of Design (Figure 7-1). The Basis of Design states that mainline track centers shall be 15 feet between centerlines of all adjacent tracks. In no case shall track centers be less than 13 feet. The preferred horizontal clearance is a minimum of 25 feet from the centerline of the track to an abutment or pier. New overpass structures are required to meet this minimum dimension. Existing structures may have a minimum of 18 feet horizontal clearance; however, anything less than the 25 feet dimension would require crash walls along the pier or abutment for safety. The minimum vertical clearance for existing structures is 23 feet between the top of the track and underside of the road overpass structure. A vertical clearance of 24 feet 3 inches is required for new overpass structures in order to not preclude the potential for future electrification. A track cannot be added beneath an existing overpass without sufficient vertical and horizontal clearance. A new road overpass may be required as part of any build alternative requiring additional main track where an existing overpass does not have sufficient vertical and horizontal clearance. There may also be potential for the overpass to be modified with minor improvements to increase the vertical clearance to the required standard, without a total reconstruction of the overpass. These minor improvements could be implemented as one or a combination of the following; roadbed or railroad undercutting; bridge raising and profile adjustment; or horizontal clearance with modifications to existing piers.

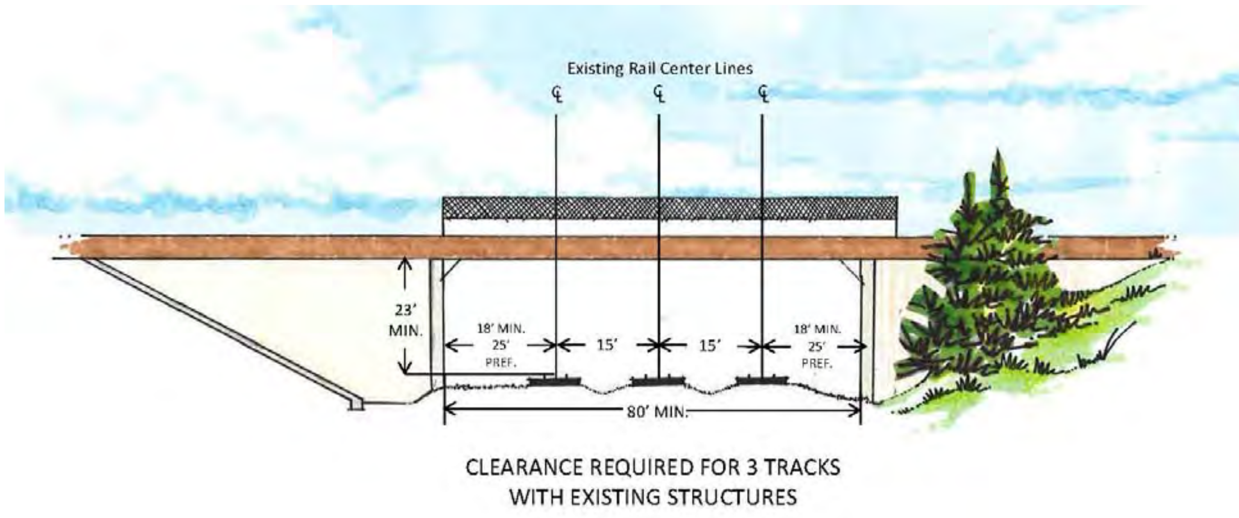


FIGURE 7-1: EXISTING ROAD OVERPASS CLEARANCE REQUIREMENTS FROM DC2RVA BASIS OF DESIGN

The road overpass assessment included the following determinations for each overpass:

1. Is there sufficient horizontal and vertical clearance to add an additional main track parallel to the existing tracks on the east?
   a) Yes, there is a minimum of 23 feet vertical clearance and ≥ 25 feet horizontal clearance from center line of track to the east, or
   b) Yes, there is a minimum of 23 feet vertical clearance and between 18 to 25 feet horizontal clearance from center line of track to the east; a crash wall is required at the road overpass pier/abutment, or
   c) No, there is insufficient vertical and/or horizontal clearance to add a track to the east.
2. Is there sufficient horizontal and vertical clearance to add an additional main track parallel to the existing tracks on the west?
   a) Yes, there is a minimum of 23 feet vertical clearance and ≥ 25 feet horizontal clearance from center line of track to the west, or
   b) Yes, there is a minimum of 23 feet vertical clearance and between 18 to 25 feet horizontal clearance from center line of track to the west; a crash wall is required at the road overpass pier/abutment, or
   c) No, there is insufficient vertical and/or horizontal clearance to add a track to the west.
3. Is there sufficient horizontal and vertical clearance to add an additional main track if the existing tracks are realigned?
   a) Yes, there is a minimum of 23 feet vertical clearance and ≥ 25 feet horizontal clearance from center line of the outside track to either the east or the west, or
   b) Yes, there is a minimum of 23 feet vertical clearance and between 18 to 25 feet horizontal clearance from center line of the outside track to the east or west; a crash wall is required at the road overpass pier/abutment, or

c) No, there is insufficient vertical and/or horizontal clearance to add a new track and realign the existing tracks.
d) Overpass can be modified with minor improvements to increase the vertical clearance to the required standard by implementing any combination of the following; roadbed or railroad undercutting; bridge raising and profile adjustment; or horizontal clearance with modifications to existing piers.

For each road overpass the assessment concluded at least one or a combination of the following outcomes:

- Space available for an additional track.
  - on east side (with or without crash walls)
  - on the west side (with or without crash walls)
  - on either east or west side (with or without crash walls)
- 3 existing tracks at this location, no additional construction required.
- Feasible to realign existing tracks

Insufficient clearance, adding track would require construction of a new overpass Generally, adding a track to the east or west side beneath an overpass would have less impacts and less cost, and, assuming similar alignments and track design speeds, would be preferred in comparison to realigning or modifying existing tracks or having to construct a new overpass.

Table 7-1 summarizes the road overpass clearance assessment findings, indicating whether a track can be added beneath the road overpass, on the east side, west side, either side, with the realignment or modification of the existing tracks (with or without crash walls), or there is insufficient space to add track.

TABLE 7-1: EXISTING ROAD OVERPASS CLEARANCE ASSESSMENT SUMMARY

Segment	Milepost	Overpass Location	Clearance Assessment Findings*
01: Arlington to Alexandria (ROAF)	CFP 108.47	Airport Access Road (Route 233)	Space available for an additional track on east or west side
	CFP 106.43	Jefferson Davis Highway (Route 1)	Space available for an additional track on east or west side
	CFP 105.05	Duke Street (Route 236)	Space available for an additional track on west side
	CFP 104.57	Telegraph Road (Route 241)	Space available for an additional track on east side
02: Alexandria to Franconia (AFFR)	CFP 100.07	Interstate 95/495	3 existing tracks at this location, no additional construction required
	CFP 99.08	Franconia Road (Route 644)	3 existing tracks at this location, no additional construction required
03: Franconia to Lorton (FRLO)	CFP 98.09	Franconia-Springfield Parkway (Route 289)	Space available for an additional track on either east or west side with a crash wall
	CFP 95.30	Backlick Road (Route 7100)	Insufficient vertical space, adding track would require construction of a new overpass.

TABLE 7-1: EXISTING ROAD OVERPASS CLEARANCE ASSESSMENT SUMMARY

Segment	Milepost	Overpass Location	Clearance Assessment Findings*
	CFP 95.14	Fairfax County Parkway (Route 286)	Space available for an additional track on the east side
	CFP 93.79	Pohick Road (Route 638)	Space available for an additional track on the west side
04: Lorton to Powells Creek (LOPC)	CFP 88.8	Dawson Beach Road (Route 687)	Insufficient clearance, adding track would require construction of a new overpass
	CFP 80.02	Possum Point Road (Route 633)	3 existing tracks at this location, no additional construction required
05: Powells Creek to Arkendale (PCAR)	CFP 77.50	Range Road/Bauer Road	3 existing tracks at this location, no additional construction required
	CFP 74.75	Private street (Wright's crossing/Osterman)	3 existing tracks at this location, no additional construction required
06: Arkendale to Dahlgren (ARDJ)	CFP 69.09	Courthouse Road (Route 630)	Space available for an additional track on the west side with a crash wall
	CFP 66.77	Eskimo Hill Road (Route 628)	Insufficient clearance, adding track would require construction of a new overpass
	CFP 63.47	Leeland Road (Route 626)	Insufficient clearance, adding track would require construction of a new overpass
	CFP 63.02	Primmer House Road (Route 624)	Space available for an additional track on either east or west side
07: Dahlgren to Fredericksburg (DJFB)	CFP 60.04	Kings Highway (Route 3 Business)	Insufficient clearance, adding track would require construction of a new overpass
	CFP 58.90	Blue and Grey Parkway (Route 3)	Space available for an additional track on either east or west side
	CFP 60.81	Butler Road/White Oak Road(Route 218)	Insufficient clearance, adding track would require construction of a new overpass
09: Hamilton to Crossroads (HAXR)	CFP 53.45	Mills Drive (Route 17)	3 existing tracks at this location, no additional construction required
10: Crossroads to Guinea (XRGU)	There are no overpass structures in this segment.		
11: Guinea to Milford (GUMD)	CFP 38.50	Rogers Clark Boulevard (Route 207) southbound	Space available for an additional track on the east or west side with a crash wall
	CFP 38.50	Rogers Clark Boulevard (Route 207) northbound	Space available for an additional track on the east or west side with a crash wall
12: Milford to North Doswell (MDND)	CFP 37.80	Nelson Hill Road (Route 722)	Space available for an additional track on the west side
	CFP 28.37	Dry Bridge Road (Route 684)	Space available for an additional track on the west side with track shift and crash wall
	CFP 26.96	Ruther Glen Road (Route 652)	Space available for an additional track on the east or west side with a crash wall

TABLE 7-1: EXISTING ROAD OVERPASS CLEARANCE ASSESSMENT SUMMARY

Segment	Milepost	Overpass Location	Clearance Assessment Findings*
	CFP 26.54	Interstate 95 northbound	Space available for an additional track on the east or west side with a crash wall
	CFP 26.54	Interstate 95 southbound	Space available for an additional track on the east or west side with a crash wall
13: North Doswell to Elmont (NDEL)	CFP 20.81	Kings Dominion Boulevard (Route 30)	Space available for an additional track on the east or west side
	CFP 18.95	Old Ridge Road (Route 738)	Space available for an additional track on the west side with a crash wall
	CFP 17.22	Washington Highway (Route 1)	Space available for an additional track on the east or west side with a crash wall
14: Elmont to Greendale (ELGN)	CFP 9.89	Greenwood Road (Route 625)	Space available for an additional track on the east or west side with a crash wall
	CFP 8.95	Interstate 295 northbound	Space available for an additional track on the east or west side
	CFP 8.95	Interstate 295 southbound	Space available for an additional track on the east or west side
15: Greendale to South Acca Yard/West Acca Yard (GNSA)	CFP 5.94	East Parham Road	Space available for an additional track on west side
	CFP 4.45	Hilliard Road (Route 356)	Space available for an additional track on the east or west side with crash walls
	CFP 3.71	Dumbarton Road	Insufficient clearance, adding track would require construction of a new overpass
	CFP 3.16	Interstate 64 westbound	Feasible to realign existing tracks
	CFP 3.16	Interstate 64 eastbound	Feasible to realign existing tracks
	CFP 1.84	Interstate 195 (northbound and southbound)	Space available for an additional track on east side with crash walls
	CFP 1.71	Westwood Avenue/Saunders Avenue (Route 197)	Insufficient clearance, adding track would require construction of a new overpass
16: SAY to AM Junction – Hermitage Lead (SAAM)	CFP 0.01	North Boulevard (Route 161)	Insufficient clearance, adding track would require construction of a new overpass
	SRN 2.91	Interstate 95/64 (northbound and southbound)	Design variances for horizontal clearance and/or crash walls may be required to utilize current overpass structure. Bridge replacement or new construction would not be required.
	SRN 2.82	North Lombardy Street	Replacing bridge would require a vertical grade change which is not feasible. Therefore, remove center pier and replace two center spans.

TABLE 7-1: EXISTING ROAD OVERPASS CLEARANCE ASSESSMENT SUMMARY

Segment	Milepost	Overpass Location	Clearance Assessment Findings*
	SRN 2.21	Belvidere Street/Chamberlayne Avenue southbound (Route 1)	Space available for an additional track on the east side with crash walls
	SRN 2.21	Belvidere Street/Chamberlayne Avenue northbound (Route 1)	Space available for an additional track on the east side with crash walls
	SRN 2.18	Chamberlayne Parkway	Space available for an additional track on the east side with crash walls
	SRN 1.59	North 1st Street	Space available for an additional track on the east side with crash walls
	SRN 1.33	North 5th Street	Space available for an additional track on the east or west side with crash walls
	SRN 1.28	Interstate 64 westbound	Space available for an additional track on the east or west side with crash walls
	SRN 1.28	Interstate 64 eastbound	Space available for an additional track on the east or west side with crash walls
17: AM Junction to Centralia – S-Line (AMCE)	SRN 0.56	Leigh Street Viaduct (Route 33)	Space available for an additional track on the east or west side
	SRN 0.43	Interstate 95 northbound ramp to Route 360 southbound	Space available for an additional track on the east or west side with crash walls
	SRN 0.00	I-95 northbound	I-95 currently passes over the viaduct which originally had two tracks. Reinstalling the second track on this viaduct may require design variances for both horizontal and vertical clearances. However, the I-95 overpass would not be reconstructed nor would a new overpass be required.
	SRN 0.00	I-95 southbound	Space available for an additional track on the west side
	S 0.13	I-95 southbound Ramp to I-195	Space available for an additional track on the west side
	S 0.14	I-195 Ramp to I-95 northbound	Space available for an additional track on the east side
	S 0.16	I-95 northbound Ramp to I-195	Space available for an additional track on east side
	S 0.17	I-195 Ramp to I-95 southbound	Space available for an additional track on east side
	S 0.97	Interstate 95 on/off ramps to Maury Street	Reinstall a third track between the two existing tracks. No modifications to or replacement of the existing overpass is anticipated.

TABLE 7-1: EXISTING ROAD OVERPASS CLEARANCE ASSESSMENT SUMMARY

Segment	Milepost	Overpass Location	Clearance Assessment Findings*
	S 5.96	Cogbill Road (access to DuPont)	Insufficient clearance, adding track would require construction of a new overpass
	S 6.43	Chippenham Parkway (Route 150)	Space available for an additional track on east side with crash walls
	S 7.83	Elliham Avenue	Insufficient clearance, adding track would require construction of a new overpass
	S 8.82	Jefferson Davis Highway (Route 1)	Space available for an additional track on east or west side
	S 10.59	Route 288 northbound	Insufficient clearance, adding track would require construction of a new overpass
	S 10.60	Route 288 southbound	Insufficient clearance, adding track would require construction of a new overpass
18: WAY to Centralia – A-Line (WACE)	ARN 3.18	Interstate 195 northbound	Insufficient clearance, adding track would require construction of a new overpass
	ARN 3.02	West Broad Street (Route 33)	Insufficient clearance, adding track would require construction of a new overpass and modification to existing I-195 travel lanes
	ARN 2.77	Monument Avenue (northbound and southbound)	Insufficient clearance, adding track would require construction of a new overpass and modification to existing I-195 travel lanes
	ARN 2.50	Patterson Avenue (Route 6)	Insufficient clearance, adding track would require construction of a new overpass and modification to existing I-195 travel lanes
	ARN 2.18	Grove Avenue	Insufficient clearance, adding track would require construction of a new overpass and modification to existing I-195 travel lanes
	ARN 1.93	West Cary Street (Route 147)	Insufficient clearance, adding track would require construction of a new overpass and modification to existing I-195 travel lanes
	ARN 1.78	I-195 southbound ramp to eastbound Downtown Expressway (Va. Route 195)	Insufficient clearance, adding track would require construction of a new overpass
	ARN 1.22	Douglasdale Road	Insufficient clearance, adding track would require construction of a new overpass
	A 0.30	Forest Hill Avenue (Route 683)	Insufficient clearance, adding track would require construction of a new overpass
	A 1.55	Midlothian Turnpike (Route 60)	Insufficient clearance, adding track would require construction of a new overpass
	A 2.42	Hull Street Road (Route 360)	Insufficient clearance, adding track would require construction of a new overpass

TABLE 7-1: EXISTING ROAD OVERPASS CLEARANCE ASSESSMENT SUMMARY

Segment	Milepost	Overpass Location	Clearance Assessment Findings*
	A 3.71	Hopkins Road (Route 637)	Space available for an additional track on east side with crash walls
	A 4.63	Warwick Road/Bells Road (Route 161)	Insufficient clearance, adding track would require construction of a new overpass
	A 5.85	Castlewood Road/Cardwell Road	Space available for an additional track on west side with crash walls
	A 6.85	Chippenham Parkway (Route 150) northbound	Insufficient clearance, adding track would require construction of a new overpass
	A 6.86	Chippenham Parkway (Route 150) southbound	Insufficient clearance, adding track would require construction of a new overpass
	A 7.12	South Beulah Road/Dundas Road (Route 641)	Space available for an additional track on west side with crash walls
	A 10.35	Route 288 northbound	Insufficient clearance, adding track would require construction of a new overpass
	A 10.37	Route 288 southbound	Insufficient clearance, adding track would require construction of a new overpass
18: Rivanna Junction to Beulah (RJBE)	CA 85.21	East Leigh Street (Route 33)	Space available for an additional track on east side
	CA 85.12	Interstate 95 northbound ramp to Route 360 southbound	Space available for an additional track on either east or west side

Table Notes: * These crossing assessments solely reflect the horizontal and vertical clearance geometry beneath the individual structures along the corridor. Results do not consider track design speed, rail operations, environmental or historical constraints. The crossing assessments inform, but are separate from, the findings presented in the corridor screening tables in Chapter 6.

7.3 EXISTING AT-GRADE ROAD CROSSING ASSESSMENT

Road-rail at-grade crossings are unique in that they constitute the intersection of two transportation modes which differ in both the physical characteristics and operations. At-grade road crossings are divided into two categories, public and private. Public crossings are roads under the jurisdiction of and maintained by a public authority and open to the traveling public. Private crossings are roads privately owned and utilized only by the landowner or licensee. The DC2RVA project corridor includes 99 at-grade road crossings. Of these, 31 are private roadway crossings and 68 are public road crossings.

DRPT's evaluation included two different at-grade road crossings assessments: physical impacts to the existing public and private road infrastructure with the addition of a single track either to the east or west of the existing track(s); and operational impacts to traffic at public at-grade crossings with the addition of a single track and changes in train operations. DRPT conducted the physical evaluation of road at-grade crossings to determine potential impacts to the road geometry and to determine whether such impacts constrain the rail alignment to the east or west of the existing tracks. DRPT's evaluation of operational impacts to traffic, including traffic delays and safety, were used to determine a partial list of crossings to be evaluated for possible closure, grade separation, or other modification.

DRPT's evaluations of at-grade crossings focused solely on existing at-grade road crossings of the rail corridor. Virginia's law generally precludes creating new at-grade road/rail crossings[1], and therefore DRPT assumed all road/rail crossings on new bypass alignments would be grade-separated, or the roads relocated or closed.

7.3.1 Assessment of Potential Physical Impacts to Existing At-Grade Crossings

The preliminary assessment of each at-grade crossing included a summary of the existing conditions and an assessment of the impacts to the existing public and private road infrastructure from adding an additional track to either side (east or west) of the existing tracks. The assessment of existing conditions of each public or private at-grade crossing in the DC2RVA project corridor included:

1. Reviewing existing aerial mapping of each at-grade crossing and road information made available by VDOT
2. Conducting field observations (limited to observations from publicly available right of way and other public areas) at roads with at-grade crossings of the rail corridor, and along the road for 500 feet on either side of the existing track. DRPT's field observations included:
    a. Horizontal or vertical roadway alignments (grade changes, curves, etc.) that could present potential sight distance, constructability, or other impacts when a track is added on either side of the existing track(s)
    b. Large drainage structures or features
    c. Existing utilities (above or below ground) that parallel the road or rail corridor
    d. Crossing protection and other railroad equipment or structures
    e. Features (large fills, steep cuts, etc.) that are located along the road or rail corridor at the crossing
    f. Roadway entrances (driveways, curb-cuts, etc.) that are located within the observation area

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[1] §56-363. Crossing of a railroad or public highway by another railroad; crossing of a railroad by a public highway.

It is hereby declared to be the policy of the Commonwealth that all crossings of one railroad by another, or a public highway by a railroad, or a railroad by a public highway, shall, wherever reasonably practicable, pass above or below the existing facility. And every railroad hereafter constructed across another railroad or across a public highway, and every public highway hereafter constructed across a railroad, shall, wherever it is reasonably practicable, and does not involve an unreasonable expense, all the circumstances of the case considered, pass above or beneath the existing structure at a sufficient elevation or depression, as the case may be, with easy grades, so as to admit of safe speedy travel over each.

If constructing a crossing either above or below the existing structure is not practical and involves an unreasonable expense, the responsible governing body constructing a new public crossing at grade, in accordance with the laws of the Commonwealth of Virginia, shall take precautions to provide for the safe movement of traffic. It is the policy of the Commonwealth to limit the number of new public at-grade crossings and to eliminate unnecessary crossings.

The findings from the field observations include an assessment for the additional track location based on the at-grade crossing conditions. This analysis considered the potential installation of an additional track only. A separate analysis is provided in section 7.3.2 that evaluates the need for grade crossing safety improvements, closure, or separation. The assessments are summarized in Table 7-2 below.

TABLE 7-2: AT-GRADE CROSSING FIELD INVESTIGATION SUMMARY

Segment	Milepost	Location	At-Grade Field Assessment Findings
01: Arlington to Alexandria (ROAF)	There are no at-grade crossings in these segments.		
02: Alexandria to Franconia (AFFR)			
03: Franconia to Lorton (FRLO)			
04: Lorton to Powells Creek (LOPC)	CFP 86.85	Featherstone Road (Route 636)	Space available for an additional track on the west side to reduce impacts to utilities, residential homes, and the existing roadways on the east side
05: Powells Creek to Arkendale (PCAR)	CFP 82.38	Cherry Hill Road (Private road)	A project is underway to add a third track independent of DC2RVA.
	CFP 78.83	Potomac Avenue	A project is underway to add a third track independent of DC2RVA.
	CFP 78.11	Epperson Avenue	A project is underway to add a third track independent of DC2RVA.
	CFP 76.70	Flemming Street	A project is underway to add a third track independent of DC2RVA.
	CFP 73.10	Lee's Crossing	A project is underway to add a third track independent of DC2RVA.
06: Arkendale to Dahlgren (ARDJ)	CFP 72.34	Brent Point Road (Route 658)	Space available for an additional track on the east side to avoid impacting the intersection of Brent Point Road and Arkendale Road (Route 633) on the west
	CFP 67.57	Mount Hope Church Road (Route 677)	Space available for an additional track on the west side to avoid impacting the private entrances to residential homes and the utility on the east side
07: Dahlgren to Fredericksburg (DJFB)	There are no at-grade crossings in this segment.		
08: Fredericksburg to Hamilton (FBHA)	CFP 57.57	Lansdowne Road (Route 638)	3 existing tracks at this location, no additional construction
09: Hamilton to Crossroads (HAXR)	CFP 54.77	Mine Road (Route 636)	3 existing tracks at this location, no additional construction
10: Crossroads to Guinea (XRGU)	CFP 51.41	Summit Crossing Road (Route 668)	Space available for an additional track on the west side to avoid impacting the utilities running along the east side of the tracks

TABLE 7-2: AT-GRADE CROSSING FIELD INVESTIGATION SUMMARY

Segment	Milepost	Location	At-Grade Field Assessment Findings
	CFP 48.63	Claiborne Crossing Road (Route 660)	Space available for an additional track on the west side to avoid impacting the existing creek channel features on the east side of the tracks
	CFP 47.24	Stonewall Jackson Road (Route 606)	Space available for an additional track on the west side to avoid impacting the majority of the utilities on the east side of the track, and the proximity of Stonewall Jackson Shrine Road and Route 607
11: Guinea to Milford (GUMD)	CFP 45.77	Jones Crossing (Private road)	Space available for an additional track on the east side to avoid impacting the existing road on the west side of tracks running parallel within 30 feet from Woodford Road to Jones Road
	CFP 44.50	Woodford Road (Route 626)	Space available for an additional track on the east side to avoid impacting the existing road and the majority of the utilities on the west side of the tracks
	CFP 43.50	Woodslane Road (Route 609)	Space available for an additional track on the east side to avoid impacting the fiber optics line on the west side of the tracks
	CFP 41.70	Rixey Road (Route 666) (Private crossing)	Space available for an additional track on the west side of the road to avoid utilities on the east side
	CFP 40.43	Paige Road (Route 605)	Space available for an additional track on the east side to avoid impacting utilities on the west side, as well as the larger flow for the natural drainage structures
	CFP 38.99	Rose Crossing/Holly Hill Drive (Private road)	Private crossing - assessment not conducted[2]
12: Milford to North Doswell (MDND)	CFP 36.95	Bates Crossing/Route 768 (Private road)	Space available for an additional track on the west side to avoid impacting a rail siding on the east side of the track
	CFP 36.66	Alexandria Lane/Route 640 (Private road)	Space available for an additional track on the west side to avoid impacting existing service tracks on the east side. Pond on west side and other water features north of crossing are far enough from tracks to fit additional track on the west side
	CFP 34.01	Pleasant Hill (Private road)	Private crossing - assessment not conducted
	CFP 33.50	Private road (Unnamed Road)	Private crossing - assessment not conducted
	CFP 33.00	Penola Road (Route 601)	Space available for an additional track on the west side to avoid impacting drainage features and utilities on the east side of the tracks

[2] Private crossings could not be accessed at the time of this field assessment due to the timing of required access permissions for field work. These crossings were later assessed and their findings considered in the Draft EIS.

TABLE 7-2: AT-GRADE CROSSING FIELD INVESTIGATION SUMMARY

Segment	Milepost	Location	At-Grade Field Assessment Findings
	CFP 31.50	Georges Crossing (Private Road)	Private crossing - assessment not conducted
	CFP 29.72	Colemans Mill Road (Route 656)	Space available for an additional track on the west side to avoid impacting existing structures and utilities
	CFP 24.38	Chandler Crossing (Private road)	Private crossing - assessment not conducted
13: North Doswell to Elmont (NDEL)	CFP 21.87	Doswell Road (Route 688)	Space available for an additional track on the east side to avoid impacting the tracks on the west side for the BBRR yard and industrial siding at Doswell
	CFP 21.66	Excelsior Mill Crossing (Private crossing)	Private crossing - assessment not conducted
	CFP 15.62	Vaughan Street	Space available for an additional track on the east side to avoid impacting existing structures and utilities
	CFP 15.16	West Patrick Street	Space available for an additional track on the east side to avoid impacting the underground utilities on the west side of the crossing
	CFP 14.85	College Avenue/Henry Clay Road	Space available for an additional track on the east side to avoid impacting underground sewer and water on the west as well as maintaining historic station building on the west side
	CFP 14.72	England Street (Route 54)	Space available for an additional track on the east side to avoid impacting the historic station building on the west side
	CFP 14.64	Myrtle Street	Space available for an additional track on the east side due to proximity of buildings on the west side of tracks to the existing Center Street, and the extra space provided by the parking on the east side that sets the buildings back from Center Street
	CFP 14.20	East Francis Street	Space available for an additional track on the east side to mitigate issues with underground utilities on the west side
	CFP 13.85	Ashcake Road (Route 657)	Space available for an additional track on the east side given that Route 663 is on the west side
	CFP 12.95	Gwathmey Church Road (Route 707)	Space available for an additional track on the east side to avoid impacting Route 663 on the west side and along the railway as Route 663 runs parallel to the tracks
	CFP 11.55	Elmont Road (Route 626)	Space available for an additional track on the east side due to proximity of residence on west side

TABLE 7-2: AT-GRADE CROSSING FIELD INVESTIGATION SUMMARY

Segment	Milepost	Location	At-Grade Field Assessment Findings
	CFP 11.15	Cedar Lane (Route 623)	Space available for an additional track on the west side to avoid impacting buried communications and fiber lines on the east side of the tracks, as well as the existing pond and current flow line of drainage around the crossing
14: Elmont to Greendale (ELGN)	CFP 9.65	Mill Road (Route 626)	Space available for an additional track on the west side to avoid impacting Old Washington Highway and the baseball fields on the east
	CFP 8.10	Mountain Road	Space available for an additional track on the east side to reduce impacts to buried communication lines
	CFP 6.60	Hungary Road (Route 682)	Space available for an additional track on the west side to reduce impacts to utilities and proximity to existing roadways in the vicinity
15: Greendale to SAY/WAY (GNSA)	CFP 5.45	Hermitage Road	Space available for an additional track on the east side of the tracks to reduce horizontal impacts to the industrial areas on the west side of the tracks
16: SAY to AM Junction – Hermitage Lead (SAAM)	SRN 3.45	Hermitage Road	Space available for an additional track on the east side to reduce horizontal and vertical impacts to the highway profile and utilities on the west
	SRN 3.07	Dinneen Street (closed crossing)	Crossing closed – assessment not conducted
	SRN 2.30	Brook Road	Space available for an additional track on the east side to reduce horizontal and vertical impacts to the recycling center property, highway alignment and grade, and the transmission lines
	SRN 1.69	St. James Street	Space available for an additional track on the west side to reduce horizontal impacts to utilities and the industrial development on the east
	SRN 1.55	North 2nd Street/Valley Road	Space available for an additional track on the east side to reduce horizontal and vertical impacts to the North 1st Street bridge located to the west and the roadway alignment and profile
	SRN 1.23	Hospital Street/North 7th Street	Space available for an additional track on the east side to reduce horizontal impacts to the roadway geometry and utilities
17: AM Junction to Centralia – S-Line (AMCE)*	S 0.77	Maury Street	Space available for an additional track between the two existing tracks to reduce horizontal impacts to the roadway geometry, the adjacent petroleum facilities and utilities on the east and west
	S 1.19	Private crossing (4th Street extension)	Space available for an additional track between the two existing tracks to reduce horizontal impacts to utilities, the industrial areas and the stormwater management basin and outfall structure on the east and west
	S 1.66	Goodes Street	Space available for an additional track between the two existing tracks to reduce horizontal impacts to

TABLE 7-2: AT-GRADE CROSSING FIELD INVESTIGATION SUMMARY

Segment	Milepost	Location	At-Grade Field Assessment Findings
			utilities, the industrial areas and the floodwall and gate on the east and west
	S 2.38	Federal Paper (Private crossing)	Private crossing - assessment not conducted
	S 2.99	Commerce Road	Space available for an additional track on the east side to reduce horizontal and vertical impacts to the existing overhead transmission lines on the west
	S 3.95	Ruffin Road	Space available for an additional track on the east side to reduce horizontal impacts to the overhead transmission line and the apartment complex and church on the west
	S 4.43	Bells Road (Route 161)	Space available for an additional track on the east side to reduce horizontal impacts to the overhead transmission lines and residential neighborhoods on the west
	S 4.97	Dale Avenue	Space available for an additional track on the east side to reduce horizontal impacts to the overhead transmission lines and the residential neighborhood on the west
	S 6.35	Texaco Road (Private crossing)	Private crossing - assessment not conducted
	S 6.70	Station Road (Private crossing)	Space available for an additional track on the east side to reduce horizontal impacts to the overhead transmission towers and industrial properties on the west
	S 9.16	Kingsland Road (Route 611)	Space available for an additional track on the west side to reduce horizontal and vertical impacts to the roadway alignment and profile and the intersection with Chester Road on the east
	S 9.83	Brinkley Road (Route 1622)	Space available for an additional track on the west side to avoid horizontal and vertical impacts on the intersection with Chester Road with regards to profile and the potential for traffic to back up on Chester Road
18: WAY to Centralia – A-Line (WACE)	A 0.68	Jahnke Road (Route 686)	Space available for an additional track on the west side to reduce horizontal impacts to utilities and the alleyway on the east
	A 1.00	Bassett Avenue	Space available for an additional track on the west side to reduce horizontal impacts to utilities and residential properties on the east
	A 3.08	Broad Rock Boulevard northbound/southbound (Route 10)	Space available for an additional track on the west side to reduce horizontal and vertical impacts to the utilities and drainage structures on the east
	A 3.87	Terminal Avenue	Space available for an additional track on the west side to reduce horizontal impacts to the existing residential development on the east

TABLE 7-2: AT-GRADE CROSSING FIELD INVESTIGATION SUMMARY

Segment	Milepost	Location	At-Grade Field Assessment Findings
	A 5.52	Walmsley Boulevard (Route 647)	Space available for an additional track on the west side to reduce horizontal impacts to the existing residential developments and railroad spur on the east side of the crossing on the east
	A 9.38	Kingsland Road (Route 611)	Space available for an additional track on the west side to reduce horizontal impacts to the residential neighborhoods on the east. The parallel entrance would have to be realigned to the west
	A 10.01	Thurston Road (Route 1452)	Space available for an additional track on the west side to reduce horizontal and vertical impacts to the impacts to the existing fiber optic line along the railroad corridor on the east
	A 10.74	Old Lane (Route 637)	Space available for an additional track on the west side to reduce horizontal and vertical impacts to the existing commercial development on the east side of the crossing and reduce impacts to the existing fiber optic line along the railroad corridor on the east
19: Rivanna Junction to Beulah (RJBE)	CA 85.12	Brown Street (Private crossing)	Space available for an additional track on the west side to reduce horizontal and vertical impacts to the I-95 off-ramp on the east. Ramp will have to be checked for the proposed track and horizontal distance to the bridge pier.
20: Buckingham Branch (BBRR)	CA 85.77	Hospital Street	Space available for an additional track on the west side to reduce horizontal and vertical impacts to utilities and the courthouse facility. Locating the track on the west will encroach into Valley Road with runs parallel to the track north of the crossing on the east
21. Fredericksburg Bypass (FBBP)	The Fredericksburg Bypass alignment combines adding a track on the Dahlgren Spur and new track; roads crossing the new alignment would be grade-separated, relocated, or consolidated.		
	Dahlgren Spur: CFQ 0.25	Debruen Lane	Install Median Separator with Quad Gates
	CFQ 0.86	Hot Top Road	Install Double Locking Gate
	CFQ 1.46	Ferry Road	Install Quad Gates and realign Mt. Vernon Avenue
	n/a (near CFQ 1.46)	Mt. Vernon Avenue	Realign to install Quad Gates at Ferry Road
	CFQ 2.63	Federal Drive	Install Quad Gates. Realign Federal Drive to fit proposed track. Close private access.
	CFQ 2.73	Private Driveway	Close
	CFQ 3.32	Cleek Lane	Install Locking Gates
	CFQ 3.42	Private Driveway	Install Locking Gates
	CFQ 3.56	Little Falls Road	Install Median Separator
	CFQ 4.32	Private Driveway	Install Locking Gates

TABLE 7-2: AT-GRADE CROSSING FIELD INVESTIGATION SUMMARY

Segment	Milepost	Location	At-Grade Field Assessment Findings
	CFQ 4.44	Forest Lane Road	Install Median Separator
22. Ashland Bypass (ASBP)	The Ashland Bypass alignment is new track; roads crossing the alignment would be grade-separated, relocated, or consolidated.		

* This segment currently consists of one to two main tracks plus siding tracks. The Project alternatives using the S-Line would improve the segment to consist of two main tracks throughout the segment and include a new siding track extending 12,000 feet south of South Yard.

7.3.2 Evaluation of at Existing At-Grade Roadway-Rail Crossings

Existing at-grade[3] roadway-rail crossings within the corridor were evaluated to identify a proposed action(s) at each individual crossing as part of the alternatives development process. The proposed action(s) are intended to modify the existing crossing treatment and/or condition in accordance with Federal guidance criteria for high speed rail corridors and, as necessary, based on site-specific physical and/or operating characteristics. While the proposed action(s) would not differ by rail alignment, the proposed actions themselves guide the development of the alternatives design and the associated impacts for evaluation in the environmental documentation. The evaluation of the existing at-grade roadway-rail crossings is summarized below and documented in a technical memorandum that is includes as Appendix OO; refer there for full details of the evaluation, including additional details on existing conditions, definition, process, and results.

7.3.2.1 Existing At-Grade Crossings

There are 50 public at-grade crossings and 19 private at-grade crossings that operate within the DC2RVA corridor. Public at-grade crossings are defined as roadway-rail crossings that are located on roadways that are open to use by the public and are maintained by a public authority; private at-grade crossings are defined as roadway-rail crossings located on roadways that are not intended for use by the public nor maintained by a public authority. The 69 at-grade crossings are located in the following jurisdictions (listed north to south):

- Alexandria City: 1 private at-grade crossing
- Prince William County: 2 public at-grade crossings; 2 private at-grade crossings
- Stafford County: 2 public at-grade crossings; 2 private at-grade crossings
- Fredericksburg City: 1 public at-grade crossing
- Spotsylvania County: 2 public at-grade crossings
- Caroline County: 7 public at-grade crossings; 7 private at-grade crossings
- Hanover County: 11 public at-grade crossings; 1 private at-grade crossing

[3] The terms "grade crossing" and "at-grade crossing" are often used interchangeably, both colloquially and within Federal documentation, to indicate a roadway-rail crossing that occurs at the same level (i.e., the roadway pavement and railroad tracks directly intersect). Note that this technical documentation uses the term "at-grade crossing" to ensure a distinct and readily understandable difference from the term "grade separated crossing".

- Henrico County: 4 public at-grade crossings
- Richmond: 16 public at-grade crossings; 2 private at-grade crossings
- Chesterfield County: 5 public at-grade crossings; 2 private at-grade crossings

Additionally, the Fredericksburg Bypass alignment partially uses an existing rail line that has five public and five private existing at-grade roadway-rail crossings. Existing roadway crossings are not subject to the same Virginia Code to grade separate or close new roadway-rail crossings. The existing roadways will either be improved by adding median separators, a four quad gate, gates with median separators, or will either realign access or be closed depending on the specific crossing study. Specific details to these crossings improvements can be referenced in Table 6-49 of Chapter 6.

7.3.2.2 Summary of Proposed Actions

In accordance with federal high speed rail definitions, every at-grade crossing must be grade separated, closed, or have appropriate crossing treatment that is connected into the train detection circuitry and physically impedes vehicles from accessing the tracks when a train is approaching or occupying the crossing. Accordingly, the following proposed actions were defined for use in the DC2RVA at-grade crossing evaluation:

- Closure/Consolidation
- Grade Separation
- Four Quadrant Gates
- Median Treatment
- Locking Gate (private crossings only)
- Site Improvements
- No Action

It is important to note that Virginia state code generally precludes the creation of new at-grade roadway-rail intersections. This means that all new rail crossings of existing roadways must be either grade separated or closed.

7.3.2.3 Summary of Evaluation Process

The proposed actions were identified by developing and applying a standardized process that is documented and consistent for all crossings, regardless of size, type, or location. The process for identifying proposed actions at existing at-grade roadway crossings consisted of the following two analysis steps, which are described in further detail below:

1) Analyze the crossing against FHWA criteria to determine if elimination of the at-grade condition (either through grade separation or closure/consolidation) should be considered.
2) Analyze site-specific conditions to determine if other reasons (i.e., geometrics, safety, etc.) warranted grade separation or closures, or other crossing improvements. Analysis was based on planning and engineering judgment by DRPT.

Step 1: Federal Guidance Criteria, Crossing Elimination

The Railroad-Highway Grade Crossing Handbook (Revised Second Edition August 2007) by the United States Department of Transportation (U.S. DOT) Federal Highway Administration (FHWA) provides a single reference document on prevalent and best practices as well as adopted standards relative to road-rail grade crossings. Specifically, Chapter V of the handbook, "Selection of Alternatives, Part A Technical Working Group Guidance on Traffic Control Devices Selection Criteria and Procedure," outlines analysis methodologies for consideration of traffic control devices or other measures at every public road-rail grade crossing. "Section 6 Grade Separation" provides 11 conditions, as shown in Table 7-3, for which public at-grade crossings "should be considered for grade separation or otherwise eliminated" if any one or more of the set thresholds are met or exceeded. A review of the existing public at-grade crossings determined that Conditions i) through vi) are not currently met, nor expected to be met, within the DC2RVA project corridor. Conditions vii) through xi) were determined to be potentially applicable, and were therefore included in a crossing elimination screening analysis that was conducted as one step of the overall at-grade crossing evaluation. A variety of detailed roadway and railroad input data, as well as train operational data, was required to complete the analysis.

TABLE 7-3: FHWA CONDITIONS FOR EVALUATING AT-GRADE CROSSINGS FOR POTENTIAL CROSSING ELIMINATION

FHWA Condition	Applicability to DC2RVA At-Grade Crossings
i. The road is a part of the designated Interstate Highway System.	Not applicable - None of the at-grade crossings include a road that is part of the Interstate Highway System.
ii. The road is otherwise designed to have full controlled access.	Not applicable - None of the at-grade crossings are fully access controlled.
iii. The posted road speed equals or exceeds 70 mph.	Not applicable - The posted highway speed at all at-grade crossings does not equal or exceed 70 mph.
iv. Annual average daily traffic (AADT) exceeds 100,000 in urban areas or 50,000 in rural areas.	Not applicable - The AADT at the at-grade crossings does not exceed these limits.
v. Maximum authorized train speed exceeds 110 mph.	Not applicable - The maximum authorized speed for the Project is 90 mph and does not exceed 110 mph at any of the at-grade crossings.
vi. An average of 150 or more trains per day or 300 million gross tons per year.	Not applicable - The average number of trains per day at the at-grade crossings does not exceed these limits.
vii. An average of 75 or more passenger trains per day in urban areas or 30 or more passenger trains per day in rural areas.	Potential applicability to existing and future conditions.
viii. Crossing exposure (the product of the number of trains per day and AADT) exceeds 1 million in urban areas or 250,000 in rural areas; or	Potential applicability to existing and future conditions.
ix. Passenger train crossing exposure (the product of the number of passenger trains per day and AADT) exceeds 800,000 in urban areas or 200,000 in rural areas.	Potential applicability to existing and future conditions.

TABLE 7-3: FHWA CONDITIONS FOR EVALUATING AT-GRADE CROSSINGS FOR POTENTIAL CROSSING ELIMINATION

FHWA Condition	Applicability to DC2RVA At-Grade Crossings
x. The expected accident frequency for active devices with gates, as calculated by the USDOT Accident Prediction Formula including five-year accident history, exceeds 0.5.	Potential applicability to existing and future conditions.
xi. Vehicle delay exceeds 40 vehicle hours per day.	Potential applicability to existing and future conditions.

Refer to Appendix OO for full details of the screening analysis, which resulted in 5 crossings meeting or exceeding FHWA condition thresholds in 2015 and 21 crossings meeting or exceeding FHWA condition thresholds by 2025. Accordingly, these crossing locations were considered for grade separation and/or closure as part of the at-grade crossing evaluation process. However, the triggering of these thresholds is not intended to be prescriptive and the proposed action will be based on a variety of considerations and local crossing conditions.

The Tier II EIS for the Richmond to Raleigh segment of the SEHSR corridor also evaluated the rail corridor between Main Street Station in Richmond and Centralia along the CSXT S-Line (DC2RVA's (Segment 17: AM Junction to Centralia – S-Line). The Richmond to Raleigh Tier II assumed the corridor would be "closed" (e.g. all at-grade crossings would be closed or grade-separated) to facilitate a passenger train speed of up to 110 mph. Table 7-4 below compares the Richmond to Raleigh Tier II recommendations for grade crossings with those developed by DRPT using the DC2RVA approach described above.

TABLE 7-4: COMPARISON OF CROSSING RECOMMENDATIONS, AM JUNCTION TO CENTRALIA – S-LINE (AMCE)

Segment	Milepost	Crossings Location	Richmond to Raleigh Tier II EIS Recommendation	DRPT Recommendation for DC2RVA
17: AM Junction to Centralia – S-Line (AMCE)	S 0.77	Maury Street	Grade separated, new road overpass	Four quad gates
	S 1.19	Private crossing (4th Street extension)	Closed	Four quad gates
	S 1.66	Goodes Street	Grade separated, new road overpass	Grade separated, new road overpass
	S 2.38	Federal Paper (Private crossing)	Closed	Four quad gates
	S 2.99	Commerce Road	Grade separated, new road overpass	Grade separated, new road overpass
	S 3.95	Ruffin Road	Grade separated, new rail bridge over road	Median treatment
	S 4.43	Bells Road (Route 161)	Grade separated, new road overpass	Median treatment
	S 4.97	Dale Avenue	Grade separated, new road overpass	Closure

TABLE 7-4: COMPARISON OF CROSSING RECOMMENDATIONS, AM JUNCTION TO CENTRALIA – S-LINE (AMCE)

Segment	Milepost	Crossings Location	Richmond to Raleigh Tier II EIS Recommendation	DRPT Recommendation for DC2RVA
	S 6.35	Texaco Road (Private crossing)	Closed	Four quad gates
	S 6.70	Station Road (Private crossing)	Grade separated, new road overpass	Four quad gates
	S 9.16	Kingsland Road (Route 611)	Grade separated, new road overpass	Median separators
	S 9.83	Brinkley Road (Route 1622)	Grade separated, new road overpass	Closure

Step 2: Site-Specific Conditions at Individual Crossings

Site-specific conditions were documented at each existing at-grade crossing location. These characteristics were identified as the aspects of the roadway, railroad, and/or surrounding area (defined as a 1,000-foot radius around the crossing) that potentially physically or operationally affect the design and control of the type of the crossing to be proposed, and included the following:

- Traffic Data and Traffic Operations. Including crossing roadway classification and number of lanes; daily volumes; adjacent or intersecting driveways and streets (including distance from crossing); and presence of pedestrian and bicycle crossings.
- Train Data and Rail Operations. Including daily volumes; number of tracks.
- Safety / Geometric Deficiencies. Including roadway and/or railroad deficiencies that affect safety, such as: sight distance; crossing angle; minimum widths, clearances, or striping/signage; or horizontal and vertical alignment.
- Major Environmental Impacts. Including: parks / recreation areas; schools; high priority cultural and/or historic areas; wetlands; military installations; and wetlands.
- Engineering Considerations. Feasibility issues, such as horizontal and vertical alignment, if grade separation of crossing was considered.
- Adjacent Property Uses. Including type and intensity/density of land uses on each side of crossing.
- Preliminary Cost-Benefit. For locations where grade separation was considered.
- Accessibility. Including summary of area/uses that the crossing roadway serves, and if the crossing provides sole access (i.e., no feasible alternate route to property/properties).

- Connectivity to Adjacent Crossings. Including distances to closest upstream (to the north) and downstream (to the south) crossings.
- Crossing Safety Treatment Considerations. Including proximity to intersection driveways and/or roadways, if median separation or four quadrant gates were considered.
- Special Uses at Crossing. Including use and/or access to the crossing by emergency vehicles; school buses; and public transit.

7.3.2.4 Summary of Results

Decisions regarding whether an existing at-grade crossing should be eliminated (grade separated or closed) or improved through the installation of traffic control devices or site and/or surface improvements depend upon a number of factors including the FHWA crossing elimination guidance criteria as well as safety, operational, and cost considerations, as summarized in the previous sections. Table 7-5 summarizes the decision-making process for proposed improvements at public at-grade crossings and Table 7-6 summarizes the decision-making process for private at-grade crossing proposed improvements. As shown in these tables, there are multiple "paths" to a potential proposed action, using a variety of data.

TABLE 7-5: SUMMARY OF DECISION-MAKING DIAGRAM, PUBLIC CROSSINGS

Condition	Proposed Action(s) Considered
If any 1 of the 11 FHWA condition thresholds are met or exceeded in 2015 or 2025	▪ Grade Separation ▪ Closure
If an adjacent crossing is located within 1 rail mile	▪ Closure
If there are rail or roadway safety or geometric deficiencies to be mitigated	▪ Geometric Safety Improvement ▪ Grade Separation ▪ Closure
If the existing condition is gates (not four quadrant)	▪ Median Treatment ▪ Four Quadrant Gate
If there are existing median treatment or four quadrant gates	▪ No Action

TABLE 7-6: SUMMARY OF DECISION-MAKING DIAGRAM, PRIVATE CROSSINGS

Condition	Proposed Action(s) Considered
If a farm / residence or industrial crossing has feasible alternate routes	▪ Closure
If a crossing is commercial / used by the public	▪ Median Treatment ▪ Four Quadrant Gate

TABLE 7-6: SUMMARY OF DECISION-MAKING DIAGRAM, PRIVATE CROSSINGS

Condition	Proposed Action(s) Considered
If a residence / farm crossing provides sole access	▪ Locking Gate
If an industrial crossing provides sole access	▪ Four Quadrant Gate ▪ Locking Gate
If the crossing is on a military property	▪ Four Quadrant Gate
If the crossing is exclusively railroad access	▪ No Action

Refer to Appendix OO for full details and locations of the following results.

The at-grade crossing evaluation resulted in the following proposed actions at the 50 existing at-grade public crossings in the main DC2RVA corridor:

- Grade Separate: 8 Crossings
- Closure: 12 Crossings
- Median Treatment: 9 Crossings
- Four Quad Gates: 19 Crossings
- No Action: 2 Crossings

The proposed actions for the 19 existing private at-grade crossings in the DC2RVA corridor are summarized below:

- Four Quad Gate: 5 crossings (all commercial, military, and/or industrial property uses).
- Locking Gate: 13 crossings (all residential and/or farm property uses)
- No Action: 1 crossing (railroad exclusive access property use)

7.4 PEDESTRIAN CROSSINGS

The DC2RVA rail corridor has 19 dedicated pedestrian-only crossings, including 11 at-grade pedestrian crossings, 6 grade-separated pedestrian overpasses, and 2 pedestrian underpasses. Both pedestrian underpasses—the Mt. Vernon Trail in Northern Virginia and the Dupont crossing south of Richmond—were evaluated in the same manner as the rail bridges over road crossings described later in this chapter. Pedestrian at-grade crossings were evaluated for site conditions that could affect the rail alignment. Safety at pedestrian at-grade crossings was not assessed as part of the alternatives development and screening process but will be evaluated in Chapter 4 the Draft EIS.

The pedestrian grade-separated overpasses were evaluated for sufficient space under the crossing structure for addition of a new track. Vertical clearance was evaluated for each pedestrian crossing was no issues were found. DRPT's potential findings of the evaluation of pedestrian overpasses included:

- There is sufficient room for a new track on the east side.
- There is sufficient room for a new track on the west side.
- There is insufficient room to add a track unless the existing tracks are realigned.
- There is insufficient room to add a track unless the pedestrian overpass is rebuilt or removed.
- There is insufficient room unless minor improvements are made to increase the vertical clearance to the required standard by implementing any combination of the following; roadbed or railroad undercutting; bridge raising and profile adjustment; or horizontal clearance with modifications to existing piers.

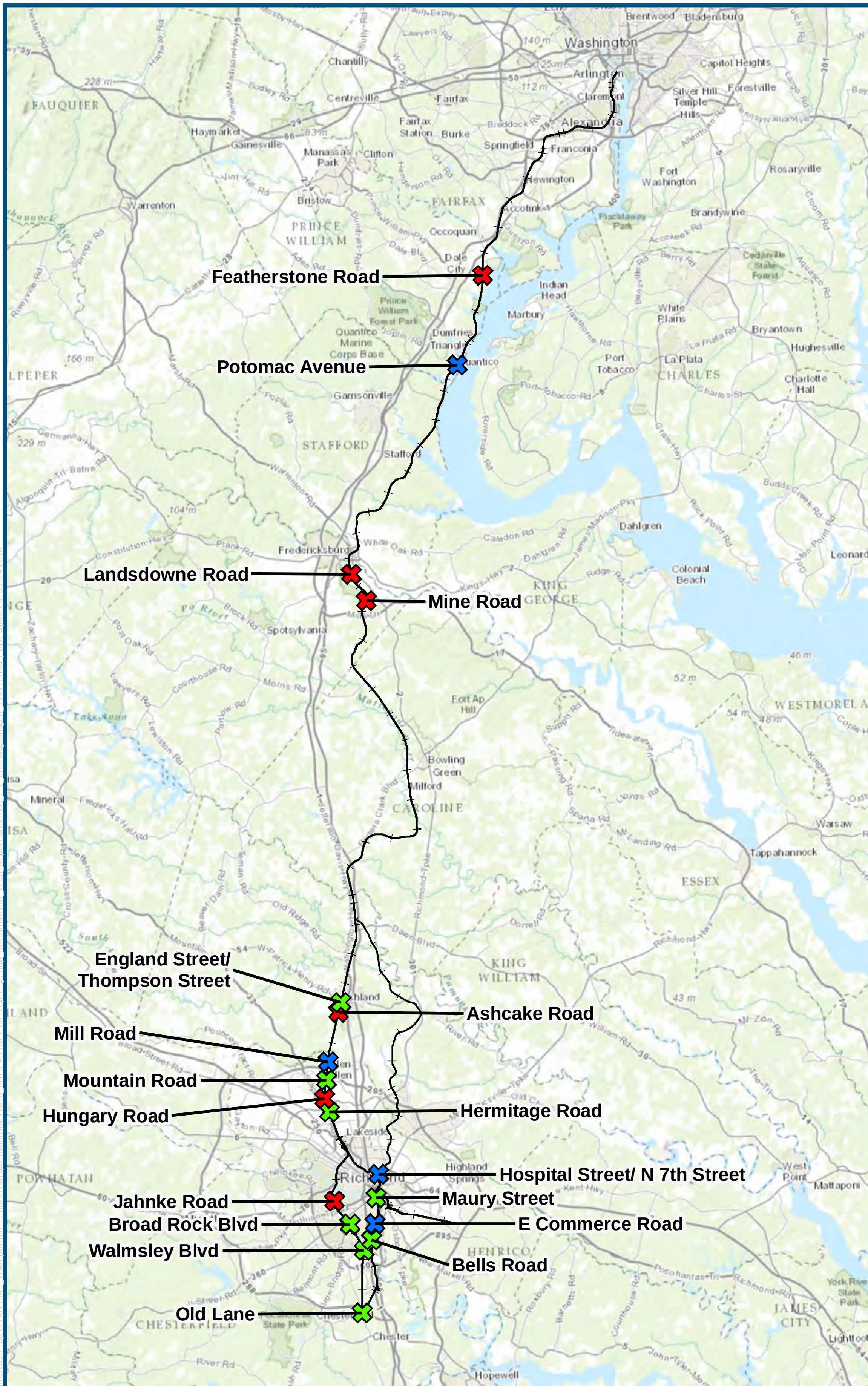
Table 7-7 describes the pedestrian grade-separated overpass crossings and the assessments needed to accommodate the addition of a third track.

TABLE 7-7: PEDESTRIAN GRADE-SEPARATED CROSSINGS

Segment	Milepost	Crossings Location	Assessment Findings for Rail Alignment in relation to Pedestrian Bridges
04: Lorton to Powells Creek (LOPC)	CFP 97.87	Pedestrian bridge over tracks for Franconia-Springfield VRE Station	Insufficient clearance for a new track unless the pedestrian bridge is lengthened
	CFP 89.10	Pedestrian bridge over tracks at Woodbridge Station	Space available for an additional track on the east side. Pedestrian bridge needed to access new track
	CFP 87.82	Pedestrian bridge over tracks at Veterans Memorial Park	Space available for an additional track on either the east or west side
	CFP 85.30	Pedestrian bridge over tracks at Rippon Station	Insufficient clearance for a new track unless the pedestrian bridge is lengthened to the east for access to the park
05: Powells Creek to Arkendale (PCAR)	CFP 81.87	Industrial pedestrian bridge	Currently being replaced by others
	CFP 76.68	Pedestrian bridge over tracks	Construction of third track does not affect existing pedestrian crossing

All of the grade-separated pedestrian crossings are located in the Northern Virginia portion of the DC2RVA corridor, where land use and populations are denser compared to the southern portion of the corridor. All of the 11 at-grade pedestrian crossings are located in the town of Ashland. Figure 7-2 gives examples of the Ashland at-grade pedestrian crossings. Figure 7-3 maps these at-grade crossings along the corridor. DRPT determined the existing or planned pedestrian crossings along the corridor did not constrain the preliminary alignments evaluated for the DC2RVA project.

FIGURE 7-2: AT-GRADE PEDESTRIAN CROSSINGS



0 6 12
Miles

1 inch = 12 miles
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap Source: 2015 ESRI Topographic Map

Legend

- 2015: Existing Conditions
- 2025: New Passenger Service Starts
- 2045: 20-Year Planning Horizon
- DC2RVA Project Corridor

Figure 7-3 Public At-Grade Crossings that Trigger an FHWA Guideline for Potential Grade Separation

7.5 RAIL BRIDGE OVER ROAD UNDERPASS EVALUATION

The evaluation of underpasses focused on the feasibility of adding a new bridge to carry a new track over the road on either side of the existing track, and assumed that existing clearances between the road and structure are adequate for the addition of a track over the road. Potential new rail bridge structures were assumed by DRPT to be similar to existing rail bridges over the roads (see Table 7-8). Potential findings of the rail bridge over road underpass assessment included:

- A new rail bridge could be built to accommodate a single track added on the east side.
- A new rail bridge could be built to accommodate a single track added on the west side.
- There is insufficient space to build a new rail bridge over the road underpass.

TABLE 7-8: EXISTING RAIL BRIDGE OVER ROAD UNDERPASS ASSESSMENT SUMMARY

Segment	Milepost	Location	Assessment Findings for Rail Bridges over Road Underpasses
01: Arlington to Alexandria (ROAF)	CFP 110.05	George Washington Memorial Parkway (SR 400)	Space available for a new rail bridge on the east or west side
	CFP 105.85	East Braddock Road	Space available on existing bridge to accommodate a new single track on the east side
	CFP 105.37	Commonwealth Avenue	Space available on existing bridge to accommodate a new single track on the east side
	CFP 105.30	King Street (Route 7)	Space available on existing bridge to accommodate a new single track on the east side
02: Alexandria to Franconia (AFFR)	CFP 102.76	Holmes Run Trail	3 existing tracks at this location, no additional construction.
	CFP 102.60	Eisenhower Avenue	3 existing tracks at this location, no additional construction
	CFP 102.15	Eisenhower Avenue Connector/Clermont Avenue	3 existing tracks at this location, no additional construction
	CFP 101.07	South Van Dorn Street (Route 613)	3 existing tracks at this location, no additional construction
03: Franconia to Lorton (FRLO)	CFP 96.04	Unnamed Road	Space available for new rail bridge built to accommodate a single track on the east or west side
	CFP 95.74	Newington Road/SR 877	Space available for new rail bridge built to accommodate a single track on the east or west side
04: Lorton to Powells Creek (LOPC)	CFP 92.58	Lorton Road (Route 642)	Space available for new rail bridge built to accommodate a single track on the east side
	CFP 90.63	Jefferson Davis Highway (Route 1)	Space available for new rail bridge built to accommodate a single track on the east or west side
	CFP 90.04	Furnace Road (Route 611)	Space available for new rail bridge built to accommodate a single track on the east or west side

TABLE 7-8: EXISTING RAIL BRIDGE OVER ROAD UNDERPASS ASSESSMENT SUMMARY

Segment	Milepost	Location	Assessment Findings for Rail Bridges over Road Underpasses
05: Powells Creek to Arkendale (PCAR)	CFP 78.60	Martin Street	A project is underway to add a third track independent of DC2RVA
06: Arkendale to Dahlgren (ARDJ)	CFP 68.01	Andrew Chapel Road (Route 629)	Space available for new rail bridge built to accommodate a single track on the east or west side
	CFP 61.79	Harrell Road (Route 623)	Space available for new rail bridge built to accommodate a single track on the east or west side
07: Dahlgren to Fredericksburg (DJFB)	CFP 60.58	White Oak Road	Space available for new rail bridge built to accommodate a single track on the east or west side
	CFP 59.98	Naomi Road (Route 607)	Space available for new rail bridge built to accommodate a single track on the east or west side
	CFP 59.45	Sophia Street	Space available for new rail bridge on the east side
	CFP 59.41	Caroline Street	Space available for new rail bridge on the east side
	CFP 59.35	Princess Anne Street	Space available for new rail bridge on the east side
	CFP 59.28	Charles Street (Route 17 Business)	Space available for new rail bridge on the east side
08: Fredericksburg to Hamilton (FBHA)	There are no rail bridges in this segment.		
10: Crossroads to Guinea (XRGU)	There are no rail bridges in this segment.		
11: Guinea to Milford (GUMD)	There are no rail bridges in this segment.		
13: North Doswell to Elmont(NDEL)	CFP 19.58	Taylorsville Road (Route 689)	Space available for new rail bridge on the east or west side
	CFP 17.70	Elletts Crossing Road (Route 641)	Space available for new rail bridge on the east or west side
15: Greendale to SAW/WAY (GNSA)	There are no rail bridges in this segment.		
16: SAY to AM Junction – Hermitage Lead (SAAM)	There are no rail bridges in this segment.		
17: AM Junction to Centralia – S-Line (AMCE)	SRN 0.30	East Marshall Street	Space available for new rail bridge built to accommodate a single track on the east or west side
	SRN 0.23	East Broad Street	Space available for new rail bridge built to accommodate a single track on the east or west side
	SRN 0.00	East Main Street	Space available for a single track on the west side

TABLE 7-8: EXISTING RAIL BRIDGE OVER ROAD UNDERPASS ASSESSMENT SUMMARY

Segment	Milepost	Location	Assessment Findings for Rail Bridges over Road Underpasses
	S 0.07	East Cary Street	Space available for a single track on the west side
	S 0.19	East Byrd Street / Dock Street	Space available for new rail bridge built to accommodate a single track on the east side
	S 1.27	Unnamed industrial access road	Space available for new rail bridge built to accommodate a single track on the east side
18: WAY to Centralia – A-Line (WACE)	A 5.5	Walmsley Blvd/Route 647	Space available for new rail bridge built to accommodate a single track on the east or west side with the addition of crash walls
	ARN 0.36	Riverside Drive	No proposed changes to the track or highway at this location
	ARN 1.08	Route 146 northbound (Downtown Expressway connector to Powhite Parkway)	No proposed changes to the track or highway at this location
	ARN 1.01	Powhite Parkway southbound (Route 76)	No proposed changes to the track or highway at this location
18: Rivanna Junction to Beulah (RJBE)	CA 84.99	East Marshall Street	Space available for new rail bridge built to accommodate a single track on the east or west side
	CA 84.91	East Broad Street	Space available for new rail bridge built to accommodate a single track on the east or west side
	CA 84.70	East Main Street	Space available for new rail bridge built to accommodate a single track on the west side
	CA 84.61	East Cary Street	Space available for new rail bridge built to accommodate a single track on the west side
	CA 84.55	Dock Street/South 18th Street	Space available for new rail bridge built to accommodate a single track on the west side

7.6 RAIL BRIDGES OVER RAIL

There are 4 locations where rail bridges cross over existing railroad tracks along the DC2RVA corridor. One of these crossings is the well-known “Triple Crossing” located in a part of Richmond known as Shockoe Bottom, just south of Main Street Station. Figure 7-4 shows the three tracks that make up this crossing. The Bellwood Subdivision bridges over an NS rail line while crossing beneath CSXT’s east-west James River line. The rail bridges over and under the Bellwood Subdivision have clearance restrictions. This prevents the Bellwood Subdivision from being used by double-stack container trains or Amtrak’s double-deck Superliner equipment used on the Auto Train.

FIGURE 7-4: TRIPLE CROSSING

Additional information related to rail over rail crossings is presented in Table 7-9 along with assessments for the additional track.

TABLE 7-9: RAIL BRIDGES OVER RAIL CROSSINGS

Segment	Milepost	Overpass Location	Assessment Findings for Rail Alignment
02: Alexandria to Franconia (AFFR)	CFP 102.86	CSXT bridge over Norfolk Southern (NS) Railway tracks	3 existing tracks at this location, no additional construction
	CFP 101.82	WMATA Metrorail (Blue Line) bridge over CSXT	3 existing tracks at this location, no additional construction
17: AM Junction to Centralia – S-Line (AMCE)	S 0.18	CSXT's James River line bridge crosses over the Bellwood CSXT bridge over NS tracks (Triple Crossing)	Insufficient space to meet Basis of Design; adding track requires variance to reduce track centers from 15 feet to 13 feet and to allow for a close clearance through the structure
18: Rivanna Junction to Beulah (RJBE)	CA 84.05	NS tracks	No track improvements are proposed for this area other than relatively minor rail signal modifications. Existing NS tracks are located at-grade in a depressed road bed that runs approximately parallel to the existing elevated CSXT mainline tracks near the East Main Street (Route 5) intersection. No track improvements are proposed for the elevated CSXT rail structure or adjacent at-grade NS tracks.

7.7 RAIL GRADE CROSSINGS

There are two locations where a railroad crosses another railroad track at-grade on the corridor. There is a rail grade crossing of the BBRR and CSXT main line at mile marker CA 111.72, part of the North Doswell to Elmont CSXT main line subsection in Hanover County. The at-grade crossing is located 280 feet south of the Doswell Road. Figure 7-5 highlights the location where the BBRR (east-west) crosses the CSXT Richmond, Fredericksburg, and Potomac (RF&P) Subdivision (north-south). DRPT recommends that the third track be added to the CSXT line on the east side of the existing tracks to avoid impacting the tracks on the west side for the BBRR yard and industrial siding at Doswell. DRPT considered a flyover alternative at this location to carry passenger trains over the BBRR without slowing for the diamond crossing; however, the reduction in travel time was minimal and there were potential impacts to multiple historic resources. DRPT dismissed a Doswell flyover from further consideration.

There is a second rail grade crossing south of the James River, where the CSXT S-Line and NS cross at Rocketts in south Richmond. The NS line was primarily used to service the City's Wastewater Treatment Plant to the east, but is now seldom used. DRPT considered grade separating this crossing by raising the S-Line over the NS line for those Richmond alignment alternatives that routed passenger trains to the S-Line. DRPT dismissed a grade separation at this location from further consideration as unnecessary given the lack of rail traffic on the NS line. Figure 7-6 highlights the location where the CSXT S-Line crosses the NS line south of the James River.

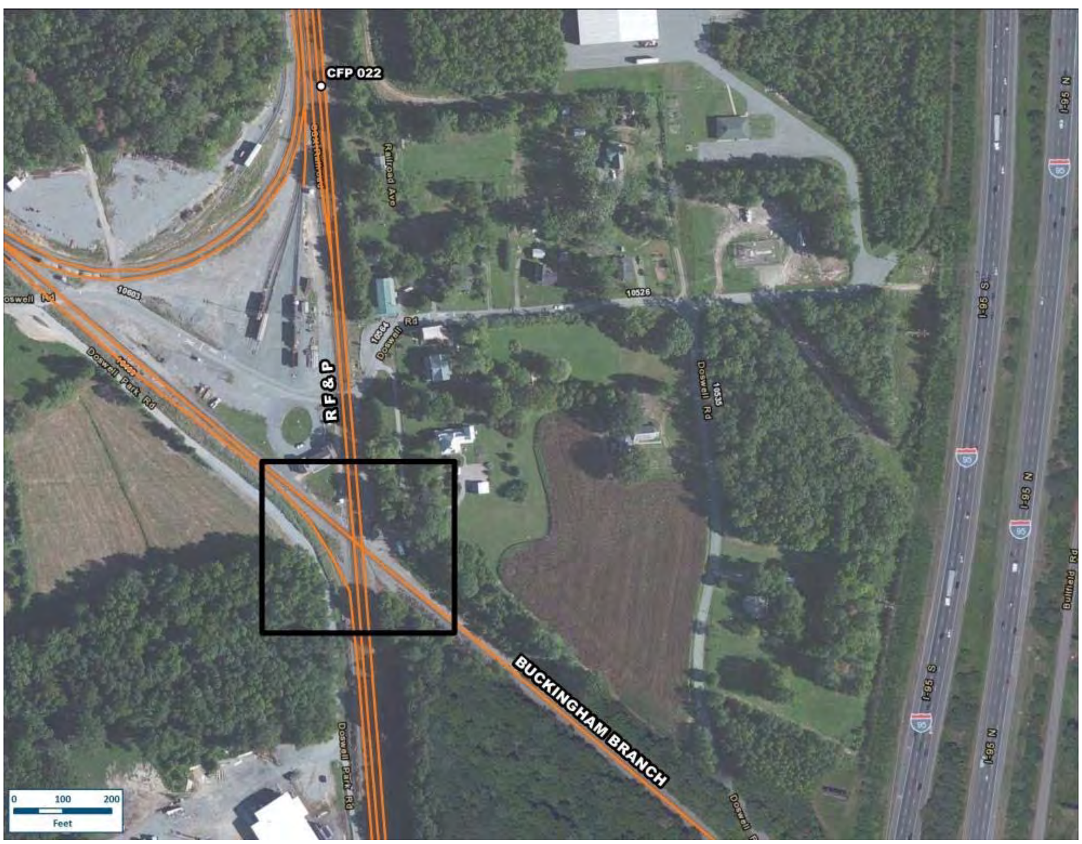


FIGURE 7-5: RAIL GRADE CROSSING AT DOSWELL

Figure 7-6: CSXT S-Line crossing the NS line south of the James River

7.8 RAIL STRUCTURES OVER WATERWAYS

The DC2VRA corridor runs north-south, while most surface waterways flow from west to east towards the Chesapeake Bay. As a result, the corridor crosses numerous large, moderate, and small waterways using a combination of bridges and large and small culverts. These waterways are characterized as rivers, streams, creeks, and brooks. There are 68 rail structures over waterways along the corridor, including bridges and large culverts that exceed 6 feet in diameter. Of these rail structures, 14 are considered major bridges. Major bridges are those bridges that require one or more center piers between spans to carry the track over the waterway. These major bridges were the focus of DRPT's evaluation of rail structures over waterways. Additional bridges longer than 6 feet, referenced as other bridges, were also evaluated and presented below. There are also numerous smaller culverts, less than 6 feet in diameter, that convey minor waterways across the rail corridor. These smaller culverts and waterways were not evaluated as part of the alternatives development and screening process.

DRPT has assumed that new rail structures will be required to convey any new track across the waterways. This will mean construction of new bridges or extension of existing culverts. Additional bridge construction can add substantial design constraints, permitting and construction costs to the Project, especially for major bridges over large waterways. Existing rail bridges are owned and maintained by CSXT and are assumed by DRPT to be in reasonable condition unless otherwise noted.

DRPT conducted a screening assessment of the waterway crossings with major bridges based on a series of preliminary reconnaissance studies and observations. DRPT's screening assessment evaluated possible limits on construction of a new rail bridge over the waterway. Assessment findings included:

- There is sufficient space and access to construct a new bridge upstream (west) of the existing rail bridge.
- There is sufficient space and access to construct a new bridge downstream (east) of the existing rail bridge.

Per the DC2RVA project's Basis of Design, the major rail bridge structures over waterways would be new parallel structures in close proximity[4] to and similar to the existing structure. DRPT has assumed that the condition of existing CSXT-owned and maintained bridges is sufficient, and that existing bridges will not need to be replaced. Therefore, DRPT is recommending building new parallel bridges to accommodate the third track. The new major bridges would be designed with a superstructure to support one track, but a substructure to accommodate the addition of a second track in the future without further disturbance of the waterway. Other smaller bridges and culverts would be designed to carry one track. Major bridge construction descriptions and alignment assessments are listed in Table 7-10 below. DRPT assumed that new bridges would be constructed similar to the existing bridges, including pier/foundation size and placement, span length, navigation clearance, and appearance, unless otherwise noted.

TABLE 7-10: MAJOR RAIL BRIDGES OVER WATERWAY CROSSINGS

Segment	Milepost	Location	Existing Bridge Conditions	Assessment Findings for New Bridge and Track Alignment
04: Lorton to Powells Creek (LOPC)	CFP 90.00	Occoquan River, Fairfax/Prince William County	919 feet, double-track truss bridge, built in 1914. Crosses over Marina Way on south end. Navigable waterway	New double track bridge, east and parallel to existing alignment
	CFP 84.70	Neabsco Creek, Prince William County	727 feet, double track deck plate girder on steel substructure bridge, built in the 1940s. Navigable waterway	New double track bridge, west/upstream, and immediately adjacent to the existing alignment
	CFP 83.50	Powells Creek, Prince William County	1,080 feet, double-track deck plate girder on concrete substructure bridge, built in the 1940s. Non-navigable waterway	New double track bridge, west/upstream, and parallel to existing alignment

[4] New bridges would be located approximately 25 feet or greater from the existing bridge and parallel to the existing bridge. The actual distance between the bridges would be determined during final design.

TABLE 7-10: MAJOR RAIL BRIDGES OVER WATERWAY CROSSINGS

Segment	Milepost	Location	Existing Bridge Conditions	Assessment Findings for New Bridge and Track Alignment
05: Powells Creek to Arkendale (PCAR)	CFP 79.2	Quantico Creek	2 Bridges at this crossing; the new bridge is 1,760 feet, double track concrete girders on drilled shafts, built in 2008. Older bridge is 1,950 feet, single track built in 1988 composed of precast concrete superstructure and substructure elements. Navigable waterway	3rd track under construction, no additional construction required
	CFP 77.20	Chopawamsic Creek, Quantico	170 feet, double track prestressed concrete slab on concrete substructure bridge. Non-navigable waterway	3rd track under construction, no additional construction required
06: Arkendale to Dahlgren (ARDJ)	CFP 70.78	Aquia Creek, Stafford County	1,321 feet, double-track deck plate girder on concrete substructure bridge, built in 1946. Navigable waterway	New double track bridge, east/downstream, and parallel to existing alignment
	CFP 65.25	Potomac Creek, Stafford County	410 feet, double track deck plate girder on concrete substructure bridge, built in 1899. Leeland Road (Route 626) crosses under south end of bridge. Non-navigable waterway	New double track bridge, east/downstream, and parallel to existing alignment
07: Dahlgren to Fredericksburg (DJFB)	CFP 59.57	Rappahannock River, Fredericksburg	650 feet, double-track concrete arch bridge, built in 1927. Sophia Street crosses under south end of bridge. Navigable waterway	New double track bridge, east/downstream, and parallel to existing alignment
12: Milford to North Doswell (MDND)	CFP 34.80	Mattaponi River, Caroline County	208 feet, double track deck plate girder on concrete substructure bridge. Non-navigable waterway	New double track bridge, west/upstream, and parallel to existing alignment
	CFP 23.82	North Anna River (Including Unnamed industrial road at south end), Hanover County	330 feet, double track deck plate girder on concrete substructure bridge. Non-navigable waterway	Sufficient space for double track on the west side, and/or a new rail overpass built to accommodate a single track on the west side
13: North Doswell to Elmont (NDEL)	CFP 19.50	Little River, Hanover County	249 feet, deck plate girder on concrete substructure bridge, built in 1916. Non-navigable waterway	New double track bridge, west/upstream, and parallel to existing alignment; span, foundation type, and configuration similar to existing structure

TABLE 7-10: MAJOR RAIL BRIDGES OVER WATERWAY CROSSINGS

Segment	Milepost	Location	Existing Bridge Conditions	Assessment Findings for New Bridge and Track Alignment
17: AM Junction to Centralia – S-Line (AMCE)	S 0.28	James River, Downtown Richmond City	1,903 feet, single track bridge, built in 1936. Navigable waterway	New single track bridge with substructure to support double track, east/downstream, and parallel to the existing alignment
18: WAY to Centralia–A-Line (WACE)	ARN 0.66	James River, Richmond City, adjacent to Powhite Parkway	2,278 feet, double track concrete arch bridge, located on East Branch Tuckahoe Creek, built in 1919. NS tracks and Riverside Drive cross under this bridge. Non-navigable waterway	Project modifications end at Meadows on the south side. No proposed changes to the track at this location.

The remaining rail bridges over waterways include bridges without center piers and culverts greater than 6 feet in diameter. These bridges and culverts were evaluated for possible constraints to adding a new bridge or culvert extension to carry an additional track. DRPT's bridges assessments represent whether it is feasible to either add track with a new structure to the east or west of the existing track. Table 7-11 describes the existing conditions and DRPT's assessments for these additional waterway crossings.

TABLE 7-11: OTHER RAIL BRIDGES OVER WATERWAY CROSSINGS

Segment	Milepost	Location	Existing Conditions	Assessment Findings for New Structure and Rail Alignment
01: Arlington to Alexandria (ROAF)	CFP 107.86	Four Mile Run Creek, Alexandria City	380 feet, double track deck plate girder on concrete substructure bridge. Non-navigable waterway.	Space available for new rail bridge on east side for a fourth track
03: Franconia to Lorton (FRLO)	CFP 94.07	Accotink Creek, Fairfax County	90 feet, double track deck plate girder on concrete substructure bridge. Non-navigable waterway.	Space available for new rail bridge built to accommodate a single track on east or west side
	CFP 93.14	Pohick Creek	90 feet, double track deck plate girder on concrete substructure bridge. Non-navigable waterway.	Space available for new rail bridge built to accommodate a single track on east or west side
04: Lorton to Powells Creek (LOPC)	CFP 86.80	Farm Creek, Prince William County	25 feet, double track prestressed concrete box girder on concrete masonry bridge. Non-navigable waterway.	Space available for new rail bridge built to accommodate a single track on east or west side

TABLE 7-11: OTHER RAIL BRIDGES OVER WATERWAY CROSSINGS

Segment	Milepost	Location	Existing Conditions	Assessment Findings for New Structure and Rail Alignment
	CFP 86.10	Unnamed Creek	20 feet, double track deck plate girder on concrete substructure bridge. Non-navigable waterway.	Space available for new rail bridge built to accommodate a single track on east or west side
05: Powells Creek to Arkendale (PCAR)	CFP 74.20	Unnamed creek (Widewater)	46.75 feet, double track deck plate girder on concrete substructure bridge. Non-navigable waterway.	3rd track under construction, no additional construction required
07: Dahlgren to Fredericksburg (DJFB)	CFP 60.00	Claiborne Run, Stafford County	40 feet, double track concrete arch bridge. Non-navigable waterway.	Space available for new rail bridge built to accommodate a single track on east or west side
09: Hamilton to Crossroads (HAXR)	CFP 54.44	Massaponax Creek/Deep Run (Including Unnamed private road at north end), Spotsylvania County	20 feet, double track bridge. Non-navigable waterway.	3rd track under construction, no additional construction required
	CFP 53.80	Unnamed private road (access may be closed at dead end streets)	30 feet, box culvert. Culvert appears to have been extended east of the tracks as part of the Spotsylvania County VRE Station.	3rd track under construction, no additional construction required
12: Milford to North Doswell (MDND)	CFP 32.10	Polecat Creek, Caroline County	105 feet, double track through plate girder bridge. Non-navigable waterway.	New single track bridge, west/upstream, and parallel to existing alignment; span, foundation type, and configuration similar to existing structure
14: Elmont to Greendale (ELGN)	CFP 10.60	Chickahominy River, Henrico County	105 feet, deck plate girder bridge, built 1987. Non-navigable waterway.	New single track bridge, west/upstream, and parallel to existing alignment; span, foundation type, and configuration similar to existing structure
17: AM Junction to Centralia – S-Line (AMCE)	S 0.17	Richmond City Canal (crosses over canal and canal walk)	Portion of 3,286 feet viaduct/bridge. Existing single track on viaduct with insufficient width for 15' track centers. Design variance required to construct second track on existing viaduct structure.	Space available for single track on the east side

TABLE 7-11: OTHER RAIL BRIDGES OVER WATERWAY CROSSINGS

Segment	Milepost	Location	Existing Conditions	Assessment Findings for New Structure and Rail Alignment
	S 0.19	ACOE James River floodwall (north bank)	Portion of 3,286 feet viaduct/bridge	Existing opening in floodwall is insufficient for a second track only. Floodwall modifications required to construct second track and maintain floodwall integrity.
	S 0.56	ACOE James River floodwall (south bank)	Portion of 3,286 feet viaduct/bridge	Existing opening in floodwall is insufficient for a two-track bridge. Floodwall modifications required to construct second track and maintain floodwall integrity.
	S 6.87	Falling Creek Branch/Marina Drive, Chesterfield County	220 feet, double track bridge	No proposed changes to the track at this location
18: WAY to Centralia – A-Line (WACE)	A 9.11	Kingsland Creek, Chesterfield County	80 feet, double track bridge. Non-navigable waterway	Space available for a new rail bridge built to accommodate a single track on the east or west side

8 STATION LOCATION OPTIONS

This chapter evaluates existing and potential passenger rail stations on the DC2RVA corridor, and identifies stations and station improvements for further evaluation in the Draft EIS. The DC2RVA project proposes to generally maintain existing intercity passenger rail service patterns while increasing the frequency and reliability of service on the corridor. The Project does not involve wholesale changes in existing station locations or stopping patterns of existing passenger trains, although some new potential stations and service patterns identified during project scoping are considered. The Project may modify existing train schedules to accommodate the proposed new passenger services provided by DC2RVA, as described in Chapter 2, which include five new Northeast Regional (SEHSR) trains making daily roundtrips and four Interstate Corridor (SEHSR) trains making daily roundtrips. Passenger train schedules for new and existing trains will be described in the DC2RVA Service Development Plan, prepared subsequent to the Final EIS.

Stations evaluated in this chapter include existing Amtrak stations and potential new intercity passenger rail stations proposed for consideration during Project scoping. This chapter includes the following:

- Identification of existing and potential intercity passenger rail station locations for intercity passenger rail service in the Washington, D.C. to Richmond corridor
- Development of functional criteria used to evaluate intercity passenger rail station locations and key station characteristics
- Screening of existing and potential intercity passenger rail station locations
- Identification of reasonable intercity passenger rail station options to be considered in the Tier II EIS

The Project does not preclude future changes to service patterns and intercity passenger rail station locations, nor does it preclude development of new stations in the future. Virginia Railway Express (VRE) commuter rail stations existing and/or under construction are also evaluated for track alignments to accommodate expanded commuter platforms and new island platforms in accordance with the Project's Basis of Design; the Project does not include construction of new platforms for stations that will only be served by VRE.

The DC2RVA project corridor is already a well-established passenger rail corridor, with four types of Amtrak passenger trains serving eight stations. The four types of Amtrak passenger trains, previously described in Chapter 2, include:

- **Northeast Regional Service –** There are currently six Northeast Regional trains operating in Virginia (Northeast Regional (Virginia)) as extensions of Northeast Corridor train service from Boston and New York that continues through Washington, D.C. to points in Virginia. These six trains provide regional passenger rail service along the length of the NEC and DC2RVA corridor, making frequent local station stops. As of 2015, Northeast Regional (Virginia) trains provided six daily round trips in Virginia that used all or part of the DC2RVA corridor and stopped at all of the Amtrak stations in the DC2RVA corridor (with the exception of the Auto Train station in Lorton, VA). Virginia provides funding for Northeast Regional (Virginia) trains operating in the state under a cost-sharing agreement with Amtrak, as required by the Passenger Rail Investment and Improvement Act of 2008. The DC2RVA project proposes to add five new Northeast Regional (SEHSR) passenger trains making daily roundtrips from Richmond, Norfolk and Newport News, VA to Washington, D.C. New York, and Boston via the DC2RVA corridor and the NEC. These trains are anticipated to stop at all Amtrak passenger stations on the DC2RVA corridor, with the exception of the Auto Train station in Lorton.
- **Interstate Corridor Service –** Interstate Corridor trains operating in Virginia are similar to the Northeast Regional (Virginia) trains; providing intercity train service from Boston and New York that extends through Virginia to North Carolina. As of 2015, there is one Interstate Corridor train, named the Carolinian, operating on the DC2RVA corridor. The Interstate Corridor (Carolinian) makes a daily round trip between New York, NY and Charlotte, NC. This train's operation is funded by the state of North Carolina, under the same law that mandates Virginia's funding of Northeast Regional (Virginia) trains. The Carolinian serves several of the Amtrak stations in the DC2RVA corridor. Four new Interstate Corridor (SEHSR) passenger trains are proposed to operate daily roundtrips from Charlotte and Raleigh, NC to Washington, D.C. and New York via the DC2RVA corridor and the NEC. These Interstate Corridor (SEHSR) trains are anticipated to make limited stops within the DC2RVA corridor.
- **Long Distance Service –** Long Distance passenger trains operate on routes greater than 750 miles. Similar to the Northeast Regional (Virginia) and Interstate Corridor (Carolinian) services, Long Distance Service operates from New York and continues through Washington, D.C. to Virginia and points south. As of 2015, Amtrak provides Long Distance Service with five round trip trains that use the DC2RVA corridor; the daily Palmetto, Silver Star, and Silver Meteor trains use the full length of the DC2RVA corridor continuing through Virginia to Georgia and Florida; the daily Crescent, and Cardinal which operate three times per week use the portion of the DC2RVA corridor between Washington and Alexandria, then diverge onto NS to points west and south. Long Distance trains in the DC2RVA corridor currently serve Washington Union Station, Alexandria Union Station, and Richmond's Staples Mill Road Station only, with the exception of the Silver Meteor, which added a stop at Fredericksburg in 2015.
- **Auto Train –** The Auto Train is a separate Long Distance service that is unique both among trains in the DC2RVA corridor and the entire Amtrak system. It operates as a daily nonstop, overnight train between dedicated station facilities in Lorton, VA and Sanford, FL. The Auto Train operates with bi-level Superliner passenger equipment (coaches, lounges, diners, and sleepers) and also uses special multi-level aluminum vehicle carrier cars that transport automobiles. The train has a maximum consist length of 50 cars.

> The Amtrak Auto Train station in Lorton, VA, is not considered as a potential station for DC2RVA service. Amtrak only provides the Auto Train service out of this station, and it is located on a constrained site that is presently configured for loading and unloading passenger vehicles onto rail cars, and the addition of regular intercity passenger-only service would require modifications that would disrupt Auto Train operations. Additional information about the Lorton Auto Train station can be found in Appendix PP.

The Northern Virginia area of the corridor also includes VRE stations that provide commuter rail service. VRE trains stop at their own stations in addition to several stations shared with Amtrak.

The DC2RVA project will increase capacity to deliver higher speed passenger rail, improve conventional speed passenger service, expand commuter rail, and accommodate growth of freight rail service, in an efficient and reliable multimodal rail corridor. The increased capacity will improve passenger rail service frequency, reliability and travel time in a corridor shared by growing volumes of passenger, commuter, and freight rail traffic, thereby providing a competitive option for travelers between Washington, D.C. and Richmond and those traveling to and from adjacent connecting corridors. Passenger stations serve as a gateway for the traveling public to access rail services, and are therefore a key aspect of making passenger rail a competitive option for travelers. Station locations should accommodate efficient rail operations and be convenient to both business and leisure travelers. Stations serving intercity passenger trains should be located in or near city centers; larger metropolitan areas may also have passenger stations in the suburbs. Stations comprise functional elements that support passenger arrivals and departures, including platforms, station buildings or shelters, pickup and drop off areas, parking facilities and intermodal connections. The design and implementation of each of these elements affects the passenger experience. A suitably-located station with functional elements that provides safe and efficient service for the passenger supports the DC2RVA project Purpose and Need by creating a positive passenger experience, thereby helping to make intercity passenger rail travel in the DC2RVA corridor and beyond a competitive choice.

Functional criteria were developed for the station evaluations by identifying key characteristics of stations that support demand for intercity passenger rail service, including station location, existing site conditions, surrounding population density and commercial activity, multimodal connectivity[1], and distance between station stops. These criteria are based on guidelines from the FRA and standards developed by Amtrak, the American Railway Engineering and Maintenance of Way Association (AREMA), and other local and national rail station studies.

The conceptual level station assessments described in this chapter evaluate existing and potential intercity passenger rail stations and identify reasonable station options to be considered in the DC2RVA Tier II EIS.

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[1] Multimodal connectivity refers to the ability for passengers to connect to multiple modes of transportation, such as passenger rail, commuter rail, subway or streetcar service, bus service, private vehicles, bicycles, and pedestrian modes.

This conceptual level station assessment evaluates station suitability to support the Project's Purpose and Need, including whether the ability of the station facilities and location to support for increased passenger service frequency and ridership demand. The effects of passenger station improvements, including expansion of station facilities such as parking, are addressed in the Tier II EIS. Potential changes in service (train stop frequency and schedules) will be addressed in the Tier II EIS and in additional detail in the DC2RVA Service Development Plan.

Intercity passenger rail stations may be affected by the Project as follows:

- Existing passenger stations may be improved or expanded in accordance with Amtrak's station facility guidelines and ridership service requirements, including new station buildings, parking, and other facilities to meet ridership demand and increased service frequency.
- New passenger stations may be established and existing stations re-located or closed to meet ridership demand and/or to improve passenger service and rail operational efficiency.
- Amtrak station platforms may be reconfigured and new island platforms added to meet new track alignments and the Project's Basis of Design. Track alignments at VRE stations will accommodate expanded platforms and new island platforms in accordance with the Project's Basis of Design; the Project does not include construction of new platforms for stations that will only be served by VRE.
- Future passenger service frequency and schedules may change; stations may receive more or less Long Distance, Interstate Corridor (SEHSR), or Northeast Regional (SEHSR) train services than they do now; or stations may receive more or less funding for improvements from public or private sources.

A summary of station locations recommended for consideration in the Tier II EIS is provided in Table 8-1, additional detail is provided in section 8.3.6 of this document.

TABLE 8-1: SUMMARY OF STATIONS DRPT RECOMMENDS FOR EVALUATION IN THE TIER II EIS

Station	Location	Current Passenger Rail Service	Potential Station Facility Changes	Potential Rail Service Changes			
				No Service, Close Station[1]	Shift Long Distance Service[2]	Add Interstate Corridor Service (SEHSR)	Add Northeast Regional (SEHSR) Service
Alexandria	City of Alexandria	Long Distance (all) Interstate Corridor (Carolinian) Northeast Regional (Virginia)	Expand platforms (work to be done by others)			✓	✓

TABLE 8-1: SUMMARY OF STATIONS DRPT RECOMMENDS FOR EVALUATION IN THE TIER II EIS

Station	Location	Current Passenger Rail Service	Potential Station Facility Changes	Potential Rail Service Changes			
				No Service, Close Station[1]	Shift Long Distance Service[2]	Add Interstate Corridor Service (SEHSR)	Add Northeast Regional (SEHSR) Service
Woodbridge	Woodbridge (Prince William County)	Northeast Regional (Virginia)	Expand platforms				✓
Quantico	Town of Quantico (Prince William County)	Northeast Regional (Virginia)	Expand platforms (work to be done by others)				✓
Fredericksburg	City of Fredericksburg	Long Distance (Silver Meteor) Interstate Corridor (Carolinian) Northeast Regional (Virginia)	New station building, parking structure, expand platforms			✓	✓
Ashland	Town of Ashland (Hanover County)	Northeast Regional (Virginia)	New station building, parking structure, expand platforms	✓			✓
Ashcake Road	Town of Ashland (Hanover County)	None, possible new station replacing Ashland station	New station building, parking structure, expand platforms				✓
Staples Mill Road	Henrico County	Long Distance (all) Interstate Corridor Northeast Regional (Virginia)	New station building, parking structure, expand platforms	✓		✓	✓

TABLE 8-1: SUMMARY OF STATIONS DRPT RECOMMENDS FOR EVALUATION IN THE TIER II EIS

Station	Location	Current Passenger Rail Service	Potential Station Facility Changes	Potential Rail Service Changes			
				No Service, Close Station[1]	Shift Long Distance Service[2]	Add Interstate Corridor Service (SEHSR)	Add Northeast Regional (SEHSR) Service
Boulevard	City of Richmond	None, possible new station replacing both Staples Mill and Main Street stations	New station building, parking structure, expand platforms	✓	✓	✓	✓
Broad Street	City of Richmond	None, possible new station replacing both Staples Mill and Main Street stations	New station building, parking structure, expand platforms	✓	✓	✓	✓
Main Street Station	City of Richmond	Northeast Regional (Virginia)	parking structure, expand platforms	✓	✓	✓	✓

Table Notes:

1. In some station/service options, a current station may be closed (Ashland, Staples Mill Road, Main Street Station) or a new station not created (Boulevard, Broad Street).

2. The DC2RVA project does not include any new trains providing long distance passenger service. However, some station/service options in the Richmond area include potentially shifting existing long distance service from Staples Mill Road station to other Richmond station options.

8.1 STATIONS IN THE DC2RVA CORRIDOR

Intercity passenger rail stations in the DC2RVA corridor addressed in this chapter include Amtrak passenger stations (existing) and potential new passenger stations identified during Project scoping, within prior corridor studies, or based on a preliminary review of rail alignments in the Richmond area that had sufficient tangent track for Long Distance platforms. Amtrak's Station Program Planning Guidelines, 2013, recommends that platforms accommodate the full length of a typical train consist to allow for maximum flexibility. Basically, platforms should be as long as the longest trains they serve, so all cars have access to the platform for loading and unloading passengers, without requiring a second station stop. The DC2RVA Basis of Design calls for stations served by Northeast Regional (Virginia and SEHSR) and Interstate Corridor (Carolinian and SEHSR) to have platforms 850 feet in length.

Stations served by Amtrak's Long Distance trains should have platforms 1,200 feet long. Available space for platform length requirements was one of the components taken into consideration by DRPT in evaluating existing and potential new intercity passenger rail stations for this Project[2]. Amtrak's passenger services currently serve multiple stations in the corridor. These stations are listed in Table 8-2. DRPT evaluated the existing Amtrak passenger stations for their ability to continue providing intercity passenger rail service.

VRE provides commuter rail service between Washington, D.C. and Spotsylvania County, VA along the northern portion of the corridor. Table 8-3 lists VRE stations in the corridor, including stations under construction. As described in Table 8-2, VRE also shares some station stops with Amtrak. DRPT evaluated the existing and planned VRE stations and VRE's planned platform expansions to ensure the Project's track alignments at the VRE stations accommodated 850 feet long platforms and island platforms where possible. Descriptions of these VRE stations/locations and their existing facilities and attributes are provided in Appendix PP.

Several locations for potential new or replacement intercity passenger stations were identified during Project scoping and from prior corridor studies. These potential station locations, which include some VRE stations and new station locations, are identified in Table 8-4. DRPT evaluated these possible new or replacement station locations for their suitability to serve as intercity passenger rail stations. In addition, DRPT reviewed rail alignments in the Richmond area to identify areas that had sufficient tangent track for 1,200 feet long platforms to determine if other areas not identified during scoping could be suitable for a combined Richmond station. DRPT identified seven areas with sufficient tangent track, but dismissed these areas from further consideration as locations for intercity passenger rail stations for the DC2RVA project due to potential incompatibility with existing land uses, lack of accessibility to local primary roads and/or transit, potential historic and natural resources impacts, and distance from the city center.

Figure 8-1 show the existing, planned, and potential stations in the DC2RVA corridor.

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2 DRPT evaluated all potential station locations and station layouts or platform improvements based on the appropriate platform lengths stated in the DC2RVA Basis of Design. Amtrak's 2013 Station Program Planning Guidelines allow for minimum platform lengths of 425 feet for Northeast Regional trains and 300 feet for State Corridor trains; however the minimum platform length of 300 feet should only be uti8lized at stations with low ridership and short trains of four or fewer passenger coaches. Platform lengths for Long Distance Trains should not be minimized.

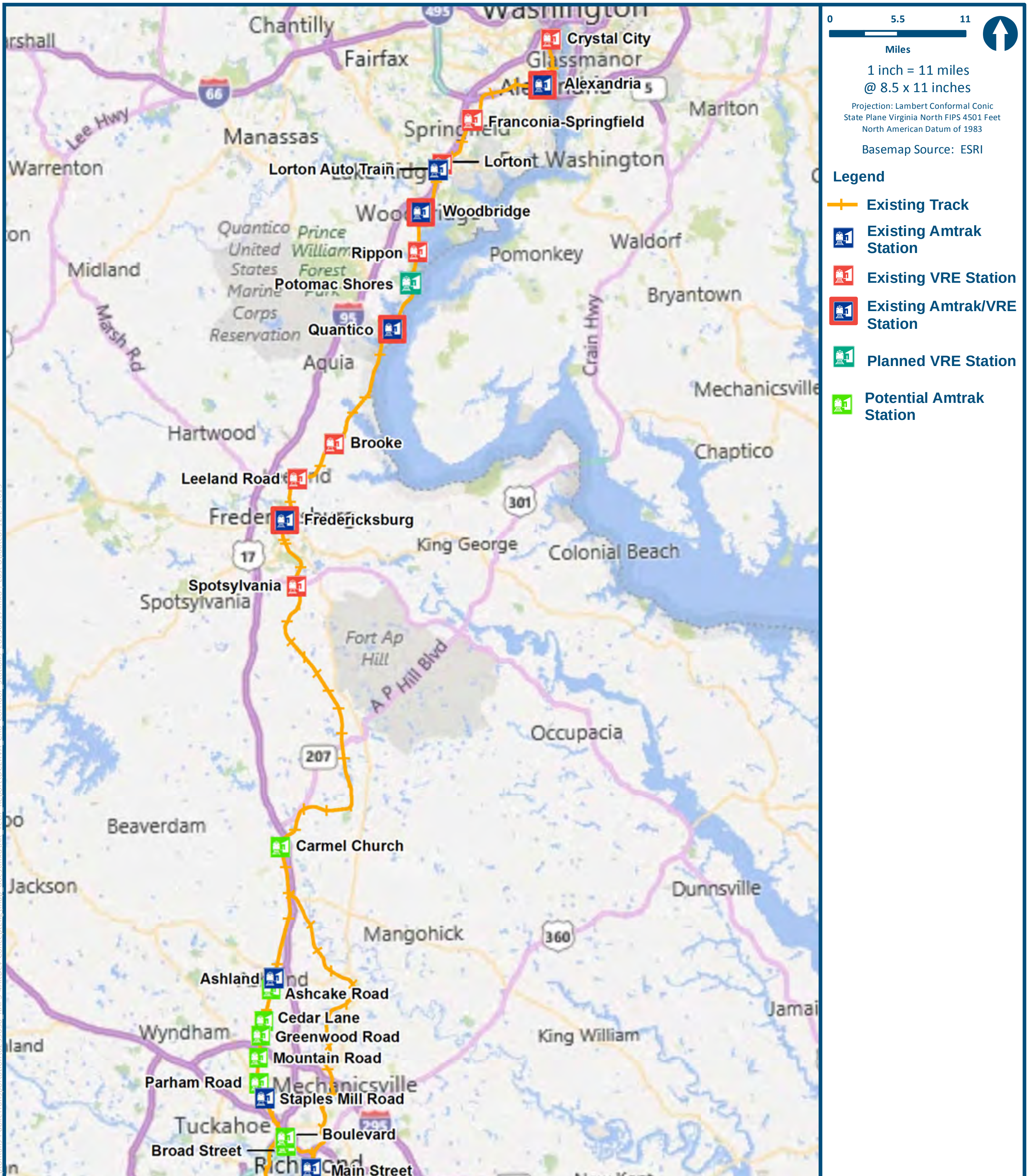

Figure 8-1
DC2RVA
Corridor
Overview Map

DRPT Virginia Department of Rail and Public Transportation

U.S. Department of Transportation
Federal Railroad Administration

www.DC2RVArail.com

DC to RICHMOND SOUTHEAST HIGH SPEED RAIL

TABLE 8-2: EXISTING AMTRAK STATIONS IN THE DC2RVA CORRIDOR

Station	Location	Existing Amtrak Passenger Services	Other Rail Services
Washington Union Station[1]	Washington, D.C.	Long Distance Interstate Corridor (Carolinian) Northeast Regional (Virginia)	VRE, Maryland Area Regional Commuter (MARC), Metrorail
Alexandria Union Station[2]	City of Alexandria	Long Distance Interstate Corridor (Carolinian) Northeast Regional (Virginia)	VRE, Metrorail
Woodbridge	Woodbridge (Prince William County)	Northeast Regional (Virginia)	VRE
Lorton Auto Train	Lorton (Fairfax County)	Auto Train	None
Quantico	Town of Quantico (Prince William County)	Interstate Corridor (Carolinian) Northeast Regional (Virginia)	VRE
Fredericksburg	City of Fredericksburg	Long Distance Interstate Corridor (Carolinian) Northeast Regional (Virginia)	VRE
Ashland	Town of Ashland (Hanover County)	Northeast Regional (Virginia)	None
Staples Mill Road	Henrico County	Long Distance Interstate Corridor (Carolinian) Northeast Regional (Virginia)	None
Main Street Station	City of Richmond	Northeast Regional (Virginia) - Newport News Services only	None

Table Notes:

1) Washington Union Station is the northern terminus of the DC2RVA corridor for purposes of evaluating ridership and train operations but is not considered part of the corridor for purposes of station evaluation or rail improvements.

2) Alexandria Union Station is typically referred to as “Alexandria Station” so as not to be confused with Washington Union Station.

TABLE 8-3: VRE STATIONS IN THE DC2RVA CORRIDOR

Station	Location	Status	Other Passenger Rail Services
L'Enfant Plaza[1]	Washington, D.C.	Existing	Metrorail, Amtrak[2]
Crystal City	Arlington County	Existing	Metrorail
Alexandria	City of Alexandria	Existing	Amtrak, Metrorail
Franconia-Springfield	Springfield (Fairfax County)	Existing	Metrorail
Lorton	Lorton (Fairfax County)	Existing	None
Woodbridge	Woodbridge (Prince William County)	Existing	Amtrak
Rippon	Woodbridge (Prince William County)	Existing	None
Potomac Shores	Dumfries (Prince William County)	Under Construction	None
Quantico	Town of Quantico (Prince William County)	Existing	Amtrak
Brooke	Stafford (Stafford County)	Existing	None
Leeland Road	Falmouth (Stafford County)	Existing	None
Fredericksburg	City of Fredericksburg	Existing	Amtrak
Spotsylvania	Spotsylvania County	Existing	None

Table Notes:

1) L'Enfant Plaza is within the DC2RVA corridor for purposes of evaluating ridership and train operations but is not considered part of the corridor for purposes of station evaluation or rail improvements.

2) L'Enfant Plaza is not an Amtrak station; however, under an agreement between Amtrak, VRE, and DRPT, Northeast Regional (Virginia) Trains may stop at L'Enfant Plaza to accommodate VRE passengers with step-up tickets.

TABLE 8-4: POTENTIAL LOCATIONS FOR NEW PASSENGER STATIONS IN THE DC2RVA CORRIDOR

Station	Location	Status/Origination[1]	Potential Other Passenger Rail Service
Crystal City/National Airport	Arlington County	Potential new station location identified during public scoping, dismissed from further consideration.	VRE, Metrorail
Spotsylvania	Spotsylvania County	Potential new station combined with existing VRE station.	VRE
Carmel Church	Caroline County	Potential new station location identified from prior studies and public scoping, dismissed from further consideration.	None
Vaughan Road	Town of Ashland	Potential new station location to replace existing Ashland Station identified during public scoping, dismissed from further consideration.	None
Patrick Road	Town of Ashland	Potential new station location to replace existing Ashland Station identified during public scoping, dismissed from further consideration.	None
Ashcake Road	Hanover County	Potential new station location to replace existing Ashland Station identified during public scoping.	None
Cedar Lane	Glen Allen Henrico County	Potential new station location based on DRPT review of rail alignment; dismissed from further consideration	None
Greenwood Road	Glen Allen Henrico County	Potential new station location based on DRPT review of rail alignment; dismissed from further consideration.	None
Mountain Road	Glen Allen Henrico County	Potential new station location based on DRPT review of rail alignment; dismissed from further consideration.	None
Parham Road	Henrico County	Potential new station location identified from prior studies, dismissed from further consideration.	None
Boulevard	City of Richmond	Potential new station location identified during public scoping	None
Broad Street	City of Richmond	Potential redevelopment of historic train station (currently Science Museum of Virginia) identified during public scoping.	None
Hull Street Road	South Richmond	Potential new station location based on DRPT review of rail alignment; dismissed from further consideration.	None
Warwick/Bells Road	South Richmond	Potential new station location based on DRPT review of rail alignment; dismissed from further consideration.	None

TABLE 8-4: POTENTIAL LOCATIONS FOR NEW PASSENGER STATIONS IN THE DC2RVA CORRIDOR

Station	Location	Status/Origination[1]	Potential Other Passenger Rail Service
Walmsley Boulevard	South Richmond	Potential new station location based on DRPT review of rail alignment, dismissed from further consideration.	None
Chester Road	Chester	Potential new station location based on DRPT review of rail alignment, dismissed from further consideration.	None

Table Notes:
1) DRPT considered and dismissed from further consideration many of the potential new station locations identified below; others were carried forward into the Draft EIS for further consideration. See Section 8.3 for additional detail on each station location.

8.2 STATION LOCATION AND FACILITY CRITERIA

Station location, size, amenities, and function are critical elements in meeting the Project's Purpose and Need to make intercity passenger rail a competitive transportation choice. Intercity passenger rail stations should be conveniently located near the urban center, readily accessible by other transit as well as by car, and appealing to both business and leisure travelers. The Project's Basis of Design identifies documents that were used for this evaluation and serves as a guide for the conceptual design and preliminary engineering of Project alternatives to meet the Purpose and Need, including stations. Table 8-5 lists some of these documents.

TABLE 8-5: STATION LOCATION AND DESIGN GUIDANCE DOCUMENTS

Name	Date	Publisher/ Source	Description
DC2RVA Southeast High Speed Rail Basis of Design	February 2015	DRPT	Developed in collaboration with FRA, VRE, Amtrak, CSXT, and VDOT.
Multi-modal System Design Guidelines	October 2013	DRPT	DRPT has developed guidelines for transit oriented development but not for intercity passenger rail stations.
Railroad Corridor Transportation Plans: A Guidance Manual	July 8, 2005	FRA	FRA guidance to long term planning proponent of new or improved high-speed intercity rail services.
Station Area Planning for High-Speed and Intercity Passenger Rail	June 2011	FRA	Multijurisdictional reference tool provided by the FRA to support station area planning and development.
Amtrak Station Program and Planning Guidelines	May 1, 2013	Amtrak	Amtrak specific design guidelines, planning processes and development standards.
VRE Station Design Guidelines	November 2002, revised November 1, 2014	VRE	VRE specific design guidelines, planning processes and development standards.

TABLE 8-5: STATION LOCATION AND DESIGN GUIDANCE DOCUMENTS

Name	Date	Publisher / Source	Description
Manual for Railway Engineering	2015	AREMA	Guidelines will be considered when potential station improvements would affect track alignment.
CSXT Engineering and Operating Standards	November 1, 2014	CSXT	Description of the basis of design for the CSX track.

FRA's *Station Area Planning for High-Speed and Intercity Passenger Rail* reference document is organized around three station area planning principles:

1. **Location**: Optimize the station location.
2. **Transportation**: Maximize station connections with other transportation modes.
3. **Development**:
   – Shape it through urban design.
   – Focus infill development around the station.

The FRA guidelines note that projected ridership along a particular corridor is heavily influenced by station accessibility and proposed train schedules. The location and number of stations along the corridor will affect ridership and revenue as well as local community land uses. The DC2RVA corridor traverses urban, suburban, and rural areas and includes stations with different passenger and community needs; therefore, the design considerations will vary among stations.

Amtrak guidelines are used as a primary basis for assessing existing stations, as this study considers improved passenger rail service along an existing corridor. Additionally, any station improvements will need to comply with Amtrak requirements since the corridor will continue to host Amtrak trains. The Amtrak guidelines recommend that passenger rail stations serve as multi-modal transportation centers with connections to local bus, commuter rail, subway, and/or streetcar systems, in addition to highway access.

While taking into account existing development patterns, stations can become a catalyst for infill development in the surrounding area. The FRA and Amtrak station planning guidelines call for train stations to function as gateways to the cities they serve, and they encourage transit oriented development with a mix of land uses.

8.2.1 Station Location

Intercity passenger rail station locations are subject to several, at times conflicting, demands including:

- Stations should be readily accessible to where people live and work.
- Too many station stops excessively lengthen trip times.
- Too few stations will limit access and reduces rail system ridership.

- Station sites need to cater to both business and leisure travel.
- Stations need an appropriate mix of transit connections and accommodations for automobile access, including parking facilities.

FRA's *Railroad Corridor Transportation Plans: A Guidance Manual (2005)* identifies the following general guidelines for locating corridor rail passenger stations:

1. Each city should have a station located in or near the central business district (CBD).[3] This is mandatory for larger Metropolitan Statistical Areas (MSAs), with metropolitan populations of 150,000 or more. To operate otherwise would undermine the inherent advantages of passenger rail systems. Central locations are highly desirable, if at all possible, for smaller cities as well. This center city station should have direct access to local transit systems (bus, rail, taxi, etc.), as well as appropriate amounts of parking for private cars.
2. One or more suburban stations need to be provided in the larger metropolitan areas with easy access to the local primary road system in order to accommodate potential riders living outside the city centers. These "beltway"-type stations cater to automobile-oriented riders and thus need to have many hundreds, if not several thousand, parking spaces to fulfill their role in corridor transportation.
3. Every effort should be made to have each corridor station serve as a regional intermodal passenger terminal for all forms of regional and local transportation systems.

Neither FRA nor Amtrak provides specific standards or guidance on preferred distances between rail stations. Rather, station locations are determined by relative proximity to major business areas and local area populations. Adequate distance between station stops should be provided to maximize average operating speed and reduce trip time. Locating stations in close proximity to each other would be unreasonable for intercity passenger train operations except in high density urban areas where multiple stations provide essential distribution for passengers. While it is acceptable to have separate stations serving the city center and suburbs of major urban areas, avoiding short distances between station stops outside of those areas is important to maintain a desirable overall trip time and maximize average operating speeds. In addition, each station represents costs for operation and maintenance; fewer stations mean less cost to operate the system. The number of stations should optimize higher ridership with lower operating expenses.

8.2.2 Ridership

Ridership, the number of passengers being carried during a period of time, is an essential consideration for a station location because it is a means to measure whether the potential benefits of providing rail service to that location can be achieved. Current ridership numbers have been established for the existing Amtrak stations and level of service along the corridor.

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3 The central business district (CBD) is not defined by FRA's guidelines, but is generally considered to be a City's downtown area, e.g. the commercial, office, retail, and cultural center of the city. The CBD is usually the focal point for transportation networks.

Ridership projections are being developed as part of the Draft EIS to forecast ridership for future service levels at potential new stations and existing stations. Forecasting models can project ridership using ridership surveys and other available data as inputs.

While sufficient multi-modal origin and destination (O&D) travel data is being developed to generate a ridership forecast for the corridor (to be presented in the Tier II EIS, other more readily available information such as population density and economic activity was used to evaluate the potential ridership demand for a station location. Station locations in areas of dense population are preferable for intercity passenger rail service, as higher population densities generally indicate higher ridership. Economic centers are characterized by large concentrations of commercial, institutional, tourist, or industrial activity. This criterion provides consideration of a station in a regional area that has potential to generate specific ridership opportunities. Additional details pertaining to ridership projections, including trip time (both door-to-door trip time and scheduled trip time), train on-time performance (e.g. schedule reliability), traffic considerations, and parking analysis will be further expanded on in the Tier II EIS.

FRA's *Final State Rail Plan Guidance* from 2013 describes FRA's preferred methodology to define the population with access to passenger rail service as the population of Census tracts within a 10- and 30-mile radius of the stations. FRA also encourages use of other measures of accessibility, including the population within a 30-minute drive of a rail station and the population within a 30-minute transit ride of a rail station. DRPT, in its Intercity Passenger Rail and Operating Capital (IPROC) fund application procedures, identifies a catchment area radius of 10 to 25 miles to define the population with access to passenger rail service. Therefore, existing and projected ridership (where available) and population density within a 10-mile radius, a 25-mile radius, and a 30-minute driving time of each station location were used to compare potential station locations. Station locations with comparatively high ridership and/or comparatively high population densities are favored for consideration for additional service under the DC2RVA project.

8.2.3 Station Categories

Amtrak's *Station Program and Planning Guidelines* classify stations into four groups based on projected annual ridership. Each station category includes a list of program components typical of that station category. The four station categories include:

- **Category 1 – Large Stations** serve the center and edges of large urban areas, and are highly integrated with supporting public transportation systems. These stations are typically a key component of urban and regional multi-modal transportation networks, are staffed to provide ticketing and support services, and often include retail space or transit oriented development surrounding the station. Category 1 stations typically serve over 400,000 passengers per year. Terminal stations are often Category 1.[4]

4 "Amtrak Station Program and Planning Guidelines." Amtrak, 2013, http://www.greatamericanstations.com/downloads/station-planning-and-program-guidelines_secure, accessed May 13, 2015. Page 27.

- **Category 2 – Medium Stations** are staffed, serve a wide variety of communities, and vary widely in rail service type and program function. Category 2 stations are primarily oriented to State Corridor service, or major destinations along Amtrak's Long Distance services, and have ticket offices and minimal staff. Category 2 stations typically serve between 200,000 and 400,000 passengers per year.
- **Category 3 – Caretaker Stations** are not staffed by Amtrak agents, but include an interior waiting facility, with restrooms, that is opened, closed, and maintained by an Amtrak caretaker or staffed by another entity. Category 3 stations are expected to serve between 20,000 and 200,000 passengers per year.
- **Category 4 – Shelter Stations** are not staffed and include only a shelter and/or platform canopy to protect passengers from the weather. Category 4 stations are expected to serve less than 20,000 passengers per year.

The amenities provided at individual stations may vary due to location-specific needs. Table 8-6, from Amtrak's *Station Program and Planning Guidelines* document, identifies features typically associated with each station category.

TABLE 8-6: STATION CHARACTERISTICS BY CATEGORY

	Station Type	**Category 1 (Large)**	**Category 2 (Medium)**	**Category 3 (Caretaker)**	**Category 4 (Shelter)**
	Projected Annual Ridership	**Greater than 400,000**	**100,000 to 400,000**	**20,000 to 100,000**	**Less than 20,000**
Station Location Environment	High Density (Urban)	●	○		
	Medium Density (Town/Suburban)		●	○	
	Low Density (Suburban/Rural)			○	○
Multi-Modal Services	Full Range (Metro/Light Rail)	●	○		
	Basic (Bus)	○	●		
	Minimal (Auto/Taxi)		○	●	●
Customer Service Staffing Level	Fully Staffed, Management Present	●	○		
	Basic Staff for Ticketing Baggage, Train Operations	○	●	○	
	Caretaker, No Passenger Assistance		○	●	
	Unstaffed				●
Baggage Services	Checked Baggage/Red Cap/Package Express	●			
	Checked Baggage/Agent Assistance	○	●		

TABLE 8-6: STATION CHARACTERISTICS BY CATEGORY

	Station Type	Category 1 (Large)	Category 2 (Medium)	Category 3 (Caretaker)	Category 4 (Shelter)
	Projected Annual Ridership	**Greater than 400,000**	**100,000 to 400,000**	**20,000 to 100,000**	**Less than 20,000**
	None			●	●
Station Configuration	Side Platforms	●	●	●	●
	Vertical Circulation to Platforms	●	●	○	
	Terminal Services	●	○		
Station Access	Pick-up/Drop-off Zone	●	●	●	○
	Vehicular Parking	○	●	○	○
	Transit and Bus Access	○	○	○	○
	Taxi Access	●		○	○
	Bike Parking/Access	●	●	●	○

Source: Amtrak, *Station Program and Planning Guidelines*, 2012.

Key: ● Typical characteristics

○ Service based on route type, ridership, train frequency, and other considerations

Passenger access to the station and nearby multi-modal services is a key consideration for evaluating station locations, whereas customer service, staffing, and baggage checking services are more related to ridership levels and facility/site designs. Station site configuration is important to determine the suitability of a station location to provide passenger access to trains without interfering with other passenger and freight train service.

8.2.3.1 Multi-Modal Services

Amtrak's Station Program and Planning Guidelines list convenient access to the station as one of their key objectives, and specify that stations should be major hubs in a multimodal network connecting downtown and other important places in the region. Therefore, stations located in areas that maximize multimodal connections are preferred by DRPT for this Project. Stations with proximity to rapid transit, commuter rail, local and intercity bus, major roadways, or airports will improve connection between travel modes and provide riders maximum mobility. Multimodal connections are defined as proximate if there are on-station site connections or sites that provide a direct shuttle or other link. Bike and pedestrian connectivity to the station completes the multimodal framework. Stations without nearby connections to services of other travel modes are less desirable.

8.2.3.2 Station Configuration

FRA includes the following among railroad operating characteristics that need to be taken into account when evaluating and designing station sites for corridor applications.

1. Each station track configuration should provide for the through movement of trains along the corridor without having to reverse the train's direction at any time. Through stations are almost always preferable to stub-end terminals, both at the endpoints and intermediate points in a corridor.
2. The length of a station platform should be as long as the longest anticipated passenger train in order to avoid a very time-consuming double stop at the station and to allow maximum flexibility in train makeup. Amtrak provides the same guidance in their 2013 Station Program and Planning Guidelines.

The DC2RVA Basis of Design establishes the following station platform characteristics for stations along the corridor:

- Fully accessible, meeting ADA requirements. This typically means level boarding platforms (48 inches above top of rail) where not in conflict with freight rail operations, or low level platforms (8 inches above top of rail) with railcar-based lifts or station-based lifts for tracks shared with freight[5]
- Platforms (side platforms and/or center island platforms) to serve all main line tracks
- 1,200 feet preferred platform length for stations served by Amtrak's Long Distance trains
- 850 feet preferred platform length for stations served by Amtrak's Interstate Corridor (Carolinian and SEHSR) and Northeast Regional (Virginia and SEHSR) trains and/or VRE commuter trains
- 15 feet minimum width for side platforms, 24 feet minimum width for center island platforms
- Grade separated pedestrian crossings of tracks (including elevators)
- Fences separating tracks through station areas

8.2.3.3 Station Access

Passengers access stations through various means, including private automobile, taxi, transit, bicycle, and walking. Proper station planning ensures each mode is accommodated and transfers are seamless. Station access criteria to be considered in the Tier II EIS include:

- **Private Automobile and Taxi Pick-up Facilities** – Areas for private automobile, group ride, and taxi stands should be available to facilitate easy passenger drop off and exit from stations. Easily identifiable taxi stands should be in close proximity to the main station entrance. Where space is available and demand is present, cell-phone waiting lots, similar to those found at large airports, should be provided at larger stations to alleviate crowding in short-term parking spaces.
- **Parking** – Parking is a critical element for stations, particularly those located in suburban areas and without multi-modal transit access. The number of parking spaces

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[5] The Project's approved Basis of Design calls for low-level platforms compatible with freight operations for stations along main tracks shared with freight.

provided should be based on the forecasted ridership demand and modal split of patrons (business and leisure travelers) expected to use the station. Parking should include both daily parking and overnight parking/multiple day parking. The lack of available parking can inhibit the potential use by patrons that prefer or need to use private automobiles to access the station. Parking should be convenient to the station to facilitate access. The Project's Basis of Design includes general guidelines for parking lots, including the *VDOT Statewide Park & Ride Program Policy and Procedures Manual* and the *VDOT Statewide Park & Ride Program Best Practices Guide*, both dated February 2013.

- **Private Car Rentals and Car Sharing** – Large and heavily used stations on the corridor should support car rental and sharing facilities in the station vicinity. While such facilities are not appropriate for all locations, larger stations should at least provide information regarding area car rental and sharing agencies.
- **Transit** – Intercity rail stations in urban areas often have extensive transit connections. Transit facilities could include rapid transit stations incorporated directly into building structures and adjacent intercity and city bus stops. Stations in suburban locations will rely less heavily on transit connections but should incorporate covered bus stops and other improvements to facilitate transfers onsite. In the DC2RVA corridor, intercity trains may share platforms with VRE commuter rail trains, and some stations are adjacent to WMATA light rail stations.
- **Pedestrian** – Stations in urban areas may depend heavily on pedestrians. The level of expected pedestrian activity will depend on station area land use and population density within a reasonable walking distance[6], such as a nearby college campus, offices, residential areas, etc. Pedestrian access to a station should include designated walkways, lighting, and security systems.
- **Bicycle Parking and Sharing** – Stations should be equipped with covered long-term bicycle parking facilities. Bicycle parking should include lighting, security systems, and some protection from the elements, possibly including bike lockers. Areas with bicycle sharing programs should provide facilities for bicycle sharing at the station.

8.2.4 Other Station Regulations and Industry Standards

Stations must comply with local, state, and federal codes and generally must adhere to industry norms. Construction, renovation, maintenance, or other changes to stations resulting from DC2RVA service implementation should follow applicable codes and standards in addition to standards adopted for the DC2RVA project and those of station facility owners.

Stations and station infrastructure should be programmed using the standards and guidelines listed in Table 8-5. Station architecture, site layout, parking, landscaping, and streetscape

[6] DRPT, in its 2013 "Multimodal System Design Guidelines" defines a reasonable walking distance as approximately one mile, or the distance that can be comfortably walked in 10 minutes. The 10-minute walk-shed (approximately one mile distance, assuming a lack of barriers such as rivers or major highways) provides a nucleus for activities and destinations within easy walking distance.

elements should be designed to meet applicable city, county, district, or neighborhood guidelines and requirements.

Where Amtrak and VRE share station facilities, the design intent is to meet the applicable criteria of both operators. In the event of conflicts between the criteria, the Amtrak criteria are assumed to control unless an alternate criteria has been established and approved by the affected Project stakeholders.

Multimodal connections at stations served by local or regional transit agencies such as the Washington Metropolitan Area Transit Authority (WMATA), Alexandria Transit Company's (ATC) DASH, Fairfax County Connector, Fairfax City-University Energysaver (CUE) FREDericksburg Regional Transit (FRED), Potomac and Rappahannock Transportation Commission (PRTC), Northern Virginia Transportation Commission (NVTC), or GRTC Transit System (GRTC) shall be designed in accordance with the respective transit agency's guidelines. Where those guidelines conflict with Amtrak and/or VRE criteria, Amtrak criteria are assumed to control followed by VRE criteria.

8.3 EVALUATION OF EXISTING AND POTENTIAL STATIONS

A screening process was used to identify reasonable station locations for consideration as part of the Project. Stations, including existing Amtrak stations and potential intercity passenger stations suggested during Project scoping or in prior studies, were compared and evaluated against the criteria described in section 8.2 of this report and summarized below. Existing stations and potential new stations with comparatively greater levels of suitability to meet the criteria will be evaluated in the Tier II EIS along with rail alignment options. Potential new stations that are less able to meet the criteria will not be considered further as part of the DC2RVA project; however, this does not preclude these or other station locations from being developed in the future, independent of DC2RVA. In addition, existing Amtrak stations were evaluated for facility improvements based on ridership projections and Amtrak station guidelines.

The initial screening of existing and potential stations considered the following factors:

- **Station Location (see Section 8.3.1) –** characteristics suitable for suburban and/or central location per FRA guidelines.
  - Stations in large cities should be in or near the central business district with direct access to local primary roads and transit services.
  - Stations in smaller cities/towns should be in or near the central business district with direct access to local primary roads.
  - Stations in large city suburban areas should have direct access to local primary roads and ample parking.
- **Potential ridership (see Section 8.3.2)** – Ridership levels and forecasts (if available). Where ridership forecasts have not yet been determined, the following measures were used to represent the potential ridership:
  - Population within a 10 mile radius of the station
  - Population within a 25 mile radius of the station
  - Population within a 30 minute driving distance of the station

- **Station Type (see Section 8.3.3) –** Evaluate station/location capability to provide amenities and features according to Amtrak station type based on existing and projected ridership
- **Multi-Modal Service (see Section 8.3.4) –** Other modes of transit service available at station
  - Full Range (Fixed guideway transit)
  - Basic (Bus)
  - Minimal (Auto, Taxi)
- **Station Configuration (see Section 8.3.5)**
  - Through track at station
  - Tangent track for platforms, minimum 850 feet of platform for Interstate Corridor (Carolinian), Northeast Regional (Virginia) and/or VRE trains, and 1,200 feet for Long Distance trains.
  - All main tracks with access to passenger platforms
- **Station Access (see Section 8.3.5)** – The proximity of each station to major highways and local primary roads. Additional site specific access relating to adequate parking, transit services, car rental, and pedestrian and bicycle facilities will be reviewed further in the Tier II Draft EIS.

A description of existing and potential intercity passenger stations suggested during Project scoping or in prior studies is presented in Section 8.3.5 along with a summary of DRPT's evaluation of their suitability for further consideration as an intercity passenger rail station as part of the DC2RVA project.

8.3.1 Station Location

In keeping with FRA guidelines, intercity passenger rail stations for the DC2RVA project should be located in the center of their respective city, town or urban area, and have direct access to local primary roads and transit systems. Larger urban areas may also have a station or stations in the suburbs in addition to the central station; suburban stations should have direct access to local primary roads, be located in their respective city suburbs and have easy access to local primary roads, plus room for ample parking. The Richmond metropolitan area is currently served by two stations, Main Street Station located downtown, and Staples Mill Road Station in the northwest suburbs. Staples Mill Road Station serves as the primary Amtrak station for the area, with Long Distance, Interstate Corridor (Carolinian) and Northeast Regional (Virginia) trains providing service. Main Street Station is currently served by two daily Northeast Regional (Virginia) trains. During project scoping, the concept of providing intercity passenger service in the Richmond area with a single "combined" station serving the needs of both center city and suburban users was identified. DRPT determined that such a combined station location should have direct access to local primary roads, be in or near the central business district, and have direct access to local transit systems. Richmond may also be served by two stations, a downtown station and a suburban station.

Table 8-7 summarizes the station location characteristics for existing Amtrak stations and proposed new station locations.

TABLE 8-7: STATION LOCATION CHARACTERISTICS

Station	Locality	Existing or Proposed Station	Location	Direct Access to Local Primary Roads	Direct Access to Local Transit Systems
Crystal City	Arlington County	New station proposed in scoping, to be combined with VRE and WMATA stations at airport.	Central/urban area	●	●
Alexandria	City of Alexandria	Existing Amtrak/VRE station	Central/urban area	●	●
Woodbridge	Prince William County	Existing Amtrak/VRE station	Suburban	●	●
Quantico	Town of Quantico Prince William County	Existing Amtrak/VRE station	Central/suburban combined	○	○
Fredericksburg	City of Fredericksburg	Existing Amtrak/VRE station	Central/suburban combined	●	●
Spotsylvania	Spotsylvania County	New station in conjunction with VRE station proposed during scoping.	Suburban	●	○
Carmel Church	Caroline County	New station proposed during scoping.	Suburban	●	○
Vaughan Road	Town of Ashland Hanover County	New station proposed during scoping to replace existing Ashland station	Suburban	◒	○
Patrick Road	Town of Ashland Hanover County	New station proposed during scoping to replace existing Ashland station	Central/suburban combined	◒	○
Ashland	Town of Ashland Hanover County	Existing Amtrak station	Central/suburban combined	●	○
Ashcake Road	Town of Ashland Hanover County	New station proposed during scoping to replace existing Ashland station	Suburban	●	○
Cedar Lane	Glen Allen Henrico County	New potential station location identified by DRPT	Suburban	◒	◒
Greenwood Road	Glen Allen Henrico County	New potential station location identified by DRPT	Suburban	◒	◒
Mountain Road	Glen Allen Henrico County	New potential station location identified by DRPT	Suburban	◒	◒
Parham Road	Henrico County	New station proposed in prior studies to replace Staples Mill Road	Suburban	●	◒

TABLE 8-7: STATION LOCATION CHARACTERISTICS

Station	Locality	Existing or Proposed Station	Location	Direct Access to Local Primary Roads	Direct Access to Local Transit Systems
Staples Mill Road	Henrico County	Existing Amtrak station	Suburban	●	◒
Boulevard	City of Richmond	New station proposed to replace both Staples Mill Road and Main Street Stations in Richmond.	Central/suburban combined	●	◒
Broad Street	City of Richmond	New station proposed to replace both Staples Mill Road and Main Street Stations in Richmond.	Central/suburban combined	●	●
Main Street	City of Richmond	Existing Amtrak station	Central	●	●
Hull Street Road	South Richmond	New potential station location identified by DRPT	Suburban	◒	◒
Warwick/Bells Road	South Richmond	New potential station location identified by DRPT	Suburban	◒	◒
Walmsley Boulevard	South Richmond	New potential station location identified by DRPT	Suburban	◒	◒
Chester Road	Chester	New potential station location identified by DRPT	Suburban	◒	◒

Table Notes: ●Station location has good access. ◒ Station location has fair access. ○Station location has poor access. Access ratings based on existing roads and transit service.

8.3.2 Potential Ridership

Potential ridership is used as a measure to predict if a station location would be effective at attracting passengers and realizing the benefits of more frequent and reliable passenger rail service. Boardings and alightings (passengers getting on and off trains) on Amtrak trains within the corridor for 2015 are shown below in Table 8–8.

TABLE 8-8: BOARDINGS AND ALIGHTINGS

City	Boardings and Alightings
Alexandria	186,841
Woodbridge	24,212
Quantico	32,754
Fredericksburg	117,423

Ashland	28,141
Richmond – Main Street	45,062
Richmond – Staples Mill	361,996
Station Usage in Corridor	796,429

Source: Amtrak Factsheet: Boardings and Alightings during FY15 in Virginia

Ridership modeling, including station by station ridership projections, is being conducted within the Draft EIS to inform the evaluation of alternatives. In order to compare the potential ridership at all of the station locations in a consistent manner pending detailed ridership modeling in the Draft Tier II EIS, the current and projected populations within given distances from station locations are used as a measure of potential ridership.

For this conceptual review, the current year (2015), anticipated initial service year (2025), and 20 years of service (2045) population densities have been considered. The populations within a 10 mile radius and 25 mile radius of each potential station have been identified for each of the three years. The population within a 30 minute driving distance of each station location has been identified for the year 2015. This information is listed in Table 8-9.

TABLE 8-9: POPULATION NEAR STATION LOCATIONS

Station	Station Location / Type of Surrounding Land Use	2015 Pop. within 10-mile radius of station	2015 Pop. within 25-mile radius of station	2015 Pop. within 30-min driving distance of station	2025 Pop. within 10-mile radius of station	2025 Pop. within 25-mile radius of station	2045 Pop. within 10-mile radius of station	2045 Pop. within 25-mile radius of station
Crystal City	Arlington County Urban	1,188,081	3,437,555	2,682,067	1,225,390	3,771,317	1,275,983	4,306,078
Alexandria	City of Alexandria Urban	966,931	3,254,497	2,362,513	1,022,024	3,579,643	1,105,029	4,107,114
Woodbridge	Prince William County Suburban	378,888	2,342,409	1,740,863	456,993	2,684,554	596,088	3,287,429
Quantico	Prince William County, Town of Quantico Suburban	129,011	1,148,726	468,148	155,970	1,378,390	209,420	1,807,606
Fredericksburg	City of Fredericksburg Urban	102,678	397,618	344,896	123,457	484,040	168,782	669,727
Spotsylvania	Spotsylvania County Suburban/Rural	73,204	335,558	232,903	85,939	408,965	114,365	570,053

TABLE 8-9: POPULATION NEAR STATION LOCATIONS

Station	Station Location / Type of Surrounding Land Use	2015 Pop. within 10-mile radius of station	2015 Pop. within 25-mile radius of station	2015 Pop. within 30-min driving distance of station	2025 Pop. within 10-mile radius of station	2025 Pop. within 25-mile radius of station	2045 Pop. within 10-mile radius of station	2045 Pop. within 25-mile radius of station
Carmel Church	Caroline County Rural	22,229	235,532	162,905	23,586	268,587	24,793	331,075
Vaughn Road	Town of Ashland Hanover County/ College & Suburban	56,529	516,568	437,842	63,278	558,444	73,704	625,828
Patrick Road	Town of Ashland Hanover County/ Downtown/College & Suburban	63,058	534,287	448,473	70,844	577,569	83,267	647,160
Ashland	Town of Ashland Hanover County/ Downtown/College & Suburban	68,243	548,355	475,726	76,851	592,828	90,874	664,341
Ashcake Road	Town of Ashland Hanover County/ Suburban	84,550	584,105	484,131	95,752	632,693	114,831	711,210
Cedar Lane	Glen Allen Henrico County	121,506	645,249	557,515	138,433	704,202	168,736	801,299
Greenwood Road	Glen Allen Henrico County	146,423	677,439	553,903	165,577	742,046	200,152	849,333
Mountain Road	Glen Allen Henrico County	195,161	726,658	603,145	216,460	799,959	254,838	922,950
Parham Road	Henrico County Suburban	262,459	786,572	652,653	284,787	870,600	324,382	1,012,975
Staples Mill Road	Henrico County Suburban	291,291	819,637	669,014	313,294	909,615	351,755	1,062,847
Boulevard	City of Richmond/ Urban	348,846	883,305	801,343	370,963	984,917	408,604	1,159,028
Broad Street	City of Richmond Urban	350,522	894,750	788,699	372,855	996,717	410,806	1,171,306
Main Street	City of Richmond Urban	344,859	919,068	849,365	367,415	1,017,873	405,841	1,186,154

TABLE 8-9: POPULATION NEAR STATION LOCATIONS

Station	Station Location / Type of Surrounding Land Use	2015 Pop. within 10-mile radius of station	2015 Pop. within 25-mile radius of station	2015 Pop. within 30-min driving distance of station	2025 Pop. within 10-mile radius of station	2025 Pop. within 25-mile radius of station	2045 Pop. within 10-mile radius of station	2045 Pop. within 25-mile radius of station
Hull Street Road	South Richmond	343,274	973,809	830,935	365,714	1,079,912	402,700	1,261,142
Warwick/Bells Road	South Richmond	327,037	978,776	864,901	350,076	1,080,822	388,251	1,255,412
Walmsley Boulevard	South Richmond	313,083	980,144	877,257	337,127	1,080,867	377,428	1,253,300
Chester Road	Chester	212,545	945,077	797,558	240,044	1,039,617	287,430	1,200,881

Source: USEPA International Climate and Land Use Scenarios (ICLUS) baseline population projections

8.3.3 Station Type

The existing Amtrak stations in the DC2RVA corridor were evaluated to determine if their current conditions meet the standards for typical stations of their respective categories as listed in Amtrak's *Station Program and Planning Guidelines* document. Table 8-10 presents this comparison along with the 2015 ridership. All of the existing Amtrak station facilities would require improvements to meet Amtrak's station guidelines if their ridership increases substantially.

TABLE 8-10: EXISTING AMTRAK STATION CHARACTERISTICS

		Alexandria	Woodbridge	Quantico	Fredericksburg	Ashland	Staples Mill Road	Main Street
Amtrak Ridership in 2015		186,841	24,212	32,754	117,423	28,141	361,996	45,062
Amtrak Station Category		Medium	Caretaker	Caretaker	Medium	Caretaker	Medium	Caretaker
Station Location Environment	High Density (Urban)	✓						✓
	Medium Density (Town/Suburban)		✓	✓	✓		✓	
	Low Density (Suburban/Rural)					✓		

TABLE 8-10: EXISTING AMTRAK STATION CHARACTERISTICS

		Alexandria	Woodbridge	Quantico	Fredericksburg	Ashland	Staples Mill Road	Main Street
Multi-Modal Services	Full Range (Metro/Light Rail)	✓						
	Basic (Bus)		✓		✓		✓	✓
	Minimal (Auto/Taxi)			✓		✓		
Customer Service Staffing Level	Fully Staffed, Management Present	✓					✓	
	Basic Staff for Ticketing Baggage, Train Operations							
	Caretaker, Passenger Assistance		✓					✓
	Unstaffed			✓	✓	✓		
Baggage Services	Checked Baggage/Red Cap/Package Express	✓					✓	
	Checked Baggage/Agent Assistance							
	None		✓	✓	✓	✓		✓
Station Configuration	Side Platforms	✓	✓	✓	✓	✓		✓
	Vertical Circulation	✓	✓		✓			✓
	Terminal Services						✓	

TABLE 8-10: EXISTING AMTRAK STATION CHARACTERISTICS

		Alexandria	Woodbridge	Quantico	Fredericksburg	Ashland	Staples Mill Road	Main Street
Station Access	Pick-up/Drop-off Zone	✓	✓	✓	✓	✓	✓	✓
	Vehicular Parking	Limited parking on-site; Off-site parking available	✓	✓	Off-site parking available	Off-site and street parking available	Limited parking on-site; Off-site parking available.	Limited parking on-site; Off-site parking available
	Bike Parking/Access	✓	✓	✓	✓	✓	✓	✓

Key: ✓ Amenity is currently provided at station (does not evaluate the condition of the amenity).

Alexandria and Main Street stations have limited on-site parking, and rely mainly on street parking, including commercial parking garages. Ashland station relies on street parking and town parking lots. Woodbridge, Quantico and Fredericksburg stations share parking lots with VRE riders. Staples Mill Road station provides parking on site; the current space is limited but land has been acquired adjacent to the station to expand on-site parking.

Possible new Amtrak station locations were not evaluated against the Amtrak station category characteristics. If one of these new station locations were selected to serve as an Amtrak station under the DC2RVA project, new facilities with amenities appropriate for the station category would be required.

8.3.4 Multi-Modal Service

Amtrak's *Station Planning and Program Guidelines* and FRA's *Station Area Planning* report emphasize connections to local and regional transportation networks as an important element of station design. Table 8-11 summarizes the current multi-modal access to the existing and potential station locations, and Table 8-12 lists the transit connections and nearby major highways accessible from each potential station.

The following station locations have multi-modal services, including better access and transportation connections, for their respective areas:

- Crystal City
- Alexandria
- Woodbridge
- Fredericksburg

- Staples Mill Road
- Boulevard
- Broad Street
- Main Street

Passenger rail stations with a primarily suburban market or limited multimodal access require convenient parking to be available for long-term and short-term use. A lack of adequate parking or multimodal access has an adverse effect on ridership. The number of parking spaces needed at a proposed station is based on the forecasted ridership and the mode of access to the station (for example, whether passengers arrive by auto or transit). As the ridership forecasts are developed in the Tier II EIS, the parking requirements will be identified along with the suitability of potential stations to accommodate surface parking lots or parking structures on or near the station site.

TABLE 8-11: ACCESS MODES[1] TO STATION LOCATIONS

Station	Full Range Multi-Modal (fixed transit)[2]	Basic Multi-Modal (bus)	Minimal Multi-Modal (car, taxi)	Provides Multi-Modal Service
Crystal City	✓	✓	✓	Full Range
Alexandria	✓	✓	✓	Full Range
Woodbridge	✓	✓	✓	Full Range
Quantico	✓	✓	✓	Full Range
Fredericksburg	✓	✓	✓	Full Range
Spotsylvania	✕	✕	✓	Minimal
Carmel Church	✕	✕	✓	Minimal
Vaughn Road	✕	✕	✓	Minimal
Patrick Road	✕	✕	✓	Minimal
Ashland	✕	✕	✓	Minimal
Ashcake Road	✕	✕	✓	Minimal
Cedar Lane	✕	✕	✓	Minimal
Greenwood Road	✕	✕	✓	Minimal
Mountain Road	✕	✕	✓	Minimal
Parham Road	✕	✕	✓	Minimal
Staples Mill Road	✕	✓	✓	Basic
Boulevard	✕	✓	✓	Basic
Broad Street	✕[3]	✓	✓	Basic
Main Street	✕[4]	✓	✓	Basic
Hull Street Road	✕	✓	✓	Basic
Warwick/Bells Road	✕	✓	✓	Basic
Walmsley Boulevard	✕	✓	✓	Basic
Chester Road	✕	✓	✓	Basic

Key: ✓ Mode is currently available at station/location
✕ Mode is not currently available at station/location

Notes:

1) Access modes are defined by Amtrak's *Station Planning and Program Guidelines.*

2) Multi-Modal (fixed transit) includes VRE commuter rail and WMATA metrorail, and would also include a Bus Rapid Transit (BRT) system on fixed right-of-way.

3) A BRT system is being planned for Richmond by GRTC Transit; current plans show a future BRT station stop adjacent to the Broad Street Station location.

4) A BRT system is being planned for Richmond by GRTC Transit; current plans show a future BRT station stop adjacent to Main Street Station.

TABLE 8-12: TRANSPORTATION CONNECTIONS TO STATION LOCATIONS

Station	Approximate distance by road to nearest major highway	Transit connections
Crystal City	0.35 mi to U.S. Route 1 0.5 mi to I-395 1 mi to George Washington Memorial Parkway	VRE Fredericksburg and Manassas Lines Metrorail Blue and Yellow Lines Metrobus, ART, Fairfax Connector, PRTC OmniRide buses
Alexandria	Less than 2 mi to I-95/I-495	VRE Fredericksburg and Manassas Lines Metrorail Blue and Yellow Lines Metrobus, Dash, King St. Trolley, Richmond Highway Express buses
Woodbridge	Adjacent to U.S. Route 1 Less than 3 mi to I-95	VRE Fredericksburg Line PRTC OmniRide, OmniLink and Prince William Metro Direct buses Greyhound intercity bus
Quantico	5 mi to I-95 3 mi to U.S. Route 1	VRE Fredericksburg Line PRTC OmniLink bus
Fredericksburg	1 mi to Va. Route 3 Less than 2 mi to U.S. Route 1 3 mi from I-95	VRE Fredericksburg Line Fredericksburg Transit (FRED) bus
Spotsylvania	3.6 mi to U.S. Route 1 4.3 mi to I-95	VRE Fredericksburg Line
Carmel Church	Adjacent to U.S. Route 1 2.5 mi to I-95	none
Vaughan Road	Runs perpendicular to I-95 and U.S. Route 1 0.5 mi to U.S. Route 1 2.1 mi to I-95 9.4 mi to I-295	None
Patrick Road	0.8 mi to U.S. Route 1 2.1 mi to I-95 8.3 mi to I-295	None
Ashland	2 mi to I-95	None
Ashcake Road	0.8 mi to U.S. Route 1 2.6 mi to I-95 7.2 mi to I-295	none
Cedar Lane	2.4 mi to U.S. Route 1 4.7 mi to I-295 3.9 mi to I-95	None

TABLE 8-12: TRANSPORTATION CONNECTIONS TO STATION LOCATIONS

Station	Approximate distance by road to nearest major highway	Transit connections
Greenwood Road	4.4 mi to I-295 3.8 mi to U.S. Route 1 5.2 mi to I-95	None
Mountain Road	1.5 mi to I-295 3.2 mi to U.S. Route 1 4.4 mi to I-95	None
Parham Road	2.8 mi to U.S. Route 1 3 mi to I-64 3.5 mi to I-95	GRTC bus (bus routes along Parham Road and Staples Mill Road)
Staples Mill Road	2 mi to I-64 2.6 mi to U.S. Route 1 5 mi to I-95	GRTC bus
Boulevard	0.5 mi to I-64/I-95	GRTC bus (bus routes along Boulevard) Greyhound intercity bus
Broad Street	1 mi to I-195 1.25 mi to I-64/I-95 3 mi to U.S. Route 1 Direct access to Broad Street (U.S. Route 250)	GRTC bus
Main Street	0.6 mi to I-95	GRTC bus, Megabus intercity bus
Hull Street Road	5.0 mi to I-95 3.6 mi to U.S. Route 1	GRTC bus
Warwick/Bells Road	0.7 mi to U.S. Route 1 2.4 mi to I-95 3.5 mi to Route 360	GRTC bus
Walmsley Boulevard	0.5 mi to U.S. Route 1 2.5 mi to I-95	GRTC bus
Chester Road	0.7 mi to VA-288 3.0 mi to U.S. Route 1 3.7 mi to I-95	GRTC bus

8.3.5 Summary of Potential Station Evaluations

Existing intercity passenger rail stations and proposed new station locations were evaluated against the FRA and Amtrak station guidelines as well as the Project's Basis of Design to determine potential suitability for providing intercity passenger rail service within the DC2RVA project. A summary of stations and station locations evaluated by DRPT is presented below, including DRPT's determination of which stations/locations are considered reasonable for further assessment within the Tier II Draft EIS. DRPT anticipates that the existing Amtrak stations in the corridor, if not replaced by a new station, would continue to receive some level of intercity passenger rail service via Interstate Corridor and/or Northeast Regional (Virginia) trains; a final determination of the level of service (frequency, schedules, and station stops) will be provided in the DC2RVA Service Development Plan.

8.3.5.1 Crystal City Station (new)

Crystal City Station would be a new Amtrak station, formed by shifting the existing Crystal City VRE station closer to Ronald Reagan Washington National Airport in Arlington, Virginia. The VRE Station has potential to serve as an Amtrak station due to its proximity to Ronald Reagan Washington National Airport, connectivity to the regional highway and transit network including proximity to WMATA metro-rail stations, and proximity to dense office and residential development. Redevelopment of the VRE station as an Amtrak intercity passenger service station would require adding two new island platforms, a passenger lobby and waiting area, and connections to Ronald Reagan Washington National Airport through an elevated walkway. Inside the passenger lobby area would be new ticketing facilities, passenger bathrooms, seating for waiting passengers, and kiosks for food and retail services.

DRPT does not support the existing Crystal City VRE station site for consideration as an intercity passenger rail station under the DC2RVA project. Extending the existing platform would be problematic because horizontal curves near the VRE station would require realignment of the tracks both north and south of the station, potentially impacting areas either east or west of the corridor. Given the 105 foot width of the right-of-way at the station, either adjacent parks or existing buildings would be impacted to construct an Amtrak station at this location. Finally, the lack of parking at this station is detrimental to its ability to meet the Purpose and Need of a suburban station to which passengers should be able to drive and park.

DRPT also considered and dismissed a relocated Crystal City Station site south of the existing VRE station and adjacent to the airport. The main track curves going past the airport and does not have sufficient tangent track for platforms. Attempting to straighten the curves to allow for platforms would be problematic due to the track and right-of-way geometry north and south of the airport. Re-aligning the track to achieve sufficient tangent track would require track realignment north and south of the curve that would impact buildings or parklands and result in lower train operating speeds, and it would have the same parking constraints as the existing station.

In addition to operational constraints, the Crystal City option was dismissed due to the potential of passenger confusion and reduced connectivity. By having future SEHSR trains stop at Crystal City while existing Amtrak long-distance and intercity trains continue to stop at Alexandria instead is likely to create confusion for intercity rail passengers as to which station they should go to. It would also reduce the opportunities for connectivity with other Amtrak services that will continue to use the Alexandria station.

Additional information on the existing VRE station in Crystal City is found in Appendix PP.

8.3.5.2 Alexandria Union Station (existing)

The Alexandria Union Station is a historic railroad station in Alexandria, Virginia located at 110 Callahan Drive in the Old Town section of the city. It is served by both Amtrak intercity and VRE commuter rail lines. Alexandria is served by 14 daily trains, as well as the tri-weekly Cardinal (Westbound: Sunday, Wednesday, Friday; Eastbound: Wednesday, Friday, Sunday).

Northeast Regional service within Virginia is funded in part through grants made available by the Commonwealth of Virginia. The Amtrak station is adjacent to the Alexandria WMATA station; a separate project underway will improve pedestrian access between the two stations.

The Alexandria station is a one-story brick building consisting of the original main passenger depot and baggage building separated by a 20-foot wide gateway passage and a covered terrace. The facility has an enclosed waiting room, and includes a staffed ticket office. Other amenities include restrooms, payphone, ticket kiosk, and vending machines. There is limited parking on site. Transit connections are provided by the adjacent WMATA station.

The Alexandria WMATA station has six bus bays, a Kiss and Ride area, taxi stands, as well as a separate area for private shuttles in an effort to provide multimodal transportation to and from the station. Currently, an expansion plan is underway to increase the bus bay area, adding four more bus bays. The expansion is expected to improve pedestrian access at the WMATA station and create better connections to the surrounding area for all modes of transit. Construction is expected to begin in the spring of 2017 and last for approximately two years (Luz, 2016).

Amtrak trains, as well as the tri-weekly Cardinal (Westbound: Sunday, Wednesday, Friday; Eastbound: Wednesday, Friday, and Sunday) and weekday VRE service on both the Fredericksburg and Manassas Lines. The station is 9.4 miles from Union Station in Washington D.C. and 103 miles from Richmond.

The station has three tracks, two of which are served by platforms connected by both an underground passage and a more commonly used at-grade crossing. The facility and the parking lot are owned by the City of Alexandria, whereas the tracks and the platform are CSX Transportation (CSXT) property.

Figures 8-2 and 8-3 show the existing station waiting area and the connection from the station to the WMATA Metro service. Figure 8-4 is a map of the region.

FIGURES 8-2 AND 8-3: EXISTING STATION WAITING AREA AND CONNECTION FROM WMATA METRO SERVICES

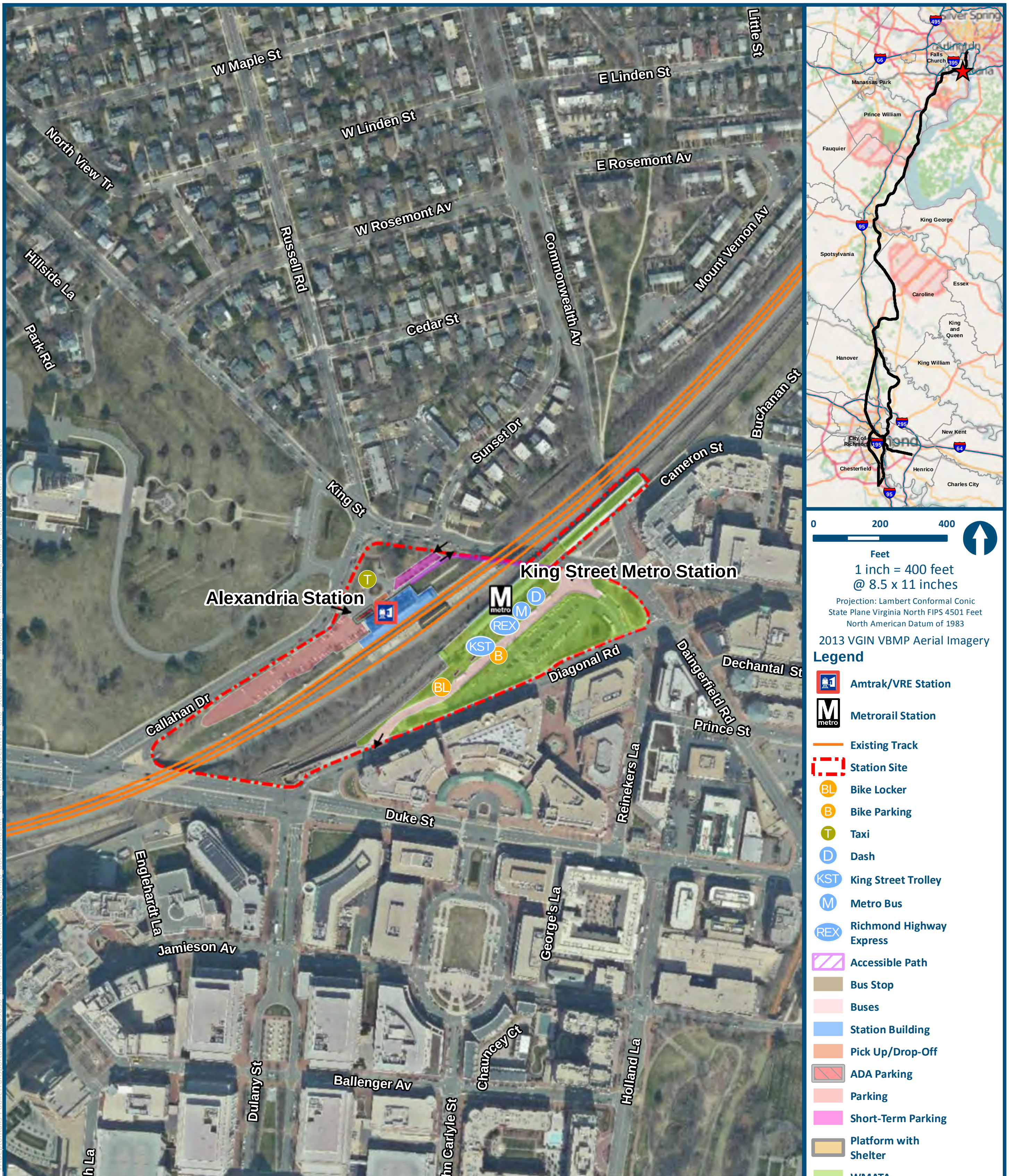


Figure 8-4 Alexandria Area Map

The Alexandria Union Station is located in a densely developed urban location. There are no prominent environmental features near the station. The site gently slopes towards the east with the Amtrak/VRE station on higher ground than the King Street Metrorail Station. The Alexandria Amtrak/VRE Station is located across the street from the George Washington Masonic National Memorial. The Memorial is a tourist attraction and destination; research center and library; community center; performing arts center and concert hall. The CSXT corridor and the King Street Metrorail Station are located to the south and southeast of the station. The area immediately to the north and northeast of the station is primarily residential. The area to the east of the station, adjacent to the King Street Metrorail Station and between King and Duke Streets is a densely developed mixed use environment including hotels, offices, restaurants and specialty stores.

Alexandria Union Station can be accessed from both King Street and Duke Street. The station is located less than two miles from an I-95/I-495 interchange. Although there is no designated taxi service or Kiss & Ride location at the station, the short-term parking lot serves as an informal location for pick-ups and drop offs. There are 30 short-term metered spots operated by the Washington Metropolitan Area Transit Authority (WMATA) at the Metrorail station and 50 parking spots (25 short term and 25 long term) provided for Amtrak passengers. There is no designated VRE parking. There are commercial parking garages in the area.

Alexandria Union Station is located directly across from the King Street – Old Town Metrorail station. The station functions as an intermodal hub for regional mass transit, linking Amtrak, VRE (Manassas and Fredericksburg Lines), and Metrorail with a number of Alexandria DASH and Metrobus lines as shown below:

- Metrorail – Yellow Line and Blue Line service connecting to Franconia-Springfield and Huntington in the south and Fort Totten and Largo Town Center in the north. The Yellow and Blue Lines provide direct service to Ronald Reagan Washington National Airport and downtown Washington, D.C.
- DASH – Route 2 to Braddock Road Metrorail Station and to Lincolnia, Route 5 to Braddock Road and Van Dorn Metrorail Stations, Route 6 to Eisenhower Avenue Metrorail Station and to Northern Virginia Community College (NVCC), Route 7 to Holmes Run Parkway, Eisenhower Avenue Metrorail Station, and to Lee Center and Duke Street, Route 8 to Old Town and Van Dorn Street Metrorail Station, Route 10 to Potomac Yard, and Route AT9 Non Stop to Mark Center on weekdays only.
- Metrobus – Routes 29K and 29N connecting to George Mason University and Fairfax Circle, collectively serving Duke Street and Washington Street, Little River Turnpike, Northern Virginia Community College (NVCC) and Pickett Road. Route 28A connects to Tysons Corner while providing service to the West Falls Church Metrorail Station.
- Richmond Highway Express (REX) to Fort Belvoir serving Eisenhower Avenue and Huntington Metrorail Stations.
- King Street Trolley (KST) providing surface road connections to the waterfront.

There are no bike facilities at the station. However, there are 34 bike racks and 20 lockers provided by WMATA for use by King Street Metrorail passengers.

Located on the edge of Alexandria's Old Town area, all streets in the vicinity of the station have sidewalks along both sides. There are uncovered stairs leading to the VRE/Amtrak station from

King Street, but they lack signage and are in a state of disrepair with water collecting in several locations. Although there is a path connecting the Metrorail station and the VRE/Amtrak station, there are no signs directing passengers to the VRE/Amtrak station. The path is long and could be difficult to traverse for a person with disabilities or someone in a wheelchair.

VRE has a project under design to construct a pedestrian tunnel that connects the mezzanine (lower level) of the King Street Metro Station to the Alexandria Amtrak/VRE Station. The tunnel project will improve pedestrian access between the two stations by providing a direct route, address ADA access between the two stations and from the West and East Platforms of the Alexandria station, eliminate the use of the at-grade track crossing between the two platforms and upgrade the eastern platform to allow use of Track 1 (farthest east track) for VRE and Amtrak passengers. The platforms and tracks at the station are constrained by the rail bridges over King Street just north of the station platforms, and the curve of the tracks and right-of-way beneath Duke Street immediately south of the station. In addition, track 1 is elevated approximately one foot above Track 2. The eastern platform is approximately 460 feet long, and varies in width from approximately 18 feet to approximately 28 feet. The east platform currently only serves Track 2. VRE is proposing to expand the eastern platform as a bi-level platform serving both Tracks 1 and 2. The project is also anticipated to improve railroad capacity and operational flexibility by allowing passenger trains to use the eastern track.

DRPT recommends the Alexandria Station for consideration as the primary Northern Virginia suburban station, with service from Long Distance, Interstate Corridor and Northeast Regional trains. It has high existing and potential ridership, is in close proximity to I-495 Capital Beltway with access to residents in Northern Virginia and Maryland, and access to multimodal transit facilities in the region. The existing station facilities are generally suitable for the potential ridership according to Amtrak's guidelines, and the proposed new platform configurations would meet Project requirements as limited by site constraints. Additional parking facilities may be required.

8.3.5.3 Lorton Auto Train Station, Lorton, Virginia

The Amtrak Auto Train Station in Lorton is located at 8006 Lorton Road just off of Interstate 95. This is a unique non-stop Amtrak service connecting Lorton, VA (25 miles south of Washington D.C) to Sanford, FL (20 miles from Orlando, FL) that enables passengers to travel with their vehicles—vans, motorcycles, small trailers, and SUVs, as well as cars, providing they meet certain size requirements. The Lorton Auto Train station anchors one end of Amtrak's Auto Train, which is only open to passengers with an accompanying motor vehicle. Passengers drive through a vehicle gate, at which they receive a claim-check number which is also affixed to their vehicles, and they then proceed to the loading area. From there, travelers continue on foot into the station with their overnight luggage. Their vehicles are video-documented and loaded into the double-level auto-rack rail cars, which are split up onto several parallel tracks. After loading, the rail cars are made up into a single train, often 40 cars or more, making this one of the longest passenger trains in the world. The full assembly of this train requires blocking a main track, which slows overall trip time for both passenger and freight. Refer to Chapter 3 for more details pertaining to Lorton Station operations.

No other trains serve this station. The entire facility, tracks and platforms are owned by Amtrak. There are several tracks (crossovers and tail tracks) to facilitate loading and unloading of automobiles but only one platform. There are 20 short-term parking spaces with additional

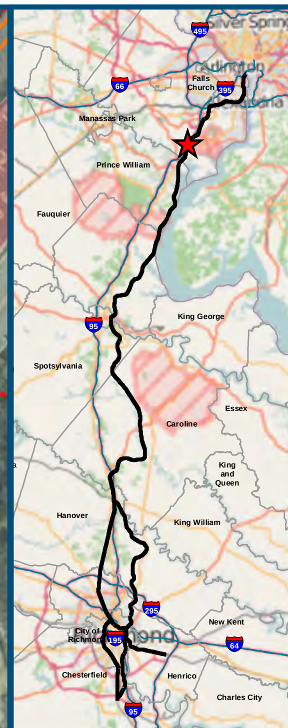
ADA accessible dedicated parking; however, there are no long term parking spaces. The 14,000 square-foot facility provides 450 seats in the single open waiting room. Other station amenities include an accessible platform, accessible restrooms, an accessible ticket office, accessible water fountain, pay phones, and Wi-Fi access. Amtrak provides ticketing but no baggage checking (baggage may be packed in respective automobiles) at the Lorton station, which is served by one daily train in each direction.

There are no transit services that access the station. Since all passengers arrive/depart with their own motor vehicle, it is not designed for access by bicycle or on foot. There are no cab services or car rental facilities nearby.

Figure 8-5 shows the Auto Train Station area. The Auto Train Station abuts Lorton Road to the south. It is between I-95 to the west and CSXT rail corridor to the east. The I-95 corridor is elevated by both fill and natural topography. Pohick Creek flows from west to east just north of the station. The Creek's floodplain is preserved as a natural park area by Fairfax County. The auto-specific nature of this station combined with the man-made barriers of I-95 and the CSXT rail corridor limits its applicability to other, albeit similar uses. There is no land on, or adjacent to, the site available for expansion of the station facilities to serve intercity passenger service. Beyond the site boundaries of interstate, rail corridor, and park/floodplain, the surrounding uses include an elementary school, residential, and strip commercial.

Much of the Lorton Auto Train site is occupied by tracks used to load passenger vehicles onto the rail cars and assemble the auto trains. The lead track in and out of the facility is west of the CSXT mainline track, connecting to the main line south of Lorton Road.

The addition of intercity passenger service would require modifications to the site to either provide a new platform and station, or it would require a complete rearrangement of the tracks used to build the trains and connect to the main line, since the existing platform is separated from the existing CSXT main lines by four tracks that include the yard lead. DRPT determined the Lorton Auto Train station would not be carried forward for further evaluation for intercity passenger service due to site limits on providing adequate station facilities and parking and potential interference with Auto Train operations.



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Feet

1 inch = 400 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

2013 VGIN VBMP Aerial Imagery

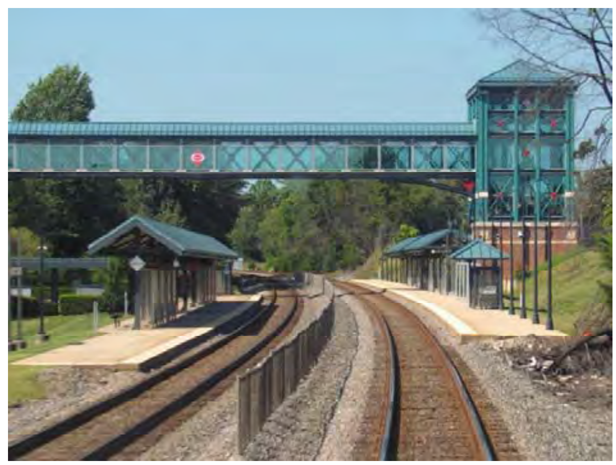
Legend

- Amtrak Station
- Existing Track
- Station Site
- Station Building
- Parking
- Platform
- Platform with Shelter

Figure 8-5
Lorton Auto Train Station Area Map

8.3.5.4 Woodbridge Station, Woodbridge, Virginia

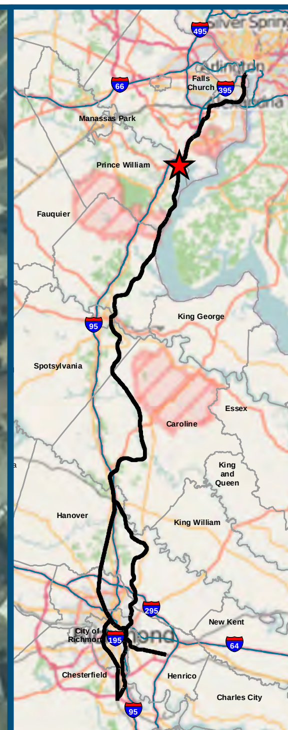
The Woodbridge Amtrak/VRE Station is located at 1040 Express Way in Woodbridge, VA. It is served by both Amtrak Northeast Regional (Virginia) and VRE commuter rail lines. The station building is a Colonial Revival depot, which opened in 1992 as part of the inauguration of the VRE commuter rail line. The facility has an enclosed waiting room. Other station amenities include restrooms, VRE ticket machines, space for a coffee stand, and newspaper racks. In the rear, a shelter provides open air access to the platforms, which has passenger seating. In 2010, VRE added a platform on the west side of the west track and an overhead pedestrian bridge to connect the west side platform to the parking garage on the east side. Previously the station only served the east track. The east and west platforms are relatively short (approximately 165 feet on the east and 175 feet on the west). The existing platforms are on horizontal curves and would need to be extended to conform to the Project's Basis of Design. Platforms on curves are less desirable than platforms on straight or tangent track. The station facility and the parking lot are owned and maintained by VRE. The station is 23.5 miles from Union Station in Washington, D.C. and 88 miles from Richmond. Figures 8-6 and 8-7 show the station building and station platforms of the Woodbridge Station. Figure 8-8 is a map of the region.

FIGURES 8-6 AND 8-7: ENTRANCE AND PLATFORM OF WOODBRIDGE STATION

The Woodbridge Amtrak/VRE Station is located in an urban/suburban area which is largely built out. The topography is relatively flat. The Occoquan River is about one mile to the north of the station. The Woodbridge station site has low density single-family residential uses to the east. The Woodbridge Shopping Center and other commercial/retail uses are located to the west.

The station is located adjacent to U.S. Route 1 and less than three miles from I-95, with direct access to I-95 and the I-95 Express Lanes. The station has a designated area for Kiss & Ride. Access is provided via Route 1 and via local streets. A multi-level parking garage adjacent to the station provides 738 free parking spaces in addition to the ground level lot. The parking facilities are at approximately 66 percent capacity. The station also has facilities for bike parking, dedicated ADA accessible parking, and a Kiss & Ride lot.



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Feet
1 inch = 200 feet
@ 8.5 x 11 inches
Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983
2013 VGIN VBMP Aerial Imagery

Legend

- Amtrak/VRE Station
- Existing Track
- Station Site
- OR PRTC OmniRide
- B Bike Parking
- PR TC Prince William Metro Direct
- GH Greyhound
- OL PRTC OmniLink
- Accessible Path
- Aerial Walkway
- Station Building
- Kiss & Ride
- ADA Parking
- Parking Garage
- Shelter
- Platform

Figure 8-8 Woodbridge Area Map

Potomac and Rappahannock Transit Commission (PRTC) provides local bus transit services. PRTC's OmniLink Route 1 connects the Quantico station with Woodbridge VRE Station and other locations in between. PRTC's Tysons Corner OmniRide connects to Tysons Corner and surrounding locations in Northern Virginia. Prince William Metro Direct (PWMD) also serves the Woodbridge Station, connecting to Franconia Springfield Metrorail Station and PRTC Transit Center. The Woodbridge Greyhound Station is also located adjacent to the Amtrak/VRE station. The station has facilities for bike parking although the roads may not be amenable for bicyclists due to heavy volume, higher vehicular speeds, and lack of designated bicycle lanes. There are no bike lanes leading to the stations or any signs encouraging users to share the road. Although there are sidewalks in some locations, the general development pattern is suburban and does not encourage walking. There is occasional taxi service but no car rental facilities in the area.

DRPT recommends this site be considered in the Draft EIS and Service Development Plan as a potential stop for Northeast Regional (Virginia and SEHSR) passenger trains due to its current use as an Amtrak station, availability of parking, and future growth projections along the U.S. Route 1 corridor.

8.3.5.5 Quantico Station, Quantico, Virginia

The Quantico Amtrak/VRE Station is located at 550 Railroad Avenue in Quantico, Virginia. It is served by both Amtrak (Northeast Regional (Virginia) and Interstate Corridor (Carolinian)) intercity and VRE commuter rail lines. The station is within the small town of Quantico, which is enclosed within Marine Corps Base Quantico. The station has two tracks with platforms on both sides, connected by an at-grade crossing at Neville Road at the north end of the station. However, the platform on the west side is not used and has fallen into disrepair. The station facility, including tracks and platforms, are owned by CSXT. The station, on the east side of the tracks, is a 1950s-era brick building used primarily by VRE passengers. The building includes an enclosed waiting area with seating, an accessible restroom, a coffee shop with limited hours and free Wi-Fi. The platform on the east side includes a shelter with amenities including pay phone, ticket vending machines and newspaper racks. The parking lot is owned and maintained by VRE. The station is 41 miles from Union Station in Washington, D.C. and 79.4 miles from Richmond.

The station is within the CSXT rail segment and is currently undergoing the addition of a third track (Arkendale to Powells Creek Third Track Project, a rail expansion project separate from DC2RVA). In conjunction with the third track project, a VRE-led project is expanding the existing station platform and adding a second platform. VRE is extending the existing platform to the south approximately 350 feet at a width of 12 feet. They are adding a second platform between tracks 2 and 3. This second platform is an island platform approximately 750 feet long at a width of approximately 16 feet. VRE is also planning expansion of the available parking facilities.

Figures 8-9 and 8-10 show the station platform and interior of the Quantico Station. Figure 8-11 is a map of the region.

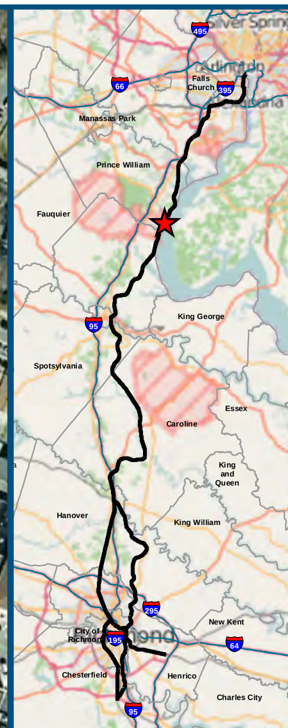
The station is located within Marine Corps Base Quantico. Access to Quantico and the station is through the Marine Corps Base. Due to heightened security, a picture ID must be presented to enter the base (this includes all passengers accessing the station from outside the Base or Town). Occasionally, military police officers may conduct random ID checks on passengers detraining at the station. Most of the base lies between Quantico Creek to the north, Chopawamsic Creek to the south and Potomac River to the east. The topography is generally flat. The base facilities abut the CSXT right of way to the west. In addition to base facilities, the surrounding town land uses are strip commercial/institutional with some retail, restaurants, and surface parking.

FIGURES 8-9 AND 8-10: HEADHOUSE INTERIOR AND STATION PLATFORMS OF QUANTICO STATION

The station is not well connected to the regional roadway network due in part, to the difficulties (and travel time/distance) involved in accessing the station through the Marine Corps Base. The population density surrounding Quantico Station is less dense than other Northern Virginia station locations, due in part to the surrounding Base. The station is about five miles from I-95 and about three miles from Route 1. There is some signage directing passengers to the station. Most passengers appear to drive to the station. There is no designated area for Kiss & Ride drop-offs. Railroad Avenue provides access to the parking lot and has space near the parking lot entrance that can be used as a drop-off location. There are 210 short-term and 60 long-term parking spaces. The parking facility is at approximately 70 percent capacity. All parking is provided free of charge. Dedicated ADA parking is available and bike racks are also provided.

OmniLink Route 1 connects the Quantico station with Woodbridge VRE Station and other locations in between. Military personnel and other employees are provided free taxi service to Marine Corps Base Quantico. There are no designated bicycle lanes; however, the roads are generally accessible for bicyclists due to low-volume, low-speed traffic. Bike parking is available at the station. There are sidewalks on both sides of Potomac Street connecting to a pedestrian pathway leading to the Amtrak/VRE station. There is very little residential development in the vicinity of the station, and there are likely few passengers who access the station on foot.

DRPT determined to consider this station further in the Draft EIS and Service Development Plan as a potential stop for Northeast Regional (Virginia and SEHSR) passenger trains due to its current use as an Amtrak station, planned station and platform improvements, availability of parking, and future growth projections along the U.S. Route 1 corridor.



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2013 VGIN VBMP Aerial Imagery

Legend

- Amtrak/VRE Station
- Existing Track
- Station Site
- B Bike Parking
- OL PRTC OmniLink
- Station Building
- ADA Parking
- Parking

Figure 8-11
Quantico Station Vicinity Map

8.3.5.6 Fredericksburg Station, Fredericksburg, Virginia

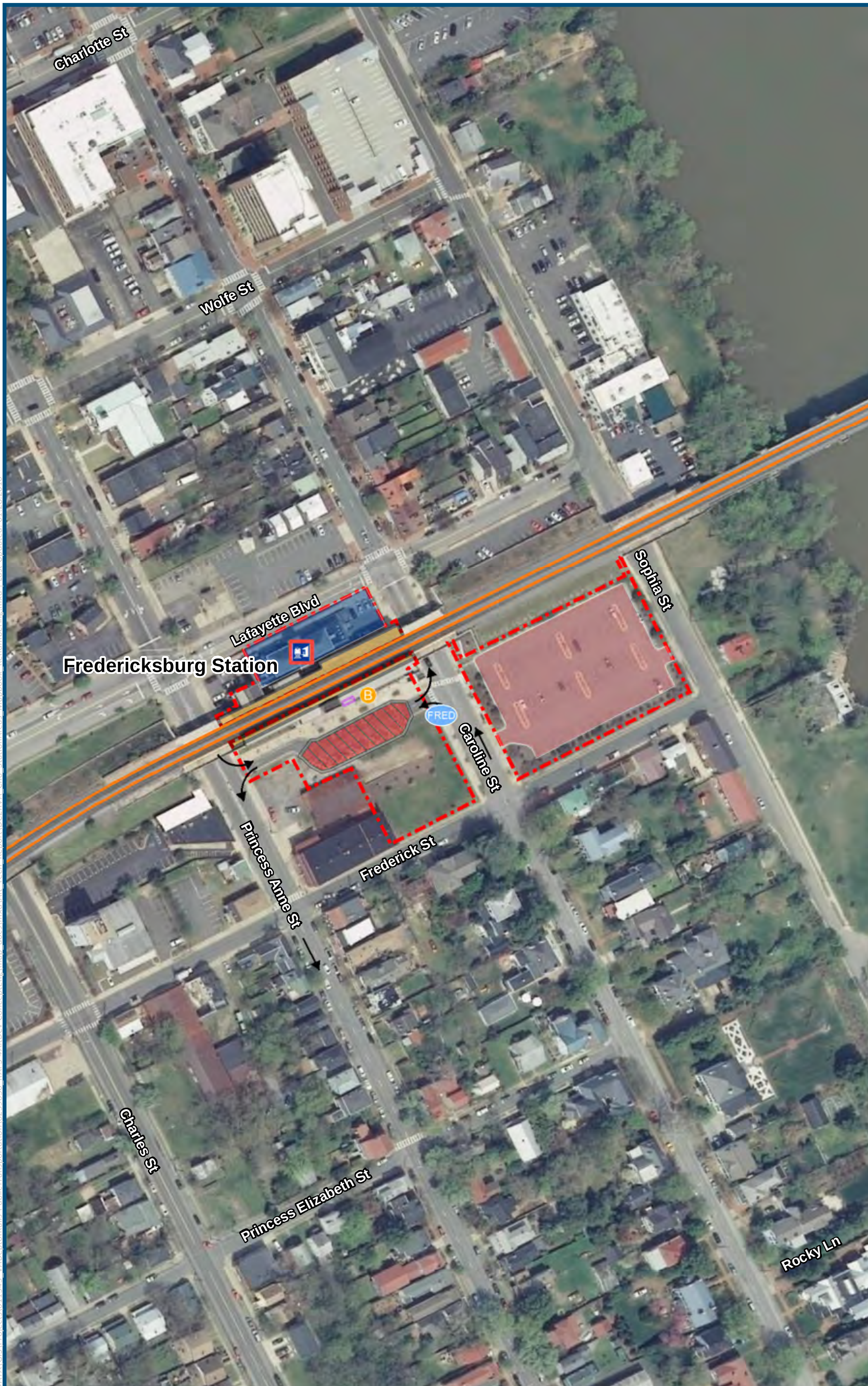
The Amtrak/VRE station in Fredericksburg is located at 200 Lafayette Boulevard in downtown Fredericksburg, VA, one block from the Rappahannock River waterfront. This historic station was built in 1910 and expanded in 1927 during a track elevation project. The Fredericksburg Station is served by all Northeast Regional (Virginia) trains, the Interstate Corridor (Carolinian), and the Long Distance Silver Meteor, and all VRE Fredericksburg Line commuter trains. The CSXT tracks cross the Rappahannock River on a historic concrete arch bridge and enter the station on a viaduct. The station is 54 miles from Washington Union Station and 60 miles from Richmond.

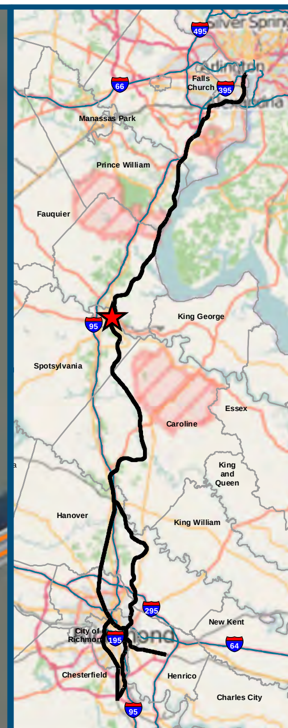
The station includes two tracks and two outside platforms with shelters on both sides. There is no station building. Shelters and benches are utilized as passenger waiting areas. The platforms and shelters run over Sophia, Caroline, Princess Anne, and Charles streets in the historic downtown, and continue south on a raised fill embankment. The station is served by a series of stairs and ramps used to reach the platforms from street level. The station is also used by VRE commuter trains. Amtrak does not provide ticketing or checked baggage services at this facility, which is served by six daily Amtrak trains. The platforms include newspaper racks, pay phones and VRE-only ticket vending machines. There are no bathrooms at this facility. The facility and the adjoining parking area are privately owned, while the platform and tracks are owned by CSXT.

Figures 8-12 and 8-13 show the entrance and headhouse of the Fredericksburg Station. Figure 8-14 is a map of the region.

FIGURES 8-12 AND 8-13: ENTRANCE AND HEADHOUSE OF FREDERICKSBURG STATION

The area surrounding the site is generally developed. The station is located in historic downtown Fredericksburg in the midst of the 40-block historic district as well as the center of a Civil War battlefield site. There are numerous battlefield monuments and memorials nearby the station, including the Fredericksburg National Battlefield Park. The picturesque Rappahannock River is one block away and the City Dock Park is less than a quarter mile walk from the station. Directly across the river from the station is Ferry Farm, a historic site that includes George Washington's childhood home. The former station building, one of the historic district's listed historic structures, is currently in use as a restaurant and provides no station services. The adjacent land uses include offices, retail, restaurants, residential (mainly single family) and surface parking. The University of Mary Washington is located about one mile from the station.





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Projection: Lambert Conformal Conic
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North American Datum of 1983

2013 VGIN VBMP Aerial Imagery

Legend

- Amtrak/VRE Station
- Existing Track
- Station Site
- Bike Parking
- Fredericksburg Transit
- Accessible Path
- Former Station Building (now a restaurant)
- ADA Parking
- Parking
- Platform with Shelter

Figure 8-14 Fredericksburg Area Map

The station is less than two miles from Route 1, one mile from Blue & Grey Parkway (the Route 3 bypass around Fredericksburg's downtown) and three miles from I-95. Most passengers access the station by private automobiles, although some residents access the VRE service by foot or other means. A large number of passengers drive from outlying areas to the station each weekday morning to take a train to work in Northern Virginia or Washington, D.C.

Parking is free in the marked VRE Lots. There are 684 parking spaces for VRE passengers and 124 reserved spaces in seven parking lots located near the station. Motorcycle parking is available in Lot D on Princess Anne Street that can accommodate 6 motorcycles. Additionally, there are several parking spaces designated for ADA accessibility located on the south side of the station; these ADA designated spaces can be accessed from both Princess Anne Street and Caroline Street. There is no designated Kiss & Ride location, although there is room for pick-up and drop-off on the south side of the station. Local cab service is often available at the station entrance.

Fredericksburg Transit (FRED) offers feeder bus service from Spotsylvania County and the City of Fredericksburg to the station. However, there is no signage indicating the location of the bus stops.

The station provides bike racks on the south side of the station, although there are no designated bike lanes present. The platforms and shelters run over Sophia, Caroline, Princess Anne, and Charles streets in the historic downtown, and an elaborate system of stairs and ramps is used for pedestrian access to the platforms from street level. The adjacent streets have sidewalks on both sides, although there are no pedestrian signals and some crosswalks are missing. The path to the station from Lafayette Boulevard traverses the restaurant property and is not barrier-free as it is lined by restaurant seating on both sides.

DRPT determined to carry the Fredericksburg Station forward into the Draft EIS for further consideration as it is an existing Amtrak station, with shared VRE parking facilities and transit connections, and a central location within the City of Fredericksburg.

8.3.5.7 Spotsylvania Station, Spotsylvania County, VA

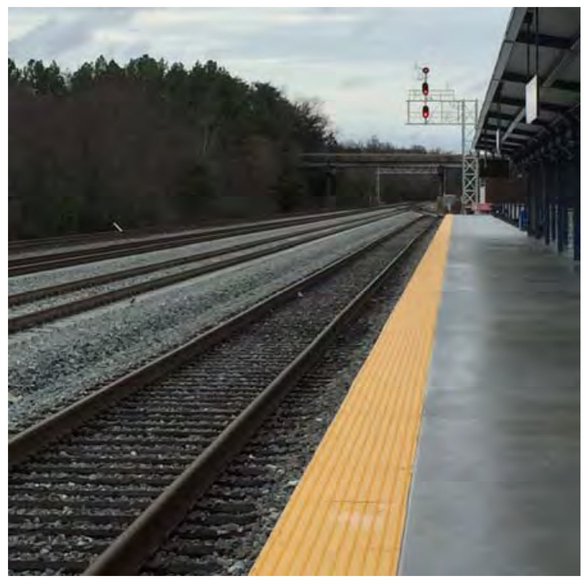
The new VRE Spotsylvania Station is located at 9442 Crossroads Parkway, Fredericksburg, Virginia, off of US Route 17 in Spotsylvania County, on the east side of the CSXT tracks. It is approximately 5 miles south of downtown Fredericksburg. The station opened on November 16, 2015. This Spotsylvania Station is served by the VRE Fredericksburg Line and is the first extension of VRE service since its opening in 1992. The station is just north of VRE's Crossroads maintenance and storage facility, also on the east side of the CSXT tracks. The Crossroads VRE facility is the southernmost extent of VRE train traffic on the CSXT tracks on the Fredericksburg line.

The station is located in a semi-rural area surrounded by woods, some adjacent industrial/commercial use and low-density, single-family homes with no nearby retail or passenger services. There is a small station shelter building with restrooms and an outdoor canopy. There are no manned vendor facilities. VRE tickets are available through multiple vending machines located on the premises. The station consists of one 700-foot low-level platform on the east side of the track. The single covered platform has benches and a designated waiting/boarding area for wheelchairs and persons with disabilities. All passengers must use a ramp or stairs to access the platform.

The Spotsylvania VRE Station is 67 miles from Washington, D.C.'s Union Station and 58 miles from Richmond, Virginia. The station has on large parking lot with 1,500 parking spots for use during train operating hours. There is only one entrance to the lot on the southeastern side. Parking is free, but overnight parking is not allowed. There are no transit connections, and while there is a bike rack, there are no bike lanes, paths or sidewalks leading to the station. There are motorcycle parking spots at the Spotsylvania Station located at the southwest corner of the lot near the bicycle racks. The parking lot access lanes provide adequate room for dropping off passengers; however there is no designated area for Kiss & Ride.

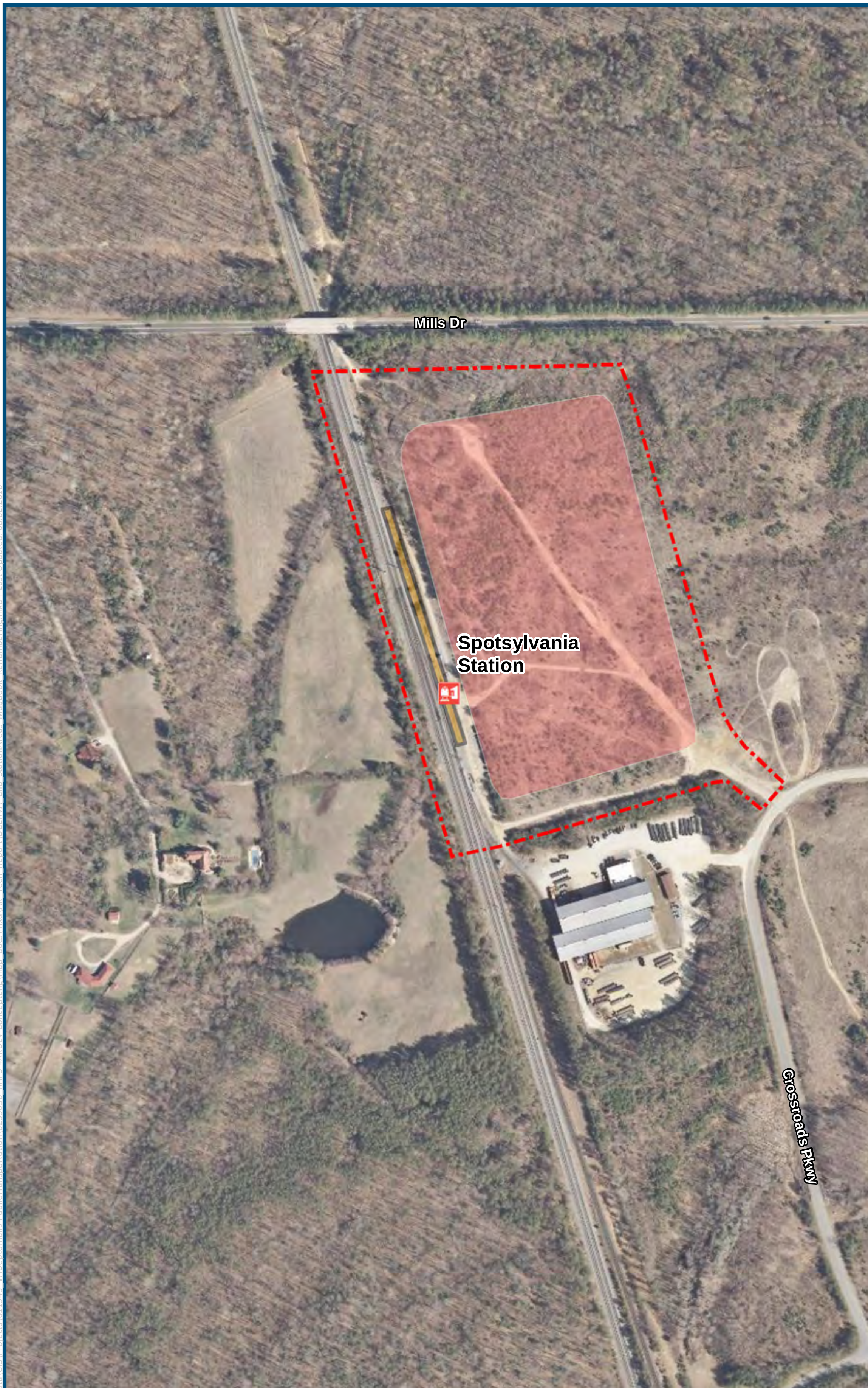
As part of the station development, VRE constructed approximately 2.5 miles of third track on the CSX right of way from the VRE Crossroads Yard to Hamilton. The project included a longer yard lead to accommodate the VRE Spotsylvania Station, plus new switches and signals at Crossroad Interlocking, and the rehabilitation of the Mine Road at- grade crossing.

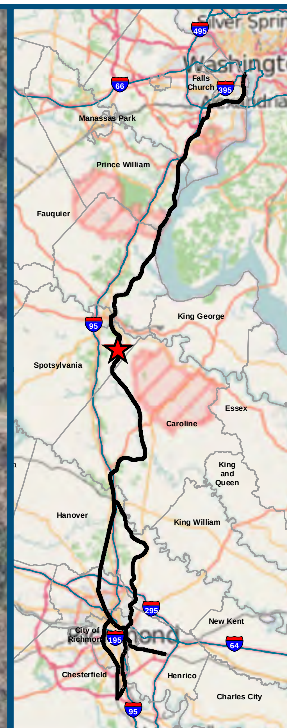
Figures 8-15 and 8-16 show the station entrance and platform. Figure 8-17 is a map of the region.



FIGURES 8-15 AND 8-16: SPOTSYLVANIA STATION ENTRANCE AND PLATFORM

DRPT considered the VRE Spotsylvania station as a potential intercity passenger station, but dismissed the station from further consideration due to rail operation inefficiencies stemming from the relative closeness to the existing Amtrak station in downtown Fredericksburg and the potential interference with VRE train movements in/out of the Crossroads facility. The station site is also not located in a central urban area and has limited multi-modal connections.





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Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
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2013 VGIN VBMP Aerial Imagery

Legend

- VRE Station
- Station Site
- Parking
- Platform with Shelter

Figure 8-17 Spotsylvania Station Area Map

8.3.5.8 Carmel Church, Caroline County, Virginia

A potential new train station at Carmel Church has been proposed in previous development studies and plans. The proposed station location is a greenfield site bound by Route 1 to the west and I-95 to the east. The CSX rail line runs through the center of this site on tangent track that could accommodate an 850 to 1200 foot platform. There is no existing development within a quarter mile of the site, and only limited residential single-family development within a half mile of the site.

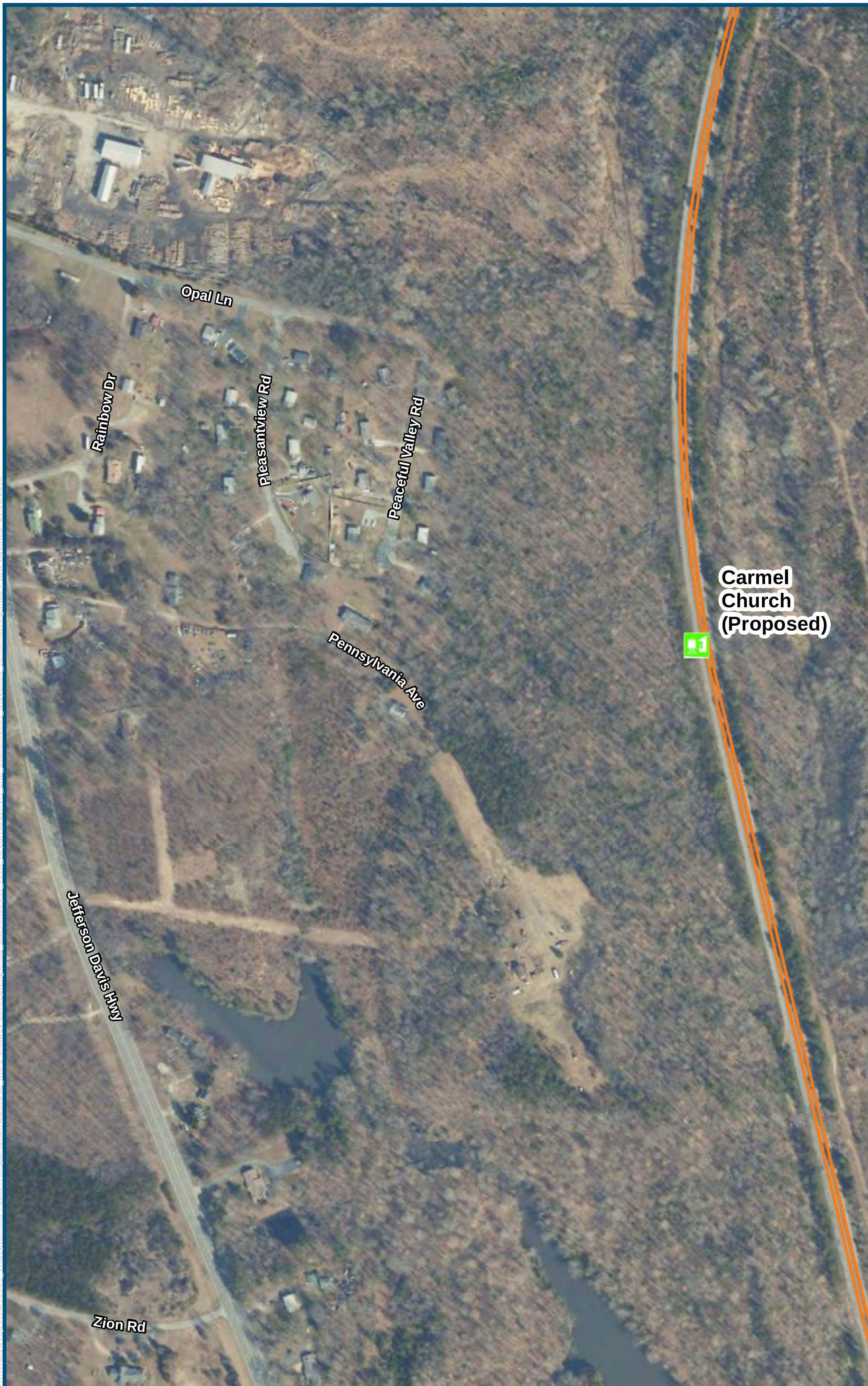
Caroline County, Virginia adopted the Carmel Church Community Plan into the county's Comprehensive Plan on January 23, 2007, having begun the community planning process in 2005. Within the Carmel Church Community Plan were action strategies and goals to "support and encourage a transit facility to be located within the Village Core of the Carmel Church Community." The proposed train/transit facility would be located 1.6 miles from U.S. 1 and 0.1 miles from I-95. The plan recommends the development of a Village Core, or town center, located between Route 1 and Interstate 95 in the Carmel Church community while preserving the surrounding rural landscape and quality of life. In the Village Core, the plan envisions higher density development (10-15 units per acre) with a diversity of uses anchored by a transit station and gradually decreasing densities further away from the center. As envisioned, the Village Core also includes public facilities, such as a library, recreational areas and a usable public space at its center. The plan includes residential and mixed-use development along Route 1, interspersed with two areas of industrial uses.

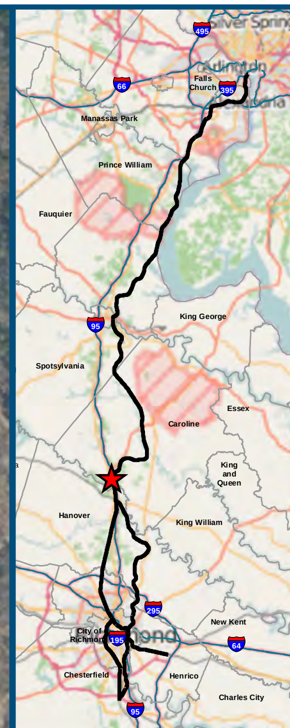
Caroline County continued study of the Carmel Church Community with a Transit Oriented Development Plan in October 2008 and an Alternatives Analysis to identify the most appropriate transportation strategy for improving mobility and regional access for residents in Caroline County and neighboring central Virginia, completed in October 2013. The recommended alternative within the Caroline County study includes commuter bus service from Carmel Church to Washington, D.C. and Richmond until the population and/or economic growth increases to levels that would justify a passenger rail station at Carmel Church, at which time the transit facility would transition from a park-and-ride with Commuter Bus stop(s) to a multi-modal transit hub with rail station. A map of the Carmel Church area is shown in Figure 8-18.

Development of the Carmel Church Community and Village has not begun, and the area remains largely rural with low density single family residential and some industrial uses. DRPT considered and dismissed the Carmel Church location for development of a train station as part of the DC2RVA project due to its lack of development and its relatively low population (and potential ridership) in the area. This does not preclude addition of a station at Carmel Church in the future if conditions change and the potential ridership warrants a new station.

8.3.5.9 Vaughn Road (Ashland Station Replacement)

DRPT evaluated three locations (Vaughn Road, Patrick Road, and Ashcake Road) in Ashland for potential development as a new Ashland station to replace the existing station location between Route 54 and College Avenue. Potential replacement station sites were identified during discussions with the Town of Ashland, Hanover County, and Randolph Macon College to reduce the potential impacts of station improvements to the central business district and





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Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

2013 VGIN VBMP Aerial Imagery

Legend

Proposed Station

Existing Track

Figure 8-18 Carmel Church Area Map

Randolph Macon College. The existing Ashland station (see Section 8.3.5.11 below) lacks designated parking and other station facilities, and requires improvements to its platforms to comply with ADA and meet the DC2RVA Basis of Design for intercity passenger service.

The Vaughn Road site is north of the current at-grade crossing of Vaughn Road and the CSXT tracks, approximately one mile north of the current downtown station location. The station site would be on the east side of the tracks, generally across from the Town's wastewater treatment facility on the west side of the tracks. There is a small park across the tracks along Vaughn Road. Farther west is low density single-family residential development. South of the site is residential, and farther south is Randolph-Macon College. The site is currently undeveloped, but is zoned as a Neighborhood Commercial area along Archie Cannon Drive (an extension of Vaughan Road to the east, connecting to Route 1). The Town's Land Use Plan shows future use in the area to be medium and low density residential and neighborhood commercial.

The site has direct access to Route 1 approximately 0.4 miles away via Archie Cannon Drive. Distance to I-95 is 2 miles (south on Route 1 to Route 54, then east), and estimated travel time to I-95 is 6 minutes. I-295 is 9 miles south of Route 54 and I-95, with an estimated travel time of 12 minutes. The site does not have direct access to local east-west primary roadways; the nearest primary east-west route is Route 54 which would have to be accessed west-bound either along Vaughn Road and then through residential neighborhoods (1.3 miles) or driving through the Randolph-Macon College campus on Center Street, or east-bound via Archie Cannon Drive to Route 1 and then south.

The site has sufficient space for likely station improvements, including a new station facility, platforms, and parking, without encroaching on Randolph-Macon College or the central business district of Ashland. However, the distance of the station site from the downtown (approximately one mile) precludes easy access for pedestrians to and from downtown and parts west, south, and east of downtown. Having the station located adjacent to the existing reduced speed zone through Ashland would result in extending the area of reduced train speed to accommodate station operations. DRPT considered and dismissed the Vaughan Road site from further consideration as a potential replacement for the Ashland station due to its limited connectivity to east-west primary roadways, possible conflicts with local land use, and distance from Ashland's central urban area.

8.3.5.10 Patrick Road (Ashland Station Replacement)

The Patrick Road site is 0.4 miles (approximately 2,000 feet) north of the current downtown Ashland Station, just north of Patrick Road's intersection with Center Street and between Linden Avenue and Patrick Street. The station site would be on the west side of the tracks, generally across from Randolph-Macon College baseball stadium. The site is currently used for single family residential with one parcel designated as Railside Park. The area between Linden Avenue and Patrick Road is owned by the College, and is slated for development as surface parking as part of the College's Master Plan for their campus. The area south and east of the site is Randoph-Macon College. North and west the land use is single-family residential.

This site is approximately 0.5 miles from Route 54, which is the local primary east-west route. Route 1 and I-95 are east on Route 54, 1 and 1.6 miles respectively from the Patrick Rd site. I-295 is 8.4 miles south of the station site, via I-95. Estimated travel time to I-295 is 12 minutes, to I-95 is 6 minutes, and to Route 1 is 4 minutes.

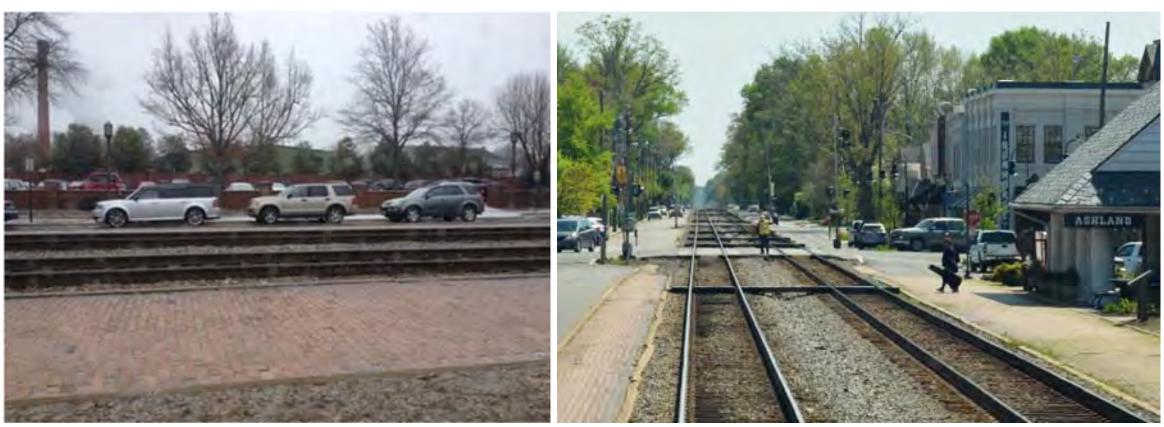
There is insufficient space in the existing CSXT right-of-way for station platforms meeting the DC2RVA basis of design; therefore a station in this location would require additional right-of-way, likely encroaching on Center Street and/or Randoph-Macon College property, and the Railside Park. A new station facility and parking at this site would likely occupy space currently designated for use by the College for expansion. DRPT therefore determined this site would not be carried forward for further consideration as a replacement station for Ashland.

8.3.5.11 Ashland Station

The Amtrak station in Ashland is located at 112 North Railroad Avenue (also known as Center Street), in Ashland's historic downtown, and adjacent to Randolph Macon College (north and east). The tracks run at grade, bisecting the downtown between the two central streets, which are lined with shade trees and a variety of colonial revival and Queen Anne homes, college and commercial buildings. The tracks' location makes Ashland a popular train-watching site for rail enthusiasts. The station is served by Amtrak's Northeast Regional (Virginia) service. The station is 93 miles from Union Station in Washington, D.C. and 19 miles from Richmond. Access to I-95 is located two miles from the station (east on Route 54). The station can be accessed from North Railroad Avenue which runs parallel to the tracks. The station platforms are between the adjacent grade crossings at College Avenue/Henry Clay Road and at Thompson Street/England Street. The area surrounding the station is fully developed with no vacant land around the station and no prominent natural features. The topography is generally flat.

The overall development in the town is low density and primarily single-family residential. Other neighboring uses include industrial, government buildings including the Ashland Municipal Building, and commercial uses such as retail and restaurants. Randolph-Macon College is the dominant land use north of the station, with facilities on both sides of the tracks. The former station building is owned and maintained by Town of Ashland and serves as the Visitor Center for the town. It provides no station services, and operating hours are independent of train service. While the former station building itself is not on the National Register of Historic Places, it is part of Ashland's 159-acre historic district, which received its listing in 1983.

Figures 8-19 and 8-20 show the Ashland Station and the right-of-way through the area. Figure 8-21 is a map of the region.



FIGURES 8-19 AND 8-20: ASHLAND STATION AND RIGHT OF WAY

The CSXT rail line passes through town with two tracks at-grade with vehicular crossings every block and multiple unmarked pedestrian grade crossings in between. There are two side platforms at Ashland, surfaced with brick pavers with an elevation of approximately top of tie. The west side platform is approximately 500 feet in length and varies in width between approximately 4 feet on the south end and 12 feet in the center and north end. The east side platform is approximately 500 feet in length and is approximately 6 feet in width. The existing marked grade crossing between the two platforms is approximately 3 feet in width. Amtrak recently placed a mobile lift on the west platform to assist with access for passengers unable to climb stairs. The east side platform is too narrow to deploy a station based mobile lift. Amtrak is aware of the platforms incompatibility with the requirements of the ADA, and is currently working with FRA, CSXT, and the Town of Ashland to develop plans for improving the existing platforms to comply with ADA.

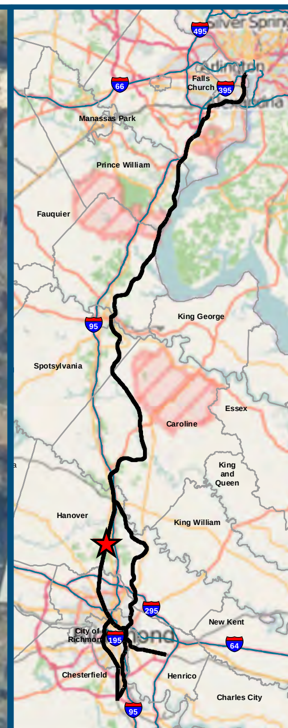
The Ashland station has no enclosed waiting area although an overhang at the old station building provides some shelter. The station does not provide ticketing or checked baggage services, and is not staffed. There are no public restrooms or retail amenities at the station. There are no designated parking facilities, although street parking is available. Both short-term (two hour limit) and long-term parking, including overnight parking, is available on the street and in nearby Town lots. There is no transit service. There are no bike facilities associated with the station although the visitors center has a bike rack. The streets adjacent to the station traverse the rail tracks at grade and there is no barrier or protection between the rail tracks and surrounding roads or sidewalks beyond a six inch curb to retain ballast. There are no cab services or car rental facilities. Major upgrades would be required to the station area in order to convert this location into one that conforms to the Project's Basis-of-Design and, in particular, meets ADA requirements.

The Town's Comprehensive Plan recognizes the need for improvements to the current station to meet future needs, including an overnight parking area and ticket vending machine. The Plan states the Town's intent to work with CSXT, Amtrak, and others to promote use of the current train station to meet future uses, while encouraging more transit-oriented development near the station.

DRPT determined to carry the Ashland station forward for further consideration in the Draft EIS, recognizing its current role serving Amtrak passengers, its central location to Ashland's downtown and Randolph-Macon College, the station's compatibility with Town plans, and it's convenient access to the local primary road network, including Route 54 providing east-west access and Route 1 and I-95 providing north-south access and regional connectivity.

8.3.5.12 Ashcake Road (Ashland Replacement Site), Hanover County

A potential site to replace the current Ashland Station is on the south of Ashcake Road, bounded by the CSXT right-of-way on the west and Maple Street (the alignment of the old Richmond to Ashland trolley line) on the east and Route 707 to the south. The station would likely extend outside of the Town of Ashland south into Hanover County, and is slightly over one mile south of the existing Amtrak station in downtown Ashland. Existing land use consists of industrial sites and a mix of woodlands/wetlands and open field. Adjacent land use is a mix of rural residential, industrial, agricultural, and some single-family residential. The Ashcake site has ready access to Ashcake Road and is approximately one mile from Route 54, both local



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2013 VGIN VBMP Aerial Imagery

Legend

- Amtrak Station
- Existing Track
- Station Site
- Building (used as Visitor Center not Station)
- Platform

Figure 8-21 Ashland Area Map

primary east-west routes. Route 1 and I-95 are east on Ashcake Road 1 and 3 miles, respectively. I-295 is 8 miles south from the intersection of Ashcake Road and I-95. Estimated travel time to I-95 is 7 minutes, and to I-295 is 12 minutes. The site would have similar population characteristics as the existing Ashland Station.

The site has sufficient space for likely station improvements, including a new station facility, platforms, and parking, without encroaching on Randolph-Macon College or the central business district of Ashland. However, the distance of the station site from the downtown (over one mile) precludes easy access for pedestrians to and from downtown and parts west, north, and east of downtown. Having the station located adjacent to the existing reduced speed zone through Ashland would likely result in extending the area of reduced train speed to accommodate train operations at the station. In addition, much of the undeveloped area adjacent to the tracks south of Ashcake Road is within the 100-year floodplain of Stony Run, which could limit site development. DRPT considered the Ashcake Road site as a potential replacement for the Ashland station and determined to evaluate the location further in the Draft EIS due to its connectivity to east-west primary roadways and the regional road network, in addition to the site's general compatibility with adjacent land use.

DRPT also evaluated locations north of Richmond on the DC2RVA corridor in the vicinity of I-95 and I-295 in Hanover and Henrico counties for potential development as a new Richmond suburban-type intercity passenger rail station. Potential station sites were identified based on the following siting criteria:

- On CSXT main line between Parham Road (about 2 miles south of I-295) and Route 657 (about 5 miles north of I-295 and one mile south of Ashland)
- A location where an arterial road crosses the ROW
- Sufficient length of tangent track to accommodate a 1,200 feet platform

The following four sites were identified and evaluated by DRPT (Figure 8-22):

- Ashcake Road (Route 657), Hanover County
- Cedar Lane (Route 623), Hanover County
- Greenwood Road, Henrico County
- Mountain Road, Henrico County

All of the sites would require land acquisition and development of a new station, ancillary facilities and parking, and upgrades to area roads (possibly including traffic signals and turning lanes) to accommodate anticipated station traffic. A new north Richmond suburban station would replace Staples Mill Road station, and could potentially replace Ashland station as well. DRPT determined that these potential station locations would not be carried forward for further consideration for new station development as part of the DC2RVA project.

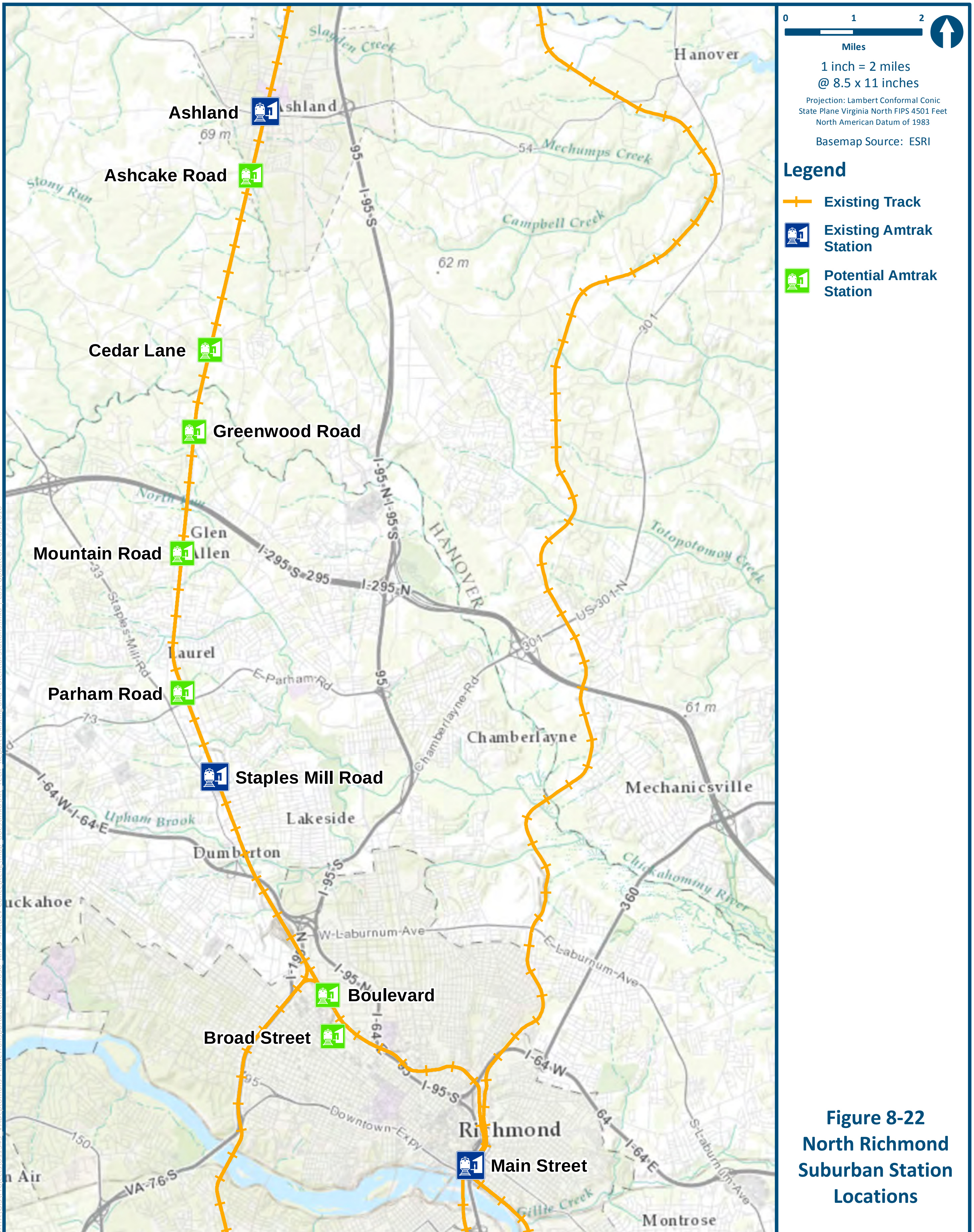


Figure 8-22
North Richmond Suburban Station Locations

8.3.5.13 Cedar Lane, Hanover County

DRPT identified a potential new station location on the south of Cedar Lane, bounded by the CSXT right-of-way to the west and the Chickahominy River to the south. The site is approximately 2 miles north of I-295 and 3 miles from an exit on I-95 and Route 1. Estimated travel time to both I-95 and I-295 is approximately 6 to 7 minutes. Existing land use consists of rural residential, agricultural, and woodland. Adjacent land use is rural residential, agricultural, and woodland. Route 623 is currently a two lane rural road, and would likely require a significant upgrade to handle anticipated station traffic. The site would have similar population characteristics as Ashland Station. DRPT considered this site for a potential new Richmond suburban station but dismissed it due to limited access to regional and local primary roads and potential land use conflicts.

8.3.5.14 Greenwood Road, Henrico County

DRPT identified a potential site where Greenwood Road crosses over the CSXT right-of-way. The site is approximately 1 mile north of I-295 and two miles from an I-295 exit. Estimated travel time to I-95 is 8 minutes and to I-295 is 4 minutes. The site is in a residential community and adjacent to a park and church. South of Greenwood Road, a 1,200 feet platform would conflict with Mill Road/Old Washington Highway. North of Greenwood Road, the potential station site would abut multiple single-family residential units. DRPT considered this site for a potential new Richmond suburban station but dismissed it due to limited access to regional and local primary roads and potential land use conflicts.

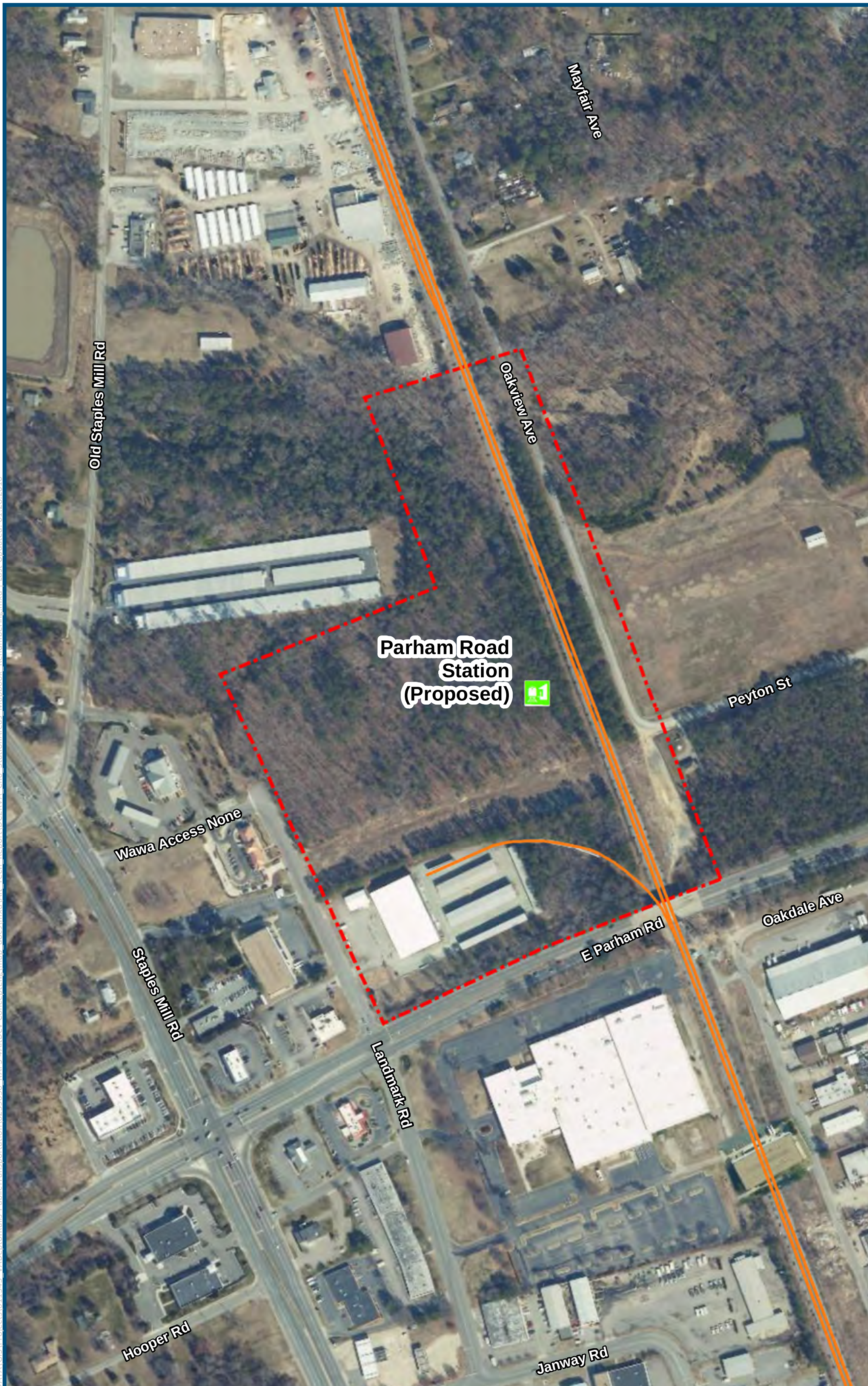
8.3.5.15 Mountain Road, Henrico County

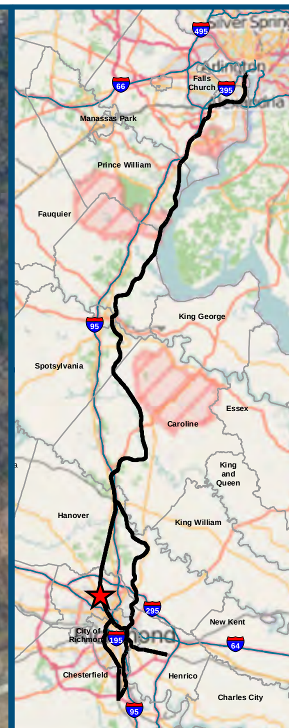
DRPT identified a potential site north of Mountain Road, bounded by CSXT right-of-way on the west. The site is in a primarily residential area but the site itself is occupied by an industrial use (Oilfield Pipe and Supply, Inc.). The site is approximately 1 mile south of I-295 and 1.3 miles from an I-295 exit. Estimated travel time to I-95 is 5 minutes and to I-295 is 3 minutes. Mountain Road would require capacity upgrades to handle anticipated station traffic. DRPT considered this site for a potential new Richmond suburban station but dismissed it due to limited access and potential land use conflicts.

8.3.5.16 Parham Road, Henrico County

Parham Road is a potential station location just east of the intersection of Parham Road and Staples Mill Road and near the intersection of Parham Road and Landmark Road, is north of the existing Staples Mill Road Station (Figure 8-23). The location on Parham Road was identified in prior Richmond area studies as a possible station site to replace the existing facilities at Staples Mill Road. The site is approximately 104 miles from Union Station in Washington, D.C. and 9.3 miles from the state capitol building in downtown Richmond.

Currently, no station infrastructure exists at the Parham Road site. The site is currently vacant wooded land adjoined by a vacant lumber yard fronting on Parham Road. All CSXT and Amtrak trains currently pass through the area without stopping.





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Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

2013 VGIN VBMP Aerial Imagery

Legend

- Proposed Station
- Existing Track
- Station Site

Figure 8-23
Parham Road Station Area Map

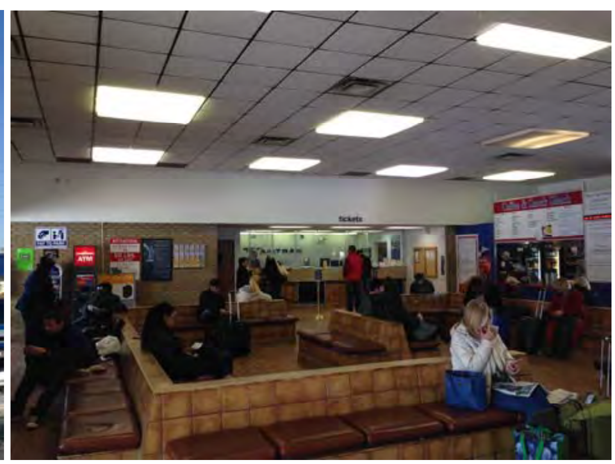
The Parham Road area is served by a fairly robust suburban network of roadways and transit operations. Major highways and primary local roads in the vicinity of the station include Interstate 95, U.S. Route 1, Route 33, and Parham Road. GRTC Transit System operates public buses in the vicinity of the proposed station site. The Richmond area is also served by a network of taxis, but the Parham Road area currently does not have a designated taxi stand. The Parham Road site is in a suburban area with strip-mall retail, single family residences, and light industrial buildings.

DRPT determined this potential station site would not be carried forward for further consideration due to the existing station infrastructure just south at Staples Mill Road station and Henrico County’s statement that a rail station at Parham Road was not in keeping with the County’s plans for the area.

3.5.17 Staples Mill Road Station, Henrico, Virginia

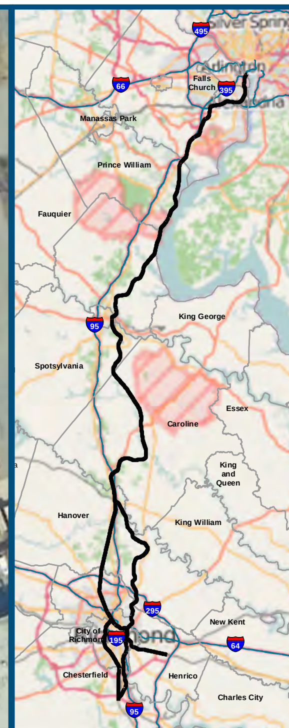
The Staples Mill Road Station is at 7519 Staples Mill Road in suburban Henrico County, VA. The station serves as the primary intercity rail station for the Richmond area and services Amtrak’s Long Distance (Silver Meteor, Silver Star, Palmetto), Interstate Corridor (Carolinian), and Northeast Regional (Virginia) trains. The one-story building is of brick and steel construction and was constructed in 1975. The station is open 24 hours and includes an enclosed waiting area, restrooms, a ticket office, ticketing machines, a coffee/snack shop, and an ATM. The station is located 104 miles from Union Station in Washington, D.C. and 8.4 miles from downtown Richmond, as measured from the state capital.

Figures 8-24 and 8-25 show the outside of the headhouse and passenger drop off/pick up area and headhouse interior. Figure 8-26 is a map of the region.



FIGURES 8-24 AND 8-25: EXTERIOR VIEW OF RICHMOND-STAPLES MILL ROAD STATION FROM THE STATION’S PARKING LOT AND INTERIOR OF THE STATION

The station is in a suburban setting, with the building set back from the street and parking in the front. The station, platforms, and parking lot are owned and managed by Amtrak whereas the tracks are owned by CSXT. The area surrounding the site is fully developed with few noticeable natural/environmental features. The area’s topography is generally flat. There is some vacant land across the street from the station that appears to be a wooded area which may include wetlands.



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Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

2013 VGIN VBMP Aerial Imagery

Legend

- Amtrak Station
- Existing Track
- Station Site
- GRTC Greater Richmond Transit Company
- Station Building
- Pick Up/Drop-Off
- ADA Parking
- Parking

Figure 8-26 Staples Mill Station Area Map

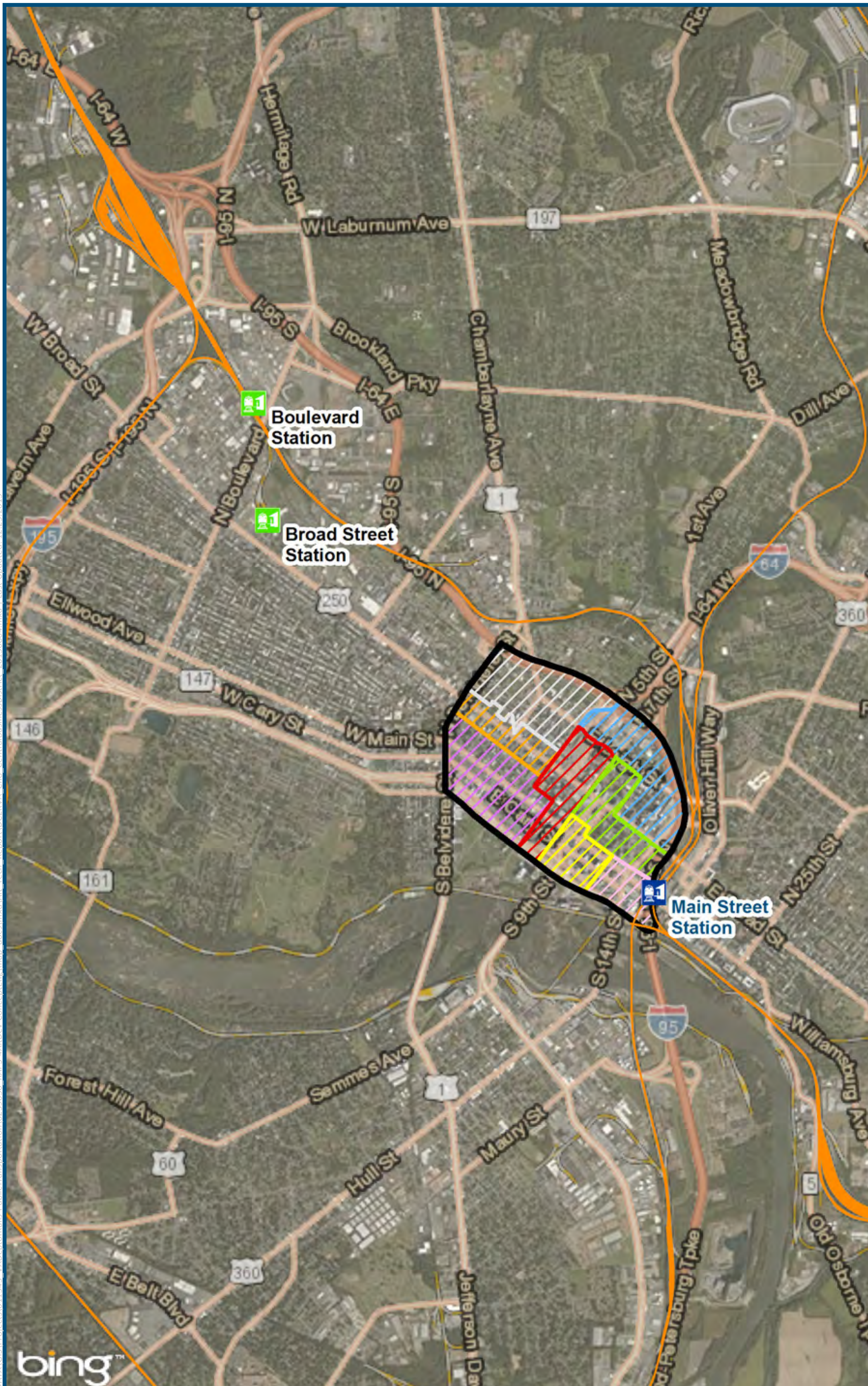
The neighboring land uses are primarily industrial and strip commercial including the Dumbarton Square Shopping Center, an auto service store, and fast food restaurants. The nearby strip commercial developments have several vacancies. Commercial developments are generally accompanied by large surface parking lots. Both single-family and multi-family housing are located west of Staples Mill Road.

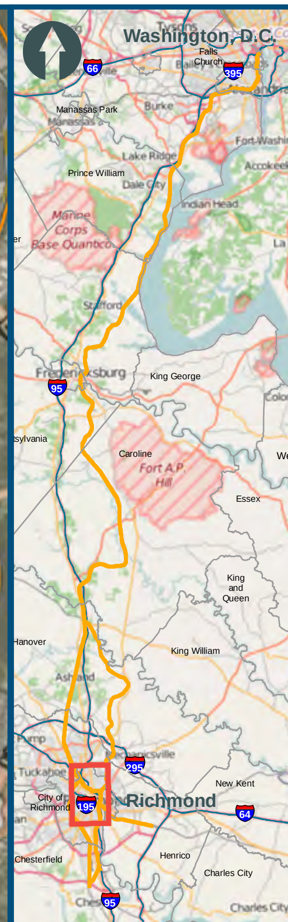
The Staples Mill Station is best accessed by automobile. It is located two miles from I-64 with an estimated travel time of 10 minutes, five miles from I-95 estimating 13 minutes travel time, and 2.6 miles from Route 1 also with approximately 13 minutes of estimated travel time. There is a 288-space surface parking lot at the station, and some parking spaces are designated for ADA accessibility. There is no dedicated space for Kiss & Ride. The canopy at the station entrance can serve as a pick-up and drop-off location provided there are not too many users at one time. The Virginia DRPT has acquired 4.95 acres for development as additional parking accommodations; the project is still in the planning stage, and a timeframe for availability of the increased parking is unknown. In the meantime, some patrons of the station are using the vacant lot for parking. The Staples Mill Road station does not have bicycle facilities. Nearby roads do not have designated bicycle lanes, and traffic volumes may impact bicyclist safety. Although there are sidewalks on both sides of Staples Mill Road, there are no crosswalks or pedestrian signals. The GRTC Shuttle Bus Route 18 Henrico shuttle (weekday daytime-only) is the only route that provides service to the station area. This route connects to various nearby residential and commercial uses as well as the Henrico County Government Center. Transfer to another bus is required to reach Richmond.

The existing Staples Mill Station facilities have operational constraints due to inadequate parking, a small and outdated waiting area, limited transit connections, and inefficient platform access. In order to accommodate a Category 1 station, the Staples Mill Road site would require enhancements to the station facilities. The station site would need a new larger headhouse with ticketing areas, checked baggage services, passenger waiting areas, and retail space. A larger parking facility, potentially a parking garage, would be required as well as space for kiss and ride, buses, taxis, and rental cars. Crew facilities, including locker rooms, break rooms, and security rooms should be accommodated. Additional station platforms with grade-separated access would be necessary to accommodate the main tracks serving the station to comply with the Project's Basis of Design.

FRA guidelines state intercity passenger rail stations should be located in or near a city's central business district. The Staples Mill Road Station does not meet this FRA guideline, particularly in comparison to other alternative Richmond station locations. However, the station has functioned as the primary long distance station for Richmond since the early 1970s, and its location just north of Acca Yard and the A-Line provides for relatively efficient movement of passenger trains north-south. The station has high ridership compared to other Virginia stations, reasonable access to the local highway network to include; I-95, I-295, and I-64, , and the ability to construct platforms suitable for the DC2RVA service. Therefore, the Staples Mill Road Station will be evaluated further in the Tier II EIS.

DRPT also evaluated one existing Amtrak station (Main Street Station) and two potential stations (Boulevard and Broad Street) as the potential Richmond central station and/or combined station. These station locations (Figure 8-27) serve a large part of the population in the metropolitan area. These stations are discussed further below.





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1 inch = 5,000 feet
@ 8.5 x 11 inches

Projection: Lambert Conformal Conic
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2015 Bing Aerial Imagery

Legend

- Proposed Stations
- Existing Stations
- Existing Rail Lines
- Central Business District
- Broad Street Corridor
- Capitol District
- Central Office
- City Center
- Jackson Ward
- MCV Campus/ Biotech Park
- Monroe Ward
- Shockoe Slip

Figure 8-27
Richmond's Central Business District

8.3.5.18 Boulevard Station

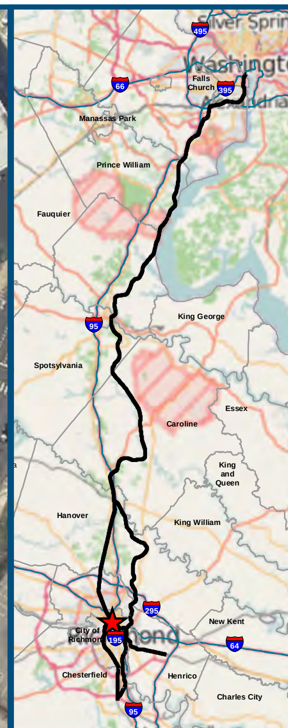
The Boulevard site option considers construction of a new station located on the north side of the CSXT S-Line, in the vicinity of North Boulevard (Figure 8-28). DRPT identified two Boulevard station locations, one immediately north and west of Boulevard, and one immediately south and east – both options would have platforms extending beneath the Boulevard Road overpass. This location is approximately 2 miles west of Richmond's urban center, and approximately 0.5 mile from the planned BRT route along Broad Street. The Boulevard location abuts a large (almost 60 acre) parcel of City-owned land with the potential for re-development, and is in close proximity to the junction of I-95, I-64, and I-195.

The Boulevard Station would include a new headhouse with ticketing areas, checked baggage services, passenger waiting areas, and retail space. Parking facilities would be required along with space for rental cars, and pedestrian connections to the existing intercity bus depot nearby and local bus services (including a potential connection to the proposed BRT system). Train service could operate at this location as through service on the four mainline tracks. If the primary passenger train route through Richmond remains the CSXT A-Line, then a passenger-only loop track would be required to access the station. If the CSXT S-Line becomes the primary passenger train route, a loop track would not be necessary. A passenger-only loop track would allow for level boarding platforms in compliance with ADA, but would add trip time for trains making the loop. If the CSXT S-line is the primarily route, at least two level boarding platforms would also be possible.

There is an existing Greyhound bus terminal on the north side of Boulevard West, adjacent to the potential train station site, which could provide multimodal transit connections. The Boulevard site is adjacent to an area of approximately 60 to 100 acres around the local baseball stadium (the Diamond) that is under consideration by the City of Richmond for re-development; the site is also adjacent to the neighborhood of Scott's Addition, one of the larger industrial and commercial districts in Richmond. A registered Historic District, Scott's Addition contains a mix of modest dwellings and large industrial plants, commercial buildings, and warehouses amongst the existing dwellings.

Train service could operate at this location as through service on the four mainline tracks with primary access to southern destinations via the CSXT S-Line. Alternatively a loop track could be incorporated into this station allowing trains utilizing the A-Line to access the station to/from the south. The Boulevard station location could also be accessible from the S-Line; however, the S-Line route would require considerably more rail improvements between the Boulevard Station location and Centralia, including a new rail bridge across the James River. Both options for the Boulevard station are carried forward for further consideration in the Draft EIS.

DRPT determined the Boulevard Station site to the north and west of Boulevard would be carried forward for further consideration as Richmond's intercity rail station due to its central location, proximity to local/regional primary roads, potential multimodal transit connections, and potential for transit oriented development. Vehicular access to the station would be from Boulevard West. There is access to I-95/I-64 approximately 2,600 feet northwest along Boulevard West, and the intersection of I-95 and I-195/I-64 is slightly less than one mile north along I-95. The Boulevard site to the north and east of Boulevard is not centrally located to the platform locations, and would not have ready pedestrian access to the intercity bus terminal on the other side of Boulevard; therefore, this location was not selected by DRPT for further consideration. Figure 8-28 shows the area surrounding the potential Boulevard Station.



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North American Datum of 1983

2013 VGIN VBMP Aerial Imagery

Legend

Proposed Station

Station Site

Figure 8-28 Boulevard Station (proposed) Area Map

DRPT recommends that the Boulevard Station location north and west of Boulevard be carried forward for further study due to its location and potential to serve as a single combined station for the Richmond area. However, the Boulevard Station location's close proximity to Staples Mill Road station precludes the Boulevard location from being considered as a central station operating in conjunction with a suburban station—the two station sites are less than 4 miles apart making for inefficient passenger service operation. Close proximity of stations does not provide adequate choice for regional riders, adversely affects efficiency of train operations, and reduces fuel efficiency. The Boulevard location is also less than 4 miles from Main Street Station and thus the stations are too close to operate in conjunction; therefore, developing both stations would not be reasonable.

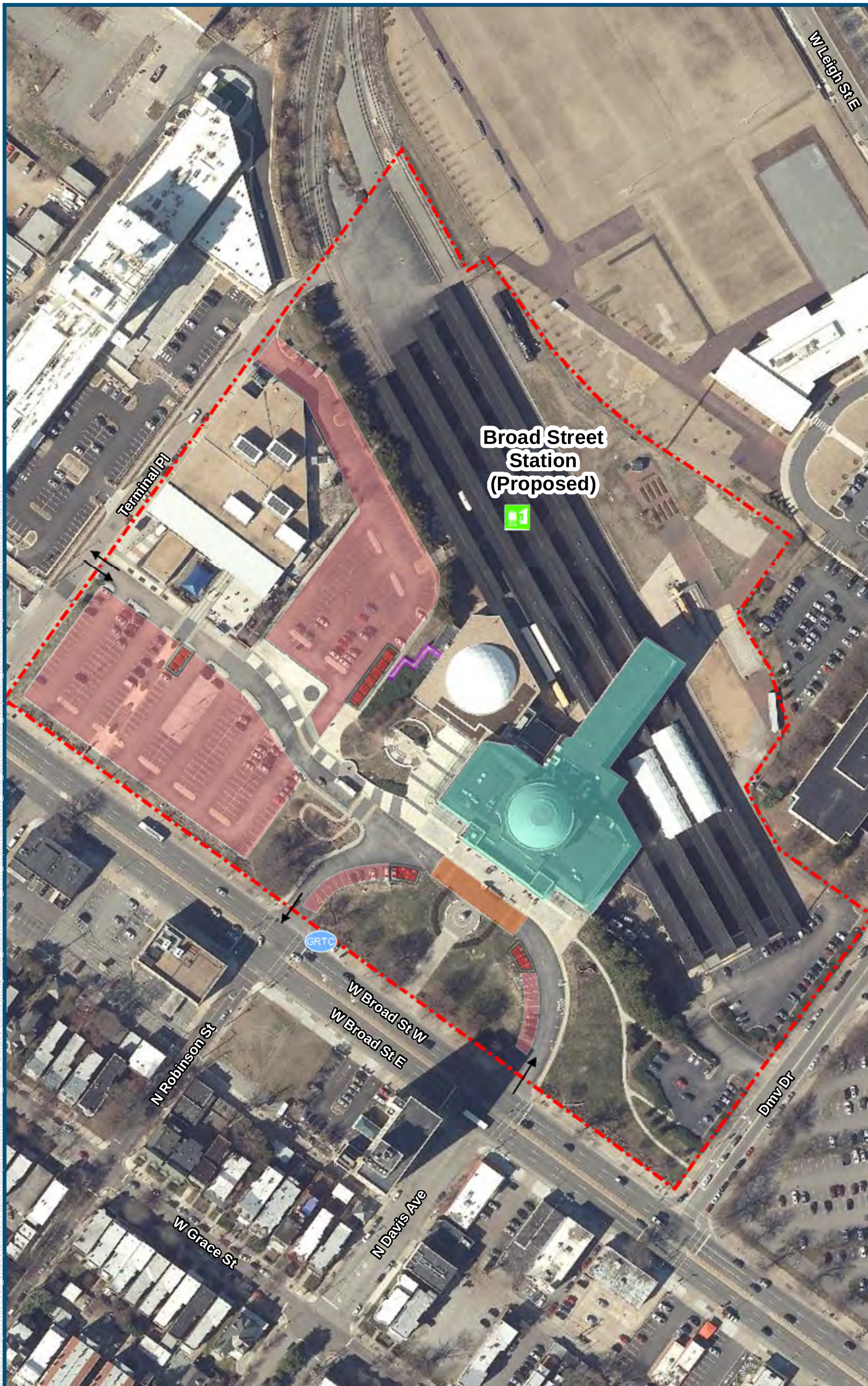
8.3.5.19 Broad Street Station, Richmond, Virginia

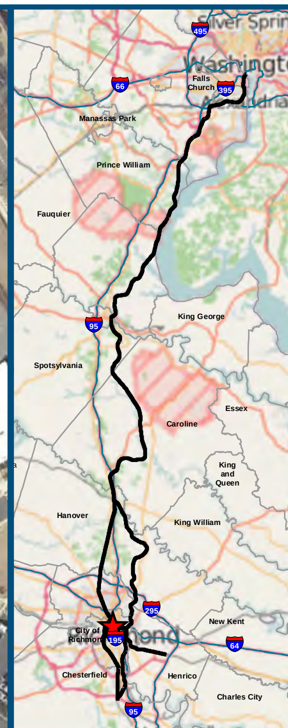
The Broad Street Station (also known as Richmond Union Station) located at 2500 West Broad Street was built as the southern terminus for the RF&P in 1917. The station also served the Atlantic Coast Line Railroad. The impressive neoclassical revival building is set back from the street with manicured lawns in the foreground. During the station's operation, trains accessed the station by means of a loop track south of the RF&P and its junction with the Bellwood Subdivision of the Seaboard Air Line Railroad. Passenger service to the station ceased in 1975, with all passenger service relocated to the Staples Mill Road Station. The station became the home of the Science Museum of Virginia in 1976, which remains in the substantially remodeled and expanded building. Although it is not in service as a train station, the historic platforms and several tracks used for exhibits of historic rolling stock remain in place. These tracks connect to the RF&P main track, but they are rarely used and in such a state of disrepair that improvements would need to be made in order for any equipment to run on them. The Museum has a large parking area that can accommodate over 300 vehicles with dedicated accessible parking in addition to bicycle parking.

The historic former train station building on Broad Street is not under consideration for future passenger rail service. However, the area in the vicinity of the station could potentially host a DC2RVA station site. The site is approximately 107 miles from Union Station in Washington, D.C. and 2.7 miles from the state capitol building in downtown Richmond.

Figures 8-29 and 8-30 show the historic Broad Street Station and West Leigh Street, an area that could potentially host a new station. Figure 8-31 is a map of the Broad Street Station area.

FIGURES 8-29 AND 8-30: HISTORIC BROAD STREET STATION AND W. LEIGH STREET AREA





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North American Datum of 1983

2013 VGIN VBMP Aerial Imagery

Legend

- Proposed Station
- Station Site
- GRTC Greater Richmond Transit Company
- Accessible Path
- Science Museum
- Pick Up/Drop-Off
- ADA Parking
- Parking

Figure 8-31 Broad Street Station (proposed) Area Map

The Broad Street Station area is located in an urban location about three miles from the Virginia Capitol. There is no vacant land and there are no prominent natural/environmental features. The topography is generally flat. The neighboring land uses are primarily strip commercial with several former industrial buildings that have been converted to residential and other uses. Other adjacent/nearby facilities include the Children's Museum of Virginia, Commonwealth of Virginia Department of Motor Vehicles headquarters, and the Washington Redskins Training Center and practice fields.

The Broad Street Station area is accessible from West Broad Street. The station can be accessed from I-195 via West Broad Street, and from I-64/I-95 via North Boulevard. All three interstates are a driving distance of under two miles. The Science Museum shares a 325-space surface parking lot with the Children's Museum. The Museum also has dedicated accessible parking in addition to bicycle parking. There is space for tour buses to unload passengers near the Science Museum entrance, which could also function as a train station pick-up and drop-off location.

GRTC bus routes 1, 2, 3, 4, 6, 19, and 24 provide transit access to the Science Museum. The bus stop located at West Broad Street and North Robinson Street (adjacent to the front driveway exit) has a shelter and seating. In addition, a BRT system along West Broad Street currently in the planning stages would serve the Science Museum and potential station.

DRPT determined that a potential new rail station adjacent to the old train station/Science Museum on Broad Street would be carried forward for further consideration. The station at this location would need sufficient space for ticketing areas, checked baggage services, passenger waiting areas, and retail space. A large parking facility would be required and space for kiss and ride, buses, taxis, and rental cars. Traffic and parking related issues along with train crew facilities, including locker rooms, break rooms, and security rooms would be incorporated into the design and evaluated in the Tier II Draft EIS. The tracks serving the station would require connections to the mainline, enabling trains to reverse direction or continue in their original direction. A loop track, similar to but larger than the historic loop track that once served the station, would be required for the station to function. Land acquisition would be required for the new station and facilities, including the loop track. The loop track would totally enclose the area currently used for the Washington Redskins Football Team summer training camp, and likely require demolition of several existing buildings, including restored historic buildings now used as residential. The requirements for a modern rail station are not compatible with the existing and projected future use of the historic Union Station building as a science museum.

DRPT does not recommend the Broad Street location for consideration as either a central Richmond station or as a combined station due to the likely effects on the existing Science Museum, the substantial property acquisition anticipated to add a loop track, and the additional trip time added for passenger trains making the loop. However, the City of Richmond has requested that the potential for a station at Broad Street be evaluated further in the Tier II DEIS. Therefore, DRPT is including the Broad Street Station within the Draft EIS for further consideration.

8.3.5.20 Main Street Station

Main Street Station is a multi-use facility owned by the City of Richmond at 1500 East Main Street in Richmond's Shockoe Valley and Tobacco Row Historic District (Figure 8-32). "Shockoe Bottom," as the area is known, was named for the valley of Shockoe Creek between Church Hill and Shockoe Hill, and is part of Richmond's original settlement. There are numerous historic and cultural resources in the vicinity, including Lumpkins Slave Jail.

FIGURE 8-32: AREAL MAP OF MAIN STREET STATION

The brick French Renaissance station building was first opened as a rail station in 1901. It is surrounded by elevated road and rail structures, including an elevated section of I-95 and the famed "triple crossing" rail bridges. The station building and adjacent train shed are on the National Register of Historic Places and designated as a National Historic Landmark. The station was originally built to jointly serve the Chesapeake & Ohio and Seaboard Air Line railroads. Passenger rail service to Main Street Station was suspended from 1975 until 2003. In the intervening years the station experienced flooding, a devastating fire, followed by renovation for use as a shopping mall, which operated from 1985 to 1987.

The City of Richmond, with funding assistance from federal and state sources, made necessary renovations to restore service to the station in 2003. Additional improvements are currently underway to accommodate retail and event space in the 123-by-517 foot train shed, and investments in the station and train shed top $86 million since 1992.

Today the facility houses government offices, event space, and a passenger rail waiting area. It is surrounded by offices and retail uses including restaurants and the 17th Street Farmers' Market. Capital Square, VCU Medical Center, and downtown office high-rises are all located within a mile of the station located nearby on the west side of the I-95 corridor.

The James River is approximately a third of a mile south of the station building, and the topography of the area generally rises from the river and north of the station. The station area is designated as part of the 100-year floodplain, although it separated from the James River by a floodwall that limits flooding by re-directing Shockoe Creek and area stormwater through an underground conduit beneath Main Street Station.

Due to the topography of the station location, trains access the station and shed along almost 3 miles of viaducts (raised trestles), with raised tracks/trestles on both the east and west side of the station. Platforms and tracks are owned by CSXT. The east side track connects to CSXT's Peninsula Subdivision, which continues eastward through Fulton Yard to Newport News and connects to the S-Line north of the station at AM Junction. The east side passenger platform was recently rebuilt on its original trestles to a length of 850 feet, also the length of the train shed. CSXT operates the track on the west side of the station building for freight service. The west track carries freight trains southward from AM Junction and continues across the James River along the S-Line.

The station is served by Amtrak's Northeast Regional (Virginia) service, which provides service between Boston and Newport News. The station is served by four daily passenger trains (two in each direction). The station hours are 9:00 a.m. to 7:00 p.m., daily. The station building has an indoor waiting area with seating, ticket vending machines, restrooms, water fountains, newspaper stands and information relevant for tourists/visitors. The station is ADA-accessible and provides an accessible platform, elevator, and wheelchair lift. Considered by Amtrak to be a Category 3 Caretaker Station, Amtrak does not provide ticketing or baggage services.

The nearest access to I-95 is 0.6 mile from the station. I-95 connects to most locations north and south and also intersects with I-64 which connects to Charlottesville in the northwest and Williamsburg in southeast. There are 30 long-term parking spaces with parking meters, although the first 30 minutes are free. The station also includes dedicated ADA-accessible parking. There are no car rental facilities or designated cab stands near the station. There is no dedicated space for Kiss & Ride.

The station can be accessed by the following transit connections:

- GRTC Transit System (GRTC) Routes: 43, 44, 45, 52, 53, 62, 63, 73. The bus stops at the station have neither shelters nor seating.
- Shuttle Bus (RamRide): Sanger Express, connecting VCU commuter parking with campus buildings.
- Intercity Bus (Megabus): Service to New York, Baltimore, Philadelphia, Washington, D.C., and other cities on the east coast.

There are no designated bicycle lanes in the area, and no dedicated bike parking is available at the station. There are sidewalks on both sides of East Main Street, and the surrounding area generally has adequate pedestrian facilities typical of an urban downtown connecting the station to nearby retail and offices, including Virginia state government offices.

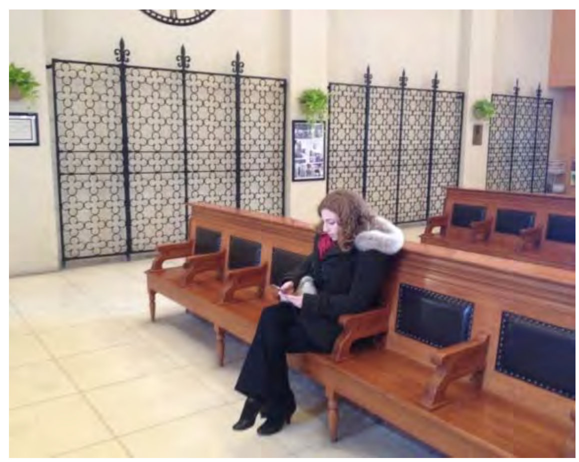
Projects that are currently underway for Main Street Station include the following:

- The City of Richmond is currently renovating the historic Train Shed with the goal of re-developing the structure into an indoor market, tourism center, and event space, while continuing to accommodate multi-modal transportation, including intercity passenger rail service. The renovations include constructing side platforms alongside the shed on both east and west sides (platforms will be the length of the shed, ~517 feet) with the potential to have up to two through tracks on each side of the station (the S-Line on the west and Peninsula Subdivision on the east,

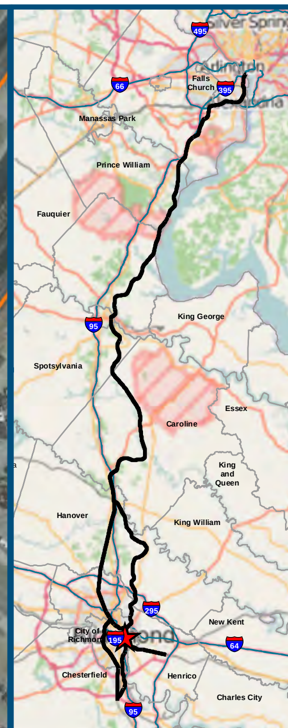
- The renovation of the shed is the third phase of a $72.3 million multi-year project to rehabilitate Main Street Station.
- The shed will have glass walls and will be lighted at night, giving it high visibility from I-95.
- The shed renovation also involves reopening Franklin Street to allow pedestrian and bicycle traffic to pass under the shed.
- In addition to train service, city officials want to make Main Street Station a multi-modal hub for buses and bicycle traffic.

GRTC Pulse, the bus rapid transit system expected to be operational by October 2017, will feature a stop directly in front of Main Street Station, which will also be linked to the Virginia Capital Trail (a bicycle/footpath linking Richmond and Williamsburg).

Figures 8-33 and 8-34 show the outside of the headhouse and passenger waiting area. Figure 8-35 is a map of the region.



FIGURES 8-33 AND 8-34: MAIN STREET STATION HEADHOUSE AND WAITING AREA



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Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
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2013 VGIN VBMP Aerial Imagery

Legend

- Amtrak Station
- Existing Track
- Station Site
- Greater Richmond Transit Company
- Megabus Intercity Bus
- Accessible Path
- Station Building
- ADA Parking
- Parking
- Platform with Shelter

Figure 8-35 Richmond Main Street Area Map

8.3.5.21 Southern Richmond Suburban Stations

DRPT evaluated locations south of downtown Richmond on the DC2RVA corridor for potential development as a new Richmond suburban intercity passenger rail station (Figure 8-36). Potential station sites were identified based on the following siting criteria:

- On either the CSXT A-Line or S-Line between James River and Centralia
- A location where an arterial road crosses the right-of-way
- Sufficient length of tangent track to accommodate 1,200 feet platforms

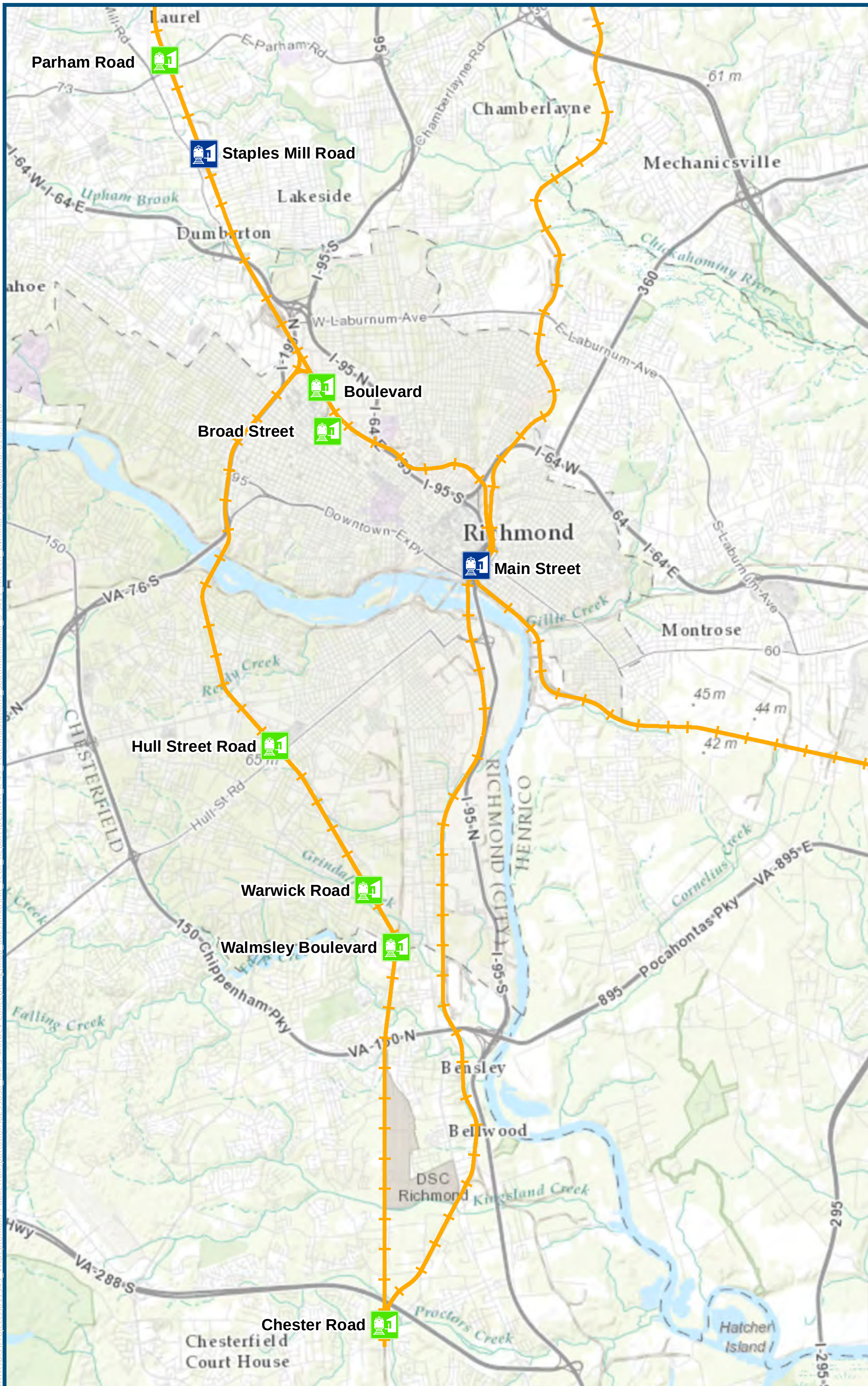
The following four sites on the CSXT A-Line were identified (Figure 8-36):

- Hull Street Road (Route 360)
- Warwick/Bells Road
- Walmsley Boulevard
- Chester Road (Route 288)

All of the sites would require land acquisition and development of a new station, ancillary facilities and parking, and upgrades to area roads (possibly including traffic signals and turning lanes) to accommodate anticipated station traffic. Northeast Regional (Virginia) passenger trains serving Newport News (which use the Peninsula Subdivision tracks to reach the Richmond area, passing Main Street Station on the east) would not be able to serve any of these locations. The travel times between Washington, D.C. and stations south of downtown Richmond would be greater than those to the north due to the increased distance. Additionally, the southern part of the Richmond region has a lower population density compared to the northern suburbs. While these locations have good connections to arterial roadways, the primary roadway network is not as densely developed as it is to the north, and the potential station sites are removed from the major population centers south of downtown Richmond. Because of these factors, DRPT dismissed these sites from further consideration.

8.3.5.22 Hull Street Road (Route 360), South Richmond

A potential station site was identified east of the CSXT A-Line tracks and north of Hull Street Road in southside Richmond. The site is between the CSXT right-of-way and the rear of a strip shopping center; access from Hull Street Road is through the shopping center’s parking lot. The existing land uses on the site are auto and truck repair, storage, and towing. Other than the shopping center to the east, the surrounding area is primarily suburban residential with neighborhoods to the north and west. The site is approximately 3.5 miles south of downtown Richmond, 3 miles from I-95 and 2.5 miles to Chippenham Parkway (Route 150), a rural freeway south of the site that connects I-95 to Powhite Parkway. Estimated travel times are 12 minutes to I-95 at Maury Street and 6 minutes to the Chippenham Parkway interchange at Hull Street Road. DRPT considered this site as a potential new Richmond suburban station but dismissed it because of the lower population density in the southern part of the Richmond region, potential land use conflicts, limited access to primary roads, and train operational concerns.



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Projection: Lambert Conformal Conic
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Basemap: ESRI World Topographic Map

Legend

- Existing Track
- Existing Amtrak Station
- Potential Amtrak Station

Figure 8-36
South Richmond Suburban Station Locations

8.3.5.23 Warwick/Bells Road, South Richmond

A potential station site on the CSXT A-Line tracks was identified at Warwick Road in southside Richmond. The existing land uses include warehouses, open storage of construction equipment and materials, and vacant wooded areas. The site is approximately 5 miles south of downtown Richmond, 2.5 miles from I-95, and 3.0 miles to Chippenham Parkway (Route 150). Estimated travel times to major highways are approximately 6 minutes to I-95 and 8 minutes to Chippenham Parkway. DRPT considered the site as a potential new Richmond suburban station but dismissed it because of the lower population density in the southern part of the Richmond region, limited access to primary roads and train operational concerns.

8.3.5.24 Walmsley Boulevard, South Richmond

A potential station site to serve the southern Richmond area was identified on the CSXT A-Line tracks at Walmsley Boulevard. The existing land uses include warehouses and manufacturing facilities, with low density residential areas are less than ¼ mile away. The site is approximately 6 miles to downtown Richmond, 1.5 miles to Chippenham Parkway and 2.5 miles to I-95 (via Chippenham Parkway). The estimated travel times are 4 minutes to Chippenham Parkway and 5 minutes to I-95. Because of the lower population density in the southern part of the Richmond region and concerns about train operations, DRPT eliminated this site from consideration.

8.3.5.25 Chester Road (Route 288), Chester, Virginia

A potential station site to serve the southern Richmond area was identified on the CSXT A-Line tracks at Chester Road, south of Route 288 in Chesterfield County. The existing land uses on the site consist of low density commercial, including restaurants, gas stations, and a variety of businesses in a strip mall. The surrounding area is characterized by similar low density development, with commercial along Chester Road near the Route 288 interchange and suburban residential less than ¼ mile from the site. This location is 10.5 miles from downtown Richmond; 0.5 miles from Route 288, a rural freeway that creates a partial beltway south and west of Richmond between I-95 and I-64; and 3 miles from I-95 via Route 288. Estimated travel times to the major roads are approximately 2 minutes to Route 288 and 4 minutes to I-95. DRPT dismissed this site as a potential Richmond suburban station due to the low population density in the surrounding area, distance from regional population centers, and train operational concerns.

9 ALTERNATIVES RECOMMENDED FOR FURTHER STUDY

9.1 INTRODUCTION

This chapter presents a summary of the build alternatives being carried forward for further evaluation in the Tier II Draft Environmental Impact Statement (EIS) for the Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA) project. The alternatives carried forward are those that potentially meet the Project's Purpose and Need, are buildable, and are anticipated to have acceptable levels of impact to the human and natural environments based on the screening process and initial evaluations described in Chapter 5 and the screening results provided in Chapter 6, 7, and 8. These alternatives will be evaluated in greater detail in the Tier II Draft EIS.

The build options were developed based on rail alignments that added an additional main track to segments of the corridor within three general areas: Northern Virginia, Central Virginia, and Richmond. As defined in Chapter 2, the Northern Virginia area extends from the northern terminus of the DC2RVA corridor at Control Point (RO) in Arlington County (MP CFP-110) to Crossroads (XR) in Spotsylvania County (Figure 2-3), the southern terminus of the part of the corridor shared with Virginia Railway Express (VRE). The Northern Virginia portion of the corridor is used by Amtrak, VRE, CSX Transportation (CSXT), and Norfolk Southern north of MP 102.8 after merging with CSXT. The Central Virginia area extends from Crossroads south to Greendale (GR) in Henrico County, just north of Staples Mill Road Station and north of Richmond, VA (Figure 2-4). This part of the corridor is used by CSXT and Amtrak. The Richmond area extends from Greendale through Staples Mill Road Station and CSXT's Acca Yard to the wye junction where two rail routes run north-south through Richmond: the A-Line, from the west Acca Yard wye (WAY) over the James River to Centralia, in Chesterfield County, and the S-Line, from the south Acca Yard wye (SAY) through AM Junction and then past Main Street Station and over the James River to Centralia (Figure 2-5). The area also includes a portion of the CSXT Peninsula Subdivision and the Buckingham Branch Railroad from Doswell to Richmond. The Richmond area is used by CSXT and Amtrak and is a critical junction in CSXT's rail system in Virginia.

The alignment build options for each segment were then evaluated and screened applying the Stage I, II, and III criteria defined in Chapter 5, and detail evaluations presented in Chapters 6, 7, and 8.

The build options carried forward from screening for each segment were then re-combined and categorized into six areas along the corridor for future/further consideration in the Tier II Draft EIS based on the conditions and rail options unique to each area. Each of the six areas has its own set of alternatives; combining one alternative from each area forms a corridor alternative. These areas and their alternatives are listed below. Figure 9-1 presents a map showing the corridor divided into the six areas.

Area 1: Arlington (approach to Long Bridge)—3 Alternatives

Add 2 tracks on the east

Add 2 tracks on the west

Add 1-track east & 1-track west

Area 2: Northern Virginia (Arlington to Dahlgren Spur)—1 Alternative

Improved Speed Option combined with No Additional Track Option

Area 3: Fredericksburg (Dahlgren Spur to Crossroads)—3 Alternatives

No Additional Track

Add 1-track East of Existing tracks to sub-segments with only 2 tracks currently

Add 2-track Bypass East, with no additional track in Fredericksburg

Area 4: Central Virginia Area (Crossroads to Doswell)—1 Alternative

Improved Speed Option (add 1 track)

Area 5: Ashland Area (Doswell to ~ I-295)—4 Alternatives Plus Station Options

Improved Speed Option north & south, with No Additional Track in Ashland

Improved Speed Option north & south, add 1 track East of Existing in Ashland

Improved Speed Option north & south, add 1 track and center 3 tracks in Ashland

Improved Speed Option, add 2-track West Bypass around Ashland

Area 6: Richmond Area (I-295 to Centralia)—7 Alternatives

Staples Mill Road Station only

Boulevard Road Station only (A-line)

Boulevard Road Station only (S-line)

Broad Street Station only

Main Street Station only

Split Service - Staples Mill Road/Main Street Stations

Full Service - Staples Mill Road/Main Street Stations

Shared Service - Staples Mill Road/Main Street Stations

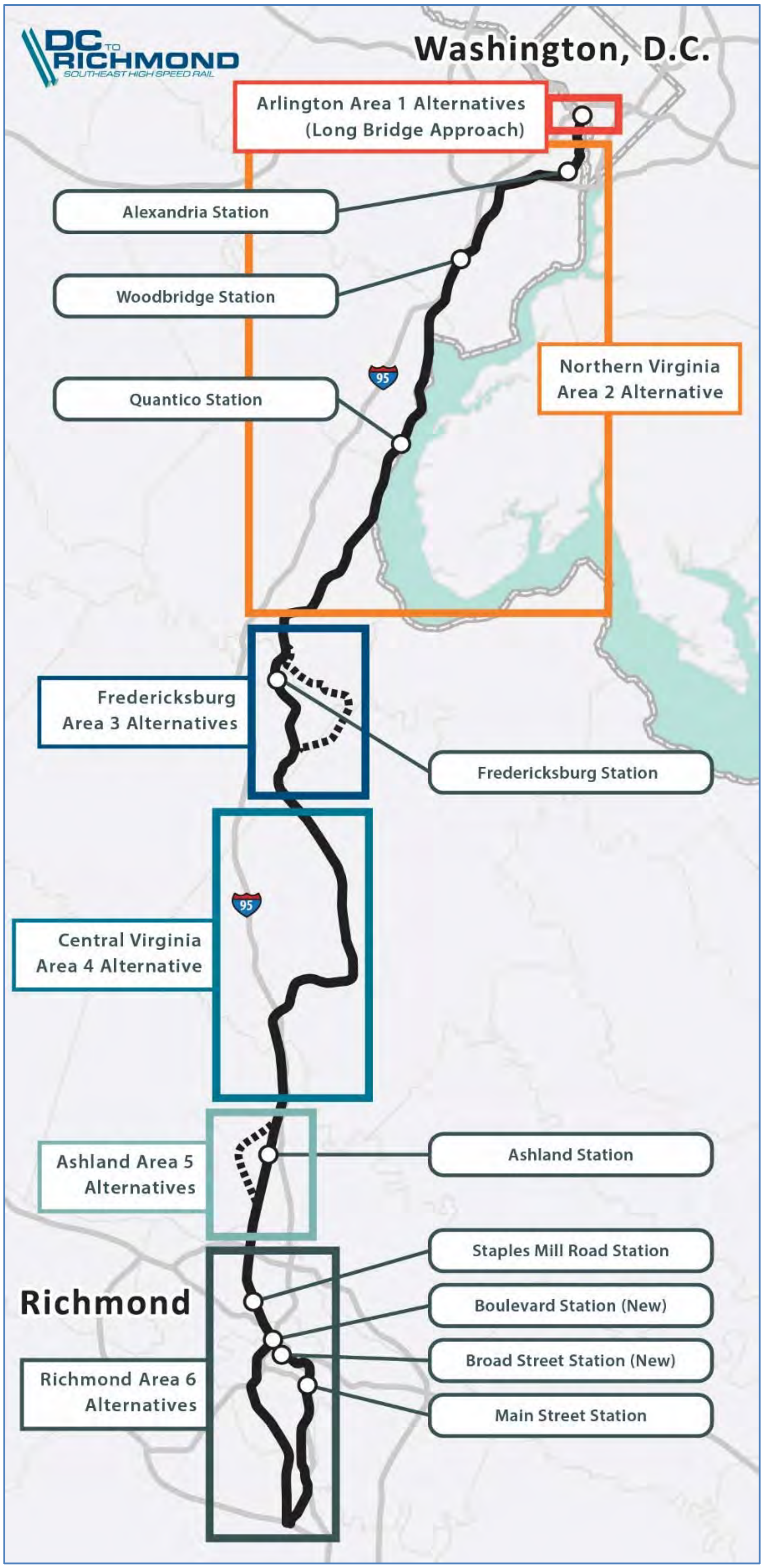

FIGURE 9-1: DC2RVA CORRIDOR AREAS

The Tier II EIS will also consider the consequences of not building the Project. This do nothing or "No Build Alternative" represents the existing conditions in the corridor without the Project, both now and projected into the future, and includes other reasonable and foreseeable projects that may be implemented. The specific characteristics of the No Build Alternative will be defined and described further in the Tier II Draft EIS. While the No Build alternative by definition does not meet the Project's Purpose and Need, it is a required part of the National Environmental Policy Act (NEPA) process and is carried forward into the Draft EIS for detailed analysis at the segment, area, and corridor level. The No Build Alternative provides a baseline against which to compare the benefits and impacts of the build alternatives.

Table 9-1 shows the milepost break points for each of the six areas along the corridor as well as the segments incorporated into the areas and reasoning for the specific grouping.

General layouts and plans identifying specific improvements to track and road alignments for the build alternatives are identified in Appendix OO. All improvements to rail and road infrastructure and related project elements would be conducted in accordance with the DC2RVA Basis of Design and applicable regulations and permits. Descriptions of the alternatives are presented below.

TABLE 9-1: ALTERNATIVE AREAS FOR TIER II DRAFT EIS

Alternative Area	Area Mileposts	Incorporated Segments or Sub-segments	Segment Milepost Split	Subarea	Subarea Length (mi)	Reasoning for grouping
1: Arlington (Approach to Long Bridge)	CFP 110 - CFP 109.3	01: Rosslyn to Alexandria (ROAF)		1A: 2-Track East Alignment	0.7	Separate Long Bridge study determines the alternatives for this area
				1B: 2-Track West Alignment	0.7	
				1C: 1-Track East & 1-Track West Alignment	0.7	
2: Northern Virginia	CFP 109.3 - CFP 62	01: Rosslyn to Alexandria (ROAF) 02: Alexandria to Franconia (AFFR) 03: Franconia to Lorton (FRLO) 04: Lorton to Powells Creek (LOPC) 05: Powells Creek to Arkendale (PCAR) 06: Arkendale to Dahlgren Junction (ARDJ)	01: CFP 104.3 - CFP 98.0	2A- Add 1 Track East of West in Some Sections; Improve Existing Track	47.3	Relatively similar alignment throughout this area.
3: Fredericksburg	CFP 62 - CFP 48	06: Arkendale to Dahlgren Junction (ARDJ) 07: Dahlgren Junction to Fredericksburg (DJFB) 08: Fredericksburg to Hamilton (FBHA) 09: Hamilton to Crossroads (HAXR) 10: Crossroads to Guinea (XRGU) 21: Fredericksburg Bypass (FBBP)	06: CFP 72.1- CFP 61.1	3A: No Additional Track	14	Consideration of additional options for Fredericksburg
				3B: Add Main Track East of Existing	14	
				3C: 2-Track Bypass (East)	18	
4: Central Virginia	CFP 48 - CFP 19	10: Crossroads to Guinea (XRGU) 11: Guinea to Milford (GUMD) 12: Milford to North Doswell (MDND) 13: North Doswell to Elmont (NDEL)	10: CFP 53.2 - CFP 47.5	4A: Add 1 Track East of West; Improve Existing Track	29	Relatively similar alignment throughout this area.

TABLE 9-1: ALTERNATIVE AREAS FOR TIER II DRAFT EIS

Alternative Area	Area Mileposts	Incorporated Segments or Sub-segments	Segment Milepost Split	Subarea	Subarea Length (mi)	Reasoning for grouping
5: Ashland	CFP 19 - CFP 09	13: North Doswell to Elmont (NDEL) 14: Elmont to Greendale (ELGN) 22: Ashland Bypass (ASBP)	13: CFP 23.1-CFP 11.4	5A: No Additional Track; Improve or Relocate Station	10	Consideration of additional options for Ashland
				5B: Add 1 Track East of Existing Tracks; Improve of Relocate Station	10	
				5C: 2-Track Bypass (West) Improve or Relocate Station	11	
				5D: Add 1 Track & Center Existing Tracks; Relocate Station	10	
6: Richmond Area	CFP 09 - A 011 (Centralia)	14: Elmont to Greendale (ELGN) 15: Greendale to South Acca Yard/west Acca Yard (GNSA) 16: SAY/WAY to AM Junction (Hermitage Lead) (SAAM) 17: AM Junction to Centralia- S-Line (AMCE) 18: West Acca Yard to Centralia –A Line (WACE) 19: AM Junction to Fulton Yard (AMFY) 20: Buckingham Branch/Hospital Wye (BBHW)	14: CFP 11.4 - CFP 4.8	6A: Staples Mill Road Station Only	23	Multiple station and alignment options for Richmond
				6B: Boulevard Station Only	24	
				6C: Broad Street Station Only	24	
				6D: Main Street Station Only	23	
				6E: Main Street & Staples Mill Road Split Service	26	
				6F: Main Street & Staples Mill Road Full Service	23	
				6G: Main Street & Staples Mill Road Shared Service	23	

9.2 BUILD ALTERNATIVES COMMON ELEMENTS

9.2.1 Improved Speed Option

The Improved Speed Option would add one main track, improve the existing main tracks to Class 5 standards[1] where improved speeds can be achieved, shift track in some curves to allow greater train speeds, and improve signals and communications. The additional track and shifts in rail alignment would largely occur within existing right-of-way. The Improved Speed Option would maintain the existing straight track alignments and continue to use existing bridges over roads, railroads, and waterways. New structures and bridges would be added parallel to existing structures to carry the new main track. Bridges over major waterways were designed with substructures capable of supporting two tracks, but with superstructures and bridge spans designed for only one track under the DC2RVA project.

The Improved Speed option would add one main line track to the east or west of existing track and realign existing tracks in curves to improve speed. This would result in a total of three or more main line tracks along the length of the corridor. The additional track would be located on either the east or west side of the existing tracks based on site constraints described in Chapters 6, 7, and 8. The Improved Speed option would continue to use existing tangent track and existing rail bridges. Additional crossovers between main line tracks would be included. Track alignment at existing and proposed Amtrak and VRE stations would allow for one or more island platforms and side platforms, with grade-separated pedestrian access so that there would be platform access from all main tracks, maximizing operating flexibility.

Additional infrastructure improvements throughout the Improved Speed Alternative include:

- Extending the existing culverts along the alignment to accommodate the new third main line track.
- Installing approximately two, 36 to 48-inch culverts under the rail line every mile along the alignment using a jack and bore technique (specific locations are not identified but an allowance has been included in the cost estimates).
- Constructing additional rail bridges adjacent to the existing rail bridges to carry the new track over roads and waterways.
- Replacing road overpasses where there is insufficient vertical and horizontal clearance for the new track.
- Improving at-grade crossings by adding additional safety warning devices, re-aligning the crossing, or adding four-quadrant gates as detailed in Chapter 7 and determined in the Draft EIS.

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[1] Class 5 standards are based on classes of track established by the Federal Railroad Administration and defined in 49 CFR 213. There are five classes of track, Class 1 through 5, that represent specific speeds for freight and passenger rail. Class 1 track allows for operating speeds of 10 mph for freight and 15 mph for passenger rail, while Class 5 allows for 80 mph for freight and 90 mph for passenger rail.

- Grade-separating several existing at-grade crossings as detailed in Chapter 7 and determined in the Draft EIS.
- Extending and widening platforms at existing or proposed Amtrak stations. Grade-separated pedestrian access would be included.
- New or improved Amtrak station facilities, including station buildings and parking, as determined in the Draft Tier II EIS.
- Track alignment at VRE stations that accommodate VRE's plans for extending side platforms and adding island platforms where required or proposed (again, providing platform access for all tracks for operating flexibility).
- Stormwater management facilities.
- Signal and communication facilities.

9.2.2 No Additional Track Option

A No Additional Track Option is being considered in several segments of the corridor. Some segments that currently have three tracks and do not require an additional track will be evaluated for minor improvements in an effort to meet the Purpose and Need of the Project. Some segments or sub-segments may not have sufficient room within existing right of way for an additional track. In these segments, a No Additional Track Option is also being considered. The No Additional Track Option would shift track in some curves to allow greater train speeds, and improve signals and communications. No Additional Track Option would maintain the existing straight track alignments and continue to use existing bridges over roads, railroads, and waterways. As no new track would be added, there would be no new rail bridges.

The No Additional Track option includes minor improvements to signals and communications systems, at-grade crossing safety systems, additional crossovers between existing main line track, additional sidings, realignment of existing track within the right-of-way to achieve higher speeds, or other minor rail infrastructure improvements work. The No Additional Track option by itself does not meet the Project's Purpose and Need for the corridor as a whole because it does not provide additional capacity, improved reliability, or reduced travel time. The No Additional Track option can meet the Project's Purpose and Need on a segment by segment basis where there is already sufficient capacity in a segment. Therefore, the No Additional Track option is carried forward for four segments in the Northern Virginia area where there are three main tracks existing or under construction:

- Alexandria to Franconia (AFFR) currently has three tracks from the AF interlocking at MP 104.5 south to MP 98 just north of the Franconia-Springfield station.
- Powells Creek to Arkendale (PCAR) is currently under construction to add a third track.
- Fredericksburg to Hamilton (FBHA) currently has three main line tracks from MP 58.5 to MP 56.
- Hamilton to Crossroads (HAXR) currently has three main line tracks along with the new VRE Spotsylvania Station.

The No Additional Track option for these four segments would be joined north and south to segments already having three or more main tracks or segments with Improved Speed options adding a third main track, forming a continuous stretch of three or more main tracks.

In addition, DRPT considered the No Additional Track option for two segments/sub-segments where existing right of way is limited:

- Dahlgren Junction to Fredericksburg (DJFB)
- Town of Ashland, within North Doswell to Elmont (NDEL)

The No Additional Track option for DJFB would be joined at the north to a segment with the Improved Speed option adding a third main track, and joined at the south to segments that already have three main tracks, forming a continuous stretch of three main tracks. The No Additional Track option for NDEL would leave an approximately two mile section of existing two track main line through Ashland, joining to the Improved Speed option adding a third main track north to Doswell and south to Elmont.

9.2.3 Bypass Alternatives

Bypass Alternative alignments are being considered in Fredericksburg and Ashland in lieu of adding a track along the existing alignment through each town. In Fredericksburg, a two-track bypass would be added on the east in lieu of adding a third track through Fredericksburg. The Fredericksburg bypass would extend from the Dahlgren Spur in Stafford County east, and then south across the Rappahannock River to connect to the CSXT main line south of Crossroads in Spotsylvania County. In Ashland, a two-track bypass would be added on the west in lieu of a third track through Ashland. The Ashland Bypass would extend south and west from the CSXT main line north of Ashland, connecting to the main line south of Ashland in Hanover County.

The bypass alignments are anticipated to be used primarily by freight trains, and possibly the Auto Train and other passenger trains not serving Fredericksburg or Ashland. The Amtrak passenger trains and/or VRE commuter trains serving the station in Fredericksburg or Ashland would continue to use the existing tracks and station. Some freight trains may also continue through the respective towns. Each Bypass Alternative includes the following common elements:

- Acquiring additional right-of-way for a 135-foot wide corridor2 for the new bypass.
- Existing track in town to remain as is, possibly with minor improvements.
- Stations to be improved with expanded platforms, additional parking, and new station facilities.
- Installing two, 36 to 48-inch culverts under the new rail line every mile along the alignment.
- Constructing rail bridges over waterways.

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[2] A 135-foot wide corridor was used for planning purposes and to identify a reasonably worst case limit of disturbance for calculating potential impacts. The actual width of new right of way required for a two-track bypass would be determined during final design, and would likely be less than 135 feet in width.

- Grade-separating or closing roads crossing the bypass alignment.
- Stormwater management facilities.
- Signal and communication facilities both in town along the existing main line and the bypass.

9.2.4 Richmond Area Alternatives

The Richmond area is characterized by several potential rail alignments and multiple station location options. While rail improvements and even additional track can be added within the existing right-of-way in many segments in Richmond, the dense urban environment and potential impacts precluded a focus on higher speed. Instead, as described in Chapter 5, the focus is on adding capacity, with station locations identified and used as the basis for identifying sets of rail improvements to form alternatives. DRPT evaluated station locations against the FRA and Amtrak station guidelines as well as the Project's Basis of Design to determine potential suitability for higher speed passenger service. Rail improvements were identified for both passenger rail and to facilitate freight rail movements and alleviate bottlenecks that could adversely affect passenger service. Seven alternatives for the Richmond area are carried forward for further evaluation in the Tier II Draft EIS:

- **Single Station Options** (include rail service along either the S-Line or A-Line to existing and proposed stations in Richmond):
  - Staples Mill Road Station (via A-Line)
  - Boulevard Station (via A-Line)
  - Boulevard Station (via S-Line)
  - Broad Street Station (via A-Line)
  - Main Street Station (via S-Line):
    - Via S-Line/Peninsula Subdivision
    - Via S-Line/Peninsula Subdivision + Freight Connector Bypass
- **Two-Station Options** (include rail service to both Main Street Station and Staples Mill Road Station):
  - **Full Service (via S-Line)**—All long distance, interstate corridor, and northeast regional passenger trains moving north-south through Richmond route through Staples Mill Road Station to the west side of Main Street Station and then to Centralia using the S-line; northeast regional service to Newport News continues from the east side of Main Street Station on the Peninsula Subdivision. Requires three interoperable main tracks between Acca Yard and Main Street Station.
  - **Full Service (via S-Line) + Freight Connector Bypass**—Similar to full service, but a freight connector bypass would be built across the James River as a means to facilitate freight movements within the Richmond area, which, in turn would facilitate passenger train movements from the Peninsula Subdivision, and between Main Street Station and Acca Yard. Requires only two interoperable main tracks between Acca Yard and Main Street Station.

- **Split Service (via A-Line)**—All long distance, interstate corridor, and northeast regional passenger trains moving north-south through Richmond route through Staples Mill Road Station to Centralia using the A-line, bypassing Main Street Station; northeast regional service to Newport News continues from the east side of Main Street Station on the Peninsula Subdivision. Requires only two interoperable main tracks between Acca Yard and Main Street Station.
- **Shared Service (via A-line and S-Line)**—All long distance, interstate corridor, and northeast regional passenger trains moving north-south through Richmond route through Staples Mill Road Station either (a) to the west side of Main Street Station and then to Centralia using the S-line, or (b) to Centralia using the A-line; northeast regional service to Newport News continues from the east side of Main Street Station on the Peninsula Subdivision. Requires three interoperable main tracks between Acca Yard and Main Street Station.
- **Shared Service (via A-line and S-Line) + Freight Connector Bypass**—Similar to shared service with the addition that a freight connector bypass would be built across the James River to facilitate freight movements within the Richmond area, which, in turn would facilitate passenger train movements from the Peninsula Subdivision, and between Main Street Station and Acca Yard. Requires only two interoperable main tracks between Acca Yard and Main Street Station.

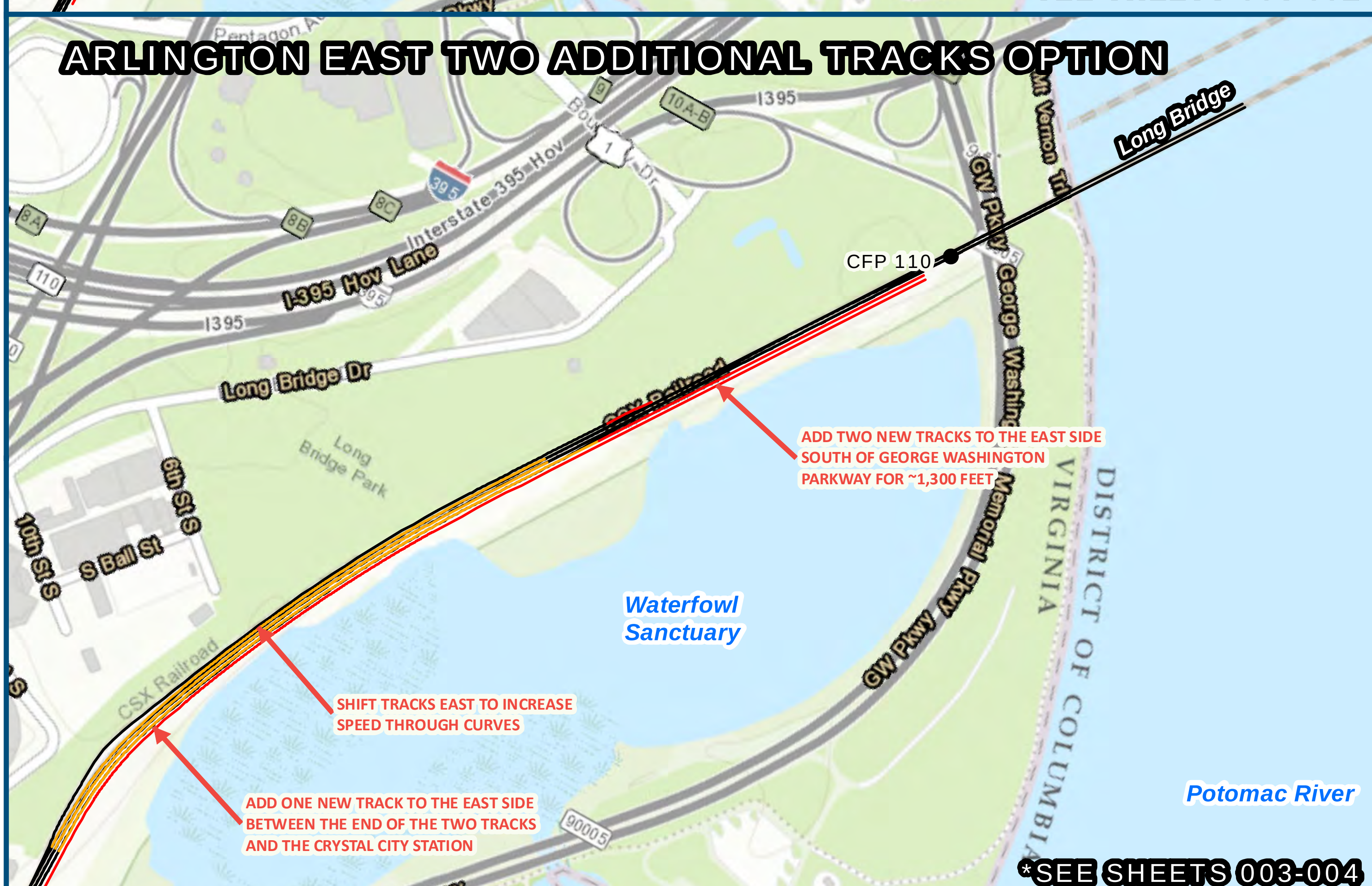
9.3 BUILD ALTERNATIVE DETAILED DESCRIPTIONS

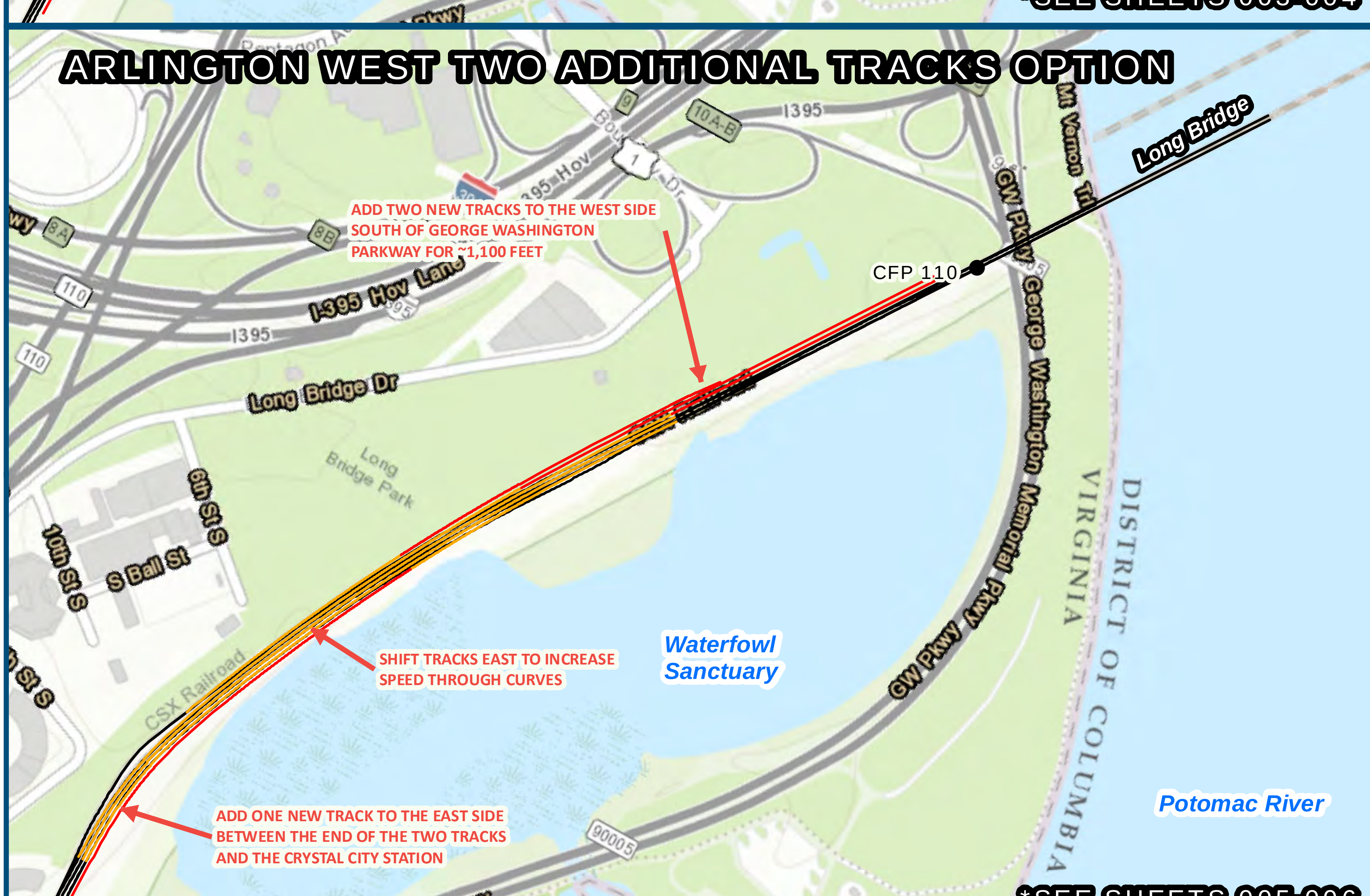
9.3.1 Arlington Alternatives

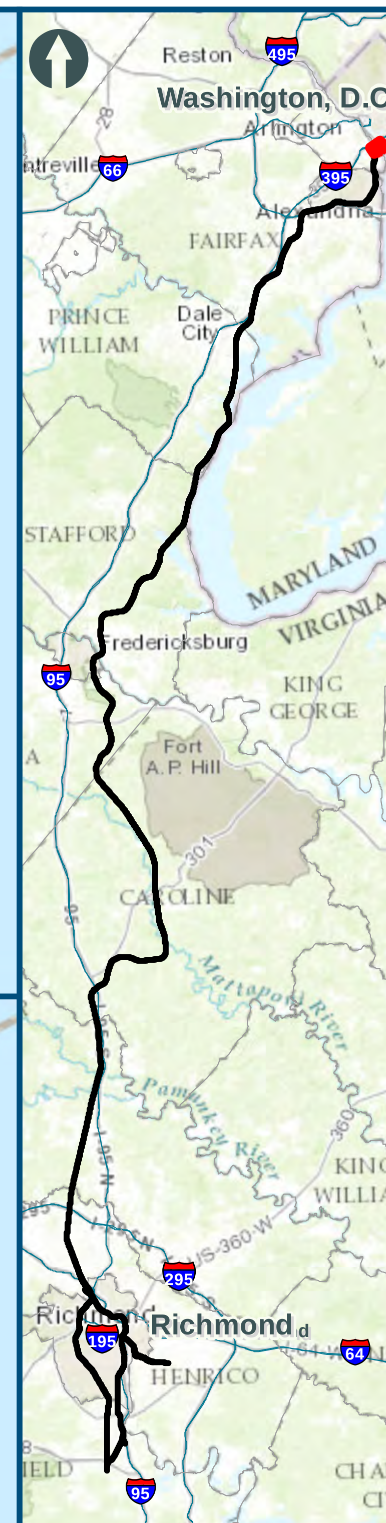
In Arlington, at the northernmost point in the DC2RVA corridor, the Project terminates just south of the George Washington Parkway. The CSXT tracks continue north across the Parkway and over the Potomac River on the CSXT-owned Long Bridge. DDOT and FRA, in coordination with DRPT, VRE, and CSXT, are currently studying alternatives to add capacity to the rail system from the DC2RVA terminus north to Union Station in Washington, D.C. DDOT's study is evaluating alternatives for adding a new rail bridge across the Potomac River parallel to the existing Long Bridge, including a new two track bridge to the east, a new two track bridge to the west, or two new single track bridges on the east and west of the existing Long Bridge.

The DC2RVA Arlington alternatives were developed to accommodate DDOT's alternatives, and include (Figure 9-2):

- **Alternative 1A—Add 2 tracks on the east**: This alternative would add two tracks on the east of the existing corridor from CFP 109.3 to CFP 110, ending about 1,500 feet south of the George Washington Parkway (The DDOT Long Bridge Study will evaluate the effects of crossing the Parkway and the Potomac River). The two additional tracks would be constructed within existing CSXT right of way.
- **Alternative 1B—Add 2 tracks on the west**: This alternative would add two tracks on the west of the existing corridor from CFP 109.3 to CFP 110, ending about 1,500 feet south of the George Washington Parkway (The DDOT Long Bridge Study will evaluate the effects of crossing the Parkway and the Potomac River). The two additional tracks would be constructed within existing CSXT right of way.
- **Alternative 1C—Add 1-track east & 1-track west**: This alternative would add two tracks (one track on the east and one track on the west) of the existing corridor from CFP 109.3 to CFP 110, ending about 1,500 feet south of the George Washington Parkway (The DDOT Long Bridge Study will evaluate the effects of crossing the Parkway and the Potomac River). The two additional tracks would be constructed within existing CSXT right of way.







0 300 600
Feet

1 inch = 600 feet
@ 11 x 17 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery Source: 2015 Bing Aerial Imagery, ESRI World Transportation

Legend

- CSXT Mileposts
- Track Improvements
- Track - Existing
- Track - Shift
- Track - Proposed

Figure 9-2
Arlington Alternatives

DRPT Virginia Department of Rail and Public Transportation
U.S. Department of Transportation Federal Railroad Administration
www.DC2RVArail.com
DC to RICHMOND SOUTHEAST HIGH SPEED RAIL

9.3.2 Northern Virginia Alternatives

The Northern Virginia alternative begins at CFP 109.3 and extends to the Dahlgren Spur at CFP 62, and encompasses six segments that combine Improved Speed and No Additional Track options as shown in Table 9-2. A map of the Northern Virginia Alternatives is shown in Figure 9-3.

TABLE 9-2: NORTHERN VIRGINIA BUILD ALTERNATIVE 2A BY SEGMENT

Segment	Milepost	Proposed Improvements
Northern Virginia Segments		
01: Rosslyn to Alexandria (ROAF)	110.0-103.7	**Improved Speed Option** Additional Track ▪ Add one track to the east side between the Crystal City station and Norfolk Southern rail yard. Track Shifts ▪ Shift tracks to the east to increase speeds through the curve at MP 109.5 to 109.4, 109.1 to 109.05, 109.0 to 108.9, 108.55 to 108.5, 108.3 to 108.25, 107.7 to 107.5, and 106.9 to 106.5. ▪ Shift tracks to the west to increase speeds through the curve at MP 109.7 to 109.5, 109.4 to 109.3, 109.05 to 109.0, 108.9 to 108.8, 108.6 to 108.55, 108.5 to 108.3, 108.25 to 108.2, 107.8 to 107.7, 107.5 to 107.4, and 105.4 to 105.3. ▪ Shift western two tracks east and eastern track west MP 108.8 to 108.6 to increase speeds through the curve. Stations ▪ Crystal City VRE Station – align track to accommodate VRE platform updates2. ▪ Alexandria Amtrak Station – the additional track to the east will not affect the existing configuration or planned platform updates by VRE. Structures ▪ Add one track on the east side of the existing bridge over Four Mile Run Creek. ▪ Construct a new one-track rail bridge on the east side of the existing structures over Braddock Road, Commonwealth Avenue, and King Street.
02: Alexandria to Franconia (AFFR)	103.7-99.0	**No Additional Track (minor improvements) Option** Track Shifts ▪ Shift tracks west to increase speed through the curves at MP 103.7 to 103.4 and 103.2 to 102.7. ▪ Shift tracks east to increase speed through the curves at MP 102.6 to 101.8. No stations occur in this segment. No structures modifications.

TABLE 9-2: NORTHERN VIRGINIA BUILD ALTERNATIVE 2A BY SEGMENT

Segment	Milepost	Proposed Improvements
03: Franconia to Lorton (FRLO)	99.0-92.6	**Improved Speed Option** Additional Track ▪ Add one new track on the east side between Franconia Springfield Station and south of Accotink Creek. ▪ Add one new track on the west side between Pohick Road and the Lorton Station. ▪ Add one track to east side between the Lorton Station and Lorton Road. Track Shifts ▪ Shift tracks to the west to increase speeds through the curve at MP 98.9 to 98.0, 97.55 to 97.5, and 95.3 to 94.8. ▪ Shift tracks west to increase speed through the curve and transition additional track from east to west at MP 94.2 to 94.1. ▪ Shift tracks west to increase speed through the curve and transition additional track from west to east at MP 93.0 to 92.8. ▪ Shift tracks east to increase speed through the curve and transition additional track from east to west at MP 94.1 to 93.8. ▪ Shift tracks east to increase speed through the curve and transition additional track from west to east at MP 93.1 to 93.0. Stations ▪ Franconia VRE Station – align track to accommodate expanded east side platform to become a center platform with construction of the third track (platform modifications to be constructed by VRE). ▪ Modify the pedestrian bridge at Franconia Station to accommodate pedestrian access on the east side. ▪ Lorton VRE Station – align track to accommodate a longer side platform on the east side, and a center platform on west side (platform modifications to be constructed by VRE). Structures ▪ Construct a new one-track rail bridge on the east side of the existing structures over Accotink Creek and west side of Pohick Creek. ▪ Construct a new one track rail bridge over an unnamed road (MP 96.04 north of Newington Road) and Newington Road. ▪ Add crash walls to accommodate the third track at the Franconia-Springfield Parkway bridge. ▪ Replace the Backlick Road bridge over the tracks to accommodate the additional third track.

TABLE 9-2: NORTHERN VIRGINIA BUILD ALTERNATIVE 2A BY SEGMENT

Segment	Milepost	Proposed Improvements
04: Lorton to Powells Creek (LOPC)	92.6-83.4	**Improved Speed Option** Additional Track ▪ Add one track to the east side between Lorton Road and Rippon VRE Station. ▪ Add one track to the west side south of Rippon VRE Station and Powells Creek. ▪ Modify at-grade crossing at Featherstone Road. Track Shifts ▪ Shift tracks east to increase speed through the curves at MP 90.6 to 90.2, 89.6 to 89.3. ▪ Shift tracks west to increase speed through the curves and transition additional track from east to west at MP 85.6 to 85.5. ▪ Shift tracks east to increase speed through the curves and transition additional track from east to west at MP 85.5 to 85.4. ▪ Shift tracks west to increase speed through the curves at MP 84.5 to 83.9. ▪ Shift tracks east to increase speed through the curves and transition additional track from west to east at MP 83.6 to 83.4. Stations ▪ Woodbridge Amtrak/VRE Station – lengthen and widen the center platform, and extend the pedestrian bridge to accommodate the additional track and provide vertical access to the pedestrian bridge. ▪ Rippon VRE Station – align track to accommodate platform with potential lengthen and widen of center platform on the east side and extend the pedestrian bridge to accommodate the additional track and provide access to the east. VRE to add a side platform station on west side. Structures ▪ Construct new one-track rail bridges on the east side of the existing structures over Giles Run, Marumsco Creek, Farm Creek and Unnamed Creek (MP 86.6). ▪ Construct new two-track rail bridges (includes construction of one track on bridge plus space for second track) on the east side of the existing rail bridge over Occoquan River, and the west side of the existing bridges over Neabsco Creek and Powells Creek. ▪ Construct a new single track rail bridge over Lorton Road (Route 642), Jefferson Davis Hwy (Route 1) and Furnace Road. ▪ Replace the Dawson Beach Road bridge over the tracks to accommodate the additional third track.

TABLE 9-2: NORTHERN VIRGINIA BUILD ALTERNATIVE 2A BY SEGMENT

Segment	Milepost	Proposed Improvements
05: Powells Creek to Arkendale (PCAR)	83.4-72.9	**No Additional Track (Minor Improvements) Option** Track Shifts ▪ Shift tracks west to increase speed through the curves and transition additional track from west to east at MP 83.4 to 83.1. ▪ Shift eastern track east to connect to additional track at MP 83.0 to 82.95. ▪ Shift tracks west to increase speed through the curves at MP 82.9 to 82.6, 82.4 to 82.2, 82.2 to 81.6, 79.7 to 79.2, 78.7 to 78.4, 75.9 to 75.5, and 73.3 to 72.9. ▪ Shift tracks east to increase speed through the curves at MP 81.3 to 80.5, 79.9 to 79.8, 77.9 to 77.3 and 75.3 to 74.7. No station or structure modifications.
06: Arkendale to Dahlgren Junction (ARDJ)	72.9-60.7	**Improved Speed Option** Additional Track ▪ Add one track to the east side between Brent Point Road and north of Courthouse Road. ▪ Add one track to the west side between Courthouse Road and Andrew Chapel Road. ▪ Add one track to the east side past the Brooke Station. ▪ Add one track to the west side between Mt Hope Church Road and north of Potomac Creek. ▪ Add one track to the east side from near Potomac Creek to Leeland Road Station. ▪ Add one track to the west side between Leeland Road Station and Claiborne Run. ▪ Add one track to the east between Claiborne Run and White Oak Road. ▪ Modify the at-grade crossing at Brent Point Road and Mt Hope Church Road to accommodate the additional third track. Track Shifts ▪ Shift tracks west to increase speed through the curves at MP 72.9 to 72.8, 65.0 to 64.4, and 63.3 to 62.4. ▪ Shift tracks east to increase speed through the curves at MP 70.6 to 70.0, 67.1 to 66.7, and 61.7 to 61.3. ▪ Shift tracks west to increase speed through the curves and transition additional track from east to west at MP 69.7 to 69.6, 69.6 to 69.4. ▪ Shift tracks east to increase speed through the curves and transition additional track from east to west to access platform at MP 67.9 to 67.4. ▪ Shift tracks east to increase speed through the curves and transition additional track from west to east at MP 68.5 to 68.1, 68.1 to 68.0, and 66.0 to 65.7. ▪ Shift tracks west to increase speed through the curves and transition additional track from west to east at MP 65.7 to 65.6. Stations ▪ Brooke VRE Station – align track to accommodate platform with potential lengthening and widening of center platform; VRE to add side platform on west side. ▪ Leeland VRE Station – align track to accommodate platform with potential lengthening and widening of center platform; VRE to add side platform on west side.

TABLE 9-2: NORTHERN VIRGINIA BUILD ALTERNATIVE 2A BY SEGMENT

Segment	Milepost	Proposed Improvements
		Structures ▪ Construct a new rail bridge (includes construction of one track on bridge with space for second track) on the east side of the existing structure over Aquia Creek and Potomac Creek. ▪ Construct a new one-track bridge on the west side over Claiborne Run. ▪ Add crash walls to accommodate the third track at Courthouse Road and Primmer House Road. ▪ Replace Eskimo Hill Road and Leeland Road over the tracks to accommodate the additional third track. ▪ Construct a new one track rail bridge over Andrew Chapel Road and Harrell Road.

Table Notes: 1. East side or west side is relative to the existing north-south CSXT track alignment.
2. VRE station improvements and platform extensions are not included within the DC2RVA project.
3. Amtrak station improvements and platform extensions are included in the DC2RVA project.

Sheet 1
SHIFT EXISTING TRACKS TO INCREASE SPEED THROUGH CURVES

MILEPOSTS (CFP)	SHIFT EAST	SHIFT WEST
109.7 - 109.5		●
109.5 - 109.4	●	
109.4 - 109.3		●
109.1 - 109.05	●	
109.05 - 109.0		●
109.0 - 108.9	●	
108.9 - 108.8		●
108.6 - 108.55		●
108.55 - 108.5	●	
108.5 - 108.3		●
108.3 - 108.25	●	
108.25 - 108.2		●
107.8 - 107.7		●
107.7 - 107.5	●	
107.5 - 107.4		●
106.9 - 106.5	●	
105.4 - 105.3		●
103.7 - 103.4		●
103.2 - 102.7		●
102.6 - 101.8	●	
98.9 - 98.0		●
97.55 - 97.5		●
95.3 - 94.8		●
94.1 - 93.8	●	
93.1 - 92.8	●	

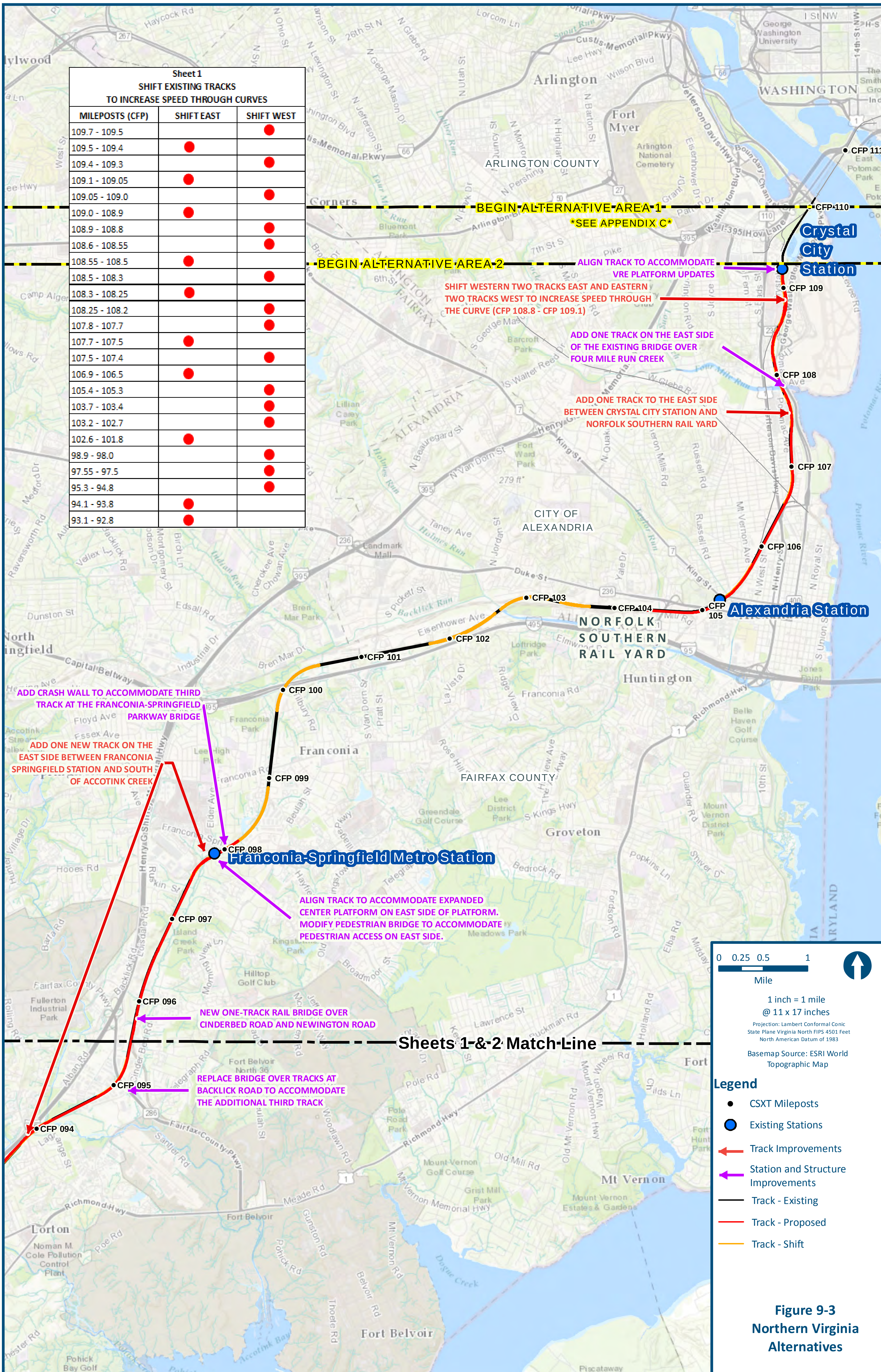


Figure 9-3
Northern Virginia Alternatives

9.3.3 Fredericksburg Alternatives

In Fredericksburg, from CFP 62 at the Dahlgren Spur to CFP 48 just south of the VRE maintenance yard at Crossroads, three alternatives are being carried forward to the Draft EIS:

- Alternative 3A—No Additional Track
- Alternative 3B—Add a Track on the East
- Alternative 3C—East Bypass

Alternative 3A applies the No Additional Track Option to the Fredericksburg area as described in Table 9-3.

TABLE 9-3: FREDERICKSBURG ALTERNATIVE 3A (NO ADDITIONAL TRACK) BY SEGMENT

Segment	Milepost	Proposed Improvements
07: Dahlgren Junction to Fredericksburg (DJFB)	60.7-58.2	**No Additional Track (Minor Improvements) Option** Track Shifts ▪ Shift tracks west to increase speed through the curves at MP 60.4 to 59.6 and 59.4 to 58.9. ▪ Shift tracks east to increase speed through the curves at MP 58.7 to 58.5. Station ▪ Fredericksburg Amtrak/VRE Station – lengthen and widen east and west side platforms, add new station facility and parking deck.
08: Fredericksburg to Hamilton (FBHA)	58.2-55.6	**No Additional Track (Minor Improvements) Option** Track Shifts ▪ Shift tracks east to increase speed through the curves at MP 57.9 to 57.6 and 56.8 to 56.5. No stations occur in this segment. No structure modifications.
09: Hamilton to Crossroads (HAXR)	55.6-53.1	**No Additional Track (Minor Improvements) Option** Track Shifts ▪ Shift tracks west to increase speed through the curves at MP 55.6 to 54.8. ▪ Shift tracks east to increase speed through the curves at 54.1 to 53.5. No station or structure modifications.

Table Notes: 1. East side or west side is relative to the existing north-south CSXT track alignment.
2. VRE station improvements and platform extensions are not included within the DC2RVA project.
3. Amtrak station improvements and platform extensions are included in the DC2RVA project.

Alternative 3B adds an additional track east of the existing track in Segment 7 (DJFB) and then continues the No Additional Track Option for segments 8 (FBHA) and 9 (HAXR) as described in Table 9-4.

TABLE 9-4: FREDERICKSBURG ALTERNATIVE 3B (ADDITIONAL TRACK) BY SEGMENT

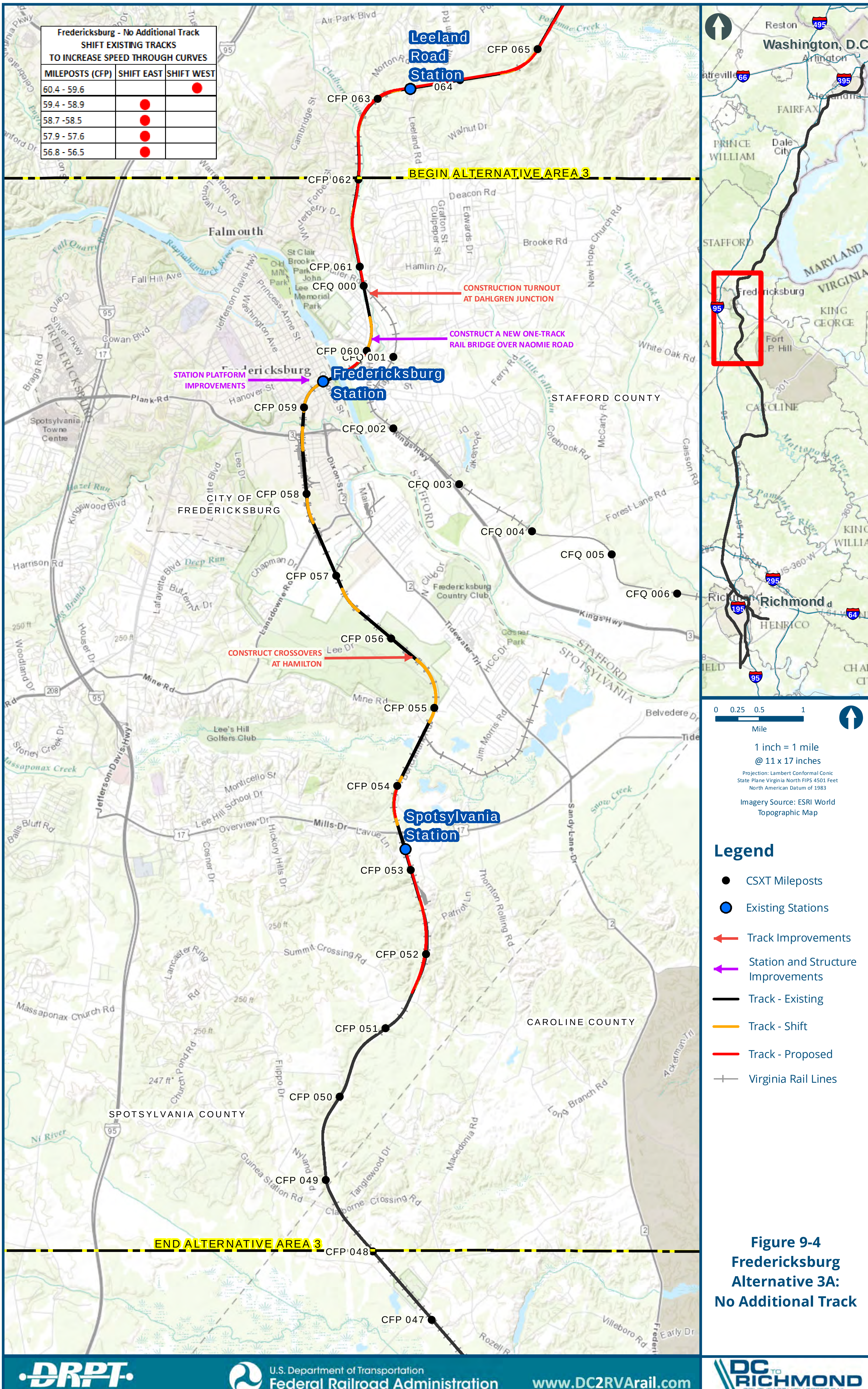
Segment	Milepost	Proposed Improvements
07: Dahlgren Junction to Fredericksburg (DJFB)	60.7-58.2	**Improved Speed Option** Additional Track ▪ Add one track to east side between White Oak Road and south of Charles Street. Track Shifts ▪ Shift tracks west to increase speed through the curves at MP 60.4 to 59.6 and 59.4 to 58.9. ▪ Shift tracks east to increase speed through the curves at MP 58.7 to 58.5. Stations ▪ Fredericksburg Amtrak/VRE Station – lengthen and widen east platform to become center platform, lengthen and widen side platform on west side, add new station building and parking deck. Structures ▪ Construct a new rail bridge (includes construction of one track on bridge) on the east side of the existing structure over the Rappahannock River. ▪ Construct a new single track rail bridge on the east side of the existing structure over Claiborne Run. ▪ Replace the Butler/White Oak Road and Kings Highway bridges over the tracks. ▪ Construct a new single track rail bridge at Naomi Road, Sophia Street, Caroline Street, Princess Anne Street, and Charles Street.
08: Fredericksburg to Hamilton (FBHA)	58.2-55.6	**No Additional Track (Minor Improvements) Option** Track Shifts ▪ Shift tracks east to increase speed through the curves at MP 57.9 to 57.6 and 56.8 to 56.5. No stations occur in this segment. No structure modifications.
09: Hamilton to Crossroads (HAXR)	55.6-53.1	**No Additional Track (Minor Improvements) Option** Track Shift ▪ Shift tracks west to increase speed through the curves at MP 55.6 to 54.8. ▪ Shift tracks east to increase speed through the curves at 54.1 to 53.5. No station or structure modifications.

Table Notes: 1. East side or west side is relative to the existing north-south CSXT track alignment.
2. VRE station improvements and platform extensions are not included within the DC2RVA project.
3. Amtrak station improvements and platform extensions are included in the DC2RVA project.

The Fredericksburg Alternative 3A represents the No Additional Track Alternative (Figure 9-4). The Fredericksburg Alternative 3B will add an additional two track bypass to the east of Fredericksburg (Figure 9-5). The Fredericksburg Alternative 3C Bypass Alternative (Figure 9-6) includes the same improvements described for Alternative 3A, the No Additional Track Alternative, plus the addition of a two track bypass east of Fredericksburg. The existing two-track corridor and station in downtown Fredericksburg would remain in the city and would continue to be served by both passenger and commuter rail. A 13.7-mile, two-track bypass would be constructed east of the city between MP 51.6 and MP 61.1 of the main line track. This bypass would serve both freight rail and possibly long distance passenger rail trains.

Additional infrastructure improvements associated with the bypass include:

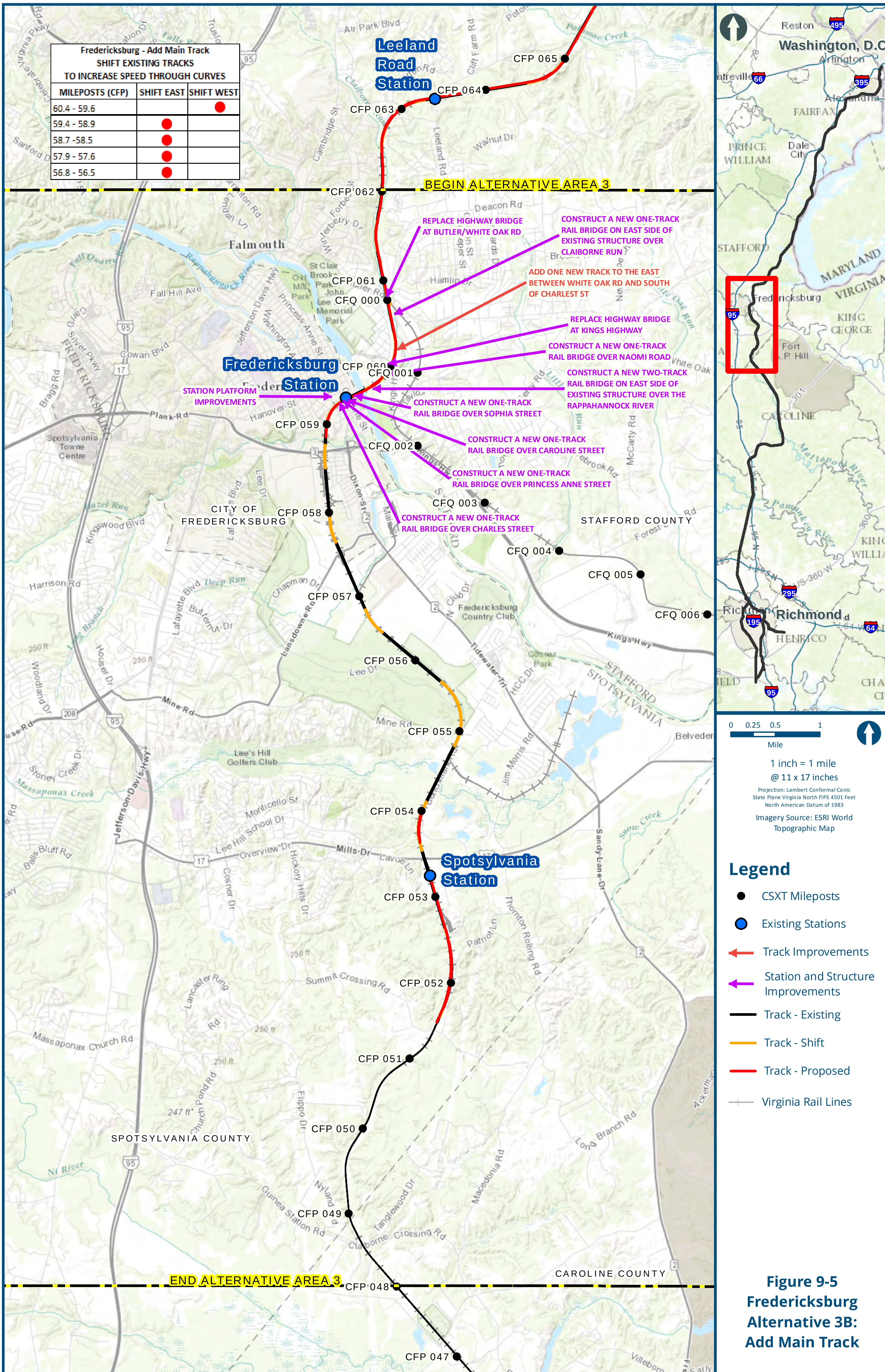
- Adding a new main track on the Dahlgren Spur, from its westernmost junction with the CSXT main line to the eastern point of the proposed connection with the rail bypass (approximately 6.7 miles), and revision of connection to CSXT main line to accommodate a second track.
- Constructing two tracks from the Dahlgren Spur on new alignment (approximately 7 miles) to the southern connection with the CSXT main line.
- Adding one track for a single-track wye joining the eastern side of the Dahlgren Spur and the new bypass track.
- Adding one track for a single track wye joining the north side of the main line to the south end of the new bypass track.
- Adding a new two-track rail bridge over the Rappahannock River at MP 6.90
- Grade crossings (roads and driveways) along the double-tracked portion of the Dahlgren Spur will be evaluated in the Tier II EIS to determine if they will remain at-grade, will be grade-separated, or will be closed.
- Roadway crossings on the new alignment between the Dahlgren Spur and the CSXT main line will be grade-separated, relocated, or closed.



Fredericksburg - No Additional Track
SHIFT EXISTING TRACKS TO INCREASE SPEED THROUGH CURVES

MILEPOSTS (CFP)	SHIFT EAST	SHIFT WEST
60.4 - 59.6		●
59.4 - 58.9	●	
58.7 -58.5	●	
57.9 - 57.6	●	
56.8 - 56.5	●	

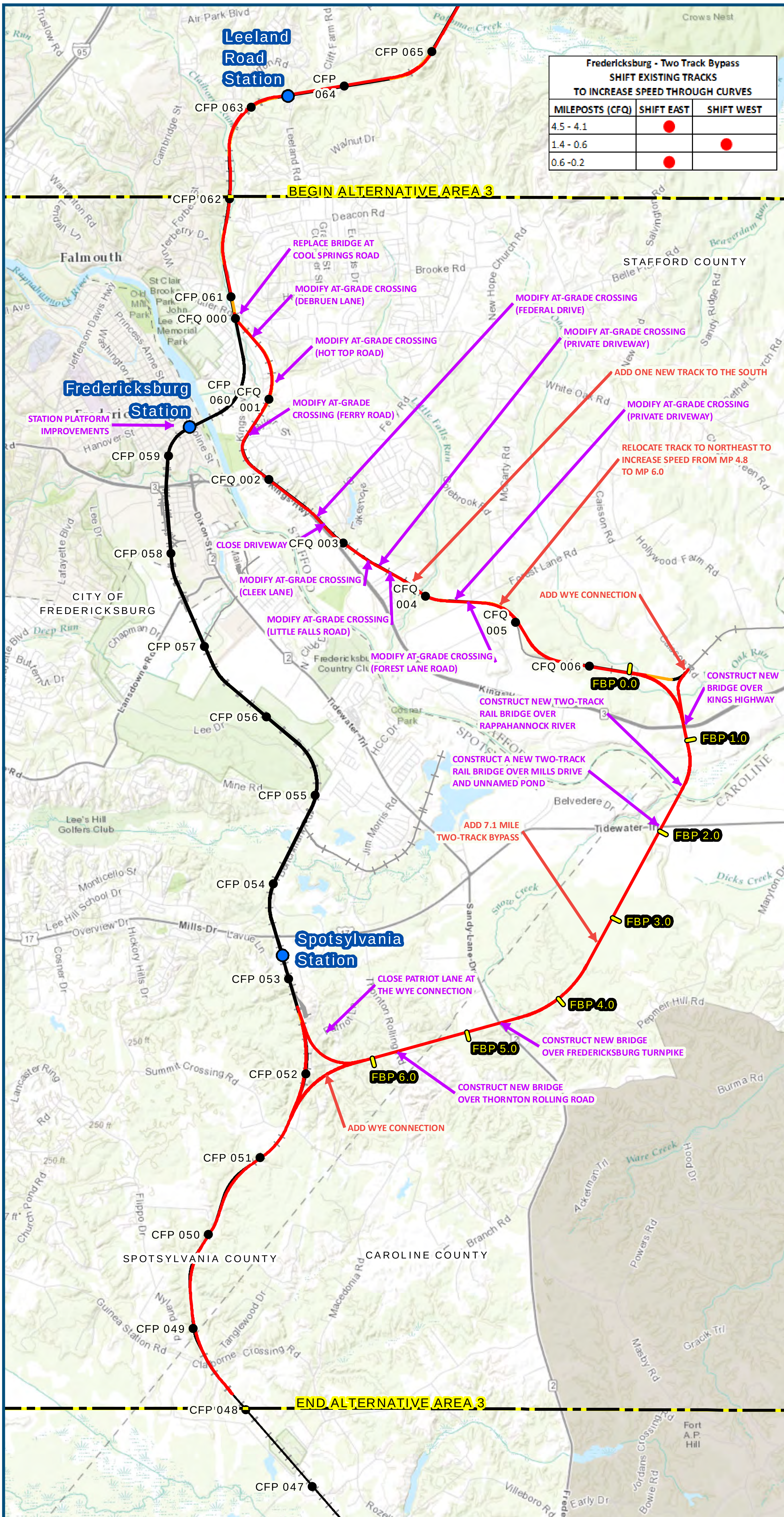
Figure 9-4
Fredericksburg Alternative 3A: No Additional Track



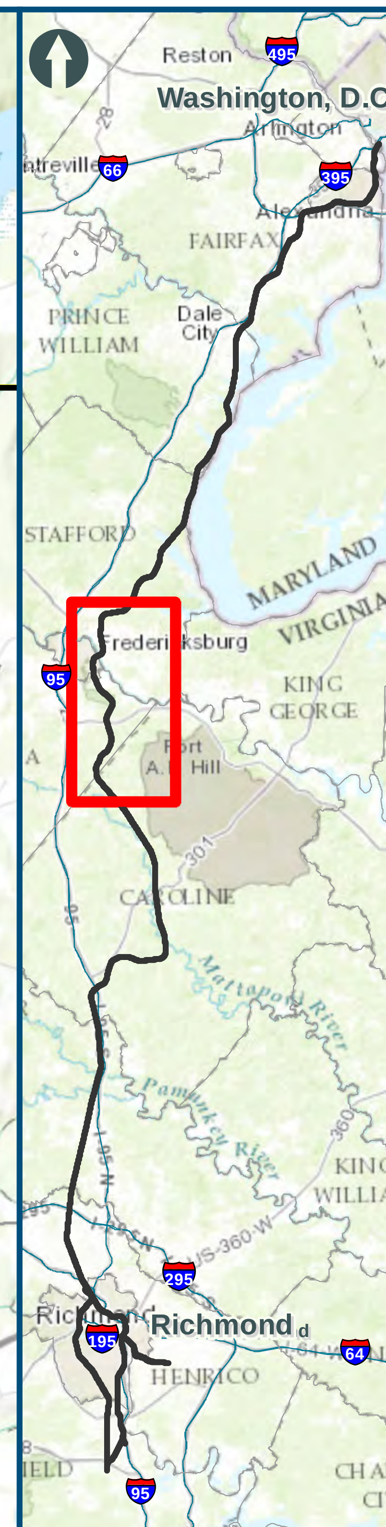
Fredericksburg - Add Main Track
SHIFT EXISTING TRACKS TO INCREASE SPEED THROUGH CURVES

MILEPOSTS (CFP)	SHIFT EAST	SHIFT WEST
60.4 - 59.6		●
59.4 - 58.9	●	
58.7 -58.5	●	
57.9 - 57.6	●	
56.8 - 56.5	●	

Figure 9-5 Fredericksburg Alternative 3B: Add Main Track



MILEPOSTS (CFQ)	SHIFT EAST	SHIFT WEST
4.5 - 4.1	●	
1.4 - 0.6		●
0.6 -0.2	●	



0 0.25 0.5 1
Mile

1 inch = 1 mile
@ 11 x 17 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Imagery Source: 2015 ESRI World Topographic Map

Legend

- CSXT Mileposts
- Proposed Mileposts
- Existing Stations
- Track Improvements
- Station and Structure Improvements
- Track - Existing
- Track - Shift
- Track - Proposed
- Virginia Rail Lines

Figure 9-6
Fredericksburg Alternative 3C: Two-Track Bypass

9.3.4 Central Virginia Alternatives

The Central Virginia alternative begins at CFP 48 and extends to the Doswell Junction at CFP 19, and encompasses six segments with Improved Speed Options as shown in Table 9.5. A map of the Central Virginia Alternatives in represented in Figure 9-7.

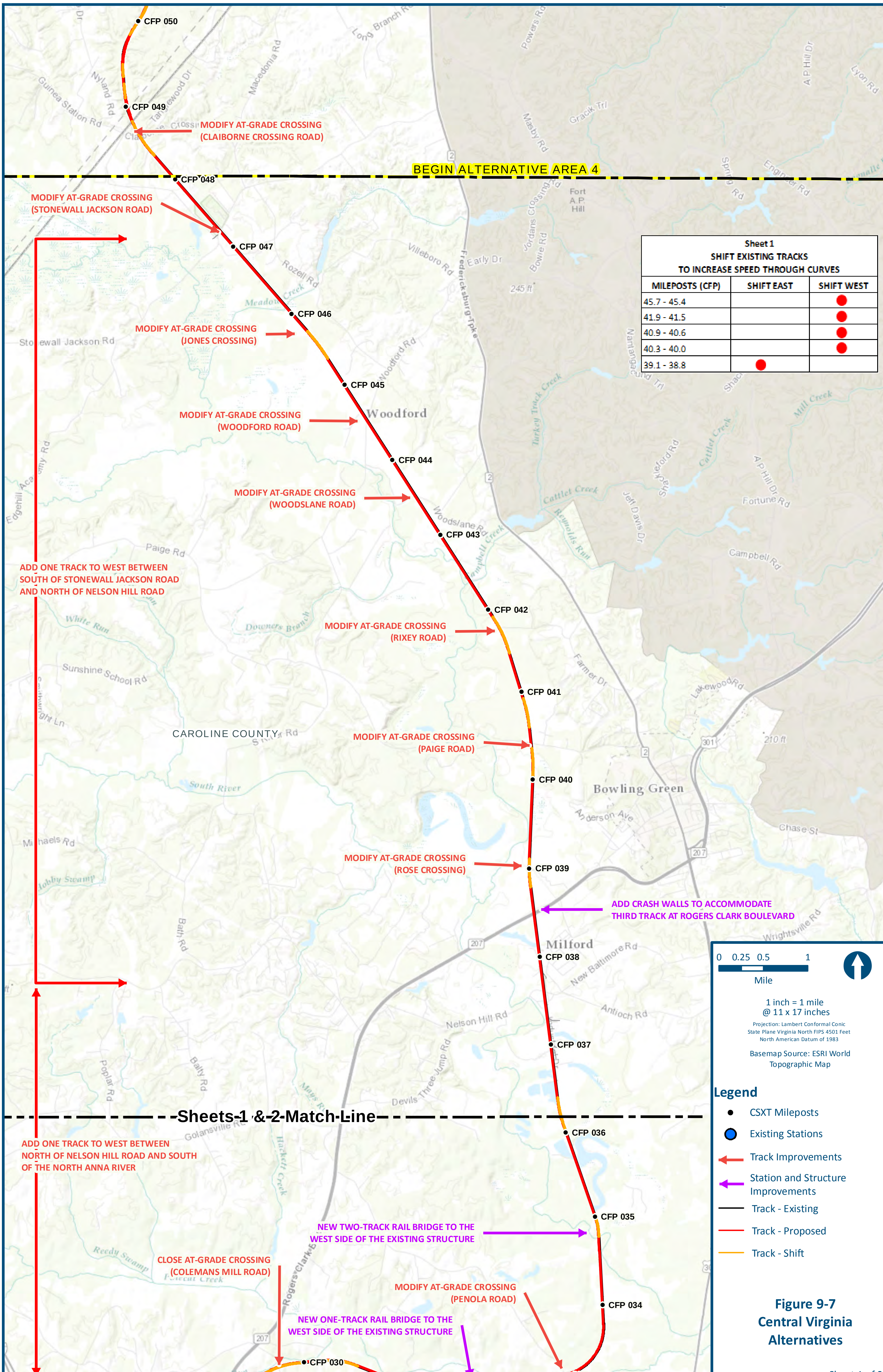
TABLE 9-5: CENTRAL VIRGINIA ALTERNATIVE 4A BY SEGMENT

Segment	Milepost	Proposed Improvements
10: Crossroads to Guinea (XRGU)	53.1-47.0	**Improved Speed Option** Additional Track ▪ Add one track on west side between Summit Crossing Road and MP 51.3. ▪ Add three tracks on west side and removal of existing tracks between MP 51.3 to 51.1. ▪ Add one track on west side between MP 51.1 and 50.8.Add one track on west side between MP 50.3 to south of Stonewall Jackson Road. ▪ Modify the at grade crossing at Summit Crossing Road (Route 668), Claiborne Crossing Road (Route 660) and Stonewall Jackson Road (Route 606) to accommodate the additional third track. Track Shifts ▪ Shift tracks west from MP 52.6 to 51.6 to increase speed and transition additional track from east to west. ▪ Shift tracks to the east and reconstruct a portion of the track to increase speeds through the curves at MP 50.6, 49.6, and 48.8. No stations occur in this segment. No structure modifications.
11: Guinea to Milford (GUMD)	47.0-38.0	**Improved Speed Option** Additional Track ▪ Add one track to west side between south of Stonewall Jackson Road and north of Nelson Hill Road. ▪ Modify the at grade crossing at Jones Crossing, Woodford Road, Woodslane Road, Rixey Road, Paige Road, and Roes Crossing to accommodate the additional third track. Track Shifts Shift tracks to the east to increase speeds through the curve at MP 38.9. Shift tracks to the west to increase speeds through the curve at MP 40.2, 40.7, 41.7, and 45.5. No stations occur in this segment. Structures ▪ Add crash walls to accommodate the third track at Rogers Clark Boulevard.

TABLE 9-5: CENTRAL VIRGINIA ALTERNATIVE 4A BY SEGMENT

Segment	Milepost	Proposed Improvements
12: Milford to North Doswell (MDND)	38.0-23.0	**Improved Speed Option** Additional Track ▪ Add one track to west side between north of Nelson Hill Road and south of the North Anna River. ▪ Modify the at-grade crossing of multiple private roads crossings; and Penola Road and Colemans Mill Road to accommodate the additional third track. Track Shifts ▪ Shift tracks to the east to increase speeds through the curve at MP 26.0, 26.8, 28.3, 29.1, 29.8, 30.4, and 36.2. ▪ Shift tracks to the west to increase speeds through the curve at MP 27.4, 31.4, and 34.9. ▪ Transition track from west to east through curve at MP 23.4. No stations occur in this segment. Structures ▪ Construct a new rail bridge (includes construction of one track on bridge with space for second track) over Mattaponi River and North Anna River. ▪ Construct a new one track rail bridge on the west side of the existing structure over Polecat Creek. ▪ Add crash walls to accommodate the third track at Dry Bridge Road, Ruther Glen Road, and I-95.
13: North Doswell to Elmont (NDEL)	23.0-11.0 (The Central Virginia portion of this segment extends from 23.0 to 19.0)	**Improved Speed Option** Additional Track ▪ Add one track to the east side south of North Anna River to north of Kings Dominion Boulevard. ▪ Add one track to the west side north of Kings Dominion Boulevard to Vaughn Road. ▪ Modify the at-grade crossing at Doswell Road, Private Crossing (Excelsior Mill) to accommodate the additional third track. Track Shifts ▪ Shift tracks to the west to increase speeds through the curve at MP 20.2. No Stations occur in this portion of the segment Structures ▪ Add crash walls to accommodate the third track at Old Ridge Road. ▪ Construct a new one track rail bridge on the west side of the existing structure over Taylorsville Road (Route 689) and Elletts Crossing Road (Route 641). ▪ Construct a new rail bridge (includes construction of one track on bridge with space for second track) over Little River. ▪ Construct a new single track rail bridge over South Anna River.

Table Notes: 1. East side or west side is relative to the existing north-south CSXT track alignment.
2. VRE station improvements and platform extensions are not included within the DC2RVA project.
3. Amtrak station improvements and platform extensions are included in the DC2RVA project.



Sheet 1
SHIFT EXISTING TRACKS TO INCREASE SPEED THROUGH CURVES

MILEPOSTS (CFP)	SHIFT EAST	SHIFT WEST
45.7 - 45.4		●
41.9 - 41.5		●
40.9 - 40.6		●
40.3 - 40.0		●
39.1 - 38.8	●	

Figure 9-7
Central Virginia Alternatives

9.3.5 Ashland Alternatives

In Ashland, from CFP 19 at the Doswell Junction to CFP 9 just north of I-295, four alternatives are being carried forward to the Draft EIS:

- Alternative 5A—No Additional Track
- Alternative 5B—Add a Track on the East Through Ashland
- Alternative 5C—West Bypass
- Alternative 5D—Add a Track and Center Three Tracks Through Ashland

Alternative 5A applies the No Additional Track Option to the Town of Ashland, with the Improved Speed (additional track) option applied north and south of the Town as described in Table 9-6, and shown in Figure 9–8.

TABLE 9-6: ASHLAND ALTERNATIVE 5A BY SEGMENT

Segment	Milepost	Proposed Improvements
13: North Doswell to Elmont (NDEL)	23.0-11.0 (the Ashland portion of this segment is 19.0 to 11.0)	**Improved Speed Option** Additional Track ▪ Add one track to the east side south of North Anna River to north of Kings Dominion Boulevard. ▪ Add one track to the west side north of Kings Dominion Boulevard to Vaughn Road. ▪ No Additional Track between Vaughn Road and Ashcake Road. ▪ Add one track to the west wide between Ashcake Road and Cedar Lane. ▪ Modify the at grade crossing at Vaughn Road, Ashcake Road, Gwathmey Church Road, Elmont Road and Cedar Lane to accommodate the additional third track. Stations ▪ Ashland Amtrak Station – lengthen and widen platforms, provide grade-separated pedestrian access between the platforms, and add a station shelter and parking.
14: Elmont to Greendale (ELGN)	11.0-6.3 (Ashland Area extends from 11.0 to 9.0 in this Segment)	**Improved Speed Option** Additional Track ▪ Add one track on the west side between Cedar Lane and south of Hungary Road. ▪ Modify the at grade crossing at Mill Road (Route 626), Mountain Road, and Hungary Rd (Route 682) to accommodate the additional third track. Track Shifts ▪ Shift tracks to the east to increase speeds through the curve at MP 6.6. No stations occur in this segment. Structures ▪ Construct a new single track rail bridge on the west side of the existing structure over Chickahominy River. ▪ Add crash walls to accommodate the third track at Greenwood Road.

Table Notes: 1. East side or west side is relative to the existing north-south CSXT track alignment.
2. VRE station improvements and platform extensions are not included within the DC2RVA project.
3. Amtrak station improvements and platform extensions are included in the DC2RVA project.

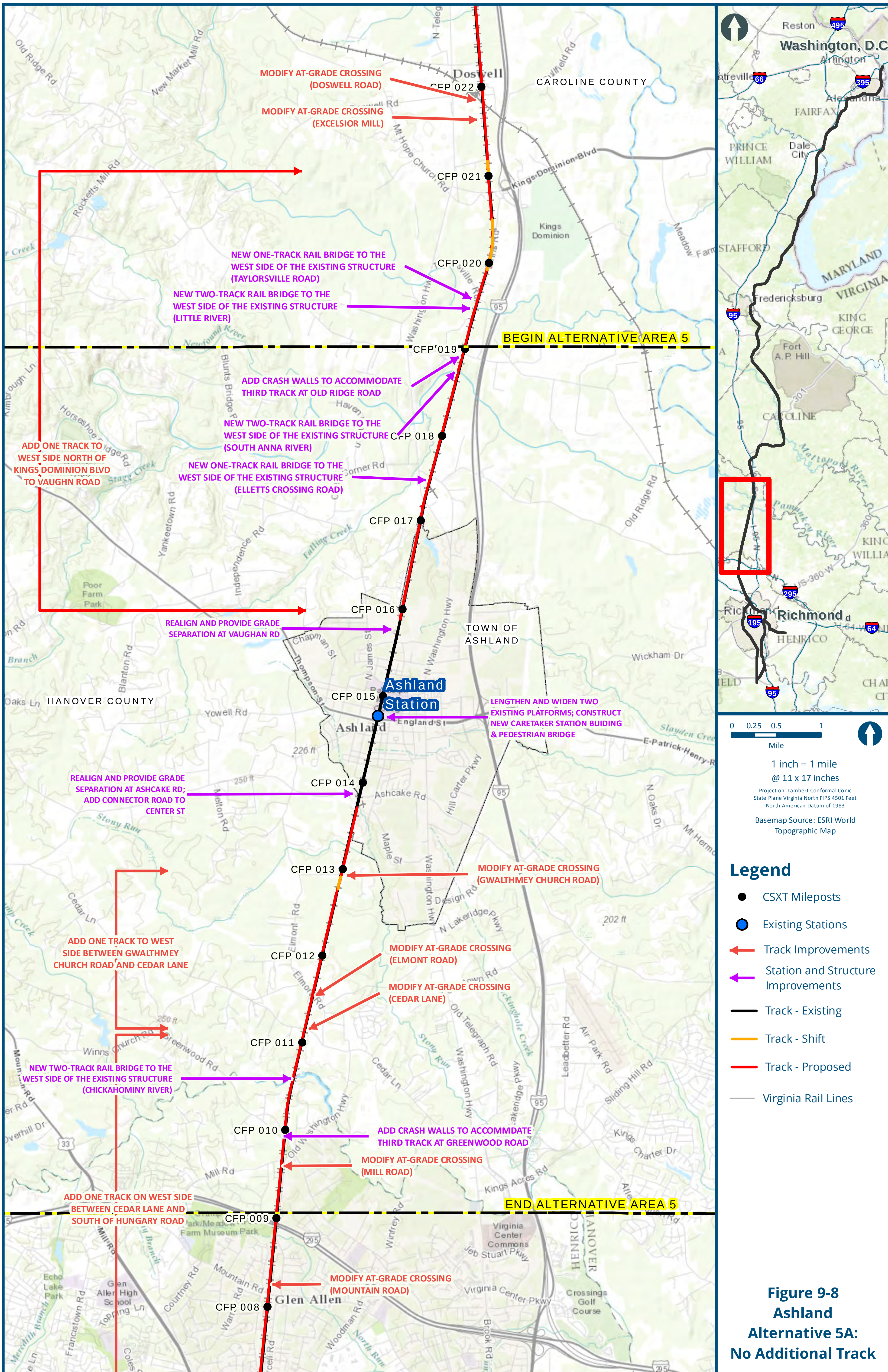


Figure 9-8
Ashland
Alternative 5A:
No Additional Track

Ashland Alternative 5B is similar to 5A, but continues the additional third track through the Town of Ashland from Vaughn Road to Ashcake Road on the east side of the existing two tracks. The new track would eliminate a portion of the travel lane of east Center Street. The east platform of the station would be widened to become an island platform, and the grade-separated pedestrian structure continued across the new track to the east. The additional track on the east would shift outward at the station to provide sufficient room for the island station platform. Figure 9-9 shows the additional track in Ashland at the station.

Alternative 5C is the Bypass Alternative and includes the same improvements described for Alternative 5A except through the town of Ashland (Figure 9-8). The bypass would diverge from the main line at MP 18.2 north of Ashland and include a two-track, 8.75-mile bypass west of the town of Ashland (Figure 9-10). The southern limit of the bypass is at MP 11.6 south of Ashland. This bypass would serve both freight and long distance passenger rail trains that do not serve the Ashland station. The existing two track corridor and Amtrak station in downtown Ashland continue to be served by Northeast Regional (Virginia/SEHSR) passenger trains. There would be a third track added at the north and south end of the Ashland area (MP 19 to 18.2 and MP 11.6 to 9.0, respectively)

Additional infrastructure improvements associated with the bypass include:

- Constructing new bridges over two crossings of Falling Creek.
- Roadway crossings on the new bypass alignment will be grade-separated, relocated, or closed.

Alternative 5D is similar to Alternative 5B, continuing the additional third track through the Town of Ashland from Vaughn Road to Ashcake Road on the east of the existing two tracks – however the three tracks are shifted slightly to the west so as to be centered on Center Street. Centering the tracks through Town maintains one travel lane on each side of the three tracks along most of Center Street. The existing downtown station is removed. Figure 9-11 shows the three tracks centered through Ashland.

DRPT is also proposing to evaluate an additional station option in Ashland, developing a new station on the east side of the tracks just south of Ashcake Road. This new station location would replace the existing downtown station in Alternatives 5A, 5B, 5C, and 5D.

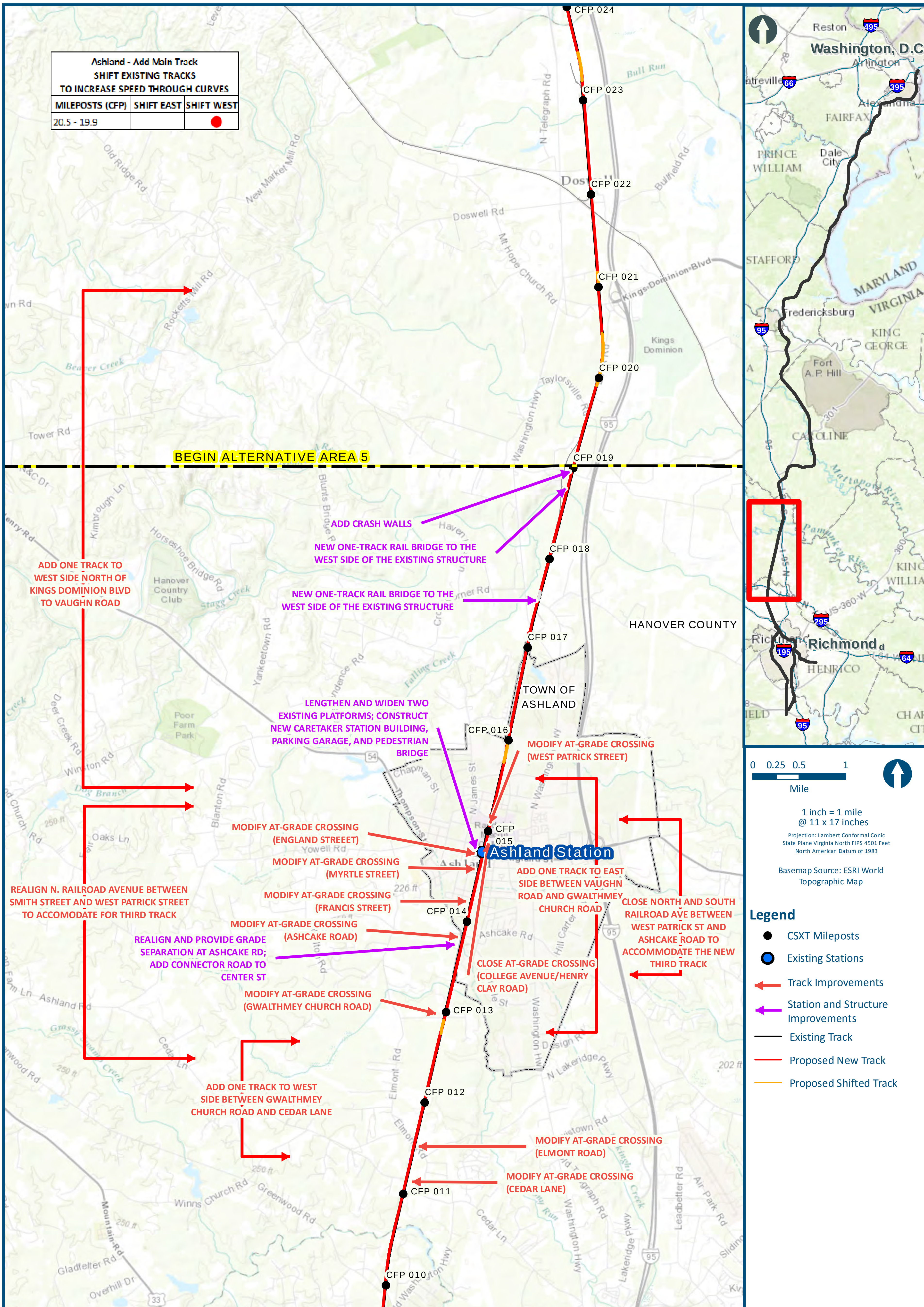
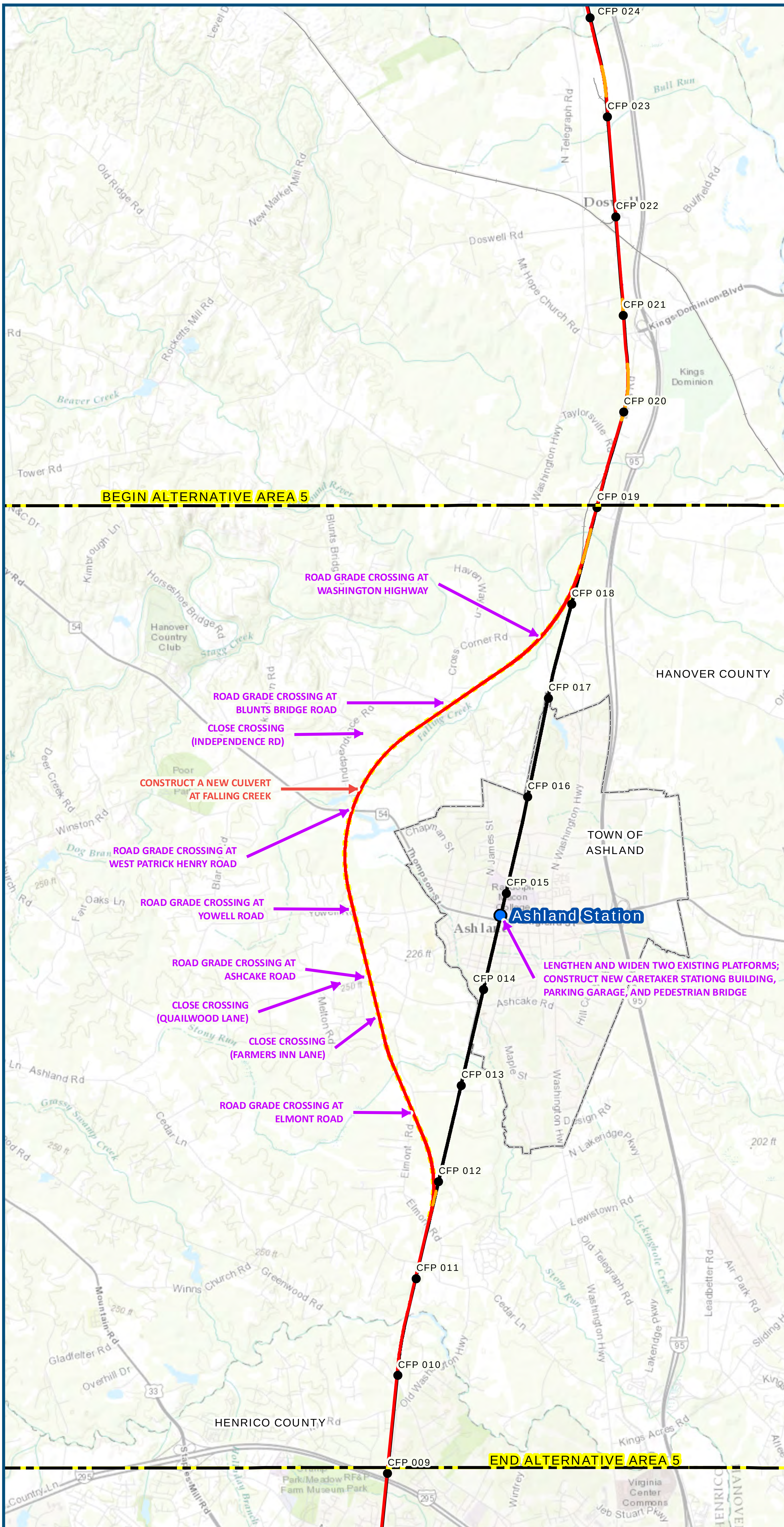


Figure 9-9 Ashland Alternative 5B: Add Main Track



0 0.25 0.5 1
Mile

1 inch = 1 mile
@ 11 x 17 inches

Projection: Lambert Conformal Conic
State Plane Virginia North FIPS 4501 Feet
North American Datum of 1983

Basemap Source: ESRI World Topographic Map

Legend

- CSXT Mileposts
- Existing Stations
- Track Improvements
- Station and Structure Improvements
- Existing Track
- Proposed New Track
- Proposed Shifted Track

Figure 9-10
Ashland Alternative 5C: Two-Track Bypass

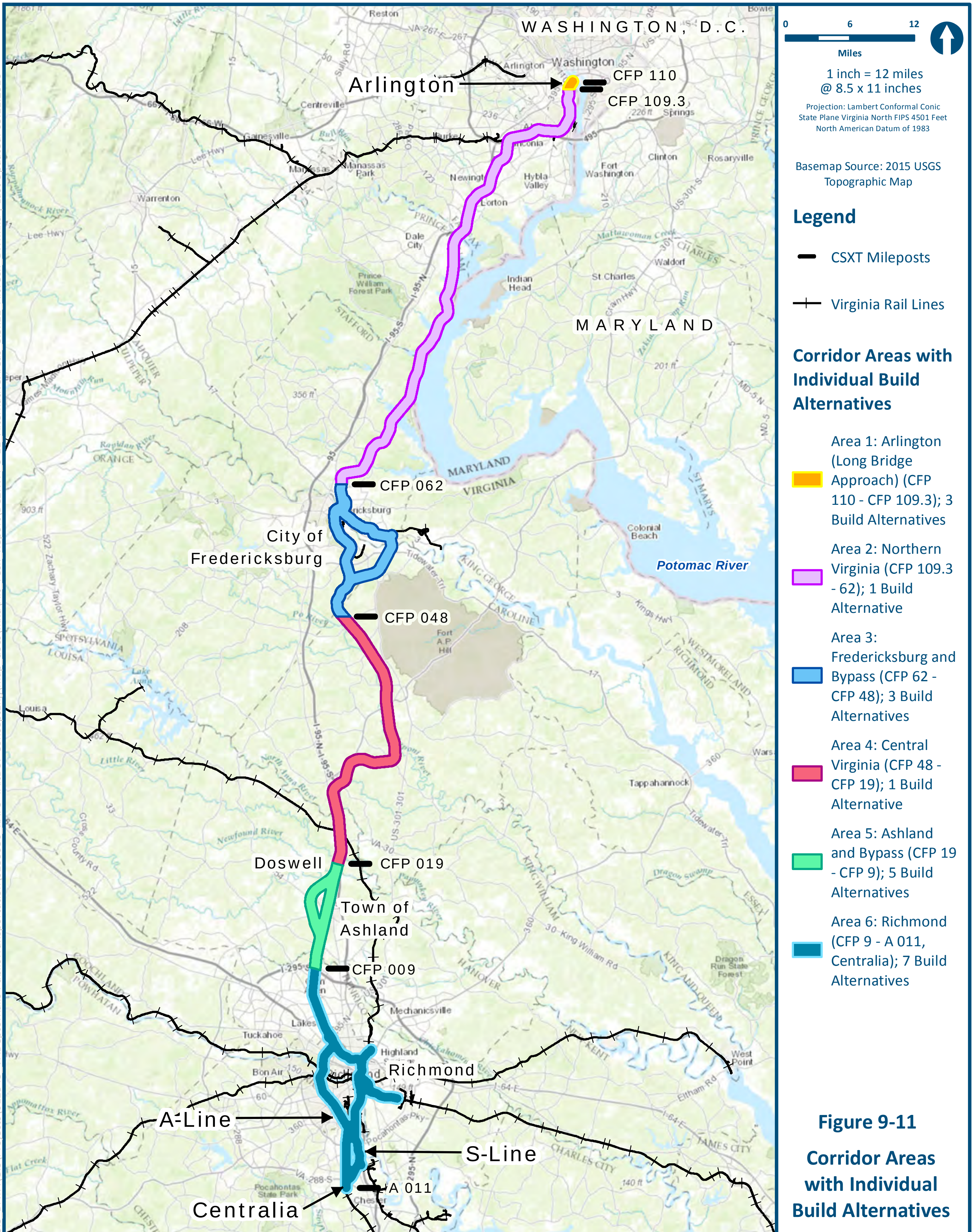


Figure 9-11

Corridor Areas with Individual Build Alternatives

9.3.6 Richmond Alternatives

The seven Richmond alternatives cover an area from Greendale to Centralia. The alternatives provide varying combinations of single stations and two station options. Two station alternatives categorize service options as Split, Full, or Shared service depending on the mix of long distance, Interstate Corridor (Carolinian/SEHSR), and Northeast Regional (Virginia/SEHSR) passenger service to each station. If there is only one station, all passenger trains would stop at that station (not including the Auto Train). See Section 5.6 for additional details and related figures for all Richmond Alternatives listed below.

Richmond area alternatives are:

- Single Station Options
  - Alternative 6A—Staples Mill Road Station (via A-line)
  - Alternative 6B—Boulevard Station (via A-line or S-line)
  - Alternative 6C—Broad Street Station (via A-line)
  - Alternative 6D—Main Street Station (via S-line)
- Two Station Options
  - Alternative 6E—Staples Mill Road and Main Street Stations Combined—Split Service (via S-line)
  - Alternative 6F—Staples Mill Road and Main Street Stations Combined—Full Service (via A-line)
  - Alternative 6G—Staples Mill Road and Main Street Stations Combined—Shared Service (via A-line and S-line)

Track infrastructure and other track improvements are identified based on current and projected passenger and freight train operations including stations served. Station facility improvements, including potential new stations and expansion of station facilities such as parking, will be addressed in the Tier II Draft EIS. Potential changes in service (train stop frequency and schedules) will also be addressed during development of the Tier II Draft EIS and in the DC2RVA Service Development Plan.

9.3.6.1 Alternative 6A — Staples Mill Road Station

All passenger trains moving north-south through Richmond would be routed through Staples Mill Road Station to Centralia using the A-Line. The Northeast Regional (Virginia) service to Newport News would continue from Staples Mill Road Station past Main Street Station on the Peninsula Subdivision. The Main Street Station would be closed.

Rail infrastructure improvements include:

- Adding a third main track from the north (RF&P subdivision) to Acca Yard.
- Modifying Staples Mill Road Station to provide one low level island boarding platform and one level island platform, and add a new station facility and additional parking facilities.
- Improving the existing two main tracks from Acca Yard to AM Junction.

- Adding a second main track on the existing elevated rail structure on the east side of Main Street Station from AM Junction to Rivanna Junction.
- Adding a third main track on the A-Line from Meadows (south of the James River) to Centralia.
- Replacing road overpasses with insufficient vertical and horizontal clearance for the new track.
- Overnighting and servicing passenger trains originating from Richmond at the station.

9.3.6.2 Alternative 6B — Boulevard Station

Boulevard station can be reached through the A-line or the S-line. In the A-line alternative, all Long Distance, Interstate Corridor (Carolinian/SEHSR), and Northeast Regional (Virginia/SEHSR) passenger trains moving north-south through Richmond would be routed through a new Boulevard Station and then to Centralia using the A-Line and an elevated loop track. The Northeast Regional (Virginia) service to Newport News would continue from the new Boulevard Station on the Peninsula Subdivision. Both the Staples Mill Road Station and Main Street Station would be closed.

Rail infrastructure improvements for the A-line Alternative include:

- Adding a third main line track from the north (RF&P subdivision) to Acca Yard.
- Adding a two-track bypass on the east side of Acca Yard.
- Adding a new Boulevard Station adjacent to the main line tracks with one low-level island platform and one high-level island platform.
- Adding a third main track from Acca Yard to AM Junction.
- Adding a new wye track near Hospital Street to turn passenger trains.
- Adding a new passenger layover/servicing facility near Brown Street Yard with three tracks.
- Adding a third main track on the A-Line from Meadows (south of the James River) to Centralia.
- Replacing road overpasses that have insufficient vertical and horizontal clearance for the new track, including Boulevard Street overpass.
- Overnighting passenger trains originating at Richmond at the station and servicing the trains at the station or at Staples Mill service platform.

In the Boulevard Station S-line alternative, all Long Distance, Interstate Corridor (Carolinian/SEHSR), and Northeast Regional (Virginia/SEHSR) passenger trains moving north-south through Richmond would be routed through a new Boulevard Station and then to Centralia using the S-Line. The Northeast Regional (Virginia) service to Newport News would continue from the new Boulevard Station on the Peninsula Subdivision. Both the Staples Mill Road Station and Main Street Station would be closed.

Rail infrastructure improvements for the S-line Alternative include:

- Adding a third main track from the north (RF&P subdivision) to Acca Yard.

- Adding a two-track bypass on the east side of Acca Yard.
- Adding a third main track from Acca Yard to AM Junction.
- Adding a new wye track near Hospital Street to turn passenger trains.
- Adding a new passenger layover/servicing facility near Brown Street Yard with three tracks.
- Adding one level boarding island platform and one low level boarding side platform. All platforms 1,200- foot long and extending under Boulevard.
- Constructing a new station facility with parking northeast of Boulevard and the S-line.
- Adding a second main track on the existing elevated rail structure on both the east and west side of Main Street Station from AM Junction to Rivanna Junction on the east side and to the Triple Rail Crossing on the west side
- Adding a new rail bridge on the S-Line across the James River from the Triple Rail Crossing (with one track on the bridge and space for a second track).
- Adding a second main track on the S-Line from the James River to Centralia.
- Adding a new 12,000-foot staging track extending south from the South Yard.
- Replacing road overpasses with insufficient vertical and horizontal clearance for the new track.

9.3.6.3 Alternative 6C — Broad Street Station

All passenger trains moving north-south through Richmond would be routed through a new Broad Street station on a loop track and then to Centralia using the A-Line. The Northeast Regional (Virginia) service to Newport News would continue from the new Broad Street Station loop track on the Peninsula Subdivision. Both the Staples Mill Road Station and Main Street Station would be closed.

Rail infrastructure improvements include:

- Adding a third main line track from the north (RF&P subdivision) to Acca Yard.
- Adding a loop track, similar to the historic loop track that once served the station. The loop track would enclose the area currently used for the Washington Redskins Football Team summer training camp, and require demolition of several existing buildings.
- Constructing a new station and extended platforms adjacent to the historic Broad Street Station (now the Virginia Museum of Science).
- Adding a third main track on the A-Line from Meadows (south of the James River) to Centralia.
- Replacing road overpasses with insufficient vertical and horizontal clearance for the new track
- Overnighting and servicing passenger trains originating from Richmond at the station.

9.3.6.4 Alternative 6D — Main Street Station

All long distance, Interstate Corridor (Carolinian/SEHSR), and Northeast Regional (Virginia/SEHSR) passenger trains moving north-south through Richmond would be routed to the west side of Main Street Station and then to Centralia using the S-Line. The Northeast Regional (Virginia) service to Newport News would continue from the east side of Main Street Station on the Peninsula Subdivision. The Staples Mill Road Station would be closed.

Rail infrastructure improvements in the Richmond area include:

- Adding a third main track from the north (RF&P subdivision) to Acca Yard.
- Adding a two-track bypass on the east side of Acca Yard.
- Adding a third main track from Acca Yard to AM Junction.
- Adding a new wye track near Hospital Street to turn passenger trains.
- Adding a new passenger layover/servicing facility near Brown Street Yard with three tracks.
- Adding two elevated low level side platforms on the west side (extending 1,200 feet) and an additional elevated low level side platform on the east side (extending 850 feet) of Main Street Station.
- Adding additional parking facilities.
- Adding a second main track on the existing elevated rail structure on both the east and west side of Main Street Station from AM Junction to Rivanna Junction on the east side and to the Triple Rail Crossing on the west side
- Adding a new rail bridge on the S-Line across the James River from the Triple Rail Crossing (with one track on the bridge and space for a second track).
- Adding a second main track on the S-Line from the James River to Centralia.
- Adding a new 12,000-foot staging track extending south from the South Yard.
- Replacing road overpasses with insufficient vertical and horizontal clearance for the new track.

9.3.6.5 Alternative 6E — Staples Mill Road and Main Street Stations Combined—Split Service

All long distance, Interstate Corridor (Carolinian/SEHSR), and Northeast Regional (Virginia/SEHSR) passenger trains moving north-south through Richmond would be routed through Staples Mill Road Station to Centralia using the A-Line, bypassing Main Street Station. Newport News trains would continue to access the S-Line as they do now at AY interlocking, but would benefit from the additional track capacity proposed north of AY on the A-Line and track improvements south of AY on the S-Line, as described below. The Northeast Regional (Virginia) service to Newport News would continue from the east side of Main Street Station on the Peninsula Subdivision.

Rail infrastructure improvements include:

- Adding a third main line track from the north (RF&P subdivision) to Acca Yard.

- Modifying Staples Mill Road Station to provide one low level island platform and one high-level island platform.
- Improving the two main line tracks from Acca Yard to AM Junction.
- Adding a new wye near Hospital Street to turn passenger trains.
- Adding a new passenger layover/servicing facility near Brown Street Yard with three tracks.
- Adding an elevated second low level side platform on the east side of Main Street station, extending 850 feet.
- Adding a second main track on the existing elevated rail structure on the east side of Main Street Station from AM Junction to Rivanna Junction.
- Adding a third main line track on the A-Line from Meadows (south of the James River) to Centralia.
- Replacing road overpasses with insufficient vertical and horizontal clearance for the new track.

9.3.6.6 Alternative 6F — Staples Mill Road and Main Street Stations Combined—Full Service

All long distance, Interstate Corridor (Carolinian/SEHSR), and Northeast Regional (Virginia/SEHSR) passenger trains moving north-south through Richmond will be routed through Staples Mill Road Station to the west side of Main Street Station and then to Centralia using the S-Line. The Northeast Regional (Virginia) service to Newport News would continue to the east side of Main Street Station on the Peninsula Subdivision.

Rail infrastructure improvements include:

- Adding a third main track from the north (RF&P subdivision) to Acca Yard.
- Modifying Staples Mill Road Station to relocate boarding platforms to the east side of the existing main with one low level island platform and one high-level island platform.
- Adding a two-track bypass on the east side of Acca Yard.
- Adding a third main track from Acca Yard to AM Junction.
- Adding a new wye track near Hospital Street to turn passenger trains.
- Adding a new passenger layover/servicing facility near Brown Street Yard with three tracks.
- Adding two low level side platforms on the west side (extending 1,200 feet) and an additional low level side platform on the east side (extending 850 feet) of Main Street Station.
- Adding a second main track on the existing elevated rail structure on both the east and west side of Main Street Station from AM Junction to Rivanna Junction on the east side and to the Triple Rail Crossing on the west side.
- Adding a new rail bridge designed wide enough to carry two tracks and built with substructures for two tracks, and superstructures and bridge spans estimated and built

for only one track on the S-Line across the James River (with one track on the bridge and space for a second track).

- Adding a second main track on the S-Line from the James River to Centralia.
- Adding a new 12,000-foot staging track extending south from the South Yard.
- Replacing approximately seven road overpasses with insufficient vertical and horizontal clearance for the new track.

9.3.6.7 Alternative 6G — Staples Mill Road and Main Street Stations Combined—Shared Service

All long distance, Interstate Corridor (Carolinian/SEHSR), and Northeast Regional (Virginia/SEHSR) passenger trains moving north-south through Richmond would be routed through Staples Mill Road Station either to the west side of Main Street Station and then to Centralia using the S-line, or to Centralia using the A-line, bypassing Main Street Station. The Northeast Regional (Virginia) service to Newport News would continue from the east side of Main Street Station on the Peninsula Subdivision.

Rail infrastructure improvements include:

- Adding a third main track from the north (RF&P subdivision) to Acca Yard.
- Modifying Staples Mill Road Station to add boarding platforms to the east side of the existing main tracks with one low level island platform and one high-level island platform and extend and widen platforms on the west.
- Adding a two-track bypass on the east side of Acca Yard.
- Adding a third main track from Acca Yard to AM Junction.
- Adding a new wye track near Hospital Street to turn passenger trains.
- Adding new passenger layover/servicing facility near Brown Street Yard with three tracks.
- Adding two low level side platforms on the west side (extending 1,200 feet) and an additional low level side platform on the east side (extending 850 feet) of Main Street Station.
- Adding a second main track on the existing elevated rail structure on both the east and west side of Main Street Station from AM Junction to Rivanna Junction on the east side and to the Triple Rail Crossing on the west side
- Adding a new rail bridge on the S-Line across the James River (with one track on the bridge and space for a second track).
- Adding a second main track on the S-Line from the James River to Centralia.
- Adding a new 12,000-foot staging track extending south from the South Yard.
- Replacing road overpasses with insufficient vertical and horizontal clearance for the new track.

10 REFERENCES

The following provides a list of references cited throughout the Alternatives Technical Report. In addition, Chapter 4 provides an overview of some of the previous and ongoing rail planning studies in the DC2RVA corridor and adjacent sections of the larger SEHSR corridor. A detailed list of previous and ongoing studies reviewed for the DC2RVA project is provided as Appendix D.

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