September 2017

DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

Tier II
Draft Environmental Impact Statement
Section 4(f) Evaluation

DRPT
Virginia Department of Rail and Public Transportation

U.S. Department of Transportation
Federal Railroad Administration

SOUTHEAST HIGH SPEED RAIL
WASHINGTON, DC TO RICHMOND, VIRGINIA

TIER II DRAFT ENVIRONMENTAL IMPACT STATEMENT
AND
DRAFT SECTION 4(f) EVALUATION

Submitted Pursuant To:
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By:
U.S. Department of Transportation - Federal Railroad Administration
and
Virginia Department of Rail and Public Transportation

Cooperating Agencies:

Federal Highway Administration
Federal Transit Administration
Virginia Department of Transportation
U.S. Army Corps of Engineers
U.S. Coast Guard
U.S. Environmental Protection Agency

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Virginia Department of Rail & Public Transportation

8/30/17
Date of Approval

Associate Administrator for Railroad Policy and Development
Federal Railroad Administration

This Tier II Draft Environmental Impact Statement defines existing and future transportation conditions and needs within the 123-mile railroad corridor from Washington, DC to Richmond, Virginia; identifies a range of alternative improvements that would address those needs; and evaluates the potential effects of the alternatives on the natural and human environments. The corridor is part of the larger Southeast High Speed Rail (SEHSR) Corridor which extends from Washington, DC to Charlotte, North Carolina. A Tier I evaluation of the SEHSR Corridor was completed in 2002.

FRA intends to issue a combined Final Environmental Impact Statement and Record of Decision document pursuant to Public Law 112-141, 126 Stat.405, Section 1319(b) unless FRA determines statutory criteria or practicability considerations preclude issuance of the combined document pursuant to Section 1319.

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Comments on this Tier II Draft Environmental Impact Statement are due by November 7, 2017 and should be sent to Ms. Stock at the above address or submitted using the online comment form at www.DC2RVArail.com.

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CHAPTER 3 – AFFECTED ENVIRONMENT

This chapter provides information on the existing resources and condition of the environment. Generally, it focuses on the important issues in order to provide an understanding of the Project area relative to the impacts of the alternatives. The affected environment includes discussions, commensurate with the importance of the potential impacts, the existing social, economic, and environmental settings surrounding the Project. It also identifies environmentally sensitive features in the project corridor.

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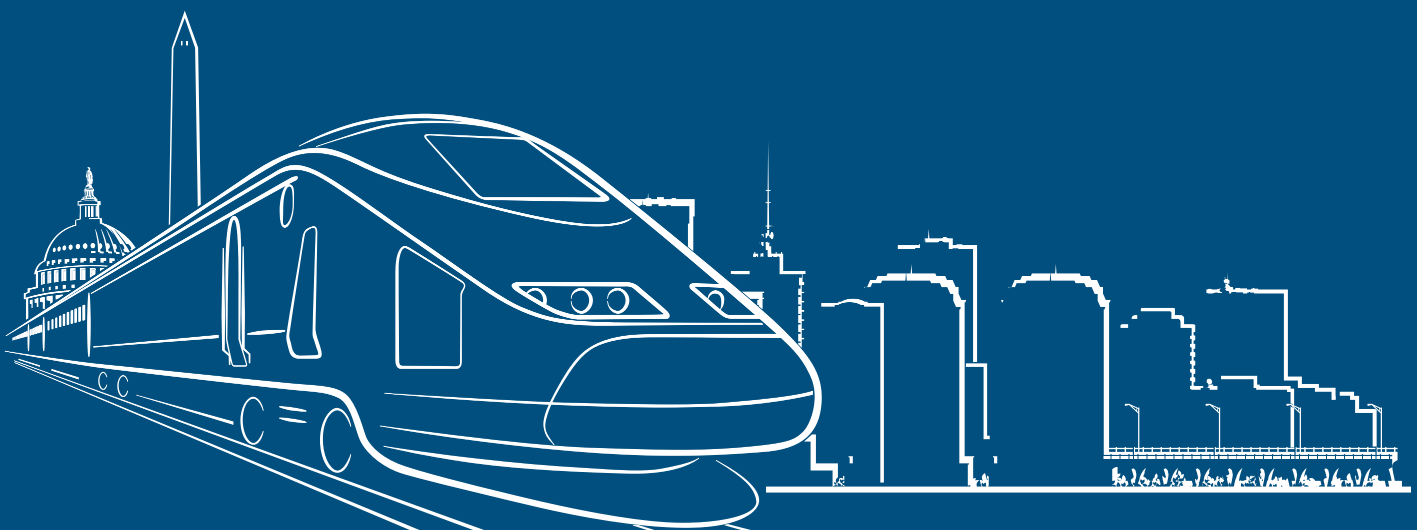
DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

1 PURPOSE AND NEED FOR THE PROPOSED ACTION



1 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

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 Project (DC2RVA Project). The Project will increase capacity to deliver higher speed passenger rail, expand commuter rail, and accommodate growth of freight rail service, in an efficient and reliable multimodal rail corridor. While there is overlap in how intercity passenger rail and commuter rail services are defined, typically intercity passenger rail facilitates business and leisure travel between central business districts. Intercity passenger rail includes both regional and long-distance services; long-distance passenger rail covers distances longer than 750 miles and does not receive financial support from the states it serves. Regional passenger rail includes routes less than 750 miles and receive funding support from states. Typically, the termini for regional passenger rail service fall within geographic areas that share similar characteristics, such as economic, environmental, infrastructure, and historical/cultural ties. Commuter rail service can travel through multiple central business districts but generally provides short-haul rail service with morning and evening peaks in ridership and service levels that facilitates travel to work. 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 door-to-door time-competitive option for travelers between Washington, D.C. and Richmond and those traveling to and from adjacent connecting corridors. The Project is part of the larger Southeast High Speed Rail (SEHSR) corridor (Figure 1.1-1), which extends from Washington, D.C. through Richmond, and continues east to Hampton Roads (Norfolk), VA, and south to Raleigh, NC, and Charlotte, NC, and then continues west to Atlanta, GA and south to Florida. The Project connects to the National Railroad Passenger Corporation (Amtrak) Northeast Corridor (NEC) at Union Station in Washington, D.C.

As sponsoring agencies for the Project, FRA and DRPT have maintained close coordination with the major stakeholders in the corridor, including rail operators Amtrak, Virginia Railway Express (VRE), and CSX Transportation (CSXT). FRA and DRPT have engaged federal and state agencies that have jurisdiction by law and/or special expertise to serve as Cooperating Agencies, including the Federal Highway Administration (FHWA), Federal Transit Administration (FTA), U.S. Army Corps of Engineers (USACE), U.S. Coast Guard (USCG), U.S. Environmental Protection Agency (EPA), and the Virginia Department of Transportation (VDOT). FRA and DRPT have also coordinated Project development with the Washington, D.C. District Department of Transportation (DDOT), the North Carolina Department of Transportation (NCDOT), and affected Virginia localities.

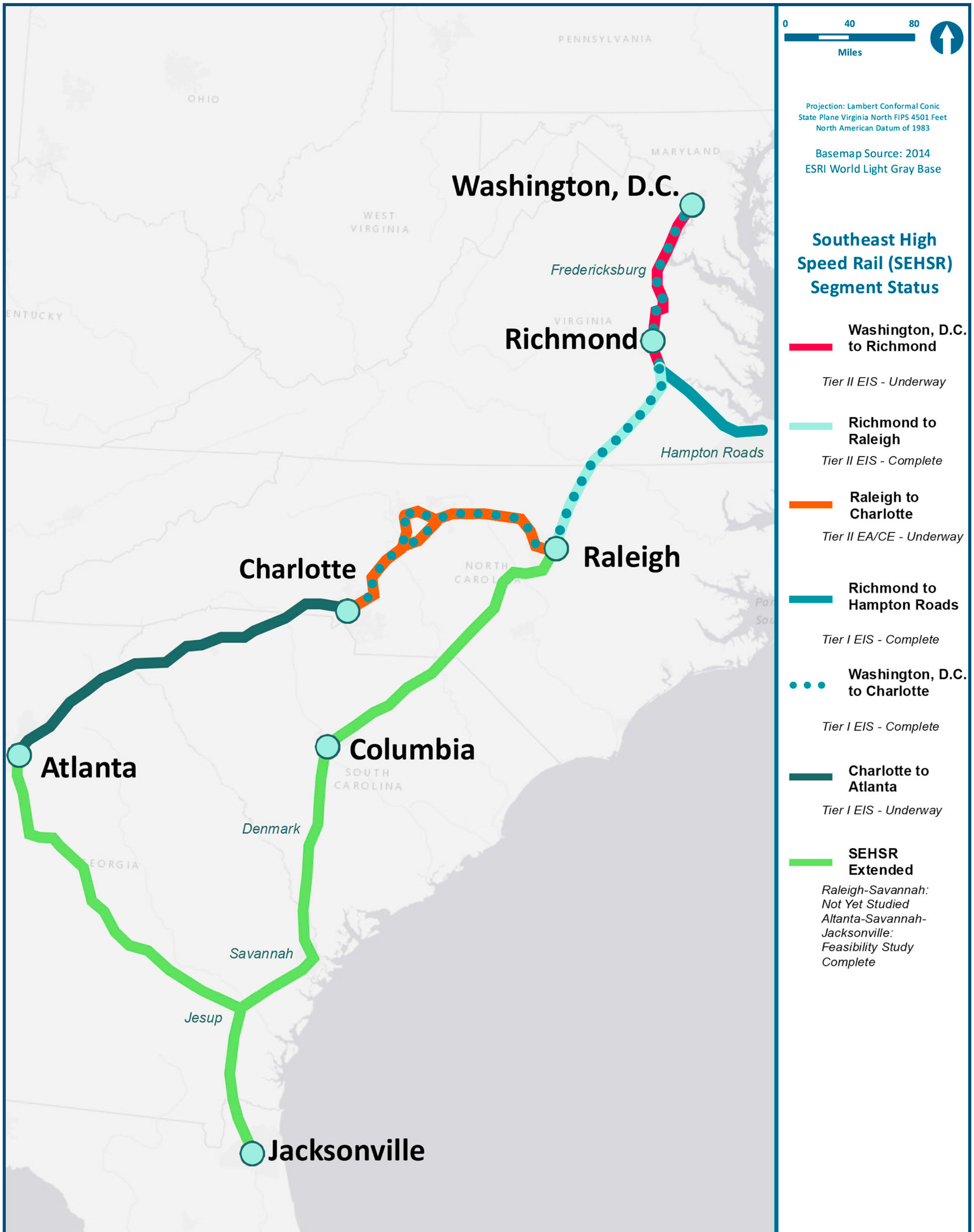


Figure 1.1-1: SEHSR Corridor

This chapter presents the purpose of and need for the 123-mile DC2RVA Project and builds on the purpose and need defined for the full SEHSR corridor in the Tier I Environmental Impact Statement (EIS), articulating and addressing the specific needs in the Washington, D.C. to Richmond segment of the SEHSR corridor. The following sections in this chapter introduce the background of the Project; describe its location; provide a synopsis of the DC2RVA Project; discuss the purpose and need identified for both the overall SEHSR corridor and the DC2RVA Project specifically; provide background information and highlight related studies; and identify the benefits of the Project.

The Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA Public Law 120-240, Section 1036) authorized a program of high speed rail corridors in the United States. In 1992, the United States Department of Transportation (U.S. DOT) designated the SEHSR corridor, from Washington, D.C. to Charlotte, as one of five original national high speed rail corridors. The SEHSR corridor is made up of a number of segments covering the south Atlantic states with passenger rail service to and from the NEC, including Amtrak's service north to New York and Boston. U.S. DOT administratively designated an extension of the SEHSR corridor from Richmond to Hampton Roads in 1996. In 1998, U.S. DOT extended the SEHSR corridor into South Carolina, Georgia, and Florida. Further extensions in 2000 added additional corridor connections in Georgia and Florida. System linkages through Atlanta would also connect passengers to Alabama, Mississippi, Louisiana, and Texas.

In October 2002, DRPT and NCDOT, together with FHWA and FRA, completed a service-level Tier I EIS[1] for the SEHSR corridor between Washington, D.C. and Charlotte, NC. This Tier I EIS established the SEHSR program-level Purpose and Need, established the preferred modal alternative (rail) and selected a preferred rail corridor. It also provided a programmatic-level environmental analysis of the various alternatives in the selection of the preferred. Note that a Tier I program level document is not a "Build" document, and requires one or more follow-on Tier II documents (such as this DC2RVA EIS process) before construction. The purpose of the SEHSR program, as stated in the Tier I EIS, is to provide a door-to-door time-competitive transportation choice to travelers within the Washington, D.C. to Charlotte travel corridor. The Tier I EIS stated that implementation of improved passenger rail service in the Washington, D.C. to Charlotte SEHSR corridor could:

- Divert trips from air and highway travel modes within the corridor, thereby relieving pressure on these congested modes.
- Provide a more balanced and energy-efficient use of the corridor's transportation infrastructure.

[1] The Tier I EIS evaluated the SEHSR program pursuant to the National Environmental Policy Act (NEPA) using a tiered approach as described in 23CFR 777.111(g) and Council on Environmental Quality (CEQ) regulations 1502.20 and 1508.28. This tiered approach is composed of a first level document (Tier I) that is general in nature and provides a program-level or corridor-level overview of study area alternatives and potential effects. Following completion of the Tier I evaluation, a second level of documents can be developed (Tier II) that is more detailed in the level of analysis. Generally, the Tier I document evaluates what is to be done at the program level, and the Tier II document(s) evaluates the specific actions necessary to accomplish the preferred Tier I alternative. A public Record of Decision (ROD) for the Tier I and Tier II NEPA evaluations provides a concise record of the NEPA decision-making process, identifies the selected alternative, presents the basis for the decision, identifies alternatives considered but not selected, specifies the "environmentally preferable alternative," and provides information on the adopted means to avoid, minimize, and compensate for environmental impacts.

- Increase the safety and effectiveness of the transportation system within the travel corridor.
- Serve long-distance travelers between and beyond Virginia and North Carolina, including Amtrak's Northeast Corridor, which extends from Washington, D.C. to Boston, MA.

The 2002 Tier I Record of Decision (ROD) for the Washington, D.C. to Charlotte SEHSR program selected an incremental approach to develop the SEHSR program. 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. Subsequently, the SEHSR corridor was separated into discrete sections (Washington, D.C. to Richmond, Richmond to Raleigh, and Raleigh to Charlotte) for further detailed (Tier II) "build" studies. Later studies added additional segments to the SEHSR corridor, including Richmond to Hampton Roads, and segments extending south and west of Charlotte.

1.2 PROJECT LOCATION

The Washington, D.C. to Richmond corridor spans 123 miles along an existing rail corridor owned by CSXT between Control Point[2] Rosslyn (RO) at milepost (MP) CFP 110 in Arlington County, VA to the junction of the CSXT North End Subdivision (sometimes referred to as the A-Line) between West Acca Yard in Richmond and Centralia, VA, and the CSXT Bellwood Subdivision (sometimes referred to as the S-Line) between Control Point Hermitage in Richmond and Centralia, VA (CE) at MP A-11 in Chesterfield County, VA (Figure 1.2-1). At the northern terminus in Arlington County, the Project limit is marked by the southern approach to Long Bridge, a double-track rail bridge connecting the rail corridor over the Potomac River[3] 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 (the A-Line and the S-Line) that begin in Richmond and rejoin approximately 11 miles south of the city. The theoretical study area for ridership and revenue estimation, and capacity modeling extends beyond the physical Project limits north to Union Station in Washington, D.C. (which is owned by Amtrak) and the NEC, and south to Norfolk and Newport News, VA and to cities in North Carolina and beyond to Florida.

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 (BBR) from AM Junction to the RF&P Crossing (MP CA-111.8) north of Richmond in Doswell, VA.

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[2] 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.

[3] A separate NEPA study of alternatives to replace and/or expand Long Bridge began in 2015. The study is funded under a 2014 TIGER Grant to the District Department of Transportation (DDOT) (see Section 1.6.4 for additional details).

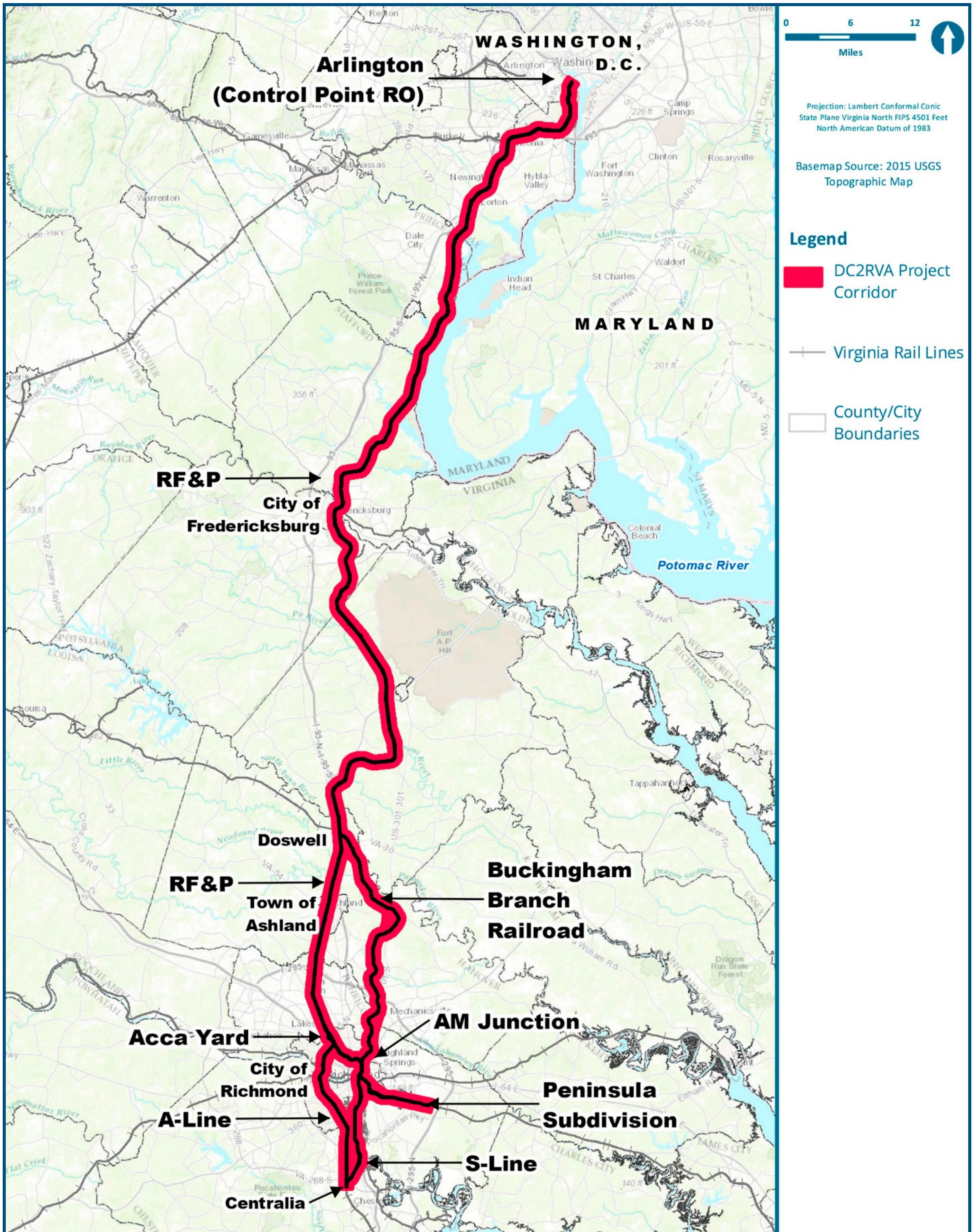

Figure 1.2-1: DC2RVA Project Corridor

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. In downtown Richmond and at Centralia, 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.[4] The Washington, D.C. to Richmond segment is an integral part of the overall Washington, D.C. to Charlotte SEHSR corridor and provides a critical link between high speed passenger service from Boston to Washington, D.C. and the southeastern United States.

1.3 PROJECT DESCRIPTION

The Project will include specific rail infrastructure improvements and service upgrades to deliver higher speed passenger rail, 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 door-to-door competitive travel time in a corridor shared by growing volumes of passenger, commuter, and freight rail traffic. Specific improvements to the existing rail infrastructure between Arlington, VA, and Centralia, VA, include:

- Corridor-wide improvements to train operating capacity to accommodate efficient operation of passenger, commuter, and freight rail service with increased frequency, reliability, and speed, including an additional main track along most of the corridor, additional sidings, crossovers, yard bypasses and leads, and other capacity and reliability improvements at certain locations.
- 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.
- Station and platform improvements for Amtrak and VRE stations to improve the efficiency of railroad operations, improve quality of service, and accommodate increased ridership.

The environmental impacts of these improvements and measures to avoid, minimize, or otherwise mitigate such impacts are described in Chapter 4.

The Project will include locations for new or replacement passenger stations on the Project corridor. Additionally, the Project will include rail capacity improvements to address congestion in the Richmond area, including on the CSXT Peninsula Subdivision from AM Junction in downtown Richmond east to Beulah Road in Henrico County, and on the Buckingham Branch Railroad from AM Junction north of Richmond to Doswell, VA.

Studies in support of the Project addressed passenger and freight rail operations and service between Union Station in Washington, D.C. and Richmond and beyond, but the Project will not include physical improvements to the Long Bridge across the Potomac River or to rail

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[4] The Tier II Final EIS (September 2015) and ROD (anticipated in 2016) for the Richmond to Raleigh SEHSR segment and the Tier I Final EIS (August 2012) and ROD (December 2012) for the Richmond to Hampton Roads SEHSR segment identify the Richmond terminus as Main Street Station with rail access from the south along the CSXT S-Line. The Washington, D.C. to Richmond project's southern terminus of Centralia overlaps with these prior NEPA evaluations to provide additional detailed study of potential passenger and freight rail improvements in the Richmond area that support the Project's Purpose and Need.

infrastructure within Washington, D.C. Other projects will address these improvements as well as improvements to the rail infrastructure north of Arlington and south of Centralia along the SEHSR corridor.

1.4 PROJECT PURPOSE

The 2002 Tier I EIS established the overall purpose for the SEHSR program, 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 current DC2RVA project carries 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. As detailed below, the Purpose of the DC2RVA project is to increase railroad capacity between Washington, D.C. and Richmond to deliver higher speed passenger rail, expand commuter rail, and accommodate growth of freight rail service in an efficient and reliable multimodal rail corridor. This Project will enable passenger rail to be a competitive transportation choice for intercity travelers between Washington, D.C. and Richmond and beyond. DRPT anticipates that the Project will 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 freight rail movement through the corridor, including to and from Virginia's ports
- 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 (GHG) emissions by diverting passenger trips by automobile and movement of freight by trucks to more environmentally sustainable rail transportation

Higher speed passenger rail service would also encourage economic development in the Commonwealth and along the Eastern Seaboard 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 with 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.

1.5 PROJECT NEED

The Project is a key component of the SEHSR program. The need for the SEHSR program was established in the Tier I EIS and is further supported by current conditions in the corridor, described below.

1.5.1 SEHSR Program Need

The Tier I Final EIS and ROD for the SEHSR corridor between Washington, D.C. and Charlotte established the needs for the overall SEHSR program, including this Project. The following needs for the SEHSR program were identified in the Tier I EIS, and remain current for the SEHSR corridor:

- **Growth.** Population growth and economic growth in the SEHSR corridor have burdened airport and highway networks, which are experiencing capacity problems that are projected to worsen over the next several decades, despite planned improvements. If the region's transportation systems do not provide options for reliable and convenient movement of goods and people, its economy may suffer.
- **Congestion**. Population growth and economic development have caused a severe increase in traffic congestion on interstates and major highways. Daily traffic volumes regularly exceed the design capacity of I-95 in the corridor, causing delays and safety concerns. Average highway speeds, particularly during rush hours, are declining, while concerns about air quality are rising. Virginia is planning or implementing improvements to I-95 and other major highways in the corridor to provide additional vehicle capacity; however, experience has shown that traffic volumes quickly reach or exceed the capacity of highway improvements. The increasing cost and potential environmental impacts of continual highway expansion make it less desirable to implement further improvements.
- **Air Travel.** Demand for air travel is increasing nationwide and within the corridor. The expansion of air travel has outpaced the growth in airport capacity, resulting in delays. Air travel delays increase airline-operating costs and generate additional noise and emissions. Delays affect the traveling public due to missed time at work, on vacation, or at home, and missed business opportunities.
- **Travel Time**. Travel time and service reliability are key factors affecting the traveling public's choice of transportation mode. The Tier I EIS found that conventional rail travel times were not competitive with travel by air or auto within the SEHSR corridor. Rail passenger service competitiveness will not increase without reductions in travel time and improvements in service frequency and reliability.
- **Air Quality.** Several localities within the Northern Virginia portion of the SEHSR corridor experience air quality impacts from mobile source emissions. Moving passengers and freight by rail produces substantially less pollution per mile than automobile or truck travel; therefore, diverting some of the passenger and freight movements from auto and truck to rail would help reduce GHG emissions through the corridor.
- **Safety**. The Tier I EIS concluded that passenger rail is one of the safest ways to travel nationally and that railroad safety in the U.S. steadily improved over the several decades prior to the Tier I EIS. The Tier I EIS also noted the most common type of rail-related accidents do not occur as a result of unsafe railroad operations or equipment, but from

incursions onto the railroad right-of-way by highway vehicles, most often as trains are approaching locations where roadways cross railroads at grade.

- **Energy Efficiency.** Diverting passenger and freight movements from highway vehicles to rail would reduce energy consumption, as well as GHG emissions within the corridor.

1.5.2 DC2RVA Project Need

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 are detailed in the sections below and 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 Congestion.** Travel by air is increasingly at capacity at airports, resulting in frequent delays and causing commercial carriers to reduce flights and increase fares, which limits the transportation options between Washington, D.C., Richmond and adjacent corridors, and generates 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 to effectively and efficiently meet existing and future demands for 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 for the Commonwealth and the 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 it uses less energy and produces fewer emissions per passenger or ton of freight moved per mile.

1.5.2.1 Population Growth

Population growth is recognized as a critical driver of passenger and freight rail needs by the 2013 *Virginia Statewide Rail Plan*. The plan notes:

- Most of the nation's population growth and its economic expansion is expected to occur in 10 or more emerging mega-regions—large networks of metropolitan regions. Virginia is part of the Northeast mega-region and abuts the Piedmont Atlantic mega-region to the south. The Washington, D.C. to Richmond corridor is a key link between these two mega-regions.

Virginia's population increased 13 percent between 2000 and 2010, significantly faster than the national growth rate (10 percent) (Tippet, 2011). Most of this growth—more than 80 percent—occurred in the Urban Crescent[5] of Northern Virginia, the Richmond region, and Hampton Roads, as shown in Figure 1.5-1. Two-thirds of Virginia's current population is within the Urban Crescent. The Washington, D.C. to Richmond corridor parallels the I-95 corridor and connects to the Richmond to Hampton Roads rail corridor, forming an integrated passenger and freight rail corridor within the Urban Crescent.

- Between 2010 and 2040, Virginia's population is expected to increase from 8 million to close to 11 million residents; a 37 percent increase occurring largely in the Urban Crescent (Virginia Statewide Rail Plan, 2013).
- One in eight Virginians is 65 or older, and this group of the population is increasing in greater proportions as the "Baby Boom" generation turns 65. The largest concentration of Virginia's aging population lives in the Urban Crescent.

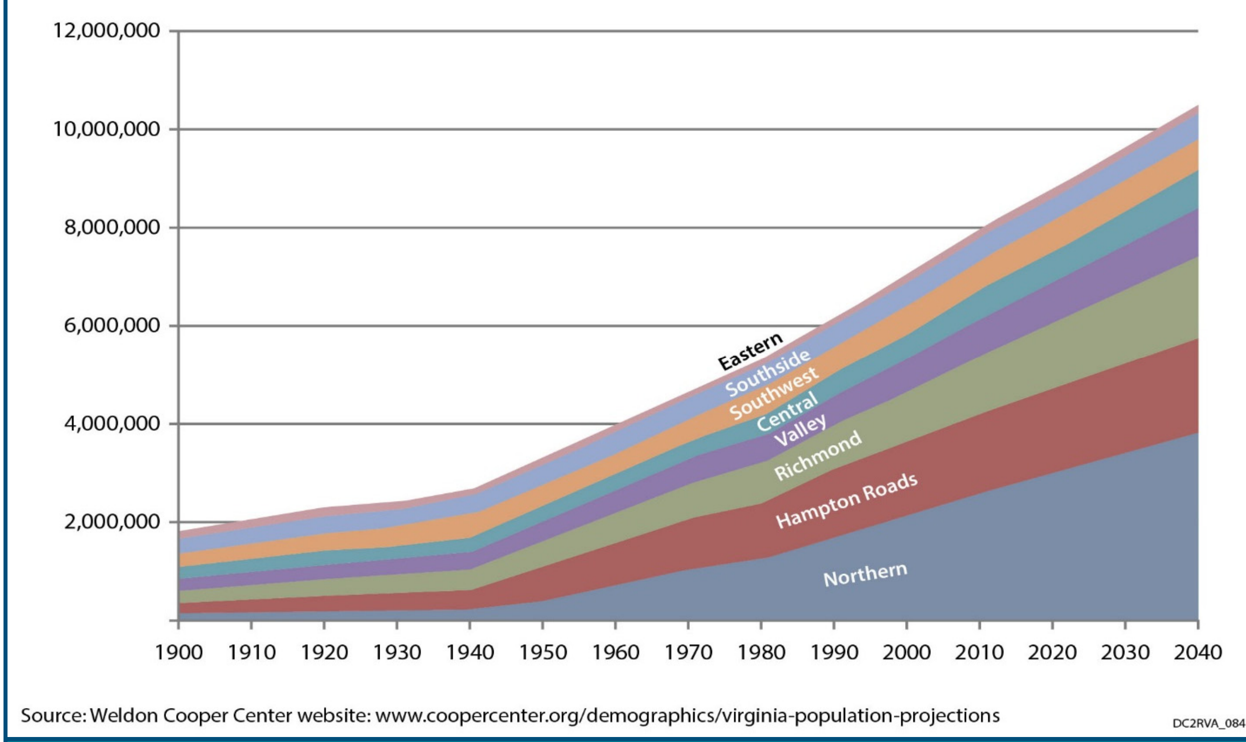

Figure 1.5-1: Virginia Population Trends by Region

[5] The Northern Virginia, Richmond, and Hampton Roads regions are highly urbanized and densely populated compared to the rest of the state. These regions are connected by the I-64 and I-95 transportation corridors, which intersect to form a "crescent"; hence, this section of the state has been named the Urban Crescent.

Much of the projected population growth in the Urban Crescent, and particularly Northern Virginia, is young professionals, typically defined as people under 40. The increasing number of young professionals and the increasing proportion of those over 65 within urban areas affect the need for public transportation choices. Both the young and the elderly are driving less, and they are even declining car ownership in favor of using public transportation options in the urban areas.

1.5.2.2 Freight Growth

Freight coming into and through Virginia is a key driver for rail services and for economic development. The Virginia Port Authority (VPA), a political subdivision of the Commonwealth of Virginia, owns and operates three marine terminals—Norfolk International Terminals (NIT), Portsmouth Marine Terminal (PMT), and Newport News Marine Terminal (NNMT)—and an inland intermodal facility, the Virginia Inland Port (VIP) located in Front Royal. VPA also leases two additional general cargo marine terminals—the Virginia International Gateway (VIG) and the Port of Richmond. These six facilities are collectively known as the Port of Virginia. The Port of Virginia currently offers 50-foot-deep harbor channels and berths, and it is the only United States East Coast port authorized by Congress for 55-foot deep channels. The Port had 2.22 million TEUs[6] in 2013. Of these, 34 percent arrived or departed by rail, the largest percentage for rail movement of cargo of any East Coast port. CSXT and Norfolk Southern (NS) rail lines link the Port facilities with 16 Midwest and Southeast inland terminals, plus many distribution facilities and other private customers. Overall, the Port of Virginia is a major source of economic growth for the Commonwealth.

Over the next 20 years, containerized cargo volume coming into the United States is expected to triple, far surpassing the capacity of existing United States ports. In addition, container ships are growing larger and requiring deeper harbors. The Panama Canal improvements, completed in 2016, are anticipated to increase the demand for deep water ports on the East Coast. The Port of Virginia is the eighth largest port by tonnage in the United States and is one of the fastest growing ports on the East Coast (American Shipper, 2015). The Port has averaged 6.5 percent growth in volume since 2010 and has exceeded 200,000 standard shipping units in six of the last seven months of 2014. The Port's TEU growth in containerized cargo is expected to increase by 330 percent between 2013 and 2040. VPA plans to construct a fifth terminal—Craney Island Marine Terminal—which is scheduled to open its first phase in 2026 and its second phase in 2038, doubling the terminal's 2026 capacity. This new facility, coupled with expansions and renovations at existing facilities, such as NIT, would allow the Port of Virginia to accommodate more than 9.5 million TEUs per year by 2038. With the completion of ongoing maritime and rail improvements, including the double stack clearance of CSXT's National Gateway Corridor, DRPT expects that rail freight will remain a competitive choice and that a similar percentage of the cargo entering the Port of Virginia in the future would be shipped by rail, including along the important north-south CSXT rail line (the RF&P Subdivision identified as the Project corridor) between Washington, D.C. and Richmond.

1.5.2.3 Congestion in the I-95 Corridor

Population and economic growth have led to increasing vehicle use on the I-95 corridor, causing congestion and adversely affecting travel time. I-95 facilitates the movement of people and freight along the entire eastern seaboard, including serving as the primary roadway linking Washington,

[6] TEU stands for 20-foot equivalent unit and represents the volume of cargo that fits within a 20-foot-long intermodal shipping container. A 40-foot intermodal shipping container, commonly used in international trade, equals two TEUs.

D.C. and Richmond. I-95 is also a regional route for commuters to the Washington, D.C. and Richmond metropolitan areas, and it is a local route for traffic in northern Virginia, the City of Fredericksburg and City of Richmond. I-95 has become so congested in recent years that the general-purpose lanes, and oftentimes the high occupancy vehicle (HOV) lanes, cannot provide reliable travel times during the peak periods.

The Commonwealth's Secretary of Transportation's Fiscal Year (FY) 2013 report to the General Assembly summarized efforts to leverage the state's investment in passenger rail and other transit programs to address highway congestion. The Secretary's report stated:

> "As Virginia's population grows, so too, will traffic congestion. Our culture's dependency on the car as the primary means of travel, in general, and single occupancy vehicle travel (SOV) auto travel, in particular, translates into increasing levels of congestion. Recognizing the correlation between an increasing population and vehicles on the road is key to understanding the congestion equation. Despite our all-out push to increase Virginia's roadway supply, the Commonwealth cannot keep pace with demand, especially in the urban areas. The lack of funding and lack of space for more roadways creates an imbalance. The result: an increasing level of congestion and a decreasing level of access and mobility. Over the next 25 years, two thirds of Virginia's I-95 infrastructure will be at or above capacity, resulting in an increase in travel times of as high as 40 percent." (Commonwealth of Virginia Report Document No 316, 2013)[7]

Recurring daily congestion resulting from travel demand exceeding available highway capacity on I-95 results in slower travel speeds and increased travel times, and it predictably occurs during morning and evening rush hours. Average travel time along the I-95 corridor is increasing, and the variability of travel time is also increasing. As traffic flows approach and exceed capacity, the higher traffic densities result in abrupt stop-and-go traffic movements, creating nonrecurring congestion (nonrecurring because it happens at different times and places every day). Because of the unstable nature of the traffic flow, the onset, severity, and frequency of congested conditions are difficult to predict. Actual travel times may vary considerably from the average from one day to the next, especially when crashes or breakdowns result in lane restrictions or closures. Such nonrecurring congestion increases the unreliability of travel times in the corridor. Because of the unreliable travel times, interstate travelers must allow extra time to be sure that they will arrive at their destinations on time.

VDOT has implemented or initiated several improvement projects to address congestion on I-95, including the recently opened I-95 Express Lanes, a 29-mile express system using dynamic tolling that adjusts tolls based on real-time traffic conditions, designed to alleviate some of the traffic bottlenecks between Stafford County and Fairfax County. However, FHWA's 2011 Environmental Assessment (EA) for the project concluded that while the I-95 Express Lanes would improve the overall traffic situation, several road segments would remain at failing service levels, and after completion of the Express Lanes, the merge areas at the northern and southern ends of the Express Lanes would operate at failing levels. The EA also concluded traditional highway capacity expansion—adding general purpose travel lanes—was not an option to meet the growing interstate travel demand. Such expansion has become increasingly expensive, and

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[7] The Virginia's Secretary of Transportation FY 2013 report to the General Assembly is compiled from data/documentation provided by VDOT, DRPT, and others.

the human impacts and physical constraints in the highly-urbanized areas in the northern section of the I-95 project corridor make highway capacity expansion exceedingly difficult to implement.

Table 1.5-1 compares train, bus, and auto travel times between Washington, D.C. and a selection of Virginia cities. As shown in table, in the absence of roadway congestion, the current intercity passenger rail travel service in Virginia is typically slower than highway travel; however, once roadway congestion is considered, passenger rail can be the faster option, even when travel time to the train station is included. This suggests that even modest improvements in passenger rail travel time could result in substantial ridership growth.

Table 1.5-1: Modal Comparison of Travel Times

Origin/Destination	Train[1]	Bus	Drive[2]
Washington D.C. (Union Station) to Richmond (Staples Mill Road Station)	2 hr, 2 min to 2 hr 22 min	2 hr 5 min to 2 hr 45 min (Greyhound[4])	1 hr 50 min to 3 hr 10 min (107 miles)
Washington D.C. (Union Station) to Richmond (Main Street Station)	2 hr 40 min to 2 hr 45 min	2 hr 33 min to 2 hr 43 min (Megabus[3])	1 hr 50 min to 3 hr 10 min (109 miles)
Washington D.C. (Union Station) to Petersburg (Ettrick Train Station)	2 hr 46 min to 3 hr 3 min	5 hr 15 min to 5 hr 30 min (Greyhound[7])	2 hr 30 min to 3 hr 40 min (132 miles)
Washington D.C. (Union Station) to Newport News Train Station	4 hr 15 min to 4 hr 22 min	4 hr 5 min to 4 hr 28 min (Megabus[6])	2 hr 50 min to 4 hr 20 min (177 miles)
Washington D.C. (Union Station) to Norfolk Train Station	4 hr 43 min to 5 hr 7 min	4 hr 54 minutes (Megabus) to 5 hr 40 min (Greyhound[8])	(3 hr 10 min to 4 hr 40 min (195 miles)
Washington D.C. (Union Station) to Lynchburg Train Station	3 hr 30 min to 3 hr 46 min	5 hr 5 min to 5 hr 50 min (Greyhound[5])	3 hr 20 min to 5 hr (183 miles)

Notes: 1. Train trip times are from Amtrak's web-based schedule (www.amtrak.com); 2. Estimated drive time along I-95 and I-64 assuming weekday pm peak travel. Range represents free flow and congested flow, and it was provided by Google Maps (https://maps.google.com); 3. Megabus runs directly between Union Station in Washington, D.C. and Richmond's Main Street Station. Megabus trip times are from Google Maps estimates based on routes and verified by the Megabus website (us.megabus.com); 4. Greyhound stops at 1300 North Boulevard, Richmond, VA, which is 5 miles from Staples Mill Station (Greater Richmond Transit Commission [GRTC] local bus service connects the Greyhound Station with Amtrak's Staples Mill Road Station). Greyhound trip times are from Greyhound's website (www.greyhound.com); 5. Greyhound stops at the Lynchburg Amtrak Station; 6. Megabus stops 9 miles from the Newport News Train Station. Hampton Roads Transit provides bus service between the Newport News Megabus stop (2 W Pembroke Avenue) and the Newport News Train Station. Trip time includes the Hampton Roads Transit bus travel, but it does not include wait time between buses. The estimated Megabus trip time alone, from the Megabus website (us.megabus.com) is 3 hours and 30 minutes; 7. Greyhound stops 2.2 miles away from the Petersburg Amtrak Station; 8. The Greyhound Station in Norfolk is 1.5 miles from the Norfolk Amtrak Station.

1.5.2.4 Air Travel Congestion

Increasingly, air travel is becoming congested throughout the major airports of the United States, with travelers experiencing frequent delays. Since 2008, airlines have experienced greater travel demand, reducing capacity and resulting in flights becoming more crowded and load factors[8] reaching record-high levels (Bureau of Transportation Statistics 2014). A recent article by the U.S. Travel Association, citing a study by Cambridge Systematics of the nation's top 30 airports, projected that as travel levels

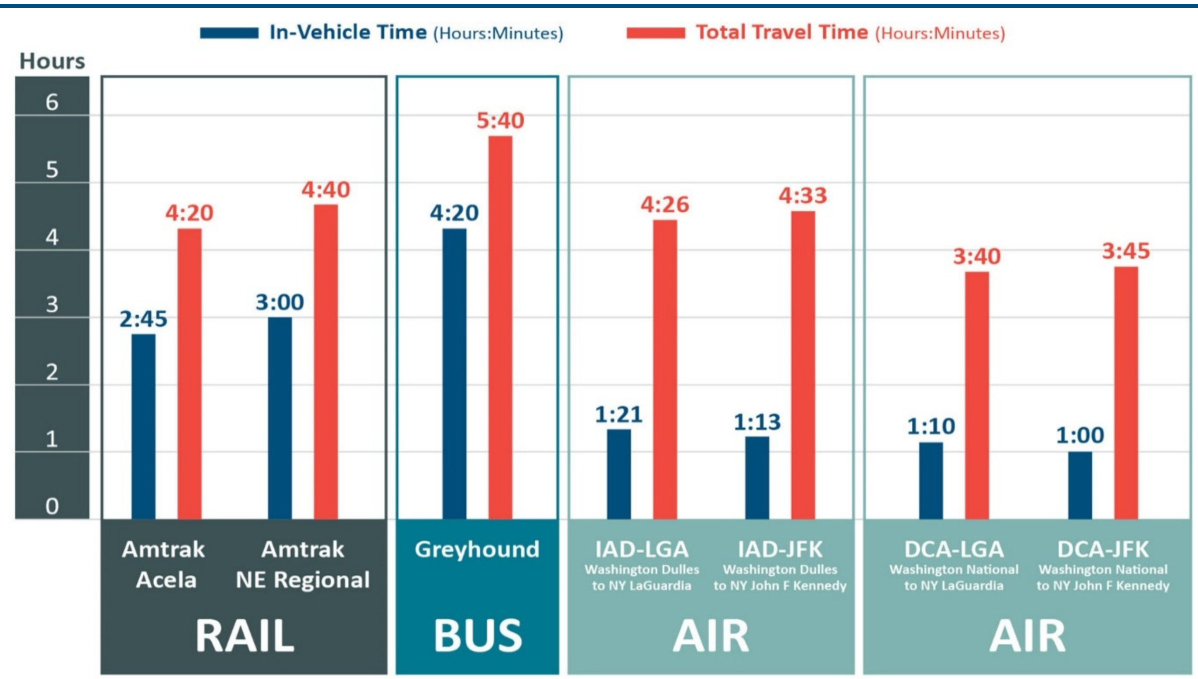
[8] Passenger load factor is a standard measure for capacity utilization of public transport services, including airlines, passenger trains, and bus service. It is typically used to assess how efficiently a transport system "fills seats" and generates fare revenue. Load factor is calculated by dividing the total revenue passenger miles by available seat miles.

grow, the average day of air travel in the United States will increasingly resemble its busiest day—the Wednesday before Thanksgiving—unless there is substantial investment in new airport infrastructure (Cambridge Systematics, 2014). Overall, the analysis found that the outlook for efficient and on-time air travel is becoming bleaker as air traffic congestion increases. The article concluded:

- Almost half (13) of the top 30 airports in the United States are already experiencing Thanksgiving-like congestion levels at least one day every week.
- Within the next six years, all of the top 30 airports will reach their Thanksgiving-peak on an average of one day per week.
- Within the next decade, 27 of the nation's top 30 airports will experience the same congestion as the Wednesday before Thanksgiving two days each week; for 20 of these airports, this will happen in the next five years.

Within the next 20 years, two-thirds of the nation's top 30 airports will feel like the Wednesday before Thanksgiving on the average day.

As noted in a recent article in the *Transport Policy Journal*, Amtrak's rail service in the NEC between Washington, D.C. and New York, NY, travels on a designated passenger corridor and provides a reliable and competitive travel choice in the corridor compared to air and motor vehicle travel modes (Kamga, 2014). The article compared intercity travel times between Washington, D.C. and New York, NY for air, rail, and bus, and it found that while actual in-vehicle travel time is much less for air versus train or bus travel, total door-to-door travel time for train travel is competitive with air travel (Figure 1.5-2) (Kamga, 2014).



Note: Total travel time includes average travel times to the originating train station, bus station, or airport; average pre-departure terminal waiting times of 30 minutes for rail, 15 minutes for bus, and 75 minutes for air; in-vehicle travel time; and average travel times from the arriving bus station, train station, or airport to a final destination.

Source: Camille Kamga, Transport Policy 37 (2015)

DC2RVA_065

Figure 1.5-2: Travel Time by Mode – Washington, D.C. – New York

Airports are typically located away from city centers due to the large land area required, airplane operational requirements, and concerns over noise and safety. Intercity (downtown-to-downtown) travelers experience longer ground travel and waiting times just going to and from the airport compared to rail and bus stations located in the city centers. Door-to-door travel times from Washington, D.C. to New York City for passengers on Amtrak's trains are only slightly greater than for air travelers. Kamga notes that although air takes less time door-to-door, rail provides an advantage because it is more reliable within the NEC, conveniently accessible, and the travel time can be more productive for business travelers. Train travel is frequently considered more desirable for travel within the NEC. Kamga's study shows that reliable passenger rail service with reasonable travel time can be competitive with air travel for intercity travel.

According to the Bureau of Transportation Statistics (2014), in 2012, 18.1 percent (more than 1.1 million) of scheduled flights were delayed, canceled, or diverted. The Bureau's data show flight cancellations are more likely to occur in winter (February in particular) than other times of the year due to the effects of snow and ice on airport operations. Trains, while not immune to extreme weather, are typically not as affected by winter weather. Amtrak[9] states that, "in general, trains are more resistant to bad weather than either planes or cars." High winds, foggy conditions, snow, and ice, which can cause trouble for planes, do not normally cause problems for trains, although these conditions may affect travel to the train station.

The north and south termini of the DC2RVA corridor are served by two airports, Ronald Reagan Washington National Airport in Arlington County, alongside the rail corridor, and Richmond International Airport in Henrico County, just east of the rail corridor. Table 1.5-2 gives the typical travel time (not including the time required for advance check-in at each departure, estimated at 1 hour 30 minutes), connections, and costs for flights originating in Richmond or Washington, D.C., terminating in cities served by passenger trains traveling the DC2RVA corridor. Other than a few selected cities, there are few direct flights, so airline travelers must first fly to a hub airport and then continue to their destination by a connecting flight. In addition to the air travel time, there is time spent at the airport for check-in and security screening (1 hour 30 minutes), connections within an airport (1 hour or more), exiting the airport to ground transportation (15 to 30 minutes), and then ground transportation to the destination city center. This has led passenger rail to be an increasingly competitive choice for medium-distance destinations, especially in terms of door-to-door travel time and cost.

Due to airport congestion, travel time and competitive pricing, air travel is neither a convenient nor affordable transportation option between Washington, D.C. and Richmond. Although frequent service is available between Richmond and cities along both the Northeast and SEHSR corridors, the high fare and collective travel time limit the accessibility of air as an option for the Richmond population and cities along the SEHSR corridor. Improved passenger rail service along the DC2RVA corridor, as part of the SEHSR corridor, will provide an additional travel alternative to the limited availability and accessibility of air service between Washington, D.C. and Richmond and to destinations both south and north.

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[9] www.railpassenger.org/Amtrak/Frequently Asked Questions; response to "Does weather delay trains?" March 5, 2015.

Table 1.5-2: Typical Air Travel Time

Departure	Direct Flight Available[1]	Destination	Cost One-Way (Per Person)[2]	Air Travel Time[3]	Distance to City Center (Train Station)[4]	Drive Time (free flow)[5]
Richmond	No	Baltimore, MD				
Richmond	Yes	Boston, MA	$270	1 hr 28 min	4.2 mi	15 min
Richmond	Yes	Charlotte, NC	$450	1 hr 14 min	11 mi	18 min
Richmond	Yes	New York, NY (JFK)	$370	1 hr 20 min	15.9 mi	41 min
Richmond	Yes	New York, NY (LaGuardia)	$390	1 hr 17 min	9.7 mi	23 min
Richmond	Yes	Newark, NJ	$370	1 hr 15 min	4.9 mi	14 min
Richmond	Yes	Philadelphia, PA	$420	56 min	9.1 mi	21 min
Richmond	No	Raleigh, NC				
Richmond	No	Washington D.C.				
Richmond	Yes	Washington D.C. (Dulles)	$390	50 min	31.1 mi	43 min
Richmond	No	Newport News, VA				
Richmond	No	Norfolk, VA				
Washington D.C.	Yes	Baltimore, MD	$1,200 (Linear Air Taxi)	27 min	12.8 mi	26 min
Washington D.C.	Yes	Boston, MA	$80	1 hr 22 min	4.2 mi	15 min
Washington D.C.	Yes	Charlotte, NC	$350	1 hr 28 min	11 mi	18 min
Washington D.C.	Yes	New York, NY (JFK)	$80	1 hr 21 min	15.9 mi	41 min
Washington D.C.	Yes	New York, NY (LaGuardia)	$280	1 hr 6 min	9.7 mi	23 min
Washington D.C.	Yes	Newark, NJ	$150	1 hr 8 min	4.9 mi	14 min
Washington D.C.	Yes	Philadelphia, PA	$350	59 min	9.1 mi	21 min
Washington D.C.	Yes	Raleigh, NC	$100	1 hr 5 min	17.8 mi	23 min
Washington D.C.	No	Newport News, VA				
Washington D.C.	Yes	Norfolk, VA	$120	1 hr	10.4 mi	15 min

Source: Airfare costs and air travel times were determined using orbitz.com and kayak.com. Non-stop flight availability was verified using Richmond International Airport's website (www.flyrichmond.com) and Reagan National Airport's website (www.flyreagan.com). Google Maps (www.maps.google.com) was then used to determine the driving distances and travel time estimates between the airport and the city center.

Notes: 1. To compare air travel with other travel modes, only non-stop flights from the specified destinations were reviewed. Destinations from Richmond or Washington, D.C. that did not have direct flights are shaded in the table; 2. Cost is for single ticket, one way. The cost information was estimated from mid-week travel day costs (Tuesdays – Thursdays); 3. Air travel time is gate to gate and does not include time required for check-in and security screening (recommended at 1.5 hours) or departure (93 percent of flights leave the ground within 30 minutes of gate departure according to the U.S. DOT Bureau of Transportation Statistics in May 2008); 4. Airports are typically located some distance from the city center, requiring additional trip time for comparison to passenger rail station-to-station travel. Distance is from airport to city's downtown passenger rail station; 5. Additional trip time required by auto to connect from airport to city center (e.g., passenger rail station).

1.5.2.5 Rail Capacity in the Corridor

The Project's rail corridor from Washington, D.C. to Richmond is owned by CSXT, a freight railroad, which shares the corridor with other rail service providers through a series of negotiated agreements. This arrangement is unlike the NEC between Boston and Washington, D.C., which largely operates on a dedicated passenger service corridor. All passenger trains operating within Washington, D.C. between Union Station and CP Virginia, just north of the VRE commuter rail station at L'Enfant, are on Amtrak-owned track. At CP Virginia and to the south, the passenger trains operate on CSXT-owned tracks leading across the Potomac River on the Long Bridge, continuing on the CSXT-owned RF&P Subdivision to Richmond. Passenger rail service also operates on the CSXT-owned property in Richmond, on the S-Line through downtown and to the east, and on the A-Line to the west of downtown. The Project's corridor is one of the most heavily used rail corridors in the nation, with four providers of rail service operating in the corridor:

- CSXT, the owner of the corridor, operates approximately 30 through and local freight trains per day along the length of the corridor. Additional local freight trains and related train movements are also operated along the corridor depending on location and customer demand.
- Amtrak operates an average of 20 passenger trains per day between Washington and Richmond (10 round trips), including 8 long distance trains (4 round trips), 10 Northeast Regional (VA) state supported regional trains (5 round trip trains supported by Virginia), 2 interstate corridor (NC) state supported trains (1 round trip train supported by North Carolina), and Amtrak's Auto Train (1 round trip) which operates between Lorton, VA and Sanford, FL.
- In the northernmost end of the corridor, between Washington, D.C. and Alexandria, VA, Amtrak operates an additional 5 passenger trains per day, including 2 daily long distance trains (1 round trip) to Atlanta and New Orleans, LA and 2 long distance trains (1 round trip) to Chicago 3 times each week (counted as ½ train per day), and 2 daily Northeast Regional (VA) trains (1 round trip) to Lynchburg, VA.
- VRE operates 16 daily commuter trains (8 round trips) between Washington, D.C. and Crossroads in Spotsylvania County, VA, and an additional 16 daily commuter trains (8 round trips) between Washington, D.C. and Manassas, VA, for a total of 32 daily commuter trains (16 round trips) on the corridor between Washington, D.C. and Alexandria during the work week (Monday – Friday). In addition, VRE operates 2 trains on non-revenue trips between Washington, D.C. and Alexandria.
- On the northern end of the corridor, NS has trackage rights on CSXT lines to access freight customers in Alexandria and to access the Northeast Corridor, and it operates up to two trains per day.

Based on these train services, daily peak volumes of trains[10] on various portions of the corridor, shown graphically in Figure 1.5-3, are approximately:

- Washington to Alexandria: 23 Amtrak trains + 34 VRE trains + 30 CSXT trains + 2 NS trains = 89 trains per day
- Alexandria to Crossroads (end of VRE operations): 20 Amtrak trains + 16 VRE trains + 30 CSXT trains = 66 trains per day
- Crossroads to Acca Yard: 20 Amtrak trains + 30 CSXT trains = 50 trains per day

The Arlington to Alexandria portion of the corridor is largely triple track, while the remainder of the corridor between Alexandria and Richmond is double track. Most of the existing capacity of the rail corridor north of VRE's Spotsylvania Station is taken up by existing passenger and commuter trains.

Several major studies of rail capacity improvements in the Washington, D.C. to Richmond corridor have been conducted (see Section 1.6.2), all of which identified the need for additional track capacity to provide fast, frequent, and reliable passenger rail service.

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[10] The daily peak volumes of trains shown are conservative estimates of current train traffic along the corridor during the peak travel period of Monday – Friday. Train volumes are less on the weekend because VRE commuter trains are not operating. CSXT and NS daily train volumes may fluctuate based on customer demands, rail system capacity, and the need to accommodate passenger and commuter train schedules.

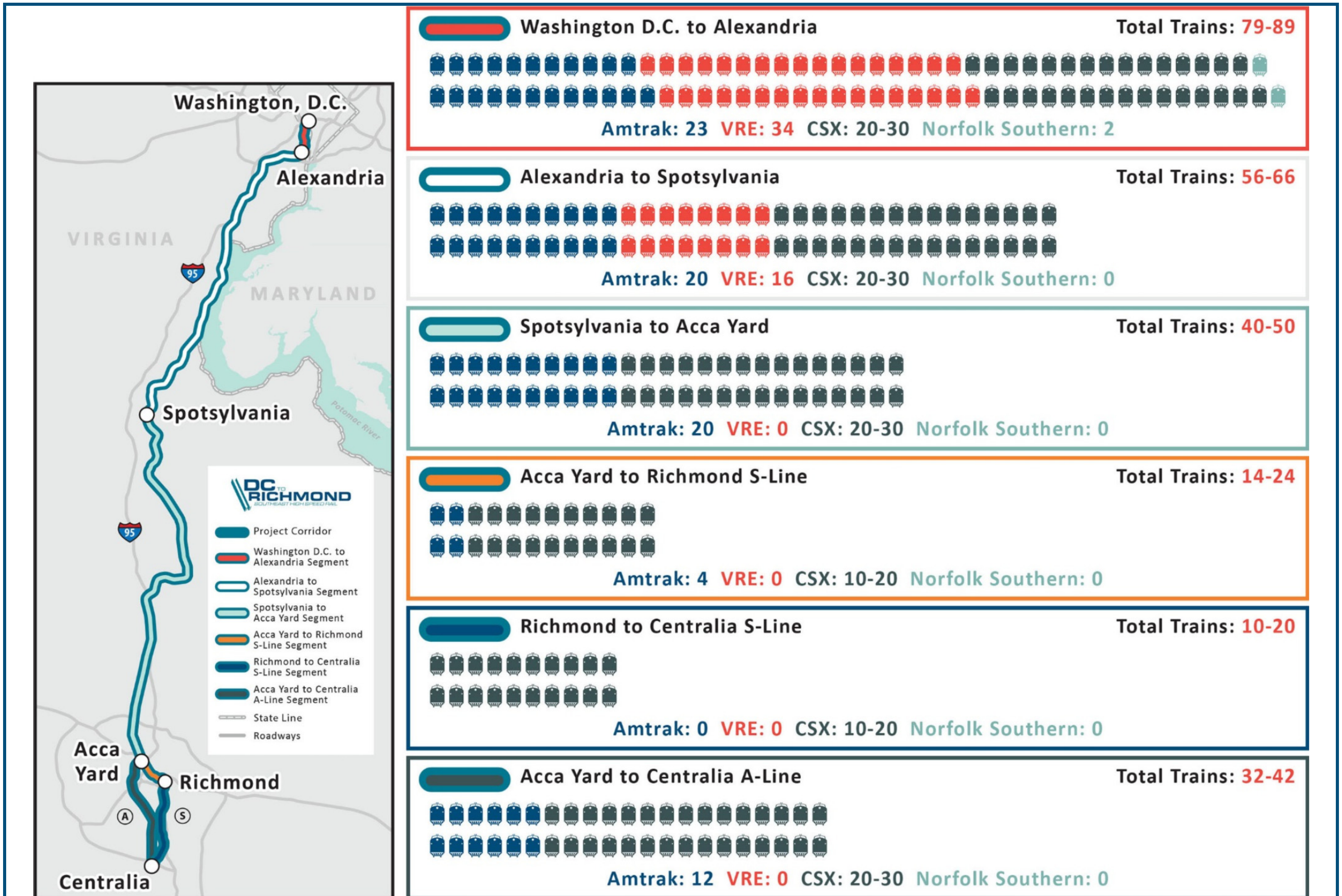

Figure 1.5-3: Number of Daily Trains by Segment in 2015

When Amtrak was created in 1970, there were few commuter trains providing corridor services and substantially less freight rail traffic nationally; however, since the early 1990s, average freight rail density has increased substantially, resulting in a scarcity of available capacity on major rail corridors. This is particularly true of the Washington, D.C. to Richmond corridor. CSXT's A-Line and RF&P corridor in Virginia are part of the greater National Gateway Corridor, which extends from inland ports in the Midwest through Maryland, Washington, D.C. and Virginia to ocean ports in Hampton Roads and Wilmington, NC. The National Gateway Corridor is the primary intermodal train corridor for CSXT connecting the Port of Virginia to national markets and is currently being improved to accommodate double-stack intermodal freight trains.[11] The Virginia Avenue Tunnel project in Washington, D.C. is currently addressing the last remaining bottleneck for double-stack freight trains on the National Gateway Corridor.[12] In addition, CSXT's A-Line and RF&P corridor through Virginia is also part of the railroad's I-95 Corridor between New York and Jacksonville, FL, which plays a vital role in moving food products, consumer products, and other rail freight for shippers in Virginia and along the entire eastern seaboard.

Ridership demand for Virginia's passenger rail services is growing rapidly, setting records over the past five years. In 2012, Amtrak operated 24 daily passenger trains (12 round trips) and 2 tri-weekly trains (1 round trip) in the Commonwealth with 1,466,965 passengers either boarding or alighting within Virginia and another 5,013,991 boarding or alighting in Washington, D.C. The 2013 State Rail Plan (DRPT, 2013) notes that Amtrak ridership in Virginia has grown 77 percent between FY 2004 and FY 2012, which is much more than the 24 percent ridership increase Amtrak has seen on the National System during that period. Virginia's efforts to bring expanded Northeast Regional rail service into the Commonwealth are largely responsible for the ridership growth experienced on routes serving Virginia.

VRE operates commuter rail service along a portion of the Washington, D.C. to Richmond corridor, from Union Station in Washington, D.C. south to its terminus in Spotsylvania County, just south of Fredericksburg.[13] VRE service currently operates at or near capacity along the corridor and provides commuter capacity that is the equivalent of a full interstate lane in the peak direction in the I-95 corridor, with less pollution, energy consumption, and accident cost than highway operations (*Virginia Railway Express System Plan 2040 Study*, 2014). Growth in ridership and demand for commuter service has continued to fill available seats on many trains, and parking at VRE stations often exceeds capacity at peak travel times. The capital projects contained in the VRE FY 2015-2020 Capital Improvement Plan and planned service expansion are expected to increase VRE's passenger-carrying capacity from 20,000 to approximately 25,000 daily passengers.

In addition to general corridor capacity issues, unique capacity constraints and operational issues affect rail operations in Richmond. CSXT has two north-south mainlines that operate through Richmond, the A-Line's Florence North End Subdivision and the S-Line's Bellwood Subdivision, and one east-west line along the James River (Rivanna and Peninsula Subdivisions) that passes through the City of Richmond along with the BBR's westerly connection (Figure 1.5-4), making

[11] A double-stack freight train carries intermodal containers stacked two high, allowing a train of a given length to carry twice as many containers. Double-stack is common in the United States for intermodal freight movements on rail lines that have sufficient vertical clearance.

[12] http://www.virginiaavenuetunnel.com/index.php

[13] VRE currently provides commuter rail service to Spotsylvania County, just south of Fredericksburg, with VRE trains continuing south a short distance to the VRE yard at Crossroads for service and storage.

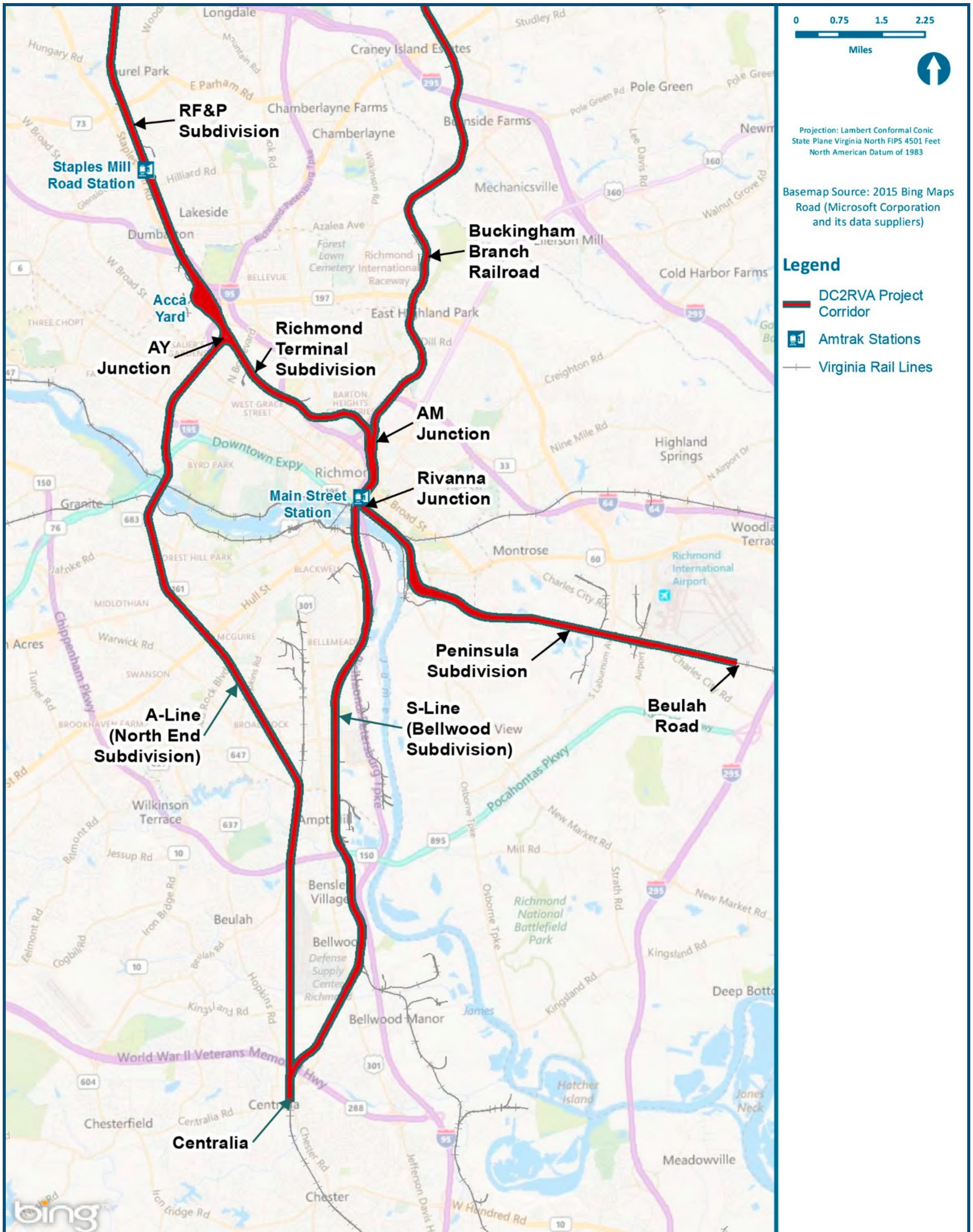

Figure 1.5-4: Richmond Area Corridor

the city a crossroads for north-south and east-west rail traffic. There is enough grade separation between the one east-west and two north-south main lines that, for the most part, east-west trains passing through the city have little impact on north-south movements passing through the city, and vice-versa. However, when trains have to change their primary direction, from east-west to north-south, the process is slow and cumbersome due to the nature of the low-speed track along the S-Line, the uphill grade between Main Street Station and Acca Yard, and switch arrangements that dictate less-than-ideal operating solutions and have the potential to introduce delays.

Acca Yard is located at the junction of the two CSXT north-south mainlines through Richmond and the RF&P Subdivision and is the hub of local freight operations serving both the east-west and north-south lines. It is a 20-track yard that is flat-switched.[14] Additionally, all through freight trains passing through Richmond must stop for a change of crews. On the north-south A-Line, this crew change typically occurs at Acca Yard, further straining the yard's limited capacity.

Amtrak long distance, Interstate Corridor (NC), and Northeast Regional (VA) trains operating into or through Richmond use one of three typical train movements:

- North-south long-distance, Interstate Corridor (NC), and Northeast Regional (VA) trains passing through Richmond between the NEC and points in Florida, Georgia, North Carolina, or Norfolk, VA. These trains stop at Staples Mills Road Station in Richmond's northern suburbs and continue north-south on the primary freight line, using the CSXT A-line between Acca Yard and Centralia to bypass downtown Richmond. Currently, there are six daily round trips that operate north-south through Richmond.
- North-south Northeast Regional (VA) trains terminating or beginning their journeys at Richmond. These trains operate between Richmond and the NEC, and lay overnight at the Staples Mill Road Station. After arriving in Richmond from the north, these trains must continue south through CSXT's Acca Yard to a wye[15] where they can be turned to face back north, then move north through the yard to reach the Staples Mill Road Station for the overnight layover. Currently, two daily round trips originate in Richmond and operate between Richmond and the Northeast.
- Northeast Regional (VA) trains operating between Boston, MA and Newport News, VA, which change their primary direction of travel at Richmond from north-south to east-west, or vice versa. These trains must use the same low-speed S-Line connecting tracks that freight trains use from Acca Yard to AM Junction, just north of Main Street Station. From AM Junction, these trains move along the east side of Main Street Station and pass through Fulton Yard onto the Peninsula Subdivision towards Newport News. Use of these low-speed connecting tracks from Acca Yard to AM Junction and AM Junction to Fulton Yard permits these trains to serve Main Street Station in downtown Richmond. These trains also stop at Staples Mill Road Station north of the city. Currently, there are two daily round trips that operate between Boston and Newport News along this route.

Some of the bottlenecks that affect Amtrak operations in Richmond are:

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14 In a flat-switched yard (also called a flat-shunted yard), freight cars are pushed by a locomotive and coast to their required location between the different classification tracks.

15 A "wye" is a triangular-shaped rail junction that allows a train to change direction.

- The AY Junction at Acca Yard, where the S-Line/Bellwood Subdivision diverges from the double-track north-south A-Line and RF&P subdivision, requires Northeast Regional (VA) trains to and from Newport News to cross all main tracks at the southern throat of Acca Yard. Two daily pairs of Northeast Regional (VA) trains use the S-Line/Bellwood Subdivision (trains 66/67 and 94/95), en route between Boston and Newport News. These trains face several operating constraints that contribute to a slow average speed as they make their way through Richmond between Staples Mill Road and Main Street Station, beginning with the configuration of the junction at AY.
- Southbound Northeast Regional (VA) trains originating from Boston and New York City call at Staples Mill Road Station, whose platforms are on the west side of CSXT's mainline. This makes it fairly easy to access the bypass track around the west side of Acca Yard on the A-Line. However, at the south end of Acca Yard, where the bypass track ends, trains to Newport News must cross over the double-track A-Line mainline at AY Junction to enter the S-Line/Bellwood Subdivision and continue on to Main Street Station on a single mainline track. This cross-over move may often be delayed if there is switching within Acca Yard or if a freight train on the S-Line/Bellwood Subdivision is stopped to cut off a helper[16] or change operating direction.
- The S-Line/Bellwood Subdivision is single-track, with a maximum operating speed of 30 miles per hour (mph) for passenger trains. At AM Junction, Northeast Regional (VA) trains traveling to/from Newport News use the same connecting track used by unit coal, grain, sulfur and general merchandise trains transferring between the east-west (Rivanna/Peninsula Subdivisions) and north-south CSXT A-Line/S-Line routes through the city. The station stop at Main Street Station is in the middle of this single connecting track.

1.5.2.6 Providing Options for Reliable and Convenient Movement of Goods and People

Passenger service in the Commonwealth is provided on rail lines owned and operated by freight railroads; shorter, faster passenger trains must share the rail infrastructure with longer and slower freight trains. The Rail Passenger Service Act of 1970 that created Amtrak guaranteed Amtrak access ("trackage") rights to use railroad lines owned by other railroads to operate passenger trains. Amtrak currently owns no track in Virginia and pays CSXT and NS for the incremental use of their tracks[17]. Amtrak's on-time performance is impacted by delays such as rail traffic congestion, speed restrictions imposed by the host railroad due to weather or maintenance issues, and available capacity—even with modern signals and train dispatch models, only a limited number of trains can use a specific segment of track per day.

Passenger train travel in the Washington, D.C. to Richmond corridor does not demonstrate consistent, reliable, on-time performance. Travelers not only want reduced travel times but also reliable travel times and schedules. Recent Amtrak on-time performance statistics (average travel times and on-time performance of Amtrak trains in the corridor) are shown in Figures 1.5-5 and 1.5-6.

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[16] A "helper" is an additional locomotive added to a train temporarily to assist the train moving up a steep gradient.

[17] Amtrak is required by Title 49 of the Rail Passenger Service Act of 1970 (RPSA) to compensate freight railroads for the incremental costs associated with accommodating passenger service over their tracks. The RPSA allows the incremental costs to include payment for incremental maintenance costs from Amtrak's use of freight railroad tracks, incremental services provided by the freight railroads such as developing and maintaining tracks and other facilities for Amtrak's exclusive use, and incentive payments for higher quality service.

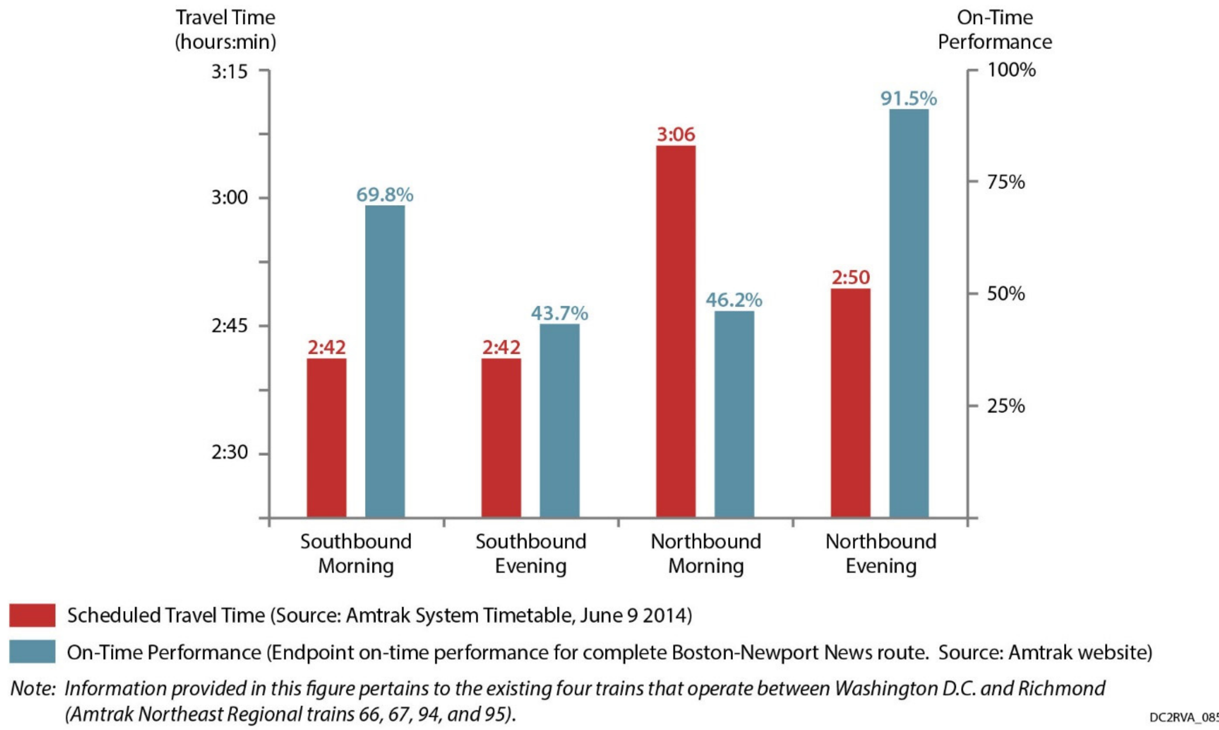
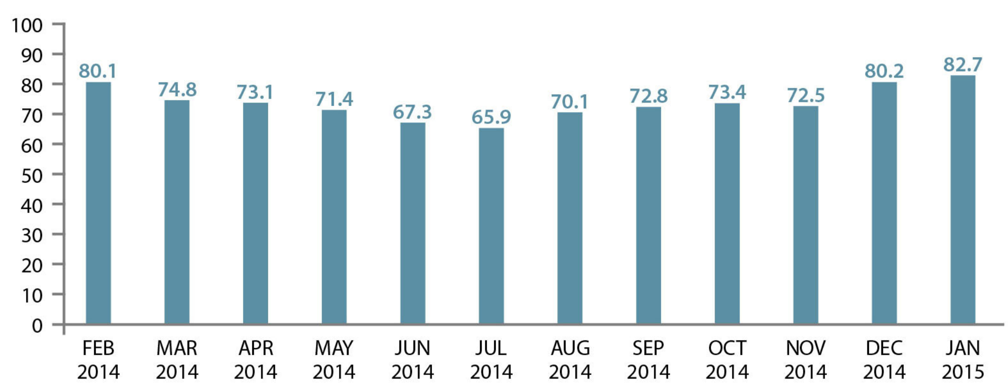


Figure 1.5-5: Washington, D.C. to Richmond Main Street Station – Travel Time and On-Time Performance (January 2014-January 2015)



Note: Includes all Northeast Regional trains between Richmond, Newport News, or Norfolk and points on the Northeast Corridor. On-time is defined as operation within 15 minutes of schedule.

Source: Amtrak Monthly Performance Reports, February 2014 through January 2015.

DC2RVA_086

Figure 1.5-6: On-Time Performance for DC2RVA Northeast Regional Trains to/from Richmond, Newport News, and Norfolk

FRA defines the standard for percent on-time performance as 90 percent for NEC Regional and state-supported passenger services, and 85 percent for long-distance routes, operating outside of the NEC[18]. Amtrak's own on-time performance standards reflect this standard and require most of its trains to run on schedule 85 to 95 percent of the time.

Likewise, maintaining the efficient and reliable movement of goods on the corridor through adequate freight rail capacity directly benefits area automobile travelers by keeping trucks off the interstate. Freight traffic that cannot be reliably moved by rail will end up on area roads, compounding the increase in road congestion caused by the growth of the area's population. As noted in the 2013 *Virginia Statewide Rail Plan*, average annual daily truck traffic on I-95 is projected to increase 78 percent over the next several decades, from 15,448 in 2011 to 27,420 in 2040 (DRPT, 2013). Increasing freight rail capacity in the corridor could help mitigate this impact, improving travel in the corridor for both people and goods.

1.5.2.7 Air Quality

The U.S. transportation sector is one of the largest contributors of GHG emissions, including carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and various hydrofluorocarbons (HFCs).[19] Transportation is the largest end-use sector emitting CO_2, the most prevalent GHG. CO_2, CH_4, and N_2O are emitted from the combustion of fuels, while HFCs are by-products from air conditioners. EPA's *Fast Facts, U.S. Transportation Sector Greenhouse Gas Emissions 1990 – 2013* states:

> "According to the *Inventory of U.S. Greenhouse Gas Emissions and Sinks 1990-2013* (the Inventory), the national inventory that the U.S. prepares annually under the United Nations Framework Convention on Climate Change (UNFCCC), transportation represented 27% of total U.S. GHG emissions in 2013. Cars, trucks, commercial aircraft, and railroads, among other sources, all contribute to transportation end-use sector emissions. Within the sector, light-duty vehicles (including passenger cars and light-duty trucks) were by far the largest category, with 60% of GHG emissions, while medium- and heavy-duty trucks made up the second largest category, with 23% of emissions. Between 1990 and 2013, GHG emissions in the transportation sector increased more in absolute terms than any other sector (i.e., electricity generation, industry, agriculture, residential, or commercial)."

EPA established National Ambient Air Quality Standards (NAAQS)[20] for six criteria pollutants: sulfur dioxide (SO_2), particulate matter (PM_{10} with an aerodynamic diameter less than 10 microns and $PM_{2.5}$ with an aerodynamic diameter less than 2.5 microns), nitrogen dioxide (NO_2), carbon monoxide (CO), ozone (O_3), and lead (Pb). EPA designates areas as meeting (attainment) or not meeting (nonattainment) the standards. The Clean Air Act (CAA) requires states to develop a general plan to attain and maintain the NAAQS. Additional planning, subject to EPA approval, is

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[18] Section 207 of the Passenger Rail Investment and Improvement Act of 2008 (Division B of Pub. L. 110-432) (PRIIA) charged FRA and Amtrak jointly and in consultation with other parties, with developing new or improving existing metrics and minimum standards for measuring the performance and service quality of intercity passenger train operations. In compliance with the statute, FRA and Amtrak jointly issued Final Metrics and Standards under Section 207 of PRIIA, effective May 12, 2010. https://www.fra.dot.gov/eLib/Details/L02875.

[19] U.S. Environmental Protection Agency, *Fast Facts, U.S. Transportation Sector Greenhouse Gas Emissions, 1990 – 2013*, Office of Transportation and Air Quality, EPA-420-F-15-032. October 2015

[20] NAAQS are based on the 1970 Clean Air Act and the 1990 Clean Air Act Amendments to protect the health and welfare of the public from the adverse effects of air pollution.

required for areas not meeting the standards. In the congested Northern Virginia region traversed by the DC2RVA corridor, nine jurisdictions are in nonattainment status for ozone, triggering certain general conformity requirements. The cities of Alexandria, Fairfax, Falls Church, Manassas and Manassas Park, and the counties of Arlington, Fairfax, Loudoun, and Prince William are currently nonattainment areas for the 2008 8-hour ozone standard.

The greater fuel efficiency of moving people and goods by rail offers a simple and relatively immediate way to reduce emissions of GHG and NAAQS pollutants. Diverting passengers and freight from passenger cars and trucks to rail means less fuel is burned and GHG and NAAQS emissions are reduced on a per mile basis. In the *2013 Virginia Statewide Rail Plan*, Amtrak is recognized as the most efficient form of motorized passenger transport. As shown in Table 1.5-3, Amtrak is approximately 12 percent more efficient than domestic airline travel and 33 percent more efficient than auto travel on a per passenger-mile basis, according to the U.S. Department of Energy.

Table 1.5-3: Passenger Travel and Energy (2013)

Mode	Passenger-miles (millions)	BTU[21] per passenger-mile	Energy use (trillion BTU)
Cars	2,241,300	3,144	7,046.6
Personal trucks	1,899,899	3,503	6,655.4
Motorcycles	23,625	2,475	58.5
Demand response[1]	2,171	12,182	26.4
Buses	[2]	[2]	204.1
Transit	22,306	4,071	90.8
Intercity[3]	[2]	[2]	32.8
School[3]	[2]	[2]	80.5
Air	[2]	[2]	1,599.1
Certificated route[4]	579,944	2,406	1,395.5
General aviation	[2]	[2]	203.6
Recreational boats	[2]	[2]	245.0
Rail	39,053	2,455	95.9
Intercity (Amtrak)	6,810	2,118	14.4
Transit	20,381	2,404	49.0
Commuter	11,862	2,737	32.5

Source: U.S. Department of Energy, 2015

Notes: 1. Includes passenger cars, vans, and small buses operating in response to calls from passengers to the transit operator who dispatches the vehicles. 2. Data are not available. 3. Energy use is estimated. 4. Only domestic service and domestic energy use are shown in this table. These energy intensities may be inflated because all energy use is attributed to passengers–cargo energy use is not taken into account.

[21] A British Thermal Unit (BTU) is the approximate amount of energy required to heat 1 pound of water from 39 to 40 degrees Fahrenheit and is used to compare the efficiency of different fuel types accomplishing the same task.

The *2013 Virginia Statewide Rail Plan* found that freight railroads were 12 times more fuel-efficient than trucks (291 BTUs per ton-mile versus 3,717 BTUs per ton-mile). Double-stack freight trains are even more efficient. The *Plan* notes that every ton-mile of freight moved by rail instead of truck emits 67 percent less greenhouse gas emissions. In 2014, according to the Association of American Railroads, freight railroads moved a ton of freight an average of 479 miles per gallon of fuel. If just 5 percent of the freight moved by truck was diverted to rail, fuel savings would be approximately 800 million gallons per year, and GHG emissions would fall by approximately 9 million tons—equivalent to taking 1.8 million cars off the road or planting more than 200 million trees[22].

1.5.3 Public Comments on Need

FRA and DRPT solicited public comment as part of the scoping process to guide development of the Project's Tier II EIS. During the scoping process, FRA and DRPT invited comments from interested agencies and the public to ensure the full range of issues related to the Project would be addressed, that all reasonable alternatives would be considered, and that significant issues would be identified. To provide an early and open scoping process, FRA and DRPT employed many forms of outreach to engage diverse audiences, inform them of the Project, and enable them to contribute their input. These initial efforts culminated in fall 2014 with 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 comments. The results of the scoping process are summarized in the Scoping Summary Report.[23]

During scoping, 428 members of Virginians for High Speed Rail (VHSR), which advocates for improved rail service in the Commonwealth, submitted a form letter that provided the following suggestions for the Project:

- The travel time from Washington, D.C. to Richmond should be shorter than a trip in an automobile.
- Reliability of the service is vital to the corridor's success, thus reaching a threshold of 90 percent on-time performance is important.
- Improvements to the level of service on the corridor should take into account future expansions of service to Newport News, Norfolk, and Roanoke/Lynchburg, as well as Raleigh/Charlotte.
- The study should put a priority on stations/stops that serve a greater density of citizens, transit-oriented development communities, and central business districts.
- The service quality should capture the choice passenger (i.e., the traveler that has a choice of more than one mode for their trip) while also providing safe, reliable, and convenient transportation options to all of the corridor's citizens.

In addition, individuals offered statements of general support of (38 comments) or opposition to (9 comments) the Project. Several commenters offered specific alignment and/or station alternatives, either through Richmond or for the full corridor; DRPT evaluated all of these proposals as part of the Project's alternatives identification and screening process described in Chapter 2 of this Tier II EIS.

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[22] Association of American Railroads, *The Environmental Benefits of Moving Freight by Rail*, August 2015.

[23] Scoping Summary Report is available on the Project website at www.DC2RVArail.com.

1.6 PROJECT BACKGROUND AND RELATED STUDIES

The following sections provide an overview of the Project's history and background, including a summary of previous rail planning studies in the corridor and adjacent segments of the SEHSR corridor.

1.6.1 National High Speed Rail Program

The High Speed Ground Transportation (HSGT) Act of 1965 is considered the first act establishing federal interest in high speed rail in the United States. Initially authorized at $90 million, this act started the federal government effort to develop and demonstrate modern and advanced HSGT technologies in the United States. Using the HSGT Act funding, FRA deployed modern HSGT technologies such as the self-propelled Metroliner cars and the Turbotrain in the NEC between Boston and Washington, D.C., in 1969 (FRA, 1997).

In 1970, Congress passed the Rail Passenger Service Act (RPSA), which led to the creation of Amtrak to ensure continued operation of an intercity rail passenger network in the United States. By 1975, appropriations from the HSGT Act of 1965 ended, which led to congressional efforts shifting towards upgrading the railroad infrastructure in the Northeast Corridor. In 1976, Congress passed the Railroad Revitalization and Regulatory Reform Act that included funding for the Northeast Corridor Improvements. These improvements included engineering and construction work to improve performance and reliability of the Northeast Corridor, which provided the foundation for a reliable high speed intercity service in the Northeast.

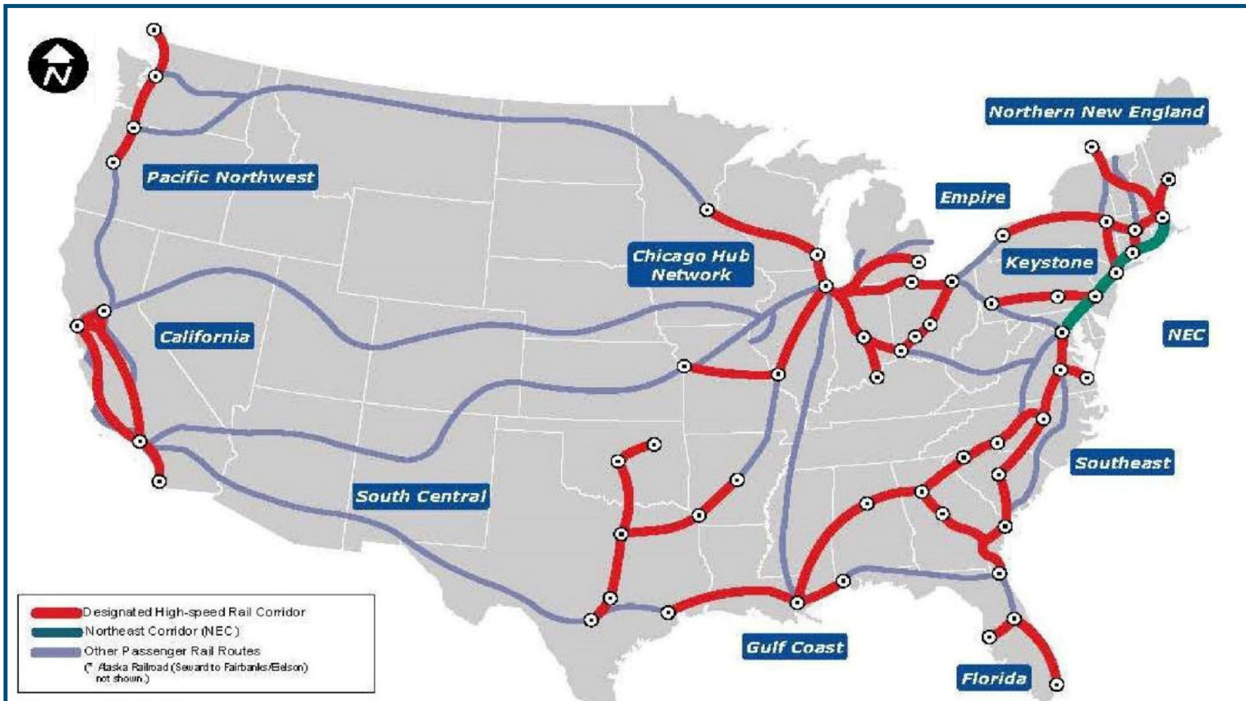
In 1980, Congress set aside $4 million in the Passenger Railroad Rebuilding Act of 1980 for HSGT corridor studies. In late 1980s, Congress requested that FRA assess the feasibility of maglev technology for high speed rail in the United States. The preliminary findings of this report were submitted to Congress by FRA in 1990 (FRA, 2015). Soon afterward in 1991, the National Maglev Initiative (NMI) was launched among the U.S. DOT, USACE, the U.S. Department of Energy (DOE), and other agencies to further research and evaluate maglev technology in the United States. In 1991, Congress passed the Intermodal Surface Transportation Efficiency Act (ISTEA), a six-year transportation authorization bill, which authorized a $725 million Maglev prototype development program and requested selection of five corridors to be designated as high speed rail corridors. However, no funding was appropriated pending the results of the NMI (FRA, 1993). The five corridors designated by FRA were:

- Midwest corridor linking Chicago, IL with Detroit, MI, St. Louis, MO, and Milwaukee, WI
- Florida corridor linking Miami with Orlando and Tampa
- California corridor linking San Diego and Los Angeles with the Bay Area and Sacramento via the San Joaquin Valley
- Southeast corridor connecting Charlotte, NC, Richmond, VA, and Washington, D.C.
- Pacific Northwest corridor linking Eugene and Portland, OR, with Seattle, WA, and Vancouver, BC, Canada

In 1997, FRA completed and submitted a report to Congress called *High Speed Ground Transportation for United States*, which analyzed the economics aspects of developing high speed ground transportation for high-population cities in the United States. The Transportation authorization bill passed in 1998, *The Transportation Equity Act for the 21st Century (TEA-21)*, authorized 6 additional corridor designations, for a total of 11, as well as the extension of other previously designated corridors:

- Gulf Coast corridor
- Keystone corridor from Philadelphia to Harrisburg, PA
- Empire State corridor from New York, NY, to Albany, NY, to Buffalo, NY
- Extension of the Southeast corridor from Charlotte to Greenville, SC, to Atlanta, GA, to Macon, GA; and from Raleigh to Columbia, SC, and to Savannah, GA, and Jacksonville, FL
- Extension of the Midwest corridor (now called the Chicago Hub corridor) from Milwaukee, WI, to Minneapolis/St. Paul, MN
- Extension of the Chicago Hub corridor to Indianapolis, IN and Cincinnati, OH

In 2008, Congress passed the Passenger Rail Investment and Improvement Act (PRIIA), establishing the initial framework for the development of the high speed rail corridors. In 2009, Congress passed the American Recovery and Reinvestment Act (ARRA), which allocated $8 billion to be granted to states for intercity rail projects, giving priority to projects that support the development of high speed intercity rail[24]. In 2009, FRA released the *High Speed Rail Strategic Plan*. Figure 1.6-1 shows the high speed rail network map proposed in the plan.



(Source: FRA 2009)

DC2RVA_087

Figure 1.6-1: U.S. High Speed Intercity Passenger Rail Network Map

[24] Congress continued to build upon the Recovery Act by making available an additional $2.1 billion through annual appropriations for FY 2009 and 2010, using the framework initially established by PRIIA, bringing the total program funding to $10.1 billion.

Shortly after the publication of the *High Speed Rail Strategic Plan*, FRA launched the High Speed Intercity Passenger Rail (HSIPR) program with the following objectives:

- Build new high speed rail corridors that expand and fundamentally improve passenger transportation in the geographic regions they serve.
- Upgrade existing intercity passenger rail corridors to improve reliability, speed, and frequency of existing services.
- Lay the groundwork for future high speed rail services through corridor and state planning efforts.

The same year, U.S. DOT announced the extension of the California High Speed Rail Corridor to Las Vegas, NV. In 2011, U.S. DOT designated the NEC as the eleventh high speed rail corridor, which includes the existing NEC main rail line and any alternative routings for intercity passenger train service between the metropolitan areas of Washington, D.C., Philadelphia, New York, and Boston.

The *High Speed Rail Strategic Plan* recommended the tiered strategy currently being used by FRA. The Plan also defined various levels of high speed rail and conventional intercity passenger rail. The DC2RVA corridor would be considered an "emerging" HSR corridor according to the FRA definition below (FRA, 2009):

- **Core Express:** Frequent service between major population centers. Top speeds of at least 125 mph on completely grade-separated, dedicated rights-of-way (with the possible exception of some shared track in terminal areas). Intended to relieve air and highway capacity constraints.
- **Regional:** Relatively frequent service between major and moderate population centers. Top speeds of 90 to 125 mph, grade-separated, with some dedicated and some shared track (using positive train control [PTC] technology). Intended to relieve highway and, to some extent, air capacity constraints.
- **Emerging:** Developing corridors with strong potential for future HSR Regional and/or Express service. Top speeds of up to 90 mph on primarily shared track (eventually using PTC technology), with advanced grade crossing protection or separation. Intended to develop the passenger rail market and provide some relief to other modes.
- **Conventional Rail:** Traditional intercity passenger rail services with as little as 1 to as many as 7 to 12 daily frequencies; may or may not have strong potential for future high speed rail service. Top speeds of up to 79 mph generally on shared track. Intended to provide travel options and to develop the passenger rail market for further development in the future.

1.6.2 SEHSR Program

SEHSR is an important element of the national high speed rail program. The SEHSR corridor was one of the five originally designated high speed rail corridors identified by FRA in 1991. The SEHSR corridor extends from Washington, D.C. to Jacksonville, FL. This corridor connects with the NEC in the northand extends southwest to Atlanta. In coordination with FRA, Virginia, North Carolina, South Carolina, Georgia, and Florida have joined together with the business communities in each state to form a Southeast Rail Coalition to plan, develop, and implement high speed rail in the Southeast. The SEHSR corridor will be developed incrementally, upgrading existing rail rights-of-way where feasible. The components of the SEHSR corridor, shown in Figure 1.1-1, are in different stages of the planning process due to need and funding. Below is an outline of the status of major components of the SESHR corridor:

- Washington, D.C. to Charlotte
  - Tier I Final EIS and ROD completed in 2002
  - Richmond to Raleigh Tier II Final EIS completed in September 2015; ROD issued in March 2017
  - Washington, D.C. to Richmond Tier II Final EIS and ROD anticipated in 2017
- Richmond to Hampton Roads
  - Tier I Final EIS and ROD completed in 2012
- Charlotte to Atlanta to Jacksonville
  - The Georgia Department of Transportation (GDOT) is leading a study to extend development of the SEHSR into Georgia. The Atlanta to Charlotte Passenger Rail Corridor Investment Plan will be conducted in tiers. The Tier I EIS will analyze passenger service between Atlanta and Charlotte on a broad scale and is anticipated to be complete in 2018.

Since the corridor was identified, DRPT and NCDOT have been working with their federal partners, FRA and FHWA, to improve rail transportation options in this key area of the national high speed rail program that joins to Amtrak's NEC. Several studies have been conducted in this corridor since 1991, which include the 1996 DRPT feasibility study for fast passenger rail service from Washington, D.C. to Richmond; the 1997 SEHSR Market and Demand Study; the 1999 FRA and Amtrak operational analysis and preliminary engineering study; and the 2002 SEHSR Washington, D.C. to Charlotte, NC Tier I EIS and ROD. Later studies added additional sections to the SEHSR corridor, including Richmond to Hampton Roads, and the sections extending southwest of Charlotte. Figure 1.1-1 shows different sections of the SEHSR program and status of projects in the corridor.

1.6.2.1 Tier I EIS for the SEHSR Project from Washington, D.C. to Charlotte, NC

In October 2002, DRPT and NCDOT, together with FHWA and FRA, completed a service-level Tier I EIS for the SEHSR corridor between Washington, D.C. and Charlotte. This Tier I EIS established the SEHSR program purpose and selected preferred rail corridors, and it provided a programmatic-level environmental analysis. The purpose of the SEHSR program, as stated in the Tier I EIS, is to provide a competitive transportation choice to travelers within the Washington, D.C. to Charlotte travel corridor. Implementation of improved passenger rail service in the Washington, D.C. to Charlotte SEHSR corridor could:

- Divert trips from air and highway travel modes within the corridor
- Provide a more balanced and energy-efficient use of the corridor's transportation infrastructure
- Increase the safety and effectiveness of the transportation system within the travel corridor
- Serve long-distance travelers between and beyond Virginia and North Carolina, including Amtrak's NEC, which extends from Washington, D.C. to Boston

The Tier I ROD for the Washington, D.C. to Charlotte SEHSR selected an incremental (step-by-step) approach to develop the SEHSR program. 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. Subsequently, the SEHSR corridor was divided into discrete sections (Washington, D.C. to Richmond, Richmond to Raleigh, and Raleigh to Charlotte) for further detailed (Tier II) studies.

The Tier I EIS also considered maglev as an option for the SEHSR program. The Tier I EIS determined that the high costs, lack of currently operating systems, and character of the proprietary maglev guideway, make its implementation an unlikely economical solution to the transportation problems in the Southeast Corridor; therefore, FRA and FHWA, together with DRPT and NCDOT, eliminated this implementation option from further consideration.

1.6.2.2 Washington, D.C. to Richmond SEHSR Corridor Segment

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

- 1994—Virginia, North Carolina, South Carolina, and Georgia formed a four-state coalition (Southeast Rail Coalition) to facilitate development of the SEHSR corridor.
- 1996—DRPT conducted an initial study addressing the feasibility of implementing fast, frequent, and reliable passenger rail service in the Washington, D.C. to Richmond segment of the SEHSR corridor.
- 1998—DRPT, NCDOT, FHWA, and FRA signed a Memorandum of Understanding (MOU) 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, which was submitted to Congress in May 1999. The operational analysis evaluated then current facilities, services, and operating conditions, and it simulated the performance of future services over multiple configurations of infrastructure improvements. The result of the study was 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 passenger, commuter, and freight services that the line's operators (CSX, Amtrak, and VRE) and public partners (FRA and DRPT) envisioned for 2015.
- 2002—Completion of SEHSR Washington, D.C. to Charlotte Tier I EIS and 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. This document was based on several earlier studies, including the range of proposed improvements that was identified by FRA in the May 1999 Report to Congress titled *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 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, D.C. Additionally, DRPT released the Virginia Statewide Rail Plan.
- 2005—The 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 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.
- 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, FRA issued a Finding of Infeasibility from the Americans with Disabilities Act (ADA) and U.S. DOT that allowed for level boarding at Main Street Station to be provided with a low-level platform and alternate means of access.
- 2008—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, 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 in the SEHSR corridor.
- 2009—Virginia and Amtrak partnered to provide state-subsidized passenger rail service under the name "Amtrak Virginia," later rebranded as "Northeast Regional" service. Amtrak Virginia assumed responsibility for four regional trains traveling the Project corridor from Washington, D.C. to Richmond (Staples Mill Road Station). Two of these

Northeast Regional (VA) trains terminated in Richmond (Staples Mill Road Station), and two continued to Richmond's Main Street Station and then on to Newport News. In 2010, this partnership introduced three new Amtrak NEC service expansions in Virginia by extending trains that had previously terminated in Washington, D.C.:

- A new round trip extending to Richmond (Staples Mill Road Station) for a fifth daily Northeast Regional (VA) train between Washington, D.C. and Richmond
- A future extension of one Northeast Regional (VA) round-trip train from Richmond (Staples Mill Road Station) to Norfolk (implemented in 2012)
- One round-trip Northeast Regional (VA) extending to Lynchburg, VA

- 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 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).
- 2010—The Virginia-North Carolina High Speed Rail Compact held their first meeting. The purpose of the Compact is to examine and discuss strategies to advance multi-state high speed rail initiatives. The SEHSR project is the primary multi-state high speed rail initiative advanced by the Compact. Congress authorized the creation of interstate compacts in 1997, and the Virginia and North Carolina legislatures formally established this compact in 2004.
- 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 passenger rail operations and development projects.
- 2011—On September 23, 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 Washington, D.C. to Richmond segment of the SEHSR corridor. This grant was supplemented by $11,077,000 in funding from DRPT and CSXT.
- 2012—FRA initiated a Northeast Corridor 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 will 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 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.

- 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 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 both passenger and freight service. Under the agreement, DRPT and CSXT are reconfiguring the Acca switching yard in Richmond to allow a western bypass of the yard to relieve the current bottleneck. The $132 million reconfiguration of the yard began in November 2015 and is scheduled to be finished in spring 2018. The bypass will allow passenger trains to avoid freight involvement and increase from current speeds of 25 mph to an estimated 40 mph.

DRPT, working with FRA, CSXT, NS, VRE, Amtrak, and others, has also initiated and/or completed several track and system upgrades along the corridor in recent years, including:

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

In addition, FRA awarded Virginia a $74.8 million grant to build up to 11 miles of third track and related improvements from Arkendale in Stafford County to Powell's Creek in Prince William County as well as final design and improvements to the station at the Quantico Marine Base in Quantico. This third track project is currently under construction.

DRPT, in cooperation with 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 TEA-21 provides funds to improve highway-rail crossings and accommodate high speed rail in designated high speed rail corridors, including the SEHSR corridor.

1.6.2.3 Richmond to Raleigh SEHSR Corridor Segment

In 2017, FRA in partnership with DRPT and NCDOT completed a Tier II EIS for the Richmond to Raleigh segment of the SEHSR corridor. The Final EIS was completed in September 2015, and FRA issued a ROD in March 2017. The EIS/ROD identified 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 slightly with that of the Washington, D.C. to Richmond Tier II EIS, specifically 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 segment will achieve maximum operating speeds up to 110 miles per hour with up to 8 trains per day (4 round trips) between Petersburg, VA, and Norlina, NC, on dedicated right-of-way. The DC2RVA project includes capacity to extend the Richmond to Raleigh SEHSR service—Interstate Corridor (NC)—trains from Richmond to Washington, D.C.

1.6.2.4 Richmond to Hampton Roads SEHSR Corridor Segment

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 DRPT, CTB, and FRA 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 S-line from the west side of Main Street Station south to Petersburg, and then access the east-west NS line to Norfolk. The Richmond to Norfolk segment will achieve maximum operating speeds up to 90 miles per hour with up to 12 trains per day (6 round trips). The Richmond to Newport News conventional service would follow the existing route for Amtrak's service to Newport News, which utilizes CSXT tracks (Peninsula Subdivision) from the east side of Main Street Station through Fulton Yard to Newport News with up to 6 trains per day (3 round trips).

In 2012, Amtrak Virginia initiated conventional speed passenger service from Richmond 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 the NS line from Petersburg to Norfolk. The DC2RVA project includes capacity to extend the Richmond to Hampton Roads SEHSR service—Northeast Regional (VA)—trains from Richmond to Washington, D.C.

1.6.3 Virginia Avenue Tunnel

In 2014, DDOT and FHWA completed an EIS and issued a ROD for reconstruction of the CSXT Virginia Avenue Tunnel in southeast Washington, D.C. 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. 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, D.C. region, including passenger trains on the Washington, D.C. to Richmond corridor. CSXT opened the first of two tracks for double-stack operation in 2016, with completion of both tracks planned for 2017. The DC2RVA project assumes the Virginia Avenue Tunnel will be completed prior to implementation of the 2025 DC2RVA service plan and includes the tunnel in the No-Build alternative.

1.6.4 Long Bridge

DDOT is currently studying expanding capacity across Long Bridge, the double-track rail bridge that carries the Washington, D.C. to Richmond corridor track across the Potomac River from Washington, D.C. into Arlington. The Long Bridge Study is considering improvements to rail infrastructure from L'Enfant Interlocking across the Potomac River to RO Interlocking in Arlington. In early 2015, DDOT and FRA completed a feasibility report on project alternatives, and a subsequent National Environmental Policy Act (NEPA) evaluation of project alternatives is being led by DDOT in conjunction with FRA, DRPT, VRE, CSXT, and other stakeholders. The DC2RVA project assumes the Long Bridge study will be complete and an expanded bridge constructed prior to implementation of the 2025 DC2RVA service plan and includes the bridge in the No-Build alternative.

1.6.5 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 served as a visioning document to address existing deficiencies and future growth. Since that time, Amtrak and USRC have incorporated initial planning efforts into an ongoing "Washington Union Station's 2nd Century" Master Planning process, which is a series of coordinated near- and long-term projects that seek to triple passenger capacity and double train capacity by modernizing and expanding station facilities over the next 20 years. The series of projects includes:

- Claytor Concourse Modernization Project: Led by Amtrak, the near-term Concourse Modernization will be the first set of improvements as part of the 2nd Century Plan with early construction tasks starting fall 2016. The environmental clearance process for this project is likely to be a categorical exclusion.
- Station Operational Improvement Projects: Led by Amtrak, these near-term improvements are immediate projects that are needed to create redundancy and additional capacity in today's intercity and commuter operations, as well as provide better phasing of the reconstruction in the future. The environmental clearance process for this project is likely to be a categorical exclusion.
- Washington Union Station Expansion Project: led by USRC and Amtrak, this project will provide improved multi-modal transportation infrastructure and passenger/user facilities to meet future demand and operational requirements. An EIS is being prepared to evaluate environmental impacts and select a preferred action; a Master Development Plan is being prepared to create a feasible, long-term, cohesive implementable project.
- Burnham Place Project: A 3-million-square-foot mixed-use development, envisioned over the rail yard, will be developed by Akridge, a private company that owns the air rights above the terminal infrastructure. The development will be a vital economic driver for Washington, D.C. because it will reconnect the urban fabric of the station's adjacent neighborhoods.

1.7 PROJECT BENEFITS

Fast, efficient passenger rail service is important for Virginia, as evidenced by the body of work described in Section 1.6, dating back to 1996. The Commonwealth participates in multi-state coalitions such as the Southeast Rail Coalition and the Virginia-North Carolina High Speed Rail Compact, to improve passenger rail services in the Mid-Atlantic region. The Commonwealth also participates in multiple state-based funding programs, including the Rail Enhancement Fund and Intercity Passenger Rail Operating and Capital Fund, for rail enhancement. Virginia is also an active member in the American Association of State Highway and Transportation Officials (AASHTO), Standing Committee on Rail Transportation (SCORT). SCORT works with its members to address policy, regulatory, safety, and enforcement issues affecting the ability of states to develop and maintain the freight and passenger rail transportation network within their borders.

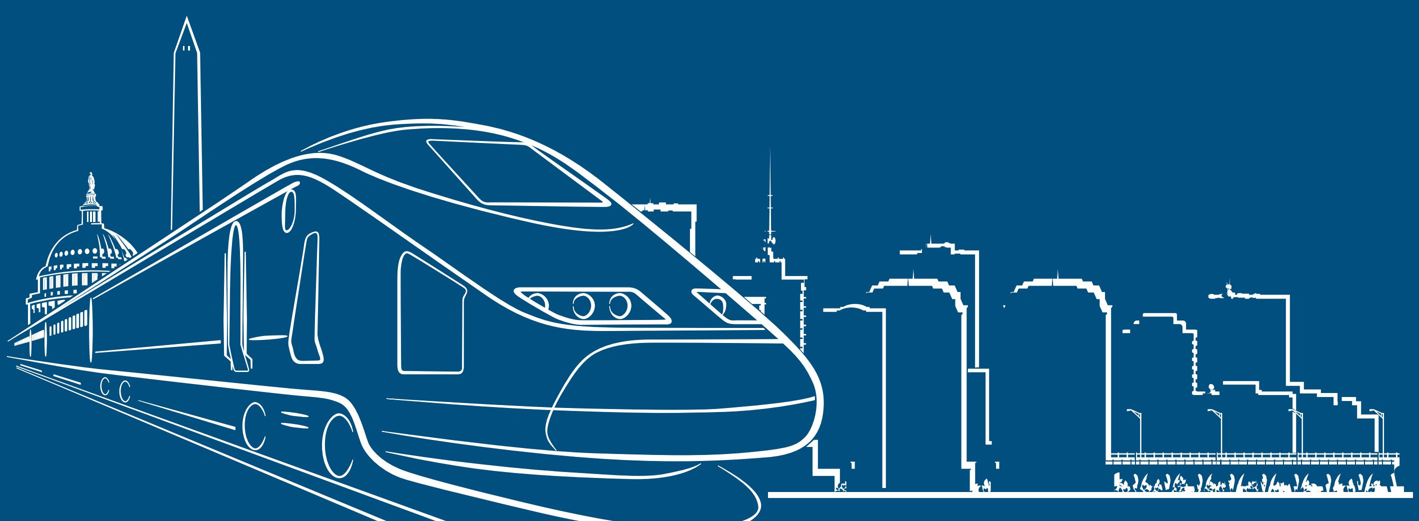
The Commonwealth has initiated environmental studies and preliminary design associated with high speed rail corridors passing through Virginia using its own funds and in partnership with FRA and other agencies. Because of the high capital cost associated with high speed rail systems, the Commonwealth has been following an incremental approach to plan for and construct rail improvements that eliminate key rail chokepoints and to increase rail speeds and on-time performance on existing passenger rail corridors.

The SEHSR corridor, originally designated in ISTEA and TEA-21, would extend high speed rail service south from the NEC in Washington, D.C. to Richmond and on to Raleigh and Charlotte. The SEHSR corridor would later expand farther south to Jacksonville via Charlotte and Atlanta or via Raleigh and Columbia, SC, and east from Richmond to Hampton Roads.

Implementing the Washington, D.C. to Richmond DC2RVA project would address the purpose described in Section 1.4, providing the following benefits:

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

2 ALTERNATIVES



2 ALTERNATIVES

2.1 INTRODUCTION

This chapter describes the process used by the Virginia Department of Rail and Public Transportation (DRPT) to develop the alternatives evaluated in the Tier II Draft Environmental Impact Statement (EIS) for the Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA) Project. The following sections summarize the Southeast High Speed Rail (SEHSR) Tier I EIS alternatives and the Tier II Draft EIS planning dates.

The remainder of Chapter 2 summarizes the Tier II Draft EIS alternatives development and evaluation process, including alternatives considered but dismissed and descriptions of the Build Alternatives evaluated in detail in the Tier II Draft EIS. Further details on the development and screening of the Tier II Draft EIS alternatives are in the Alternatives Technical Report in Appendix A.

2.1.1 SEHSR Tier I EIS Alternatives Summary

The DC2RVA Tier II EIS builds on the decisions the Federal Railroad Administration (FRA) and the Federal Highway Administration (FHWA) made as part of the SEHSR Tier I EIS and Record of Decision, completed in 2002 (Figure 2.1-1). The SEHSR Tier I EIS addressed the development, implementation, and operation of higher speed passenger rail service in the approximately 500-mile travel corridor from Washington, D.C. through Richmond, VA and Raleigh, NC to Charlotte, NC[1]. The SEHSR Tier I EIS considered the no build option and nine alternatives utilizing combinations of existing track sections. The study area for each SEHSR Tier I alternative was a six-mile wide corridor, centered on existing rail rights-of-way, between Washington, D.C. and Charlotte, NC. Proposed improvements for these alternatives generally included track upgrades, adding an additional main track to single-track lines, additional sidings, curve straightening, signal improvements, and grade crossing safety.

The 2002 SEHSR Tier I EIS evaluated and dismissed advanced high speed rail (trains with average operating speeds of 185 to 200 mph) because it would require the construction of an entirely new and separate passenger-only railroad system, which would not meet the need of the project to connect major urban centers. Building a new, separate rail system would involve substantially higher costs and longer implementation time and result in substantially greater community and environmental impacts. Electrified systems also were dismissed in the SEHSR Tier I EIS because they have substantial initial costs (both monetary and environmental) that made them infeasible

[1] The SEHSR Tier I EIS and 2002 Record of Decision addressed high speed passenger rail service in the Washington, D.C. to Charlotte, NC corridor. Subsequent studies have extended the bounds of the SEHSR program from Richmond, VA to Hampton Roads, VA, and from Charlotte, NC to Atlanta, GA and south to Florida.

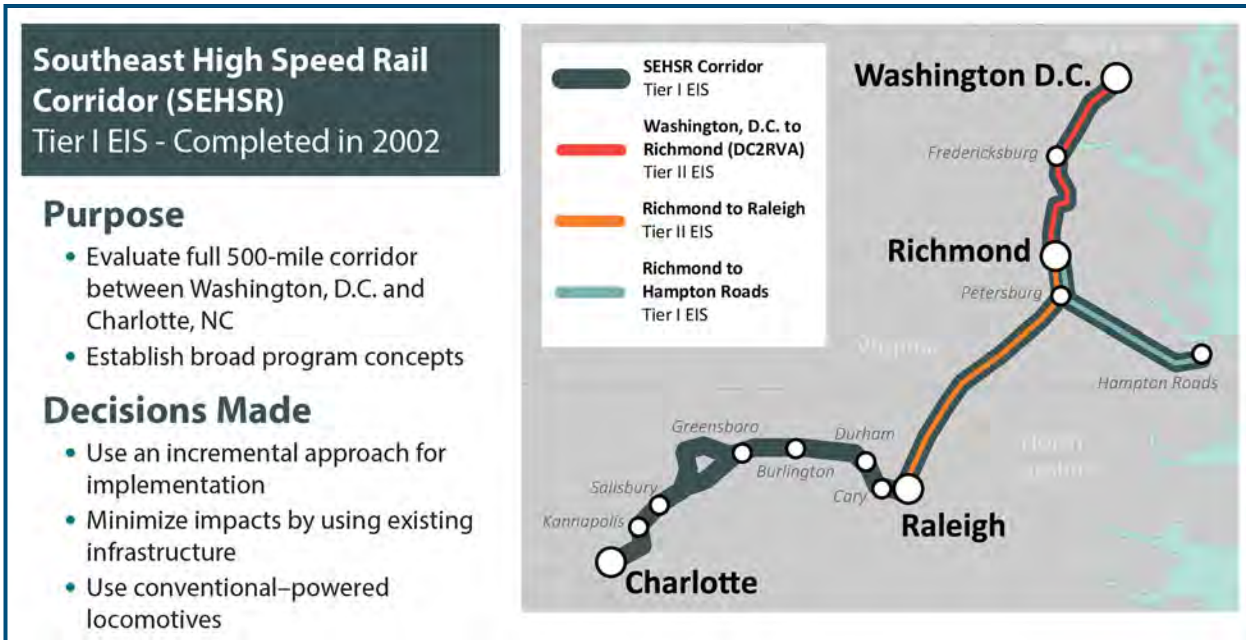


Figure 2.1-1: Southeast High Speed Rail Corridor – Tier I EIS

at the time, relative to the ridership/revenue projections for the SEHSR corridor. The door-to-door travel time needed to attract positive ridership/revenue was determined in the SEHSR Tier I EIS to be met by conventional fossil-fuel powered trainsets.

In the SEHSR Tier I EIS, NCDOT and DRPT conducted a comparative evaluation of the nine SEHSR Tier I alternatives (Figure 2.1-2) and recommended a preferred alternative based on the physical and operational characteristics of each alternative and the potential for environmental impacts. This evaluation specifically considered public and agency comments on the proposed SEHSR and evaluative criteria based on the SEHSR project's Purpose and Need. Each SEHSR Tier I alternative was ranked based on these criteria that are explained in further detail in the SEHSR Tier I EIS. The criteria included:

- Annual Ridership/Revenue
- Annual Diversions in 2025 for air and auto
- Net Energy Reduction (fuel gallons/year)
- Number of At-Grade Crossings
- Air Quality – Reduction in Nitrogen Oxides
- Average Total Travel Time
- Net Operating Contribution
- Capital Cost Efficiency Factor
- Environmental Complexity Index
- Engineering and Operations Complexity Index

Alternative A ranked the highest of the nine alternatives for five of the ten assessment criteria, namely annual ridership, annual air to rail diversions in 2025, net operating contribution, capital cost efficiency, and areas of engineering complexity.

The SEHSR project's "business case" required the preferred alternative to be economically viable. In order to determine relative economic viability among the different alternatives, the SEHSR Tier I comparative evaluation examined alternatives based on their potential net operating contribution and their conceptual capital cost. Alternative A and Alternative B showed the strongest potential for economic vitality.

Figure 2.1-2: SEHSR Tier I EIS Build Alternatives (Reproduced from the 2002 Tier 1 EIS)

The comparative evaluation of the SEHSR Tier I alternatives also reviewed which alternative would cause the least potential environmental and social impacts. NCDOT and DRPT found that Alternative A and Alternative B minimized potential wetland impacts. Given the complexity of avoiding and/or mitigating impacts to significant wetland acreage, substantial numbers of protected species, and prime farmlands, Alternatives A and B were the least environmentally damaging among those candidate alternatives, which satisfied the Purpose and Need criteria and economic viability requirements.

The SEHSR Tier I no Build Alternative, which encompasses the travel corridor's existing transportation network and planned infrastructure improvements for the network, was also evaluated and compared to the nine Build Alternatives. NCDOT and DRPT found the impacts of the no Build Alternative to be similar to the impacts for Build Alternatives due to the projected growth of freight and passenger rail expected in the corridor over time. The difference, however, is that without SEHSR program improvements, freight and passenger services along the corridor from Washington, D.C. to Charlotte, NC were projected to experience greater delays and congestion over time. The no Build Alternative lacked the positive benefits of improved air quality and net energy reduction per passenger mile traveled in the corridor. It also failed to meet the other Purpose and Need factors such as offering additional transportation choices, easing congestion, improving overall transportation system safety, and minimizing environmental impacts. Due to the factors listed above, FRA and FHWA concluded that the no Build Alternative did not meet the SEHSR project's Purpose and Need.

In the ROD, FRA and FHWA determined that the alternative that best satisfied the stated Purpose and Need, met the business model requirements, and minimized environmental impacts was a combination of Alternatives A and B.

The preferred alternative identified in the SEHSR Tier I EIS consists of Alternative A (utilizing the S-line and the North Carolina Railroad rights-of-ways) modified to include passenger-connectivity to Winston-Salem, NC plus Alternative B via the Winston Salem South Bound (WSSB) and the K-line railroad rights-of-ways (Figure 2.1-3).

Figure 2.1-3: SEHSR Tier I EIS Selected Alternative

The combination of Alternatives A and B best satisfied the SEHSR project's Purpose and Need while minimizing environmental impacts, and received the highest level of public and agency support. The combination of Alternative A and Alternative B has:

- Minimum potential impacts to wetlands and threatened and endangered species
- Moderate levels of potential environmental complexity
- Strongest agency support
- Highest level of service
- Highest projected annual ridership

- Largest combined trip diversions from auto and air to rail, with competitive total travel time
- Second best net reduction in NO_x emissions and overall net energy use reduction
- Best potential operating cost recovery
- Highest level of public support

The preferred alternative selected as part of the SEHSR Tier I EIS process forms the basis of the alternatives developed and evaluated for the DC2RVA Project.

2.1.2 Tier II EIS Planning Dates

For this EIS, FRA and DRPT established two important planning dates. The first planning date is 2025, which is FRA and DRPT's current best estimate of when construction of the DC2RVA infrastructure could be completed and the new DC2RVA service would be placed in operation. FRA and DRPT's estimate of the year 2025 as the "opening day" is dependent on many factors, not the least of which is finalizing the EIS and Record of Decision. The date also assumes that federal funding in addition to other funding sources will be available at the level required to build all of the proposed infrastructure improvements and acquire the necessary equipment and train-sets. DRPT based this date on an aggressive but potentially achievable schedule assumption that all necessary permits, approvals, agreements, and funding could be finalized by 2020, final design would take one year (2021), right-of-way acquisition (if needed) would take one year (2022), and construction would take three years (2023 – 2025). FRA and DRPT also used 2025 as the date when the physical impacts associated with DC2RVA Project construction would take place. Thus, all of the physical impact analyses within this Draft EIS on human and natural resources are estimated for 2025, and compared to the No Build Alternative conditions projected for 2025.

The second key planning date established by FRA and DRPT is the planning horizon date of 2045, 20 years after the projected implementation of the new rail service in 2025. Both the Passenger Rail Investment and Improvement Act (PRIIA) and FRA guidance require that DRPT demonstrate that the proposed project is sufficient to deliver the proposed passenger rail benefits and an efficient and reliable multimodal rail corridor over a 20-year time horizon following the completion of the passenger project. DRPT uses operational simulations analysis, as discussed in Section 2.6, to test the proposed alternatives to determine if the rail capacity is adequate for both the opening day (2025) levels of projected freight, commuter and passenger rail traffic and to determine if the infrastructure remains adequate over the 20 year planning horizon or until 2045. DRPT also used the 2045 planning horizon date to estimate some of the longer term effects of the proposed service such as ridership, energy use, and effects on air quality, as well as indirect and cumulative effects.

2.2 SERVICE PLAN

Alternatives developed as part of the DC2RVA Project include two elements: physical improvements along the rail alignment (see Section 2.3), and the proposed train service that would run throughout the corridor. This section summarizes the latter, describing the service plan inputs that DRPT will use to prepare the Service Development Plan, which will occur at the conclusion of the NEPA process.

2.2.1 Existing Intercity Passenger Rail Service

2.2.1.1 Types of Service

Amtrak trains operating in the DC2RVA corridor can be divided into the following four types:

- **Northeast Regional (Virginia)**. Northeast Regional (Virginia) trains provide a travel alternative to driving I-95. Northeast Regional (Virginia) trains are southward extensions of Amtrak regional trains operating on the Northeast Corridor between Boston, New York, and Washington to endpoint stations in Virginia. The trains' trips are extended south of Washington, D.C. on four different routes through Virginia that terminate at Norfolk, Newport News, Richmond, and Lynchburg, providing passengers with a one-seat ride to destinations throughout the Northeast. 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. The Commonwealth of Virginia funds the operation of Northeast Regional (Virginia) passenger trains as required under Section 209 of the Passenger Rail Investment and Improvement Act of 2008 (PRIIA).
- **Interstate Corridor (Carolinian)**. The Carolinian operates one daily round trip between New York, NY and Charlotte, NC. Carolinian Service is similar to Northeast Regional (Virginia) Service, in that it operates as an extension of Northeast Corridor service south of Washington, but in this case to an endpoint station in North Carolina and with funding provided solely by the state of North Carolina. The Carolinian serves Alexandria, Quantico, Fredericksburg, Richmond Staples Mill Road, and Petersburg stations in Virginia.
- **Long Distance**. Long Distance trains are trains that operate on routes greater than 750 miles. States are not required to provide operating support for Long Distance trains. As of 2015, Amtrak operated five Long Distance round-trip trains in the DC2RVA corridor: three round-trip trains use the full length of the DC2RVA corridor continuing through Virginia to Georgia and Florida, and two round-trip trains use only the portion of the DC2RVA corridor between Washington and Alexandria. Long Distance trains in the DC2RVA corridor serve Washington Union Station, Alexandria, Fredericksburg, and 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.

2.2.1.2 Frequency of Service

In 2015, Amtrak operated 24 daily trains and 2 tri-weekly trains in the DC2RVA corridor north of Alexandria. Of those trains, four daily trains and two tri-weekly trains only operate on the corridor north of Alexandria where Amtrak passenger trains, using an NS rail line from Lynchburg and Manassas, VA, join the DC2RVA corridor for trips north to Washington Union Station.

South of Alexandria, Amtrak operates an average of 20 passenger trains per day between Washington and Richmond (10 round trips), including 8 long distance trains (4 round trips), 10 Northeast Regional (VA) state supported regional trains (5 round-trip trains supported by Virginia), 2 interstate corridor (NC) state supported trains (1 round-trip train supported by North Carolina), and Amtrak's Auto Train (1 round trip) which operates between Lorton, VA and Sanford, FL.

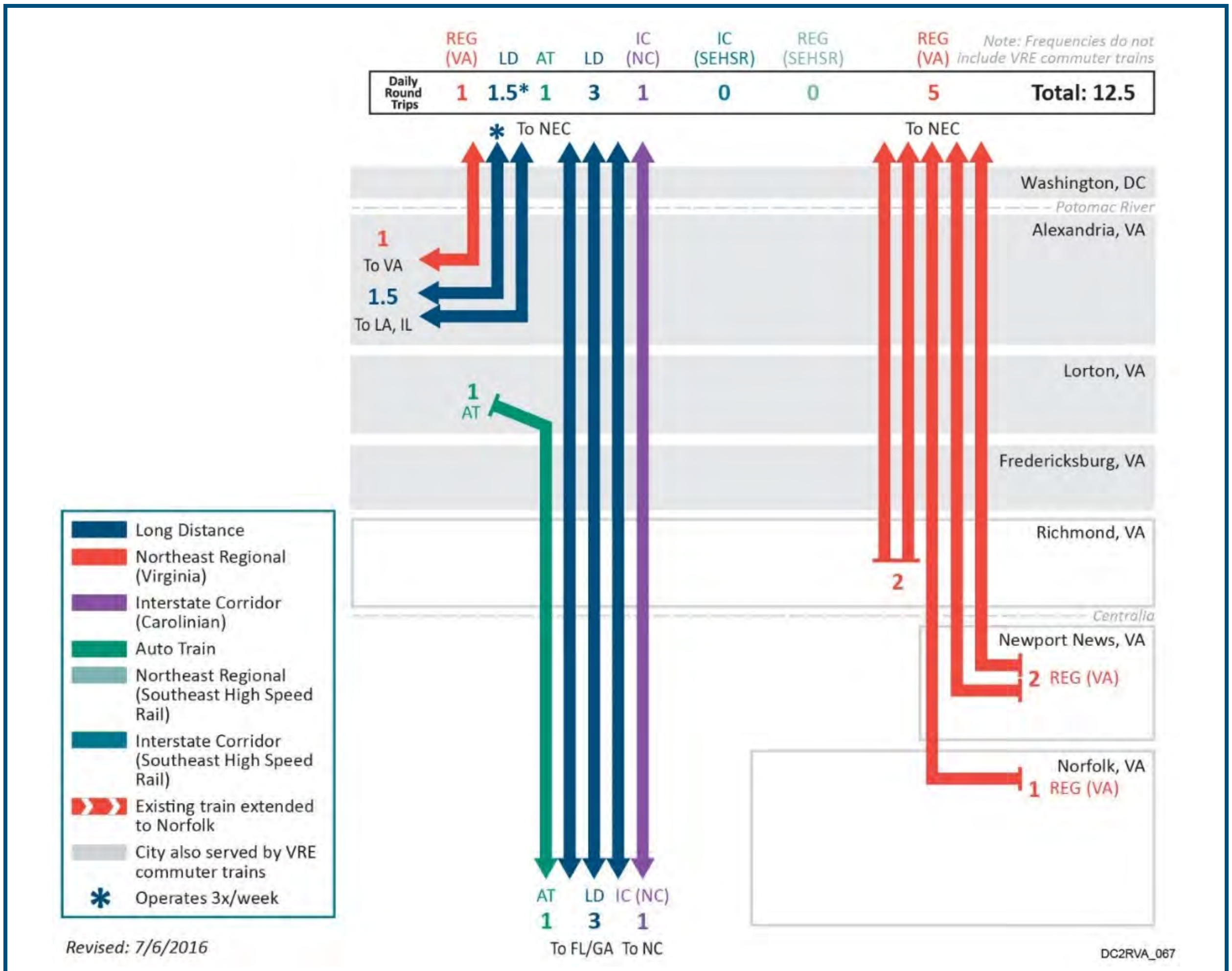


Figure 2.2-1: Existing Passenger Train Frequencies in the DC2RVA Corridor

Figure 2.2-1 (above) illustrates the type and frequencies of current Amtrak intercity passenger rail services operating in the DC2RVA corridor.

2.2.2 Future Intercity Passenger Rail Service

2.2.2.1 No Build Alternative

Section 2.5.1 describes the 2025 passenger-rail service assumptions for the No Build Alternative. In the northern section of the DC2RVA corridor, between Arlington and Alexandria, planned infrastructure improvements will support the operation of one additional Amtrak Northeast Regional (Virginia) round-trip passenger train, operating between Washington, D.C. and Lynchburg, VA via Alexandria, VA. In the southern section of the corridor, south of Richmond, planned infrastructure improvements will support the extension of two Amtrak Northeast Regional (Virginia) round-trip passenger trains from Richmond to Norfolk, VA via Petersburg, VA.

Figure 2.2-2 illustrates the type and frequencies of Amtrak intercity passenger rail services operating in the DC2RVA corridor in the No Build Alternative.

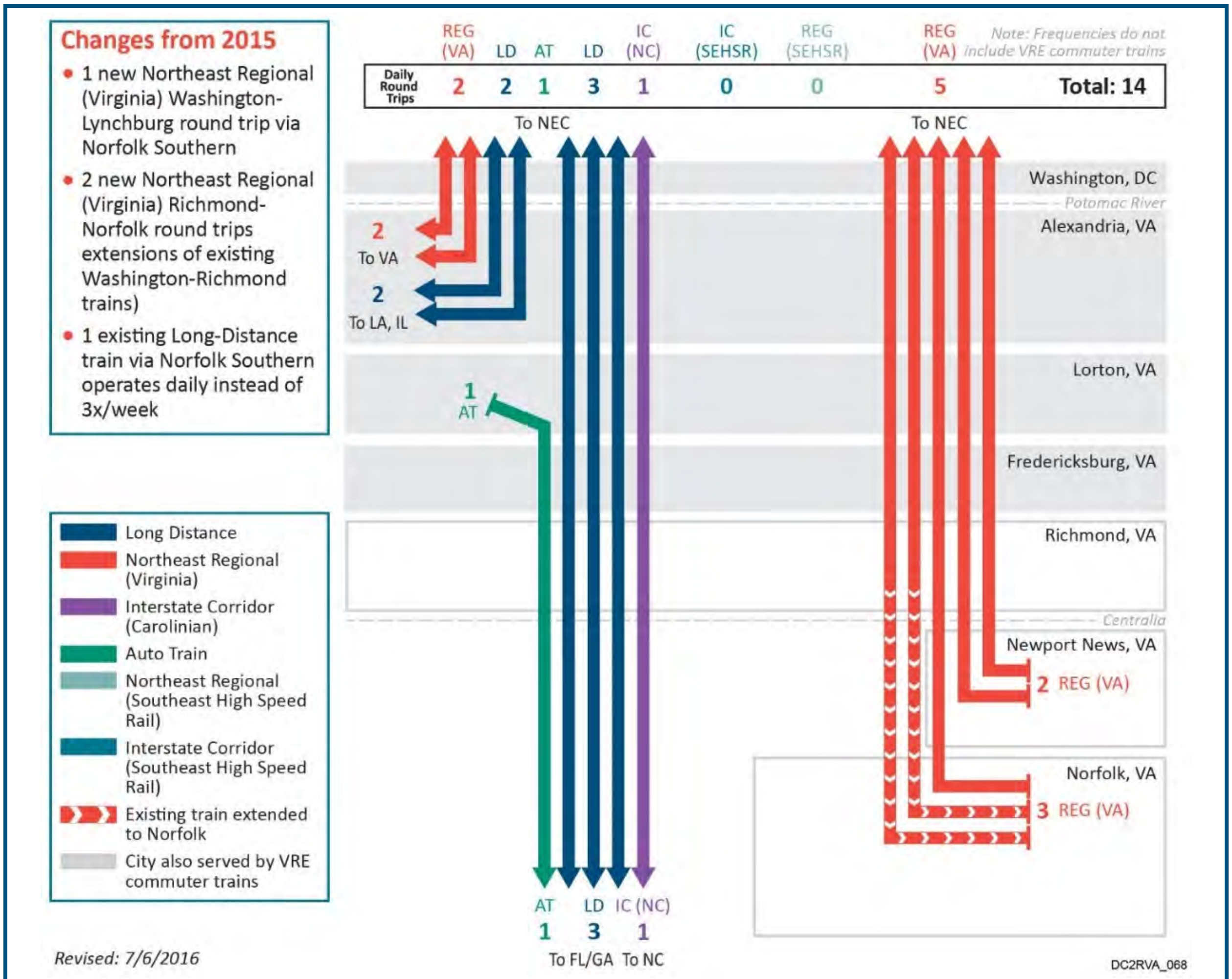


Figure 2.2-2: No Build Alternative Passenger Train Frequencies in the DC2RVA Corridor

2.2.2.2 Build Alternative

The DC2RVA Project proposes to add rail infrastructure to support the following proposed intercity passenger rail service increases between Washington, D.C., Richmond, VA, and Centralia, VA:

- Four new Interstate Corridor (SEHSR) round-trip passenger trains operating between New York and Raleigh or Charlotte, NC.
- Five new Northeast Regional (SEHSR) round-trip passenger trains operating between Boston, New York, or Washington, D.C. and destinations in Virginia. Three of the new round-trip passenger trains will operate to Norfolk. One new round-trip passenger train will operate to Newport News, and one to Richmond.

As part of the Project, the maximum operating speed for all passenger trains on the DC2RVA corridor, with the exception of the Auto Train, will be increased from 70 mph today to 90 mph. Figure 2.2-3 illustrates the type and frequencies of proposed intercity passenger rail services operating in the DC2RVA corridor in the Build Alternative. It is important to note that the implementation of the proposed intercity passenger rail service increases described above are not

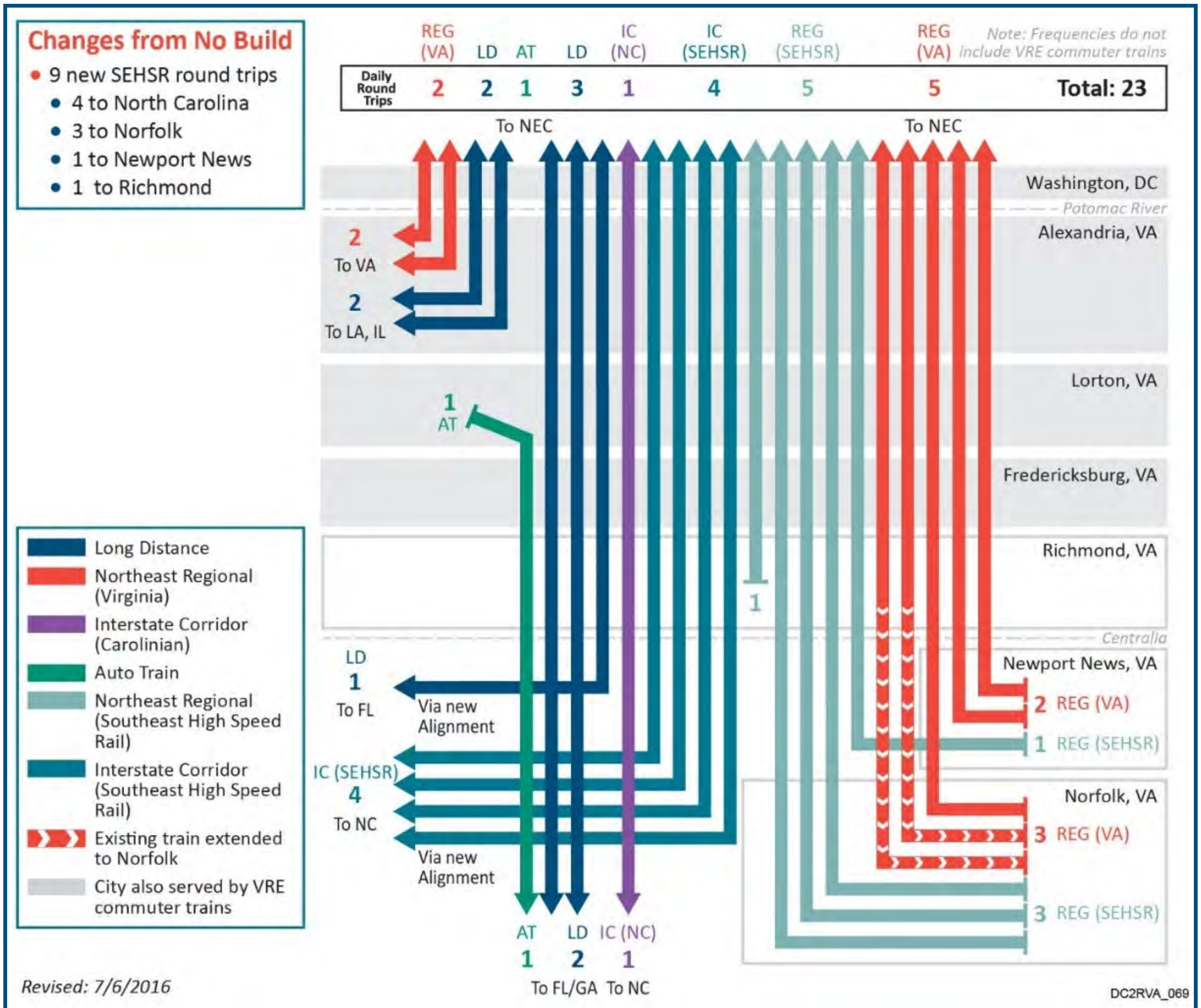


Figure 2.2-3: Proposed Passenger Train Frequencies in the DC2RVA Corridor

solely dependent on rail infrastructure improvements made within the DC2RVA corridor, but also depend on additional rail improvements made in adjoining rail corridors to accommodate these service increases. (Improvements made in adjoining rail corridors are outside the scope of the DC2RVA Project.)

2.2.3 Service Plan Development

2.2.3.1 Sources Used to Determine Future Passenger Train Frequencies

The additional passenger train frequencies proposed in the DC2RVA Project are determined primarily by previously signed federal Records of Decision governing the development of high-speed intercity passenger rail service in the federally designated SEHSR corridor. The proposed DC2RVA Project service frequency increases would add 9 new round trips (18 passenger trains) to the DC2RVA corridor between Washington, D.C. and Richmond, VA as follows:

- The four proposed Washington-North Carolina Interstate Corridor (SEHSR) round trips are planned to operate between the NEC and Washington, D.C. through the DC2RVA corridor to Raleigh and Charlotte, NC as defined in the Richmond to Raleigh Tier II EIS. The Interstate Corridor (SEHSR) trains do not exist today, and would be new passenger frequencies implemented under the DC2RVA Project. This new Interstate Corridor passenger service would add eight new trains per day under the DC2RVA Project. These new trains would supplement, not replace, the one Interstate Corridor (Carolinian) round trip that currently operates daily between Washington, D.C. and Charlotte, NC.
- One proposed new Northeast Regional (SEHSR) daily round trip (two trains) would be added between Washington, D.C. and Newport News, VA under the DC2RVA Project, supplementing the two daily Northeast Regional (Virginia) round trips (four trains) between Washington, D.C. and Newport News that currently operate. The DC2RVA Project will support the expansion of service between Washington. D.C. and Newport News from two round trips (four trains per day) to three round trips (six trains per day). This additional Northeast Regional (SEHSR) train to Newport News was defined in the Richmond to Hampton Roads Tier I EIS in 2012.
- Three proposed new Northeast Regional (SEHSR) daily round trips (six trains) would be added between Washington, D.C. and Norfolk, VA under the DC2RVA Project. This would supplement the one daily Northeast Regional (Virginia) round trip between Washington and Norfolk that operates today, and the two daily Northeast Regional (Virginia) round trips that currently operate between Washington and Richmond and are planned to be extended to Norfolk with the completion of capacity projects currently underway. The DC2RVA Project will support the expansion of service between Washington and Norfolk from three round trips (six trains) to six round trips (12 trains). The additional Northeast Regional (SEHSR) trains to Norfolk were defined in the Richmond to Hampton Roads Tier I EIS in 2012.
- One proposed new Northeast Regional (SEHSR) daily round trip (two trains) would be added between Washington, D.C. and Richmond, VA. This train would provide for a 6 a.m. northbound Richmond origination and a late-evening southbound arrival back in Richmond. This would allow the other trains from Newport News and Norfolk to operate at more traveler-friendly times to improve the attractiveness of the passenger rail service to those cities.

2.2.3.2 Service Patterns for DC2RVA Corridor Passenger Trains

The following general service patterns were established by DRPT for the train types proposed to operate in the DC2RVA corridor:

- New Interstate Corridor (SEHSR) trains to/from Charlotte and Raleigh make the following station stops in the DC2RVA corridor: Alexandria, Fredericksburg, and Richmond. These trains operate via the S-Line between Petersburg and Raleigh.
- The daily Interstate Corridor (Carolinian) between New York and Charlotte makes the same stops in the DC2RVA corridor as it does today: Alexandria, Quantico, Fredericksburg, and Richmond. The Carolinian continues to operate via the A-Line between Petersburg and Raleigh.

- New Northeast Regional (SEHSR) trains, as well as existing Northeast Regional (Virginia) trains make the following station stops in the DC2RVA corridor: L'Enfant (limited peak-hour departures), Alexandria, Woodbridge, Quantico, Ashland, and Richmond.
- Long Distance trains and Auto Train frequencies and stopping patterns do not change, except for the following:
  - The Silver Star (trains 91 and 92) is rerouted onto the restored S-Line between Petersburg and Raleigh.
  - The Cardinal, which uses the DC2RVA corridor between Washington and Alexandra and is currently on a tri-weekly schedule, is projected to operate as a daily train by the proposed DC2RVA 2025 implementation year.
- All trains (including Long Distance trains but not Auto Train) are scheduled to operate at a higher maximum authorized speed between Arlington and Richmond up to 90 mph where authorized.
- All new Northeast Regional (Virginia and SEHSR), Interstate Corridor (SEHSR) and Amtrak Long Distance trains are planned to operate north of Washington, D.C., with the exception of one which may terminate in Washington, D.C.

Specific station stop patterns within the DC2RVA corridor, as well as north and south of the corridor are subject to future refinement based on ridership analyses, future operating conditions, and stakeholder and public input.

Figure 2.2-4 illustrates potential service patterns of the proposed intercity passenger rail services operating in the DC2RVA corridor in the Build Alternative by identifying the specific station stop patterns for the different passenger train types. DRPT will finalize service patterns as part of the Service Development Plan.

Amtrak Silver Star Crossing Powells Creek

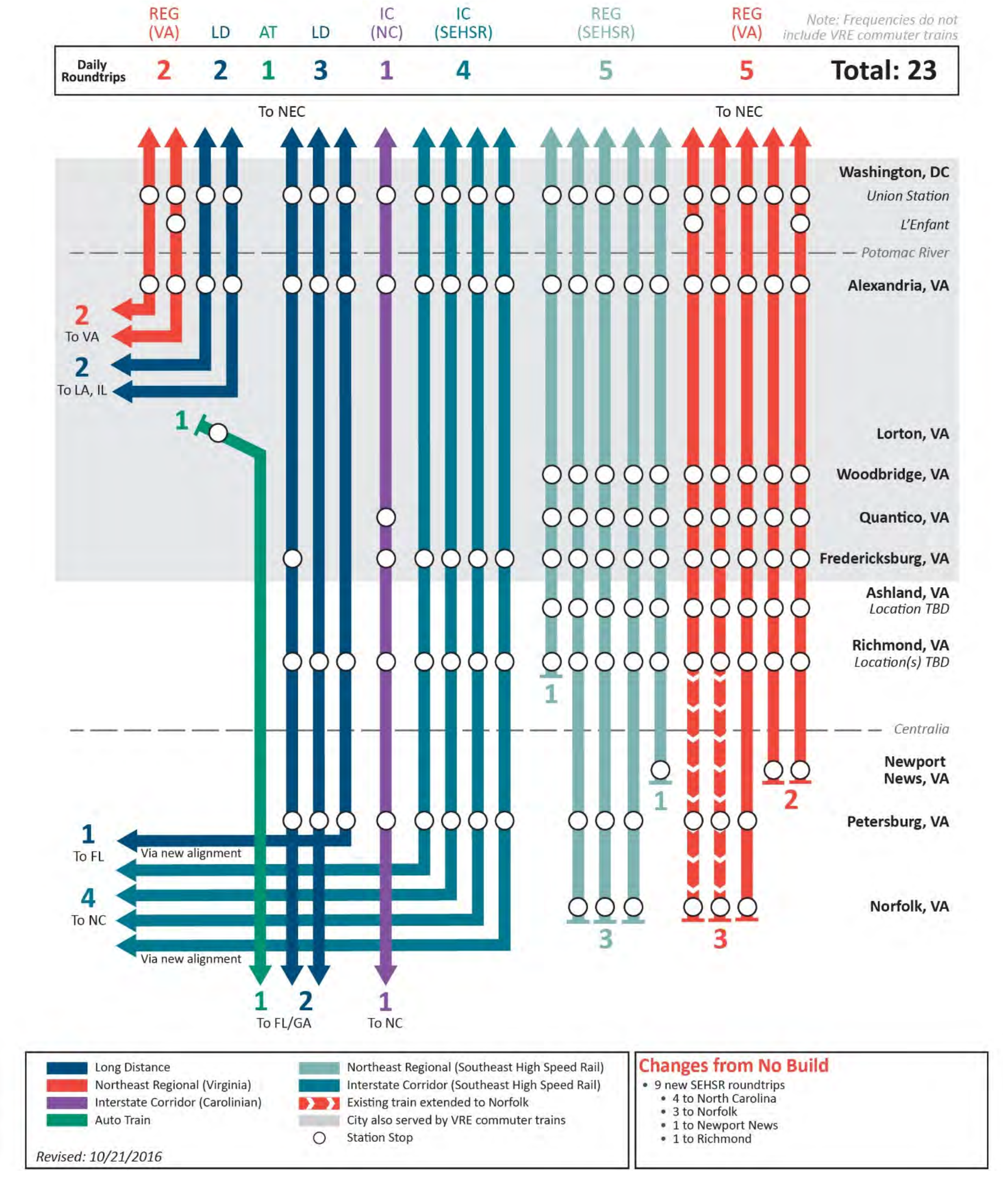


Figure 2.2-4: Service Patterns of Proposed Passenger Trains in the DC2RVA Corridor

2.3 ALTERNATIVES DEVELOPMENT AND SCREENING PROCESS

In this section is an overview of the alternatives development and screening process for the DC2RVA Project. The process established a range of alternatives for consideration and then systematically evaluated and screened the range of alternatives down to only the most reasonable alternatives for detailed analysis in the Draft EIS. Reasonable alternatives are those that meet the established Purpose and Need, are buildable and cost-effective, and are anticipated to have acceptable levels of impact to the human and natural environments.

2.3.1 Project Alternative Areas and Segments

For the development and evaluation of alternatives in the Tier II Draft EIS, DRPT initially categorized the DC2RVA Project corridor, which extends from Washington, D.C. to Richmond, into three general areas based on common rail operation characteristics and environmental conditions: Northern Virginia, Central Virginia, and Richmond. DRPT collected and evaluated data for 22 functional segments within these three areas, which were then grouped into six alternative areas that are more specific to the types of Build Alternatives that would be developed as part of the DC2RVA Project. The six alternative areas are shown in Figure 2.3-1 and the relationship between the three general areas, the six alternative areas, and the 22 segments is identified by milepost in Table 2.3-1. In addition, existing intercity passenger rail stations in the Project corridor are listed in Table 2.3-2. Note that the Build Alternatives developed in each of the six alternative areas will be linked to form a single corridor preferred alternative (see Chapter 7).

Rail Bridge Over Neabsco Creek

Table 2.3-1: Project Alternative Areas and Segments

General Area	Alternative Area	Mileposts	Segments	Reason for Grouping
Northern Virginia	Area 1: Arlington	CFP 110– CFP 109.3	01: Arlington to Alexandria (ROAF)	Alternative bridge approach alignments developed pending decision on location of Long Bridge capacity expansion
	Area 2: Northern Virginia	CFP 109.3– CFP 62	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)	Relatively similar alignment throughout this area
	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)	Consideration of multiple alignments through or around (bypass option) Fredericksburg
Central Virginia	Area 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)	Relatively similar alignment throughout this area
	Area 5: Ashland	CFP 19– CFP 9	13: North Doswell to Elmont (NDEL) 14: Elmont to Greendale (ELGN) 22: Ashland Bypass (ASBP)	Consideration of multiple alignments through or around (bypass option) Ashland
Richmond	Area 6: Richmond	CFP 9–A 011	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 (Peninsula Subdivision) (AMFY)* 20: Buckingham Branch/Hospital Wye (BBHW)**	Multiple station options for Richmond on separate alignments

*Prior to the Alternatives Development Process as described in this chapter, DRPT truncated the longer AM Junction to Beulah (AMBE) and Buckingham Branch to Doswell (BBRR) segments to the limits indicated herein. Additional information can be found in the Alternatives Technical Report in Appendix A.

DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

Table 2.3-2: Existing Intercity Passenger Rail Stations in the DC2RVA Corridor by Area

General Area	Alternative Area	Station	Location	Existing Amtrak Passenger Services[1]	Other Rail Services
N/A		Washington Union Station[2]	Washington, D.C.	Long Distance Interstate Corridor (Carolinian) Northeast Regional (Virginia)	VRE, Maryland Area Regional Commuter (MARC), Metrorail
Northern Virginia	Area 1: Arlington	No stations			
	Area 2: Northern Virginia	Alexandria Union Station[3]	City of Alexandria	Long Distance Interstate Corridor (Carolinian) Northeast Regional (Virginia)	VRE, Metrorail
		Lorton Auto Train	Lorton (Fairfax County)	Auto Train	None
		Woodbridge	Woodbridge (Prince William County)	Northeast Regional (Virginia)	VRE
		Quantico	Town of Quantico (Prince William County)	Interstate Corridor (Carolinian) Northeast Regional (Virginia)	VRE
	Area 3: Fredericksburg	Fredericksburg	City of Fredericksburg	Long Distance Interstate Corridor (Carolinian) Northeast Regional (Virginia)	VRE
Central Virginia	Area 5: Ashland	Ashland	Town of Ashland (Hanover County)	Northeast Regional (Virginia)	None
Richmond	Area 6: Richmond	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

Notes:

1) See Section 2.2.1 for description of existing Amtrak passenger service train types

2) 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.

3) Alexandria Union Station is typically referred to as "Alexandria Station" so as not to be confused with Washington Union Station.

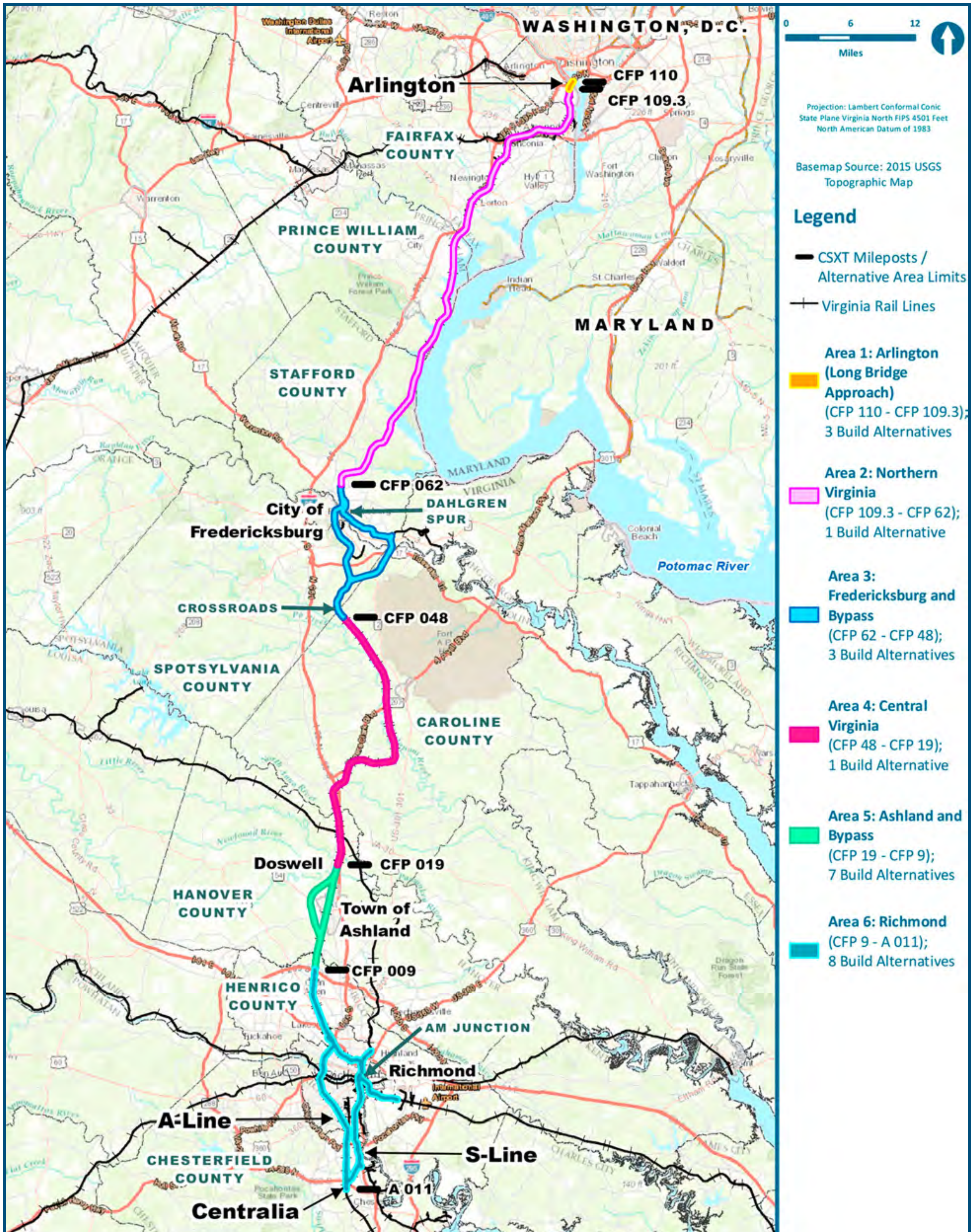


Figure 2.3-1: Alternative Areas

2.3.2 Considerations for Alternatives Development

The alternatives development process for DC2RVA began with the development of technical criteria as the basis for Project Build Alternatives. Additional considerations that guided the development of alternatives included their ability to meet the Project Purpose and Need and the presence of physical constraints, i.e., crossing infrastructure, along existing and potential rail alignments. Each of these three considerations are described below.

2.3.2.1 Technical Criteria

The engineering Basis of Design (BOD) Report (Appendix B) presents the technical criteria that were followed for conceptual and preliminary engineering on the DC2RVA Project. The BOD was developed in coordination with the major Project stakeholders: FRA, DRPT, Virginia Department of Transportation (VDOT), CSXT, Amtrak, and Virginia Railway Express (VRE).

The BOD for rail components of the Project emphasizes safety and follows accepted engineering practices used by CSXT, Amtrak, and VRE and comports with FRA track safety standards and the American Railway Engineering and Maintenance-of-Way Association (AREMA) Manual for Railway Engineering. The BOD for roadway components follows VDOT standards.

Key features of the BOD are incorporated into the alternatives described in this chapter and include the following:

- Both new and existing main line track will be designed for a maximum authorized passenger train speed of 90 mph, where practicable.
- Both new and existing main line tracks shall be designed for interoperability between all passenger and freight service.
- Track centers (distance between the centerlines of two adjacent tracks) for new main line, lead tracks, tangent tracks[2], and tracks parallel to main line tracks shall be a minimum of 15 feet between an existing track and a proposed track or between two or more proposed tracks (Figure 2.3-2).

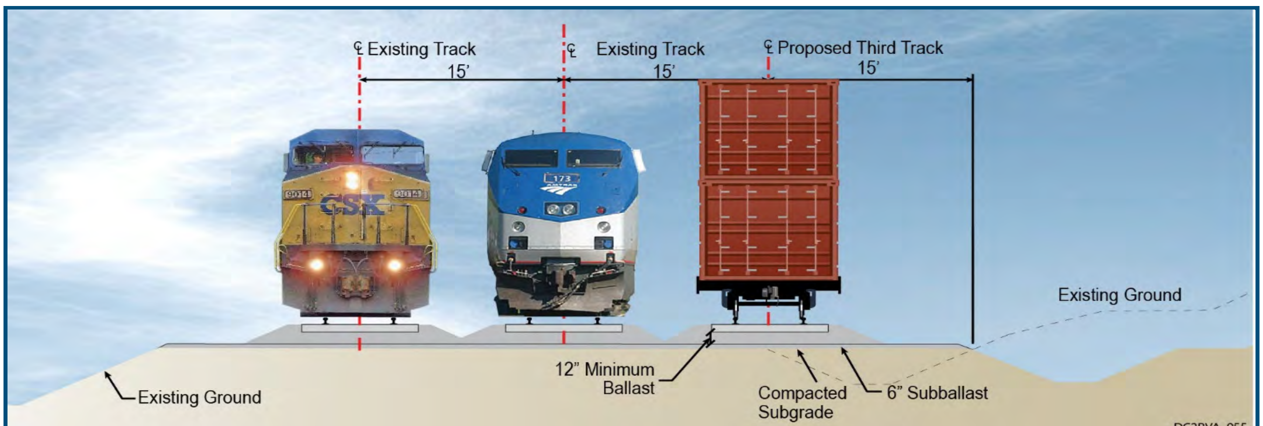


Figure 2.3-2: Typical Track Section

[2] Main line track is the primary track used for through train movements. Lead tracks connect yards or other facilities to the main line track. Tangent track are tracks that follow a straight line.

- Passenger station improvements shall include low-level side or center island platforms serving all main line tracks in accordance with FRA, Amtrak, and VRE standards[3]. Platform length should be 850 feet for platforms serving Northeast Regional and Interstate Corridor trains and VRE commuter trains, and 1,200 feet for platforms serving Long Distance trains.
- Utilization to the extent feasible and practicable of ongoing and previously completed studies, concept development, and rail improvement designs in the corridor.

The BOD and key features discussed above are applicable only to areas where new construction or major remodeling might occur. Existing tracks where improvements are not required are exempt from the design criteria as well as the approvals and design variance process in the BOD. DRPT anticipates that portions of the existing track may need to be modified or upgraded for improved rail geometrics as well as included in modifications to the signal system.

Rail alignment options include common elements such as signals, crossovers, sidings, turnouts, etc. These elements are defined and shown in Figure 2.3-3.

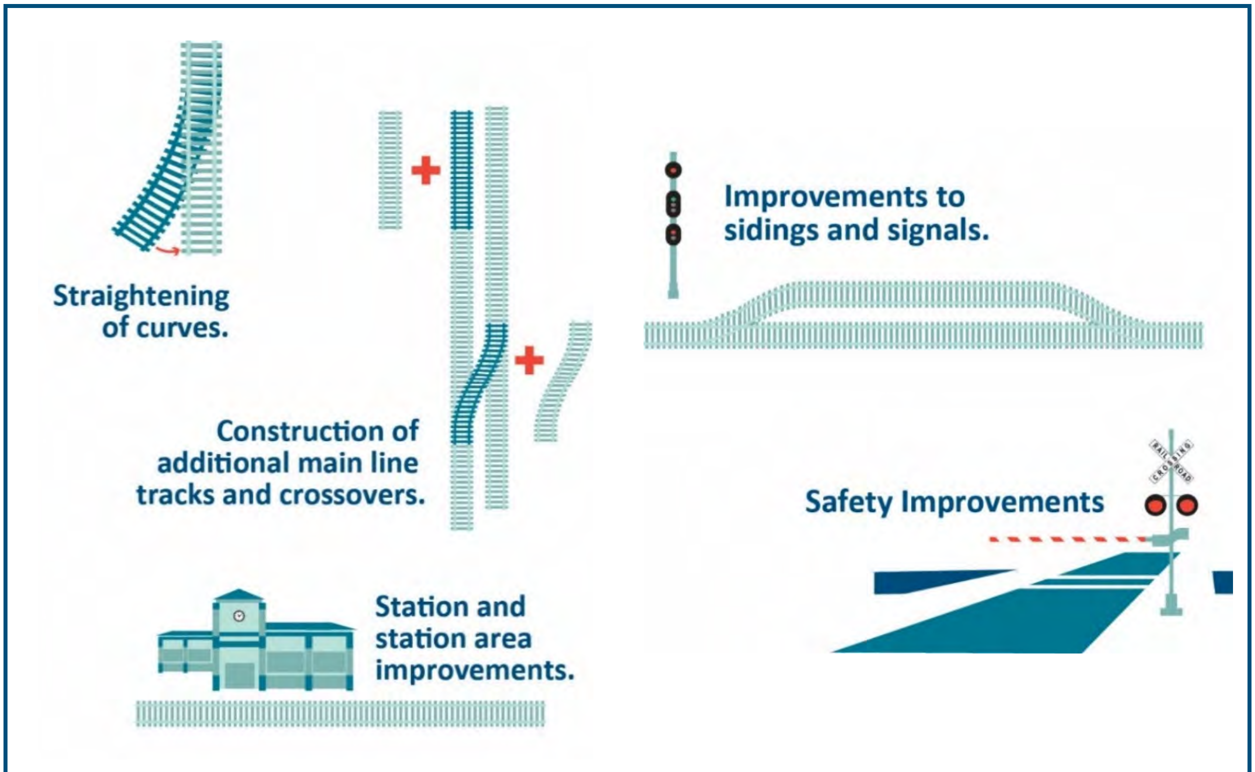


Figure 2.3-3: Typical Rail Alignment Elements

[3] Platforms are required to comply with the Americans with Disabilities Act (ADA), and those located on tracks used solely for passenger trains must have high platforms allowing level boarding with Amtrak's passenger cars. FRA waives this requirement for platforms on tracks where freight trains are commingled with passenger trains, and instead allows a low-level platform (top of platform is 8 inches from top of rail). Where low-level platforms are used, the station must have alternate means of providing level access to Amtrak's passenger cars for those with disabilities.

2.3.2.2 DC2RVA Purpose and Need

In the 2002 SEHSR Tier I EIS, FRA and FHWA established the overall purpose for the SEHSR program, which is to provide a door-to-door time-competitive transportation choice to travelers within the Washington, D.C. to Richmond, Raleigh, and Charlotte travel corridor. The SEHSR Tier I EIS concluded that adding a third track between Alexandria and Richmond was necessary to accommodate the freight and passenger growth needs of all users and institute high speed passenger service. The current DC2RVA Project carries forward the purpose of the SEHSR Tier I EIS within the Washington, D.C. to Richmond section of the larger SEHSR corridor. The purpose of the DC2RVA Project (as stated in Chapter 1) is to increase rail capacity between Washington, D.C. and Richmond to deliver higher speed passenger rail, expand commuter rail, and accommodate growth of freight rail service in an efficient and reliable multimodal rail corridor. The DC2RVA Project will enable passenger rail to be a competitive transportation choice for intercity travelers between Washington, D.C. and Richmond and destinations beyond the corridor.

The DC2RVA section of SEHSR is critical to the success of the other SEHSR sections to the south. It is the "gateway" for those future corridors to the south to access the Northeast Corridor (NEC), and their ridership/revenue is dependent upon that access. Without improvements to DC2RVA, any trains travelling north would be affected by congestion.

Current conditions experienced in the Project corridor confirm the SEHSR Tier I EIS Purpose and Need and are the foundation for the Project today. These conditions, described in detail in Chapter 1, include:

- Population growth
- Freight growth
- Congestion in the I-95 corridor
- Air travel congestion
- Limited rail capacity in the corridor
- Options for reliable and convenient movement of goods and people
- Air quality

Accordingly, in this Tier II Draft EIS, DRPT developed Project alternatives to meet the Project's Purpose and Need by considering the factors listed in Table 2.3-3.

2.3.2.3 Crossing Infrastructure Considerations

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 other railroads, roads, or pedestrian paths, as well as grade-separated crossings with other railroads, roads, or pedestrian paths going over (overpasses) or under (underpasses) the railroad. 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 existing at-grade and grade-separated crossings:

- Roadway crossings (public and private crossings)
- Pedestrian crossings
- Rail crossings
- Waterway crossings

Table 2.3-3: Factors Considered to Develop Alternatives

DC2RVA Purpose and Need Elements	Factors Considered in the Development of Alternatives (i.e., Does the alternative…?)
Provide an efficient and reliable multimodal rail corridor	▪ Avoid, reduce, or mitigate impacts to sensitive human, natural, and physical environmental resources ▪ Avoid, reduce, or mitigate impacts to property owners ▪ Optimize capital and operation costs, including: - Ridership and revenue - Social and economic benefits - Infrastructure costs - Operations and maintenance costs ▪ Provide infrastructure and service improvements that are practicable and constructible
Increase the capacity of the multimodal rail system	▪ Provide additional main track, sidings, crossovers, yard bypasses and leads, and other capacity and reliability improvements sufficient to accommodate future volumes of passenger, commuter, and freight train traffic
Improve the frequency of passenger rail operations	▪ Increase passenger train frequency by up to nine round trips per day ▪ Provide a passenger train schedule suitable to ridership demand within the corridor and beyond
Improve the reliability of passenger rail operations	▪ Improve on-time performance by reducing the likelihood of passenger train delays within the corridor
Improve the travel time of passenger rail operations	▪ Reduce the current passenger train trip time between Washington, D.C. and Richmond ▪ Provide a passenger train trip time competitive with auto travel between Washington, D.C. and Richmond based on ridership demand
Accommodate VRE commuter rail service operations	▪ Accommodate VRE future growth ▪ Accommodate VRE commuter train schedules ▪ Accommodate VRE non-revenue train movements and yard access ▪ Accommodate VRE platform designs, including alignment, length, and number of platform edges served ▪ Accommodate existing and planned VRE station locations, including sharing platform space and other facilities at Amtrak passenger stations
Accommodate freight rail service operations	▪ Reduce freight train delays from passenger and commuter train operations ▪ Improve average freight train running time based on track design speed ▪ Accommodate rail freight future growth ▪ Accommodate yard operations ▪ Accommodate access to local customers ▪ Accommodate sidings for crew changes and layovers
Improve modal connectivity with other public transportation systems	▪ Develop an intercity passenger train schedule meeting ridership demand ▪ Accommodate a commuter train schedule suitable to ridership demand ▪ Provide passenger stations that accommodate commuter trains and other transit providers ▪ Provide station locations consistent with FRA guidelines ▪ Enhance station accessibility - Primary road access - Other public transit connections/access - Pedestrian/bicycle access/facilities - Parking facilities ▪ Provide station facilities consistent with Amtrak station guidelines ▪ Provide station locations consistent with state and local plans
Improve multimodal rail operations safety	▪ Improve road at-grade crossing safety warning systems ▪ Grade separate or close crossings with unacceptable safety risks ▪ Provide platform and station improvements ▪ Provide upgrades to signals and communication systems
Improve air quality and reduce greenhouse gas emissions	▪ Divert passenger trips by automobile and air to passenger train ▪ Divert movement of freight by trucks to rail ▪ Reduce fuel usage

DRPT's assessment of constraints on rail alignments for each crossing depended on the location and the specific type of crossing. The evaluation of existing overpasses addressed spatial limitations that could constrain the ability to add an additional main track beneath the overpass. The evaluation of underpasses addressed existing geometry and the configuration of the rail structure for potential constraints on the rail alignment. The evaluation of at-grade crossings addressed 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). Finally, 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.

DRPT identified proposed crossing improvements for each at-grade roadway crossing in accordance with FHWA grade crossing guidance and the site-specific conditions for each crossing. The proposed improvements for the DC2RVA Project include crossing elimination (grade separation or closure) or safety improvements (including four quadrant gates or center median treatment with gates), and were identified to enhance the safety and operations of both roadway and rail traffic through the at-grade crossings. Refer to Chapter 4.15 for details.

2.3.3 Alternatives Development

The SEHSR Tier I EIS and 2002 Record of Decision (ROD) 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 defined the general location and configuration of existing and additional main line tracks required 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 BOD, described above in Section 2.3.2.1. The BOD 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. The rail alignments developed for the DC2RVA Project, described below, generally include the addition of a main track following the existing CSXT Richmond, Fredericksburg, and Potomac Subdivision (RF&P) corridor and improvements to existing track to increase potential speed, accommodate platform improvements, improve roadway crossings, or make room for additional track:

- DRPT developed preliminary rail alignments, including the addition of a new main track, from approximately 250 feet south of the Potomac River in Arlington, VA to the Staples Mill Road Amtrak station in Richmond.
- 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 the primary existing rail corridors (the A- and S-Lines) through the city.

In addition, 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, two potential alignments through the city and multiple station location options were 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.

Developing potential rail alignments was an iterative process and considered options for rail alignments, station options, and physical constraints, as shown in Figure 2.3-4.

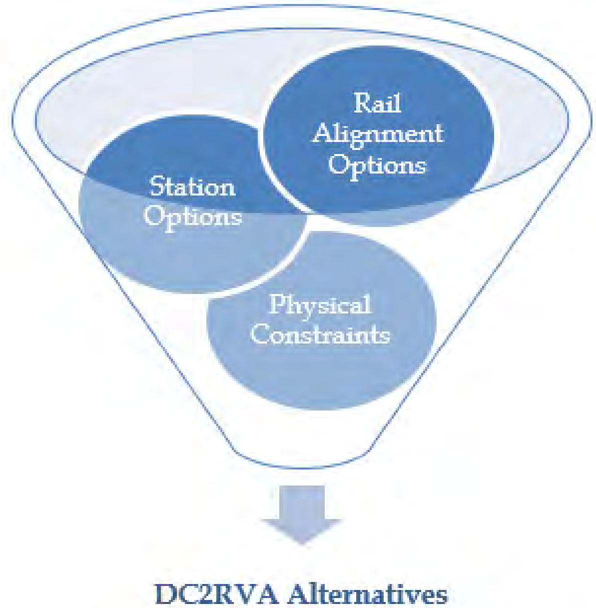


Figure 2.3-4: DC2RVA Alternatives Development Process

2.3.3.1 Rail Alignment Alternatives

DRPT developed three initial alignments to represent the range of potential Additional Track Alignments along the existing DC2RVA corridor, as shown in Figure 2.3-5 and described further below:

- Maximum Speed (Unconstrained) Alignment—adds one new track and realigns existing track to achieve the maximum authorized speed of 90 mph unconstrained by existing right-of-way.
- Improved Speed (Constrained) 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. A variation on this alignment was also developed that optimizes use of existing rail infrastructure while also seeking to achieve the maximum possible speed up to 90 mph— called the Improved Speed Alignment (Hold Bridges/Tangents) Alignment.
- Existing Speed (West/East Track) Alignment —adds one new track to either side of the existing track while maintaining existing speed.

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, which 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. 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.

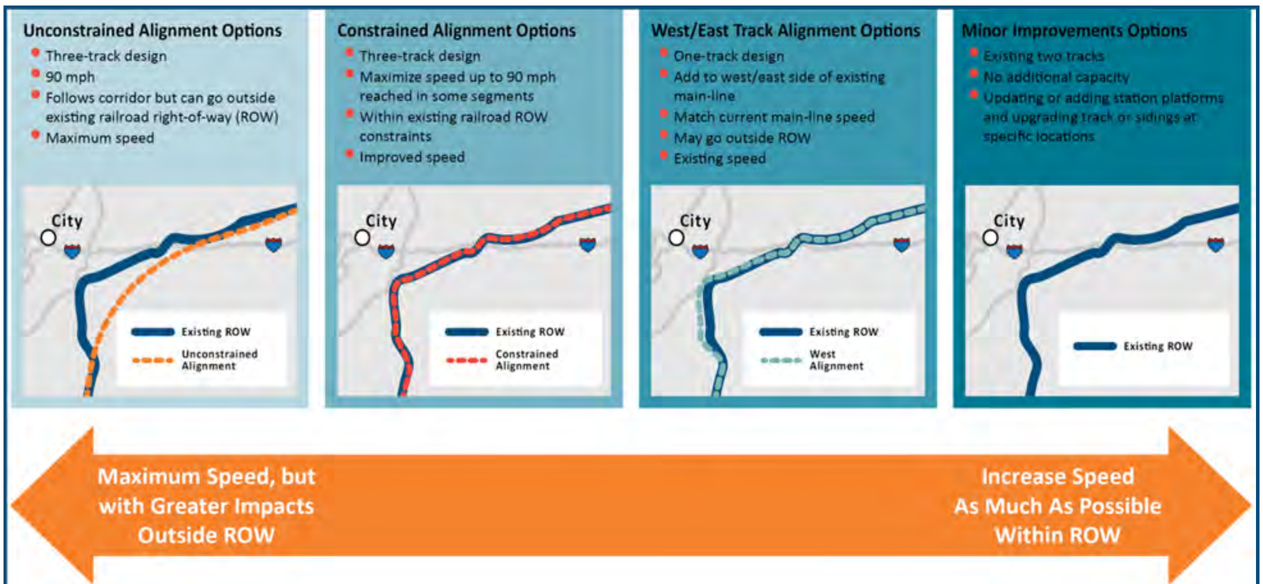


Figure 2.3-5: DC2RVA Preliminary Rail Alignment Options

In addition, a fourth alternative was developed for segments and areas where no additional track was warranted but minor improvements would be necessary to upgrade the existing rail system to meet Purpose and Need, and be compatible with alternatives north and south of the specific segment/area. For example, some segments already have three main tracks and may not require an additional main track. This fourth alternative is the <u>No Additional Track, or Minor Improvements, Alignment</u>.

Maximum Speed (Unconstrained) Alignment

The Maximum Speed Alignment was designed by DRPT to show what the rail alignment would look like if the primary criterion was to design track capable of the maximum allowable speed of 90 mph for passenger trains 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 90 mph 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.

Improved Speed (Constrained) Alignment

The Improved Speed Alignment was designed by DRPT 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 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 this constrained alignment was developed to optimize use of existing rail infrastructure while also seeking to achieve the maximum possible speed up to 90 mph—called the Improved Speed Alignment (Hold Bridges/Tangents). This design variation 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) would be preferred due to lower infrastructure impacts and anticipated cost savings from continuing use of existing rail bridges and tangent track alignments.

Existing Speed (West/East Track) Alignment

The Existing Speed Alignment adds one additional main line track to the existing alignment and matches the existing track alignment's curvature and operating speed. The Existing Speed Alignment would add capacity to the system but would minimally increase design speed using track superelevation. 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; 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. There may be some areas, however, where the slope of the track bed and associated cut/fill line, utility relocations, replacement of existing access roads, or other related improvement extend 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 Authorized Speed (MAS).

Alignment Options Based on Prior Studies

In addition to the rail alignments described above, several rail alignments were identified in prior corridor studies and were considered by DRPT in the alternatives development process (previous studies are further described in the Alternatives Technical Report in Appendix A). These alignments included those from studies by DRPT and CSXT for the addition of a main track and/or third track for portions of the DC2RVA corridor. The rail alignments developed in prior studies used varying design criteria; therefore, these alignment options were reconfigured by DRPT at the conceptual sketch level following the DC2RVA BOD. Once reconfigured to match the DC2RVA BOD, DRPT realized that the prior rail alignment options generally overlapped the East Addition or West Addition versions of the Existing Speed Alignment and in many segments were indistinguishable from the Existing Speed Alignments.

Considerations from Scoping/Public Input

Agency and public input during the scoping process also identified several alternatives for consideration (see Chapter 6 for more information on the scoping process). Comments that were potentially consistent with the Project's Purpose and Need were considered and incorporated into the 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 and a bypass at Fredericksburg)
- 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
- 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 during Project scoping and determined by DRPT to be 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 and was therefore 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; therefore, any greenway would require additional right-of-way to be acquired outside of the existing CSXT right-of-way 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.

Alternatives Development in Fredericksburg (Build Alternative Area 3) and Ashland (Build Alternative Area 5)

DRPT, based on prior corridor studies and in coordination with FRA, has assumed an additional main track is necessary in the corridor to meet the Project's Purpose and Need. DRPT evaluated the Maximum Speed, Improved Speed, and Existing Speed additional track alignments in Fredericksburg and Ashland; however, all of the alignments that add a main track would affect historic or other resources in the areas. DRPT therefore considered two additional options within each of these areas:

- No Additional Track—This option would not add any additional track through Fredericksburg or Ashland. 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 on the existing corridor.
- Two-track Bypass—This option would add a two-track bypass, either east or west of Ashland or Fredericksburg. DRPT anticipated these bypass alignments would be used primarily by freight trains, the Auto Train, and possibly some long-distance passenger trains; regional passenger trains and VRE commuter trains (Fredericksburg only) would continue to utilize the existing tracks and pass through the existing station.

2.3.3.2 Station Location Alternatives

DRPT evaluated both existing and potential passenger rail stations in the DC2RVA corridor. The DC2RVA Project proposes to generally maintain existing intercity passenger rail service patterns while increasing the frequency and reliability of service on the corridor. DRPT anticipates that the existing intercity passenger rail stations in the corridor (see Table 2.3-2), if not replaced by a new station, would continue to receive some level of intercity passenger rail service via Interstate Corridor (Carolinian and SEHSR) and/or Northeast Regional (Virginia and SEHSR) trains. The Project may modify existing train schedules to accommodate the proposed new passenger services provided by DC2RVA. 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.

Intercity passenger rail stations may be affected by the Project as follows:

- Existing intercity 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 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 stations that will only be served by VRE[4], although it does not preclude VRE from pursuing such improvements.
- 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.

Several locations for potential new or replacement intercity passenger stations were identified during Project scoping and from prior corridor studies. These potential new station locations, which include some VRE stations and new station locations, are identified in Table 2.3-4.

2.3.3.3 Richmond Area Rail Alignment–Station Service 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 in Richmond for increased capacity to form alternatives.

Station location alternatives in Richmond were developed using the following FRA station location guidance, and associated rail improvements were identified to serve both intercity passenger rail needs and to alleviate freight rail movements and bottlenecks that could adversely affect passenger service:

- Intercity passenger rail stations should be located in or near the central business district.
- For larger metro areas, there should be one or more suburban stations.
- Stations should be readily accessible and cater to business and leisure travel.

Refer to Section 2.4.3 below for details.

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[4] 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 the Alternatives Technical Report. VRE existing commuter rail stations and those under construction or planned were also evaluated to ensure DC2RVA track alignments could accommodate expanded commuter platforms and new island platforms in accordance with the Project's BOD. The Project does not include construction of new platforms for stations that will only be served by VRE.

Table 2.3-4: Potential Locations for New Passenger Stations in the DC2RVA Corridor

Station	Location/DC2RVA Build Alternative Area	Status/Origination	Potential Other Passenger Rail Service
Crystal City/National Airport	Arlington County/Area 2: Northern Virginia	Potential new station location identified during public scoping	VRE, Metrorail
Spotsylvania	Spotsylvania County/Area 4: Central Virginia	Potential new station combined with existing VRE station	VRE
Carmel Church	Caroline County/Area 4: Central Virginia	Potential new station location identified from prior studies and public scoping	None
Vaughan Road	Town of Ashland/Area 5: Ashland	Potential new station location to replace existing Ashland Station identified during public scoping	None
Patrick Road	Town of Ashland/Area 5: Ashland	Potential new station location to replace existing Ashland Station identified during public scoping	None
Ashcake Road	Hanover County/Area 5: Ashland	Potential new station location to replace existing Ashland Station identified during public scoping.	None
Cedar Lane	Glen Allen, Henrico County/Area 6: Richmond	Potential new station location based on DRPT review of rail alignment	None
Greenwood Road	Glen Allen, Henrico County/Area 6: Richmond	Potential new station location based on DRPT review of rail alignment	None
Mountain Road	Glen Allen, Henrico County/Area 6: Richmond	Potential new station location based on DRPT review of rail alignment	None
Parham Road	Henrico County/Area 6: Richmond	Potential new station location identified from prior studies	None
Boulevard	City of Richmond/Area 6: Richmond	Potential new station location identified during public scoping	None
Broad Street	City of Richmond/Area 6: Richmond	Potential redevelopment of historic train station (currently Science Museum of Virginia) identified during public scoping	None
Hull Street Road	South Richmond/Area 6: Richmond	Potential new station location based on DRPT review of rail alignment	None
Warwick/Bells Road	South Richmond/Area 6: Richmond	Potential new station location based on DRPT review of rail alignment	None
Walmsley Boulevard	South Richmond/Area 6: Richmond	Potential new station location based on DRPT review of rail alignment	None
Chester Road	Chester/Area 6: Richmond	Potential new station location based on DRPT review of rail alignment	None

2.4 OPTIONS CONSIDERED AND DISMISSED

DRPT's determination of which alternatives were considered and dismissed versus those carried forward for further evaluation and/or inclusion in the Draft EIS was the outcome of a systematic evaluation and screening process. Accordingly, this section begins with a description of the screening process, followed by a summary of the outcome of the application of that process.

2.4.1 Screening Process

2.4.1.1 Rail Alignment Screening Process

The rail alignment screening process evaluated potential rail alignments for effectiveness in meeting the Project's Purpose and Need. The overall rail alignment screening process is summarized in Table 2.4-1 and includes the following:

- **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. During this stage, 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
- **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). Options that were identified in each area during Stage IV were also evaluated against the Stage I, II, and III screening elements.

At the northern end of the DC2RVA corridor in Arlington, the CSXT tracks continue across the Potomac River on a two-track rail bridge, known as the Long Bridge. The Washington, D.C. District Department of Transportation (DDOT), in coordination with FRA, DRPT, VRE and CSXT, is completing a comprehensive study for the replacement of the Long Bridge to increase the rail capacity across the Potomac River.[5]

The DDOT Long Bridge study is separate from the DC2RVA Project and addresses a critical bottleneck to rail operations where the DC2RVA corridor connects to the NEC. DRPT developed multiple alignments for the southern approach to the bridge in coordination with the Long Bridge study and subjected those options to the same Stage I, II, and III screening as described above for the corridor rail alignments. 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.

[5] The DDOT Long Bridge Study project website is: https://ddot.dc.gov/page/long-bridge-study-phases-i-and-ii

Table 2.4-1: 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.
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) ▪ 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.

2.4.1.2 Station Location Screening Process

DRPT developed functional criteria for 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,[6] and distance between station stops. These criteria are based on guidelines from the FRA and standards developed by Amtrak, AREMA, and other local and national rail station studies.

Screening of existing and potential stations considered: station location; potential ridership/revenue; station type; multimodal service; station configuration; station access; and parking. DRPT anticipates that the existing intercity passenger rail 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 and SEHSR) trains. Potential new

[6] Multimodal connectivity refers to the ability for passengers to transfer between multiple modes of transportation, such as passenger rail, commuter rail, subway or streetcar service, bus service, private vehicles, bicycles, and pedestrian modes.

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.

2.4.2 Screening Results for Northern Virginia (Build Alternative Areas 1, 2, and 3) and Central Virginia (Build Alternative Areas 4 and 5)

2.4.2.1 Rail Alignments

DRPT identified Northern Virginia and Central Virginia rail alignment options based on the opportunity to improve track design speed.

The cumulative results of Stage I, II, and III screening of rail alignments in Northern and Central Virginia are shown in Table 2.4-2. The 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 (●). Refer to the Alternatives Technical Report (Appendix A) for detailed screening tables for each stage by segment. Detailed graphics illustrating the specific improvements for segments within Northern Virginia and Central Virginia are in Appendix D and F, respectively.

Northern Virginia Screening Outcome

In Segment 01: Rosslyn to Alexandria (ROAF), DRPT considered the following alignments, none of which were dismissed:

- Add two tracks east of existing corridor
- Add two tracks west of existing corridor
- Add one track east and one track west of existing corridor

This less than one-mile-long section of the DC2RVA corridor provides the transition between the DC2RVA corridor and the approach to the Long Bridge across the Potomac River. DRPT considered the environmental, social, and economic impacts of each of the three Build Alternatives, in addition to each alternative's ability to meet the Project Purpose and Need. DRPT determined that each of the three alternatives are very similar in their impacts, and that lacking overriding issues, DRPT would not select one alternative over the other at this time.

In the remainder of Northern Virginia, DRPT eliminated the Maximum Speed Alignment options during screening due to their relatively high levels of impacts to the human and natural environment.

The Improved Speed Alignment option (Hold Bridges/Hold Tangents) was advanced by DRPT 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, due to limited right-of-way, site constraints, or rail operational constraints.[7] In these portions of track, the Improved Speed Alignment seeks to improve speed up to the limiting speed on either end.

[7] 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 decelerate to the limiting speed without wasting fuel.

Table 2.4-2: Summary of Stages I, II, and III Screening by Segment (Northern and Central Virginia)

Segment	Max Speed	Improved Speed			Existing Speed			No Additional Track
		Constrained	Hold BR	Hold BR/Tan	East	West	2006	
Northern Virginia								
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	○
Central Virginia								
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

Notes: ●Alignment eliminated from further evaluation during screening. ○Alignment carried forward for further evaluation

Detailed graphics illustrating the specific improvements for segments within Northern Virginia and Central Virginia are in Appendix D and F, respectively.

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, a No Additional Track Option was advanced. The No Additional Track Option includes shifting track in some curves to improve speed.

Taking into consideration the Improved Speed (Hold Bridges/Hold Tangents) Alignment and No Additional Track Option, 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 (West/East Track) Alignment options one segment on each side that advanced through these screenings. However, the Existing Speed Alignments do not accommodate improving speed on the curves in the corridor.

Based on the results of the Stage I, II, and III screening, 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.

Central Virginia Screening Outcome

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 (West/East) Alignments were eliminated from further consideration because they did not accommodate improving speed.

2.4.2.2 Station Locations

As indicated above, DRPT anticipates that the existing intercity passenger rail stations in the corridor (see Table 2.3-2), if not replaced by a new station, would continue to receive some level of intercity passenger rail service. DRPT evaluated possible new or replacement station locations for their suitability to serve as intercity passenger rail stations, as shown in Table 2.4-3, but ultimately determined that no new stations are needed in the Northern and Central Virginia areas to meet the Purpose and Need for service. This, however, does not preclude future stations along the corridor.

Table 2.4-3: Station Screening Summary, Northern and Central Virginia

Station	Location/DC2RVA Build Alternative Area	Status	Station Notes
Crystal City/ National Airport	Arlington County/Area 2: Northern Virginia	Potential new location. Dismissed from further consideration.	Platform configuration constraints, parking constraints, and proximity to Alexandria Station.
Spotsylvania	Spotsylvania County/Area 4: Central Virginia	Potential new location. Dismissed from further consideration.	Proximity to Fredericksburg Station, and interference with VRE operations.
Carmel Church	Spotsylvania County/Area 4: Central Virginia	Potential new location. Dismissed from further consideration.	Access to I-95 and US-1. Lack of development and relatively low population and ridership in the area.

▶ Continued.

Table 2.4-3: Station Screening Summary, Northern and Central Virginia

Station	Location/DC2RVA Build Alternative Area	Status	Station Notes
Vaughan Road	Caroline County/Area 4: Central Virginia	Potential new location. Dismissed from further consideration.	Limited connectivity to east-west primary roadways, possible conflicts with local land use, and distance from Ashland's central urban area.
Patrick Road	Town of Ashland/Area 5: Ashland	Potential new location. Dismissed from further consideration.	Land acquisition and occupying space currently designated for use by the College for expansion.
Ashcake Road	Town of Ashland/Area 5: Ashland	Potential new location. Carried forward based on potential conflicts of existing station location in the Town of Ashland with DC2RVA improvements.	South of Ashcake Road, on the eastern side of tracks.

2.4.3 Screening Results for Richmond (Build Alternative Area 6)

In Richmond, the existing dense urban development, grade changes, and historic rail ROW configuration limit opportunities to improve travel time. Additionally, there are multiple rail lines, including two CSXT-owned north-south lines (A-Line and S-Line, see below), to consider. Because of these factors, DRPT developed preliminary rail alignments and other improvements for the Richmond area primarily based on the ability to serve passenger train routes and potential station locations. **Rail Lines through Richmond.** In Richmond, the A-Line and S-Line railroads diverge at the south end of Acca Yard forming two routes through the city. The westward of the two routes is the A-Line, which arcs around Richmond as the double-track North End Subdivision, CSXT's principal freight route between Richmond and points south toward North Carolina. The eastward of the two routes is the S-Line, which passes through the center of Richmond as the Bellwood Subdivision, used primarily by local freights to serve industries and passenger train service to Newport News. The double-track A-Line runs through the median of I-195 south of Acca Yard and has limitations for expanding capacity. The single-track S-Line has limited vertical and horizontal clearance in the vicinity of Main Street Station caused by I-95 bridge pillars and the Triple Crossing of three railroad lines, of which the S-Line is the middle-level track in the crossing.

2.4.3.1 Rail Alignment—Station Service Options

Rail alignment options in Richmond were driven by station service options. 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 in this chapter.

As described in Section 2.4.3.2, DRPT's evaluation of potential new station locations in Richmond identified two station locations for further consideration. Together with the two existing stations in the Richmond area, the following four stations were carried forward as part of either a single-station or two-station option:

- Staples Mill Road Station—existing Amtrak station in Henrico County

- Boulevard Station—new station location adjacent to the Boulevard Street overpass and northeast 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

DRPT identified multiple options based on combinations of the existing rail alignments through the city (the A-line and the S-Line) and existing and potential station locations, as shown in Figure 2.4-1. Options based on station service were developed by DRPT for single-station options and two-station options at the four station locations. Each station location option includes a corresponding set of rail alignments and improvements.

The 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 Only (via A-Line)
- Boulevard Station Only (via A-Line)
- Boulevard Station Only (via S-Line)
- Broad Street Station Only (via A-Line)
- Main Street Station Only (via S-Line)
    - Via S-Line/Peninsula Subdivision
    - Via S-Line/Peninsula Subdivision + Freight Connector Bypass

The two-station options include varying rail services to both Main Street Station and Staples Mill Road Station:

- Full Service (via S-Line)— Long Distance (Amtrak), Interstate Corridor (SEHSR and Carolinian), and Northeast Regional (SEHSR and 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 S-Line; all Northeast Regional service to Newport News continues from the east side of Main Street Station on the Peninsula Subdivision.
- 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.
- Split Service (via A-Line)—Similar to the existing service pattern, 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.

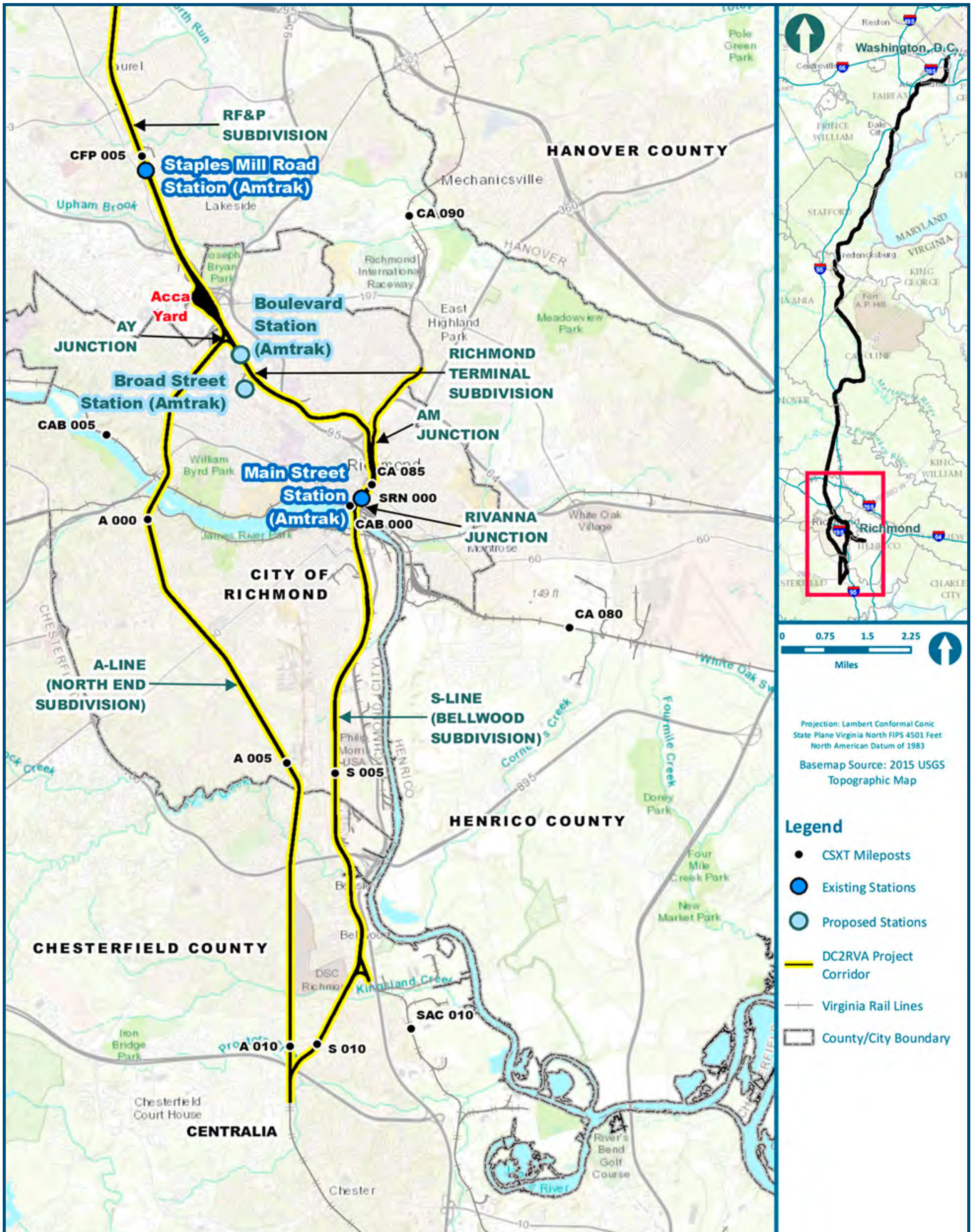


Figure 2.4-1: Richmond Area Station Options

- 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 and then 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.
- Shared Service (via A-Line and S-Line) + Freight Connector—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.

DRPT further considered the potential for sharing service between a new Broad Street station and either the Main Street or Staples Mill Road stations, or between a new Boulevard Street Station and either the Main Street or Staples Mill Road stations. These options were dismissed 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.

All other options were moved forward into screening, which is summarized in Table 2.4-4. The 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 (●).

Table 2.4-4: Summary of Screening by Station Location (Richmond)

Station Location Options	Stage I Screening	Stage II Screening	Stage III Screening	Summary
Staples Mill Road Station Only	○	○	○	○
Boulevard Station Only (via A-Line)	○	○	○	○
Boulevard Station Only (via S-Line)	○	○	○	○
Broad Street Station Only	○	○	○	○
Main Street Station Only	○	○	○	○
Main Street Station Only + Freight Connector Bypass	○	●	●	●
Split Service—Staples Mill Road/Main Street Stations (via A-line)	○	○	○	○
Full Service—Staples Mill Road/Main Street Stations (via S-line)	○	○	○	○
Full Service—Staples Mill Road/Main Street Stations (via S-line) + Freight Connector Bypass	○	●	●	●
Shared Service—Staples Mill Road/Main Street Stations (via A-line and S-line)	○	○	○	○
Shared Service—Staples Mill Road/Main Street Stations (via A-line and S-line) + Freight Connector Bypass	○	●	●	●

Notes: ●Alignment eliminated by DRPT during screening. ○Alignment carried forward for further evaluation

The screening of Richmond station alignment options defined the rail infrastructure improvements determined to be reasonable for evaluation within the Draft EIS. Numerous options for the Richmond Freight Connector were considered but all were eliminated from consideration due to impacts to wetlands, historic resources, and/or public parks and recreations areas.

2.4.3.2 Station Locations

DRPT anticipates that the existing Amtrak stations in Richmond (see Table 2.3-2), if not replaced by a new station, would continue to receive some level of intercity passenger rail service. DRPT evaluated possible new or replacement station locations for their suitability to serve as intercity passenger rail stations, as shown in Table 2.4-5. In addition, DRPT reviewed rail alignments in the Richmond area to identify stations 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. While DRPT did identify areas with sufficient tangent track, these locations were dismissed from further consideration due to potential incompatibility with existing land uses, lack of accessibility to local primary roads and/or transit, potential historic and natural resources effects, and distance from the city center.

Main Street Station

Table 2.4-5: Station Screening Summary, Richmond

Station	Location/Build Alternative Area	Status	Reason for Elimination
Cedar Lane	Glen Allen, Henrico County/Area 6" Richmond	Potential new location. Dismissed from further consideration.	Land acquisition required for the new station, ancillary facilities and parking, and upgrades to area roads.
Greenwood Road	Glen Allen, Henrico County/Area 6: Richmond	Potential new location. Dismissed from further consideration.	Land acquisition required for the new station, ancillary facilities and parking, and upgrades to area roads.
Mountain Road	Glen Allen, Henrico County/Area 6: Richmond	Potential new location. Dismissed from further consideration.	Land acquisition required for the new station, ancillary facilities and parking, and upgrades to area roads.
Parham Road	Henrico County/Area 6: Richmond	Potential new location. Dismissed from further consideration.	Proximity to 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.
Boulevard	City of Richmond/Area 6: Richmond	Potential new location. Carried forward.	--
Broad Street	City of Richmond/Area 6: Richmond	Potential new location. Carried forward.	--
Hull Street Road	South Richmond/Area 6: Richmond	Potential new location. Dismissed from further consideration.	Lower population density in the southern part of the Richmond region, potential land use conflicts, limited access to primary roads, and train operational concerns.
Warwick/Bells Road	South Richmond/Area 6: Richmond	Potential new location. Dismissed from further consideration.	Lower population density in the southern part of the Richmond region, limited access to primary roads, and train operational concerns.
Walmsley Boulevard	South Richmond/Area 6: Richmond	Potential new location. Dismissed from further consideration.	Lower population density in the southern part of the Richmond region and concerns about train operations.
Chester Road	Chester/Area 6: Richmond	Potential new location. Dismissed from further consideration.	Low population density in the surrounding area, distance from regional population centers, and train operational concerns.

2.4.4 Screening Results for Fredericksburg (Build Alternative Area 3, Segment 21)

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 one track, two tracks, or three tracks along multiple routes.

Options that DRPT identified and considered during Stage IV but dismissed before evaluating them against Stage I, II, or III screening criteria because they were not feasible or practical include the following (refer to the Alternatives Technical Report in Appendix A for full details):

- Maximum Speed Alignment
- Improved Speed Alignment
- Existing Speed Alignment, West Side
- Elevated Track Concept
- Below-ground Track Concept
- Single Track Bypass
- Three-Track Bypass
- All West Bypass Alignments
- East Bypass Alignments along the Deep Run (Bowman) Spur
- East Bypass Alignments along the Massaponax Spur

The following options moved forward to Stage I, II, and III Screening:

- No Additional Track
- Existing Speed Alignment, East Side
- East Bypass Alignments that joined south of VRE Crossroads facility
- East Bypass Alignments that were developed after December 2015 public meeting, seeking to reduce impacts to potential conservation lands, developed lands, and/or historic and cultural resources

Based on the screening results, DRPT carried forward the option for No Additional Track through Fredericksburg, as well as the option of adding a track on the east side.

DRPT also identified and screened 11 two-track bypass alignments east of Fredericksburg, and the results of the screening are summarized in Table 2.4-6. The bypass 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 (●). As the table indicates, DRPT dismissed all but one bypass alignment option from further consideration.

2.4.5 Screening Results for Ashland (Build Alternative Area 5, Segment 22)

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 a possible alternative, 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 of all three tracks along the street axis
- Elevating one or more tracks through town
- Placing one or more tracks below grade in a cut-and-cover or deep bore tunnel

Table 2.4-6: Summary of Stages I, II, and III Screening of Bypass Options for Fredericksburg

Bypass Option	Stage I	Stage II	Stage III	Eliminating Factor(s)
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
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

Notes: ●Alignment eliminated by DRPT during screening. ○Alignment carried forward for further evaluation

DRPT also considered multiple bypass configurations using one track, two tracks, or three tracks along multiple routes east and west of the town.

Options that DRPT identified and considered during Stage IV but dismissed before evaluating them against Stage I, II, or III screening criteria because they were not feasible or practical include the following (refer to the Alternatives Technical Report in Appendix A for full details):

- Maximum Speed Alignment
- Improved Speed Alignment, and Existing Speed, Add Track on West
- Elevated Tracks (of any number) through Ashland
- Three-track Tunnel, cut-and-cover or deep bore, through Ashland
- Single-track Tunnel, deep bore through unconsolidated material
- Single-track Bypass, either east or west
- Three-track Bypass, either east or west

DRPT evaluated the following options against Stage I, II, and III screening criteria:

- 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 are connected 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 east of existing tracks. DRPT determined to carry this alternative forward to the Draft EIS.
  - Add a track and center all three tracks. DRPT determined to carry this alternative forward to the Draft EIS.
- Adding a Track Below Grade (Tunnel). DRPT evaluated two options:
  - 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.
  - Both tunnel options would have some permanent impacts to historic resources in the town of Ashland, primarily from the multiple ventilation and emergency access structures or pop-up doors. Additional information on these and other tunnel elements can be found in the Alternatives Technical Report in Appendix A. Both tunnel options have impacts on wetlands, primarily from the areas occupied by the tunnel portals and ramps to the surface south of Ashcake. The cut-and-cover tunnel option and the north and south cut-and-cover sections of the deep 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 for ventilation systems and emergency access along Center Street, adversely affecting historic resources. Therefore, DRPT dismissed the tunnel options from further consideration.
- Adding a Two-Track Bypass. The results of the screening process for the bypass alignments evaluated by DRPT for five options east of town and four options west of town are summarized in Table 2.4-7. As indicated in the table, DRPT dismissed all but one bypass option from further evaluation. Additionally, DRPT dismissed all Doswell "wye" bypass options due to impacts to wetlands and/or infrastructure, and because a new wye at Doswell is not necessary with a west bypass.
- Buckingham Branch Freight Diversion. DRPT evaluated the option of diverting through freight trains onto the Buckingham Branch Railroad (BBRR) between Doswell and AM Junction in Richmond to open capacity on existing track through Ashland. DRPT dismissed this option from further evaluation due to substantial impacts to wetlands along the BBRR alignment, and the incompatibility with existing infrastructure and freight and passenger operations in Richmond.

As indicated in each of the options described above, the screening results for the Ashland area were used to develop the Build Alternatives that are presented in Section 2.5.2.5. In addition, DRPT also met with the Town of Ashland, Hanover County, the public, and other stakeholders, which provided input into the development of the Build Alternatives as presented in that section.

Table 2.4-7: Summary Screening results of Bypass Options for Ashland

Bypass Option	Stage I	Stage II	Stage III	Eliminating Factor(s)
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 I-95 infrastructure
AEB 3 (Ashland East Bypass that does not Cross I-95)	O	●	●	Impacts to wetlands, acquisition of urban/developed lands
AEB 4 (Ashland East Bypass in the I-95 Median)	O	●	●	Impacts to wetlands, impacts to I-95 infrastructure
AEB 5 (Ashland East Bypass White Paper)	O	●	●	Impacts to wetlands, potential acquisition of urban/developed lands, impacts to I-95 infrastructure
AWB 1 (Ashland West Bypass)	O	●	●	Impacts to wetlands, acquisition of urban/developed lands
AWB 2 (Ashland West Bypass Revision #1 per Public Comment)	O	●	●	Impacts to wetlands and acquisition of agricultural lands and community (church)
AWB 3 (West Ashland Bypass)	O	●	●	Impacts to wetlands and l acquisition of agricultural lands and community (church)
AWB 4 (West Ashland Bypass)	O	O	O	Option carried forward for further evaluation in the Draft EIS
BBRR Freight Diversion	O	●	●	Impacts to wetlands and incompatibility with passenger and freight movements in Richmond

Notes: ● Alignment eliminated by DRPT during screening. O Alignment carried forward for further evaluation

2.5 ALTERNATIVES EVALUATED IN THE TIER II DRAFT EIS

2.5.1 No Build Alternative

The No Build Alternative defines the future (2025) infrastructure and service levels that will result from planned investments in the Washington, D.C. to Richmond rail corridor, independent of the improvements planned by the DC2RVA Project. The No Build Alternative provides a basis for comparing and contrasting the potential impacts of different DC2RVA Build Alternatives.

Information about planned physical improvements and rail service additions in the corridor was gathered from fiscally constrained Metropolitan Planning Organization (MPO) planning documents, Commonwealth multi-year improvement programs, and from transit agency planning documents. If a project was under construction, fully funded, or was the focus of advanced collaborative planning (evidenced by partial funding, board-level commitments, or interagency agreements), it was assumed by DRPT to be complete by 2025 for the purposes of this evaluation. This includes, for example, projects in the VRE 2040 System Plan, which was adopted by the VRE Operations Board in 2014, and has received support from VDOT and other state agencies.

2.5.1.1 Infrastructure Improvements in the No Build Alternative

Table 2.5-1 summarizes the infrastructure improvements that are assumed by DRPT to be in place by 2025 that are already programmed, and is followed by a detailed description of each infrastructure improvement project included in DC2RVA's No Build Alternative.

Table 2.5-1: No Build Infrastructure Assumptions

Mode	Project	Source for Inclusion
Rail	Washington Union Station Capacity upgrade	Amtrak Washington Union Station Master Plan
	Virginia Avenue Tunnel expansion	CSXT National Gateway Program
	VRE 4th Track: CP Virginia–CP L'Enfant	VRE 2040 System Plan
	Long Bridge Expansion	FRA/DDOT Pre-NEPA Study
	RF&P Franconia–Featherstone improvements (CSXT "Fast Track agreement")	DRPT FY2016 Six Year Improvement Program
	RF&P Powells Creek–Arkendale improvements	DRPT FY2016 Six Year Improvement Program
	Main Line Relocation Project at Acca Yard and Crossovers South of the James River	DRPT FY2016 Six Year Improvement Program
	Richmond-Petersburg segment improvements for service expansion to Norfolk	DRPT FY2016 Six Year Improvement Program
	Franconia to Occoquan third mainline track improvements	DRPT FASTLANE Grant
	VRE Broad Run/Crossroads Yard expansion	VRE 2040 System Plan
	VRE Gainesville/Haymarket Extension	VRE 2040 System Plan
	VRE Station Platform Expansion Program	VRE 2040 System Plan
	VRE Potomac Shores Station	VRE 2040 System Plan
Transit	GRTC Broad Street Bus Rapid Transit Implementation (The Pulse BRT)	Greater Richmond Transit Company
	WMATA Silver Line Phase II Implementation	Washington Metropolitan Area Transportation Authority/Metropolitan Washington Airport Authority
	DDOT DC Streetcar	District Department of Transportation
	Crystal City BRT (Metroway)/Streetcar Corridor	Washington Metropolitan Area Transportation Authority

No Build Infrastructure Improvements: Rail

Washington Union Station Capacity Upgrade—Union Station has two track levels. The upper level consists of mostly high-level platforms serving stub-end tracks and is utilized by MARC and Amtrak trains terminating in Washington, D.C. The lower level consists of four low-level platforms located along eight through-running tracks that lead to the First Street Tunnel, which serves VRE and Amtrak trains that continue south to Virginia. The Union Station Master Plan has identified improvements to the lower track level that will proceed in the first phase of the master plan project. A new low-level side platform will be added on the easternmost track, for a total of five platforms serving the eight lower tracks. Two of the existing lower level platforms will be upgraded as high-level platforms to provide level boarding on four tracks for faster boarding and alighting of Amtrak trains. The new side and other two existing platforms will remain low-level providing four tracks to accommodate VRE's rolling stock, which is incompatible with high-level platforms. Construction began January of 2017 with completion in **2021.**

Virginia Avenue Tunnel Expansion—CSXT began construction on an expansion of the Virginia Avenue Tunnel in Washington, D.C. in 2015. CSXT uses the current single-track Virginia Avenue Tunnel to bypass Union Station as freight trains travel through Washington, D.C. between Virginia and Maryland. The single-track tunnel is a bottleneck for CSXT, as freight trains must wait for authorization to travel through the tunnel at slow speeds, causing delays for freight movements along the DC2RVA corridor. When freight delays occur, freight trains may be held along the DC2RVA corridor, causing passenger trains to wait behind freight trains, or operate in both directions on the remaining free track. The expansion will add a second track to the tunnel and increase its height to provide clearance for double-stack[8] freight trains to travel through the tunnel. CSXT opened the first of two tracks for double-stack operation in 2016, with completion of both tracks planned for 2017.

VRE 4th Track CP Virginia–CP L'Enfant—VRE has allocated funding under its capital program to construct a 4th track between Control Point (CP) Virginia and CP L'Enfant in Washington, D.C. The track extension, identified in the 2040 System Plan adopted by the VRE Board in 2014, will provide four tracks through the VRE L'Enfant Plaza station and generally separate intercity passenger and commuter traffic from CSXT freight traffic in southwest Washington, D.C.. The CP Virginia–CP L'Enfant section is outside the limits of the DC2RVA Project, but affects the operation of intercity passenger, commuter and freight operations continuing south to Virginia.

Long Bridge Expansion—DDOT and FRA are preparing a separate EIS for the expansion of rail capacity from CP Virginia in Washington, DC across the Potomac River to CP RO in Alexandria, VA through an expansion of the Long Bridge. The existing Long Bridge is a two-track bridge completed in 1903 and owned and operated by CSXT. The Long Bridge is a bottleneck for train traffic capacity between Virginia and Washington, D.C. DDOT is considering alternatives that would add additional capacity to the bridge to accommodate planned growth in intercity passenger, commuter and freight train traffic travelling across the river. As part of the Atlantic Gateway Program, the Commonwealth of Virginia, in cooperation with VRE and the FRA, has begun program development to advance engineering, stakeholder agreements, and outreach in support of the construction of a new bridge. VRE is in the process of identifying funding in its capital program to support the Long Bridge Expansion program.

RF&P Subdivision, Franconia–Featherstone Improvements—DRPT is advancing improvements to the DC2RVA corridor in Northern Virginia between Franconia and Featherstone, south of Woodbridge, VA. The improvements are focused around the Auto Train station in Lorton, VA, where the daily Auto Train service originates and runs non-stop to Sanford, FL. The Auto Train station is located on a spur from the DC2RVA corridor. The improvements will provide improved switches to support faster train movements through Lorton. Construction began in the spring of 2016 and is planned for completion in 2020.

[8] "Double-stack freight trains" are trains in which containers are stacked two high on railroad cars.

Franconia to Occoquan Third Mainline Track Improvements—As part of the Atlantic Gateway Project, DRPT is advancing 8 miles of new third main-line track from the Franconia-Springfield Station south to a location just north of the Occoquan River. The additional third track would connect with the existing third main-line track constructed between Alexandria and Franconia in 2009, to provide approximately 20 miles of continuous three main-line track railroad from Arlington, VA to the Occoquan River. DRPT will prepare a draft Categorical Exclusion (CE) worksheet for FRA review and approval prior to construction of this project. Construction is planned to begin in the spring of 2017 with completion in early 2020.

RF&P Subdivision, Arkendale–Powells Creek Improvements—Construction is underway on approximately 9 miles of third track constructed adjacent to existing tracks in the CSXT right-of-way. Construction encompasses additional track, siding, turnouts, a new platform at Quantico station, and the Bauer Road Bridge near Marine Corps Base Quantico. This capacity project was pursued by DRPT as the first part of SEHSR corridor to begin construction. Construction began in 2014 and is planned for completion in 2020.

Main Line Relocation Project at Acca Yard—Acca Yard, CSXT's major freight yard in the Richmond area, creates freight-passenger rail conflicts for trains traveling south of Richmond's Staples Mill Road station. The activities in the yard require passenger trains to travel at slow speeds and often require passenger and/or freight trains to wait as freight trains clear the active tracks. Construction is underway on a project that will remove all main-line tracks from inside the yard and relocate them to the western edge of the yard and signal them, enabling through passenger and freight trains to bypass yard operations and move through the terminal area more smoothly and at a higher speed. The project will also add a fourth main-line track between Staples Mill Road station and the north throat of Acca Yard, and rebuild interlockings at the south throat of the yard so through trains can pass by at a higher operating speed. This will reduce passenger train delays and reduce trip time through Acca Yard. In exchange for these improvements, CSXT has provided DRPT with the right to operate an additional round trip of Amtrak's Northeast Regional service between Washington, D.C. and Lynchburg, VA, and extend the two Northeast Regional (Virginia) trains currently terminating in Richmond to Norfolk, VA. Construction began in late 2015 and is planned for completion in 2020.

Richmond–Petersburg Segment Improvements for Service Expansion to Norfolk—DRPT restored Amtrak service to Norfolk in 2012 after improvements were made to Norfolk Southern and CSXT tracks south of Petersburg. Additional improvements are to be constructed on the CSXT A-Line between Richmond and Petersburg to support the extension of the two Northeast Regional (Virginia) trains that currently terminate in Richmond to Norfolk for a total of three daily Northeast Regional (Virginia) trains to Norfolk. Construction began in 2015 and is planned for completion in 2018.

VRE Broad Run/Crossroads Yard Expansion—VRE is expanding two rail yards (the Broad Run Yard serves the Manassas Line, the Crossroads Yard serves the Fredericksburg Line) to store additional train sets needed for VRE's planned future service expansion. Each yard will be able to store eight 8-car train sets overnight. Construction began in 2015 and is planned for completion in 2018.

VRE Gainesville/Haymarket Extension—The VRE 2040 System Plan identified a VRE service expansion to serve population and job centers in Gainesville and Haymarket, Prince William County, VA. The 11-mile extension would include three stops along an existing railroad right-of-way. The service would join the Manassas Line west of Manassas station, and would join the DC2RVA corridor at AF interlocking south of Alexandria Station. VRE has identified funding in its current capital plan to support the planning of service to Gainesville and Haymarket. On March 17, 2017 VRE canceled plans to extend service to Gainesville/Haymarket in favor of expanding and relocating the Broad Run station. The cancellation of this project, however, does not affect the modeling that was conducted for the DC2RVA Project as VRE is still increasing the number of trains on their Manassas Line as anticipated.

VRE Station Platform Expansion Program—Most VRE stations in the DC2RVA corridor consist of a single low-level platform on the east side of the tracks south of Alexandria and on the west side of the tracks between Alexandria and Washington, D.C. At these stations, all VRE trains, regardless of direction, must use the eastern track for boarding and alighting south of Alexandria, then switch to the west side north of Alexandria. This requires all other traffic passing in both directions to utilize the opposite track. Additionally, many VRE stations have platforms that can only accommodate five to six rail cars. As VRE expands to longer train consists (up to ten rail cars), the shorter platforms currently deprive VRE of the ability for simultaneous boarding and alighting passengers of all rail cars, which lengthens station dwell time. In preparation for VRE's planned fleet expansion, and to improve operational flexibility along the DC2RVA corridor, VRE is planning or implementing improvements at the stations listed below. Construction is planned to begin in 2018 with completion by 2021 or earlier.

- VRE L'Enfant Station—VRE will create an island platform serving the two westernmost tracks.
- VRE Crystal City Station—VRE will build a new island platform serving the two westernmost tracks.
- VRE Alexandria Station—VRE will lengthen and widen the existing island platform so that it can also serve Track 1. VRE will also improve the tunnel connecting the island platform to the main station for ADA accessibility.
- VRE Franconia-Springfield Station—VRE will lengthen the existing platforms and widen the east platform.
- VRE Lorton Station—VRE will lengthen the existing eastern platform, and add a side platform on the western side of the right-of-way.
- VRE Woodbridge Station—VRE will lengthen the existing eastern platform.
- VRE Rippon Station—VRE will lengthen the existing eastern platform, and add a side platform on the western side of the right-of-way.
- VRE Quantico Station—VRE is lengthening both existing platforms to accommodate longer trains, and is converting the west side platform into an island platform for operational flexibility.
- VRE Brooke Station—VRE will lengthen the existing eastern platform, and add a side platform on the western side of the right-of-way.
- VRE Leeland Road Station—VRE will lengthen the existing eastern platform, and add a side platform on the western side of the right-of-way.
- VRE Potomac Shores Station—VRE is constructing a new station at Potomac Shores, with two side platforms that accommodate eight car trains.

The track improvements through the VRE stations that are planned as part of the DC2RVA Project will accommodate the additional platforms and modifications outlined in this section.

No Build Infrastructure Improvements: Transit

GRTC Broad Street BRT (The Pulse)—The GRTC Transit System (GRTC) is implementing a bus rapid transit (BRT) system along Broad Street in Richmond and western Henrico County. The BRT line, branded "The Pulse," completed an Environmental Assessment in 2014. GRTC received a TIGER grant award of $24.9 million for the construction of The Pulse, and has received additional funding from VDOT and DRPT to implement the project. The Pulse would connect major employment centers in Henrico and downtown Richmond Main Street Station. GRTC is presently completing the final design and beginning construction for the facilities to support the BRT line. Construction began in the summer of 2016 and is planned for completion in the fall of 2017.

<u>WMATA Silver Line Phase II</u>—The Washington, D.C. Metro opened the first phase of the Silver Line in 2014, connecting Tysons, VA to the wider Metro system serving the Greater Washington area. The Washington Metropolitan Area Transit Authority (WMATA), in partnership with Metropolitan Washington Airports Authority (MWAA), is presently constructing an additional 11.5-mile extension with six stations, including one planned to serve Washington Dulles International Airport. The Silver Line will provide important transit connection for area and regional population to access intercity passenger rail. Phase II of the Silver Line is expected to be complete by 2020.

<u>DDOT DC Streetcar</u>—In February 2016, DDOT opened the 2.4-mile H Street/Benning Road Streetcar Line. The streetcar line connects Union Station with neighborhoods in Northeast Washington, D.C., providing a transit connection for area and regional populations to access intercity passenger rail. Plans exist to extend the current line toward downtown Washington, and construct a larger system of streetcar lines to serve areas without access to the Washington Metro.

<u>Crystal City BRT (Metroway)</u>—In August 2014, WMATA launched Metroway, a bus rapid transit line connecting Crystal City in Arlington, with Potomac Yards and Braddock Road in Alexandria, VA. The line parallels U.S. Route 1, and consists of significant sections of separated busways to speed bus travel and reduce congestion. The separated busways were designed with provisions for conversion to a light rail or streetcar right-of-way in the future. Although Metroway does not directly serve the DC2RVA corridor, it provides important transit connection for area and regional population to access intercity passenger rail.

2.5.1.2 Rail Service Growth in the No Build Alternative

Rail service levels vary along the length of the DC2RVA corridor, and not all passenger service is continuous through the entire DC2RVA corridor (see Figure 2.2-2). The DC2RVA corridor hosts all VRE commuter rail service and Amtrak passenger rail service to points south of Washington, D.C. between CP Virginia in Washington, D.C. and AF interlocking in Alexandria. At AF Interlocking, VRE and Amtrak trains heading toward Manassas, Charlottesville and Lynchburg leave the DC2RVA corridor (presently two to three daily Amtrak round trips and nine weekday VRE round trips, including one non-revenue VRE round trip). The remaining VRE service (currently, eight weekday round trips) continues on the DC2RVA corridor south of Alexandria to Crossroads Yard south of the VRE Spotsylvania station. Approximately 20 to 30 freight trains operate on the DC2RVA corridor between Washington, D.C. and Richmond, along with five daily round-trip Amtrak Northeast Regional (Virginia) intercity passenger trains and five daily round-trip Amtrak long-distance and interstate corridor (Carolina) passenger trains.

Table 2.5-2 summarizes existing service along the DC2RVA corridor and provides the estimated 2025 and 2045 service assumptions for the No Build condition. The table is a summary of all activity on the corridor, excluding local freight trains and yard assignments. Existing service along the DC2VA corridor is an estimated 79 to 89 daily trains (depending on the volume of freight trains). Planned rail infrastructure improvements described in Section 2.5.1.1 above would support the operation of one additional Amtrak Northeast Regional (Virginia) round-trip passenger train to Lynchburg and two additional VRE commuter train round trips, along with an estimated 2.3 percent annual growth in freight service. Additionally, Amtrak intends to increase the operations of the Cardinal (a long distance passenger train that operates via Charlottesville and Alexandria) through the corridor from three trips per week to one round trip daily. To forecast freight train growth in the corridor from existing (2015) levels, CSXT provided freight volumes for the future years 2025 and 2045 using the U.S. DOT Freight Analysis Framework projected growth rates for rail. CSXT freight growth is independent of the DC2RVA Project and will occur regardless of whether or not the DC2RVA Project is implemented. CSXT actual freight growth may be greater or less than the projected growth rates based on market demands. DRPT estimates that the total number of trains in the No Build condition in 2025 to be between 91 and 103 daily trains, and in the No Build condition in 2045 to be between 106 and 121 daily trains.

Table 2.5-2: Existing and No Build Service along DC2RVA Corridor (Daily 1-Way Trips)

Service Type	Existing Service	2025 No Build	Proposed Change in Service from Existing	2045 No Build	Proposed Change in Service from Existing
Freight	20-30 trains	25-37 trains (est.)	Increase of 5-7 trains	40-55 trains (est.)	Increase of 20-25 trains
Amtrak Long Distance	11 trains (1 train 3x a week)	12 trains	Increase of 1 train	12 trains	Increase of 1 train
Interstate Corridor (NC)	2 trains	2 trains	No change	2 trains	No change
Northeast Regional (VA)	12 trains	14 trains	Increase of 2 trains	14 trains	Increase of 2 trains
VRE	34 trains (including nonrevenue movements)	38 trains	Increase of 4 trains	38 trains	Increase of 4 trains
Total Daily Trains (est.)	79-89 trains	91-103 trains	Increase of 12-14 trains	106-121 trains	Increase of 27-32 trains

Notes:

- VRE train counts in 2015 include nonrevenue movements. Future train counts assume that nonrevenue movements are converted to revenue movements, based on data provided by VRE
- The 2 additional Northeast Regional (VA) trains in 2025 and 2044 operate between Washington and Lynchburg, and use the DC2RVA corridor only between Washington and Alexandria.
- The 4 additional VRE trains in 2025 and 2045 are comprised of 2 additional Fredericksburg Line trains operating on the DC2RVA corridor between Washington and Spotsylvania, and 2 additional Manassas Line trains that operate on the DC2RVA corridor only between Washington and Alexandria.

Intercity Rail Service Growth Outside the DC2RVA Corridor in the No Build Alternative

Intercity service levels outside the physical boundaries of the DC2RVA corridor are relevant to travel demand estimates within the DC2RVA corridor because mobility improvements that are created by potential transportation improvements would affect total travel both within and outside the DC2RVA corridor. The No Build Alternative includes two additional round-trip intercity passenger trains within North Carolina between Raleigh and Charlotte that will be introduced as a result of the state's Piedmont Improvement Program. The No Build Alternative also incorporates Amtrak's plans for future Northeast Corridor service, including planned changes to Northeast Regional services north of Washington, D.C., as additional NEC infrastructure and additional high-speed-train services are introduced.

2.5.2 Build Alternatives

From a wide range of options that were considered during the alternatives development process, twenty-one Build Alternatives, which vary in each of the six alternative areas, were carried forward for evaluation; these Build Alternatives are summarized in Table 2.5-3. All alternatives include build-alternative-specific improvements to features such as stations and crossings.

Detailed descriptions of the Build Alternatives within each area are provided in the subsequent sections. Within the descriptions, east side or west side is relative to the existing north-south CSXT track alignment.

Table 2.5-3: Summary of Build Alternatives Carried Forward

Alternative Area	Alternative	Description
Area 1: Arlington (Long Bridge Approach)	1A	Add Two Tracks on the East
	1B	Add Two Tracks on the West
	1C	Add One Track East and One Track West
Area 2: Northern Virginia	2A	Add One Track/Improve Existing Track
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	Maintain Two Tracks Through Town
	3B	Add One Track Through Town East of Existing
	3C	Add Two-Track Bypass East
Area 4: Central Virginia (Crossroads to Doswell)	4A	Add One Track/Improve Existing Track
Area 5: Ashland (Doswell to I-295)	5A	Maintain Two Tracks Through Town
	5A–Ashcake	Maintain Two Tracks Through Town (Relocate Station to Ashcake)
	5B	Add One Track Through Town East of Existing
	5B–Ashcake	Add One Track Through Town East of Existing (Relocate Station to Ashcake)
	5C	Add Two-Track West Bypass
	5C–Ashcake	Add Two-Track West Bypass (Relocate Station to Ashcake)
	5D–Ashcake	Three Tracks Centered Through Town (Add One Track, Relocate Station to Ashcake)
Area 6: Richmond (I-295 to Centralia)	6A	Staples Mill Road Station Only
	6B–A-Line	Boulevard Station Only, A-Line
	6B–S-Line	Boulevard Station Only, S-Line
	6C	Broad Street Station Only
	6D	Main Street Station Only
	6E	Split Service, Staples Mill Road/Main Street Stations
	6F	Full Service, Staples Mill Road/Main Street Stations
	6G	Shared Service, Staples Mill Road/Main Street Stations

In addition, DRPT evaluated several stations in the Tier II EIS for potential rail service changes, including stations at Alexandria, Woodbridge, Quantico, Fredericksburg, Ashland, Ashcake Road, Staples Mill Road, Boulevard, Broad Street, and Main Street. A summary of station locations is provided in Table 2.5-4.

Table 2.5-4: Summary of Stations DRPT Recommends for Evaluation in the Tier II EIS

Alternative Area	Station	Location	Current Passenger Rail Service	Potential Rail Service Changes			
				No Service, Close Station[1]	Shift Long Distance Service[2]	Add Interstate Corridor Service (SEHSR)	Add Northeast Regional Service (SEHSR)
Area 2: Northern Virginia	Alexandria	City of Alexandria	Long Distance (all) Interstate Corridor (Carolinian) Northeast Regional (Virginia)			✓	✓
	Woodbridge	Woodbridge (Prince William County)	Northeast Regional (Virginia)				✓
	Quantico	Town of Quantico (Prince William County)	Northeast Regional (Virginia)				✓
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	Fredericksburg	City of Fredericksburg	Long Distance (Silver Meteor) Interstate Corridor (Carolinian) Northeast Regional (Virginia)			✓	✓
Area 5: Ashland (Doswell to I-295)	Ashland	Town of Ashland (Hanover County)	Northeast Regional (Virginia)	✓			✓
	Ashcake Road	Town of Ashland (Hanover County)	None, possible new station replacing Ashland station				✓

▶ Continued.

Table 2.5-4: Summary of Stations DRPT Recommends for Evaluation in the Tier II EIS

Alternative Area	Station	Location	Current Passenger Rail Service	Potential Rail Service Changes			
				No Service, Close Station[1]	Shift Long Distance Service[2]	Add Interstate Corridor Service (SEHSR)	Add Northeast Regional Service (SEHSR)
Area 6: Richmond (I-295 to Centralia)	Staples Mill Road	Henrico County	Long Distance (all) Interstate Corridor Northeast Regional (Virginia)	✓		✓	✓
	Boulevard	City of Richmond	None, possible new station replacing both Staples Mill and Main Street stations		✓	✓	✓
	Broad Street	City of Richmond	None, possible new station replacing both Staples Mill and Main Street stations		✓	✓	✓
	Main Street	City of Richmond	Northeast Regional (Virginia)	✓	✓	✓	✓

Notes:

1. In some station/service options, a current station may be closed (*e.g.,* Ashland, Staples Mill Road, Main Street Station) or a new station not created (Boulevard, Broad Street).

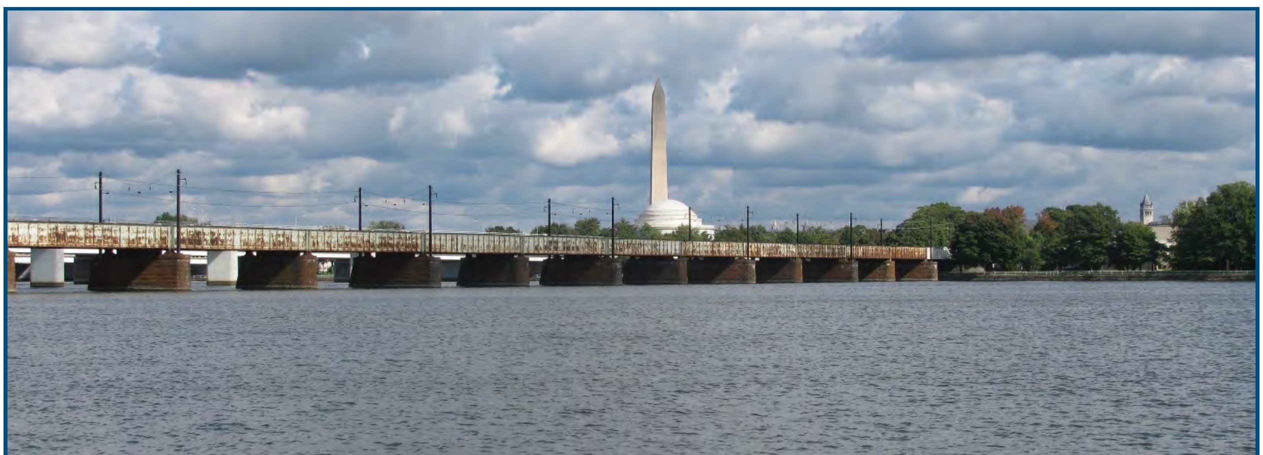
2. The DC2RVA Project does not include any new trains providing long distance passenger service. However, some station/service options in the Richmond area include potentially shifting existing long distance service from Staples Mill Road station to other Richmond station options.

2.5.2.1 Area 1: Arlington (Long Bridge Approach) Build Alternatives

The Arlington area (CFP 110 to CFP 109.3) includes the area at the southern approach of Long Bridge, which crosses the Potomac River between Washington, D.C. and Virginia. Two tracks currently exist in this roughly one-mile-long section before crossing Long Bridge, located north of the DC2RVA corridor. DDOT, in coordination with FRA, DRPT, CSXT, and VRE, is completing a separate study for the rehabilitation or replacement of the Long Bridge over the Potomac River. The previous feasibility study for the bridge recommended expanding the crossing to accommodate two additional tracks. DRPT, as part of the DC2RVA Project, is evaluating three rail alignment options to the southern approach of Long Bridge, which will become the connection between the Long Bridge Study alternative and the DC2RVA corridor. Each DC2RVA option includes two additional tracks that provide flexibility to physically align with the Long Bridge alternatives. The improvements for the Arlington area Build Alternatives are described in Table 2.5-5 and Figure 2.5-1. Detailed graphics illustrating the specific improvements are in Appendix C.

Table 2.5-5: Area 1: Arlington (Long Bridge Approach) Build Alternatives

Build Alternative	Proposed Improvements
1A: Add Two Tracks on the East. The east alignment would add two additional tracks east of the existing tracks between CFP 110.0 to 109.3, within existing right-of-way.	Track ▪ Add two tracks south of George Washington Memorial Parkway (CFP 110.05) for approximately 1,300 feet. ▪ Shift all tracks to the east to increase speeds through the curve at CFP 109.8 to 109.4. ▪ Install additional 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities, as required. ▪ Install additional signal and communication facilities, as required. No station or structure modifications.
1B: Add Two Tracks on the West. The west alignment would add two additional tracks west of the existing tracks between CFP 110.0 to 109.3, within existing right-of-way.	Track ▪ Add two tracks to the west side south of George Washington Memorial Parkway (CFP 110.05) for approximately 1,100 feet. ▪ Shift tracks to the east to increase speeds through the curve at CFP 109.8 to 109.4. ▪ Install additional 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities, as required. ▪ Install additional signal and communication facilities, as required. No station or structure modifications.
1C: Add One Track East and One Track West. The east and west alignment would add one additional track to the east and one to the west of the existing tracks between CFP 110.0 to 109.37, within existing right-of-way.	Track ▪ Add one track to the east side and one track to the west side south of George Washington Memorial Parkway (CFP 110.05) for approximately 1,300 and 1,100 feet, respectively. ▪ Shift tracks to the east to increase speeds through the curve at CFP 109.8 to 109.4. ▪ Install additional 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities, as required. ▪ Install additional signal and communication facilities, as required. No station or structure modifications.



Long Bridge Over the Potomac River

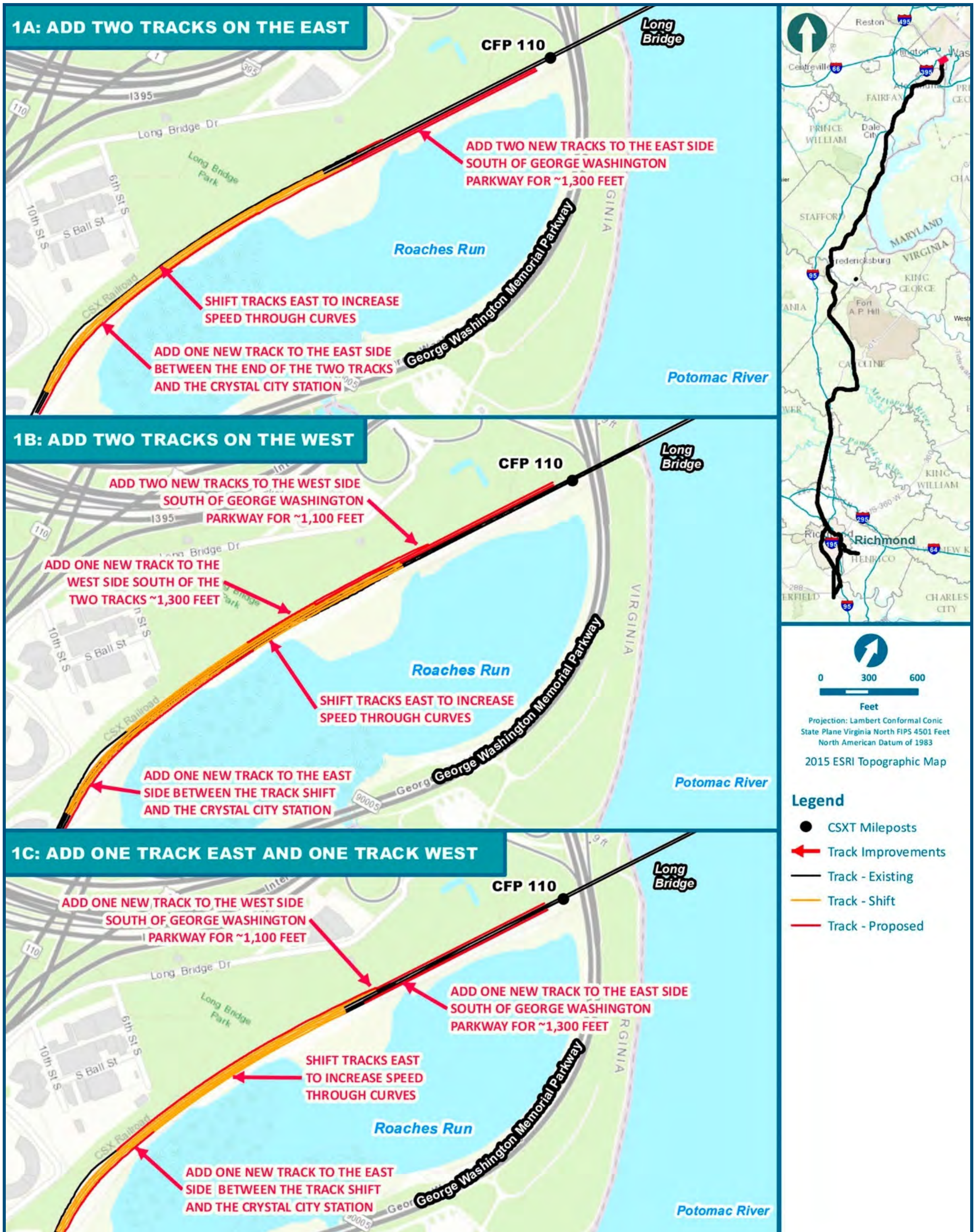


Figure 2.5-1: Build Alternatives 1A, 1B, 1C

2.5.2.2 Area 2: Northern Virginia Build Alternative

The Northern Virginia Alternative Area (CFP 109.3 to CFP 62) extends from the Crystal City station in Arlington County to Harrell Road (Route 623) north of the Dahlgren Spur near Fredericksburg (Figure 2.5-2). There is one Build Alternative in the Northern Virginia Alternative Area (Alternative 2A: Add One Track/Improve Existing Track), which is composed of sections of additional track and no additional track to provide a corridor with at least three main tracks. The build improvements to the Alexandria Station and Woodbridge Station, which are located within Area 2, are shown in Figures 2.5-3 and Figure 2.5-4, respectively.

Table 2.5-6 describes the general improvements to Build Alternative 2A. Segment-specific track, station, and structure improvements associated with Build Alternative 2A are described by segment and milepost in Table 2.5-7. Detailed graphics illustrating the specific improvements are in Appendix D. Service improvements are described in Section 2.2.2.

Table 2.5-6: Build Alternative 2A (Northern Virginia) — General Improvements

Build Alternative	Proposed Improvements
2A: Add One Track/Improve Existing Track ***Rail Alignment: Figure 2.5-2*** ***Stations: Figure 2.5-3 and Figure 2.5-4.*** This alternative would add one additional main line track and realigns existing tracks in some curves to improve speed. The additional track would result in a fourth track from Crystal City to Alexandria, and a third track from Alexandria to Spotsylvania. The additional track would be located on either the east or west side of the existing tracks, based on rail operation considerations, site constraints, and potential impacts. Rail improvements are generally within existing right-of-way.	Track Improvements Common to all Segments in the Northern Virginia Area. Site-specific and station improvements are described in Table 2.5-7. ▪ Add one main line track and realign existing tracks in some curves to improve speed in the Northern Virginia area. ▪ Extend the existing culverts along the alignment to accommodate the new third main line track. ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Five segments within the Northern Virginia area do not require an additional main track because either the required capacity has been added or an additional main track is under construction through an independent action. Improvements in these five segments would be limited to re-aligning existing track through the curves to improve speed. These five segments are (Figure D, Appendix D): ▪ Alexandria to Franconia (AFFR) currently has three tracks from the AF interlocking at CFP 104.5 south to CFP 98 just north of the Franconia-Springfield VRE station. ▪ Franconia to Occoquan is currently two tracks but is being designed for three tracks as part of a separate project. ▪ Powells Creek to Arkendale (PCAR) is currently under construction to add a third track. The third track construction at PCAR includes adding a track to match existing speed. Track realignment recommended to improve speed in this segment of the DC2RVA Project would require widening the roadbed in selected areas to allow for the realignment. Station improvements are included for Alexandria Station and Woodbridge Station.

Table 2.5-7: Build Alternative 2A (Northern Virginia) — Specific Infrastructure Improvements

Segment and Milepost (MP)	Figure	Proposed Improvements
Arlington to Alexandria (ROAF) CFP 109.3-103.7	Appendix D Figure D-1	Track ▪ Add one track to the east side between the Crystal City VRE Station (CFP 108.60) and Norfolk Southern rail yard (CFP 103.9). ▪ Shift tracks to the east to increase speeds through the curves at CFP 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 curves at CFP 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 CFP 109.1 to 108.8 to increase speeds through the curve. Stations ▪ Crystal City VRE Station (CFP 108.60) – align tracks to accommodate VRE platform updates. ▪ Alexandria Amtrak/VRE Station (CFP 105.30) – additional surface parking to accommodate approximately 150 parking spaces adjacent to the existing station building. Structures ▪ Add one track on the east side of the existing bridge over Four Mile Run Creek (CFP 107.86).
Alexandria to Franconia (AFFR) CFP 103.7-99.0	Appendix D Figure D-1	Track ▪ Shift tracks west to increase speed through the curves at CFP 103.7 to 103.4 and 103.2 to 102.7. ▪ Shift tracks east to increase speed through the curves at CFP 102.6 to 101.8 and 100.5 to 99.7. No stations occur in this segment. No structures modifications.
Lorton to Powells Creek (LOPC) CFP 92.6-83.4	Appendix D Figure D-2	Track ▪ Add one track to the east side between Furnace Road (CFP 90.0) and Rippon VRE Station (CFP 85.30). ▪ Add one track to the west side south of Rippon VRE Station (CFP 85.30) to Powells Creek (CFP 83.70). ▪ Modify at-grade crossing at Featherstone Road (CFP 86.85). ▪ Shift tracks east to increase speed through the curves at CFP 89.6 to 89.3. ▪ Shift tracks west to increase speed through the curves and transition additional track from east to west at CFP 85.6 to 85.5. ▪ Shift tracks east to increase speed through the curves and transition additional track from east to west at CFP 85.5 to 85.4. ▪ Shift tracks west to increase speed through the curves at CFP 84.5 to 83.9. ▪ Shift tracks east to increase speed through the curves and transition additional track from west to east at CFP 83.6 to 83.4. Stations ▪ Woodbridge Amtrak/VRE Station (CFP 89.10) – lengthen and widen east platform to become the center platform, and extend the pedestrian bridge to accommodate the additional track and provide vertical access to the pedestrian bridge. ▪ Rippon VRE Station (CFP 85.30) – align track to accommodate platform and extend the pedestrian bridge to accommodate the additional track and provide access to the east platform.

▶ *Continued.*

Table 2.5-7: Build Alternative 2A (Northern Virginia) — Specific Infrastructure Improvements

Segment and Milepost (MP)	Figure	Proposed Improvements
		Structures ▪ Add crash wall to accommodate the third track at the Pedestrian Bridge to Veterans Memorial Park (CFP 87.8). ▪ Construct new single-track rail bridges on the east side of the existing structures over Farm Creek (CFP 86.6) and Unnamed Creek (CFP 86.1). ▪ Plan for construction of a new two-track rail bridge (includes construction of one track on bridge plus space for a second track) on the west side of the existing bridges over Neabsco Creek (CFP 84.8) and Powells Creek (CFP 83.70). ▪ Construct a new single-track rail bridge over Furnace Road (CFP 90.0). ▪ Replace the Dawson Beach Road bridge (CFP 88.80) over the tracks to accommodate the additional third track.
Powells Creek to Arkendale (PCAR) CFP 83.4-72.9	Appendix D Figure D-2 and D-3	Track ▪ Add one track to the east side from near Powell's Creek (CFP 83.50) to Potomac Shores Station (CFP 82.95). ▪ Shift tracks west to increase speed through the curves and transition additional track from west to east at CFP 83.4 to 83.1. No station or structure modifications.
Arkendale to Dahlgren Junction (ARDJ) CFP 72.9-62.0	Appendix D Figure D-3	Track ▪ Add one track to the east side between Brent Point Road (CFP 72.34) and north of Courthouse Road (CFP 69.09), and between Claiborne Run (CFP 62.60) and White Oak Road (CFP 60.81). ▪ Add one track to the west side between Courthouse Road (CFP 69.09) and Andrew Chapel Road (CFP 68.01), between Mt Hope Church Road (CFP 67.57) and Claiborne Run (CFP 62.60), and between Potomac Creek (CFP 65.65) and Leeland Road Station (CFP 63.47). ▪ Add one track to the east side past the Brooke Station (CFP 67.91). ▪ Modify the at-grade crossing at Brent Point Road (CFP 72.34) to accommodate the additional third track. ▪ Shift tracks west to increase speed through the curves at CFP 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 CFP 70.6 to 70.0 and 67.1 to 66.7. ▪ Shift tracks west to increase speed through the curves and transition additional track from east to west at CFP 69.7 to 69.4. ▪ Shift tracks east to increase speed through the curves and transition additional track from east to west to access platform at CFP 67.9 to 67.4. ▪ Shift tracks west to increase speed through the curves and transition additional track from west to east at CFP 68.5 to 68.1, 68.1 to 68.0, and 66.0 to 65.7. Stations ▪ Brooke VRE Station (CFP 67.91) – align track to accommodate platforms. ▪ Leeland VRE Station (CFP 63.47) – align track to accommodate platforms. Structures ▪ Plan for construction of a new two-track rail bridge (includes construction of one track on bridge plus space for a second track) on the east side of the existing structure over Aquia Creek (CFP 70.9), Potomac Creek (CFP 65.3), and Claiborne Run (CFP 62.5). ▪ Replace Eskimo Hill Road (CFP 66.77), Leeland Road (CFP 63.47), and Primmer House Road (CFP 63.02) over the tracks to accommodate the additional third track. ▪ Construct a new single-track rail bridge over Andrew Chapel Road (CFP 68.01). ▪ Close Mt. Hope Church Road (CFP 67.57) and provide alternative route.

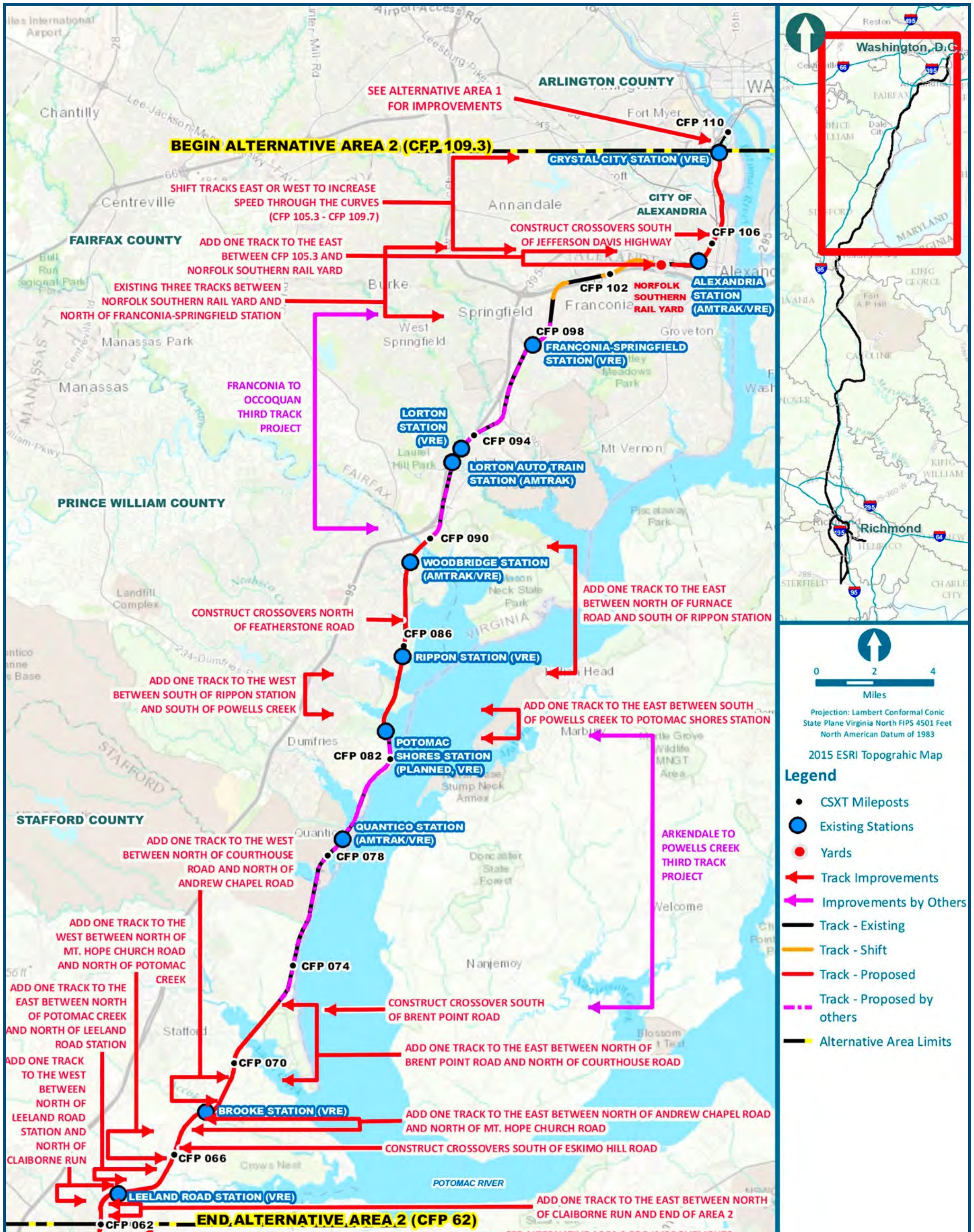


Figure 2.5-2: Build Alternative 2A–Add One Track / Improve Existing Track

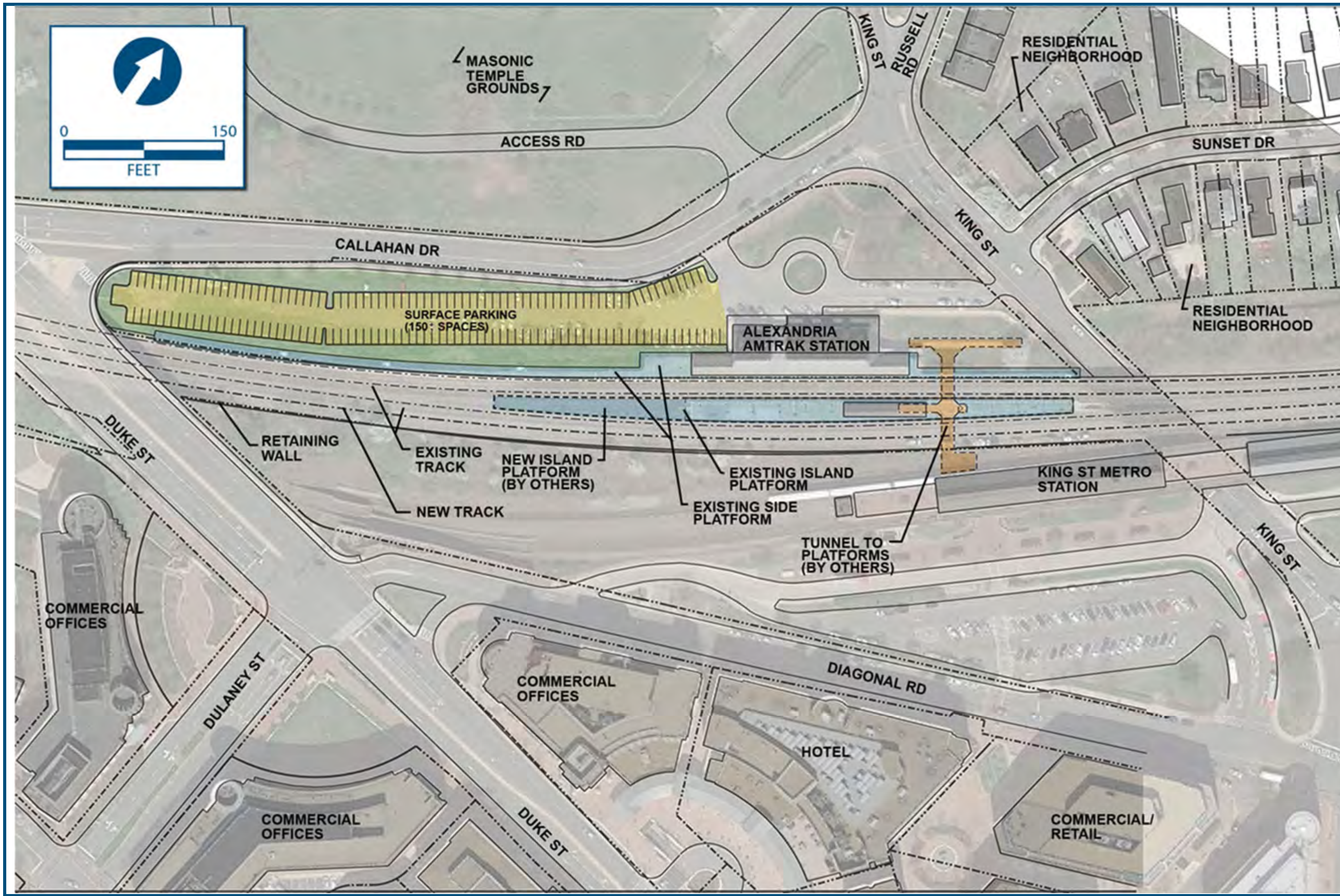


Figure 2.5-3: Alexandria Station Improvements for Build Alternative 2A

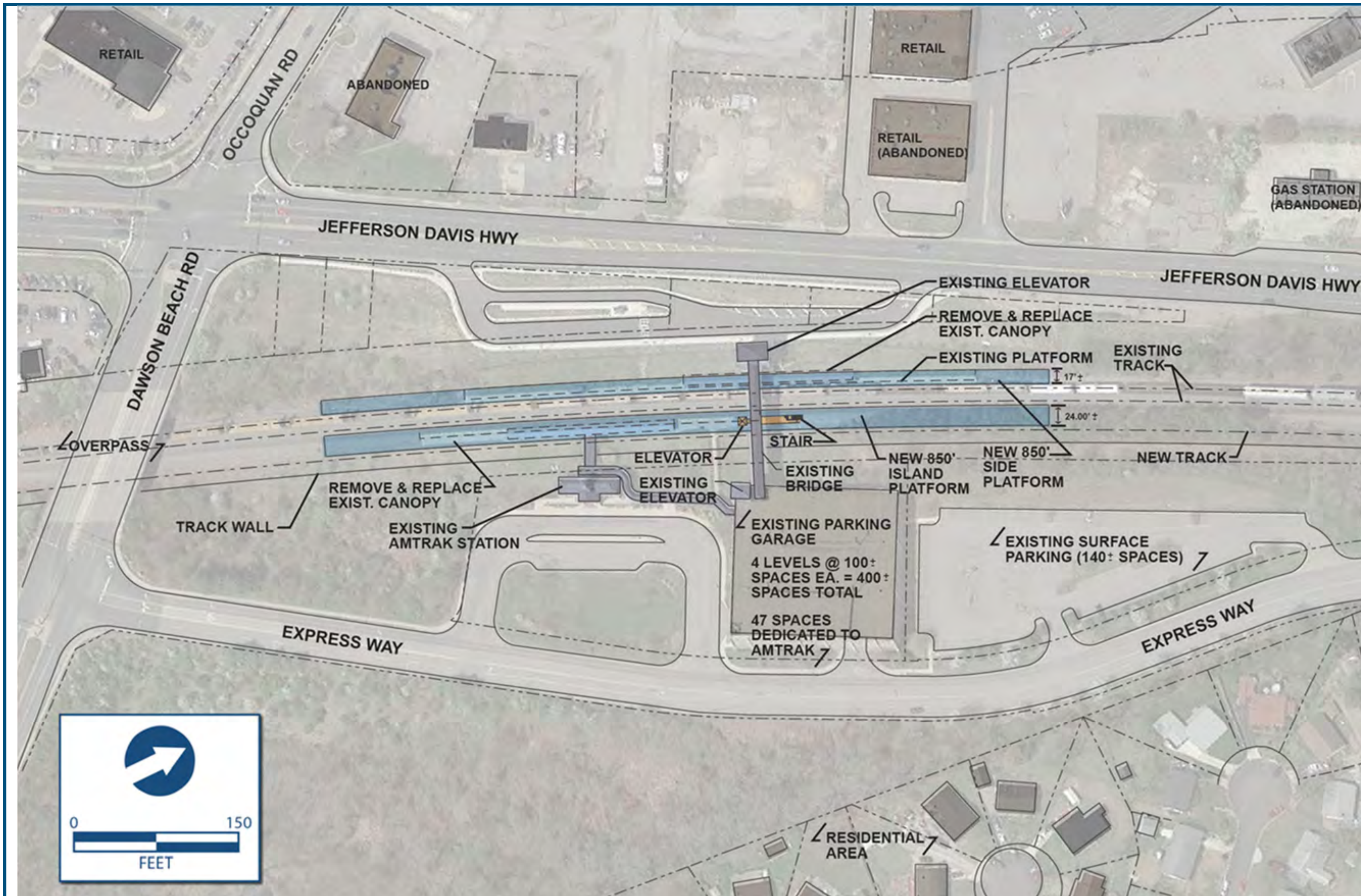


Figure 2.5-4: Woodbridge Station Improvements for Build Alternative 2A

2.5.2.3 Area 3: Fredericksburg (Dahlgren Spur to Crossroads) Build Alternatives

The Fredericksburg area (CFP 62 to CFP 48) extends from Harrell Road (Route 623) north of the Dahlgren Spur through the town of Fredericksburg to Claiborne Crossing Road (Route 660). The Fredericksburg area consists of a segment of two main tracks on an elevated structure in a relatively narrow CSXT right-of-way through a historic urban area. DRPT evaluated several alternatives to provide the required rail capacity in this area, including the evaluation of a possible bypass. These options are summarized in Table 2.5-8. Build Alternative 3A, 3B, and 3C are shown in Figure 2.5-5, Figure 2.5-6, and Figure 2.5-9, respectively. The Fredericksburg Station improvements associated with the Build Alternatives 3A and 3C, which are identical, are shown in Figure 2.5-7; the Fredericksburg Station improvements associated with Build Alternative 3B are shown in Figure 2.5-8. Detailed graphics illustrating the specific improvements are in Appendix E.

Table 2.5-8: Area 3: Fredericksburg Build Alternatives

Build Alternative	Proposed Improvements
3A: Maintain Two Tracks Through Town ***Rail Alignment: Figure 2.5-5*** ***Station: Figure 2.5-7*** This alternative would maintain the existing two tracks (i.e., no construction of new track) through Fredericksburg, which is used by freight, commuter, and passenger trains similar to current conditions. One new track would be constructed north and south of the city, and there are some shifts of existing tracks to improve speed throughout the area. Rail improvements are generally within existing right-of-way.	Track ▪ Construct turnout to tie-in new third track at Dahlgren Junction (CFP 61.1). ▪ Shift tracks west to increase speed through the curves at CFP 60.4 to 59.6. ▪ Shift tracks east to increase speed through the curves at CFP 61.7 to 61.3, 59.4 to 58.9, 58.7 to 58.5, 57.9 to 57.6, and 56.8 to 56.5. ▪ Construct crossovers at Hamilton (CFP 55.7). ▪ Add one track on the east side between VRE Spotsylvania Station (CFP 53.3) to the VRE Crossroad Layover Yard (CFP 52.5). ▪ Add one track on west side between north of Summit Crossing Road (CFP 52.5) to north of Stonewall Jackson Road (CFP 48). ▪ Add three tracks on west side and removal of existing tracks between CFP 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 CFP 50.3 to south of Stonewall Jackson Road. ▪ Add one track to the east side between Claiborne Run (CFP 62.60) and White Oak Road (CFP 60.81). ▪ Modify the at-grade crossing at Summit Crossing Road (Route 668) (CFP 51.41) and Claiborne Crossing Road (Route 660) (CFP 48.63) to accommodate the additional third track. ▪ Shift tracks to the east and reconstruct a portion of the track to increase speeds through the curves at CFP 50.6, 49.6, and 48.8. Stations ▪ Fredericksburg Amtrak/VRE Station (CFP 59.38) - Lengthen and widen east and west side platforms to 850 feet. - Construct new station building (approximately 6,800 square feet) west of the existing tracks at the intersection of Caroline Street and Lafayette Boulevard. - Construct a new vertical access between the station building, platforms and parking structure. - Construct a three-level parking garage for approximately 225 parking spaces and modify the existing surface parking to accommodate approximately 20 parking spaces. The new parking garage and surface parking would be located east of the tracks opposite the new station where the current surface parking lot is located. Approximately nine ADA parking spaces would be installed adjacent to the new station building. Structures ▪ Construct a new single-track rail bridge over Harrell Road (CFP 61.8) and Naomi Road (CFP 60.0).

▶ Continued.

Table 2.5-8: Area 3: Fredericksburg Build Alternatives

Build Alternative	Proposed Improvements
3B: Add One Track East of Existing ***Rail Alignment: Figure 2.5-6*** ***Station: Figure 2.5-8*** This alternative would add one additional main line track in most areas and realigns existing tracks to improve speed. Through the city, the additional track would be constructed east of the existing two tracks. No improvements would be required between Fredericksburg and Spotsylvania Stations, where a third track already exists. Rail improvements are generally within existing right-of-way.	Track ▪ Add one track to east side between White Oak Road (CFP 60.81) and south of Charles Street (CFP 59.28). ▪ Shift tracks west to increase speed through the curves at CFP 60.4 to 59.6 and 59.4 to 58.9. ▪ Shift tracks east to increase speed through the curves at CFP 58.7 to 58.5. ▪ Shift tracks east to increase speed through the curves at CFP 61.7 to 61.3, 57.9 to 57.6 and 56.8 to 56.5. ▪ Add one track on the east side between VRE Spotsylvania Station (CFP 53.3) to the VRE Crossroad Layover Yard (CFP 52.5). ▪ Add one track on west side between north of Summit Crossing Road (CFP 52.5) to north of Stonewall Jackson Road (CFP 48). ▪ Add three tracks on west side and removal of existing tracks between CFP 51.3 to 51.1. ▪ Add one track on west side between CFP 51.1 and 50.8. Add one track on west side between CFP 50.3 to south of Stonewall Jackson Road. ▪ Modify the at-grade crossing at Summit Crossing Road (Route 668) (CFP 51.41) and Claiborne Crossing Road (Route 660) (CFP 48.63) to accommodate the additional third track. ▪ Shift tracks to the east and reconstruct a portion of the track to increase speeds through the curves at CFP 50.6, 49.6, and 48.8. ▪ Add one track to the east side between Claiborne Run (CFP 62.60) and White Oak Road (CFP 60.81). ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Two segments within the Fredericksburg area do not require an additional main track because the segments already have a comparable number of main tracks. Improvements in these two segments would be limited to re-aligning existing track through the curves to improve speed. These two segments are (Figure E-1, Appendix E): ▪ Fredericksburg to Hamilton (FBHA) currently has three main line tracks from CFP 58.5 to CFP 56. ▪ Hamilton to Crossroads (HAXR) currently has three main line tracks along with the new VRE Spotsylvania Station (CFP 53.3). Stations ▪ Fredericksburg Amtrak/VRE Station (CFP 59.38) - Lengthen and widen east platform to become a center platform. Length and widen the west platform. Both platforms would be lengthened to 850 feet. - Construct new station building (approximately 6,800 square feet) west of the existing tracks at the intersection of Caroline Street and Lafayette Boulevard. - Construct a new vertical access between the station building, platforms and parking structure. - Relocate existing elevator on east platform to accommodate the new third track. - Construct a three level parking garage for approximately 225 parking spaces and modify the existing surface parking to accommodate approximately 20 parking spaces. The new parking garage and surface parking would be located east of the tracks opposite the new station where the current surface parking lot is located. Approximately nine ADA parking spaces would be installed adjacent to the new station building.

▶ Continued.

Table 2.5-8: Area 3: Fredericksburg Build Alternatives

Build Alternative	Proposed Improvements
	Structures ▪ Construct a new single-track rail bridge on the east side of the existing structure over the Rappahannock River (CFP 59.45). ▪ Construct a new single-track rail bridge on the east side of the existing structure over Claiborne Run (CFP 62.5). ▪ Replace the Butler/White Oak Road (CFP 60.81) and Kings Highway (CFP 60.04) bridges over the tracks. ▪ Construct a new single-track rail bridge at Harrell Road (CFP 61.8), Naomi Road (CFP 60.0), Sophia Street (CFP 59.40), Caroline Street (CFP 59.39), Princess Anne Street (CFP 59.35), and Charles Street (CFP 59.28).
3C: Add Two-Track Bypass East ***Rail Alignment: Figure 2.5-9*** ***Station: Figure 2.5-7*** The existing two-track corridor and station in downtown Fredericksburg would continue to serve both regional passenger and commuter rail. An 11.8-mile, two-track bypass would be constructed east of the city and would serve both freight rail and possibly long distance passenger rail trains. One new track would be added north and south of the bypass, with some track shifts to improve speed.	Track ▪ Add one track to south side between CFP Dahlgren spur junction (CFP 61.1) with CSXT main line and CFQ 4.8 and between CFQ 6.0 to 6.6 where it connects to the proposed bypass. ▪ Relocate track to northeast to increase speed from CFQ 4.8 to 6.0. ▪ Add Wye connection to existing track to the east at CFQ 6.6. ▪ Shift tracks east to increase speed through the curves at CFQ 61.7 to 61.3, 0.2 to 0.6 and CFQ 4.1 to 4.5. ▪ Shift tracks west to increase speed through the curve at CFQ 0.6 to 1.4. ▪ Add 7.1 mile two-track bypass from Dahlgren Spur 6.6 miles east of Dahlgren Junction (CFP 61.1) to CSXT main line north of Summit Crossing Road (CFP 51.41). ▪ Add wye connection to CFP 52.0 to CSXT mainline. ▪ Add one track on west side between north of Summit Crossing Road (CFP 52.5) to north of Stonewall Jackson Road (CFP 48.0). ▪ Add one track to the east side between CFP 51.53 to CFP 48 including new crossovers to accommodate the Fredericksburg bypass track and tie into existing CSXT mainline. ▪ Add four tracks on west side and removal of existing tracks between CFP 51.3 to 51.1. ▪ Add one track on west side between CFP 51.1 and 50.8. Add one track on west side between CFP 50.3 to south of Stonewall Jackson Road. ▪ Modify the at-grade crossing at Summit Crossing Road (Route 668) (CFP 51.41) and Claiborne Crossing Road (Route 660) (CFP 48.63) to accommodate the additional third track and Fredericksburg bypass tie in track. ▪ Shift tracks to the east and reconstruct a portion of the track to increase speeds through the curves at CFP 50.6, 49.6, and 48.8. ▪ Add one track to the east side between Claiborne Run (CFP 62.60) and White Oak Road (CFP 60.81). ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Stations ▪ Fredericksburg Amtrak/VRE Station (CFP 59.38) - Lengthen and widen east and west side platforms to 850 feet. - Construct new station building (approximately 6,800 square feet) west of the existing tracks at the intersection of Caroline Street and Lafayette Boulevard. - Construct a new vertical access between the station building, platforms and parking structure. - Construct a three-level parking garage for approximately 225 parking spaces and modify the existing surface parking to accommodate approximately 20 parking spaces. The new parking garage and surface parking would be located east of the tracks opposite the new station where the current surface parking lot is located. Approximately nine ADA parking spaces would be installed adjacent to the new station building.

▶ Continued.

Table 2.5-8: Area 3: Fredericksburg Build Alternatives

Build Alternative	Proposed Improvements
	Structures ▪ Construct a new single-track rail bridge at Harrell Road (CFP 61.8). ▪ Replace the Cool Springs Road bridge (CFQ 0.0) over the tracks. ▪ Modify the at-grade crossings at Debruen Lane (CFQ 0.4), Hot Top Road (CFQ1.1), Ferry Road (CFQ 1.6), Federal Drive (CFQ 2.9), Cleek Lane (CFQ 3.36), Private Driveways (2) (CFQ 3.7), Little Falls Road (CFQ 3.8), Forest Lane Road (CFQ 4.7) to accommodate the additional second track. ▪ Construct new two-track rail bridge (includes construction of two tracks on bridge) over Rappahannock River (FBP 1.58). ▪ Roads along the existing Dahlgren Spur cross the proposed tracks at-grade and the roads crossing the tracks in the new greenfield section would be grade-separated. ▪ Close private driveway east of Federal Drive (CFQ 2.9). ▪ Close Patriot Lane (FBP 6.3) at the wye connection. ▪ Construct a new two-track rail bridge over Mills Drive/Tidewater Trail (FBP 1.95), and Unnamed Pond (FBP 3.72). ▪ Construct new bridge over tracks at Kings Highway (FBP 0.8), Fredericksburg Turnpike (FBP 4.75), and Thornton Rolling Road (FBP 5.70).

Rappahannock River Bridge

Original Fredericksburg Railroad Station

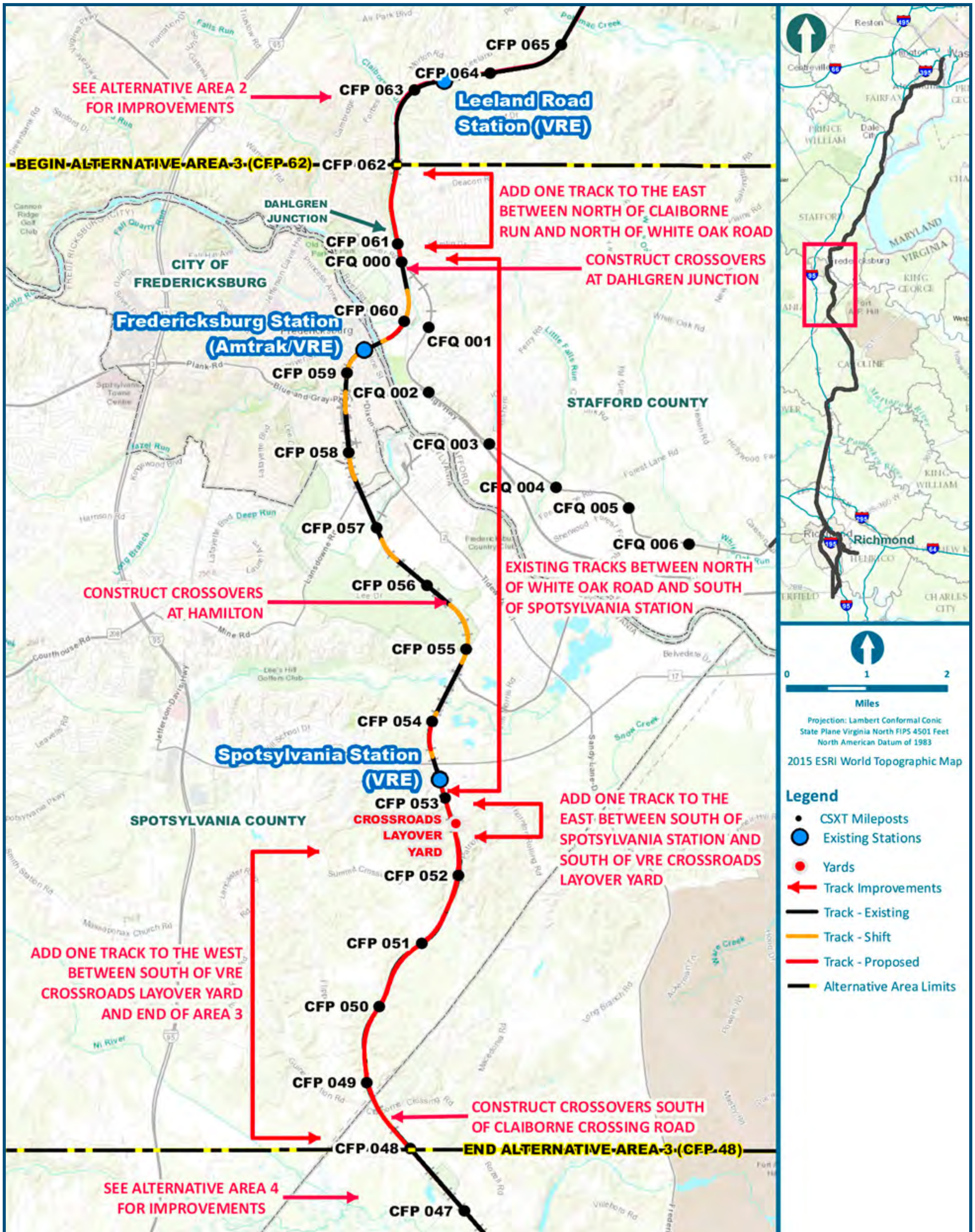


Figure 2.5-5: Build Alternative 3A – Maintain Two Tracks Through Town

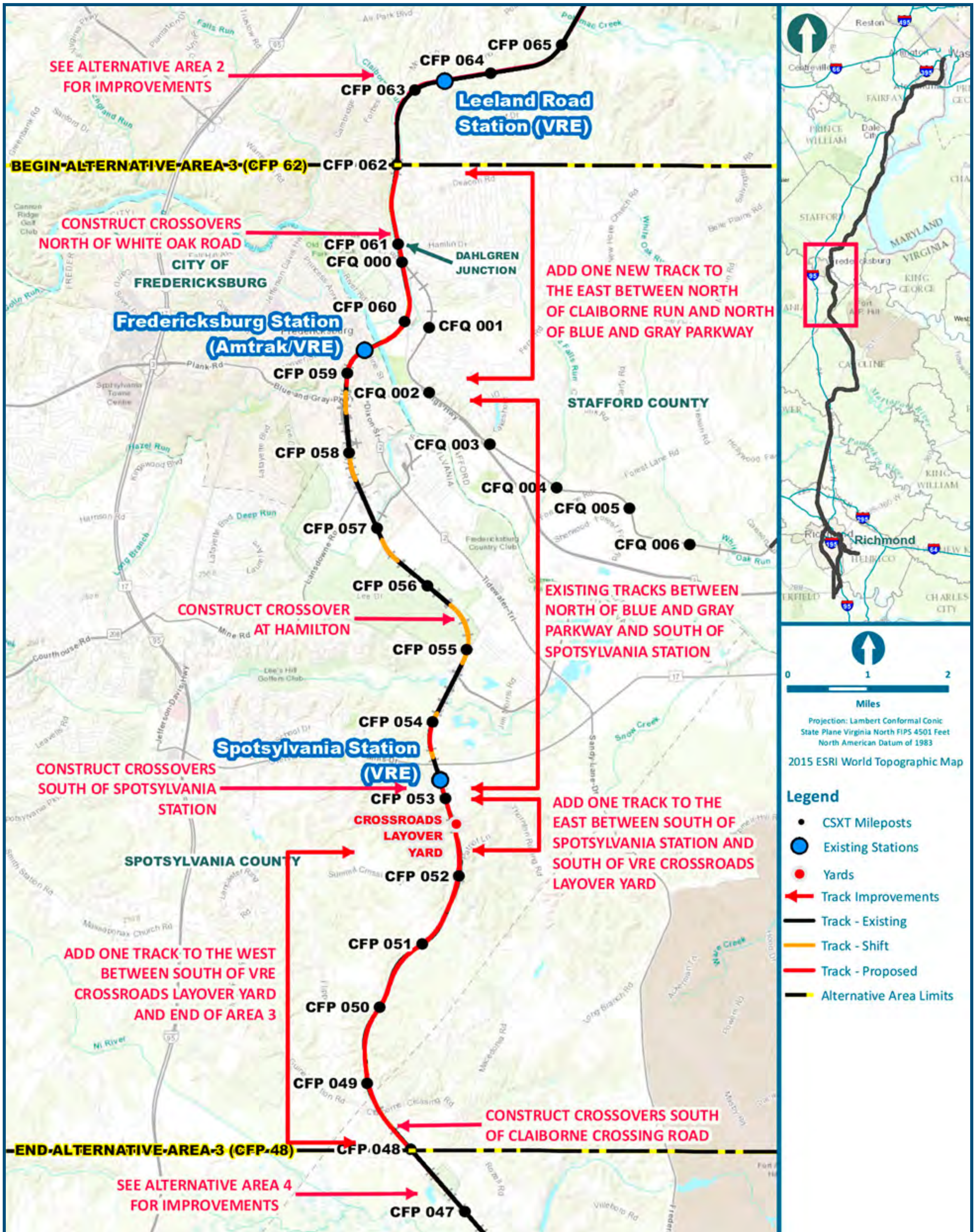


Figure 2.5-6: Build Alternative 3B – Add One Track Through Town East of Existing

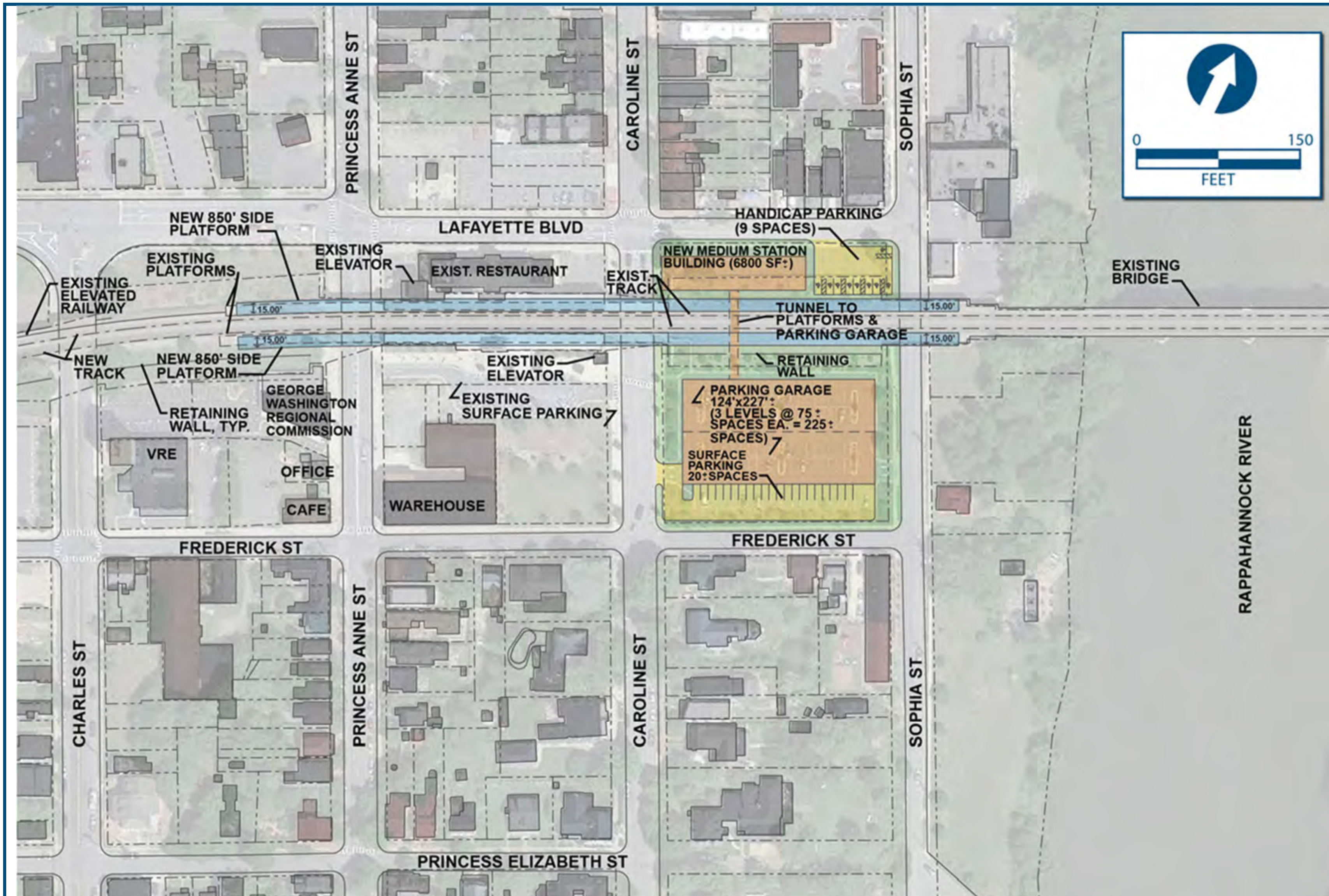


Figure 2.5-7: Fredericksburg Station Improvements for Build Alternatives 3A and 3C

DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

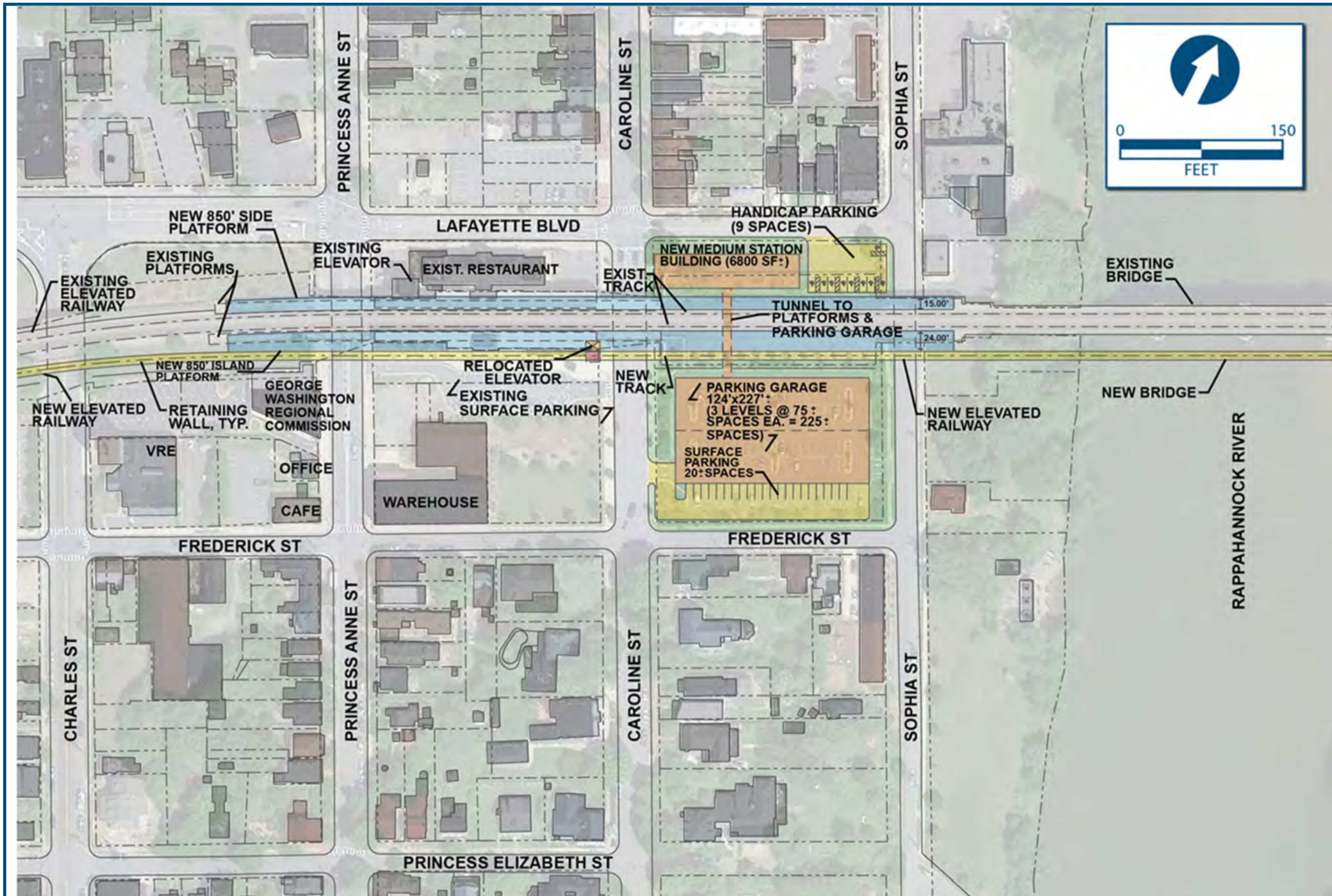


Figure 2.5-8: Fredericksburg Station Improvements for Build Alternative 3B

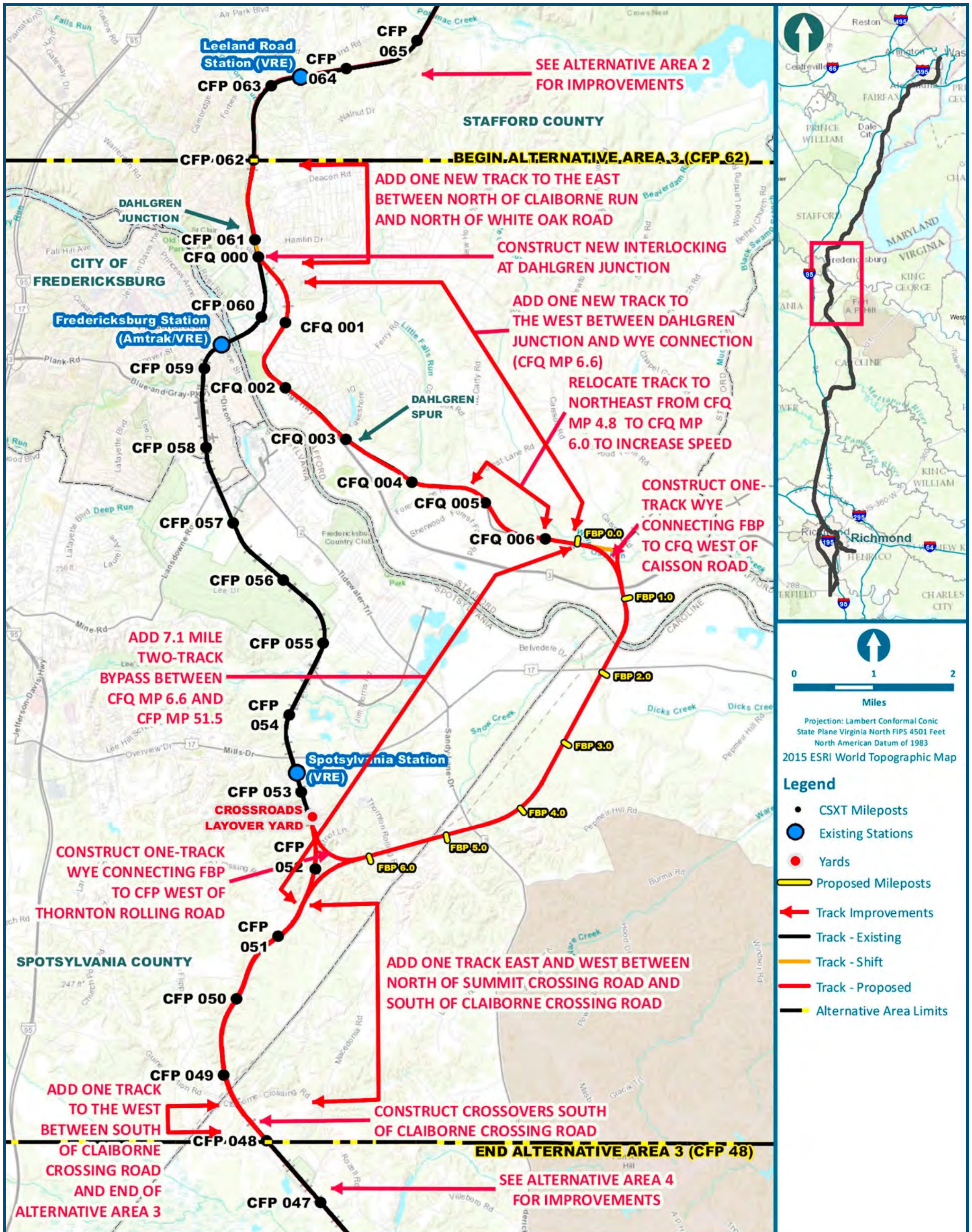


Figure 2.5-9: Build Alternative 3C – Add Two-Track Bypass East

2.5.2.4 Area 4: Central Virginia (Crossroads to Doswell) Build Alternative

The Central Virginia area (CFP 48 to CFP 19) extends from Claiborne Crossing Road (Route 660) south of Fredericksburg to the South Anna River in Henrico County (Figure 2.5-10). There is one Build Alternative in the Central Virginia area (Alternative 4A: Add One Track/Improve Existing Track) composed of sections of additional track and no additional track. Table 2.5-9 describes the general improvements to the Central Virginia alternative area. Segment specific track and structure improvements associated with the Central Virginia area Build Alternative are described by segment and milepost in Table 2.5-10. Detailed graphics illustrating the specific improvements are in Appendix F. Service improvements are described in Section 2.2.2.

Table 2.5-9: Build Alternative 4A (Central Virginia)—General Improvements

Build Alternative	Proposed Improvements
4A: Add One Track/Improve Existing ***Rail Alignment: Figure 2.5-10*** ***Station: None*** This alternative would add one additional main line track and realign existing tracks in some curves to improve speed. The additional track would be located on either the east or west side of the existing tracks based on rail operation considerations, site constraints, and potential impacts.	Track Improvements Common to all Segments in the Central Virginia Area. Site-specific improvements are described in Table 2.5-9. ▪ Add one main line track and realign existing tracks in some curves to improve speed in the Central Virginia area. ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities.

Existing Corridor in Area 4: Central Virginia

Table 2.5-10: Build Alternative 4A (Central Virginia)—Specific Infrastructure Improvements

Segment and Milepost (MP)	Figure	Proposed Improvements
Crossroads to Guinea (XRGU) MP 48.0-47.0	Appendix F Figure F-1	Track ▪ Add one track to west side between CFP 48.0 and 47.0. Modify the at-grade crossing at Stonewall Jackson Road (Route 606) (CFP 47.24) to accommodate the additional third track. No stations occur in this segment. No structure modifications.
Guinea to Milford (GUMD) MP 47.0-38.0	Appendix F Figure F-1	Track ▪ Add one track to west side between south of Stonewall Jackson Road (CFP 47.24) and north of Nelson Hill Road (CFP 37.8). ▪ Modify the at-grade crossing at Jones Crossing (CFP 45.77), Woodford Road (CFP 44.50), Woodslane Road (CFP 43.50), Rixey Road (CFP 41.70), Paige Road (CFP 40.43), and Roes Crossing (CFP 38.99) to accommodate the additional third track. ▪ Shift tracks to the east to increase speeds through the curve at CFP 39.1 to 38.8. ▪ Shift tracks to the west to increase speeds through the curve at CFP 45.7 to 45.4, 41.9 to 41.5, 40.9 to 40.6, and 40.3 to 40.0. No stations occur in this segment. Structures ▪ Add crash walls to accommodate the third track at Rogers Clark Boulevard (CFP 38.50).
Milford to North Doswell (MDND) MP 38.0-23.0	Appendix F Figure F-1 and F-2	Track ▪ Add one track to west side between north of Nelson Hill Road (CFP 37.80) and south of the North Anna River (CFP 23.82). ▪ Modify the at-grade crossing of multiple private road crossings; and Penola Road (CFP 33.0) and close the crossing of Colemans Mill Road (CFP 29.72) to accommodate the additional third track. ▪ Shift tracks to the east to increase speeds through the curve at CFP 36.4 to 36.0, 30.6 to 30.2, 30.0 to 29.5, 29.4 to 28.2, 26.9 to 26.6, 26.4 to 25.5, 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 CFP 35.0 to 34.8, 31.7 to 31.1, 27.7 to 27.1, 27.4, 31.4, and 34.9. ▪ Transition track from west to east through curve at CFP 23.5 to 23.2. No stations occur in this segment. Structures ▪ Construct a new single-track rail bridge over Mattaponi River (CFP 34.8) and North Anna River (CFP 23.9) on the west side of the existing structure. ▪ Construct a new single-track rail bridge on the west side of the existing structure over Polecat Creek (CFP 32.1). ▪ Add crash walls to accommodate the third track at Dry Bridge Road (CFP 28.37), Ruther Glen Road (CFP 26.96), and I-95 (CFP 26.54).
North Doswell to Elmont (NDEL) MP 23.0-19.0	Appendix F Figure F-2	Track ▪ Add one track to the east side south of North Anna River (CFP 23.82) to north of Kings Dominion Boulevard (CFP 20.81). ▪ Add one track to the west side north of Kings Dominion Boulevard (CFP 20.81) to Vaughan Road (CFP 15.62). ▪ Modify the at-grade crossings at Doswell Road (CFP 21.87) and Private Crossing (Excelsior Mill) (CFP 21.66) to accommodate the additional third track. ▪ Shift tracks to the west to increase speeds through the curve at CFP 20.5 to 19.9. No stations occur in this segment. Structures ▪ Construct a new single-track rail bridge on the west side of the existing structure over Taylorsville Road (Route 689) (CFP 19.58). ▪ Construct a new single-track rail bridge over Little River (CFP 19.5).

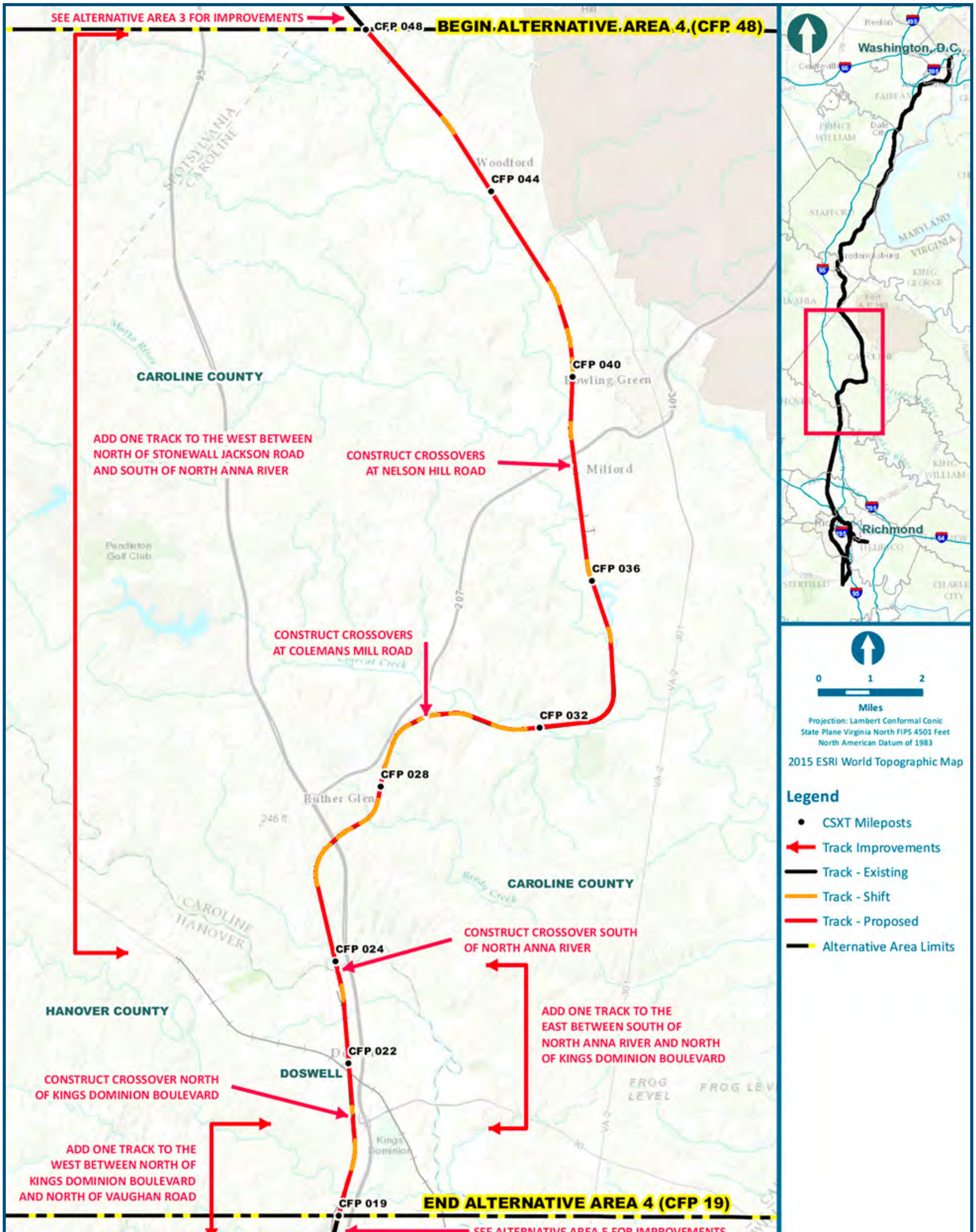


Figure 2.5-10: Build Alternative 4A – Add One Track / Improve Existing Track

2.5.2.5 Area 5: Ashland (Doswell to I-295) Build Alternatives

The Ashland area (CFP 19 to CFP 9) extends from the South Anna River through the Town of Ashland to I-295. The corridor through the Town of Ashland consists of an approximately 9,500-foot-long segment of two main tracks in the median of Center Street/Railroad Avenue that 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. The vehicular lanes of Center Street/Railroad Avenue 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. CSXT's right-of-way has sufficient room for an additional main track through most of the Ashland area, except through downtown Ashland where the right-of-way is limited to the existing tracks. DRPT evaluated several options to provide the required rail capacity in this area, including a bypass option. These options are listed in Table 2.5-11 and shown in Figures 2.5-11 through 2.5-20; the figures include both maps of the Build Alternative rail alignments as well as the station build improvements.

Station options considered include improving the existing downtown Ashland station (with 850-foot platforms or 350-foot platforms) or constructing a new station just south of Ashcake Road (with 850-foot platforms). For the purposes of assessing the effects of the Ashland Area Build Alternatives that retain the existing downtown Ashland station, DRPT assumed that 850-foot platforms would be constructed, which is the worst-case (*i.e.*, greatest impact) platform option and follows the DC2RVA BOD. If shorter 350-foot platforms were constructed instead, the impacts to the surrounding station area described in Chapter 4 would be reduced, with a minor impact on the efficiency of trains stopping at the station.

Detailed graphics illustrating the specific improvements are in Appendix G.

Table 2.5-11: Area 5: Ashland Build Alternatives

Build Alternative	Proposed Improvements
5A: Maintain Two Tracks Through Town ***Rail Alignment: Figure 2.5-11*** ***Station: Figure 2.5-12 A & B*** This alternative would maintain the existing two tracks (i.e., no construction of new track) through Ashland, which would be used by freight and passenger trains similar to current conditions. A new station would be constructed in town. One new track would be constructed north and south of town, and there some shifts of existing tracks to improve speed throughout the area. Rail improvements are generally within existing right-of-way.	Track ▪ Add one track to the west side north of Kings Dominion Boulevard (CFP 20.81) to Vaughan Road (CFP 15.62). ▪ Add one track to the east side between Ashcake Road (CFP 13.85) and Gwathmey Church Road (CFP 12.95). ▪ Add one track to the west side between Gwathmey Church Road (CFP 12.95) and Cedar Lane (CFP 11.15). ▪ Modify the at-grade crossings at Gwathmey Church Road (CFP 12.95), Elmont Road (CFP 11.55) and Cedar Lane (CFP 11.15) to accommodate the additional third track. Stations ▪ Ashland Amtrak Station (CFP 14.71) - Construct a new station building (approximately 2,300 square feet) and surface parking for approximately 45 spaces at the intersection of Henry Clay Road and Center Street. - Construct two new platforms to service the Amtrak trains; these platforms would be 850 feet in length, and eight inches above top of rail. (An option for this alternative is to construct 350-foot-long platforms.) - A pedestrian access bridge would connect the station to the two platforms, including an elevator to provide ADA access. *Note: these improvements would not apply if 350-foot-long platforms were constructed.*

▶ *Continued.*

Table 2.5-11: Area 5: Ashland Build Alternatives

Build Alternative	Proposed Improvements
	Structures ▪ Add crash walls to accommodate the third track at Old Ridge Road (CFP 18.95) overpass. ▪ Construct a new single-track rail bridge on the west side of the existing structure over Elletts Crossing Road (Route 641) (CFP 17.70). ▪ Plan for construction of a new rail bridge (includes construction of one track on bridge plus space for a second track) on the west side of the existing structure over the South Anna River (CFP 18.70). ▪ Realign and provide grade separation at Vaughan Road (CFP 15.62). ▪ Realign and provide grade separation at Ashcake Road (CFP 13.85) with new connector road from Ashcake Road to Center Street.
5A–Ashcake: Maintain Two Tracks Through Town (Relocate Station to Ashcake) ***Rail Alignment: Figure 2.5-13*** ***Station: Figure 2.5-20*** This alternative would maintain the existing two tracks (i.e., no construction of new track) through Ashland, which would be used by freight and passenger trains similar to current conditions. A new station would be constructed just south of Ashcake Road and the existing station location in town would be closed. One new track would be constructed north and south of town, with some track shifts to improve speed, which would generally be within existing right-of-way.	Track ▪ Add one track to the west side north of Kings Dominion Boulevard (CFP 20.81) to Vaughan Road (CFP 15.62). ▪ Add one track to the east side between Ashcake Road (CFP 13.85) and Gwathmey Church Road (CFP 12.95). ▪ Add one track to the west side between Gwathmey Church Road (CFP 12.95) and Cedar Lane (CFP 11.15). ▪ Modify the at-grade crossings at Gwathmey Church Road (CFP 12.95) and Elmont Road (CFP 11.55) and Cedar Lane (CFP 11.15) to accommodate the additional third track. Stations ▪ Ashland Amtrak Station (CFP 14.71) – existing station platforms removed and service relocated to a new station near Ashcake Road. ▪ Ashcake Road Amtrak Station - Construct a new station building (approximately 2,300 square feet) and surface parking for approximately 45 spaces would be constructed just south of Ashcake Road - A pedestrian access bridge would connect the station to the two platforms, including an elevator to provide ADA access - Two new platforms, 850 feet in length and 8 inches above top of rail, would be constructed to service the Amtrak trains. Structures ▪ Add crash walls to accommodate the third track at Old Ridge Road (CFP 18.95) overpass. ▪ Construct a new single-track rail bridge on the west side of the existing structure over Elletts Crossing Road (Route 641) (CFP 17.70). ▪ Plan for construction of a new rail bridge (includes construction of one track on bridge plus space for a second track) on the west side of the existing structure over the South Anna River (CFP 18.70). ▪ Realign and provide grade separation at Vaughan Road (CFP 15.62). ▪ Realign and provide grade separation at Ashcake Road (CFP 13.85) with new connector road from Ashcake Road to Center Street.
5B: Add One Track East of Existing ***Rail Alignment: Figure 2.5-14*** ***Station: Figure 2.5-19 A & B*** Through downtown Ashland, one additional track is added to the east side of the existing two tracks, which would new right-of-way to construct. A new station would be constructed in town.	Track ▪ Add one track to the west side north of Kings Dominion Boulevard (CFP 20.81) to Vaughan Road (CFP 15.62). ▪ Add one track to the east side between Vaughan Road (CFP 15.62) and Gwathmey Church Road (CFP 12.95). ▪ Add one track to the west side between Gwathmey Church Road (CFP 12.95) and Cedar Lane (CFP 11.15). ▪ Modify the at-grade crossing at West Patrick Street (CFP 15.16), England Street (CFP 14.72), Myrtle Street (CFP 14.64), Francis Street (CFP 14.20), Ashcake Road (CFP 13.85), Gwathmey Church Road (CFP 12.95), Elmont Road (CFP 11.55) and Cedar Lane (CFP 11.15) to accommodate the additional third track.

▶ Continued.

Table 2.5-11: Area 5: Ashland Build Alternatives

Build Alternative	Proposed Improvements
One new track would be constructed north and south of town, with some track shifts to improve speed, on the west side of the existing track. These rail improvements would generally be within existing right-of-way.	▪ Modify/reconstruct North Center Street between Smith Street and England Street, and South Center Street between England Street and Ashcake Road to accommodate the additional third track. ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Stations ▪ Ashland Amtrak Station (CFP 14.71) - Construct a new station building (approximately 2,300 square feet) and surface parking for approximately 45 spaces at the intersection of Henry Clay Road and Center Street. - Two new platforms would be constructed to service the Amtrak trains; these platforms would be 850 feet in length, and eight inches above top of rail. (An option for this alternative is to construct 350-foot-long platforms.) - A pedestrian access bridge would connect the station to the two platforms, including an elevator to provide ADA access. *Note: these improvements would not apply if 350-foot-long platforms were constructed.* Structures ▪ Add crash walls to accommodate the third track at Old Ridge Road (CFP 18.95) overpass. ▪ Construct a new single-track rail bridge on the west side of the existing structure over Elletts Crossing Road (Route 641) (CFP 17.70). ▪ Plan for construction of a new rail bridge (includes construction of one track on bridge plus space for a second track) on the west side of the existing structure over the South Anna River (CFP 18.70). ▪ Realign and provide grade separation at Ashcake Road (CFP 13.85) with new connector road from Ashcake Road to Center Street.
5B–Ashcake: Add One Track East of Existing (Relocate Station to Ashcake) ***Rail Alignment: Figure 2.5-15*** ***Station: Figure 2.5-20*** Through downtown Ashland, one additional track is added to the east side of the existing two tracks, which would new right-of-way to construct. A new station would be constructed just south of Ashcake Road and the existing station location in town would be closed. One new track would be constructed north and south of town, with some track shifts to improve speed, on the west side of the existing tracks. These rail improvements would generally be within existing right-of-way.	Track ▪ Add one track to the west side north of Kings Dominion Boulevard (CFP 20.81) to Vaughan Road (CFP 15.62). ▪ Add one track to the east side between Vaughan Road (CFP 15.62) and Gwathmey Church Road (CFP 12.95). ▪ Add one track to the west side between Gwathmey Church Road (CFP 12.95) and Cedar Lane (CFP 11.15). ▪ Modify the at-grade crossing at West Patrick Street (CFP 15.16), England Street (CFP 14.72), Myrtle Street (CFP 14.64), Francis Street (CFP 14.20), Ashcake Road (CFP 13.85), Gwathmey Church Road (CFP 12.95), Elmont Road (CFP 11.55) and Cedar Lane (CFP 11.15) to accommodate the additional third track. ▪ Modify/reconstruct North Center Street between Smith Street and England Street, and South Center Street between England Street and Ashcake Road to accommodate the additional third track. ▪ Install 36- to 48-inch culverts, as required, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Stations ▪ Ashland Amtrak Station (CFP 14.71) – existing station platforms removed and service relocated to a new station near Ashcake Road. ▪ Ashcake Amtrak Station - Construct a new station building (approximately 2,300 square feet) and surface parking for approximately 45 spaces would be constructed just south of Ashcake Road - A pedestrian access bridge would connect the station to the two platforms, including an elevator to provide ADA access - Two new platforms, 850 feet in length and 8-inches above top of rail, would be constructed to service the Amtrak trains.

▶ *Continued.*

Table 2.5-11: Area 5: Ashland Build Alternatives

Build Alternative	Proposed Improvements
	Structures ▪ Add crash walls at Old Ridge Road (CFP 18.95) overpass. ▪ Construct a new single-track rail bridge on the west side of the existing structure over Elletts Crossing Road (Route 641) (CFP 17.70). ▪ Plan for construction of a new rail bridge (includes construction of one track on bridge plus space for a second track) on the west side of the existing structure over the South Anna River (CFP 18.70). ▪ Realign and provide grade separation at Ashcake Road (CFP 13.85) with new connector road from Ashcake Road to Center Street.
5C: Add Two-Track West Bypass ***Rail Alignment: Figure 2.5-16*** ***Station: Figure 2.5-12 A & B*** The existing two-track corridor and a new station in downtown Ashland would continue to serve regional passenger rail. An 8.75-mile, two-track bypass would be constructed on new right-of way west of the town and would serve both freight rail and possibly long distance passenger rail trains, which do not serve the Ashland station. One new track would be added north and south of the bypass in the area, with some track shifts to improve speed, which would generally be within existing right-of-way.	Track ▪ Add one track to the west side north of Kings Dominion Boulevard (CFP 20.81) to south of the South Anna River (CFP 18.52) ▪ Construct a two-track bypass on a greenfield alignment west of Ashland from south of the South Anna River (CFP 18.52 = ABP 8.32) to north of Elmont Road (CFP 11.61 = ABP 0.00) ▪ Add one track to the west side north of Elmont Road (CFP 11.55) to Cedar Lane (CFP 11.15) ▪ Construct a new culvert over Falling Creek ▪ Install culverts, as required for drainage, under the rail line along the alignment ▪ Install stormwater management facilities ▪ Install signal and communication facilities Stations ▪ Ashland Amtrak Station (CFP 14.71) ▪ Construct a new station building (approximately 2,300 square feet) and surface parking for approximately 45 spaces would be constructed at the intersection of Henry Clay Road and Center Street. ▪ Two new platforms would be constructed to service the Amtrak trains; these platforms would be 850 feet in length, and eight inches above top of rail. (An option for this alternative is to construct 350-foot-long platforms.) ▪ A pedestrian access bridge would connect the station to the two platforms, including an elevator to provide ADA access. *Note: these improvements would not apply if 350-foot-long platforms were constructed.* Structures ▪ Add crash walls at Old Ridge Road (CFP 18.95) overpass. ▪ Plan for construction of a new rail bridge (includes construction of one track on bridge plus space for a second track) on the west side of the existing structure over the South Anna River (CFP 18.70). ▪ Grade separate crossings at Washington Highway (ABP 7.0), Blunts Bridge Road (ABP 5.83), West Patrick Henry Road (ABP 4.29), Yowell Road (ABP 3.25), Elmont Road (ABP 1.11) (including realignment of the road) and Ashcake Road (ABP 2.59). ▪ Close the crossing at Independence Road, Farmers Inn Lane, and Quailwood Lane. Alternative driveway access to be provided for Quailwood Lane.
5C–Ashcake: Add Two-Track West Bypass (Relocate Station to Ashcake) ***Rail Alignment: Figure 2.5-17*** ***Station: Figure 2.5-20*** The existing two-track corridor in downtown Ashland and a new station just south of Ashcake Road would continue to serve regional passenger rail, and the existing station location would be closed.	Track ▪ Add one track to the west side north of Kings Dominion Boulevard (CFP 20.81) to south of the South Anna River (CFP 18.52) ▪ Construct a two-track bypass on a greenfield alignment west of Ashland from south of the South Anna River (CFP 18.52 = ABP 8.32) to north of Elmont Road (CFP 11.61 = ABP 0.00) ▪ Add one track to the west side north of Elmont Road (CFP 11.55) to Cedar Lane (CFP 11.15) ▪ Construct a new culvert over Falling Creek ▪ Install culverts, as required for drainage, under the rail line along the alignment ▪ Install stormwater management facilities ▪ Install signal and communication facilities Stations ▪ Ashland Amtrak Station (CFP 14.71) – existing station platforms removed and service relocated to a new station near Ashcake Road.

▶ *Continued.*

Table 2.5-11: Area 5: Ashland Build Alternatives

Build Alternative	Proposed Improvements
An 8.75-mile, two-track bypass would be constructed on new right-of-way west of the town and would serve both freight rail and possibly long distance passenger rail trains, which do not serve the Ashland station. One new track would be added north and south of the bypass in the area, with some track shifts to improve speed, which would generally be within existing right-of-way.	▪ Ashcake Amtrak Station - Construct a new station building (approximately 2,300 square feet) and surface parking for approximately 45 spaces would be constructed just south of Ashcake Road - A pedestrian access bridge would connect the station to the two platforms, including an elevator to provide ADA access - Two new platforms, 850 feet in length and 8-inches above top of rail, would be constructed to service the Amtrak trains.
	Structures ▪ Add crash walls at Old Ridge Road (CFP 18.95) overpass. ▪ Plan for construction of a new rail bridge (includes construction of one track on bridge plus space for a second track) on the west side of the existing structure over the South Anna River (CFP 18.70). ▪ Grade separate crossings at Washington Highway (ABP 7.0), Blunts Bridge Road (ABP 5.83), West Patrick Henry Road (ABP 4.29), Yowell Road (ABP 3.25), Elmont Road (ABP 1.11) (including realignment of the road) and Ashcake Road (ABP 2.59). ▪ Close the crossing at Independence Road, Farmers Inn Lane, and Qualiwood Lane. Alternative driveway access to be provided for Qualiwood Lane.
5D–Ashcake: Three Tracks Centered Through Town (Add One Track, Relocate Station to Ashcake) ***Rail Alignment: Figure 2.5-18*** ***Station: Figure 2.5-20*** One additional track is added to the existing two-track corridor, with the centering of all tracks on the existing alignment. This rail alignment would preclude use of the existing station location, which would be closed and the platforms would be removed. A new station would be constructed just south of Ashcake Road. Rail improvements generally require new right-of-way, especially within the town of Ashland.	Track ▪ Add one track to the west side north of Kings Dominion Boulevard (CFP 20.81) to Vaughan Road (CFP 15.62) ▪ Shift existing tracks east up to 9 feet from Vaughan Road (CFP 15.62) to Gwathmey Church Road (CFP 12.95). ▪ Add one track to the west side between Vaughan Road (CFP 15.62) to Gwathmey Church Road (CFP 12.95). ▪ Modify the at-grade crossing at West Patrick Street (CFP 15.16), England Street (CFP 14.72), Myrtle Street (CFP 14.64), Francis Street (CFP 14.20), Gwathmey Church Road (CFP 12.95), Elmont Road (CFP 11.55) and Cedar Lane (CFP 11.15) to accommodate the additional third track. ▪ Install 36- to 48-inch culverts, as required, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Stations ▪ Ashland Amtrak Station (CFP 14.71) –existing station platforms removed and service relocated to a new station near Ashcake Road. ▪ Ashcake Amtrak Station - Construct a new station building (approximately 2,300 square feet) and surface parking for approximately 45 spaces just south of Ashcake Road. - A pedestrian access bridge would connect the station to the two platforms, including an elevator to provide ADA access. - Two new platforms, 850 feet in length and 8-inches above top of rail, would be constructed to service the Amtrak trains. Structures ▪ Add crash walls at Old Ridge Road (CFP 18.95) overpass. ▪ Construct a new single-track rail bridge on the west side of the existing structure over Elletts Crossing Road (Route 641) (CFP 17.70). ▪ Plan for construction of a new rail bridge (includes construction of one track on bridge plus space for a second track) on the west side of the existing structure over the South Anna River (CFP 18.70). ▪ Grade separate crossings at Ashcake Road (CFP 13.85) and Vaughan Road (CFP 15.62).

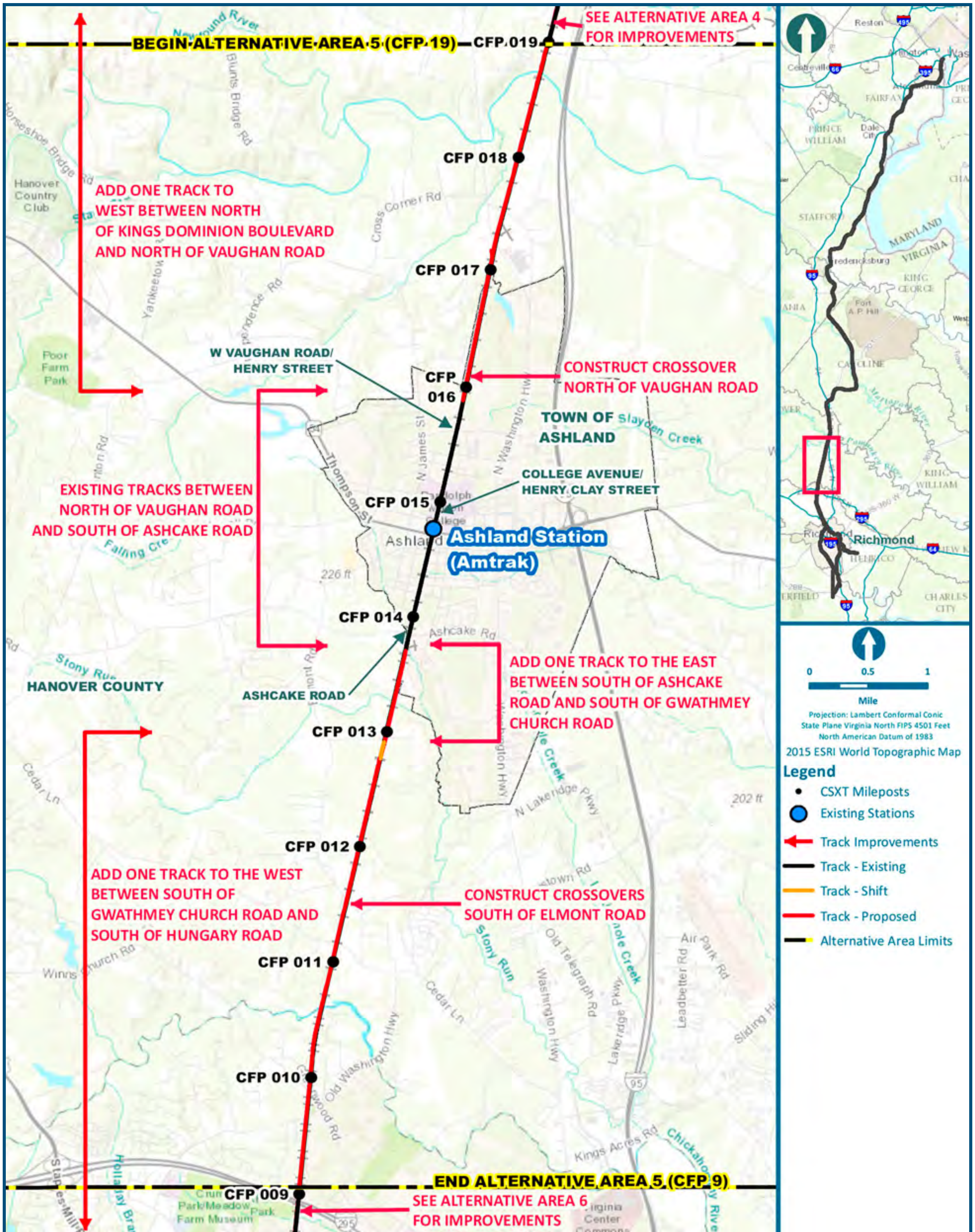


Figure 2.5-11: Build Alternative 5A – Maintain Two Tracks Through Town

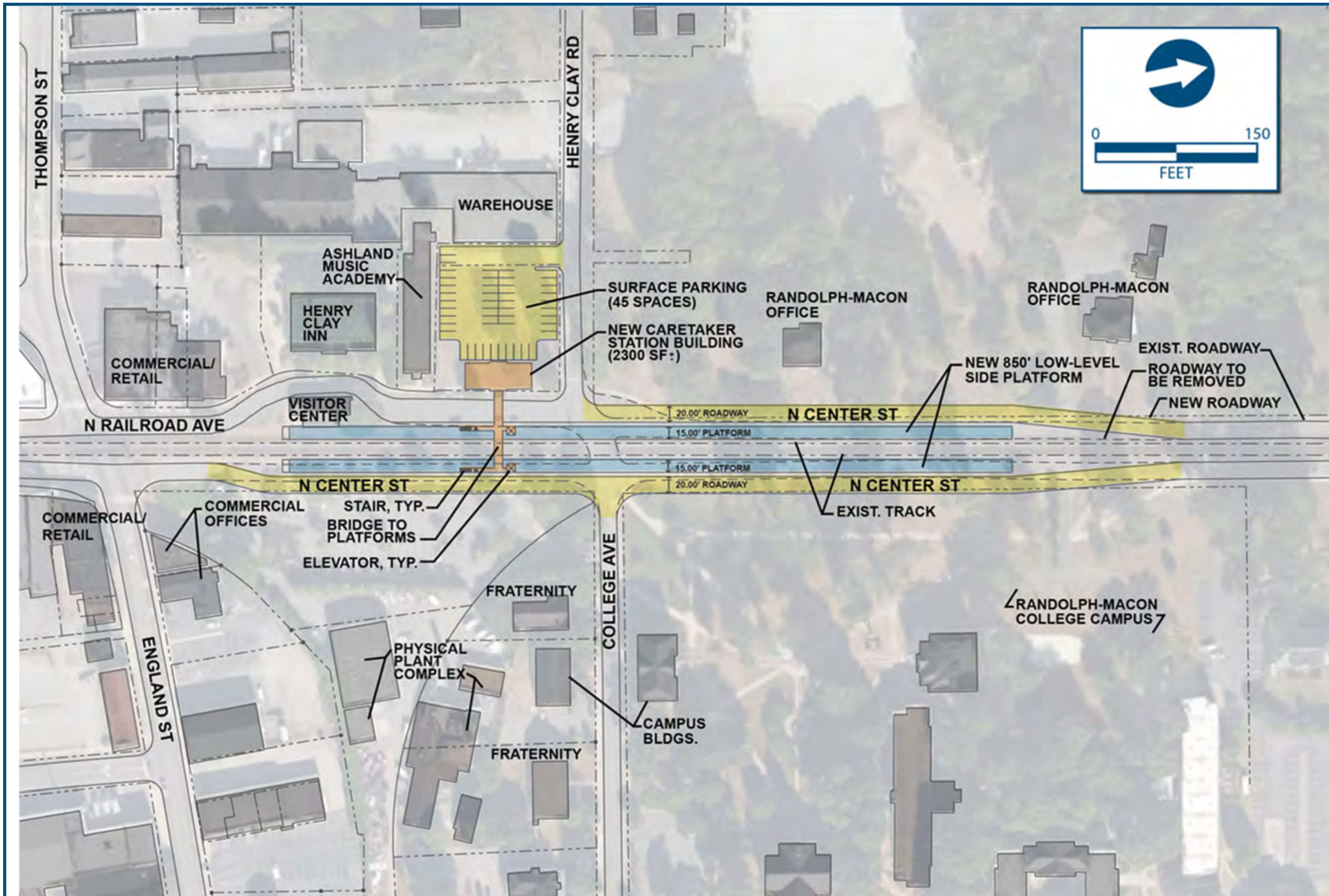


Figure 2.5-12A: Ashland Station Improvements for Build Alternatives 5A and 5C (Two-Track/850-Foot Platforms)

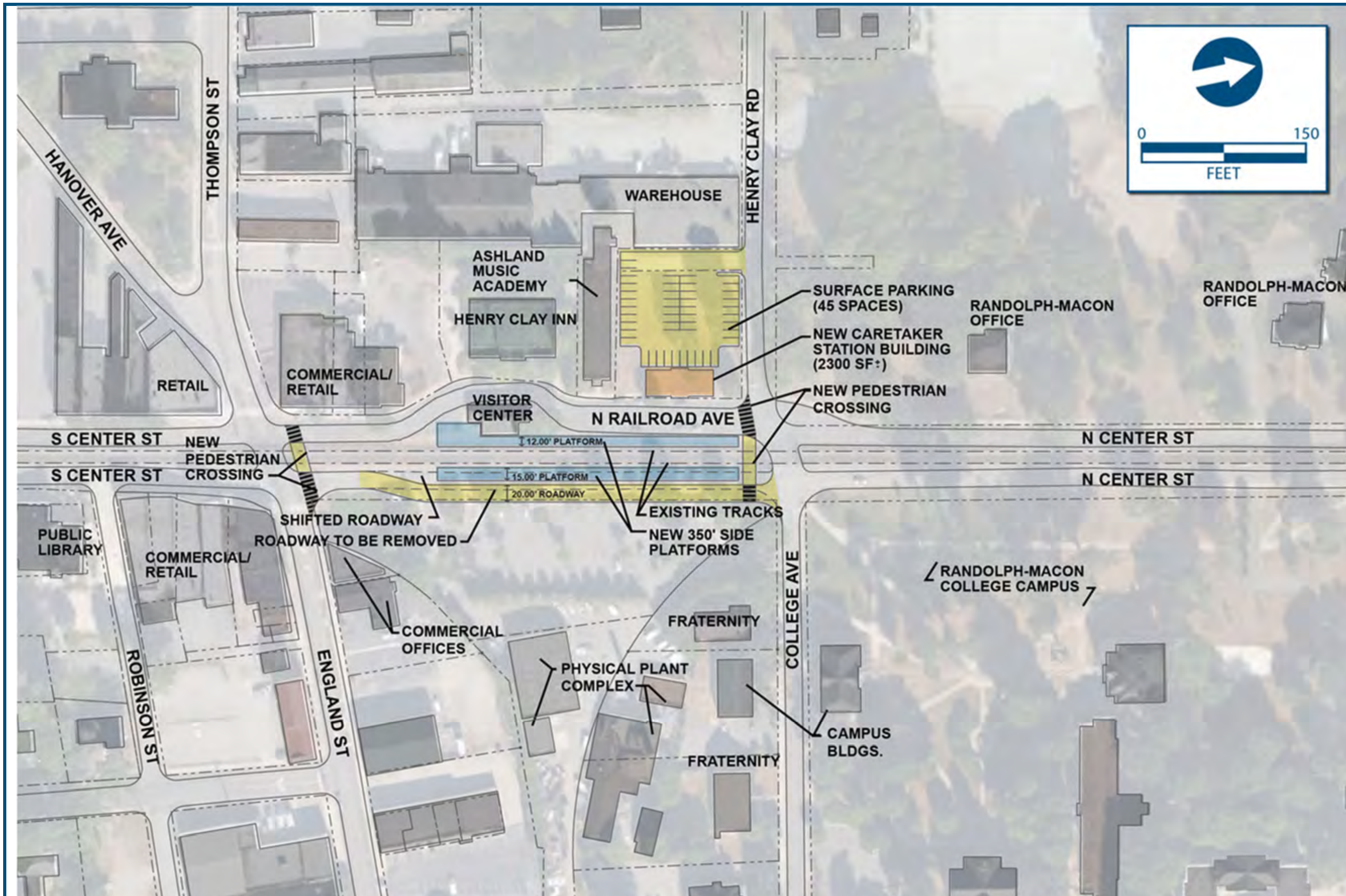


Figure 2.5-12B: Ashland Station Improvements for Build Alternatives 5A and 5C (Two-Track/350-Foot Platforms)

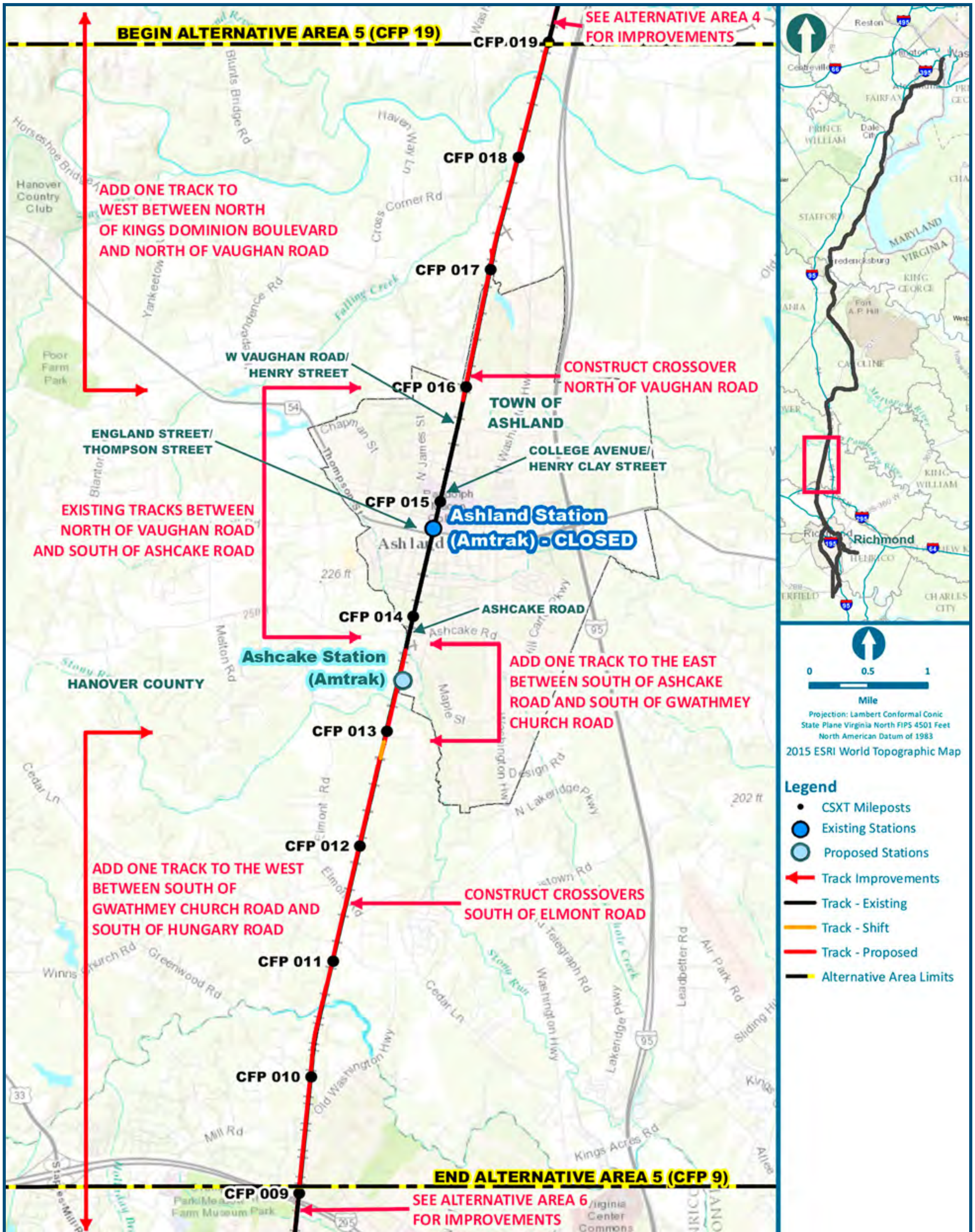


Figure 2.5-13: Build Alternative 5A–Ashcake – Maintain Two Tracks Through Town (Relocate Station to Ashcake)

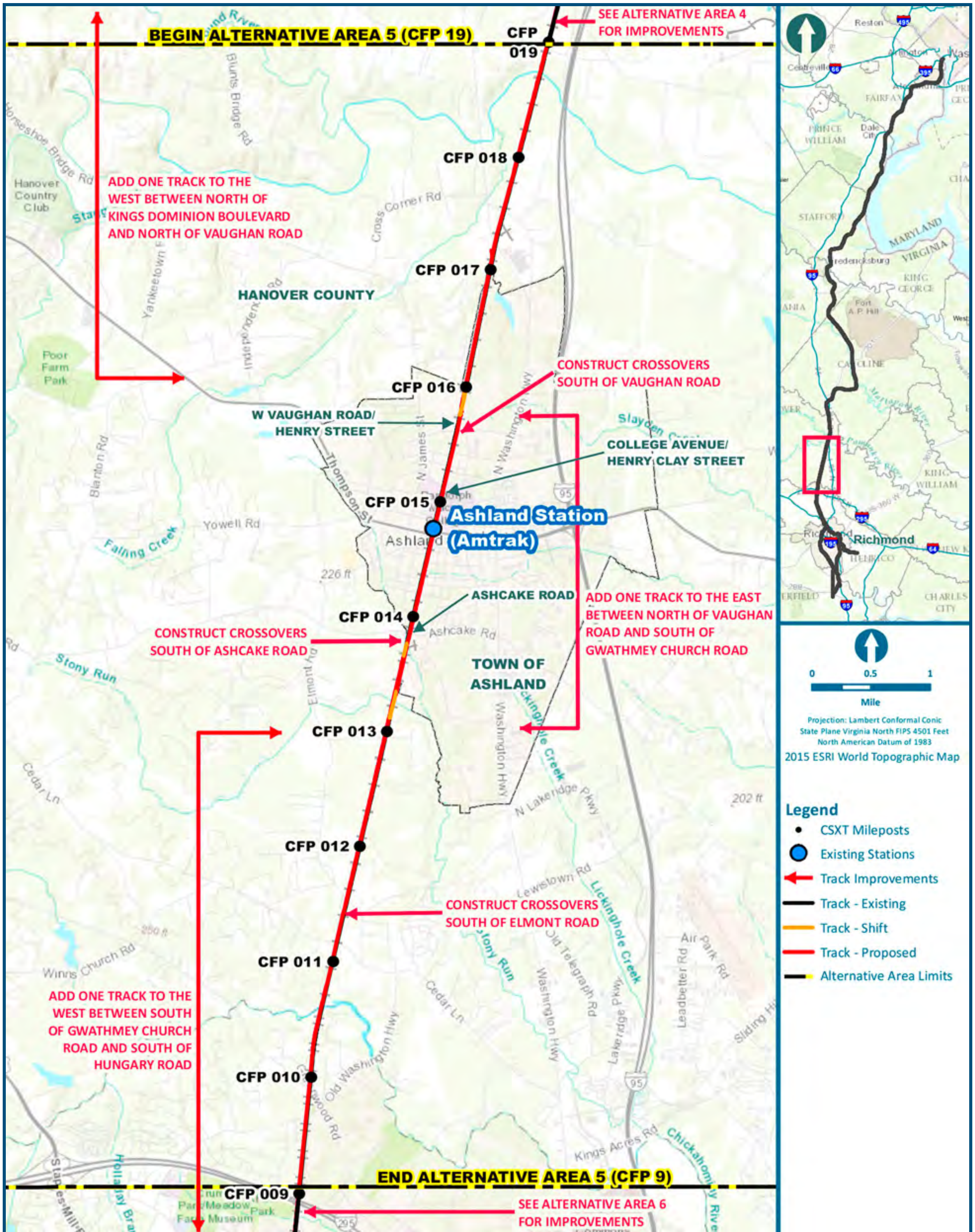


Figure 2.5-14: Build Alternative 5B – Add One Track Through Town East of Existing

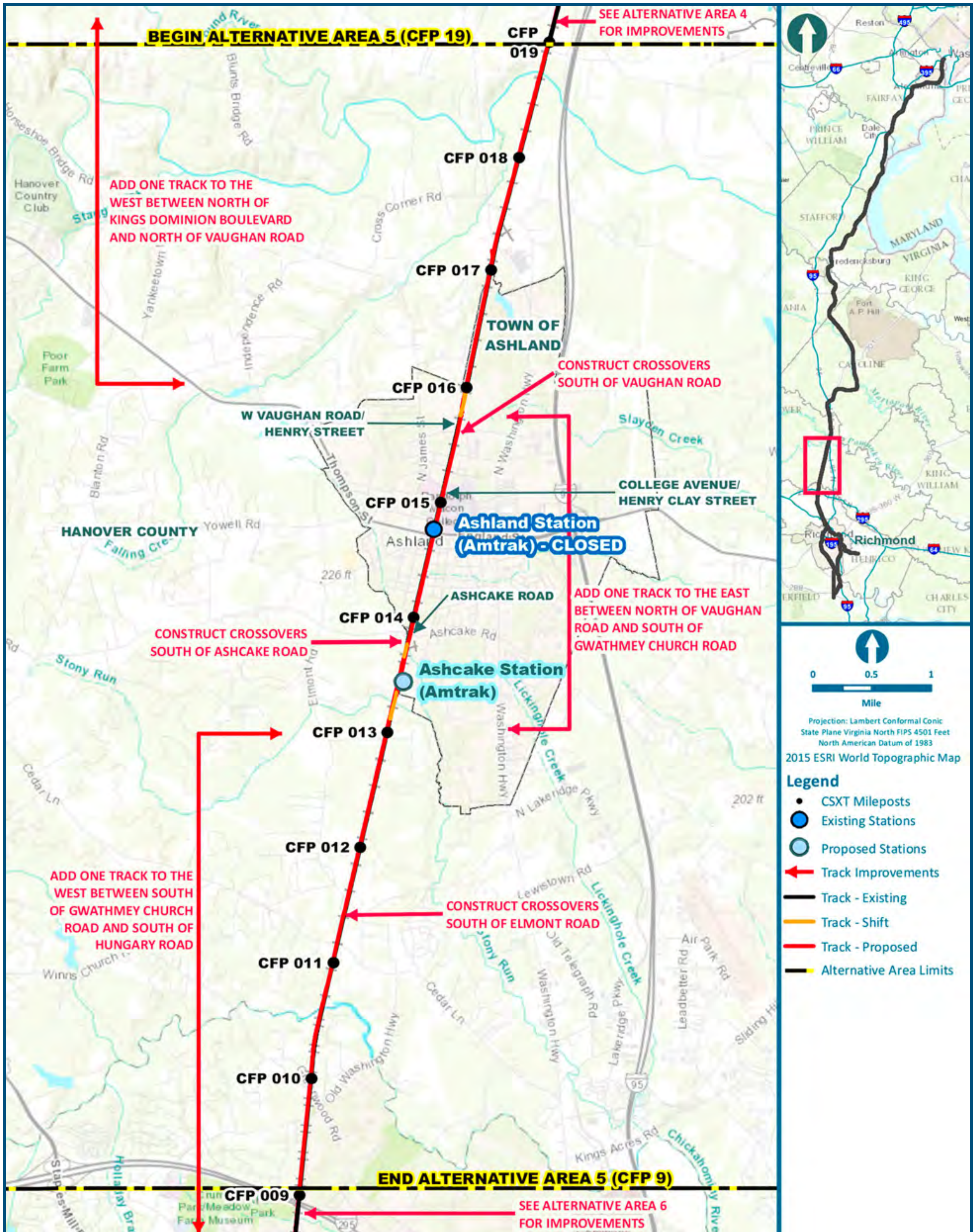


Figure 2.5-15: Build Alternative 5B–Ashcake – Add One Track Through Town East of Existing (Relocate Station to Ashcake)

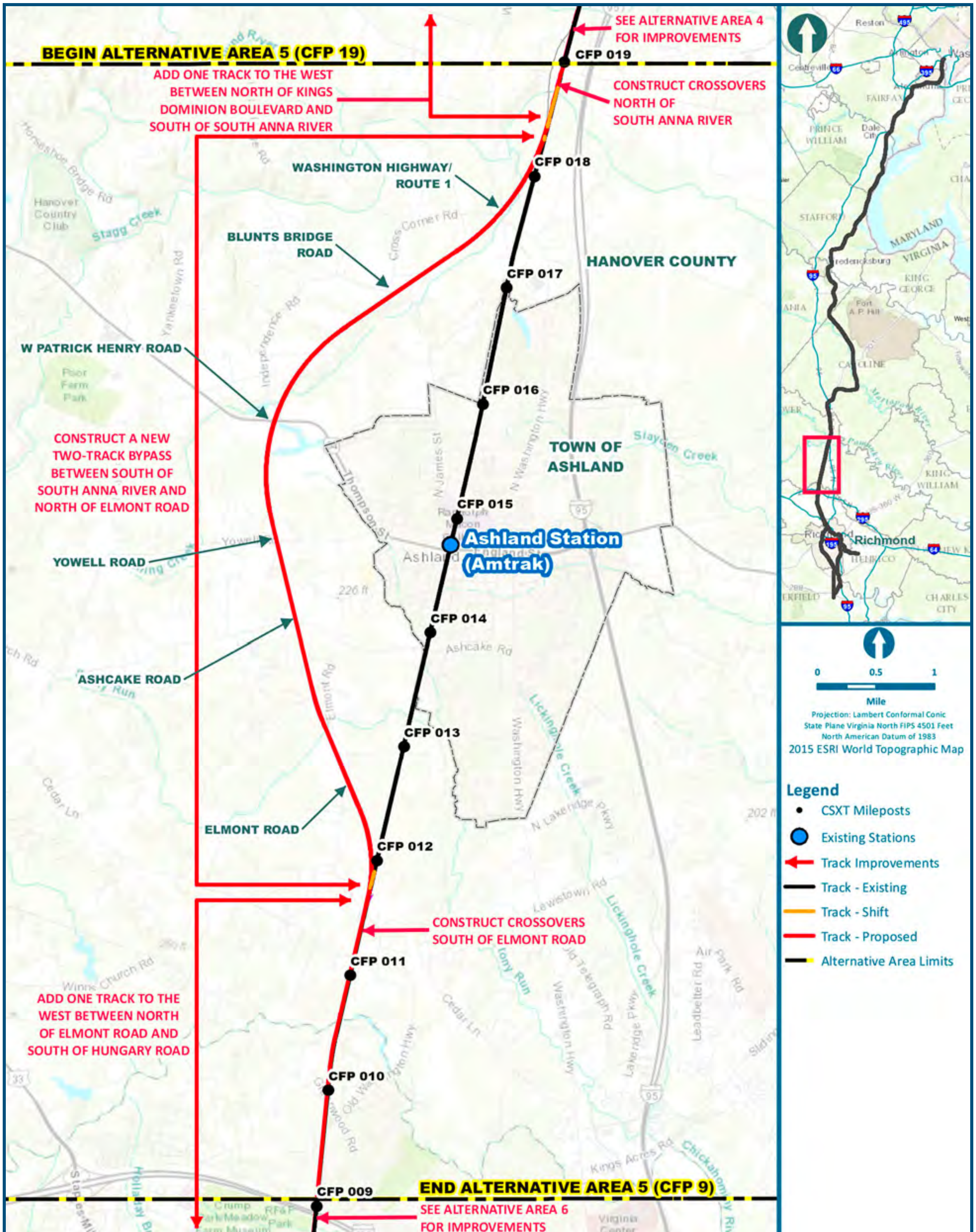


Figure 2.5-16: Build Alternative 5C – Add Two-Track West Bypass

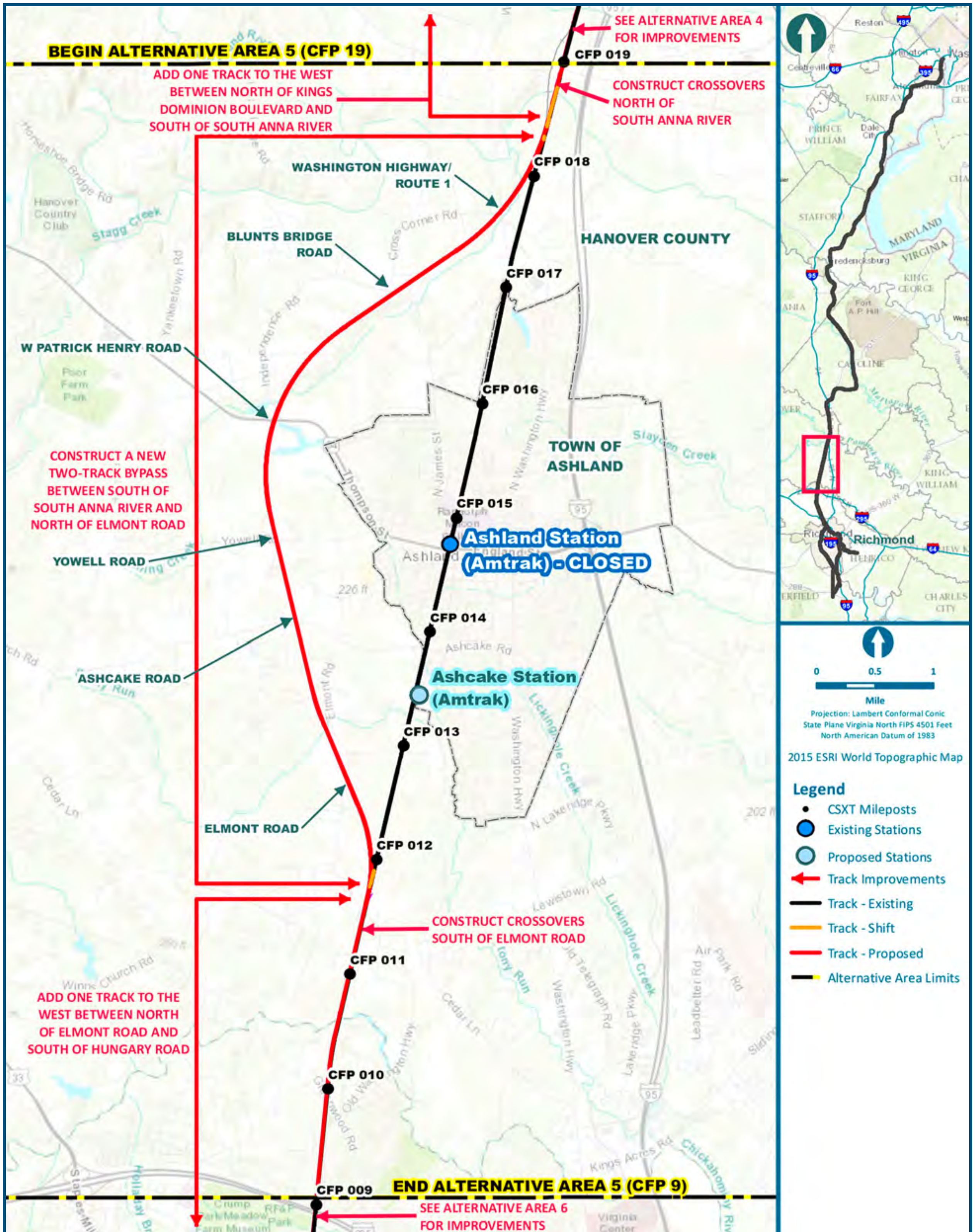


Figure 2.5-17: Build Alternative 5C–Ashcake – Add Two-Track West Bypass (Relocate Station to Ashcake)

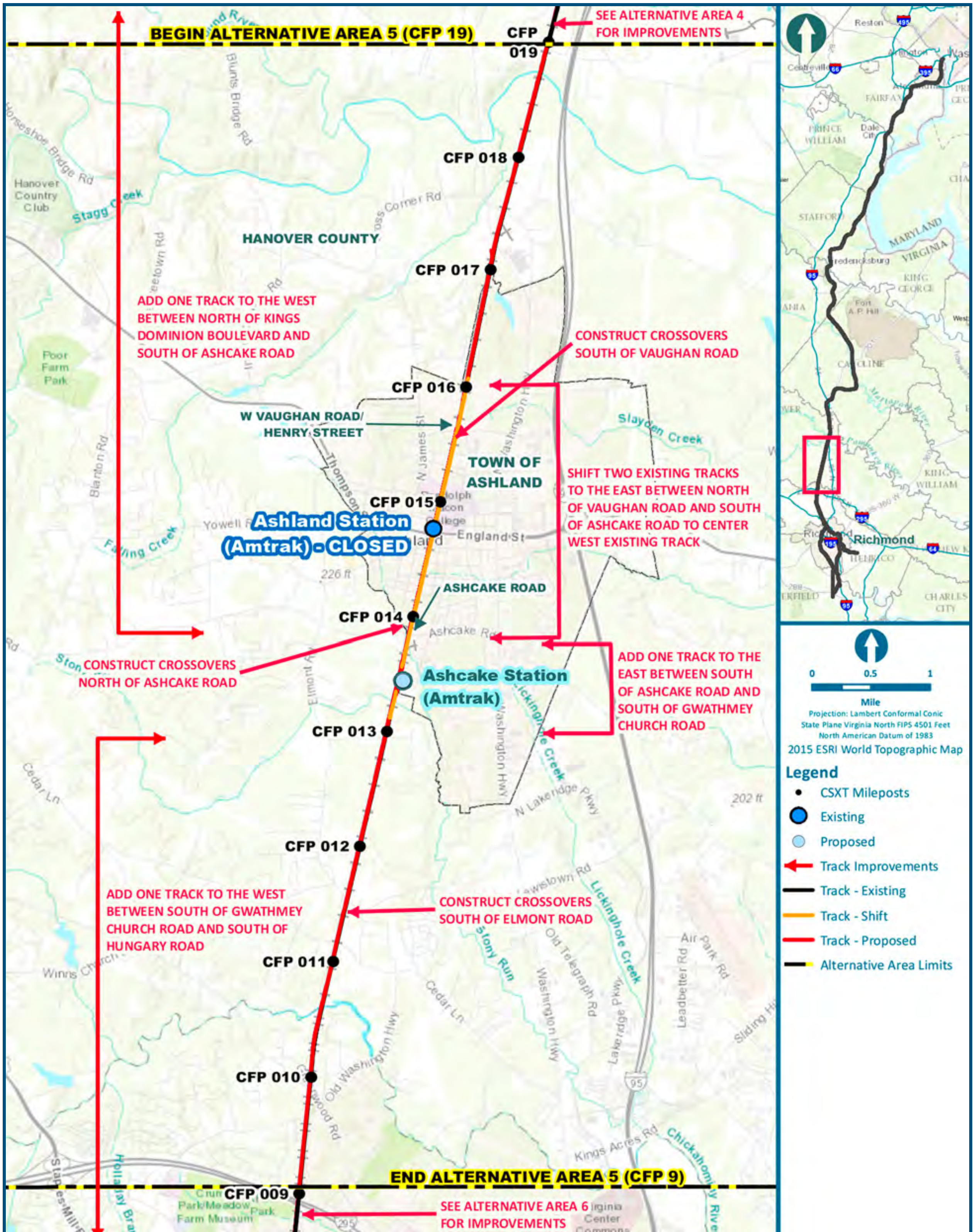


Figure 2.5-18: Build Alternative 5D – Three Tracks Centered Through Town (Add Single Track, Relocate Station to Ashcake)

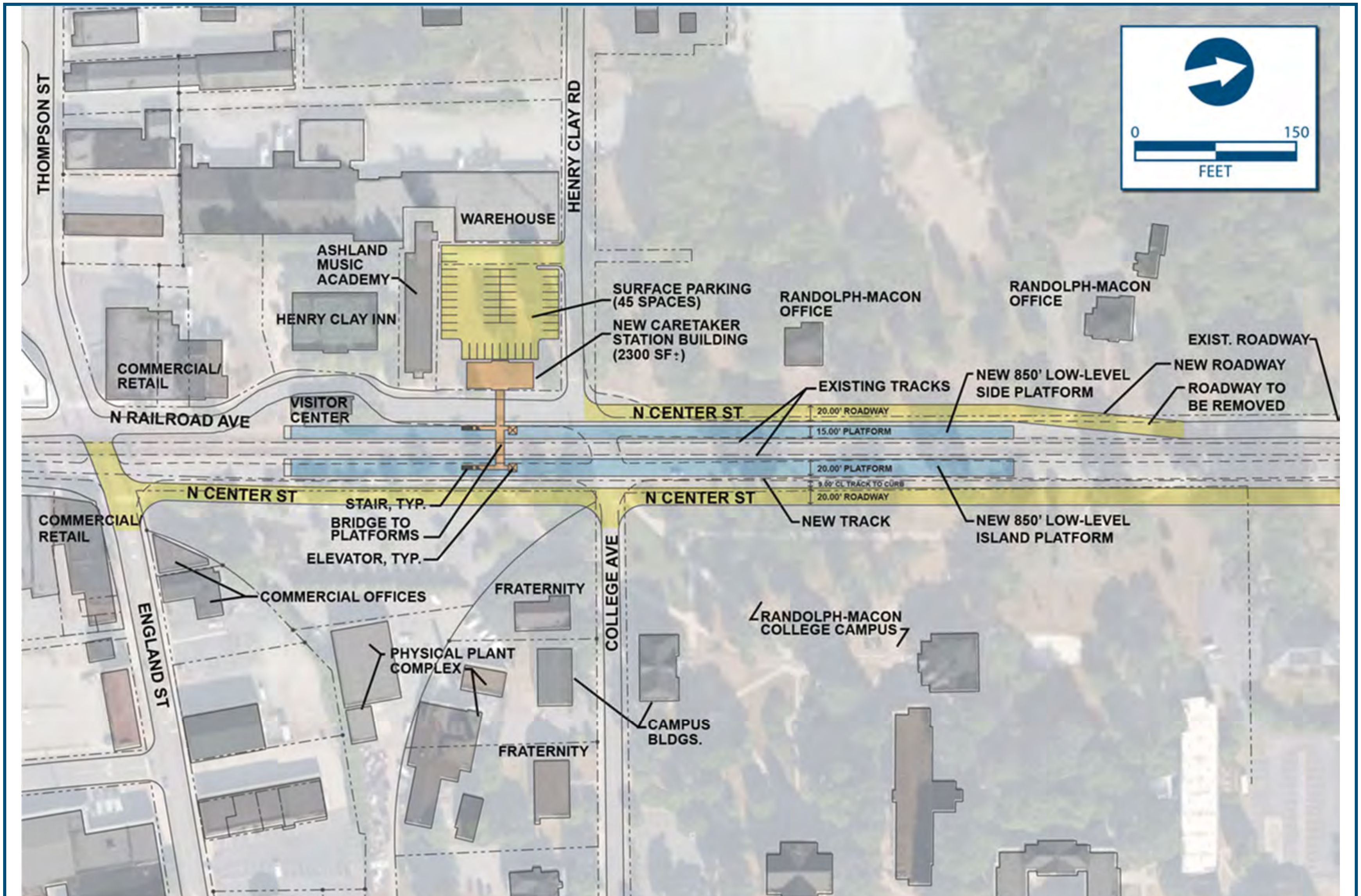


Figure 2.5-19A: Ashland Station Improvements for Build Alternative 5B (Three-Track/850-Foot Platforms)

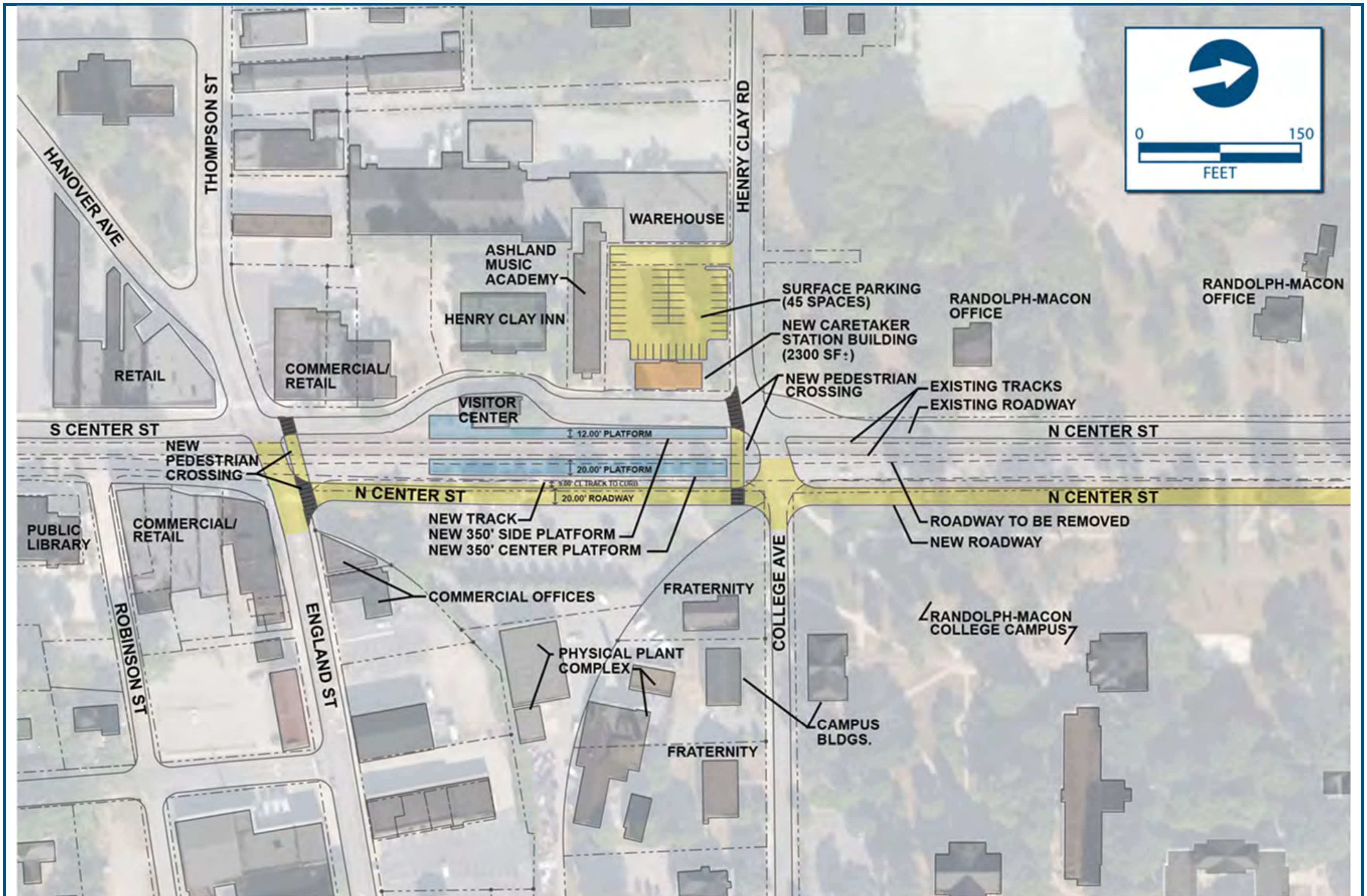


Figure 2.5-19B: Ashland Station Improvements for Build Alternative 5B (Three-Track/350-Foot Platforms)

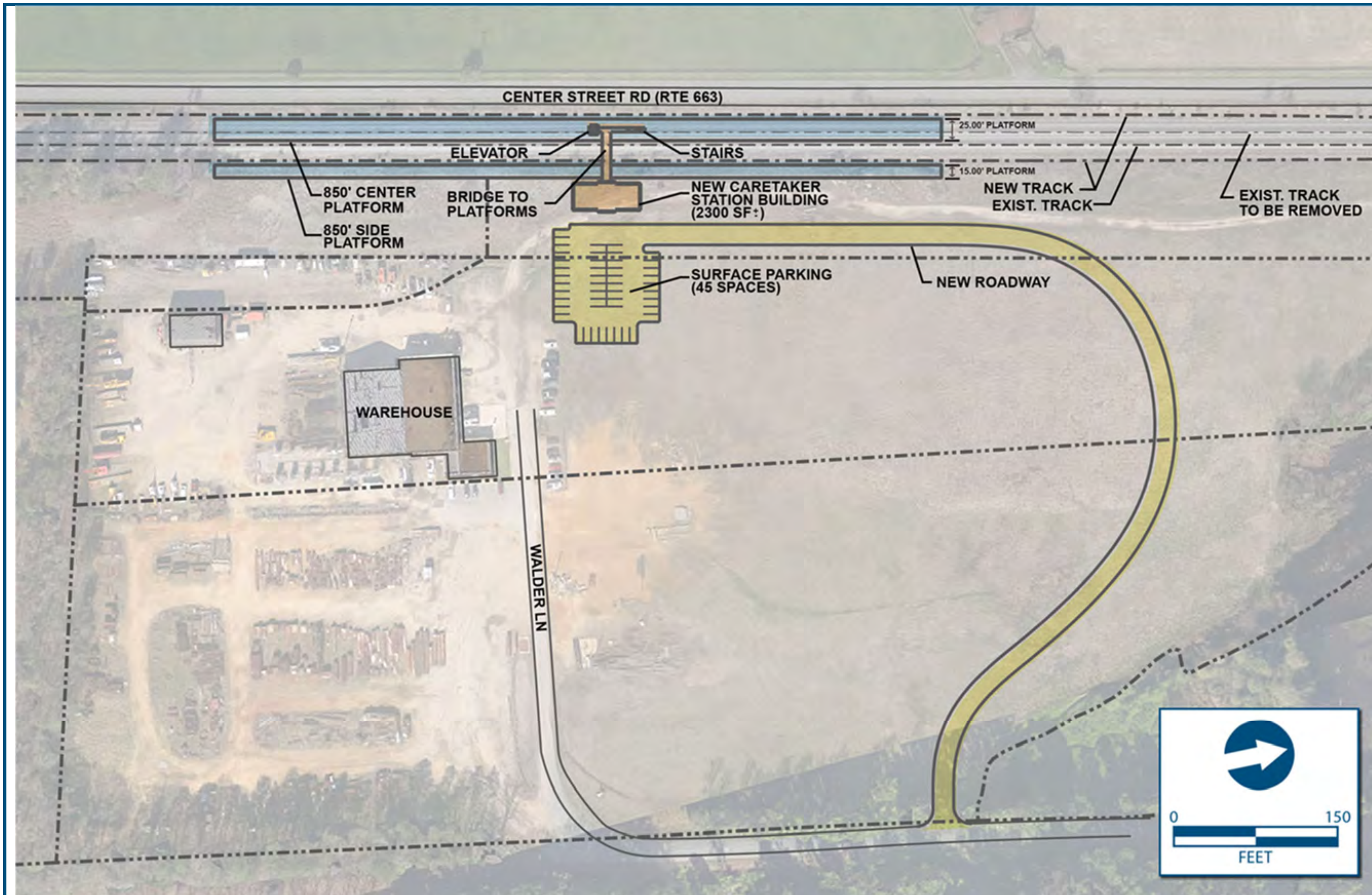


Figure 2.5-20: Ashcake Station Improvements for Build Alternatives 5A–Ashcake, 5B–Ashcake, 5C–Ashcake, and 5D–Ashcake

2.5.2.6 Area 6: Richmond (I-295 to Centralia) Build Alternatives

The Richmond area (CFP 9 to A11) encompasses the area from I-295 through Richmond to Centralia. In Richmond, the A-Line and S-Line railroads diverge at the south end of Acca Yard forming two routes through the city. The westward of the two routes is the A-Line, which arcs around Richmond as the double-track North End Subdivision, CSXT's principal freight route between Richmond and points south toward North Carolina. The eastward of the two routes is the S-Line, which passes through the center of Richmond as the Bellwood Subdivision, used primarily by local freights to serve industries and Amtrak service to Newport News. The A-Line and the S-Line reconnect at Centralia, approximately 14 miles south of the south Acca Yard wye.

DRPT developed alternatives for the Richmond area based on passenger train routes and potential station locations, with the majority of potential improvements largely within existing railroad right-of-way. Alternatives vary on whether they use the A-Line or S-Line, based primarily on the ability to service both passenger train and freight service routes and potential station locations. DRPT identified eight Build Alternatives, to include four single station alternatives that would consolidate service to one station, and three potential two-station alternatives that offer combinations of services and rail lines using the existing Main Street Station and Staples Mill Road Station.

Each Build Alternative is described further below in Table 2.5-12 and shown in Figure 2.5-21 through Figure 2.5-38, which include maps of the Build Alternative rail alignments as well as station build improvements.

Table 2.5-12 includes descriptions of which passenger train types serve which stations for each Build Alternative. For the single station alternatives, all alternatives provide Interstate Corridor (SEHSR and Carolinian), Northeast Regional (SEHSR and Virginia), and Amtrak Long Distance service to one station. Service to the two-station alternatives vary by Build Alternative; however, all alternatives do provide Northeast Regional (SEHSR) and Interstate Corridor (SEHSR) service to at least one station; which station, as well as Long Distance (Amtrak), Interstate Corridor (Carolinian), and Northeast Regional (Virginia) service, varies by Build Alternative. The Auto Train (Amtrak) does not stop in Richmond.

For reference, passenger trains serve Richmond in existing and No Build conditions as follows:

- Northeast Regional (Virginia) trains currently terminating at Richmond terminate at the Staples Mill Road Station; however, under No Build conditions, those trains are extended to Norfolk.
- Northeast Regional (Virginia) trains terminating at Newport News stop at Staples Mill Road Station, are routed on the S-Line to the east side of Main Street Station where they stop, and then continue on the Peninsula Subdivision.

There are no changes to CSXT freight service routes on the A-Line or S-Line as a result of proposed changes to passenger train routes through Richmond as part of the DC2RVA Project.

Detailed graphics illustrating the specific improvements are in Appendix H.

Table 2.5-12: Area 6: Richmond Build Alternatives

Build Alternative	Proposed Improvements
6A: Staples Mill Road Station Only ***Rail Alignment: Figure 2.5-21*** ***Station: Figure 2.5-24*** This alternative includes infrastructure and station improvements associated with service consolidated to Staples Mill Road Station. Main Street Station would be closed to passenger rail service. One main track would be added along portions of RF&P (north of Richmond) and A-Line (through Richmond), with track shifts to improve speed. Freight and passenger rail service operating together on the A-Line, CSXT's principal freight corridor, would increase rail congestion/delay. *Passenger Service*: Interstate Corridor (SEHSR and Carolinian), Northeast Regional (SEHSR and Virginia) service to Norfolk, and Long Distance (Amtrak) passenger trains moving north-south through Richmond would be routed through Staples Mill Road Station to Centralia using the A-Line. One Northeast Regional (SEHSR) round trip would terminate at Staples Mill Road Station. Northeast Regional (SEHSR and Virginia) service to Newport News would continue from Staples Mill Road Station past Main Street Station (closed) on the S-Line, then on the Peninsula Subdivision.	Track ▪ Add a third main line track on the A-Line from Meadows (A 1.0) (south of the James River) to Centralia (A 10.7). The added track is on the east side of the existing track north of the Clopton Lead (A 5.5) and transitions to the west side south of Clopton to the junction with the S-Line at Centralia (A 10.7). ▪ Shift tracks on the A-Line east to improve speed between MP 1.2 and 1.4. ▪ Add a third main track from Greendale (CFP 4.8) to Staples Mill Road Station (CFP 4.6). ▪ Improve the existing two main tracks from Acca Yard (CFP 1.7) to AM Junction (CA 85.5). ▪ Add a second main track on the existing elevated rail structure on the east side of Main Street Station (SRN 0.0) from AM Junction (CA 85.5) to Rivanna Junction (CA 84.5). ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Stations ▪ Staples Mill Road Station (CFP 4.6) - Modify existing platforms to one low-level island boarding platform and one level island platform. - Construct a pedestrian bridge with an elevator and stairs to access the platforms. - Replace the existing station building with a two-story building. - Construct surface parking for approximately 340 spaces and parking garage for approximately 300 spaces to replace the existing surface parking lot. ▪ Close Main Street Station to intercity passenger rail service. Structures ▪ Replace deficient road overpasses with new structures providing sufficient vertical and horizontal clearance for the new track including: - Midlothian Turnpike (A 1.55) - State Route 288 (A 10.35)
6B–A-Line: Boulevard Station Only, A-Line ***Rail Alignment: Figure 2.5-22*** ***Station: Figure 2.5-25*** This alternative includes infrastructure and station improvements associated with service consolidated to a new station at Boulevard, which would include an elevated loop track. Staples Mill Road Station and Main Street Station would be closed to passenger rail service. One main track would be added along portions of existing RF&P (north of Richmond) and A-Line (through Richmond), with track shifts to improve speed. Freight and passenger rail service operating together on the A-Line, CSXT's principal freight corridor, would increase rail congestion/delay.	Track ▪ Add a third main line track from Greendale (CFP 4.8) to former Staples Mill Road Station (CFP 4.6) and add a fifth main line track from Staples Mill Road Station (CFP 4.6) to north Acca Yard (CFP 3.4). ▪ Add a two-track bypass on the east side of Acca Yard (CFP 1.7). ▪ Add a third main track from Acca Yard (CFP 1.7) to the proposed Boulevard Station. ▪ Add a second main track on the existing elevated rail structure on the east side of Main Street Station (SRN 0.0) from AM Junction (CA 85.5) to Rivanna Junction (CA 84.5). ▪ Add a third main line track on the A-Line from Meadows (A 1.0) (south of the James River) to Centralia (A10.7). The added track is on the east side of the existing track north of the Clopton Lead (A 5.5) and transitions to the west side south of Clopton to the junction with the S-Line at Centralia (A 10.7).

▶ Continued.

Table 2.5-12: Area 6: Richmond Build Alternatives

Build Alternative	Proposed Improvements
Passenger Service: Interstate Corridor (SEHSR and Carolinian), Northeast Regional (SEHSR and Virginia) service to Norfolk, and Long Distance (Amtrak) passenger trains moving north-south through Richmond would be routed through a new Boulevard Station and then to Centralia using the A-Line. One Northeast Regional (SEHSR) round trip would terminate at the new Boulevard Station. Northeast Regional (SEHSR and Virginia) passenger service to Newport News would continue from the new Boulevard Station past Main Street Station (closed) on the S-Line, then on the Peninsula Subdivision.	▪ Shift tracks on the A-Line east to improve speed between MP 1.2 and 1.4. ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Stations ▪ Boulevard Station - Construct a new two-story station building adjacent to the main line tracks. - Construct one low-level island boarding platform and one level island platform; both 1,200 feet in length. - Construct a pedestrian bridge with an elevator and stairs to access the platforms. - Construct surface parking for approximately 30 spaces and parking garage for approximately 600 spaces adjacent to the new station building. ▪ Close Main Street Station and Staples Mill Road Station to intercity passenger rail service. Structures ▪ Replace deficient road overpasses with new structures providing sufficient vertical and horizontal clearance for the new track including: - Dumbarton Road (CFP 3.71) - North Boulevard (SRN 3.90) - Midlothian Turnpike (A 1.55) - State Route 288 (A 10.35)
6B–S-Line: Boulevard Station Only, S-Line ***Rail Alignment: Figure 2.5-23*** ***Station: Figure 2.5-25*** This alternative includes infrastructure and station improvements associated with service consolidated to a new station at Boulevard Road. Staples Mill Road Station and Main Street Station would be closed to passenger rail service. One main track would be added along portions of existing RF&P (north of Richmond) and S-Line (through Richmond), with track shifts to improve speed. Locating all passenger train service (except Auto Train, which does not stop in Richmond) to S-Line, separate from CSXT's principal freight corridor through Richmond (i.e., the A-Line), would reduce rail congestion/delay. *Passenger Service*: All Interstate Corridor (SEHSR and Carolinian), Northeast Regional (SEHSR and Virginia) to Norfolk, and Long Distance (Amtrak) passenger trains moving north-south through Richmond would be routed through a new Boulevard Station and then to Centralia using the S-Line. One Northeast Regional (SEHSR) round trip would terminate at the new Boulevard Station.	Track ▪ Add a third main line track from Greendale (CFP 4.8) to former Staples Mill Road Station (CFP 4.6) and add a fifth main line track from Staples Mill Road Station (CFP 4.6) to north Acca Yard (CFP 3.4). ▪ Add a two-track bypass on the east side of Acca Yard (CFP 1.7). ▪ Add a third main track from Acca Yard (CFP 1.7) to AM Junction (CA 85.5). ▪ Add a new wye track near Hospital Street (SRN 1.23) to turn passenger trains. ▪ Add a new passenger layover/servicing facility near Brown Street Yard (SRN 0.4) with three tracks. ▪ Add a second main track on the existing elevated rail structure on both the east and west side of Main Street Station (SRN 0.0) from AM Junction (CA 85.5) to Rivanna Junction (CA 84.5) with the west track extending from AM Junction (CA 85.5) to the Triple Rail Crossing. ▪ Add a second main track on the S-Line from the Triple Rail Crossing to Centralia (S 10.9) where only a single track currently exists. ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities.

▶ Continued.

Table 2.5-12: Area 6: Richmond Build Alternatives

Build Alternative	Proposed Improvements
Northeast Regional (SEHSR and Virginia) passenger service to Newport News would continue from the new Boulevard Station past Main Street Station (closed) on the S-Line, then on the Peninsula Subdivision.	Stations ▪ Boulevard Station - Construct a new two-story station building adjacent to the main line tracks. - Construct one low-level island boarding platform and one level island platform; both 1,200 feet in length. - Construct a pedestrian bridge with an elevator and stairs to access the platforms. - Construct surface parking for approximately 30 spaces and parking garage for approximately 600 spaces adjacent to the new station building. ▪ Close Main Street Station and Staples Mill Road Station to intercity passenger rail service. Structures ▪ Replace deficient road overpasses with new structures providing sufficient vertical and horizontal clearance for the new track including: - Dumbarton Road (CFP 3.71) - North Boulevard (SRN 3.90) - Elliham Avenue (S 7.83) ▪ Plan for construction of a new rail bridge on the S-Line across the James River from the Triple Rail Crossing (includes construction of one track on bridge plus space for a second track).
6C: Broad Street Station Only ***Rail Alignment: Figure 2.5-26*** ***Station: Figure 2.5-28*** This alternative includes infrastructure and station improvements associated with service consolidated to a new Broad Street Station, which includes an at-grade loop track. Staples Mill Road Station and Main Street Station would be closed to passenger rail service. One main track would be added along portions of existing RF&P (north Richmond) and A-Line (through Richmond), with track shifts to improve speed. Freight and passenger rail service operating together on the A-Line, CSXT's principal freight corridor, would increase rail congestion/delay. *Passenger Service*: Interstate Corridor (SEHSR and Carolinian), Northeast Regional (SEHSR and Virginia) to Norfolk, and Long Distance (Amtrak) 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. One Northeast Regional (SEHSR) round trip would terminate at Broad Street. Northeast Regional (SEHSR and Virginia) passenger service to Newport News would continue from the new Broad Street Station loop track past Main Street Station (closed) on the S-Line, then on the Peninsula Subdivision.	Track ▪ Add a third main line track from Greendale (CFP 4.8) to Staples Mill Road Station (CFP 4.6). ▪ Add a loop track, similar to the historic loop track that once served the Broad Street 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. ▪ Add a second main track on the existing elevated rail structure on the east side of Main Street Station (SRN 0.0) from AM Junction (CA 85.5) to Rivanna Junction (CA 84.5). ▪ Add a third main line track on the A-Line from Meadows (A 1.0) (south of the James River) to Centralia (A 10.7). The added track is on the east side of the existing track north of the Clopton Lead (A 5.5) and transitions to the west side south of Clopton to the junction with the S-Line at Centralia (A 10.7). ▪ Shift tracks on the A-Line east to improve speed between MP 1.2 and 1.4. ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Stations ▪ Broad Street Station - Construct a new two-story station building adjacent to the old Broad Street Station building (now the Virginia Science Museum). - Construct two level island platforms 1,000 feet in length. - Construct a pedestrian bridge with an elevator and stairs to access the platforms.

▶ Continued.

Table 2.5-12: Area 6: Richmond Build Alternatives

Build Alternative	Proposed Improvements
	- Construct surface parking for approximately 300 spaces and parking garage for approximately 300 spaces adjacent to the new station building. ▪ Close Main Street Station and Staples Mill Road Station to intercity passenger rail service. Structures ▪ Replace deficient road overpasses with new structures providing sufficient vertical and horizontal clearance for the new track including: - Midlothian Turnpike (A 1.55) - State Route 288 (A 10.37)
6D: Main Street Station Only ***Rail Alignment: Figure 2.5-27*** ***Station: Figure 2.5-29*** This alternative includes infrastructure and station improvements associated with service consolidated to Main Street Station. Staples Mill Road Station would be closed. One main track would be added along portions of existing RF&P (north of Richmond) and S-Line (through Richmond), with track shifts to improve speed. Locating all passenger train service (except Auto Train, which does not stop in Richmond) to S-Line, separate from CSXT's principal freight corridor through Richmond (i.e., the A-Line), would reduce rail congestion/delay. *Passenger Service*: All Interstate Corridor (SEHSR and Carolinian), Northeast Regional (SEHSR and Virginia) to Norfolk, and Long Distance (Amtrak) 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. One Northeast Regional (SEHSR) round trip would terminate at Main Street Station. Northeast Regional (SEHSR and Virginia) passenger service to Newport News would be routed to the east side of Main Street Station and then on the Peninsula Subdivision.	Track ▪ Add a third main line track from Greendale (CFP 4.8) to former Staples Mill Road Station (CFP 4.6) and add a fifth main line track from Staples Mill Road Station (CFP 4.6) to north Acca Yard (CFP 3.4). ▪ Add a two-track bypass on the east side of Acca Yard (CFP 1.7). ▪ Add a third main track from Acca Yard (CFP 1.7) to AM Junction (CA 85.5). ▪ Add a new wye track near Hospital Street (SRN 1.23) to turn passenger trains. ▪ Add a new passenger layover/servicing facility near Brown Street Yard (SRN 0.4) with three tracks. ▪ Add a second main track on the existing elevated rail structure on both the east and west side of Main Street Station (SRN 0.0) from AM Junction (CA 85.5) to Rivanna Junction (CA 84.5) with the west track extending from AM Junction (CA 85.5) to the Triple Rail Crossing. ▪ Add a second main track on the S-Line from the James River to Centralia (S 10.9) where only a single track currently exists. ▪ Add a new 12,000-foot staging track extending south from the South Yard (S 1.7). ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Stations ▪ Main Street Station (SRN 0.0) ▪ Construct new station facilities (approximately 6,800 square feet) within the existing station building and renovated train shed. ▪ Construct two low-level boarding platforms (850 feet in length) east of the existing station and two low-level boarding platforms (1,200 feet in length) west of the existing station. ▪ Construct surface parking and two parking garages for approximately 600 spaces east of the existing station building. ▪ Close Staples Mill Road Station to intercity passenger rail service. Structures ▪ Replace deficient road overpasses with new structures providing sufficient vertical and horizontal clearance for the new track including: - Dumbarton Road (CFP 3.71) - Elliham Avenue (CFP 7.83) ▪ Plan for construction of a new rail bridge on the S-Line across the James River from the Triple Rail Crossing (includes construction of one track on bridge plus space for a second track).

▶ Continued.

Table 2.5-12: Area 6: Richmond Build Alternatives

Build Alternative	Proposed Improvements
6E: Split Service, Staples Mill Road/Main Street Stations ***Rail Alignment: Figure 2.5-30*** ***Stations: Figure 2.5-31 and Figure 2.4-32*** This alternative includes infrastructure improvements associated with station and service improvements at both Main Street Station and Staples Mill Road Station-Split Service; both stations would remain operational. One main track would be added along portions of existing RF&P (north of Richmond) and A-Line (through Richmond), with track shifts to improve speed. Freight and passenger rail service operating together on the A-Line, CSXT's principal freight corridor, would increase rail congestion/delay. *Passenger Service*: As described further below, all passenger trains that stop in Richmond serve Staples Mill Road Station; trains to and from Newport News additionally serve Main Street Station. Interstate Corridor (SEHSR and Carolinian), Northeast Regional (SEHSR and Virginia) to Norfolk, and Long Distance (Amtrak) 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. One Northeast Regional (SEHSR) round trip would terminate at Main Street Station. Northeast Regional (SEHSR and Virginia) passenger service to Newport News would continue from Staples Mill Road station to the east side of Main Street Station on the S-Line, then continue on the Peninsula Subdivision.	Track ▪ Add a third main track from Greendale (CFP 4.8) to Acca Yard (CFP 1.7). ▪ Improve the two main line tracks from Acca Yard (CFP 1.7) to AM Junction (CA 85.5). ▪ Add a new wye near Hospital Street (SRN 1.23) to turn passenger trains. ▪ Add a new passenger layover/servicing facility near Brown Street Yard (SRN 0.4) with three tracks. ▪ Add a second main track on the existing elevated rail structure on the east side of Main Street Station (SRN 0.0) from AM Junction (CA 85.5) to Rivanna Junction (CA 84.5). ▪ Add a third main line track on the A-Line from Meadows (A 1.0) (south of the James River) to Centralia (A 10.7). The added track is on the east side of the existing track north of the Clopton Lead (A 5.5) and transitions to the west side south of Clopton to the junction with the S-Line at Centralia (A 10.7). ▪ Shift tracks on the A-Line east to improve speed between MP 1.2 and 1.4. ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Stations ▪ Staples Mill Road Station (CFP 4.6) - Construct new platforms, to include one low-level island boarding platform east of all new tracks and one level island platform between the new tracks. - Construct a pedestrian bridge with an elevator and stairs to access the platforms. - Replace the existing station building with an approximately 10,400 square foot two-story building. - Construct surface parking for approximately 300 spaces and parking garage for approximately 300 spaces to replace the existing surface parking lot. ▪ Main Street Station (SRN 0.0) - Construct station facilities within the approximately 6,800 square foot existing station building and renovated train shed. - Construct two low-level island boarding platform (850 feet in length) east of the existing station. - Construct surface parking for approximately 80 spaces east of the existing station building. Structures ▪ Replace deficient road overpasses with new structures providing sufficient vertical and horizontal clearance for the new track including: - Midlothian Turnpike (A 1.55) - State Route 288 (A 10.35)

▶ Continued.

Table 2.5-12: Area 6: Richmond Build Alternatives

Build Alternative	Proposed Improvements
6F: Full Service, Staples Mill Road/Main Street Stations ***Rail Alignment: Figure 2.5-33*** ***Stations: Figure 2.5-34 and Figure 2.4-35*** This alternative includes infrastructure improvements associated with station and service improvements at Main Street Station and Staples Mill Road Station-Full Service; both stations would remain operational. One main track would be added along portions of existing RF&P (north of Richmond) and S-Line (through Richmond), with track shifts to improve speed. Locating all passenger train service (except Auto Train, which does not stop in Richmond) to S-Line, separate from CSXT's principal freight corridor through Richmond (i.e., the A-Line), would reduce rail congestion/delay. *Passenger Service*: As described further below, all passenger trains that stop in Richmond serve both stations. Interstate Corridor (SEHSR and Carolinian), Northeast Regional (SEHSR and Virginia) to Norfolk, and Long Distance (Amtrak) 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. One Northeast Regional (SEHSR) round trip would terminate at Main Street Station. Northeast Regional (SEHSR and Virginia) passenger service to Newport News would continue from the east side of Main Street Station on the Peninsula Subdivision.	Track ▪ Add a third main line track from Greendale (CFP 4.8) to Staples Mill Road Station (CFP 4.6) and add a fifth main line track from Staples Mill Road Station (CFP 4.6) to north Acca Yard (CFP 3.4). ▪ Add a two-track bypass on the east side of Acca Yard (CFP 1.7). ▪ Add a third main track from Acca Yard (CFP 1.7) to AM Junction (CA 85.5). ▪ Add a new wye track near Hospital Street (SRN 1.23) to turn passenger trains. ▪ Add a new passenger layover/servicing facility near Brown Street Yard (SRN 0.4) with three tracks. ▪ Add a second main track on the existing elevated rail structure on both the east and west side of Main Street Station (SRN 0.0), with the east track extending from AM Junction (CA 85.5) to Rivanna Junction (CA 84.5) and the west track extending from AM Junction (CA 85.5) to the Triple Rail Crossing. ▪ Add a second main track on the S-Line from the James River to Centralia (S 10.9) where only a single track currently exists. ▪ Add a new 12,000-foot staging track from the South Yard. ▪ Install 36- to 48-inch culverts, as required, under the rail line. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Stations ▪ Staples Mill Road Station (CFP 4.6) - Remove existing platforms and construct one low-level island boarding platform and one level island platform; both 1,200 feet in length on east side of main tracks - Construct a pedestrian bridge with an elevator and stairs to access the platforms. - Replace the existing station building with an approximately 10,400 square foot two-story building. - Construct surface parking for approximately 400 spaces to replace the existing surface parking lot. ▪ Main Street Station (SRN 0.0) - Construct station facilities within the approximately 6,800 square foot existing station building and renovated train shed. - Construct two low-level boarding platforms (850 feet in length) east of the existing station and two low level platforms (850 feet in length) west of the existing station. Long distance passenger trains would be served by the new 850-foot platforms as there is no baggage service nor are crew changes required at the Main Street Station under this Build Alternative. - Construct parking garage for approximately 300 spaces east of the existing station building. Structures ▪ Replace deficient road overpasses with new structures providing sufficient vertical and horizontal clearance for the new track including: - Dumbarton Road (CFP 3.71) - Elliham Avenue (S 7.83) ▪ Plan for construction of a new rail bridge on the S-Line across the James River (includes construction of one track on bridge plus space for a second track).

▶ Continued.

Table 2.5-12: Area 6: Richmond Build Alternatives

Build Alternative	Proposed Improvements
6G: Shared Service, Staples Mill Road/Main Street Stations ***Rail Alignment: Figure 2.5-36*** ***Stations: Figure 2.5-37 and Figure 2.4-38*** This alternative includes infrastructure improvements associated with station and service improvements at Main Street Station and Staples Mill Road Station-Shared Service; both stations would remain operational. One main track would be added along portions of existing RF&P (north of Richmond) and the S-Line (through Richmond), with track shifts to improve speed; while the A-Line is used for service as part of this alternative, it does not require proposed new track. Freight and passenger rail service operating together on the A-Line, CSXT's principal freight corridor, would increase rail congestion/delay. *Passenger Service*: As described further below, all new proposed SEHSR service (Interstate Corridor and Northeast Regional) serve both stations, while other Amtrak passenger trains that stop in Richmond serve either one or both stations. Interstate Corridor (SEHSR) and Northeast Regional (SEHSR and Virginia) to Norfolk passenger trains moving north-south through Richmond would be routed from Staples Mill Road Station to the west side of Main Street Station and then to Centralia using the S-Line. Interstate Corridor (Carolinian) and Long Distance (Amtrak) 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. One Northeast Regional (SEHSR) round trip would terminate at Main Street Station. Northeast Regional (SEHSR and Virginia) service to Newport News would be routed from Staples Mill Road Station to the east side of Main Street Station on the S-Line, then continue on the Peninsula Subdivision.	Track ▪ Add a third main line track from Greendale (CFP 4.8) to former Staples Mill Road Station (CFP 4.6) and add a fifth main line track from Staples Mill Road Station (CFP 4.6) to north Acca Yard (CFP 3.4). ▪ Add a two-track bypass on the east side of Acca Yard (CFP 1.7). ▪ Add a third main track from Acca Yard (CFP 1.7) to AM Junction (CA 85.5). ▪ Add a new wye track near Hospital Street (SRN 1.23) to turn passenger trains. ▪ Add new passenger layover/servicing facility near Brown Street Yard (SRN 0.4) with three tracks. ▪ Add a second main track on the existing elevated rail structure on both the east and west side of Main Street Station (SRN 0.0) from AM Junction (CA 85.5) to Rivanna Junction (CA 84.5) with the west track extended to the Triple Rail Crossing. ▪ Add a second main track on the S-Line from the James River to Centralia (S 10.9) where only a single track currently exists. ▪ Add a new 12,000-foot staging track extending south from the South Yard. ▪ Install 36- to 48-inch culverts, as required for drainage, under the rail line along the alignment. ▪ Install stormwater management facilities. ▪ Install signal and communication facilities. Stations ▪ Staples Mill Road Station (CFP 4.6) - Remove existing platforms and construct four level island platforms all 1,200 feet in length (two platforms on the east side of the tracks and two platforms on the west side of the tracks). - Construct a pedestrian bridge with an elevator and stairs to access the platforms. - Replace the existing station building with an approximately 10,400 square feet two-story building. - Construct surface parking for approximately 475 spaces to replace the existing surface parking lot. ▪ Main Street Station (SRN 0.0) - Construct station facilities within the approximately 6,800 square foot existing station building and renovated train shed. - Construct two low-level boarding platforms (850 feet in length) east of the existing station and two low-level platforms (850 feet in length) west of the existing station. Long distance passenger trains would be served by the new 850-foot platforms as there is no baggage service nor are crew changes required at the Main Street Station under this Build Alternative. - Construct parking garage for approximately 200 spaces east of the existing station building. Structures ▪ Replace deficient road overpasses with new structures providing sufficient vertical and horizontal clearance for the new track including: - Dumbarton Road (CFP 3.71) - Elliham Avenue (S 7.83) ▪ Add a new rail bridge on the S-Line across the James River (with one track on the bridge)

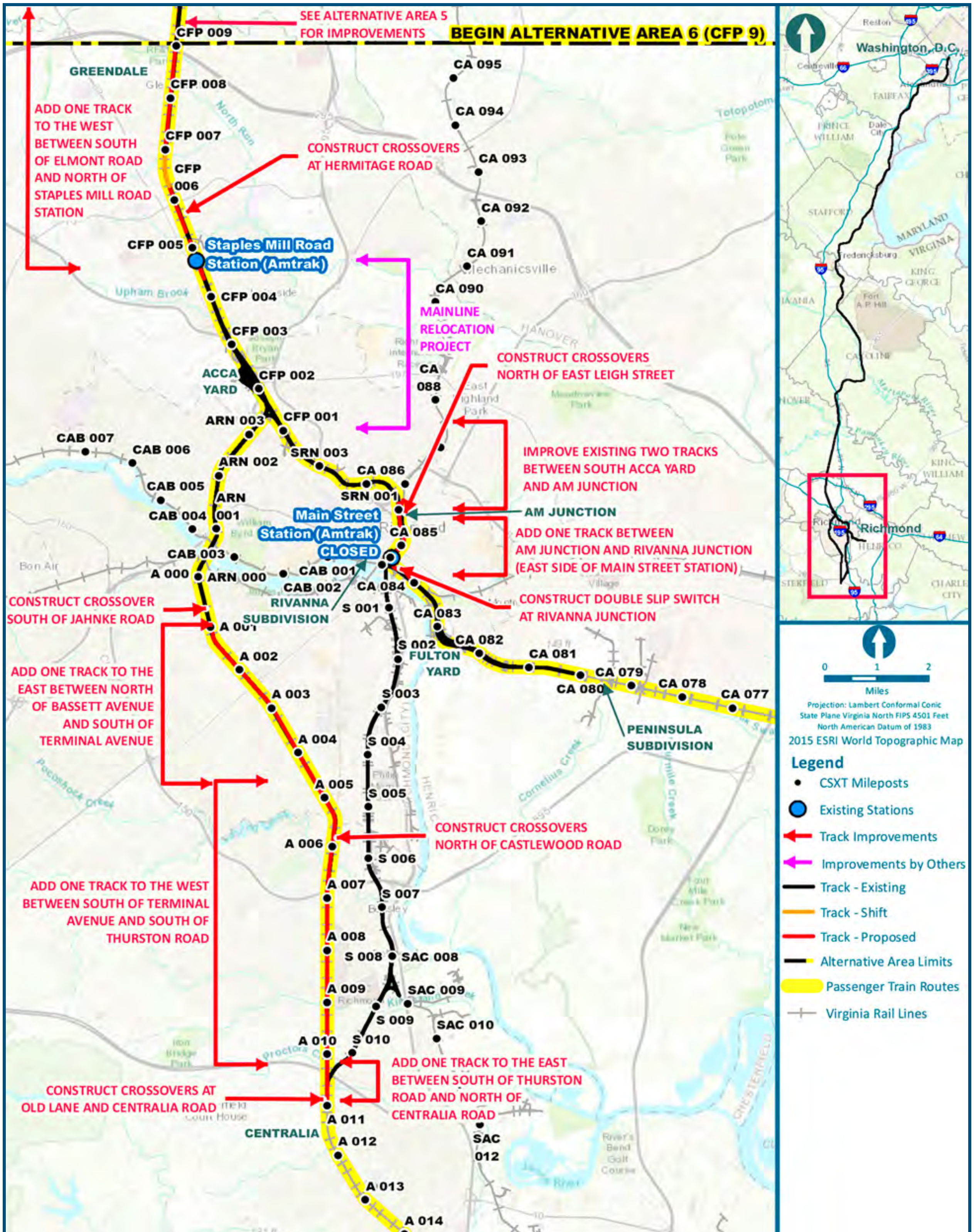


Figure 2.5-21: Build Alternative 6A – Staples Mill Road Station Only

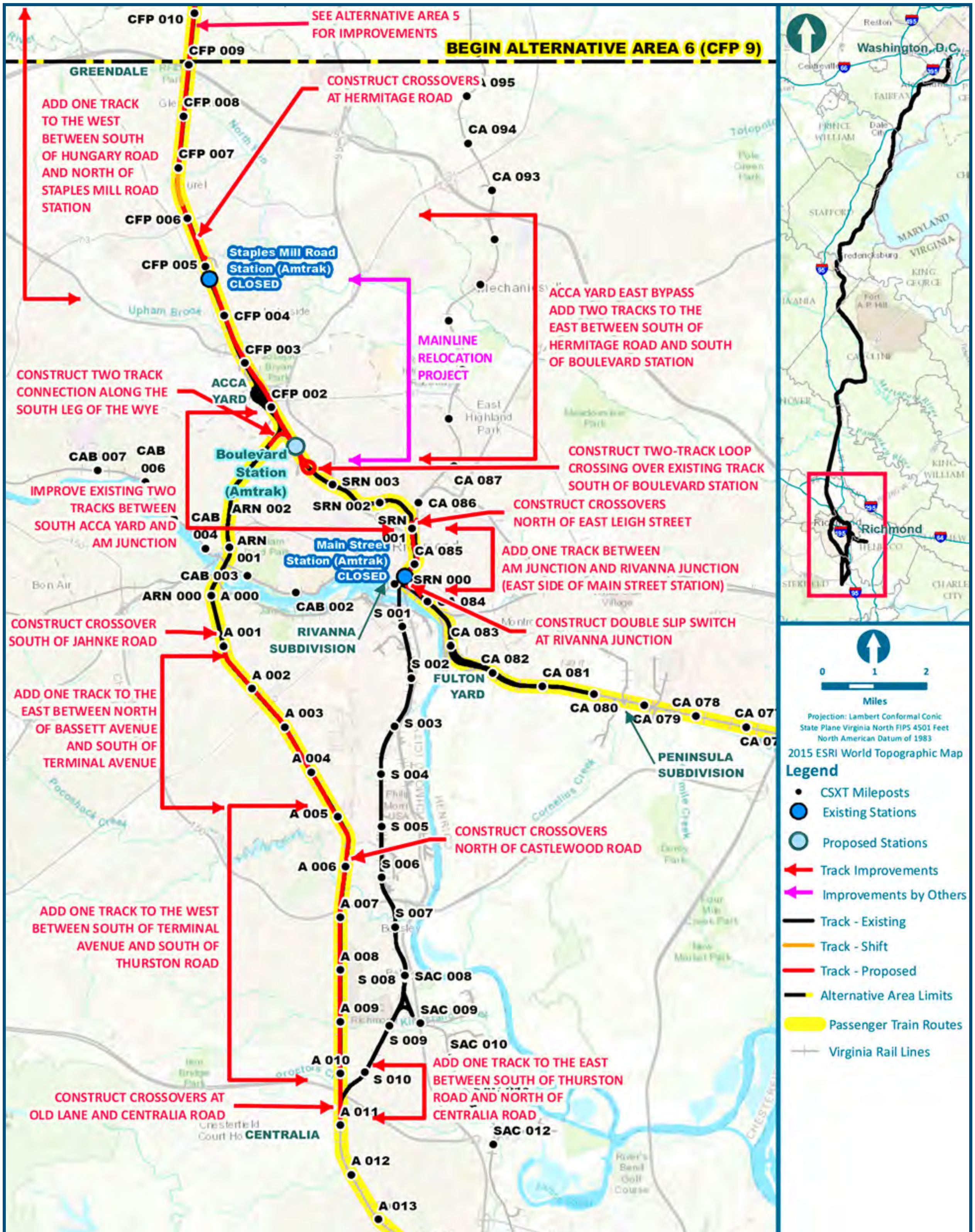


Figure 2.5-22: Build Alternative 6B–A-Line – Boulevard Station Only, A-Line

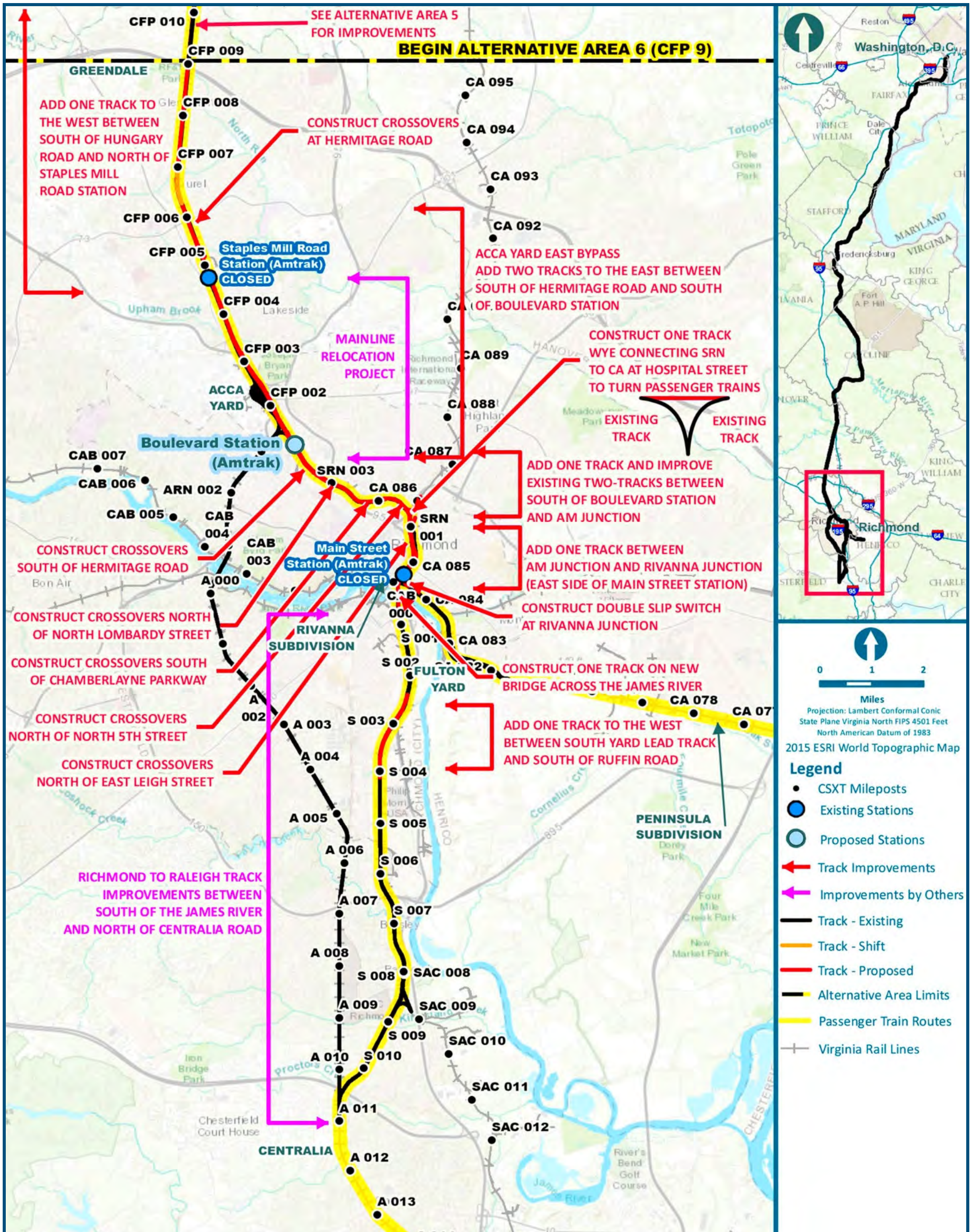


Figure 2.5-23: Build Alternative 6B–S-Line – Boulevard Station Only, S-Line

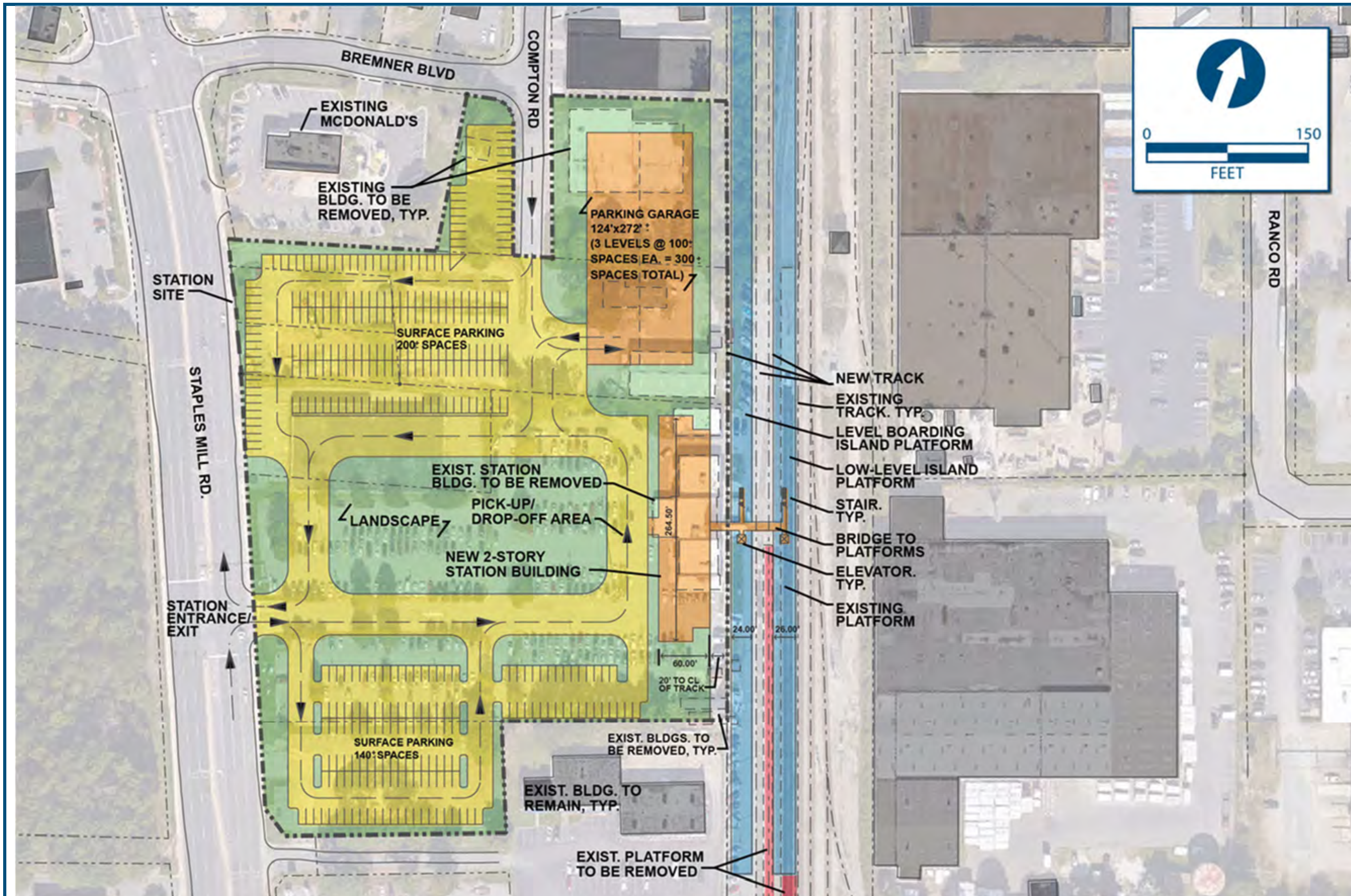


Figure 2.5-24: Staples Mill Road Station Improvements for Build Alternative 6A

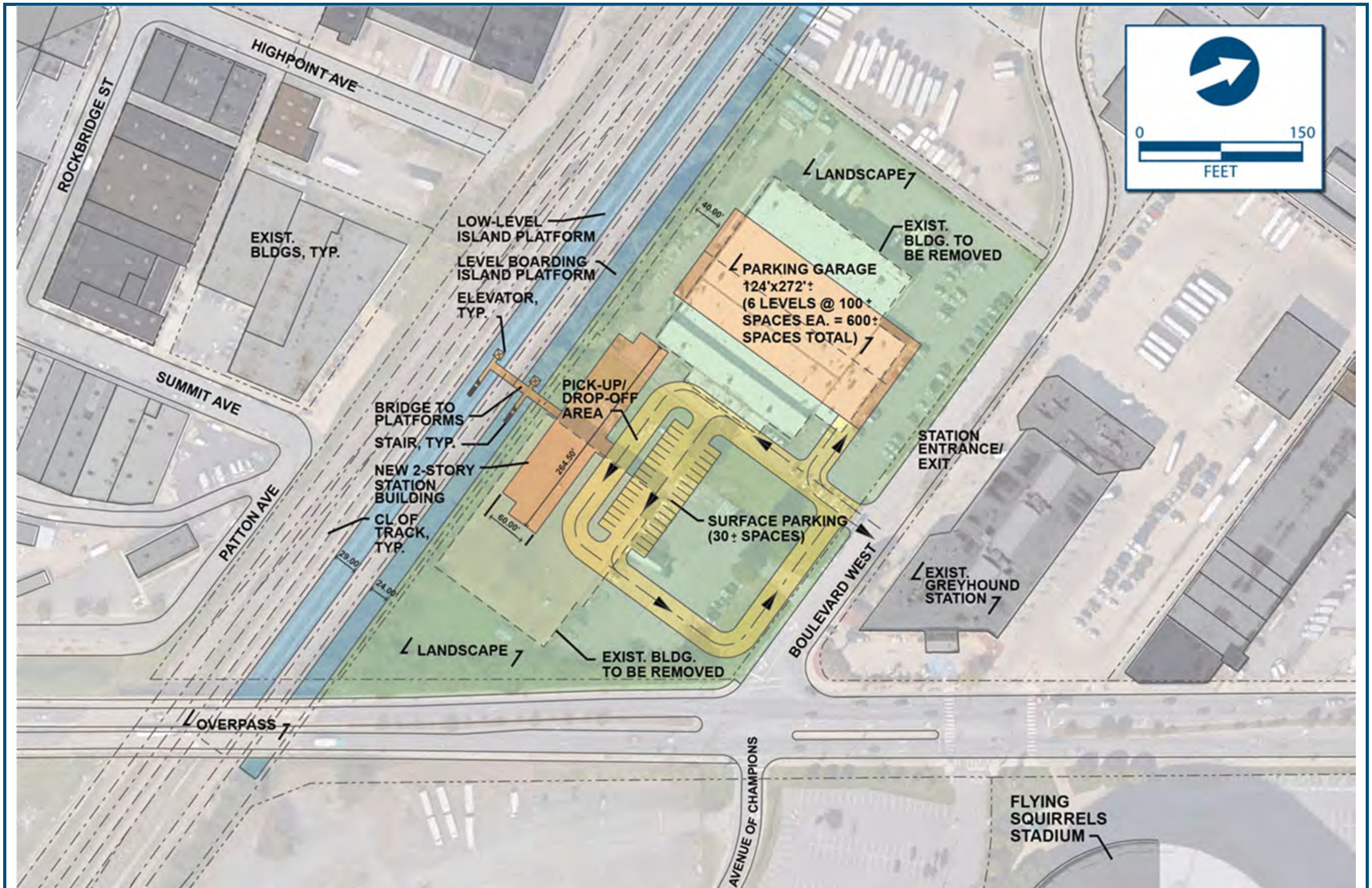


Figure 2.5-25: Boulevard Station Improvements for Build Alternatives 6B–A-Line and 6B–S-Line

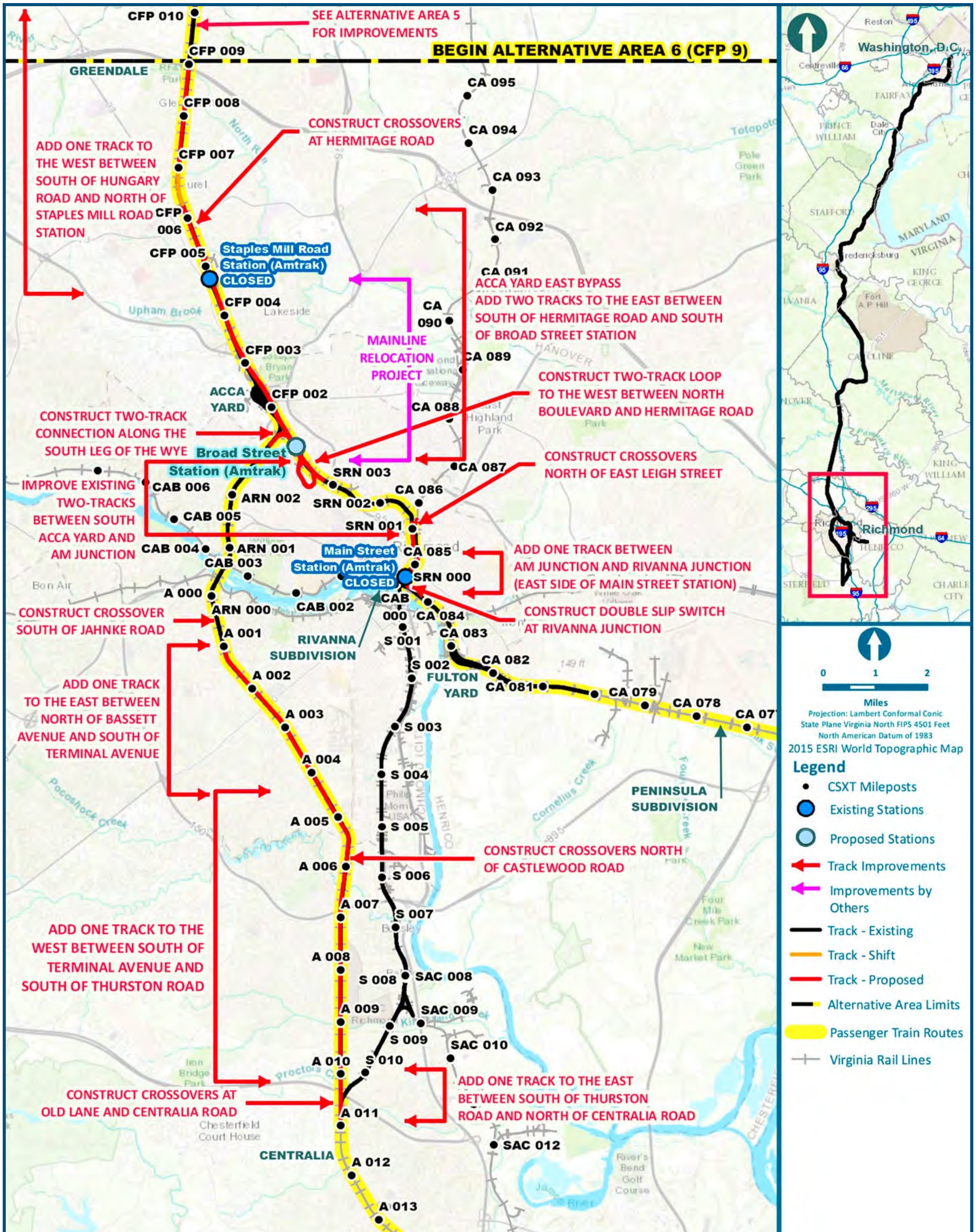


Figure 2.5-26: Build Alternative 6C – Broad Street Station Only

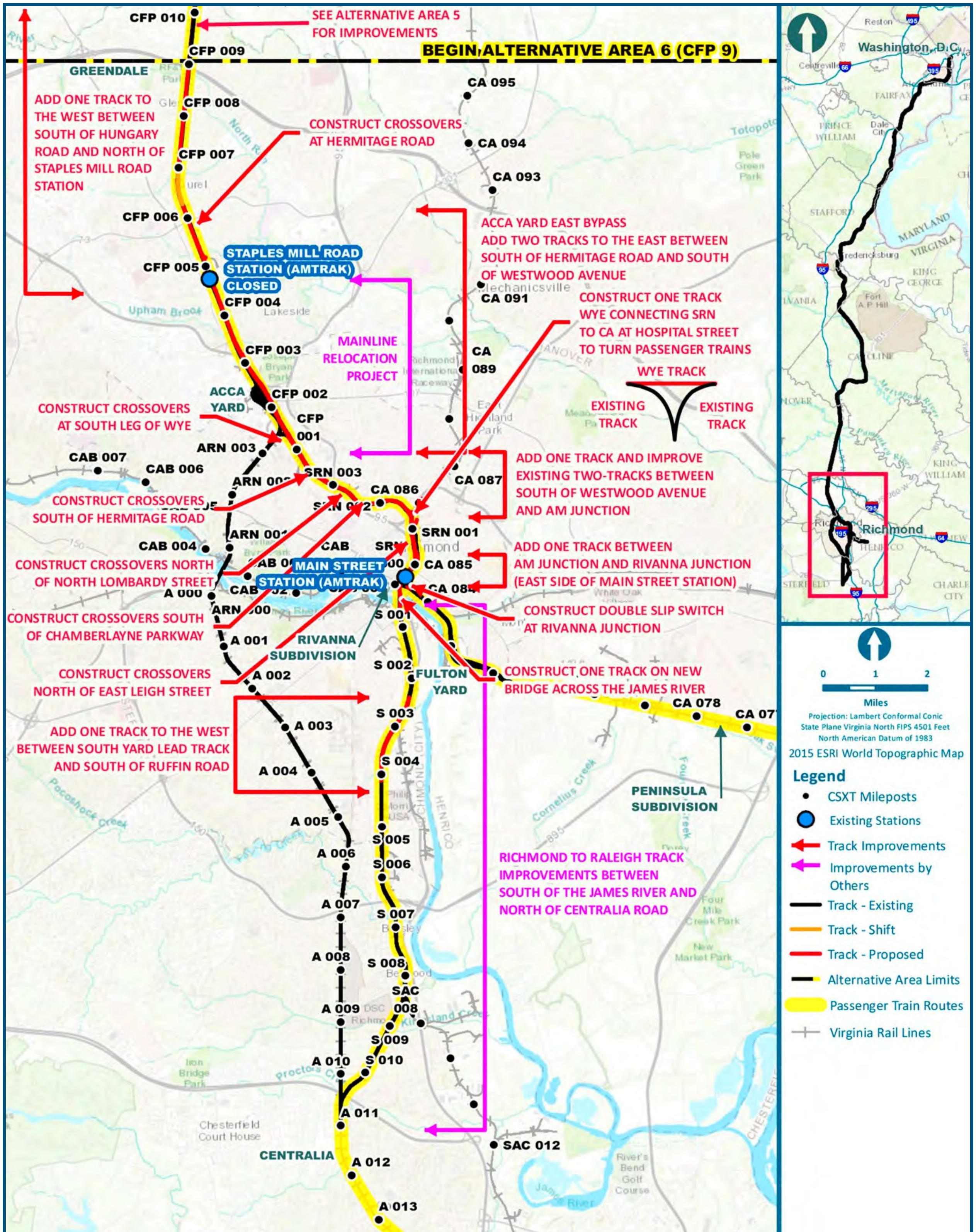


Figure 2.5-27: Build Alternative 6D – Main Street Station Only

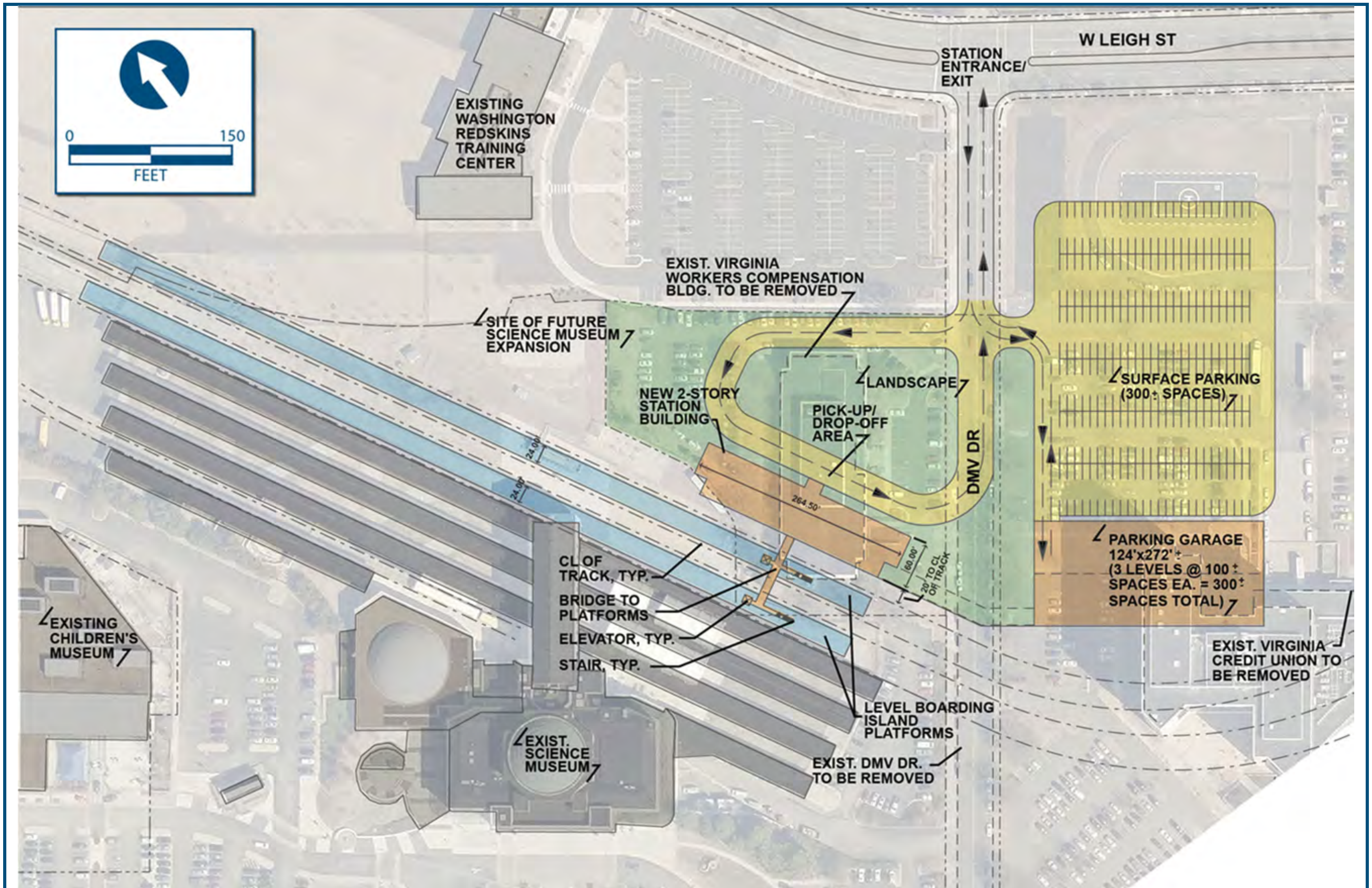


Figure 2.5-28: Broad Street Station Improvements for Build Alternative 6C

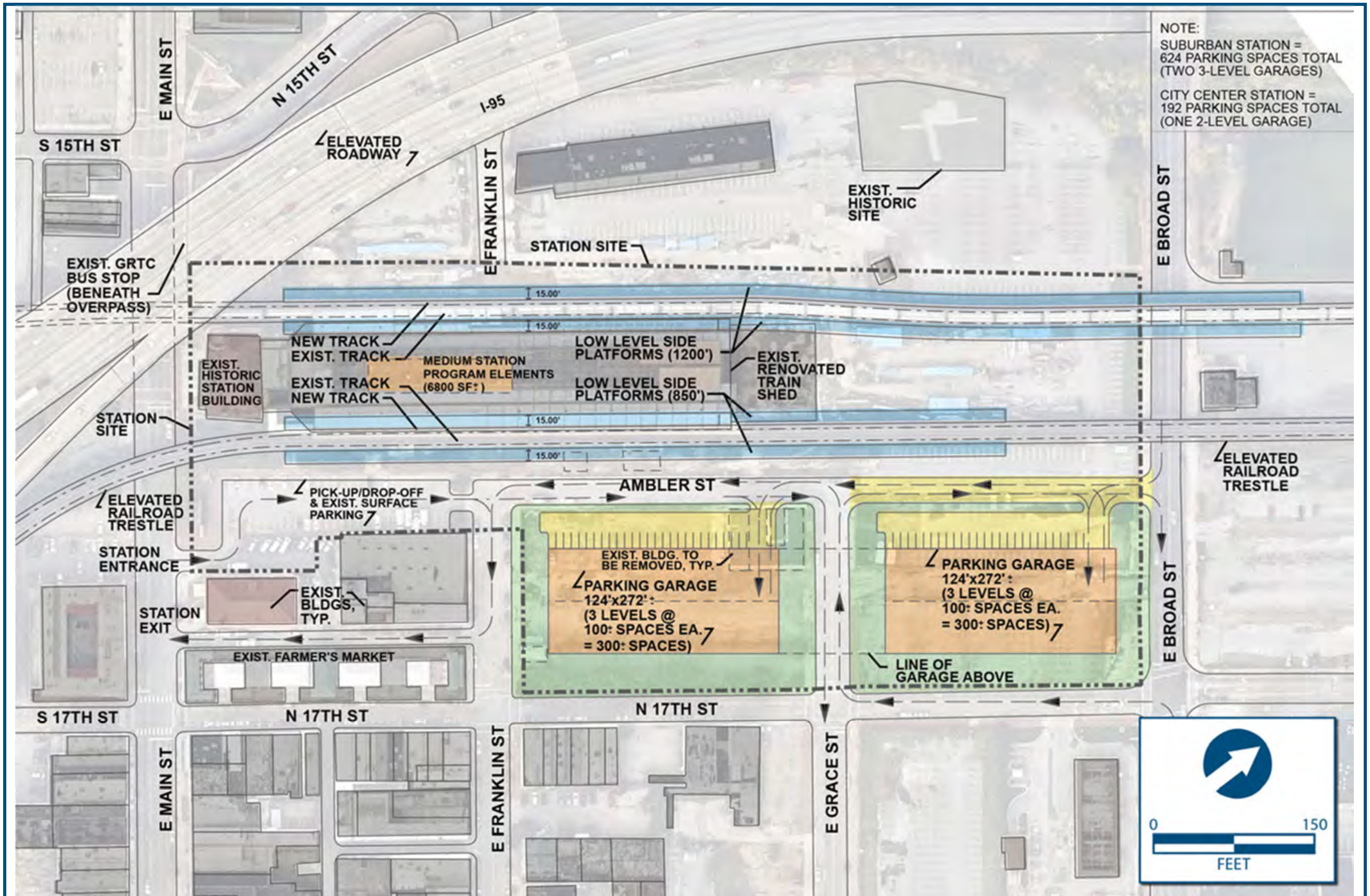


Figure 2.5-29: Main Street Station Improvements for Build Alternative 6D

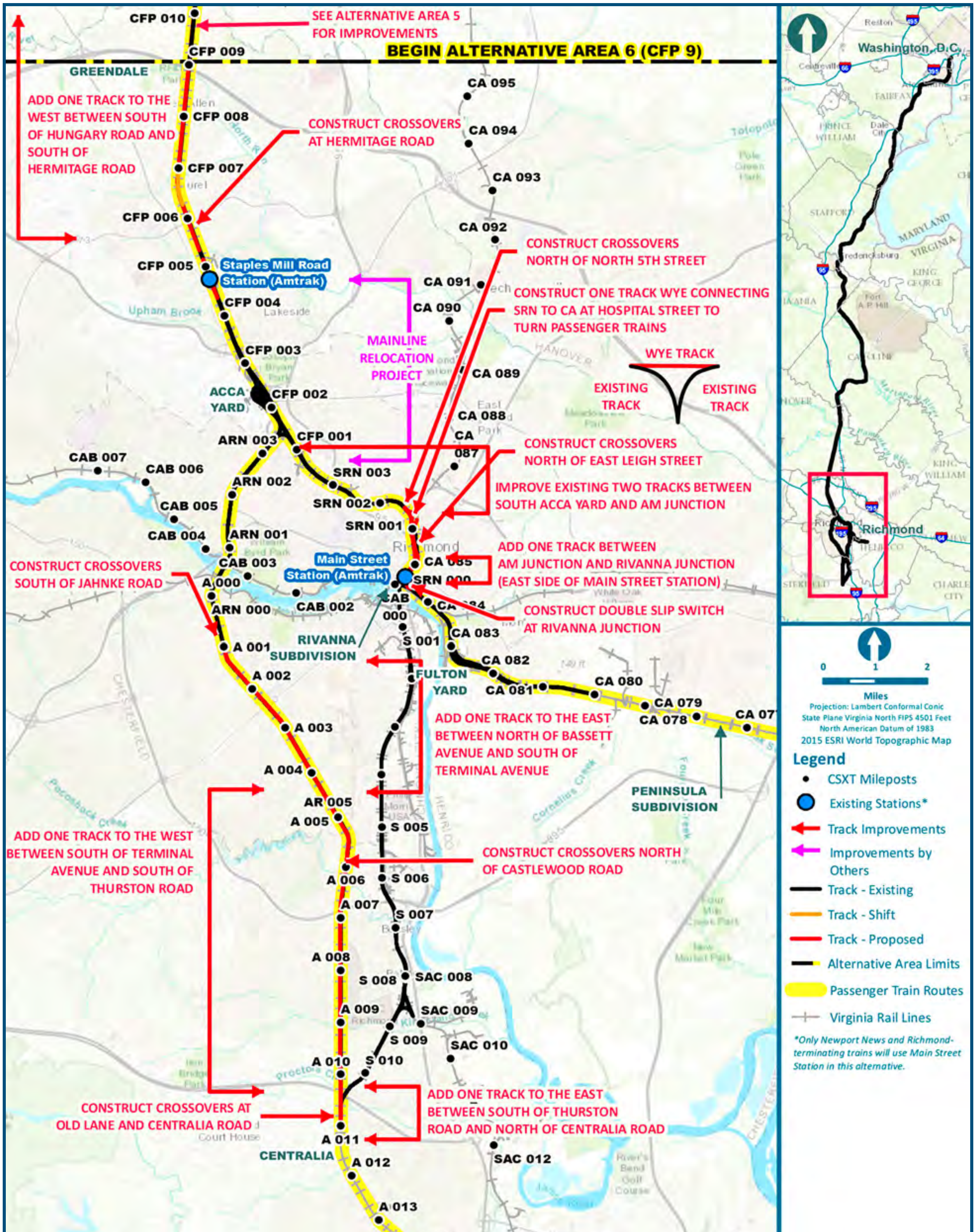


Figure 2.5-30: Build Alternative 6E – Split Service, Staples Mill Road / Main Street Stations

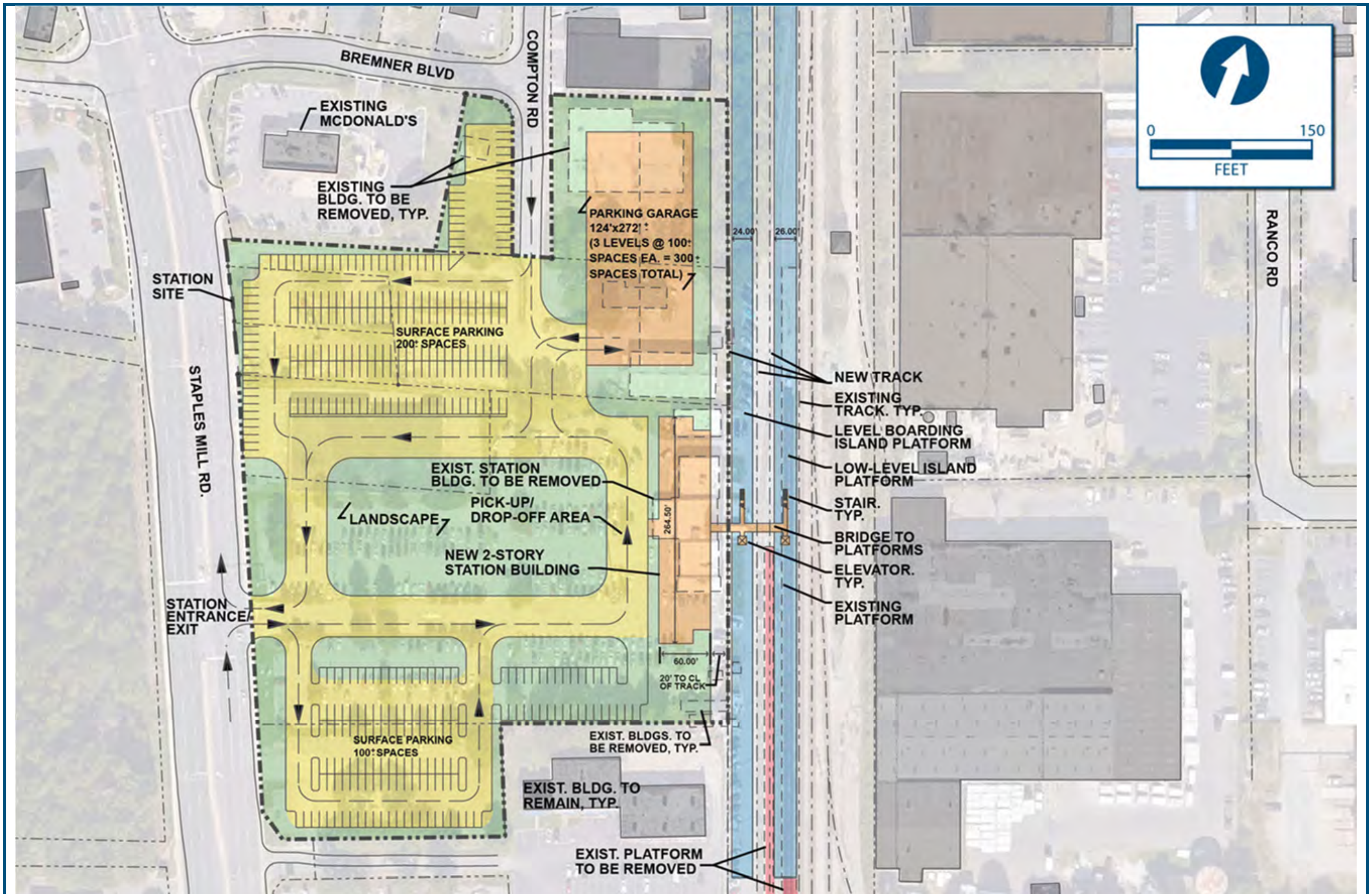


Figure 2.5-31: Staples Mill Road Station Improvements for Build Alternative 6E

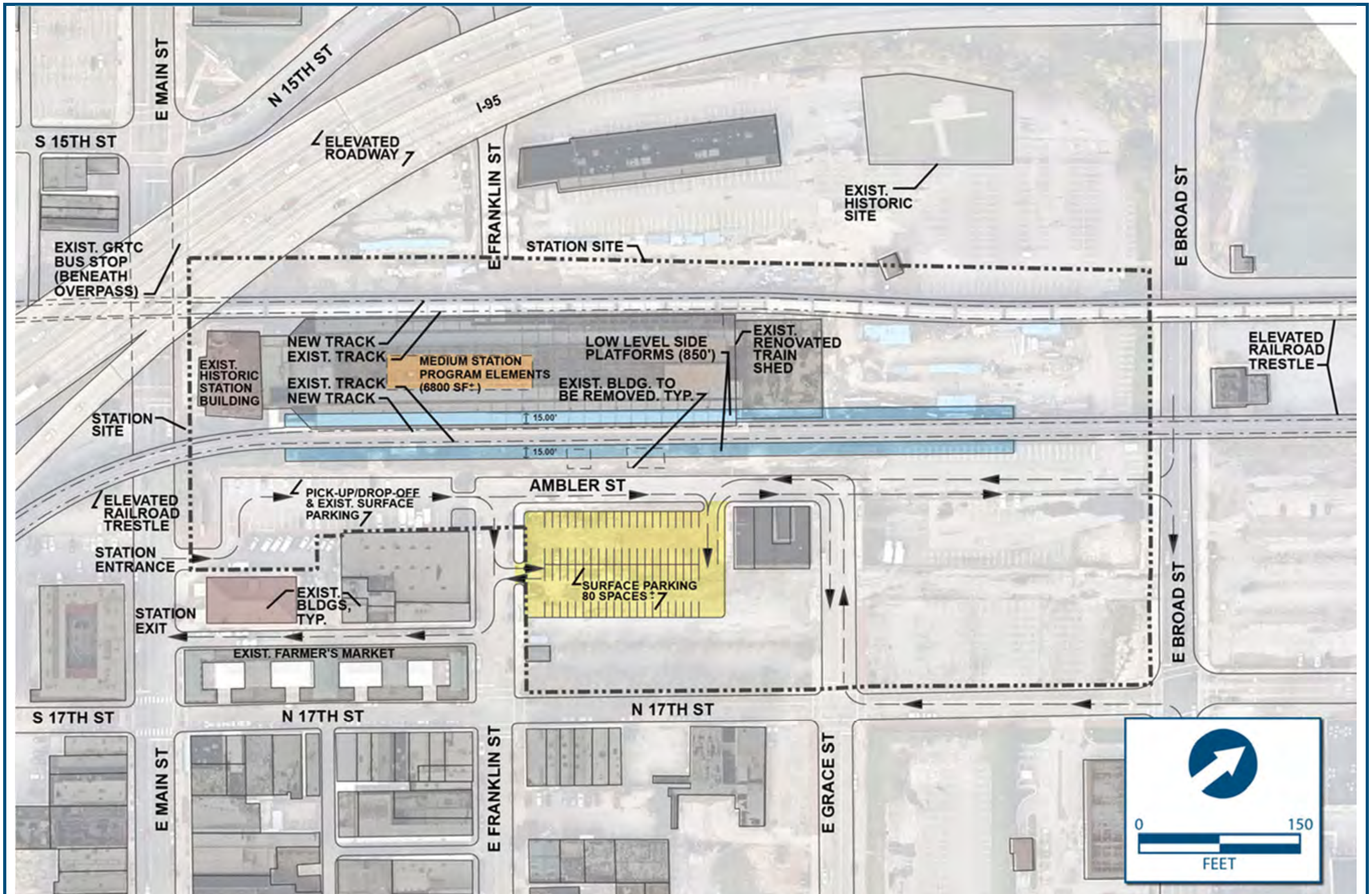


Figure 2.5-32: Main Street Station Improvements for Build Alternative 6E

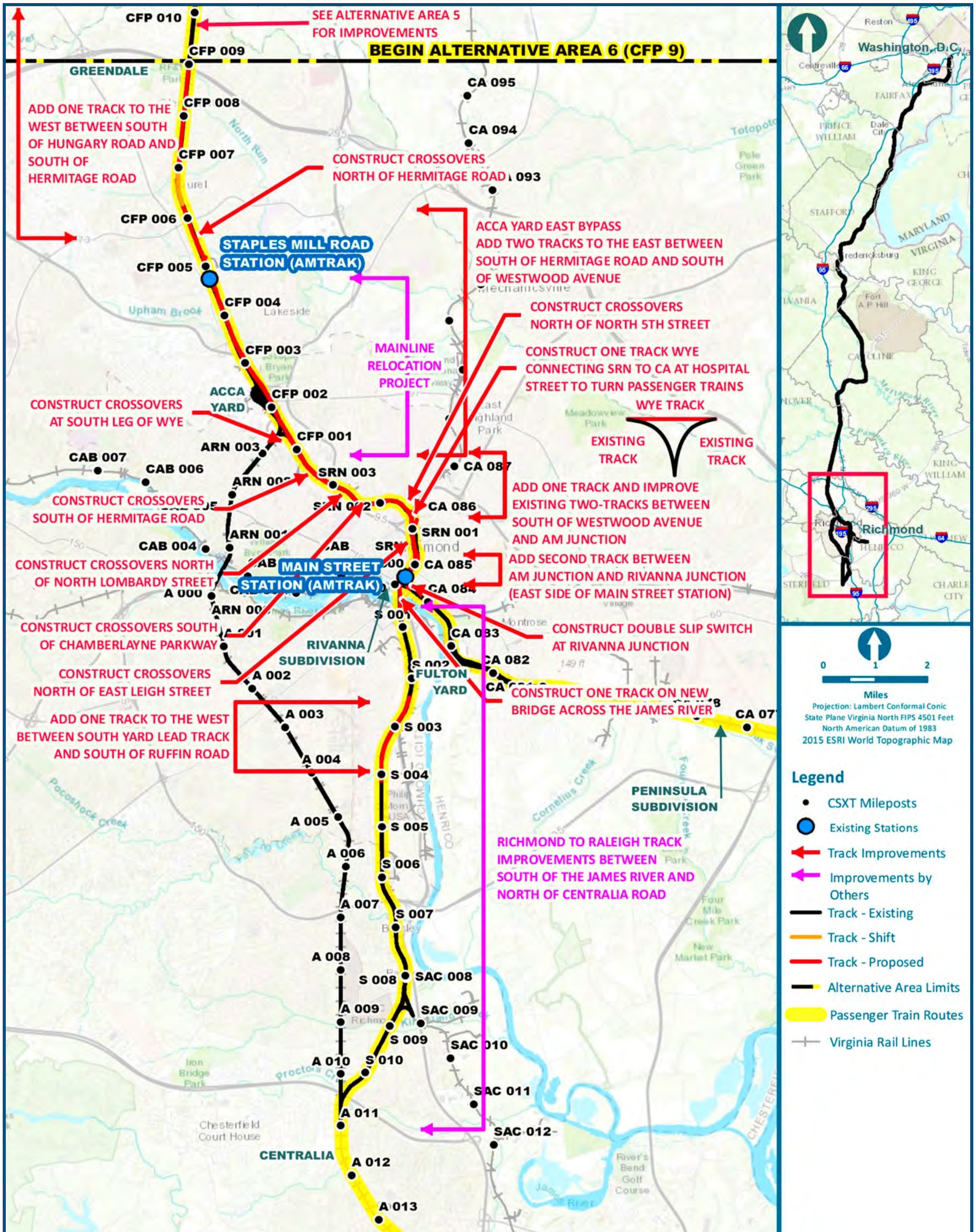


Figure 2.5-33: Build Alternative 6F – Full Service, Staples Mill Road / Main Street Stations

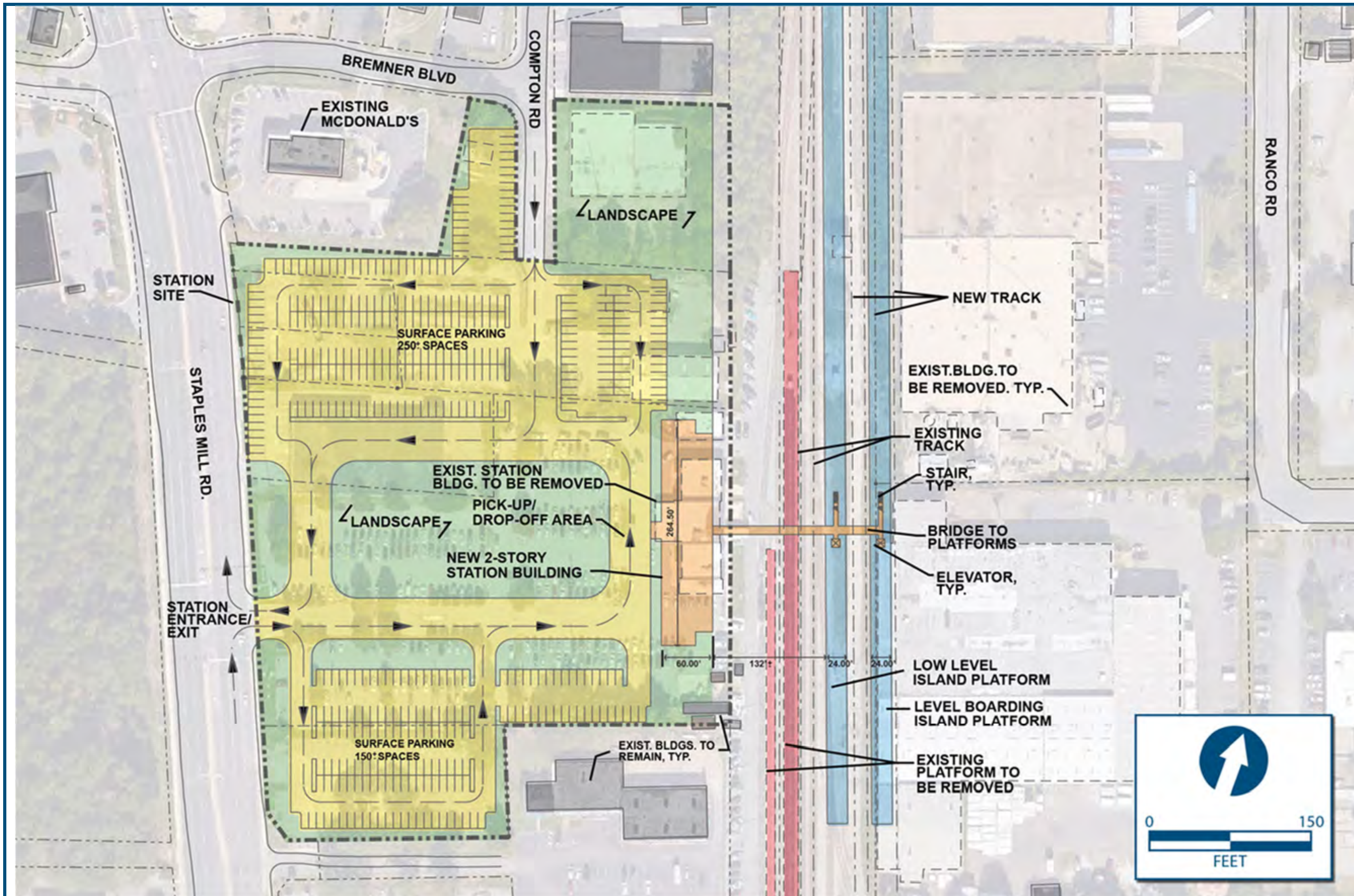


Figure 2.5-34: Staples Mill Road Station Improvements for Build Alternative 6F

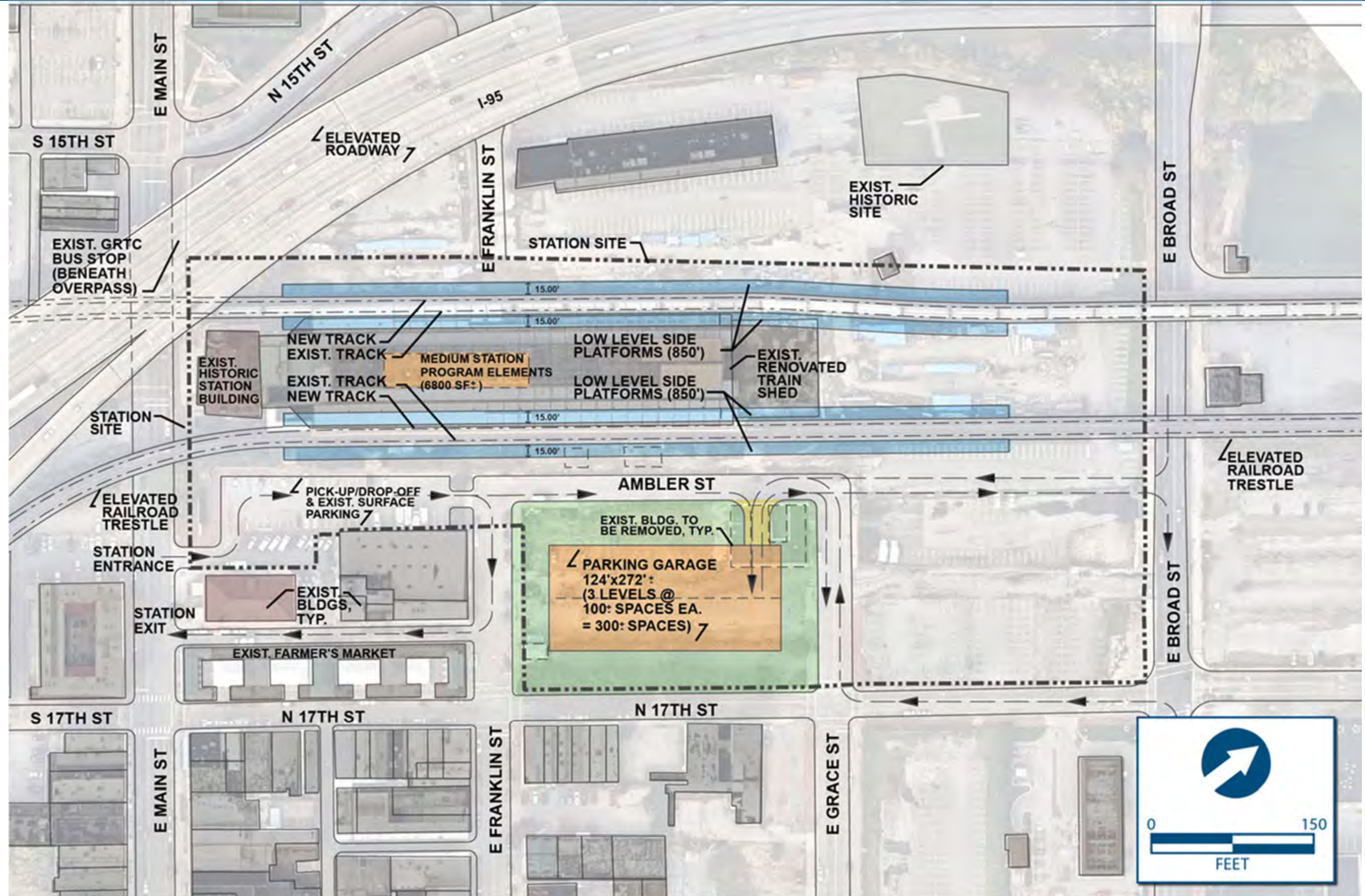


Figure 2.5-35: Main Street Station Improvements for Build Alternative 6F

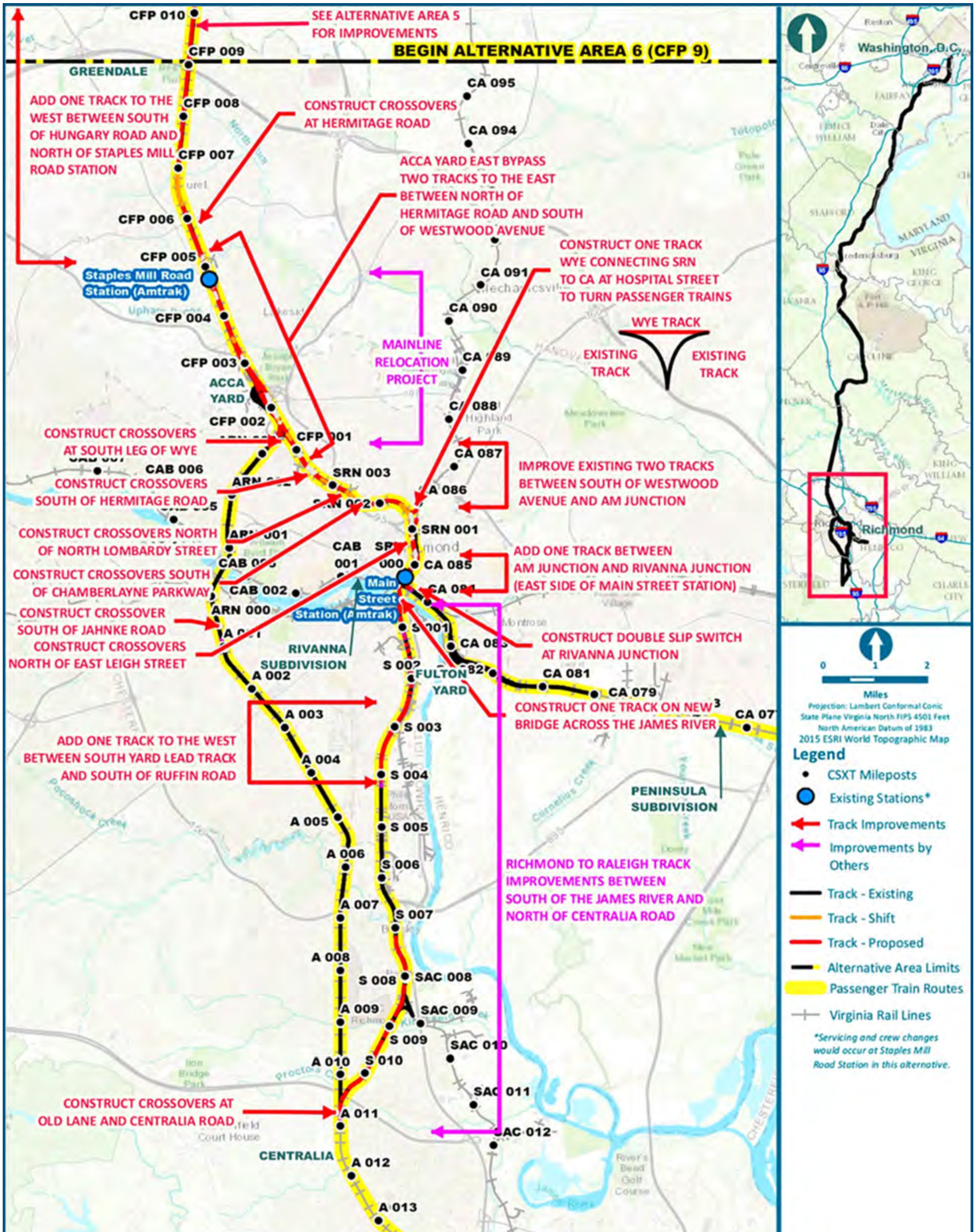


Figure 2.5-36: Build Alternative 6G – Shared Service, Staples Mill Road / Main Street Stations

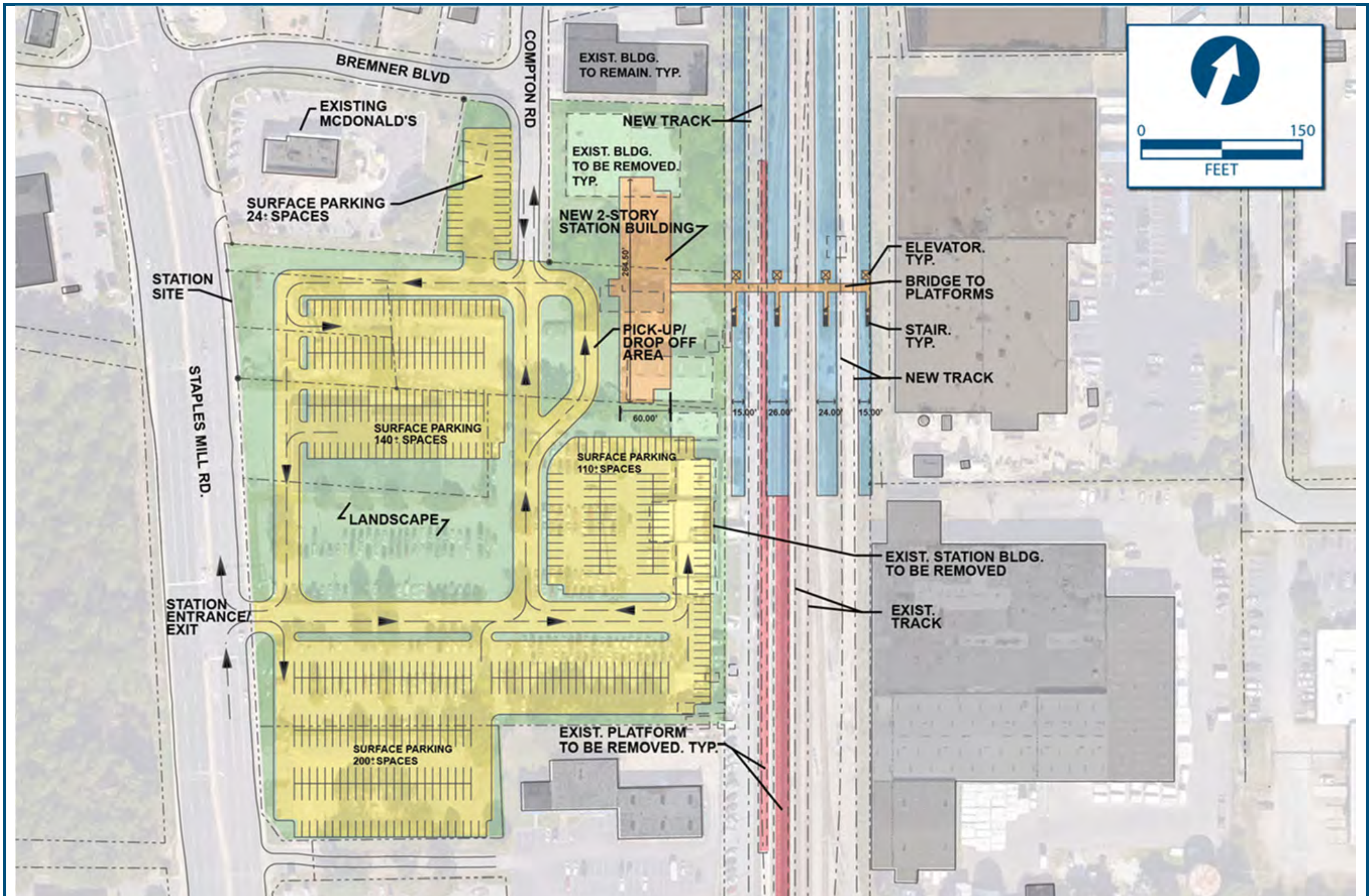


Figure 2.5-37: Staples Mill Road Station Improvements for Build Alternative 6G

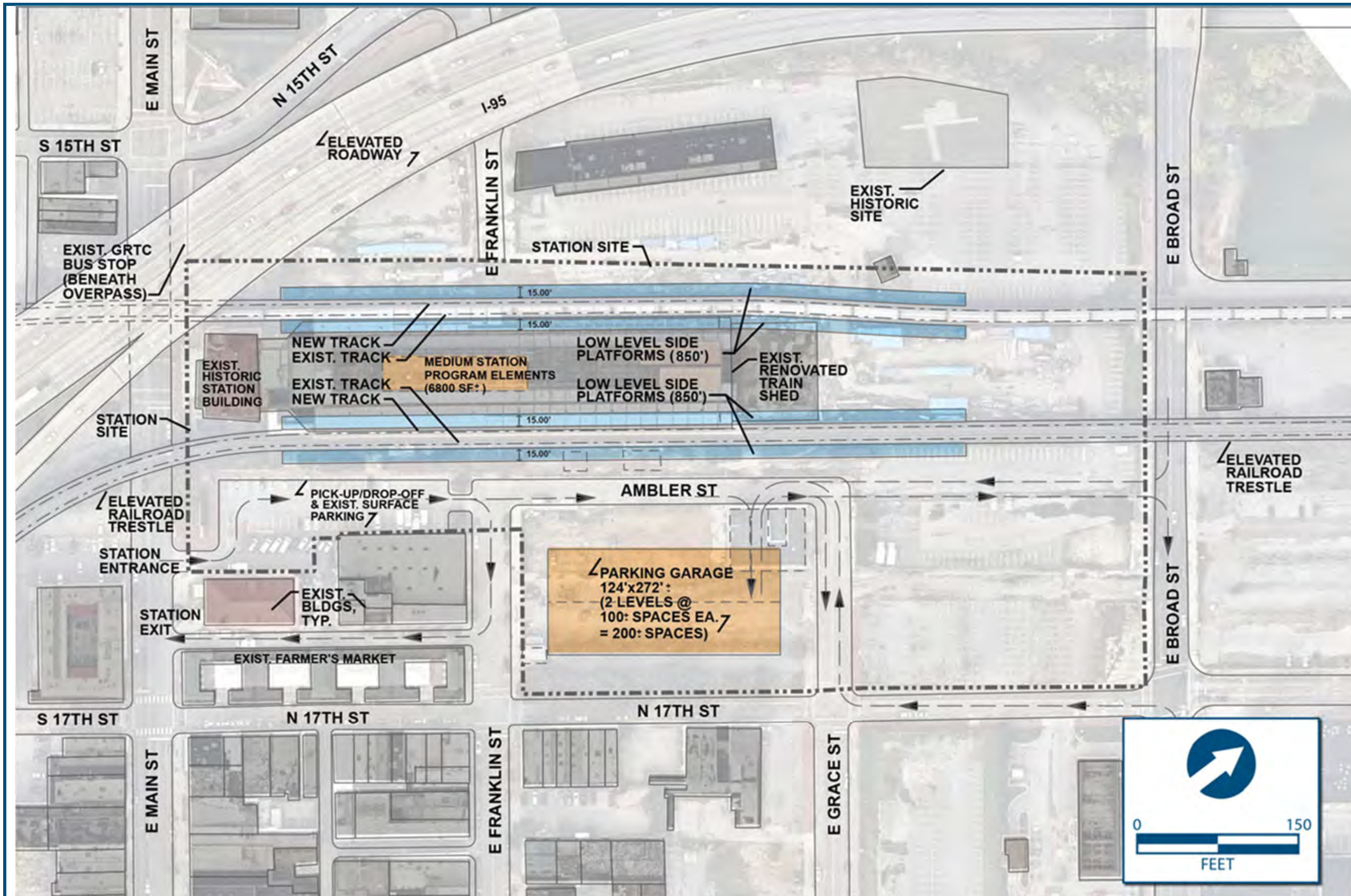


Figure 2.5-38: Main Street Station Improvements for Build Alternative 6G

2.6 OPERATIONS ANALYSIS AND RIDERSHIP ESTIMATES

2.6.1 Operations Analysis

DRPT has conducted preliminary operations simulation modeling to estimate rail performance in the corridor and inform DRPT's evaluation of alternatives. Operations simulation modeling is an iterative process that is ongoing, and additional operations simulation analyses will be conducted through the Final EIS and SDP phases of the Project. Appendix I provides additional details of this operations analysis, which is summarized in this section.

DRPT's preliminary operations simulation modeling focused on evaluating whether suggested infrastructure is sufficient to meet the DC2RVA Project's Purpose and Need, and specifically to meet intercity passenger train and freight service performance goals established by the *Passenger Rail Investment and Improvement Act of 2008* (PRIIA), also known as Public Law 110-432, and published as the *Metrics and Standards for Intercity Passenger Rail Service Under Section 207 of the Passenger Rail Investment and Improvement Act of 2008*, in the Federal Register on May 12, 2010. PRIIA's performance goals for intercity passenger trains are for all passenger trains to be on-time at each station and at corridor endpoints at least 90% of the time. On-time, as defined by PRIIA, means arriving at a station at the scheduled time or within a set "late tolerance" period following the scheduled time. The length of the late tolerance period varies by the type of intercity passenger service and the total distance between the train's scheduled endpoints. PRIIA's performance goal for freight service is for intercity passenger rail service to not materially delay the movement of freight. The performance of freight trains is compared for different alternatives by estimating future freight train delay and comparing against existing freight train performance. Freight train delay is measured as minutes of delay per train, per 100 train-miles. This metric compares the simulated time a freight train took to cover its route inclusive of interactions with other trains, passenger and freight, compared to the time the freight train would have taken to cover its route had it encountered no delays en route.

The operations simulation analyses evaluate a schedule of planned train movements (encompassing all intercity passenger, commuter, and freight trains moving through the corridor) in combination with a set of existing or proposed infrastructure. The results of the analyses estimate whether the combined schedule of operations and infrastructure performs sufficiently to meet the PRIIA goals. The operations simulation analyses include the proposed intercity passenger trains described in Section 2.2.1, as well as CSXT freight trains and VRE commuter trains. DRPT assumed the new DC2RVA service (18 additional intercity passenger trains per day) would be in place in 2025, and that no additional changes in intercity passenger trains would occur between 2025 and the horizon year of 2045. VRE commuter train frequencies were assumed to increase from 34 weekday trains in 2015 to a projected 38 weekday trains for the years 2025 through 2045. To forecast freight train growth from existing (2015) levels, CSXT provided freight volumes for the future years 2025 and 2045 using the U.S. DOT Freight Analysis Framework projected growth rates for rail. CSXT freight growth is independent of the DC2RVA Project and will occur by itself regardless of whether or not the DC2RVA Project is implemented. CSXT actual freight growth will be driven by market forces and may be greater or less than the projected growth rates.

Intercity passenger train and freight train performance estimates from the different Build Alternatives simulated in 2025 are compared against performance estimates for a 2025 No Build Alternative consisting of the No Build infrastructure and service levels described in Sections 2.2 and 2.5.1.

DRPT has completed three preliminary phases of operations simulation modeling that assess the performance of trains operating in the DC2RVA corridor between Washington, D.C. and Centralia, VA. These three phases have assumed ideal operating conditions – that all tracks are fully operational, with no outages for maintenance, repairs, or other restrictions on operations. These preliminary operations simulations also apply an intercity passenger train schedule developed by DRPT to reduce travel time through the corridor to the maximum extent practical by assuming intercity passenger trains will operate at the maximum practical speed allowed by track design and geometry between station stops. The operations simulations incorporate VRE's operating schedule, and projected movements of CSXT freight trains. The three preliminary phases of operations simulation modeling completed to date are:

1. Preliminary Ashland and Fredericksburg Simulations Modeling - performed to estimate whether two main tracks through Ashland and/or Fredericksburg would be sufficient in the Build Alternative. *See Section 2.6.1.1.*
2. Additional Ashland Simulation Modeling - performed to estimate the operational impacts of 11 potential infrastructure and service options in the Ashland/Hanover area that, if proven operationally feasible, would not require the addition of a third main track through the Town of Ashland, VA. *See Section 2.6.1.2.*
3. Richmond Area Simulation Modeling - performed to compare passenger train and freight train operating performance among the Richmond-area alternatives carried forward into the Draft EIS. *See Section 2.6.1.3.*

2.6.1.1 Preliminary Ashland and Fredericksburg Simulation Modeling

This first phase of the preliminary operations modeling was performed to estimate whether two main tracks through Ashland and/or Fredericksburg would be sufficient to consider in a Build Alternative. Based on previous studies, such as the 2002 SEHSR Tier 1 document, DRPT assumed three main tracks in the corridor from Arlington to Richmond, and then evaluated the effects on train performance of having only two main tracks through Fredericksburg and/or Ashland. The operations simulation for year 2025 estimated that having only two main tracks in Fredericksburg and/or Ashland could potentially meet the PRIIA on-time performance goal for the corridor. However, operations simulation for year 2045 estimated that having only two main tracks in Fredericksburg and/or Ashland failed to dispatch (i.e., the operations simulation concluded that the infrastructure had insufficient capacity for the number of trains projected to operate in the corridor in the year 2045). DRPT's preliminary conclusion, based on the schedule, infrastructure, and operating parameters evaluated in this initial phase of operations simulation, was that three main tracks through Fredericksburg, or a two-track bypass around Fredericksburg in lieu of a third main track through the city and town, would be required by year 2045 to accommodate the projected future levels of passenger, freight, and commuter service. DRPT also concluded that additional operations simulation modeling should be undertaken in the Ashland Area to test a broader range of infrastructure and service options that might not require the addition of a third main track through the Town of Ashland.

2.6.1.2 Additional Ashland Simulation Modeling

DRPT's second phase of preliminary operations simulation modeling was performed to estimate the operational impacts of additional potential infrastructure and service options in the Ashland/Hanover area that, if proven operationally feasible, would not require the addition of a third main track through the Town of Ashland. DRPT evaluated the effects of a tunnel beneath the Town in lieu of a third track at grade, effects of operating trains at a maximum speed of 70 mph instead of 90 mph, and modifying or eliminating station service, including relocation of the station to south of Ashcake Road. DRPT also evaluated the effects of routing some northbound freight trains onto the Buckingham Branch Railroad between Richmond and Doswell. (Not all northbound freight trains are feasible to be rerouted onto the Buckingham Branch owing to operational requirements and clearance restrictions.) The train performance estimates derived from this second phase of DRPT's preliminary operations simulation suggested that in order to accommodate the additional 18 intercity passenger trains per day , accommodate CSXT's projected freight growth, and meet PRIIA's passenger and freight train on-time performance goals through 2045, either a third main track through Ashland or a two-track bypass around Ashland would provide the highest likelihood that trains would meet their performance goals under the service level and schedule projected. DRPT's preliminary conclusion, based on the schedule, infrastructure, and operating parameters evaluated in this second phase of operations simulation was that, while a third main track through Ashland or a two-track bypass around Ashland would accommodate the Project's service and performance goals through 2045, other alternatives should be considered, perhaps in concert with service and schedule modifications, that could also achieve the Project's service and performance goals.

2.6.1.3 Richmond Area Simulation Modeling

Preliminary operations simulation modeling was also performed by DRPT to compare passenger train and freight train operating performance among the Richmond-area alternatives carried forward into the Draft EIS. Like the earlier preliminary operations simulation modeling, DRPT applied a preliminary intercity passenger train schedule based on maximum practical reductions to travel time, assumed an additional 18 intercity passenger trains plus CSXT's projected growth for 2025 and 2045, and assumed ideal operating conditions. The seven Richmond-area Alternatives modeled are listed below:

- 6A. Staples Mill Road Station (all trains via A-Line and West Acca bypass)
- 6B. Broad Street Station (all trains via A-Line and East Acca bypass)
- 6C. Boulevard Station (all trains via A-Line and East Acca bypass). A Boulevard Station S-Line option (all trains via S-Line and East Acca bypass) was not modeled, but is assumed by DRPT to have similar operating parameters as Alternative 6D Main Street Station.
- 6D. Main Street Station (all trains via S-Line and East Acca bypass)
- 6E. Main Street / Staples Mill – Split Service (only Newport News trains make both stops; all other via trains via A-Line with a Staples Mill only stop; West Acca bypass)
- 6F. Main Street / Staples Mill – Full Service (all trains make both stops, operate via S-Line and East Acca bypass)
- 6G. Main Street / Staples Mill – Shared Service (all Regional and Interstate Corridor trains make both stops, operate via S-Line and East Acca bypass; long distance trains operate via A-Line and stop at Staples Mill Only)

DRPT's third phase of preliminary operations simulation modeling estimated that alternatives relying on the A-Line to carry both passenger and freight trains through 2045 (Alternatives 6A, 6B, 6C, 6E and 6G) failed to meet the PRIIA performance goals. Factors that contributed to the inability of the A-Line options to accommodate the projected passenger and freight train service levels at the performance thresholds required under PRIIA include the lack of a third main track from Acca Yard south within the existing median of I-195 and across the James River and the operating complexities associated with freight trains entering and exiting the Acca Yard terminal area. The third phase also estimated that the two Richmond-area alternatives (6C Boulevard Station S-Line and 6F Main Street/Staples Mill Road – Full Service) that keep most freight trains and the Amtrak Auto Train on the A-Line while using the S-Line through Richmond for the regular intercity passenger trains could potentially meet the PRIIA performance goals through 2045.

2.6.2 Ridership

DRPT prepared ridership forecasts using a travel demand forecasting model derived from a survey of rail and other travel in the Washington, D.C. to Richmond corridor. Appendix J provides additional details of the ridership forecasting process, which is summarized in this section.

DRPT combined information from this survey with ridership forecasting procedures developed for connecting corridors north and south of the DC2RVA Project corridor to estimate ridership within the areas of DC2RVA, the SEHSR corridor, and the Northeast Corridor. Key elements of the forecasting process include:

- The size and geographic distribution of the overall demand for long-distance travel in the corridor.
- Estimating total travel for 2015 and 2045 by assuming that growth from 2008 is proportional to zone-level projections of population and employment growth obtained from corridor Metropolitan Planning Organizations.
- The size and geographic distribution of rail travel demand was obtained from 2015 Amtrak station-level actual ridership.
- Characteristics of existing rail travelers and their sensitivity to potential service improvements (e.g., faster running times, more service, easier access and egress, and greater on-time performance).
- The structure of the demand forecasting models was adapted by DRPT from those developed for the NEC FUTURE project. Parameters were adjusted to match traveler sensitivity to service attributes obtained from the corridor surveys.
- Modeling parameters were refined so that the model replicates existing observed Amtrak station-level ridership and revenue when the model is tested with the current rail schedules.
- Future year ridership for each alternative is forecasted by combining the calibrated model, projections of future overall travel, and rail schedules representing each DC2RVA alternative.

Using this methodology, DRPT projects population growth and employment in the corridor together with planned service enhancements included in the No Build Alternative will increase corridor ridership from approximately 1.4 million annual trips in 2015 to 2.2 million annual trips in 2045, an increase of approximately 57 percent. DRPT projects that the various Build Alternatives will result in between 2.9 million and 3.0 million annual rail trips traveling to, from, and within the corridor. This represents a growth of approximately 40 percent over the ridership expected with the No Build service plan and an increase of approximately 110 percent over existing ridership.

The principal drivers of this increase are:

- A reduction in train travel times between Washington, D.C. and Richmond.
- An increase in frequency from 9 round trips (in the No Build Alternative) to 18 round trips per day (in the Build Alternative) between Washington, D.C. and Richmond.
- Increased service to Norfolk, which will grow from one daily round trip per day with the current schedule and three daily round trips per day in the No Build Alternative, up to six round trips per day with the Build Alternatives.
- Improved reliability of the passenger rail service from an on-time perspective from 66 percent today to 90 percent in the Build Alternatives.

Table 2.6-1 summarizes the ridership associated with each of the 2045 build service conditions. As this table indicates, ridership is highest for the Staples Mill Road Only Build Alternative due to a slightly faster trip time for trains passing through Richmond from the south. The different Staples Mill Road and Main Street station combination alternatives follow closely behind due to accessibility to the market for Downtown Richmond.

Table 2.6-1: Annual Rail Trips to/from/within DC2RVA Corridor (Millions) by Year and Alternative

Year	Build Alternative	Annual Rail Trips
2015	Existing Schedule (66% OTP)	1.388
2045	Existing Schedule (66% OTP)	2.018
2045	No Build Alternative[1] (66% OTP)	2.180
2045	6A: Staples Mill Road Station Only (90% OTP)	3.295
2045	6B: Boulevard Station Only, A-Line[2] (90% OTP)	3.203
2045	6C: Broad Street Station Only (90% OTP)	3.160
2045	6D: Main Street Station Only (90% OTP)	3.213
2045	6E: Split Service, Staples Mill Road/Main Street Stations (90% OTP)	3.218
2045	6F: Full Service, Staples Mill Road/Main Street Stations (90% OTP)	3.258
2045	6G: Shared Service, Staples Mill Road/Main Street Stations (90% OTP)	3.261

Notes:

1) No Build Alternative includes ridership associated with the extension of two Northeast Regional (VA) round trips from Richmond to Norfolk and the addition of one new Northeast Regional (VA) round trip between Washington, D.C. and Lynchburg.

2) A single 6B ridership is reported because 6B–A-Line ridership and 6B–S-Line ridership are anticipated to be similar.

Although the ridership varies among the alternatives, the standard deviation among all station alternatives was approximately 1%, which is within the margin of error for the analysis performed.

The ridership model used by DRPT also provides a high-level estimate of the revenue generated by the new service for each of the Richmond alternatives. DRPT has included the revenue estimates in Appendix J for another point of reference; Section 4.5 of Appendix J includes tables that show estimates for 2025 and Section 5.0 of Appendix J shows revenue estimates for 2045.

DRPT developed revenue forecasts based on current average station-to-station passenger fares. The resulting estimates of revenue represent the entire trip from the originating to the destination station.

Portions of some trips extend outside of the DC2RVA corridor, such as trips to North Carolina, New York, or Boston. DRPT made no attempt to show any allocation of the estimated revenue to the specific parties, such as Amtrak, the Commonwealth of Virginia, or other NEC states, or to specific geographic areas.

It should be noted that these revenue forecasts are not comparable to the operating costs provided in Section 2.7, which account only for costs accrued inside the DC2RVA corridor. DRPT did not include revenue estimates as a factor in its consideration of recommended preferred alternatives described in Chapter 7.

2.6.3 Travel Time and Reliability

To aid in preliminary ridership forecasting, DRPT developed conceptual timetables incorporating the train frequency and train speed for each of the Richmond Build Alternatives described in Section 2.5.2.6. Table 2.6-2 summarizes the estimated travel times, inclusive of station stops, between Washington and Richmond based on the conceptual timetables developed for each Richmond Build Alternative.

Table 2.6-2: DC2RVA Corridor Travel Times (hours:minutes) by Richmond Station Option, Washington Union Station to Richmond, VA

Service Type	Interstate Corridor		Northeast Regional		Long Distance	
Direction	South	North	South	North	South	North
No Build (to Staples Mill Road)	2:06	2:16	2:16	2:20	2:02	2:22
No Build (to Main Street Station)	*No Service*	*No Service*	2:40	2:50	*No Service*	*No Service*
6A: Staples Mill Road Station Only	1:50	1:50	1:58	1:57	1:49	2:10
6B–A-Line: Boulevard Station Only, A-Line	1:56	1:58	2:04	2:05	1:55	2:14
6B–S-Line: Boulevard Station Only, S-Line	1:56	1:58	2:04	2:05	1:55	2:14
6C: Broad Station Street Only	2:01	2:02	2:09	2:09	2:00	1:58
6D: Main Street Station Only	2:06	2:06	2:14	2:13	2:05	2:23
6E: Split Service, Staples Mill Road/Main Street Stations (travel time to Staples Mill)	1:50	1:50	1:58	1:57	1:49	2:10
6E: Split Service, Staples Mill Road/Main Street Stations (travel time to Main Street)	2:15	2:13	2:21	2:18	2:20	2:37
6F: Full Service, Staples Mill Road/Main Street Stations (travel time to Staples Mill)	1:50	1:50	1:58	1:57	1:49	2:10
6F: Full Service, Staples Mill Road/Main Street Stations (travel time to Main Street)	*No Service*	*No Service*	2:29	2:25	*No Service*	*No Service*
6G: Shared Service, Staples Mill Road/Main Street Stations (travel time to Staples Mill Road)	1:50	1:50	1:58	1:57	1:49	2:10
6G: Shared Service, Staples Mill Road/Main Street Stations (travel time to Main Street)	2:15	2:13	2:21	2:18	*No Service*	*No Service*

Currently, intercity passenger trains traveling between Washington, D.C. and Richmond reach the end of their trip segment on the DC2RVA corridor on time approximately 66% of the time – meaning that 34% of the trains are late. Given that the definition of "on-time" includes a potential delay interval – i.e., a train may be several minutes past its scheduled arrival into a station and still be classified as "on-time" – this makes it difficult for many train travelers to rely on the train schedules, and forces passengers to allot additional time to their trips to compensate for the potential delays. The DC2RVA Project, by increasing capacity and interoperability of the main tracks, would improve the reliability of intercity passenger trains within the corridor. For example, a recent (June 9, 2017) train trip on Northeast Regional Train #95 from Washington Union Station to Richmond's Staples Mill Road Station, illustrates how the limited track capacity on this busy shared-use corridor can cause delays. Train #95, traveling south from Boston on the Northeast Corridor, arrived in Washington Union Station late. After an engine change, crew change, and passenger loading and unloading, train #95 departed Washington Union Station approximately 20 minutes behind schedule. Because it was late leaving Union Station, and owing to heavy passenger and freight train volume on the corridor south of Washington, D.C., Train #95 was positioned behind a slower freight train. Passenger and freight traffic moving in the opposite direction used the adjacent second main track to pass Train #95, leaving no opportunity for Train #95 to cross to the adjacent track and overtake the slower freight train until well south of Fredericksburg, more than an hour after departing Washington. As a result, Train #95 was 61 minutes late arriving into Staples Mill Road Station – an additional 41 minutes of delay caused by congestion on the corridor.

The DC2RVA Project would not be able to improve the on-time performance of trains arriving into Union Station from the Northeast Corridor – however, the added track capacity and additional crossovers of the DC2RVA Project would provide additional opportunities for higher-speed passenger trains to pass slower-speed freight trains and commuter trains making frequent station stops. The additional infrastructure planned by the DC2RVA Project would allow intercity passenger trains to closely adhere to their scheduled travel time between Washington, D.C. and Richmond without incurring delays in that segment of their total trip. The DC2RVA Project shares PRIIA's performance goals for intercity passenger trains for all passenger trains to be on-time at each station and corridor endpoints at least 90% of the time.

2.7 CAPITAL AND OPERATING COSTS

This section presents a summary of the estimated capital cost to design and construct and the estimated annual cost to operate and maintain the various DC2RVA alternatives under consideration. This section discusses the estimated costs for building, operating, and maintaining the DC2RVA Project.

2.7.1 Capital Costs

Capital costs represent the total cost associated with the design, management, land acquisition, and construction of the DC2RVA Project. All material quantities are estimated based on a conceptual (10 percent) level of design for the DC2RVA Project and are based on 2025 unit costs. Table 2.7-1 shows the capital cost estimates for each Build Alternative for the DC2RVA Project. Detailed estimates are provided in Appendix K.

Table 2.7-1: Capital Costs Per Build Alternative

Alternative Area	Build Alternative	Capital Cost (2025 $ - millions)
Area 1: Arlington (Long Bridge Approach)	1A: Add Two Tracks on the East	$35.6
	1B: Add Two Tracks on the West	$46.6
	1C: Add One Track East and One Track West	$42.3
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A: Add One Track/Improve Existing Track	$1,652.6
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A: Maintain Two Tracks Through Town	$240.2
	3B: Add One Track East of Existing	$506.9

DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

Table 2.7-1: Capital Costs Per Build Alternative

Alternative Area	Build Alternative	Capital Cost (2025 $ - millions)
	3C: Add Two-Track Bypass East	$977.5
Area 4: Central Virginia (Crossroads to Doswell)	4A: Add One Track/Improve Existing Track	$643.2
Area 5: Ashland (Doswell to I-295)	5A: Maintain Two Tracks Through Town (850-Foot Platforms)	$349.5
	5A–Ashcake: Maintain Two Tracks Through Town (Relocate Station to Ashcake)	$350.3
	5B: Add One Track Through Town East of Existing (850-Foot Platforms)	$388.3
	5B–Ashcake: Add One Track Through Town East of Existing (Relocate Station to Ashcake)	$388.8
	5C: Add Two-Track West Bypass (850-Foot Platforms)	$599.2
	5C–Ashcake: Add Two-Track West Bypass (Relocate Station to Ashcake)	$600.0
	5D–Ashcake: Three Tracks Centered Through Town (Add One Track, Relocate Station to Ashcake)	$398.8
Area 6: Richmond (I-295 to Centralia)	6A: Staples Mill Road Station Only	$1,087.7
	6B–A-Line: Boulevard Station Only, A-Line	$1,524.1
	6B–S-Line: Boulevard Station Only, S-Line	$1,451.2
	6C: Broad Street Station Only	$1,488.7
	6D: Main Street Station Only	$1.323.5
	6E: Split Service, Staples Mill Road/Main Street Stations	$1.266.5
	6F: Full Service, Staples Mill Road/Main Street Stations	$1,482.9
	6G: Shared Service, Staples Mill Road/Main Street Stations	$1,599.1

The 2025 capital costs represent the infrastructure required for a potential Build Alternative. Operational modeling, ridership, and revenue are factors that impact the level of infrastructure required. Build Alternative 6A (Staples Mill Road Station Only), which does not include a third mainline track across the James River on the CSXT A-Line and stays within the median of Powhite Parkway, has the lowest overall estimated capital costs. However, train performance estimates calculated using computer-based operations simulation modeling indicate that this alternative does not meet the Project's passenger train on-time performance requirements or freight train delay requirements, because of the lack of additional track capacity to accommodate the increases in passenger train service. Adding a third main line track and new bridge across the James River on the CSXT A-Line and the third track in the median of the Powhite Parkway would increase the capital cost of Build Alternative 6A to $1,887.0 million, and may require additional environmental impacts. Other Build Alternatives that also primarily use the A-Line for freight and passenger service (6B–A-Line, 6C, 6E, and 6G) would have similar increases in capital costs. Build Alternative 6G (Shared Service, Staples Mill Road/Main Street Stations) has the highest overall estimated capital costs because it uses both the CSXT A-Line and S-Line corridors in Richmond, requiring the maximum amount of additional improvements.

2.7.2 Operating and Maintenance Costs

The estimate of long-term operations and maintenance (O&M) costs include both train operations and infrastructure maintenance. Operations consists of labor costs, electrical power, and other factors required to keep the DC2RVA Project in service, whereas maintenance includes routine servicing of vehicles, maintenance of the tracks, signals, communications, and other systems needed to keep the system safe and reliable. This section presents a summary of the estimated annual cost to operate and maintain the DC2RVA passenger rail service. These costs are calculated based on the passenger rail service for the full DC2RVA corridor and are presented relative to the suite of alternatives that result in changes in passenger rail service: the No Build Alternative and the Richmond Area Build Alternatives.

Table 2.7-2 shows the resultant total costs by alternative. Costs are shown in 2015 constant dollars.

Table 2.7-2: Estimated O&M Costs for Each Alternative

Year	Build Alternative	Total O&M Cost (2015 $)
2015	Existing	$46,837,206
2045	No Build Alternative	$54,767,392
2045	6A: Staples Mill Road Station Only	$97,499,879
2045	6B: Boulevard Station Only (A- and S-Line alternatives)	$99,449,483
2045	6C: Broad Street Station Only	$99,253,709
2045	6D: Main Street Station Only	$99,910,050
2045	6E: Split Service, Staples Mill Road/Main Street Stations	$97,795,859
2045	6F: Full Service, Staples Mill Road/Main Street Stations	$100,331,049
2045	6G: Shared Service, Staples Mill Road/Main Street Stations	$99,646,766

Notes:

Although the O&M cost varies among the alternatives, the standard deviation among all 2045 Richmond Build Alternatives was approximately 1%, which is within the margin of error for the analysis performed.

The 2045 build service conditions represent approximately a doubling of intercity passenger service and ridership. Because service and ridership are the key drivers of cost, the O&M costs for the Build Alternatives are also approximately double the costs of today's service (2015). Build Alternative 6A (Staples Mill Road Stations Only) has the lowest overall estimated O&M costs because it has the lowest estimated number of annual revenue miles (tied with Build Alternative 6E: Split Service, Staples Mill Road/Main Street Stations), the lowest estimated number of annual revenue hours, and a high number of overall station boardings/alightings. Build Alternative 6F (Full Service, Staples Mill Road/Main Street Stations) has the highest overall estimated O&M costs. That alternative has the highest estimated station boardings/alightings and the second-highest revenue hours compared with the other Build Alternatives.

2.8 CONSTRUCTION PLAN

The approach to constructing infrastructure improvements for the DC2RVA Project, described below, would be common to all of the Build Alternatives. Construction would not begin until a final design is approved, additional permanent and temporary right-of-way is acquired, and all necessary permits and approvals are in place.

Within the DC2RVA corridor, the construction of the additional track, infrastructure additions and modification to control points, new station infrastructure with additional platforms, and track shifts requires a phased construction approach. During construction, at least one main track would remain in operation while under construction. Station improvements for platform additions and pedestrian access would be constructed early to support the new track when placed in operation. Additional early construction activities include major bridges having an extended lead time, earthwork, and retaining walls. Figure 2.8-1 provides a general construction approach for the DC2RVA Project.

Figure 2.8-1: General Construction Approach

Four major construction activities would comprise the majority of the construction efforts: rail, bridge, road, and station construction. Appendix L provides a general description of each of the major construction activities, which are summarized below.

Rail Construction. The proposed track structure is ballasted track to be constructed on a prepared track bed. As the earthwork is completed, a sub-ballast layer would be constructed with aggregates hauled from the local quarries and from contractor's stockpiles. The sub-ballast would be graded, rolled, and compacted to establish a solid base. Following placement of the sub-ballast, an 8-inch layer of ballast would be placed as the final layer. This new surface is called a track bed. Once the track bed is in place, railroad ties (wood or concrete) would be placed and the continuous welded rail (CWR) fastened and anchored in place. As placement of the ties and CWR can disturb the ballast, tamping and lining track would be done to finish the installation.

In addition to new main track construction, construction would also involve shifting the existing track alignment. The track shifts would utilize existing rail and track bed if possible. In areas where existing rail and track bed are not feasible to use, additional grading and installation of new track bed would occur, followed by tamping and lining the track to finish.

The addition of the new main line track and speed improvements would require upgrades and reconfiguration of the existing control points, and the addition of new control points on the DC2RVA corridor.

Bridge Construction. Bridge construction along the corridor would include rail and road structures. New structures would generally reflect the horizontal and vertical profiles of existing structures. The structure type (concrete, steel, or timber types) proposed varies according to function, and design requirements at each respected location. Foundations also vary from spread footings to deep foundations (*e.g.*, pipe piles, pre-stressed concrete piles, or drilled shafts). Pile driving would be required for the deep foundations. Local ordinances may limit work activities to avoid night time work. During construction, existing roads would be temporarily closed or temporary detours would be used.

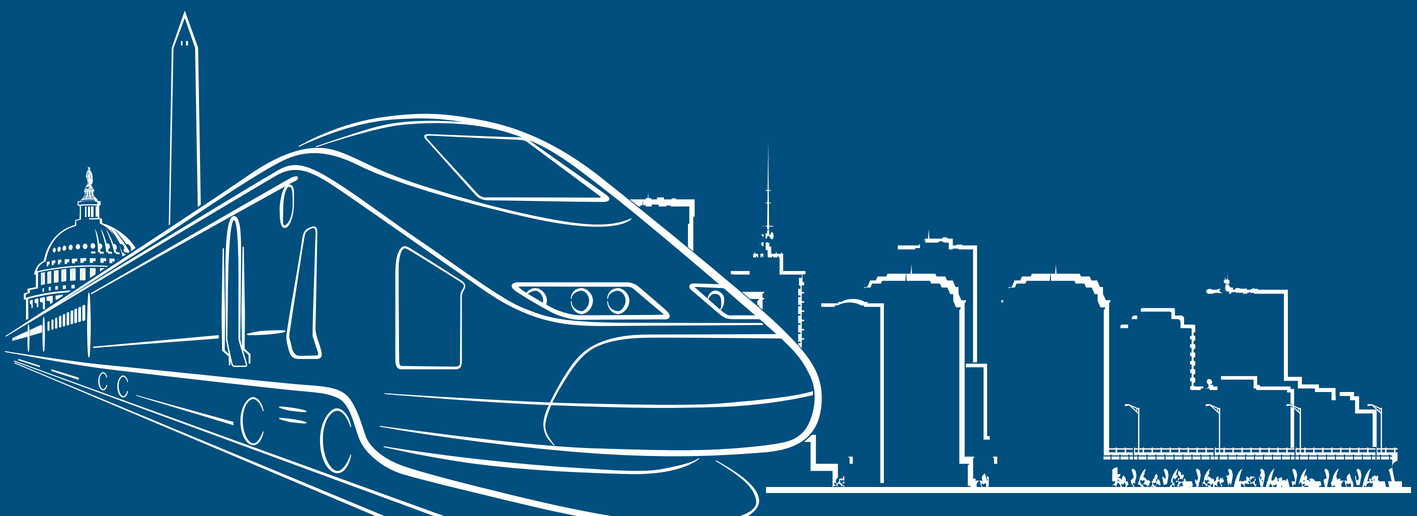
Road Construction. Due to the alignment of the corridor, roads are proposed to be lowered, elevated, realigned, or reconstructed. The roadways would be designed and constructed to VDOT standards. After the earthwork operations and utilities relocations are constructed, the roadway subgrade, base and final pavement sections would be constructed. Since roadway closures and detours during the construction process are anticipated, close coordination between the contractor and the relevant local agencies will be essential to scheduling temporary road closures and obtaining approval of detour routes.

Station Construction. The existing railway passenger stations on the DC2RVA corridor require facilities infrastructure improvements. The site preparation for station construction may include clearing and grubbing; building demolition and relocation; grading for the platform and third track; utility service installation and relocations; and drainage installations. Other infrastructure improvements proposed at the Richmond area stations include intermodal connectivity for local transit, passenger pickup and drop offs, and parking as either parking decks or paved parking areas.

The additional main line track would require construction of new platforms at the stations. The platform work consists of a poured concrete structure with, utilities, elevators, and pedestrian overpasses for ingress and egress to the station. The overhead pedestrian structures include stairways and elevators to be constructed on the platforms and station for access.

DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

3 AFFECTED ENVIRONMENT



D.C. TO RICHMOND SOUTHEAST HIGH SPEED RAIL

3 AFFECTED ENVIRONMENT

This chapter describes the existing social, economic, and environmental conditions present in the Washington, D.C. to Richmond High Speed Rail (DC2RVA) corridor to provide an understanding of the Project area relative to the effects of the alternatives evaluated in this Draft Environmental Impact Statement (EIS). It also identifies environmentally sensitive features in the Project corridor.

As described in Chapter 2, the DC2RVA corridor has been subdivided into six alternative areas—Arlington (Long Bridge Approach), Northern Virginia, Fredericksburg (Dahlgren Spur to Crossroads), Central Virginia (Crossroads to Doswell), Ashland (Doswell to I-295), and Richmond (I-295 to Centralia)—that correspond with proposed improvements and alternatives (Figure 3.0-1). At the northern terminus in Arlington, VA, the Project starts at the southern approach to Long Bridge, a double-track rail bridge that carries the rail corridor over the Potomac River and into Washington, D.C., where it connects to the southern terminus of the Northeast Corridor (NEC) at Union Station. Long Bridge and the tracks continuing north of the bridge into Union Station are not a part of the DC2RVA project for environmental clearance purposes. The southern terminus in Centralia is the junction of two CSX Transportation (CSXT) routes that begin in Richmond and rejoin approximately 11 miles south of Richmond. At Centralia, the Project connects to both the Richmond to Raleigh section of the Southeast High Speed Rail (SEHSR) corridor and the Richmond to Hampton Roads section of the SEHSR corridor.

Additional sections of the Project include approximately 8.3 miles of the CSXT Peninsula Subdivision CA-Line from Beulah Road in Henrico County, VA, to AM Junction in the City of Richmond, and the approximately 26-mile-long Buckingham Branch Railroad (BBR) from AM Junction to the Richmond, Fredericksburg, and Potomac Railroad Railway (RF&P) crossing in Doswell, VA.

From north to south, the Project travels through the following towns, cities, and counties:

- Arlington County
- City of Alexandria
- Fairfax County
- Prince William County
- Town of Dumfries
- Town of Quantico
- Stafford County
- City of Fredericksburg
- Spotsylvania County
- Caroline County
- Hanover County
- Town of Ashland
- Henrico County
- City of Richmond
- Chesterfield County

For each resource inventoried in this chapter, the Virigina Department of Rail and Public Transportation (DRPT) defined a study area. The study areas differ from the alterantive areas described above, vary in size depending on the resource, and are typically centered about the existing rail or potential bypass alignment. The study areas for the human environment, noise, and air quality are larger than the natural environment boundaries. The larger study areas are defined by regions of influence in which a resource may potentially have noticeable project-related impacts. Regions of influence for human resources account for factors such as community sizes, geographical and political boundaries, and census boundaries. These human resources

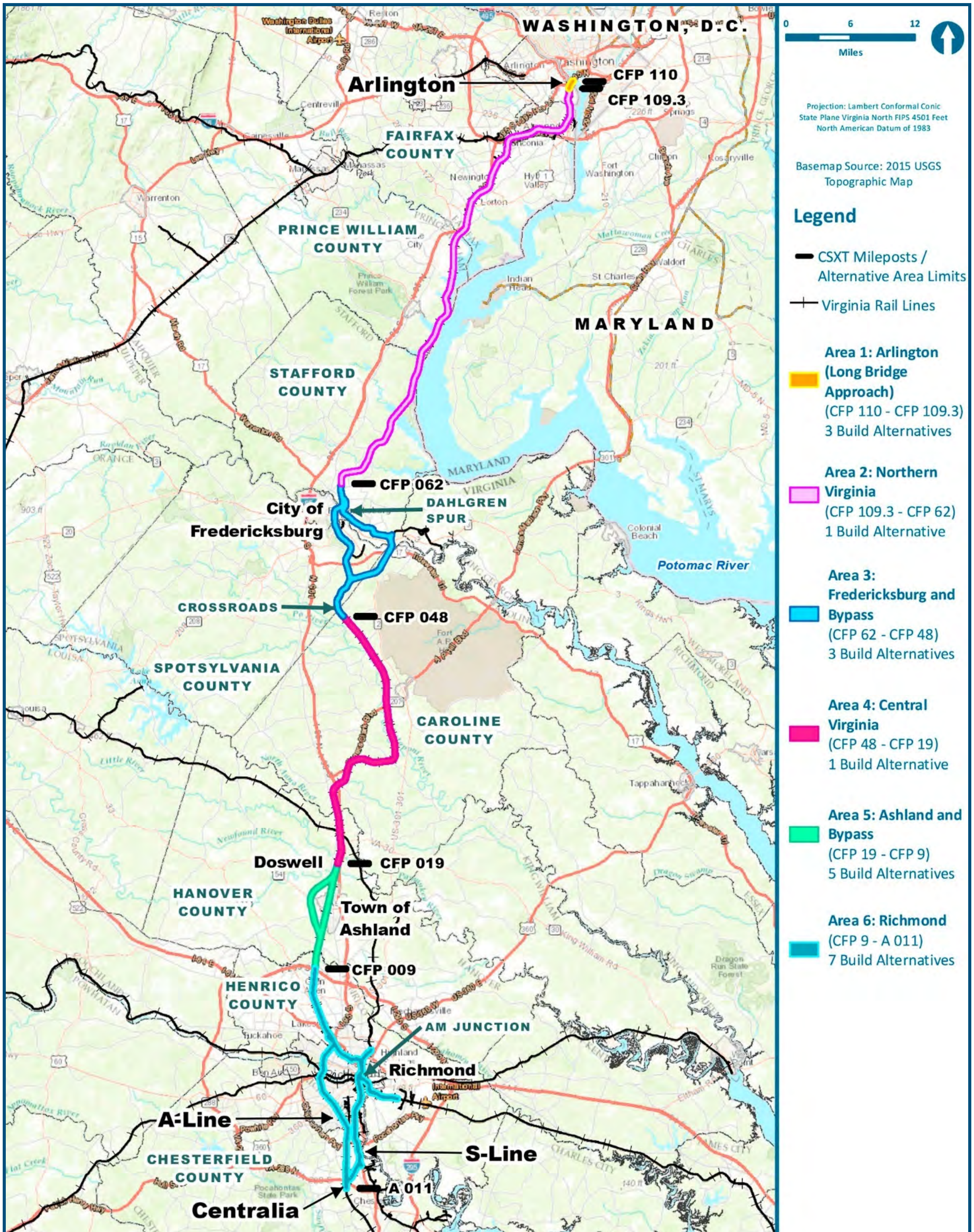


Figure 3.0-1: Alternative Areas

include social and economic issues, community resources, and land use planning. The air quality study area is influenced by local and regional atmospheric conditions. The noise study area is determined by the limit of noise intrusions associated with the Project. The extent of the study areas for the other natural resources described in this chapter were defined through coordination with federal and state regulatory agencies, and the anticipated limits of disturbance to the resource from Project construction and operation. The study areas were defined to extend well past the expected limits of disturbance to ensure that all potentially affected resources were identified and were generally established as a minimum of 500 feet (Table 3.0-1)

Table 3.0-1: Study Area by Resource

Resource	Study Area[1]	Comment
Water Resources	Varies	500-foot study area for review of maps, photographs, databases, etc. Wetland and stream delineations were performed within a 100-foot study area.
Topography, Geology, Soils	600 feet	Wider study area because soils in disturbed areas such as the existing railroad corridor are not rated, so a wider study area provides a better understanding of the soil profile along the corridor.
Agricultural Lands	1,000 feet	Study area established to include larger farms and Agricultural/Forestal Districts within rural areas.
Mineral Resources	Varies	Resources identified for both a 2,000-foot wide study area and a 2-mile study area. Wider study area used since the resources, regardless of size, are identified as points on a map.
Solid Wastes and Hazardous Materials	1,000 feet	Wider study area to account for potential for contamination to travel from adjacent properties that may be affected and to include properties that might be considered for acquisition or easements.
Air Quality	All counties the Project is located within	Study area is larger than for other resources because much of the available data regarding regional air quality is provided at the county level and not at a smaller scale.
Noise and Vibration	Varies	Study area for the noise and vibration analysis varies in size throughout the corridor to account for potential impacts and is as wide as approximately 3 miles through some sections.
Energy	Not applicable	Analysis covers energy use from intercity travel to, from, within, and through the DC2RVA corridor.
Aesthetics and Visual Environment	Varies	Study area includes areas from which the Project would be visible as well as areas visible from the rail.
Biological Resources	500 feet	Minimum study area width. Considered conservative to capture any potential impacts.
Community Resources	1,000 feet	Study area of 1000 feet set for consistency with Title VI and Environmental Justice study area and for inclusion of smaller communities within rural areas. Counties discussed for comprehensive planning.
Title VI and Environmental Justice	1,000 feet	Includes census tracts with any portion within the 1,000-foot study area.
Archaeological and Aboveground Historic and Cultural Resources	Varies	Study area is the Area of Potential Effect which is the limits of disturbance for archaeological resources and 1000 feet for aboveground resources, which is expanded to 2000 feet in areas of overpass recommendations.
Parklands, Recreational Areas, and Refuges	1,000 feet	Wider study area to ensure inclusion of all additional right-of-way impacts including those related to roadway improvements.
Transportation Facilities	Varies	Two study areas established. Regional study area focuses on the broader transportation network and transportation modes that provide the overall context for the existing railroad service, as well as the proposed DC2RVA service. It includes portions of every county and city that the proposed service will traverse, and its extents include I-95 and U.S. Route 1, which run roughly parallel to the DC2RVA corridor. The second study area is 1-mile-wide and was used for more-detailed analysis of the affected transportation network.

Note: 1. Study area is centered along the corridor.

3.1 WATER RESOURCES

Water resources are regulated by the United States Environmental Protection Agency (EPA) and the United States Army Corps of Engineers (USACE) according to the *Water Pollution Control Act of 1972* (Clean Water Act [CWA]) and the *Water Quality Act of 1987.* Section 404 of the CWA regulates activities affecting Waters of the United States (WOUS). WOUS can be generally defined as all navigable waters and waters that have been or can be used for interstate or foreign commerce, their tributaries, and any waters that, if impacted, could affect the former. WOUS include surface waters (e.g., streams, lakes, bays) and their associated wetlands (i.e., inundated or saturated areas that support vegetation adapted for life in wet soils). EPA, USACE, the United States Coast Guard (USCG), the Virginia Department of Environmental Quality (DEQ), and the Virginia Marine Resources Commission (VMRC) all issue permits for various activities in, under, and over WOUS.

Virginia DEQ administers the Virginia Water Protection Permit program (9 VAC 25-210), Section 401 of the Clean Water Act (CWA), and the State Water Control Law for activities affecting jurisdictional wetlands, streams, and other water bodies. In July 2000, Virginia DEQ authority was modified by the Virginia General Assembly to develop a non-tidal wetlands program and to provide regulations to protect fish and wildlife resources. While waters that are considered "isolated" do not fall under federal CWA permitting, they are regulated by Virginia DEQ.

VMRC is authorized to permit activities in, on or over state-owned subaqueous lands in Virginia (Code of Virginia Chapter 2, Title 62.1). In addition, VMRC is responsible for managing and regulating the use of Virginia's tidal wetlands and coastal primary sand dunes in conjunction with Virginia's local wetlands boards, where established. VMRC also protects and regulates those areas designated as non-vegetated and vegetated tidal wetlands and state-owned subaqueous bottom land.

Virginia's WOUS, including wetlands, are also regulated under the Virginia Wetlands Act and through Subtitle III of Title 28.2 of the Code of Virginia. These laws include oversight of areas and activities, such as isolated wetlands or Tulloch ditching, that are not covered by the Federal wetland program. Through this framework, each County's Local Wetlands Board regulates activities in tidal wetlands within their Counties.

Streams, wetlands, and floodplains within a 500-foot-wide study area centered on the DC2RVA corridor were identified by reviewing aerial photographs and topographic maps, Virginia Wetlands Catalog maps from the Virginia Department of Conservation and Recreation (VDCR)–Division of Natural Heritage, wetlands digitized by the City of Richmond, National Hydrography Dataset (NHD) maps from the United States Geological Survey (USGS), National Wetlands Inventory (NWI) maps from the United States Fish and Wildlife Service (USFWS), Virginia Department of Transportation's (VDOT) "Comprehensive Environmental Data and Reporting System" (CEDAR) Geographic Information System (GIS) data (VDOT, no date), VDOT mitigation sites, and Flood Insurance Rate Maps (FIRM) from the Federal Emergency Management Agency (FEMA).

DRPT conducted field surveys in September 2015 through September 2016 to verify the existence of potential ephemeral, intermittent, and perennial streams and wetlands within 100 feet of the existing rail on the side of the track where improvements are proposed. The field survey findings augmented and updated the NHD and NWI mapping. These water resources are discussed in greater detail in the sections below. Streams and wetlands mapped within the study areas are shown in Appendix M. Lengths of streams and areas of wetlands within the study corridor were calculated using GIS.

Due to the DC2RVA corridor being located in two geographic regions, DRPT confirmed with USACE at a meeting held prior to fieldwork that two different regional supplements of the USACE delineation manual and its forms would be used for the delineation of wetlands along the corridor. The Eastern Mountains and Piedmont – Version 2.0 would be used for all wetlands delineated west of I-95, and the Atlantic and Gulf Coastal Plane Region – Version 2.0 would be used for all wetlands delineated east of I-95. All stream channels with the potential to be impacted by the DC2RVA project were assessed using the Unified Stream Methodology (USM) form. In Virginia, the USM is the approved assessment methodology for existing stream condition and the necessary mitigation requirements for stream impacts. Field reviews by USACE and Virginia DEQ, spot checks with the field crews at several intervals during the field survey, ensured methods were conducted according to agency expectations. Additional information was obtained through the scoping process, participating agency meetings, and consultation with regulatory agencies.

3.1.1 Drainage Basins

For permitting purposes, regulatory agencies prefer that mitigation take place within the same Hydrologic Unit Code (HUC) 8 watershed as the project. The DC2RVA corridor crosses seven USGS Subbasins or HUC 8 watersheds:

- Middle Potomac–Anacostia–Occoquan
- Lower Potomac River
- Lower Rappahannock
- Mattaponi
- Pamunkey
- Middle James–Willis
- Lower James

Figure 3.1-1 shows these watersheds.

Middle Potomac–Anacostia–Occoquan Watershed
This watershed encompasses approximately 831,483 acres in Alexandria, Arlington, Fairfax, Prince William, Loudoun, Fauquier, and Stafford counties. It is one of the most polluted watersheds in Virginia with approximately 27 percent of the surface waters reporting reduced water quality, even though roughly 45 percent of the watershed is forested.

Lower Potomac River Watershed
Prince William, Westmoreland, King George, Northumberland, Richmond, Fauquier, and Stafford counties contain a portion of this watershed. Most of the 1,160,160 acres is forested (i.e., deciduous, evergreen, and mixed).

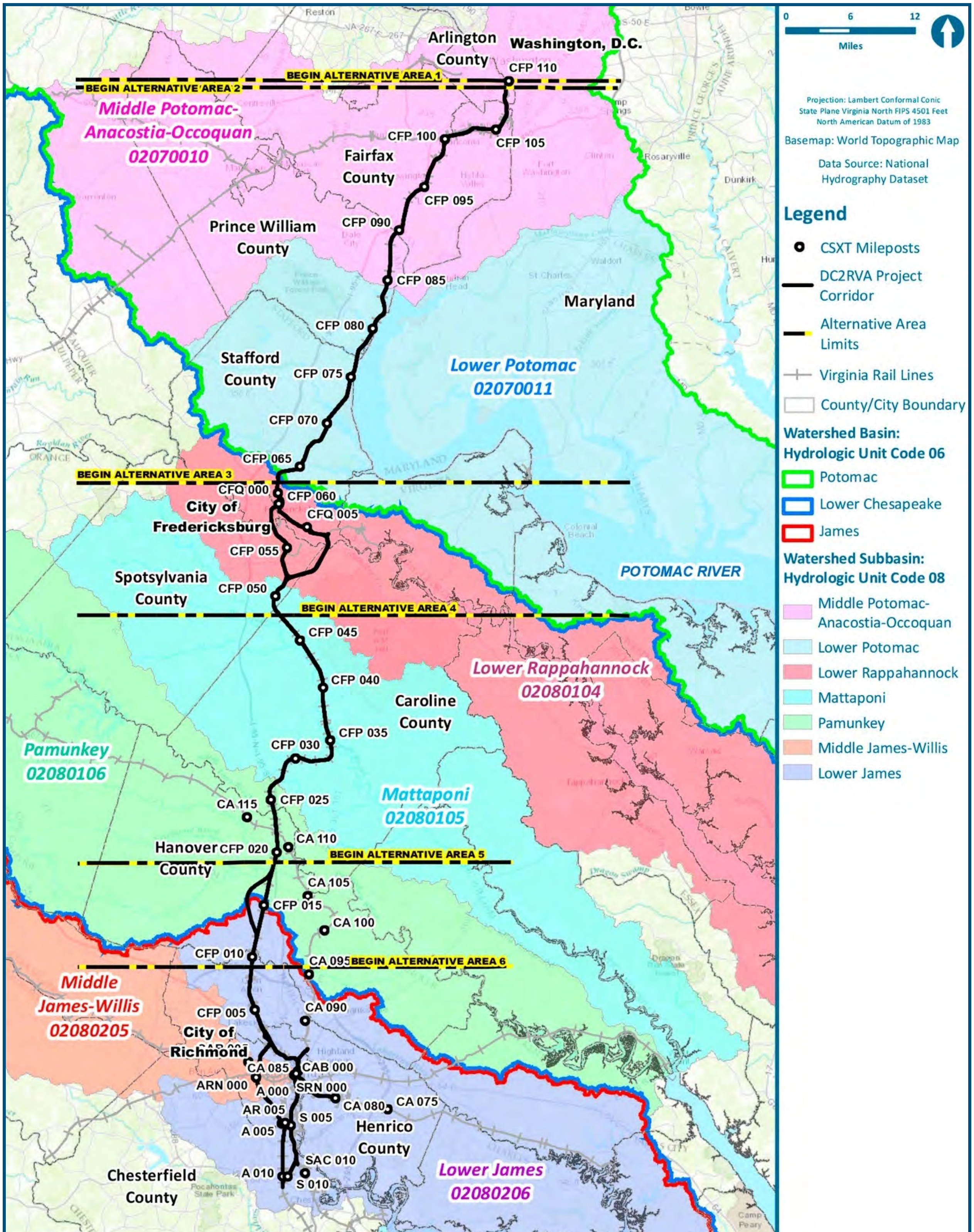


Figure 3.1-1: Watershed Boundaries

Lower Rappahannock Watershed

This watershed drains directly to the Chesapeake Bay and supplies important coastal habitat to waterfowl and migratory birds along the Eastern Flyway (USDA, 2004). The Lower Rappahannock Watershed encompasses approximately 738,446 acres in Stafford, Spotsylvania, Caroline, King George, Richmond, Westmoreland, Lancaster, Essex, and Middlesex counties. Half of the area is forested with a mixture of hardwood and pines. Of the remaining area, agriculture makes up approximately 21 percent of the land use, producing mainly soybeans, corn, and hay; 14 percent has been developed.

Mattaponi Watershed

This watershed encompasses approximately 582,426 acres in Orange, Spotsylvania, Caroline, King and Queen, and King William counties. Most of the land (approximately 70 percent) in this watershed is forested with a mixture of hardwood and pines. Roughly 14 percent of the land is used for agriculture, and 10 percent of the land has been developed. This watershed drains to the York River and eventually the Chesapeake Bay.

Pamunkey Watershed

This watershed is located in Hanover, Louisa, King William, Spotsylvania, Caroline, and New Kent counties. Approximately 941,032 acres drain to the York River and eventually to the Chesapeake Bay. The area is predominantly wooded with irregular plains and low, rolling hills. Elevations downstream are very low, stream flow is slow, and stained water is common. Land use in the drainage area is mostly forested (approximately 64 percent), pasture and crop land account for approximately 13 percent of the area, and approximately 4 percent is developed or barren.

Middle James–Willis Watershed

This watershed contains approximately 615,449 acres in a portion of 6 counties—Buckingham, Cumberland, Fluvanna, Goochland, Henrico, and Powhatan—and the city of Richmond.

Lower James Watershed

Land use in this approximately 1,135,000-acre watershed is mostly urban and suburban (48 percent), with only 31 percent forested and 12 percent agricultural. It is known for its large military installations, port facilities, and manufacturing. The watershed covers part or all of Hanover, Henrico, Prince George, New Kent, Surry, Isle of Wight, and York counties.

3.1.2 Surface Waters, Rivers, and Streams

The 500-foot-wide study area along the DC2RVA corridor includes more than 350 rivers, streams, and other surface waters (Figure 3.1-2), including approximately 204,563 linear feet of surface waters, including rivers and streams (Table 3.1-1). Most of the surface waters are small perennial or intermittent streams. Eight of the waters are classified as navigable.

Table 3.1-1: Surface Waters, Rivers, and Streams

Alternative Area	Water Bodies	Number of Streams Delineated	Linear Feet in Study Area[1]
Area 1: Arlington (Long Bridge Approach)	▪ Roaches Run	1	214
Area 2: Northern Virginia	▪ Roaches Run ▪ Four Mile Run ▪ Timber Branch (piped underground) ▪ Taylor Run ▪ Cameron Run ▪ Long Branch ▪ Accotink Creek ▪ Pohick Creek ▪ Giles Run ▪ Occoquan River ▪ Marumsco Creek ▪ Marumsco Acres Creek/Lake ▪ Farm Creek ▪ Neabsco Creek ▪ Powells Creek ▪ Boars Creek ▪ Aquia Creek ▪ Accokeek Creek ▪ Potomac Creek ▪ Claiborne Run	112	49,147
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	▪ Claiborne Run ▪ Rappahannock River ▪ Hazel Run ▪ Deep Run ▪ Little Falls Run ▪ Snow Creek ▪ Meadow Creek	67	46,778
Area 4: Central Virginia (Crossroads to Doswell)	▪ Mattaponi River ▪ Campbell Creek ▪ Polecat Creek ▪ Reedy Creek ▪ North Anna River ▪ Bull Run ▪ Little River	60	25,734
Area 5: Ashland (Doswell to I-295)	▪ South Anna River ▪ Falling Creek ▪ Stony Run ▪ Chickahominy River	45	31,129
Area 6: Richmond (I-295 to Centralia)	▪ North Run ▪ Hungry Creek ▪ Rocky Branch ▪ Horsepen Branch ▪ Jordans Branch ▪ Cannon Branch & Shockoe Creek (piped underground in some locations) ▪ Goode Creek ▪ Grindall Creek ▪ Falling Creek ▪ James River ▪ Kingsland Creek ▪ Proctors Creek ▪ Reedy Creek ▪ Broad Rock Creek	69	51,561

Source: Field Surveys, 2015-2016.

Notes: 1. Lengthwise measurement of streams and rivers (i.e., the width of the study area across larger river crossings)

3.1.3 Designated Waters

Table 3.1-2 identifies special status streams and other special waterway designations in the DC2RVA corridor. Figure 3.1-2 shows these designated waters.

Table 3.1-2: Special Stream Designations

Designation	Organization	Water Body	Alternative Area
Navigable Waters	USACE/USCG	Occoquan River Neabsco Creek Powells Creek Aquia Creek Rappahannock River Hazel Run Mattaponi River James River	Northern Virginia Northern Virginia Northern Virginia Northern Virginia Fredericksburg Fredericksburg Central Virginia Richmond
State Scenic River	VDCR	Occoquan River[1] Rappahannock River North Anna River[1] South Anna River[1] James River	Northern Virginia Fredericksburg Central Virginia Ashland Richmond
Wild and Scenic Rivers	Bureau of Land Management (BLM), National Park Service (NPS), USFWS, United States Forest Service (USFS)	There are no federally listed Wild or Scenic Rivers in Virginia.	n/a
Nationwide Rivers Inventory[2]	NPS	North Anna River South Anna River	Central Virginia Ashland
Exceptional State Waters[3]	Virginia DEQ	No Exceptional State Waters are located in the study area.	n/a
Chesapeake Bay Preservation Areas	VDCR	The study area includes 2,986 acres of Chesapeake Bay Resource Protection Areas (RPA). The remainder of the land located within the study area is considered to be Resource Management Area (RMA).	All
Virginia Coastal Zone Management Areas	Virginia DEQ	The entire study area is located within Virginia's coastal zone.	All
Fisheries Management Areas	VMRC	No Fisheries Management Areas are located in the study area.	n/a
Shellfish Areas	VMRC	No commercial shellfish sites, Baylor Grounds (public oyster grounds), private oyster grounds, or state-constructed oyster reef areas are located in the study area.	n/a

Source: USACE, 2016, VDCR, 2011, VDCR, 2013, DOI, *et al.,* 2014, NPS, 2009, Virginia DEQ, 2014, VMRC, 2012, USCG, no date.

Notes: 1. Identified as worthy of future study (not yet a legislatively designated river); 2. More than 3,400 free-flowing river segments determined to possess one or more "outstandingly remarkable" natural or cultural values judged to be of more than local or regional significance; 3. Waters with outstanding qualities in which activities such as discharge and the temporary lowering of water quality are regulated to protect and maintain their exceptional status.

3.1.3.1 Navigable Waters

According to USACE and USCG, the following waters crossed by the existing rail line are navigable:

- Four Mile Run
- Accotink Creek
- Occoquan River
- Neabsco Creek
- Powells Creek
- Quantico Creek
- Chopawamsic Creek
- Aquia Creek
- Rappahannock River
- Hazel Run
- Mattaponi River
- James River

USCG has jurisdiction over navigable waters. Navigable waters are defined by 33 *Code of Federal Regulations* (CFR) 2.05-25 as waters subject to the ebb and flow of tide; or any water that is presently used, was previously used, or is susceptible to use in its natural condition, or by reasonable improvement, as a means to transport substantial interstate or foreign commerce. Work in or near such a water may require consultation with or permits from USCG. Figure 3.1-2 identifies the navigable waters.

3.1.3.2 State Scenic Rivers

The *Virginia Scenic Rivers Act of 1970,* §10.1-400 requires state and federal agencies to take into consideration how projects and programs affect state scenic rivers. The DC2RVA corridor crosses five scenic rivers (Table 3.1-3 and Figure 3.1-2).

Table 3.1-3: State Scenic Rivers Crossed by the Project

River	Designated Reach	Alternative Area	Status
Occoquan River	Entire River	Northern Virginia	Potential Components—Identified as worthy of future study
Rappahannock River	Headwaters to Route 3 at Ferry Farm	Fredericksburg	Scenic River—Legislatively designated component
North Anna River	Route 1 at Chandler Crossing to Pamunkey River	Central Virginia	Potential Components—Identified as worthy of future study
South Anna River	Route 686 to Pamunkey River	Ashland	Potential Components—Identified as worthy of future study
James River	West limits of Richmond to Orleans Street (extended)	Richmond	Scenic River—Legislatively designated component

Source: VDCR, 2011.

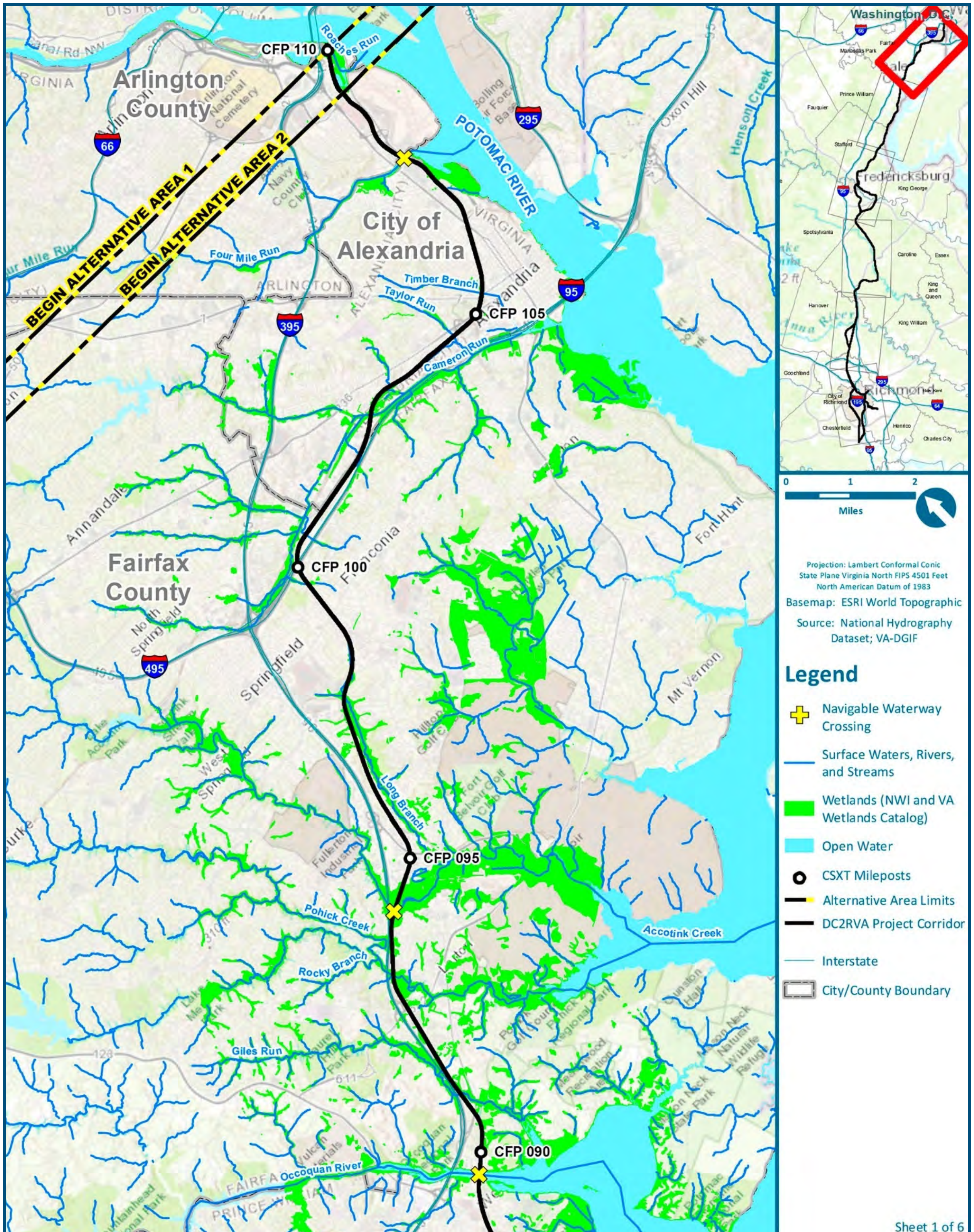


Figure 3.1-2: Surface Waters, Rivers, Streams, and Wetlands

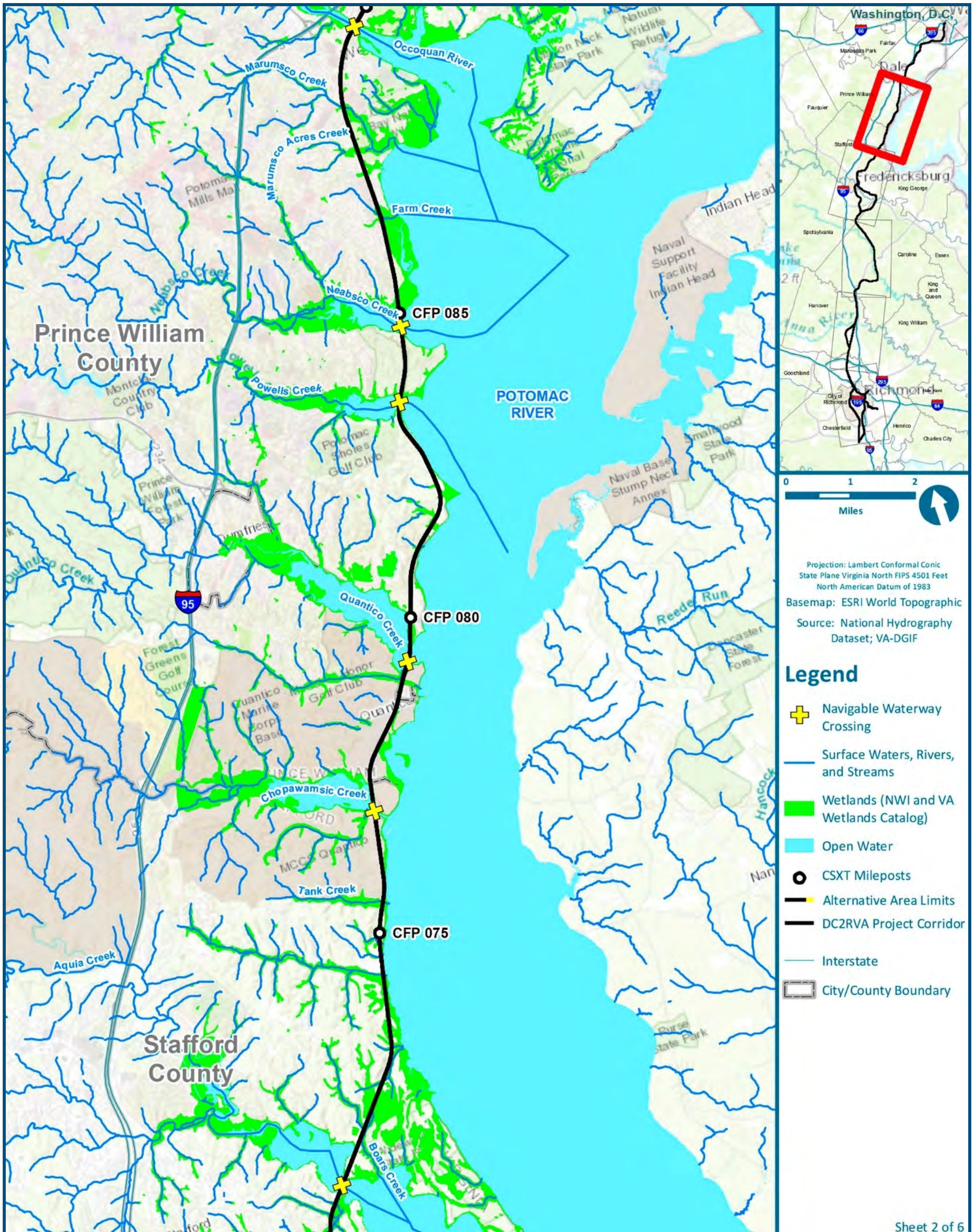


Figure 3.1-2: Surface Waters, Rivers, Streams, and Wetlands

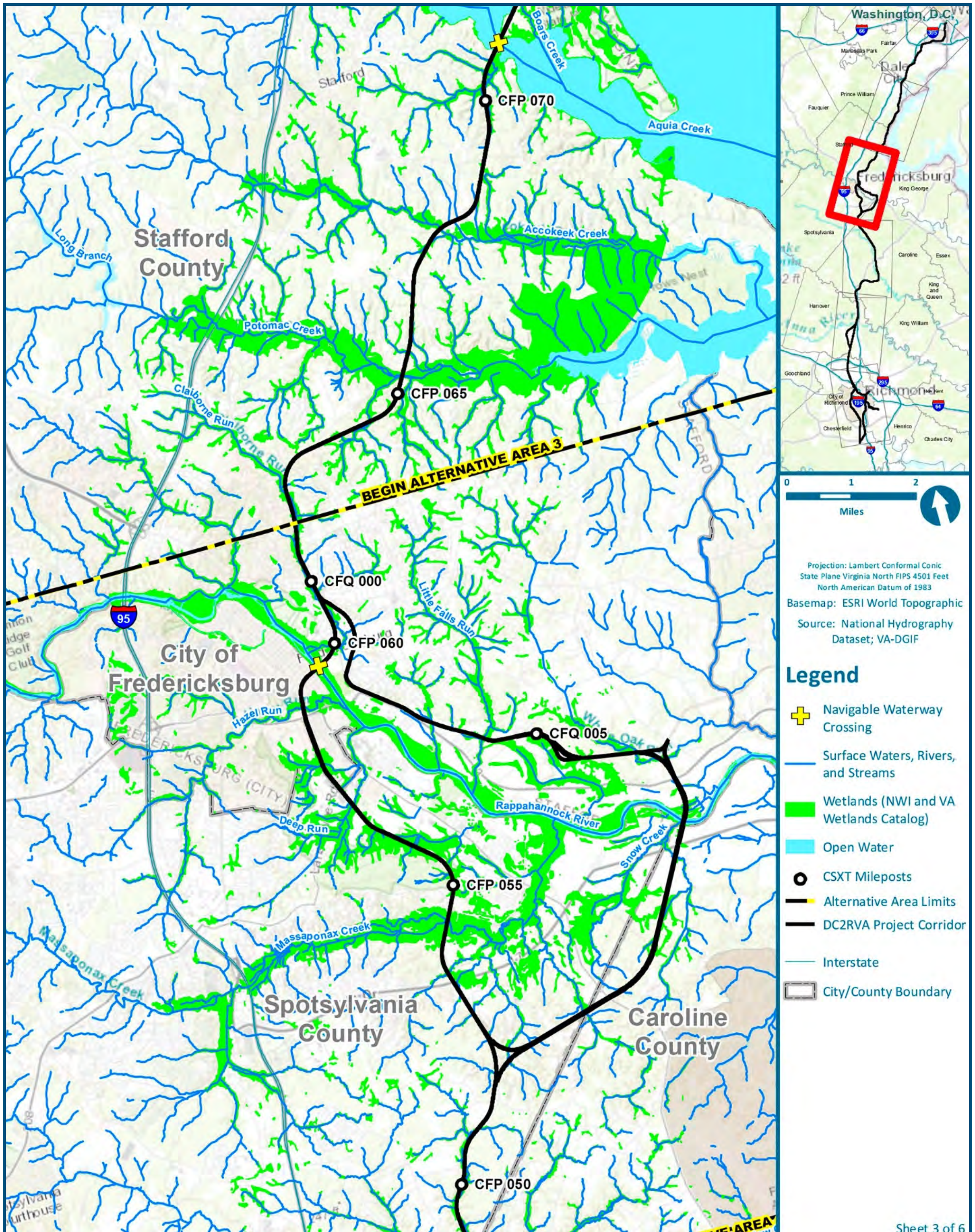
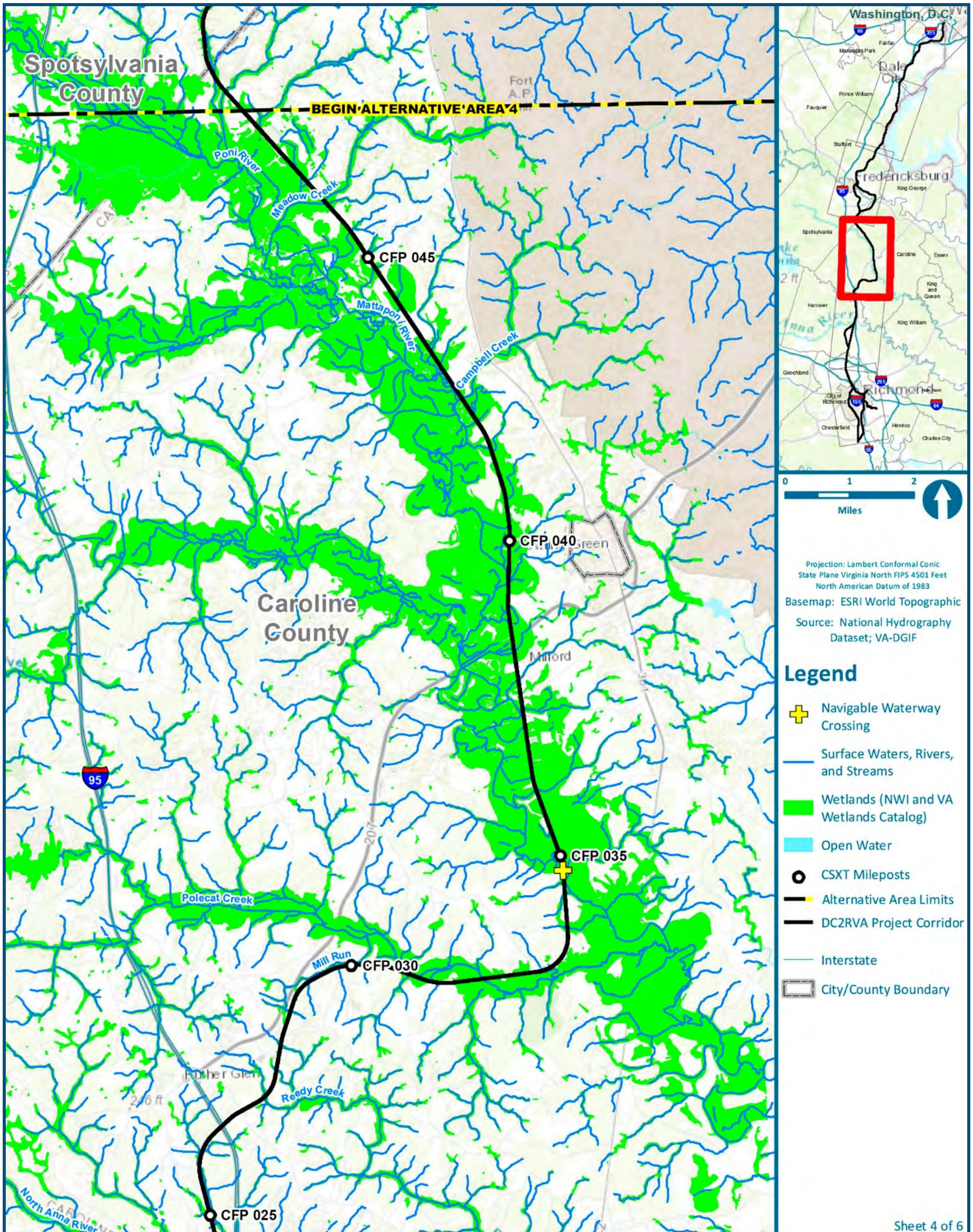


Figure 3.1-2: Surface Waters, Rivers, Streams, and Wetlands



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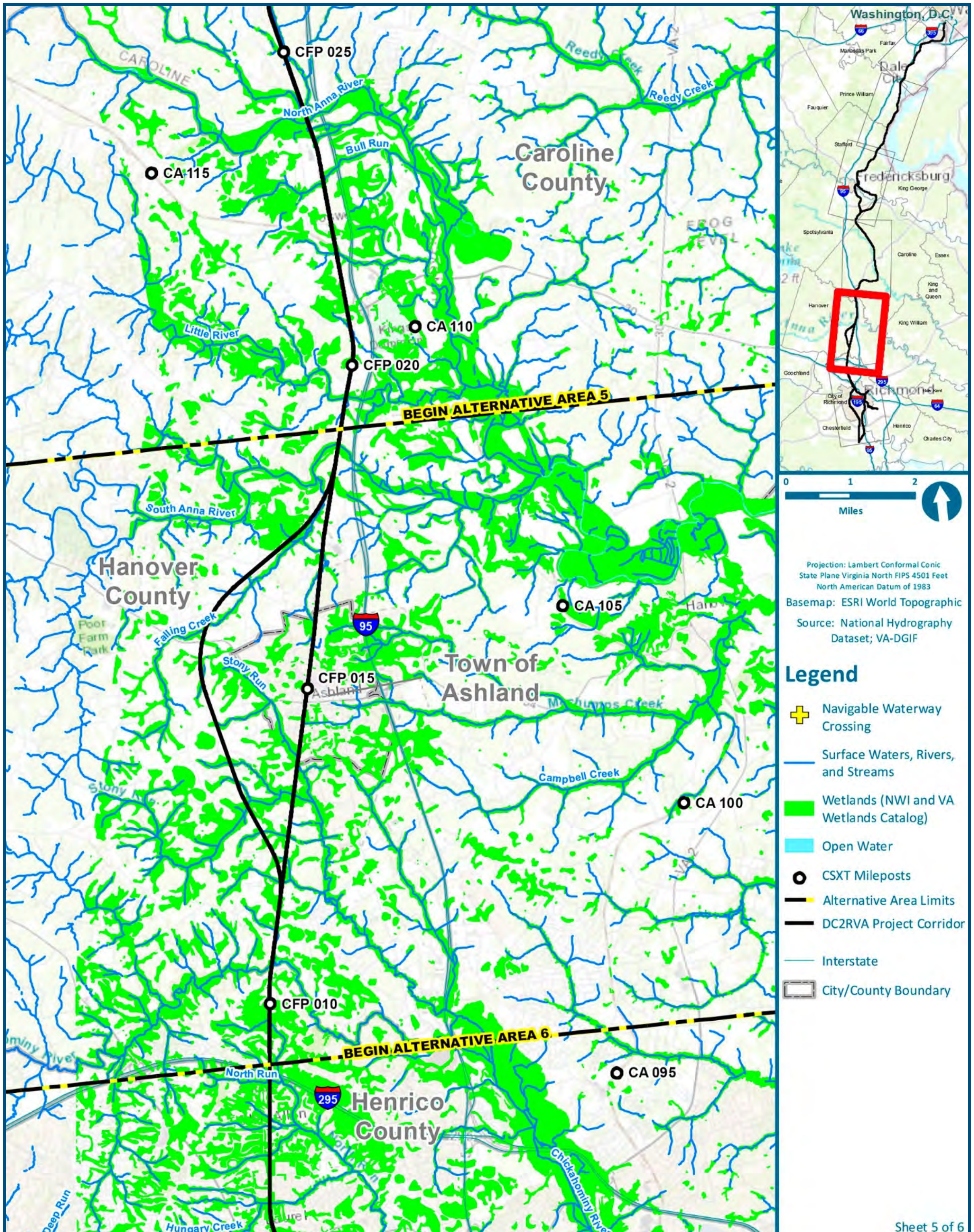

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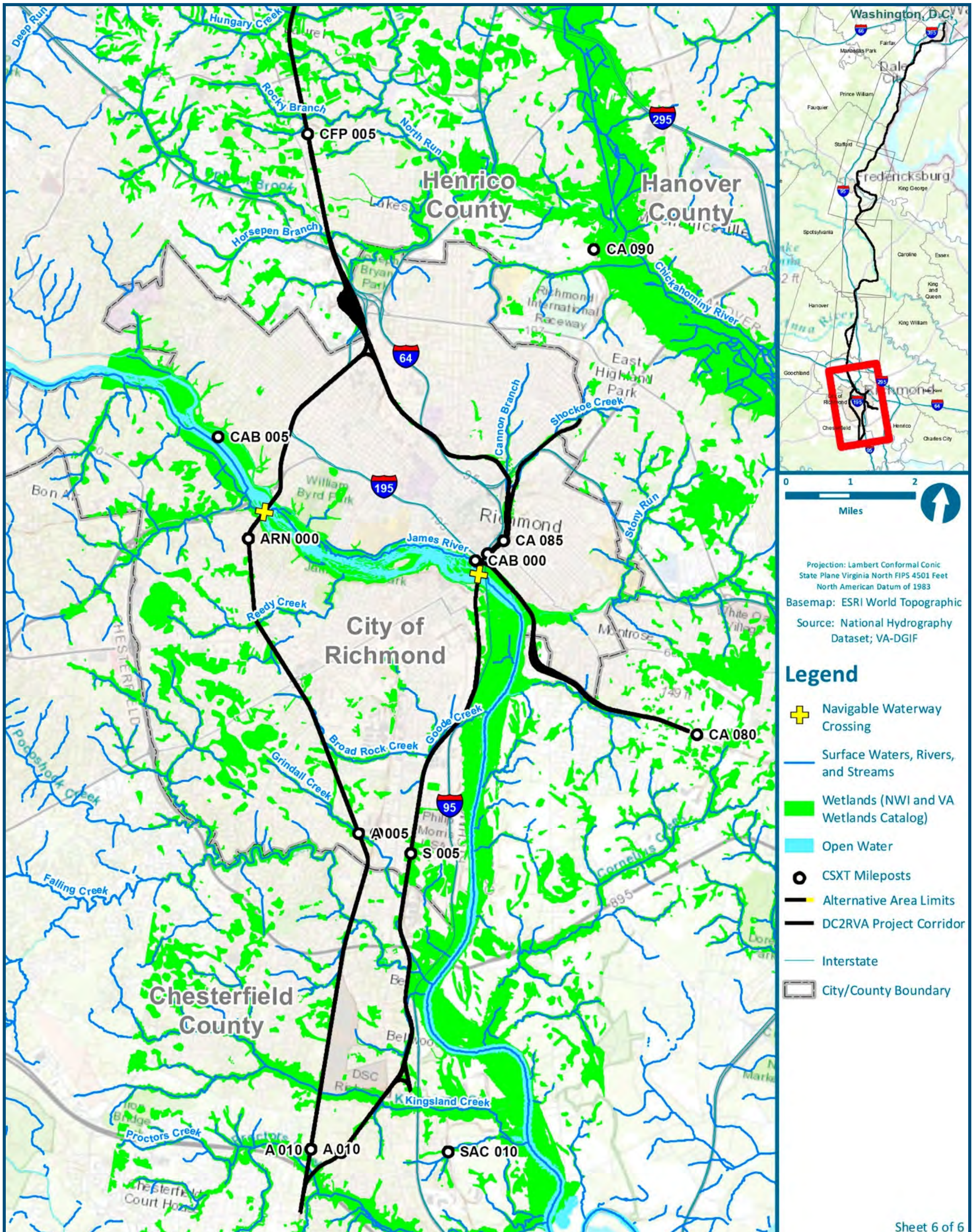


Figure 3.1-2: Surface Waters, Rivers, Streams, and Wetlands

3.1.3.3 Nationwide Rivers Inventory

The Nationwide Rivers Inventory (NRI) is a listing of more than 3,400 free-flowing river segments in the United States, maintained by the National Park Service, that are believed to possess one or more "outstandingly remarkable" natural or cultural values (ORVs) judged to be of more than local or regional significance. ORVs include scenic, recreational, geologic, fish, wildlife, historic, cultural, or other. Under a 1979 Presidential Directive, and related Council on Environmental Quality (CEQ) procedures, all federal agencies must seek to avoid or mitigate actions that would adversely affect one or more NRI reaches. Table 3.1-4 lists the resources within the DC2RVA corridor that are listed on the NRI.

Table 3.1-4: Designated Nationwide River Reaches

River	Designated Reach	ORVs
North Anna River	1.5 miles above Morris Bridge to Lake Anna	Historic—Historic mill sites and ruins, Civil War Battlefields and breastworks, Indian artifact sites Recreational—Popular whitewater canoe run, noted for smallmouth bass fishing
South Anna River	North Anna River to Gouldin	Historic—Historic mill sites and ruins, Civil War Battlefields and breastworks, Indian artifact sites Recreational—Unique proximity to Richmond and Fredericksburg, noted for smallmouth bass fishing

Source: NPS, 2009.

3.1.3.4 Chesapeake Bay Preservation Areas

The *Chesapeake Bay Preservation Act* (CBPA) was enacted by the Virginia General Assembly in 1988 to protect and manage Virginia's "coastal zone." The CBPA requires local governments to include water quality protection measures in their zoning and subdivision ordinances and in their comprehensive plans. Executive Order (EO) 13508, *Chesapeake Bay Protection and Restoration*, issued in 2009, requires DRPT to consider goals for restoring clean water by reducing nitrogen, phosphorus, sediment, and other pollutants; recovering habitat by restoring a network of land and water habitats to support priority species and other public benefits; sustaining fish and wildlife; and conserving land and increasing public access.

The entire DC2RVA corridor is located within the Chesapeake Bay Preservation Area. Resource Protection Areas (RPAs) include tidal wetlands; tidal shores; non-tidal wetlands connected by surface flow and contiguous to tidal wetlands or perennial water bodies; and highly erodible soils, as well as a 100-foot-wide vegetated buffer area located adjacent to and landward of these features and along both sides of any water body with perennial flow within the Chesapeake Bay watershed. When preserved in their natural condition, RPAs protect water quality; filter and reduce the volume of runoff; prevent erosion; and perform other important biological and ecological functions. These areas are subject to local CBPA requirements to minimize land disturbance, preserve indigenous vegetation, minimize impervious surfaces, control stormwater runoff, and implement erosion and sediment control plans for land disturbances. The DC2RVA project is conditionally exempt from additional avoidance or minimization of impacts to RPAs provided it is constructed in accordance with the *Erosion and Sediment Control Law* (§10.1-560 *et seq.* of the Code of Virginia) and the *Stormwater Management Act* (§10.1-603. 1 *et seq.* of the Code of Virginia).

DRPT mapped RPAs by including a 100-foot-wide buffer to the edge of perennial streams and adjacent wetlands. Approximately 1,760 acres of RPAs are associated with delineated wetlands and streams. All additional land within the DC2RVA corridor is considered a Resource Management Area (RMA). The RMA includes all land outside the RPA that, if improperly used or developed, has the potential to degrade water quality or diminish functions of the RPA.

3.1.3.5 Virginia Coastal Zone Management Area

Pursuant to Section 307 of the Coastal Zone Management Act of 1972 (CZMA), as amended, and National Oceanic and Atmospheric Administration (NOAA) *Federal Consistency Regulations* (15 CFR Part 930), federal agency projects occurring within, or with reasonably foreseeable likelihood to affect, Virginia's coastal uses or resources must be conducted in a manner that is consistent to the maximum extent practicable with the Virginia Coastal Zone Management Program (CZMP) and require a consistency determination.

Virginia DEQ administers the Virginia CZMP through a network of state agencies and local governments, which share responsibility for administering the enforceable policies as follows: Fisheries Management (VMRC and the Virginia Department of Game and Inland Fisheries [VDGIF]), Subaqueous Lands Management (VMRC), Wetlands Management (VMRC and Virginia DEQ), Dunes Management (VMRC), Non-point Source Pollution Control (Virginia DEQ), Point Source Pollution Control (Virginia DEQ, State Water Control Board), Shoreline Sanitation (VDH), Air Pollution Control (Virginia DEQ, Air Pollution Control Board), and Coastal Lands Management (Virginia DEQ).

According to Virginia DEQ, Virginia's coastal zone "encompasses the 29 counties, 17 cities, and 42 incorporated towns in 'Tidewater Virginia,' as defined in the *Code of Virginia* 28.2-100" (Virginia DEQ, no date) (Figure 3.1-2). The entire DC2RVA corridor is located within Virginia's coastal zone. Any development within this area must be consistent with the applicable Enforceable Regulatory Programs that comprise Virginia's CZMP.

3.1.4 Wetlands

Wetlands provide valuable habitat for fish and wildlife; improve water quality; perform important hydrologic functions, such as regulating storm flow; maintain food chain and nutrient cycling functions; serve socioeconomic roles; and may support rare and endangered species. EO 11990, *Protection of Wetlands*, mandates that each federal agency take action to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural values.

Wetlands are currently defined by USACE (33 CFR 328.3[b]) and EPA (40 CFR 230.3[t]) as:

> Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

Wetlands observed in the study area were generally associated with freshwater riparian corridors, railway ditches, and some tidal waterways along riparian corridors in the north. Their functions include groundwater discharge, groundwater recharge, nutrient removal, sediment/ toxin retention, and wildlife habitat. Most of the emergent wetlands are railside ditches and include vegetation such as Japanese stiltgrass *(Microstegium vimineum),* Asian spiderwort *(Murdannia keisak),* cat tails *(Typha latifolia* and *angustifolia),* rice cut-grass *(Leersia oryzoides),* deertongue *(Dichanthelium clandestinum)*, greenbrier *(Smilax rotundifolia)*, Japanese honeysuckle *(Lonicera japonica)*, soft rush *(Juncus effusus)*, several species of *Carex*, woolgrass *(Scirpus cyperinus)*, and panic grass *(Dichanthelium dichotomum)*, with a large variety of other non-dominant species. The most common tree species found in the palustrine forested wetlands set back from the railroad in rural areas include red maple *(Acer rubrum)*, sweetgum *(Liquidambar styraciflua)*, willow oak *(Quercus phellos)*, loblolly pine *(Pinus taeda)*, and river birch *(Betula nigra)*.

This Draft EIS uses an abbreviated version of the classification system developed by USFWS, also known as the Cowardin System (Cowardin, *et al.*, 1979), for identifying wetlands. The study area includes palustrine emergent wetlands (PEM), palustrine scrub–shrub wetlands (PSS), and palustrine forested wetlands (PFO) (Table 3.1-5 and Figure 3.1-2).

Table 3.1-5: Wetlands (acres)

Alternative Area	PEM	PEM/PSS	PEM/PFO	PEM/PSS/PFO	PSS	PSS/PFO	PFO	Total
Area 1: Arlington (Long Bridge Approach)	–	–	–	–	9.0	–	–	**9.0**
Area 2: Northern Virginia	13.4	1.2	23.4	15.3	0.8	–	18.7	**72.8**
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	9.6	1.8	19.5	–	8.6	0.0	93.2	**132.7**
Area 4: Central Virginia (Crossroads to Doswell)	14.6	4.5	106.0	13.1	2.2	11.4	36.6	**188.4**
Area 5: Ashland (Doswell to I-295)	10.3	0.1	13.6	–	0.0	1.9	24.3	**50.2**
Area 6: Richmond (I-295 to Centralia)	14.7	0.5	3.8	0.8	1.7	0.2	15.4	**37.1**
Total	**62.6**	**8.1**	**166.3**	**29.2**	**22.3**	**13.5**	**188.2**	**490.2**

Source: Field Surveys, 2015-2016.

3.1.5 Floodplains and Floodways

A floodplain is an area of low-lying ground near waterways subject to flooding. Floodplains have many natural and beneficial values, including flood flow moderation, water quality maintenance, and wildlife habitat. The *National Flood Insurance Act of 1968* established the National Flood Insurance Program, under which FEMA maps the nation's flood-prone areas on the FIRM. The FIRM identifies the 100- and 500-year flood boundaries. The 100-year flood boundary is the area that will be inundated by a flood event having a 1.0 percent chance of being equaled or exceeded in any given year. The 500-year flood boundary is the area that will be inundated by a flood event having a 0.2 percent chance of being equaled or exceeded in any given year.

EO 11988, *Floodplain Management*, requires federal agencies to avoid to the extent possible the long- and short-term adverse effects associated with the occupancy and modification of floodplains. In accomplishing this objective, "each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health, and welfare, and to restore and preserve the natural and beneficial values served by flood plains in carrying out its responsibilities."

According to the FIRM produced by FEMA, approximately 3,574 acres of 100-year floodplains are within a 500-foot-wide study area along the DC2RVA corridor, as shown in Figure 3.1-3. Mapped floodplains include those associated with 51 waterways in the study area. Table 3.1-6 summarizes the acres of floodplain by alternative area. DRPT also learned of localized flooding in Stafford County at the Brooke Fire Station and at Claiborne Run during the scoping process.

Table 3.1-6: Floodplains

Alternative Area	Acres	Percent of Study Area
Area 1: Arlington (Long Bridge Approach)	47	1%
Area 2: Northern Virginia	954	27%
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	251	7%
Area 4: Central Virginia (Crossroads to Doswell)	1,171	33%
Area 5: Ashland (Doswell to I-295)	386	11%
Area 6: Richmond (I-295 to Centralia)	765	21%
Total	3,574	100%

3.1.6 Water Quality

In compliance with Sections 303(d), 305(b), and 314 of the federal CWA and the *Safe Drinking Water Act,* Virginia DEQ has developed a prioritized list of water bodies that currently do not meet water quality standards. Virginia DEQ monitors streams for a variety of water quality parameters, including temperature; dissolved oxygen; pH; fecal coliform; *Escherichia coli*; *Enterococci*; total phosphorus; chlorophyll a; benthic invertebrates; metals and toxins in the water column; suspended sediments; and fish tissues.

Water quality standards designate uses for waters. In Virginia, the six designated uses include aquatic life, fish consumption (*i.e.*, the ability of humans to eat fish from that water body), public water supplies (where applicable), recreation (swimming), shell fishing, and wildlife, with some additional subcategories in aquatic life adopted for the Chesapeake Bay and its tributaries. If a water body contains more contamination than allowed to support one or more of its designated uses, the waters are labeled "impaired." A cleanup plan to restore waters to their intended uses is developed for these impaired waters. The maximum amount of pollutant a water body can receive and still meet its intended use is known as the Total Maximum Daily Load (TMDL).

The Section 303(d) list includes those water bodies and watersheds that exhibit levels of impairment requiring investigation and restoration. Not all parameters are monitored at each ambient water quality monitoring station. Citizen groups and federal agencies also monitor some streams and provide their data to Virginia DEQ for compilation. The DC2RVA corridor crosses 62 assessed water bodies included on the Section 303(d) list, 51 of which are impaired (see Table 3-9 in Appendix M).

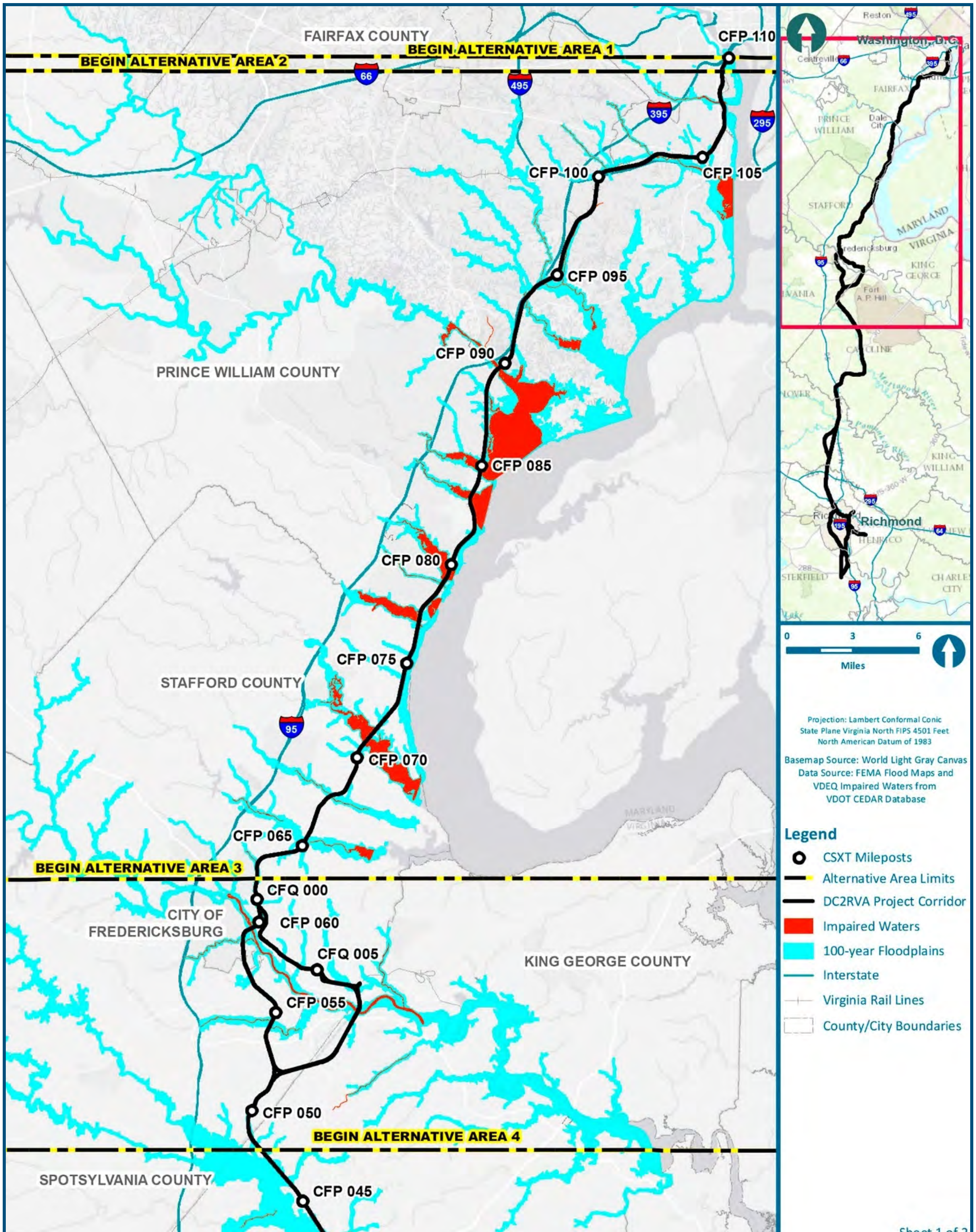


Figure 3.1-3: Floodpains and Impaired Waters

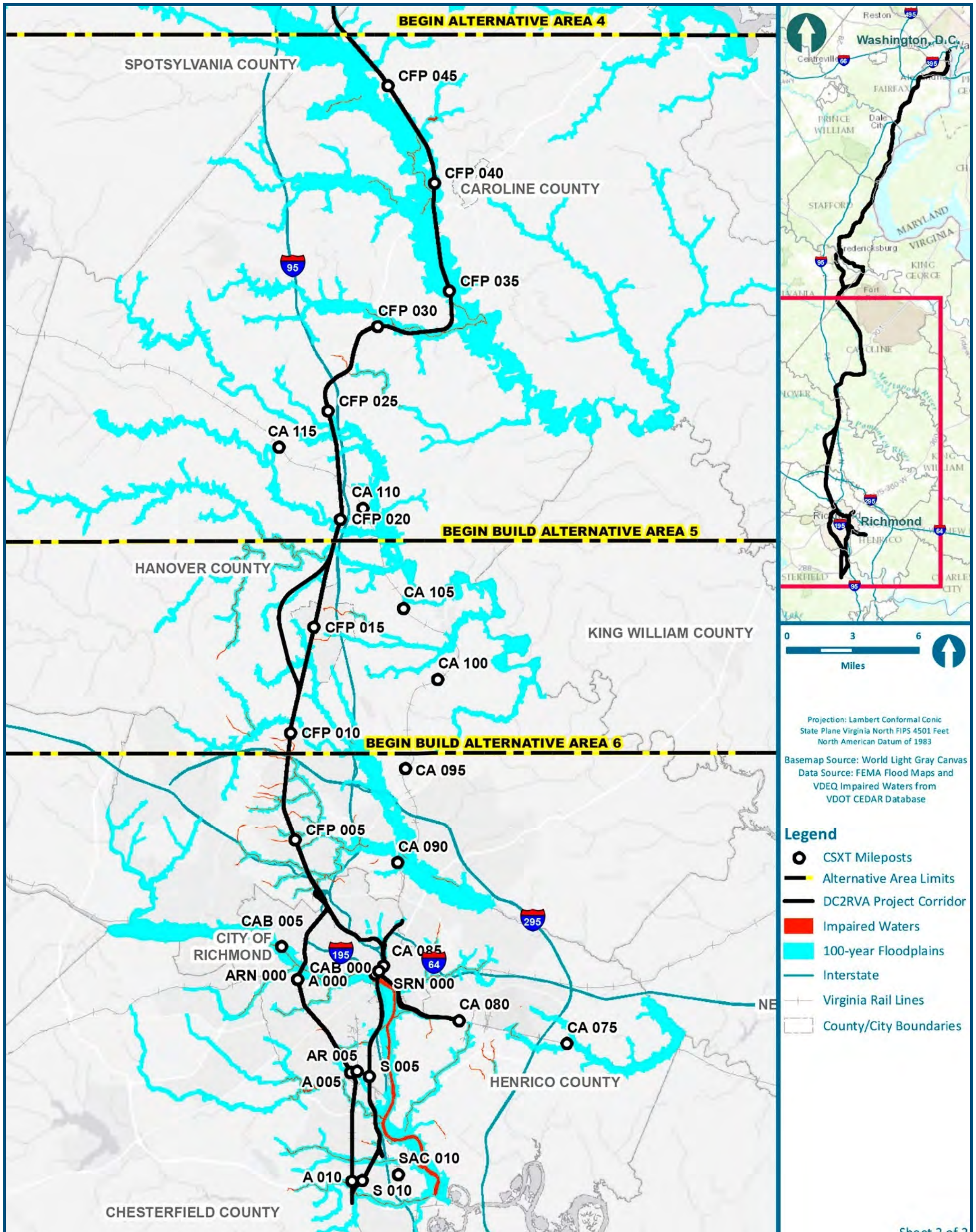


Figure 3.1-3: Floodpains and Impaired Waters

3.1.7 Drinking Water/Aquifers/Water Supply

In 1974, the *Safe Drinking Water Act* (SDWA) was passed by Congress to regulate the public drinking water supply. Amendments in 1986 and 1996 further protect the water supply by requiring actions that protect drinking water and its sources. The 1996 Amendments mandate that states assess, delineate, and map protection areas for their public drinking water sources and determine potential risks to those sources. Source water protection is not specifically mandated by the SDWA; however, states, tribes, and communities are encouraged to use this information to protect the sources from pollution of major concern and may pass local regulations.

This Project is located in the Coastal Plain province, which is composed of mostly unconsolidated deposits/layers of sand, gravel, shell rock, silt, and clay. These pervious unconsolidated layers store more groundwater than Virginia's other provinces in two separate groundwater systems—one shallow and one deep. The shallow groundwater system sits on top of a relatively impermeable clay layer and provides water for many domestic and smaller capacity wells. Due to the permeability of the soil above these shallow systems, they have a high potential for contamination (Virginia Tech, 2011). Release of chemicals during construction; release of transported chemicals; salts and chemicals used for snow and ice removal; and chemicals used for the removal of vegetation are the main sources of contamination to public water supplies along rail lines.

As a result of the 1996 SDWA amendments, Virginia adopted a 1-mile wellhead protection zone around all groundwater public sources (Zone 2). Zone 1 includes a 1,000-foot radius in which land use activities should be assessed for their potential to contaminate water supplies (Virginia DEQ, 2005). Seven public wellheads are located within Zone 1 of the existing rail corridor, and an additional six are located outside Zone 1 but within Zone 2. This does not include private wells, which also have the potential to be affected by this Project.

CEDAR GIS mapping from VDOT and mapping of wells from the Virginia Department of Mines, Minerals, and Energy (DMME) indicates two public and eight private water wells located within 100 feet of the DC2RVA corridor.

Reservoir Protection Overlay Districts are areas of zoning restricting use and require best management practices (BMPs) and other protective measures in areas critical to the integrity of public water supplies, rivers, streams, and other sensitive features. The existing rail corridor does not cross near any Reservoir Protection Overlay Districts (VDOT, no date).

The Project falls within SDWA Zone 1 (5-mile radius) of three public surface water supply intakes—Fairfax County Water Authority, Hanover Suburban Water System, and City of Richmond. Fairfax County Water Authority and City of Richmond water supplies are located upstream of the existing rail corridor.

No sole source aquifers (EPA, no date), source protection areas, or water supply reservoirs are located near the DC2RVA corridor.

3.2 TOPOGRAPHY, GEOLOGY, AND SOILS

Topography, geology, and soil characteristics affect development and land use, and they impact planning, design, and construction of roads and rail infrastructure. Topography may create engineering obstacles, and soil types can determine stability, durability, and choice of construction materials.

Information was gathered through research of USGS maps and atlases for geology and topography, and the Natural Resources Conservation Service (NRCS), under the United States Department of Agriculture (USDA), for soils.

Additional information was obtained from websites, local and regional plans, and personal communications with representatives from various federal, state, and local agencies and VDOT's CEDAR database, which includes database records collected from Virginia regulatory agencies.

The study area for geology and topography includes the overall landscape along the Project corridor. DRPT assessed soils information within a 600-foot-wide study area centered on the DC2RVA corridor, 300 feet to each side of the existing rail and proposed alignment. A wider study area (i.e., 600 feet versus 500 feet) was chosen because soils in disturbed areas such as the existing railroad corridor are not rated, so a wider study area provides a better understanding of the soil profile along the corridor.

3.2.1 Topography

In this region, most of the landscape is dominated by low rolling hills. Some sharper changes in topography exist along streams and rivers where erosion has taken away the topsoil and bedrock is exposed. In the north, most of the Project is located near the Potomac River on low flat plains. Topography in the southern stretches contains more variability.

3.2.2 Geology

The DC2RVA corridor crosses between two physiographic provinces—the Piedmont province and the Coastal Plain province (Figure 3.2-1). The dividing line between the provinces is the fall line with the Piedmont province to the west and the Coastal Plain province paralleling the coast to the east. The fall line (or fall zone) is the geomorphologic break between an upland region of relatively hard crystalline basement rock and a coastal plain of softer sedimentary rock. In Virginia, I-95 runs roughly along this line.

The Coastal Plain province contains Pliocene and Miocene sedimentary rocks formed from former shorelines and cut into terraces by historic emergent bay and river bottoms. These sedimentary rocks are relatively soft, unconsolidated layers of Cretaceous and younger clay, sand, and gravel. West of the Coastal Plain province, the Piedmont province is made up of late Proterozoic and Paleozoic igneous rock (formed by molten rock that has come to the surface and cooled) and metamorphic rock (physically and/or chemically changed due to heat and pressure) that has been strongly weathered and is buried under 6 to 65 feet of soil. The metamorphic rock is very complex due to the number of times it has been altered and often contains mineral deposits, including gold, talc, kyanite, slate, and feldspar (W&M, 2016).

3.2.3 Soils

NRCS rates soils for suitability for building site development. These ratings are based on many different soil properties. Suitability for construction of railroads is not rated; however, suitability for building local roads and streets is rated. Some of the same properties considered in building local roads and streets apply to building railroads, such as frost action; flooding potential; ponding; amount of large stones; depth to bedrock or a cemented pan; hardness of bedrock or a cemented pan; low strength; depth to saturation; shrink-swell potential; and slope. These properties affect ease of excavation and grading and traffic-supporting capacity.

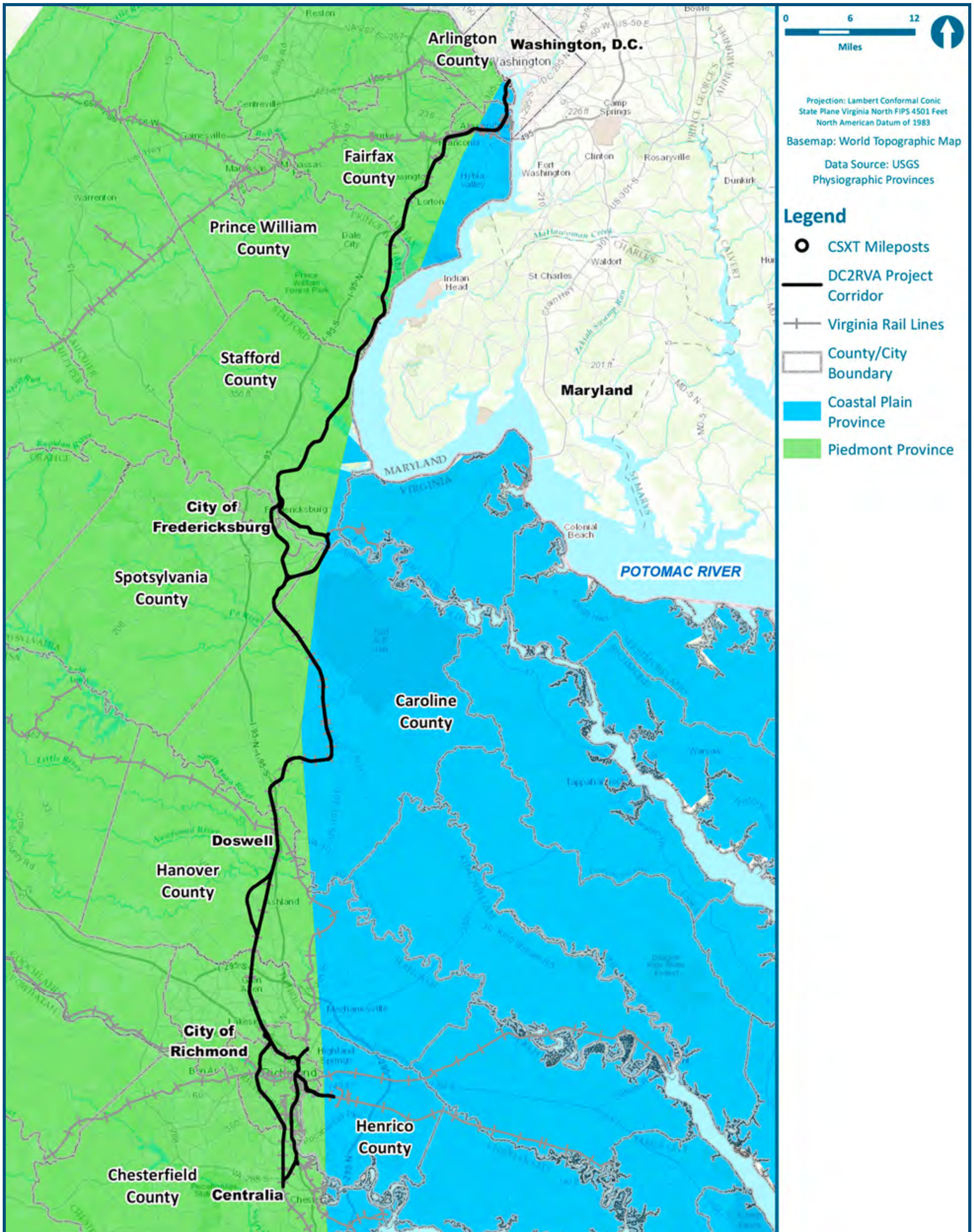


Figure 3.2-1: Physiographic Provinces (Virginia)

Table 3.2-1 below shows an analysis of soil mapped within the study area. Ratings indicate the extent to which the soils are limited by all soil features that affect the ability to build local roads and streets and should be considered for construction of railroad lines and roadway crossings. Most of the areas where construction is expected to occur were previously disturbed and are considered urban or cut/fill land. These locations are not rated for characteristics of concern for sensitive soil types.

Table 3.2-1: Construction-Limiting Soils

Alternative Area	Suitability for Building Local Roads and Streets (Acres)				Hydric Soils (Acres)			
	Not Rated	Not Limited[1]	Somewhat Limited[2]	Very Limited[3]	Unknown	Not Hydric	Partially Hydric	Hydric
Area 1: Arlington (Long Bridge Approach)	55	–	–	–	55	–	–	–
Area 2: Northern Virginia	1,149	37	459	1,763	1,151	1,583	385	289
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	146	175	657	1,220	105	1,179	573	341
Area 4: Central Virginia (Crossroads to Doswell)	54	234	768	1,058	19	690	620	785
Area 5: Ashland (Doswell to I-295)	7	142	565	543	2	393	721	141
Area 6: Richmond (I-295 to Centralia)	502	74	456	2,347	113	2,136	702	428
Corridor Total	**1,913**	**662**	**2,905**	**6,931**	**1,445**	**5,981**	**3,001**	**1,984**
% of Study Area	**15.4**	**5.3**	**23.4**	**55.9**	**11.6**	**48.2**	**24.2**	**16.0**

Table Source: USDA, 2015.

Notes: 1. Not Limited—Soil works well for specified use; good performance/low maintenance required. 2. Limitations can be overcome/ minimized through planning, design, and installation; fair performance/moderate maintenance. 3. Limitations may require major soil reclamation, special design, or expensive installation procedures to be overcome; poor performance/high maintenance.

The rating for the Project corridor soils for building roads and railbeds is approximately 33 percent "very limited" and 19 percent "somewhat limited." Appendix M includes figures that show the soils with potential construction limitations. These ratings indicate one or more factors that should be taken into consideration when used for that specified purpose. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance of the soil can be expected if these steps are taken (USDA, 2014).

3.3 AGRICULTURAL LANDS

The following discussion of agricultural lands is organized into two components: farmland soils and agricultural/forestal districts. The farmland soils data are based on mapping and data available from NRCS (Appendix N). Agricultural and forestal districts are based on mapping and data available from local jurisdictions and VDOT. Figure 3.3-1 shows the agricultural lands in the study area.

3.3.1 Farmland Soils

The *Farmland Protection Policy Act of 1981* (FPPA) (7 United States Code [U.S.C.] 4201 *et seq.)* established regulations to "minimize the extent to which Federal programs … contribute to … conversion of important farmland to nonagricultural uses, encourage alternative actions … that could lessen adverse effects on farmland, and assure that Federal programs are … compatible" with state, local, and private programs that protect farmland (7 CFR 658). NRCS has jurisdiction over the farmland program.

Farmland, as defined by 7 U.S.C. 4201, includes:

- Prime Farmland: The best combination of physical and chemical characteristics for producing food, feed, fiber, forage, oilseed, and other agricultural crops.
- Unique farmland: Land other than prime farmland that is used for production of specific high-value food and fiber crops.
- Farmland of statewide or local importance: Farmland that is important for the production of food feed, fiber, forage, or oilseed crops, as determined by the appropriate state or local agency.
- Pastureland, cropland, forestland, and other land that is not urban land or water.
- All farmland and forestland meeting the criteria for farmland soils, even if zoned for development.

These farmlands are based on individual soil types as determined by NRCS. Table 3.3-1 includes the acreage of farmland soils within 500 feet of either side of the the existing CSXT rail line and the centerlines of potential new alignments.

Table 3.3-1: Farmland Soils

Farmland Soil Type	Acreage within 1,000-Foot Study Area	Percent of Total
Prime and Unique Farmland Soils	3,979	21.5%
Statewide and Locally Important Soils	2,362	12.8%
Not Farmland Soils	12,163	65.7%

Source: VDOT, no date.

3.3.2 Agricultural and Forestal Districts

In the Commonwealth of Virginia, agricultural and forested lands are regulated under the *Local Agricultural and Forestal Districts Act*. The purpose of this act is to "encourage the development and improvement of the Commonwealth's agricultural and forestal lands for the production of food and other agricultural and forestal products … and to conserve and protect agricultural and forestal lands as valued natural and ecological resources which provide essential open spaces for clean air sheds, watershed protection, wildlife habitat, as well as for aesthetic purposes" *(Code of Virginia* 15.2-4300 to 4314 and 15.2-4400 to 4407). The lands are formed into districts within individual localities, and the provisions for the districts state that "no parcel within" or "added to an already created district shall be developed to a more intensive use than its existing use at the time of adoption/addition to the district for eight years from the date of adoption of the original district ordinance."

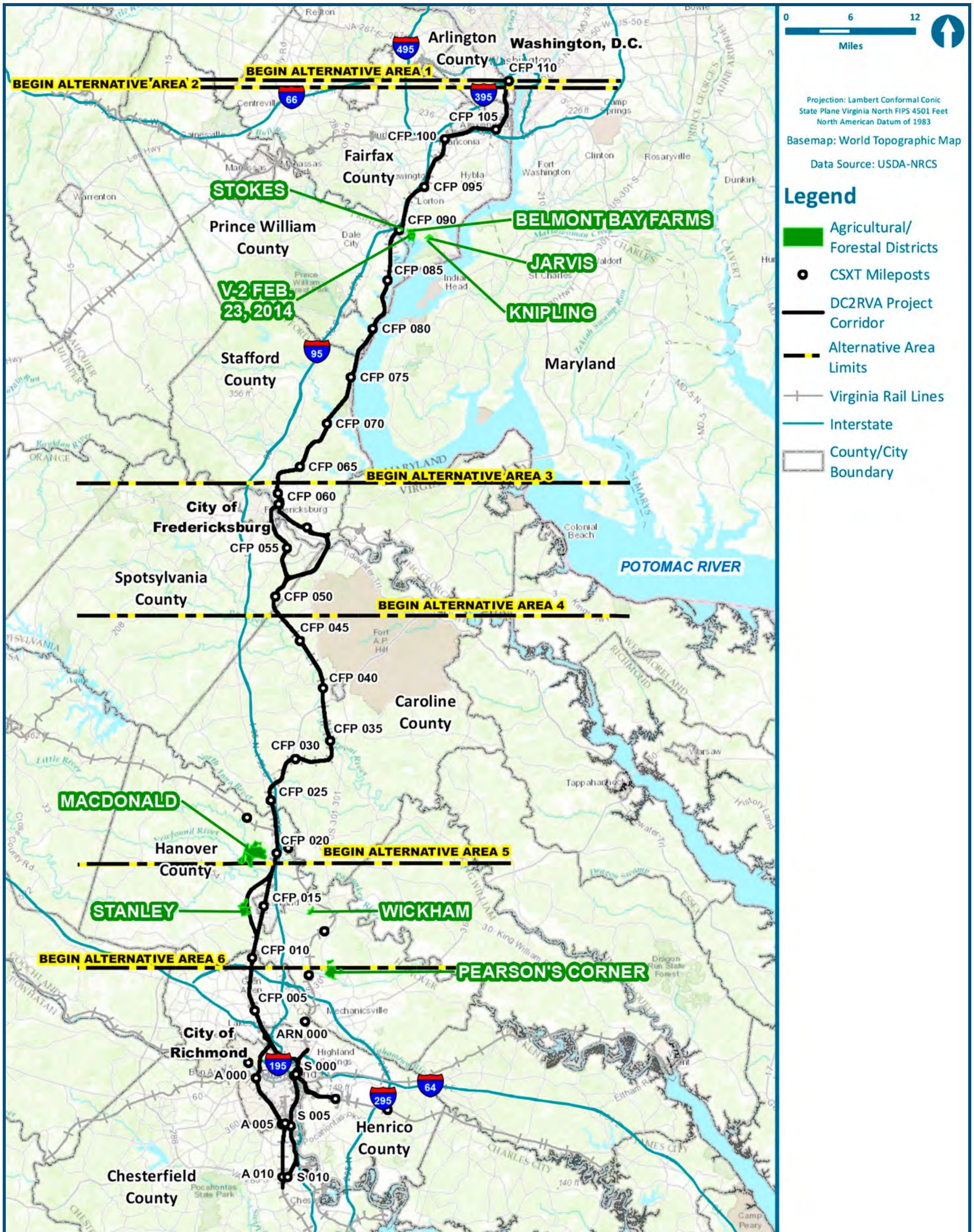


Figure 3.3-1: Agricultural/Forestal Districts

Along the Project corridor, Fairfax County, Hanover County, Prince William County, and Spotsylvania County have agricultural and forestal district programs. Table 3.3-2 includes the acreage of agricultural/forestal districts within 500 feet of the existing rail or the bypass alignment alternatives. One agricultural/forestal district is located within the study area: the Stanley District in Hanover County. The Stanley District is along the Ashland Bypass section in Alternative Area 5. The 1,000-foot-wide study area centered on the bypass section covers approximately 15 percent of the Stanley District.

Table 3.3-2: Agricultural and Forestal Districts

Location	Acreage within 1,000-Foot Study Area
Fairfax County	0
Hanover County	95.7 acres (all within the Stanley District)
Prince William County	0
Spotsylvania County	0

Source: VDOT, no date.

3.4 MINERAL RESOURCES

The location of mineral deposits affects development and land use, and it impacts planning, design, and construction of roads and rail. Mineral resource economic opportunities can influence the need for transportation. Information was gathered from the DMME ArcGIS service for mineral resources. Mineral resources were identified within 1 mile of the existing rail or proposed bypass alignment to comprise a 2-mile-wide study area (Figure 3.4-1). A wider study area (*i.e.*, 2 miles versus 500-feet) was chosen to account for the size of mine lands that are only represented by a point on a map, and to account for the potential impacts to mines from road closures.

More than 400 minerals are in Virginia. The value of non-fuel minerals produced in the Commonwealth of Virginia in 2012 was estimated at approximately $1.24 billion. Industrial minerals include kyanite; feldspar; fuller's earth; amazonite and other semi-precious gemstones; iron-oxide pigments; feldspar; salt; high-purity silica sand; heavy mineral sands (titanium and zirconium concentrates); chemical and agricultural carbonates; dimension stone; and vermiculite.

DMME has interactive ArcGIS maps for eight resource categories: Abandoned Coal Mine Reclamation Lands, Wind Energy Study Locations, Oil and Gas Wells, Active and Abandoned Underground Mines, Reclaimed Mines, Mineral Mines, Mineral Resources, and Gas and Oil Wells. Of these categories, only Mineral Mines and Mineral Resources had locations mapped within 1 mile of the DC2RVA corridor. The mines and resources identified are listed by alternative area in Table 3.4-1. To avoid double counting resources, each resource was only counted once even if it was within 1 mile of two different areas.

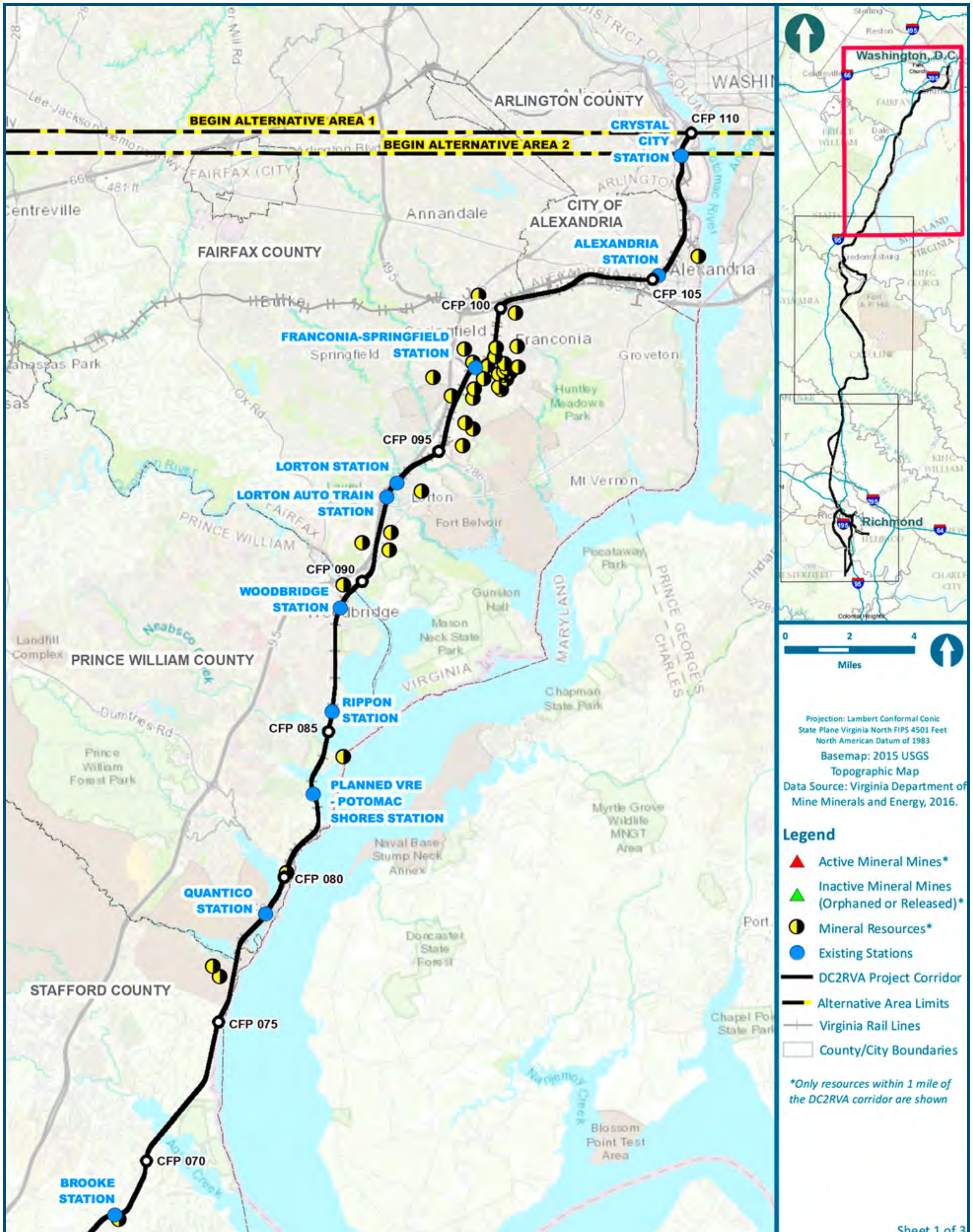


Figure 3.4-1: Mines & Mineral Resources

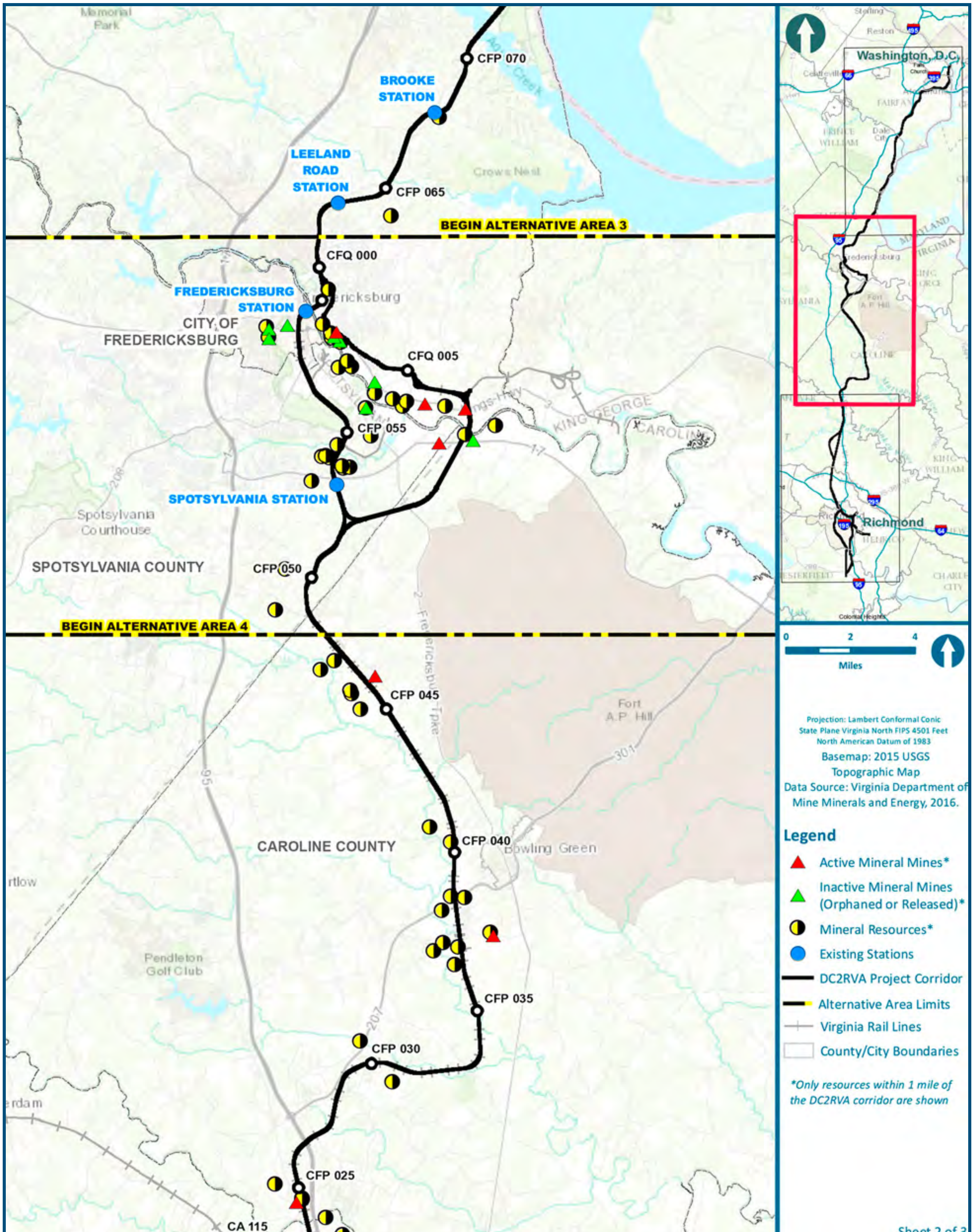


Figure 3.4-1: Mines & Mineral Resources

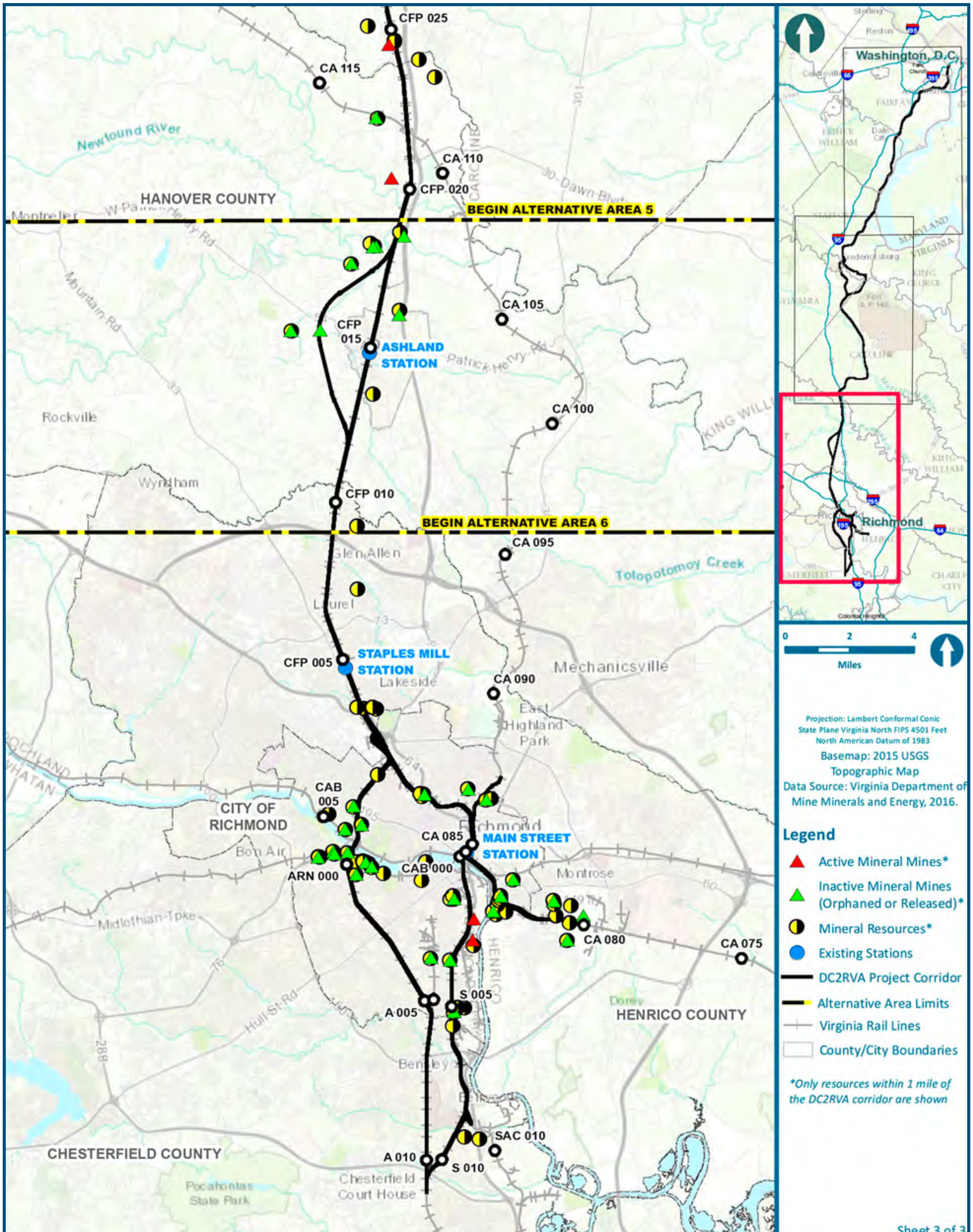


Figure 3.4-1: Mines & Mineral Resources

Table 3.4-1: Mineral Resources

Alternative Area	Mineral Mine		Mineral Resources	
	Within 1 mile	Within 1,000 feet	Within 1 mile	Within 1,000 feet
Area 1: Arlington (Long Bridge Approach)	–	–	–	–
Area 2: Northern Virginia	–	–	35	5 gravel resource areas (204C-908, 204C-906, 204C-913, 204C-804, 204C-805) 1 clay resource (194D-901) 1 sand and gravel resource (182B-901)
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	8	2 active sand and gravel mines (90385AA, 06100AA) 2 orphaned sand mines (DMM10104, DMM10108)	34	5 sand and gravel resources (182C-501, 182C-502, 182C-808, 169A-101, 182C-802) 3 sand and gravel resources (169B-210, 169B-205, 182C-501)
Area 4: Central Virginia (Crossroads to Doswell)	2	1 orphaned granite mine (DMM06028)	16	3 sand and gravel resources (169C-602, 169C-905, 169D-703)
Area 5: Ashland (Doswell to I-295)	8	1 orphaned gravel mine (DMM8951)	6	2 clay resources (149B-703, 149B-702) 1 sand and gravel resource (149C-403)
Area 6: Richmond (I-295 to Centralia)	25	1 orphaned sand and gravel mine (DMM13007) 2 sand and gravel mines (DMM12094, DMM13016) 5 orphaned granite mines (DMM12070, DMM13009, DMM13010, DMM12075, DMM13025)	56	18 sand and gravel resources (126C-104, 126C-101, 126C-505, 126C-404, 126C-403, 126C-708, 126C-701, 126C-501, 126C-503, 126C-502, 126C-915, 126C-914, 126C-913, 126C-912, 126C-911, 126C-908, 126C-907, 126D-709) 1 granite resource (099B-206) 4 clay resources (099B-202, 099B-203, 099B-501, 126C-401)

Note: To avoid double counting resources, each resource was only counted once even if it was within one mile of two different areas

3.5 SOLID WASTES AND HAZARDOUS MATERIALS

Hazardous materials are substances that are ignitable, explosive, corrosive, or toxic. Concerns associated with them include health hazards, environmental damages, liability issues, and potentially high costs of cleanup. Hazardous material sites can include gas stations; industrial sites; businesses that use hazardous materials in commercial operations; aboveground storage tanks (ASTs) and underground storage tanks (USTs); disposal sites; spill sites; and others.

Solid wastes refer to wastes produced as a result of construction-related activities such as debris produced from clearing and grubbing, excess materials, and removal of old materials. Disposal and reuse issues have been recognized in the construction industry, and an effort is being made to reduce volumes of waste produced by construction and demolition that are disposed of in landfills.

The study area for hazardous materials and solid wastes extends 500 feet to each side of the existing or proposed rail in the bypass areas, to comprise a 1,000-foot-wide study area. A wider study area (*i.e.*, 1,000 feet versus 500 feet) was chosen to account for potential for contamination to travel from adjacent properties that may be affected, and to include properties that might be considered for purchase or easements for the construction of the DC2RVA project. Further investigation of hazardous sites/facilities that could potentially be affected by the Project would be completed in a Phase I Environmental Site Assessment that would occur prior to construction.

3.5.1 Regulatory Context

The federal government and the Commonwealth of Virginia, primarily through EPA and Virginia DEQ, respectively, regulate hazardous materials under multiple statutes. The two main statutes that regulate materials of primary concern include the *Resource Conservation and Recovery Act of 1976* (RCRA) and the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA) and their respective amendments. The RCRA regulates generators, transporters, and treatment, storage, and disposal facilities of hazardous materials. RCRA defines these materials as those that have ignitability, corrosivity, reactivity, or toxicity. The CERCLA was passed to provide an avenue to correct those sites already contaminated with hazardous substances. EPA and Virginia DEQ maintain databases of regulated sites and facilities.

3.5.2 Data Collection

DRPT conducted an environmental records review to identify hazardous material (hazmat) database records along the Project corridor from Environmental Risk Information Service (ERIS), a commercial database search and environmental risk information provider. Records within 500 feet of the existing track or potential bypass track were reviewed to identify sites with the known or potential presence of contamination. Additional information was obtained on potential hazardous materials sites from VDOT's CEDAR database, which includes database records collected from Virginia regulatory agencies. This information was compiled and compared with the results of the ERIS database search. Table 3.5-1 lists the databases that were searched.

Table 3.5-1: Hazardous Material Databases

Database	Definition
FEDERAL RECORDS (databases marked with an asterisk had no records within the search area)	
BROWNFIELDS	The Assessment, Cleanup, and Redevelopment Exchange System (ACRES) Brownfield Database and EPA Listing of Brownfields—Property on which use or development activities may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. Generally, these consist of abandoned or underused industrial and commercial facilities that may be available for reuse or redevelopment.
CERCLIS/National Priorities List (NPL)/ Superfund Sites	Comprehensive Environmental Response, Compensation, and Liability Information System—Superfund is a program administered by EPA to locate, investigate, and cleanup the worst hazardous waste sites throughout the United States. CERCLIS is a database of potential and confirmed hazardous waste sites at which the EPA Superfund program has some involvement. It contains sites that are either proposed to be or are on the NPL, as well as sites that are in the screening and assessment phase for possible inclusion on the NPL. EPA administers the Superfund program in cooperation with individual states and tribal governments. EPA is transitioning to the Superfund Enterprise Management System (SEMS). SEMS includes the same data fields and content as CERCLIS. This database is made available by EPA and includes: ▪ Sites that have been removed and archived from the inventory of CERCLIS sites. Archived status indicates that, to the best of EPA's knowledge, assessment at a site has been completed and EPA has determined no further steps will be taken to list this site on the NPL. This decision does not necessarily mean that there is no hazard associated with a given site; it only means that, based on available information, the location is not judged to be a potential NPL site. ▪ Sites on which liens can exist by operation of law where EPA has spent Superfund monies. ▪ NPL deletions. ▪ Property on which EPA has filed liens to recover remedial action expenditures or when the property owner received notification of potential liability.

▶ *Continued – see end of table for notes.*

Table 3.5-1: Hazardous Material Databases

Database	Definition
Emergency Response Notification System (ERNS)	Records of spill reports controlled by the National Response Center. The National Response Center serves as the sole national point of contact for reporting all oil, chemical, radiological, biological, and etiological discharges into the environment anywhere in the United States and its territories.
Engineering Controls	Locations maintained by EPA of physical barriers (e.g., soil capping, subsurface venting systems, mitigation barriers, fences) to contain and/or prevent exposure to contamination on a property.
Facility Registry System (FRS)	Centrally managed database that identifies facilities, sites, or places subject to environmental regulations or of environmental interest. FRS creates high-quality, accurate, and authoritative facility identification records through rigorous verification and management procedures that incorporate information from program national systems, state master facility records, data collected from EPA's Central Data Exchange registrations, and data management personnel.
Hazardous Materials Information Reporting System (HMIRS)	Incident reported to and managed by the United States Department of Transportation (U.S. DOT) Pipeline and Hazardous Materials Safety Administration (PHMSA).
Institutional Controls	Sites with institutional controls in place. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post-remediation care requirements intended to prevent exposure to contaminants remaining onsite. Deed restrictions are generally required as part of the institutional controls.
National Clandestine Drug Labs	Locations where law enforcement agencies report they found chemicals or other items that indicate the presence of either clandestine drug laboratories or dumpsites. In most cases, the Drug Enforcement Administration has not verified the entry and does not guarantee its accuracy.
RCRA	RCRA, including: ▪ Large Quantity Generators (more than 1,000 kilograms [kg] of hazardous waste or more than 1 kg of acutely hazardous waste per month). ▪ Small Quantity Generators (between 100 kg and 1,000 kg of hazardous waste per month). ▪ Conditionally Exempt Small Quantity Generators (less than 100 kg of hazardous waste or less than 1 kg of acutely hazardous waste per month). ▪ Hazardous waste treatment, storage, or disposal facility. ▪ Hazardous waste handlers with RCRA corrective action activity—Owners are required to clean up hazardous materials released at these sites. ▪ Hazardous waste handlers with no RCRA corrective action activity requirements. ▪ Facilities that do not presently generate hazardous waste.
STATE AND LOCAL RECORDS	
Brownfields Site-Specific Assessments (State)	Property on which use or development activities may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant. This list is maintained by Virginia DEQ.
Institutional Controls	Legal or contractual restrictions on property use that remain effective after remediation is completed and are used to satisfy remediation levels. This list is maintained by Virginia DEQ.
Landfills and Solid Waste Facilities	Facilities that regulate the disposal and treatment of solid waste (sanitary landfills, construction/demolition debris landfills, transfer stations, materials recovery facilities, energy recovery/incineration facilities, and RMW (Regulated Medical Waste) facilities). Set up by Virginia DEQ, solid waste program to encourage the reuse and recycling of solid waste and to ensure that hazardous waste is properly managed.
Petroleum Release Sites	Location of petroleum release sites from USTs and ASTs as collected by Virginia DEQ.

▶ *Continued – see end of table for notes.*

Table 3.5-1: Hazardous Material Databases

Database	Definition
Spills	Records of responses to air, water, and waste pollution incidents to protect human health and the environment maintained by the Virginia DEQ Pollution Response Program (PREP). PREP staff often assist emergency responders, state agencies, federal agencies, and responsible parties to manage pollution incidents. Examples include oil spills, fish kills, and hazardous materials spills.
Storage Tanks (UST, AST)	USTs (regulated under Subtitle I of RCRA) and ASTs containing hazardous substances and petroleum products as collected by Virginia DEQ.
Voluntary Remediation Program	Sites where owners of contaminated sites have acted to conduct voluntary cleanups that meet state environmental standards. These sites are generally open dumps or unpermitted solid waste disposal facilities.
TRIBAL RECORDS	
No Tribal environmental record sources available for this state.	

Source: VDOT, no date; and ERIS, 2014.

All parcels with database records of known or potential contamination or a hazardous materials release were mapped, along with points to indicate facilities that generate, treat, store, or dispose of hazardous materials or facilities that store petroleum products. The parcels were sorted into categories based on the likelihood and potential level of contamination that Project activities could affect (Table 3.5-2). Hazardous materials and petroleum facilities with no records of release have a low chance of affecting the Project, unless removal of the facility is required.

Table 3.5-2: Hazardous Waste and Special Waste Screening Criteria

Category	Description
PARCELS	
Superfund/ CERCLA/NPL	High level of concern. These are known contamination sites with a high priority for remediation. Remediation of these sites is likely to be extremely costly and would have a high chance of causing Project delays. Even if the site is in the process of being remediated or has been remediated, these properties could contain highly contaminated soil depending on the level of remediation performed.
Known Hazmat Release	Medium to high level of concern. Purchase of these properties may result in remediation being the responsibility of the owner. Remediation may be costly and cause Project delays.
Potential Hazmat Contamination	Medium level of concern. Although a record of release may exist for a property, it may be difficult to determine where the release occurred. Should contaminated soil be discovered, remediation may be required.
Potential Petroleum Contamination	Lower level of concern. If petroleum-contaminated soil is encountered, the soil will need to be taken to a facility that deals with petroleum-contaminated soil. Removal of petroleum-contaminated soil is not as costly as other hazardous contaminants, and local facilities can be found.
POINTS	
Hazmat Facility	Low level of concern, if there are no reported leaks or spills. Consideration should be made if the facility requires removal.
Petroleum Facility	Low level of concern, if there are no reported leaks or spills. Consideration should be made if the facility requires removal.

3.5.3 Hazardous Materials Sites within Study Area

All hazardous materials sites within the study area are shown in Figure O-1 in Appendix O. A summary of the types of sites is provided in Table 3.5-3. There are 1,034 mapped hazardous materials sites/facilities within the study area. Most of the sites are either Petroleum Registered Facilities or Petroleum Release Sites (702).

Table 3.5-3: Hazardous Materials Sites within the Study Area

Alternative Area	Superfund/ CERCLA/NPL*	Known Hazmat Release[1]	Potential Hazmat Contamination[2]	Petroleum Release[3]	Hazmat Facility[4]	Petroleum Storage Tanks[5]
Area 1: Arlington (Long Bridge Approach)	1	–	5	3	2	5
Area 2: Northern Virginia	2	1	54	78	59	80
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	2	1	20	15	20	35
Area 4: Central Virginia (Crossroads to Doswell)	1	–	3	3	4	9
Area 5: Ashland (Doswell to I-295)	–	–	2	15	3	14
Area 6: Richmond (I-295 to Centralia)	9	1	63	205	79	240
Total Sites Counted	15	3	147	319	167	383

Source: VDOT GIS database, 2014.

Notes: *Includes those sites that have or are being remediated 1. Area known to be contaminated by hazmat or has had a toxic release of unlisted chemicals. 2. Area with history of use for hazmat or has had a release. 3. Area where a petroleum product is known to have been released. The case may be closed; however, there is the potential for uncovering petroleum-contaminated soil through construction/soil disturbance. 4. Facilities that generate, transport, treat, store, and/or dispose of hazardous waste. 5. Facilities with ASTs and USTs that store petroleum or hazardous substances; most store petroleum products.

Naturally Occurring Asbestos

Asbestos occurs naturally in some rocks and soils as a result of natural geological processes. Construction activities in areas where asbestos occurs have the potential of releasing mineral fibers into the air, which may pose a risk for human exposure through inhalation. According to mapping available through USGS, no known locations of naturally occurring asbestos occur in the study area (Van Gosen, 2006).

Orphan Sites

The American Society for Testing and Materials (ASTM) standard database reports listed approximately 2,500 additional sites in the Project vicinity that did not have accurate location information to place on a map (Orphan Sites). Most of these sites are petroleum spills, and many of the sites listed are repeats. The location of Orphan Sites that could potentially be affected by the Project would be further researched in a Phase I Environmental Site Assessment that would occur before acquisition of new right-of-way.

3.6 AIR QUALITY

Transportation sources generate varying amounts of ozone (O_3) and its precursors; nitrogen oxides (NO_X); hydrocarbons (HC) (specifically volatile organic compounds [VOCs]); particulate matter (PM); and/or carbon monoxide (CO) emissions, all of which are concerns for human and environmental health.

O_3 is a highly reactive pollutant that damages lung tissue, causes congestion, reduces vital lung capacity, and can also damage vegetation. From 1980 to 2013, there was a 33 percent decrease in the 8-hour design value O_3 concentrations in the United States. A design value is a statistic that describes the air quality status of a given area relative to the level of the National Ambient Air Quality Standards (NAAQS).

Nitrogen oxides are an important precursor to O_3 and acid rain and may affect terrestrial and aquatic ecosystems. The major mechanism for the formation of nitrogen dioxide (NO_2) in the atmosphere is the oxidation of the primary air pollutant nitric oxide (NO). NO_X plays a major role, together with VOCs, in the atmospheric reactions that produce O_3. NO_X forms when fuel is burned at high temperatures. The two major emissions sources are transportation and stationary fuel combustion sources, such as electric utilities and industrial boilers. NO_X can also contribute to the formation of secondary PM, which can cause headaches, eye and nasal irritation, chest pain, and lung inflammation. From 1980 to 2013, was a 58 percent decrease in the annual NO_2 average (i.e., arithmetic mean) in the United States.

PM is the term for particles found in the air, including dust, dirt, soot, smoke, and liquid droplets. Particles less than 10 micrometers in diameter (PM_{10}) pose a health concern because they can be inhaled into and accumulate in the respiratory system. Particles less than 2.5 micrometers in diameter ($PM_{2.5}$) are referred to as "fine" particles and are believed to pose the largest health risks. From 1990 to 2013, there was a 34 percent decrease in the design value PM_{10} concentration averages. From 2000 to 2013, there was a 34 percent decrease in the design value $PM_{2.5}$ concentration averages in the United States.

CO is a colorless, odorless, and poisonous gas produced by incomplete burning of carbon in fuels. Exposure to elevated CO levels can cause impairment of visual perception, manual dexterity, learning ability, and performance of complex tasks (Bureau of Transportation Statistics [BTS], 1990). From 1980 to 2013, there was an 84 percent decrease in the 8-hour design value CO concentrations in the United States.

The counties that the DC2RVA corridor is located within form the air quality study area. The study area for this resource is larger than for other resources because much of the available data regarding regional air quality is provided at the county level and not at a smaller scale.

3.6.1 National Ambient Air Quality Standards

The *Clean Air Act of 1970* (CAA) and 1990 *Clean Air Act Amendments* (CAAA) required EPA to establish NAAQS for pollutants considered harmful to public health and the environment. The NAAQS are implemented by EPA under 40 CFR Part 50. The CAA established two types of national air quality standards. Primary standards set limits to protect public health, including the health of "sensitive" populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. Table 3.6-1 lists the primary and secondary standards. Units of measure for the standards are parts per million (ppm) by volume, milligrams per cubic meter (mg/m^3) of air, and micrograms per cubic meter (µg/m^3) of air. With the exception of sulfur dioxide (SO_2), the secondary standards for all pollutants are the same as the primary standards.

Table 3.6-1: National Ambient Air Quality Standards

Pollutant		Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		Primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead (Pb)		Primary and Secondary	Rolling 3-month average	0.15 μg/m$^{3(1)}$	Not to be exceeded
Nitrogen Dioxide (NO_2)		Primary	1-hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Primary and Secondary	Annual	53 ppb$^{(2)}$	Annual Mean
Ozone (O_3)		Primary and Secondary	8-hour	0.070 ppm$^{(3)}$	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution	$PM_{2.5}$	Primary	Annual	12 μg/m^3	Annual mean, averaged over 3 years
		Secondary	Annual	15 μg/m^3	Annual mean, averaged over 3 years
		Primary and Secondary	24-hour	35 μg/m^3	98th percentile, averaged over 3 years
	PM_{10}	Primary and Secondary	24-hour	150 μg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		Primary	1-hour	75 ppb$^{(4)}$	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Notes: 1. In areas designated nonattainment for the Pb standards before promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 μg/m^3 as a calendar quarter average) also remain in effect. 2. The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of parts per billion (ppb) for the purposes of clearer comparison to the 1-hour standard level. 3. Final rule signed October 1, 2015, and became effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards. 4. The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a State Implementation Plan (SIP) call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its SIP to demonstrate attainment of the required NAAQS.

Title I of the CAAA addresses nonattainment issues related to O_3, CO, and PM_{10}. Nonattainment areas are progressively ranked according to the severity and type of their air pollution problems. Each category of nonattainment has a label, such as severe or moderate, and a date for meeting the NAAQS.

Title II of the CAAA addresses mobile sources and stipulates more-stringent emission standards for cars, trucks, and buses. This title also regulates fuel quality (e.g., gasoline volatility and diesel sulfur content); requires reformulated gasoline in the highest O_3 areas and oxygenated fuels in the highest CO areas; and requires clean-fueled vehicles for certain fleets and other pilot programs.

3.6.2 Clean Air Act Conformity

The CAAA require federal agencies to ensure that their actions conform to the appropriate State Implementation Plan (SIP). States are required to develop SIPs that explain how they will meet the requirements of the CAA. The SIP is a plan for implementation, maintenance, and enforcement of the NAAQS, and it includes emission limitations and control measures to attain the standards. States must involve the public in development of the SIP through hearings and opportunities to comment. In Virginia, the state Air Pollution Control Board administers the SIP. In the District of Columbia, the Air Quality Division of the District Department of Energy and Environment administers the SIP. Conformity to a SIP, as defined in the CAAA, means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of such standards. The federal agency responsible for the action is required to determine if its action conforms to the applicable SIP. EPA has developed two sets of conformity regulations:

- Transportation projects developed or approved under the Federal Aid Highway Program or Federal Transit Act are governed by the "transportation conformity" regulation (40 CFR Part 3, Subpart A).
- Other projects, which include the federal action planned for the DC2RVA project, are governed by the "general conformity" regulations. The regulations for *Determining Conformity of General Federal Actions to State or Federal Implementation Plans* were published in the *Federal Register* on November 30, 1993. The general conformity regulation (40 CFR Part 93, Subpart B) became effective January 31, 1994. On March 24, 2010, EPA revised the general conformity regulations to improve the process federal entities use to demonstrate that their actions will not contribute to a violation of an NAAQS. In Virginia, general conformity criteria and procedures are set forth in 9 *Virginia Administrative Code* (VAC) 5-10-20. In the District of Columbia, these criteria and procedures are set forth in 57 DCR 527.

The conformity regulations apply to federal actions occurring in air basins designated as nonattainment areas for criteria pollutants or in attainment areas subject to maintenance plans (maintenance areas). Federal actions occurring in air basins that are in attainment with criteria pollutants are not subject to the conformity rule.

3.6.3 Clean Air Nonroad Diesel Rule

In June 2004, as part of the *Clean Air Nonroad Diesel Rule*, EPA finalized new requirements for nonroad diesel fuel that will decrease the allowable levels of sulfur in fuel used in locomotives by 99 percent. Because sulfur damages exhaust emission control devices, these fuel improvements will reduce PM from existing engines. Diesel fuel currently has a sulfur content of approximately 3,000 ppm. The new rule cut that amount to 500 ppm in 2007 and to 15 ppm in 2010.

3.6.4 Mobile Source Air Toxics Rule

Effective April 27, 2007, EPA adopted controls on mobile source air toxics (MSATs). MSATs are emitted by motor vehicles, nonroad engines (e.g., lawn and garden equipment, farming and construction equipment, locomotives, and ships), aircraft, and their fuels. Also in 2007, EPA proposed more-stringent standards for large diesel engines used in locomotives, as well as certain marine diesel engines. In June 2008, EPA published the final rule adopting a comprehensive program to dramatically reduce pollution from locomotives, applying to all types of locomotives. This final rule completes an important step in EPA's ongoing National Clean Diesel Campaign (NCDC) by adding new programs for locomotives and marine diesel engines to the clean diesel initiatives that have already been undertaken for highway, other nonroad, and stationary diesel engines in 2004. It significantly strengthens the locomotive and marine diesel programs, especially in controlling emissions during the critical early years through the early introduction of advanced technologies and the more complete coverage of existing engines. When fully implemented, this coordinated set of new programs will reduce harmful diesel engine emissions to a small fraction of their previous levels.

Locomotives and marine diesel engines account for approximately 20 percent of mobile source NO_X emissions and 25 percent of mobile source diesel $PM_{2.5}$ emissions in the United States. Absent this final action, by 2030 the relative contributions of NO_X and $PM_{2.5}$ from these engines would have grown to 35 and 65 percent, respectively.

On a nationwide annual basis, these reductions will amount to 800,000 tons of NO_X and 27,000 tons of PM by the year 2030. For locomotives, the reduction from existing standards in PM range from 60 to 90 percent depending on the date of manufacture. The reduction in NO_X range from 20 to 80 percent. Locomotive idle emissions are predicted to be reduced by 50 percent for PM and NO_X.

3.6.5 Ambient Air Quality Conditions in the DC2RVA Corridor

In this section, existing ambient air quality conditions and emissions in the DC2RVA corridor and at specific locations are identified.

3.6.5.1 Attainment/Nonattainment/Maintenance Designations

EPA publishes a list of all geographic areas in compliance with the NAAQS, as well as those areas not in attainment of the NAAQS. The designation of an area is made on a pollutant-by-pollutant basis. Areas classified as "attainment areas" comply with the applicable NAAQS. Areas once classified as nonattainment that have since demonstrated attainment of the NAAQS are classified as "maintenance areas." Areas not in compliance with the NAAQS are classified as "nonattainment areas."

The current attainment status in the DC2RVA project area is listed in Table 3.6-2. The nonattainment areas are also identified in Figure 3.6-1.

Table 3.6-2: Attainment Status

City/County	Pollutant and Attainment Status in the Project Area						
	CO	Pb	NO_2	O_3	$PM_{2.5}$	PM_{10}	SO_2
Arlington County	Attainment	Attainment	Attainment	Nonattainment	Attainment	Attainment	Attainment
Alexandria	Attainment	Attainment	Attainment	Nonattainment	Attainment	Attainment	Attainment
Fairfax County	Attainment	Attainment	Attainment	Nonattainment	Attainment	Attainment	Attainment
Prince William County	Attainment	Attainment	Attainment	Nonattainment	Attainment	Attainment	Attainment
Stafford County	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment
Fredericksburg	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment
Spotsylvania County	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment
Caroline County	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment
Hanover County	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment
Henrico County	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment
Richmond	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment
Chesterfield County	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment	Attainment

3.6.5.2 Ambient Air Quality

Air quality monitors are located throughout the study corridor. Table 3.6-3 shows data for criteria pollutants of greatest concern within the study corridor—those for which one or more counties through which the DC2RVA corridor passes are nonattainment areas. Table 3.6-3 provides statistical pollutant concentration values relevant to assessing NAAQS compliance. These values are provided for each county or area where the indicated pollutant is of concern. For these pollutants, Table 3.6-3 then indicates whether the applicable NAAQS was exceeded.

Data are provided for the most recent 5 years for which comprehensive and official monitoring data are available. Determination of attainment status for O_3 is based on a multiyear evaluation, whereas any violations indicated in Table 3.6-3 are based only on a single year of data.

Table 3.6-3: Criteria Air Pollutant Monitoring Data

Pollutant	Averaging Period	Parameter	City/County	Value				
				2010	2011	2012	2013	2014
Ozone	8-hour	Maximum Concentration (ppm) for 4th-Highest Day	Arlington County	0.087	0.087	0.084	0.067	0.071
			Alexandria	0.081	0.084	0.086	0.063	n/a
			Fairfax County	0.089	0.087	0.084	0.067	0.065
			Prince William County	0.073	0.071	0.072	0.066	0.062
		> 2015 NAAQS (0.070 ppm)	Arlington County	Yes	Yes	Yes	No	Yes
			Alexandria	Yes	Yes	Yes	No	n/a
			Fairfax County	Yes	Yes	Yes	No	No
			Prince William County	Yes	Yes	Yes	No	No

Source: EPA Air Data www.epa.gov/airdata. 2010-2014.

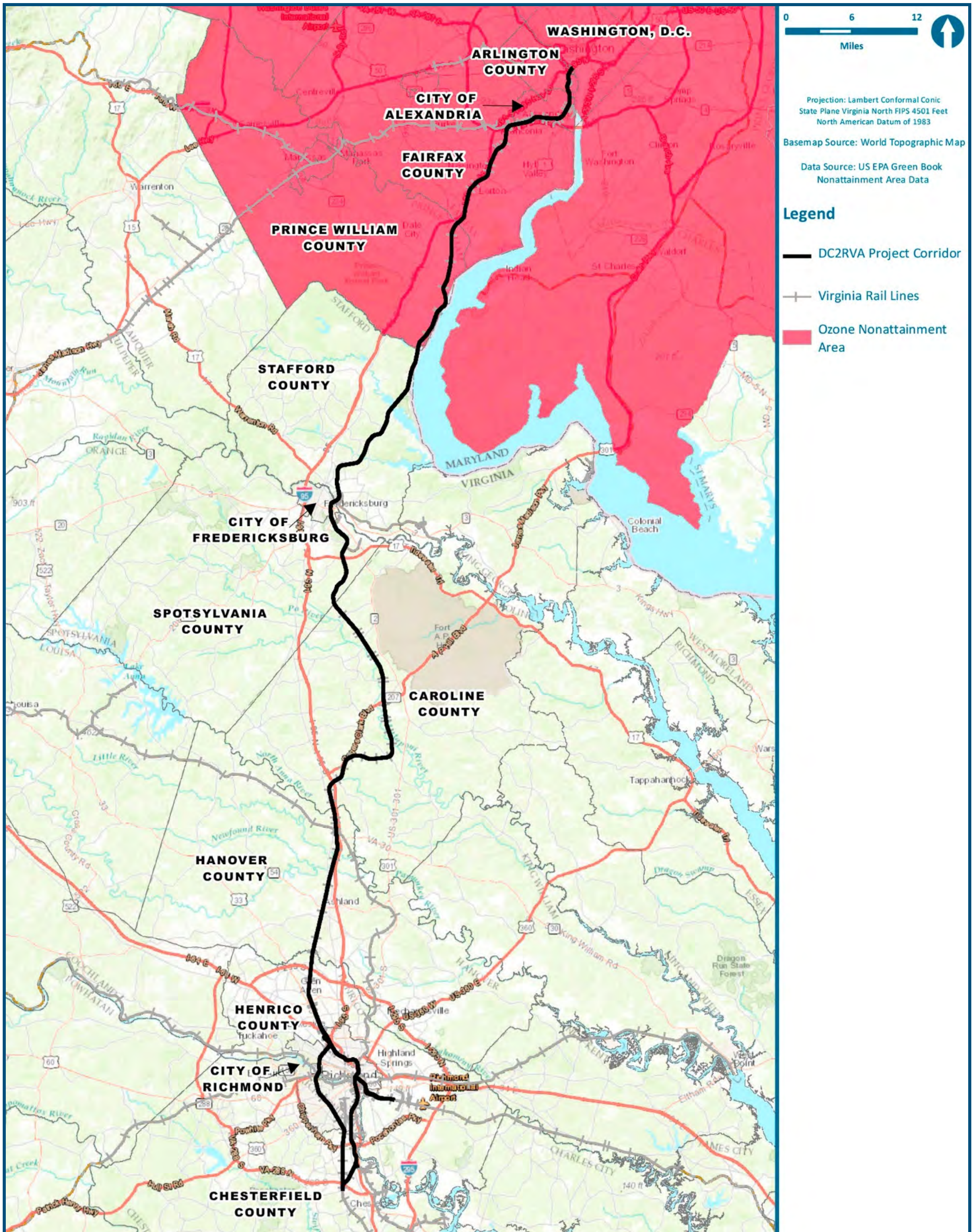


Figure 3.6-1: NAAQS Nonattainment Areas

3.6.5.3 Air Quality Index

EPA created the Air Quality Index (AQI) to enhance the public's understanding of air pollution across the nation. Previously known as the Pollutant Standards Index, this uniform air quality index is used by state and local agencies for reporting on daily air quality to the public. The AQI provides general information to the public about air quality and associated health effects. It provides information on pollutant concentrations for ground-level O_3, PM, CO, SO_2, and NO_X. The AQI is "normalized" across pollutants so that a value of 100 represents the level of health protection associated with the health-based standard for each pollutant, and a value of 500 represents the significant harm level.

An AQI value between zero and 50 is considered "good." Air quality is considered satisfactory, and air pollution poses little or no risk. Values between 51 and 100 are considered "moderate." Air quality is acceptable; however, for some pollutants there may be a moderate health concern for a very small number of people. For example, people who are unusually sensitive to O_3 may experience respiratory symptoms. AQI values between 101 and 150 are considered "unhealthy for sensitive groups." This means they are likely to be affected at lower levels than the general public. For example, people with lung disease are at greater risk from exposure to O_3, while people with either lung disease or heart disease are at greater risk from exposure to particle pollution. The general public is not likely to be affected when the AQI is in this range.

AQI values greater than 150 are considered "unhealthy." This includes the AQI categories unhealthy, very unhealthy, and hazardous. In general, very few locations across the United States ever have days in the very unhealthy or hazardous categories.

The 2014 AQI through the DC2RVA corridor is presented in Table 3.6-4. With the exception of Arlington County, air quality was either good or moderate 100 percent of the days measured in the counties in the DC2RVA corridor.

Table 3.6-4: 2014 Air Quality Index Summary

City/County	Percent of Days				
	Good	Moderate	Unhealthy for Sensitive Groups	Unhealthy	Very Unhealthy
Arlington County	90%	9%	1%	0%	0%
Alexandria	98%	2%	0%	0%	0%
Fairfax County	84%	16%	0%	0%	0%
Prince William County	96%	4%	0%	0%	0%
Stafford County	96%	4%	0%	0%	0%
Fredericksburg	100%	0%	0%	0%	0%
Spotsylvania County	n/a	n/a	n/a	n/a	n/a
Caroline County	96%	4%	0%	0%	0%
Hanover County	96%	4%	0%	0%	0%
Henrico County	83%	17%	0%	0%	0%
Richmond	100%	0%	0%	0%	0%
Chesterfield County	89%	11%	0%	0%	0%

Source: EPA Air Data www.epa.gov/airdata. 2014.

3.6.6 Greenhouse Gas

In December 2009, the EPA Administrator issued findings under the federal CAA that the current and projected greenhouse gas (GHG) concentrations in the atmosphere threaten the health and welfare of current and future generations. In response, EPA has introduced a series of policies designed to slow the growth of GHG emissions, invest in science and technology, and enhance international cooperation.

These policies include a Renewable Fuel Standard Program that mandates a minimum volume of renewable fuel in all transportation fuel sold in the United States. EPA partnered with the National Highway Traffic Safety Administration (NHTSA) to enable the production of a new generation of clean vehicles with improved fuel economy and reduced emissions of GHGs (EPA, 2015). Lastly, EPA introduced the Greenhouse Gas Reporting Program. Through this program, EPA tracks GHG data from large emission sources across a range of industry sectors (EPA, 2015). EPA has also established multiple incentive-based programs that encourage voluntary GHG reductions. These programs include "ENERGY STAR," "Climate Leaders," and Methane Voluntary Programs (EPA, 2015).

3.7 NOISE AND VIBRATION

Noise and vibration associated with construction and operation of the Project are subject to review by the Federal Railroad Administration (FRA). FRA has noise and vibration impact assessment methods (FRA, 2012) that are appropriate to evaluate noise and vibration from trains that travel at speeds of 90 miles per hour (mph) or higher. For train speeds lower than 90 mph, FRA endorses use of noise and vibration impact assessment methodologies published by the Federal Transit Administration (FTA) (FTA, 2006). The Maximum Authorized Speed for passenger trains for the DC2RVA corridor is 90 mph, and actual train speeds with the proposed improvements will generally be lower than 90 mph through much of the DC2RVA corridor; therefore, Project-related noise and vibration levels were determined using FTA and FRA methods. Additionally, certain aspects of the FRA locomotive horn noise model were adapted for use on this Project. The study area for the noise and vibration analysis varies in size throughout the corridor to account for potential impacts and is as wide as approximately 3 miles through some sections. Detailed information on the noise and vibration analyses conducted for the Project can be found in Appendix P, *Noise and Vibration Technical Report*.

3.7.1 Noise

Noise is usually defined as sound that is undesirable because it interferes with speech communication and hearing, or it is otherwise annoying. Under certain conditions, noise may cause hearing loss, interfere with human activities, and, in various ways, may affect people's health and well-being. Noise along a railroad corridor typically consists of noise from locomotives, noise from steel wheels operating over rails, and noise from train horns.

3.7.1.1 Noise Descriptors

The decibel (dB) is the accepted standard unit for measuring the amplitude of sound because it accounts for the large variations in sound pressure amplitude. When describing sound and its effect on a human population, A-weighted (dBA) sound pressure levels are typically used to account for the response of the human ear to different frequencies. The term "A-weighted" refers to a filtering of the noise signal in a manner corresponding to the way the human ear perceives sound. The A-weighted noise level has been found to correlate well with people's judgments of the noisiness of different sounds and has been used for many years as a measure of community noise. Figure 3.7-1 illustrates typical A-weighted sound pressure levels for various noise sources.

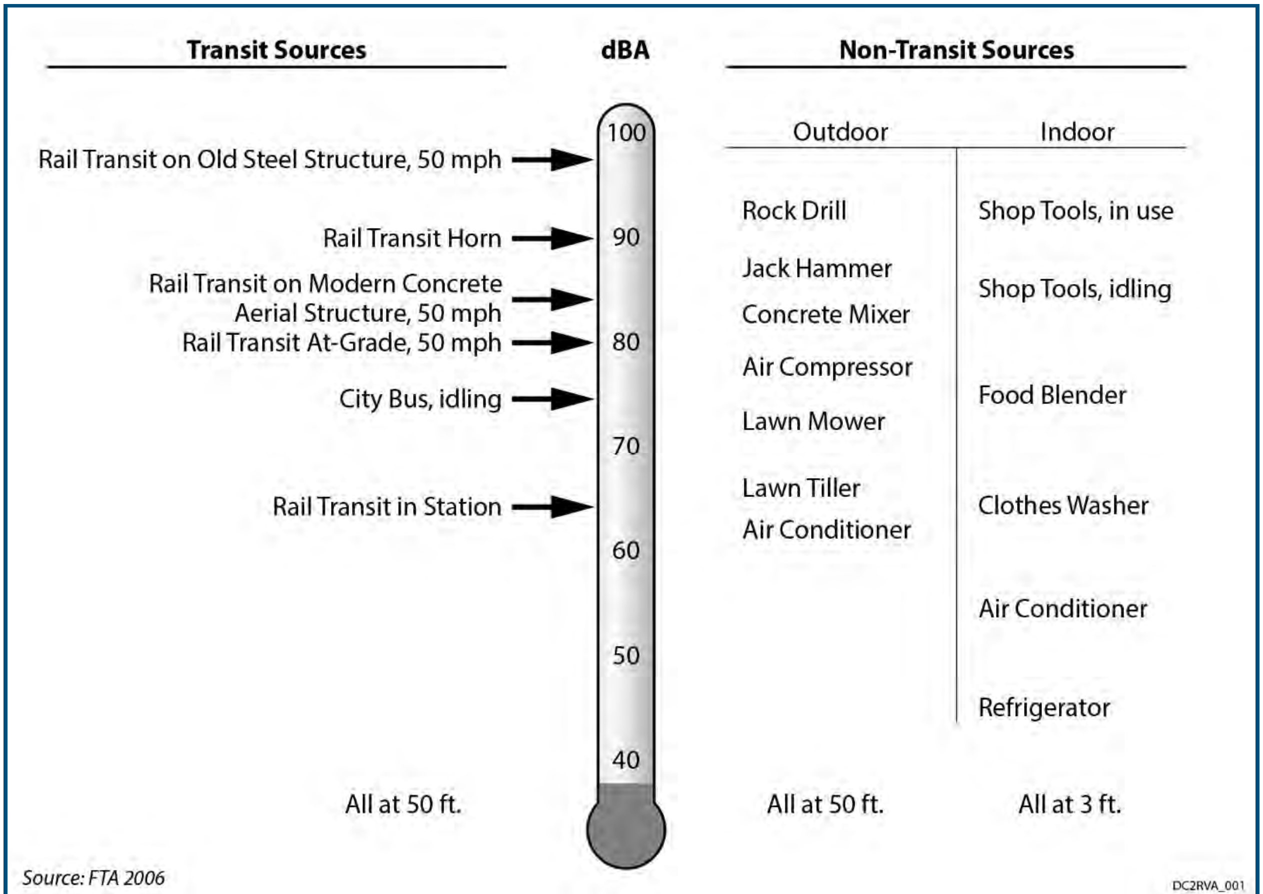


Figure 3.7-1: Typical Noise Levels

Community noise levels usually change continuously during the day. The equivalent continuous A-weighted sound pressure level (L_{eq}) is normally used to describe community noise. The L_{eq} is the equivalent steady-state A-weighted sound pressure level that would contain the same acoustical energy as the time-varying A-weighted sound pressure level during the same time interval. The maximum sound pressure level (L_{max}) is the greatest instantaneous sound pressure level observed during a single noise measurement interval.

Another descriptor, the day-night average sound pressure level (L_{dn}), was developed to evaluate the total daily community noise environment. The L_{dn} is a 24-hour average sound pressure level with a 10-dB time-of-day weighting added to sound pressure levels that occur during the nine nighttime hours from 10:00 p.m. to 7:00 a.m. This nighttime 10-dB adjustment is an effort to account for the increased sensitivity to nighttime noise events. FRA uses L_{dn} and L_{eq} to evaluate train noise effects at the surrounding communities (FRA, 2012).

3.7.1.2 Existing Noise Measurements

In accordance with FRA and FTA noise assessment methodologies, existing noise levels were measured throughout the Project area. Existing noise levels were measured for a continuous 24-hour period at 29 residential locations. Noise levels were also measured for 1-hour durations at 8 institutional locations.

3.7.1.3 Existing Noise Levels

Table 3.7-1 presents the results of the 24-hour and 1-hour noise measurements. The table shows the measured L_{dn} at each residential measurement location (ML) and the L_{eq} at each institutional measurement location. Figure 3.7-2 shows the noise measurement sites.

Land use adjacent to the railroad right-of-way varies throughout the DC2RVA corridor and can be broadly described as ranging from urban to suburban and rural. Ambient noise levels among those three categories of land use are typically highest in urban areas, where population density and the density of roadways and vehicular traffic are also highest among these three broad land use categories. In urban areas, human activities and traffic noise typically dominate the ambient soundscape. That is also true in suburban areas; however, the density of population and traffic is usually lower and that corresponds to noise levels generally being lower in suburban areas. Rural areas have the lowest population density of these three land use categories. The density of roadways and vehicular traffic is also lowest, and ambient noise levels are also generally lower than urban and suburban areas. Rural areas also exhibit noise from traffic and human activities; however, noise from agricultural activities is also common. Trains are a noise source that all three of these broad land use categories also have in common. Noise measurement results presented in Table 3.7-1 generally indicate higher noise levels in urban areas and lower noise levels in rural areas; however, the proximity between the measurement locations and the rail line or local roadways also influenced noise measurement results in urban, suburban, and even rural areas.

Table 3.7-1: Existing Train Noise Measurement Sites

Alternative Area	Location ID	Address	Measurement Type	L_{dn} (dBA)	$L_{eq}(h)$ (dBA)
Area 2: Northern Virginia	ML01	1801 Crystal Drive, Arlington	24-hour	66	
Area 2: Northern Virginia	ML02	301 Mt. Vernon, Alexandria	24-hour	68	
Area 2: Northern Virginia	ML03	DC Metro Church, 1100 N. Fayette Street, Alexandria	1-hour		61
Area 2: Northern Virginia	ML04	Summers Grove Homeowners Association, Alexandria	24-hour	65	
Area 2: Northern Virginia	ML05	6261 Franconia Station Court, Franconia	24-hour	63	
Area 2: Northern Virginia	ML06	6701 Jerome Street, Springfield	24-hour	75	

▶ *Continued – see end of table for notes.*

Table 3.7-1: Existing Train Noise Measurement Sites

Alternative Area	Location ID	Address	Measurement Type	L_{dn} (dBA)	L_{eq}(h) (dBA)
Area 2: Northern Virginia	ML07	8923 Milford Haven Court, Lorton	24-hour	69	
Area 2: Northern Virginia	ML08	Lorton Station Elem School, 9298 Lewis Chapel, Lorton	1-hour		64
Area 2: Northern Virginia	ML09	10526 Old Colchester Road, Lorton	24-hour	62	
Area 2: Northern Virginia	ML10	14726 Featherstone Road, Woodbridge	24-hour	69	
Area 2: Northern Virginia	ML11	333 3rd Avenue, Quantico	24-hour	68	
Area 2: Northern Virginia	ML12	945 Widewater Road, Stafford	24-hour	62	
Area 2: Northern Virginia	ML13	71 Mt. Hope Church Road, Stafford	24-hour	77	
Area 2: Northern Virginia	ML14	Andrew Chapel, Andrew Chapel Road, Stafford	1-hour		62
Area 3: Fredericksburg	ML15	7 Fairfax Circle, Falmouth	24-hour	63	
Area 3: Fredericksburg	ML16	432 Summit Street, Fredericksburg	24-hour	68	
Area 3: Fredericksburg	ML17	10235 Sunset Hill Lane, Fredericksburg	24-hour	77	
Area 3: Fredericksburg	ML18	9015 McAlister Street, Fredericksburg	24-hour	64	
Area 4: Central Virginia	ML19	Jackson Shrine, 12023 Stonewall Jackson Road, Woodford	1-hour		60
Area 4: Central Virginia	ML20	15503 Nelson Hill Road, Milford	24-hour	69	
Area 4: Central Virginia	ML21	11491 Chesterfield Road, Ruther Glen	24-hour	71	
Area 5: Ashland	ML22	14158 Independence Road, Ashland	24-hour	49	
Area 5: Ashland	ML23	Randolph Macon, 204 Henry Street, Ashland	1-hour		60
Area 5: Ashland	ML24	403 S. Center Street, Ashland	24-hour	74	
Area 5: Ashland	ML25	15503 Ashcake Road, Ashland	24-hour	60	
Area 5: Ashland	ML26	Gwathmey Church, Ashland	1-hour		68
Area 5: Ashland	ML27	Glen Allen Freewill Baptist Church, 11101 Old Washington Highway, Glen Allen	1-hour		61
Area 6: Richmond	ML28	2912 Allen's Crossing, Glen Allen	24-hour	69	
Area 6: Richmond	ML29	2733 Hungary Road, Richmond	24-hour	73	

▶ *Continued – see end of table for notes.*

Table 3.7-1: Existing Train Noise Measurement Sites

Alternative Area	Location ID	Address	Measurement Type	L_{dn} (dBA)	$L_{eq}(h)$ (dBA)
Area 6: Richmond	ML30	1415 Chamberlayne Parkway, Richmond	24-hour	61	
Area 6: Richmond	ML31	1901 5th Avenue, Richmond	24-hour	77	
Area 6: Richmond	ML32	Hebrew Cemetery, N. 4th & Hospital Street, Richmond	1-hour		59
Area 6: Richmond	ML33	5516 Parker Street, Richmond	24-hour	77	
Area 6: Richmond	ML34	912 Hill Top Drive, Richmond	24-hour	75	
Area 6: Richmond	ML35	2290 Ruffin Road, Richmond	24-hour	75	
Area 6: Richmond	ML36	4405 Atlantic Avenue, Richmond	24-hour	71	
Area 6: Richmond	ML37	2900 Kingsland Road, Richmond	24-hour	73	

Note: *ML refers to "measurement location."

3.7.2 Vibration

Vibration is an oscillatory motion that can be described in terms of displacement, velocity, or acceleration. Displacement, in the case of a vibrating floor, is simply the distance that a point on the floor moves away from its static position. The velocity represents the instantaneous speed of the floor movement, and acceleration is the rate of change of the speed. The response of humans, buildings, and equipment to vibration is normally described using velocity or acceleration. Velocity will be used in describing ground-borne vibration.

Ground-borne vibration (GBV) can be a serious concern for residents or at facilities that are vibration-sensitive, such as laboratories or recording studios. The effects of GBV include perceptible movement of building floors, interference with vibration-sensitive instruments, rattling of windows, and shaking of items on shelves or hanging on walls. Additionally, GBV can cause the vibration of room surfaces resulting in ground-borne noise (GBN). GBN is typically perceived as a low-frequency rumbling sound.

Existing vibration levels in areas adjacent to the rail line are dominated by train-induced ground-borne vibration during train pass-by events. In the study area, the duration of train pass-by events varies between less than a minute (for faster passenger trains) to more than a minute (for long freight trains). In general, heavier rail cars produce higher ground-borne vibration levels than lighter cars. According to FTA and FRA vibration assessment guidance, diesel-electric locomotives typically produce some of the higher levels of train-induced ground-borne vibration levels. In the absence of trains, existing vibration levels in the study area are usually low. Heavy trucks and buses on local roadways likely produce the highest levels of ground-borne vibration in the absence of trains. Ground-borne vibration from roadway traffic is usually much lower than from trains.

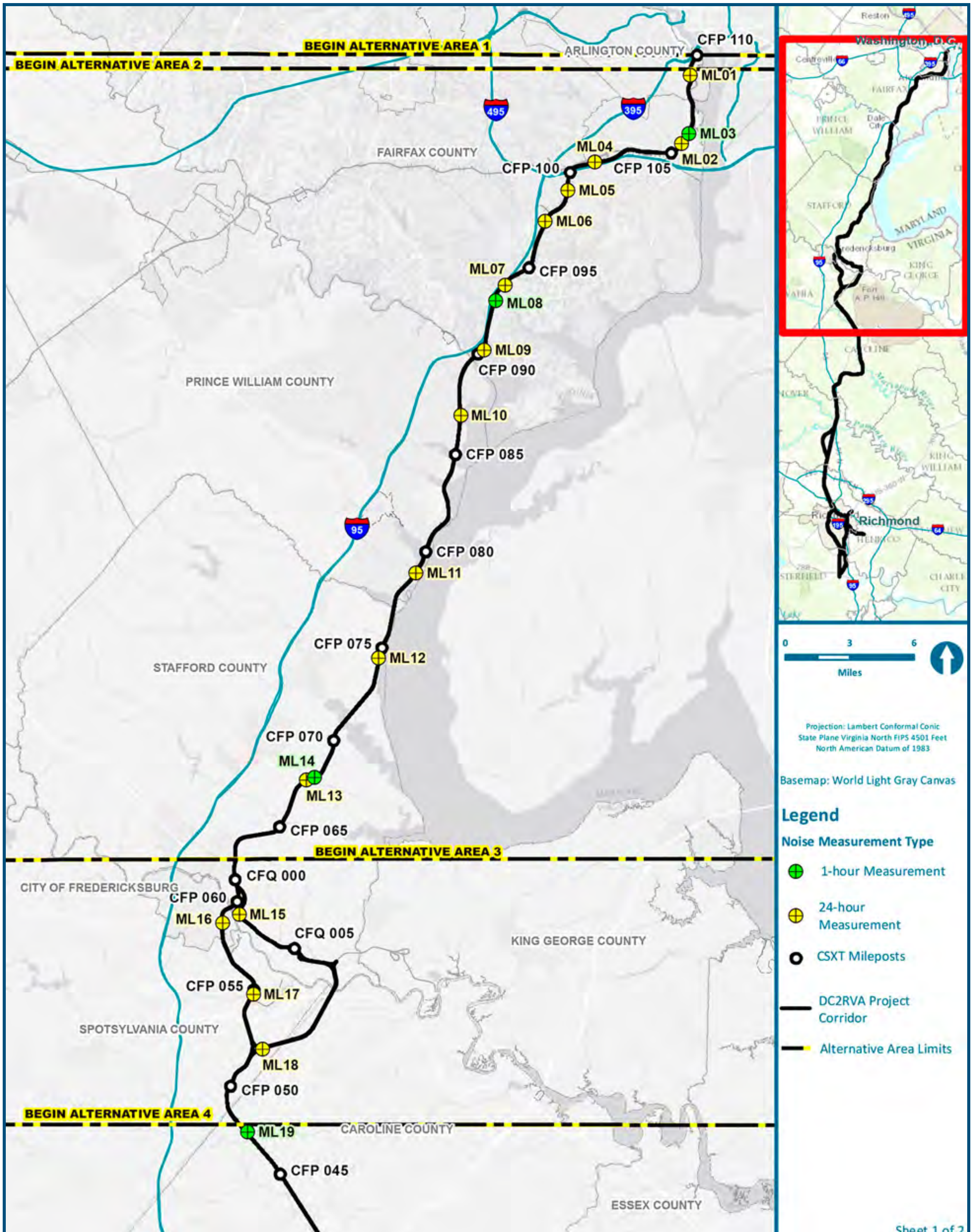


Figure 3.7-2: Noise Measurement Locations

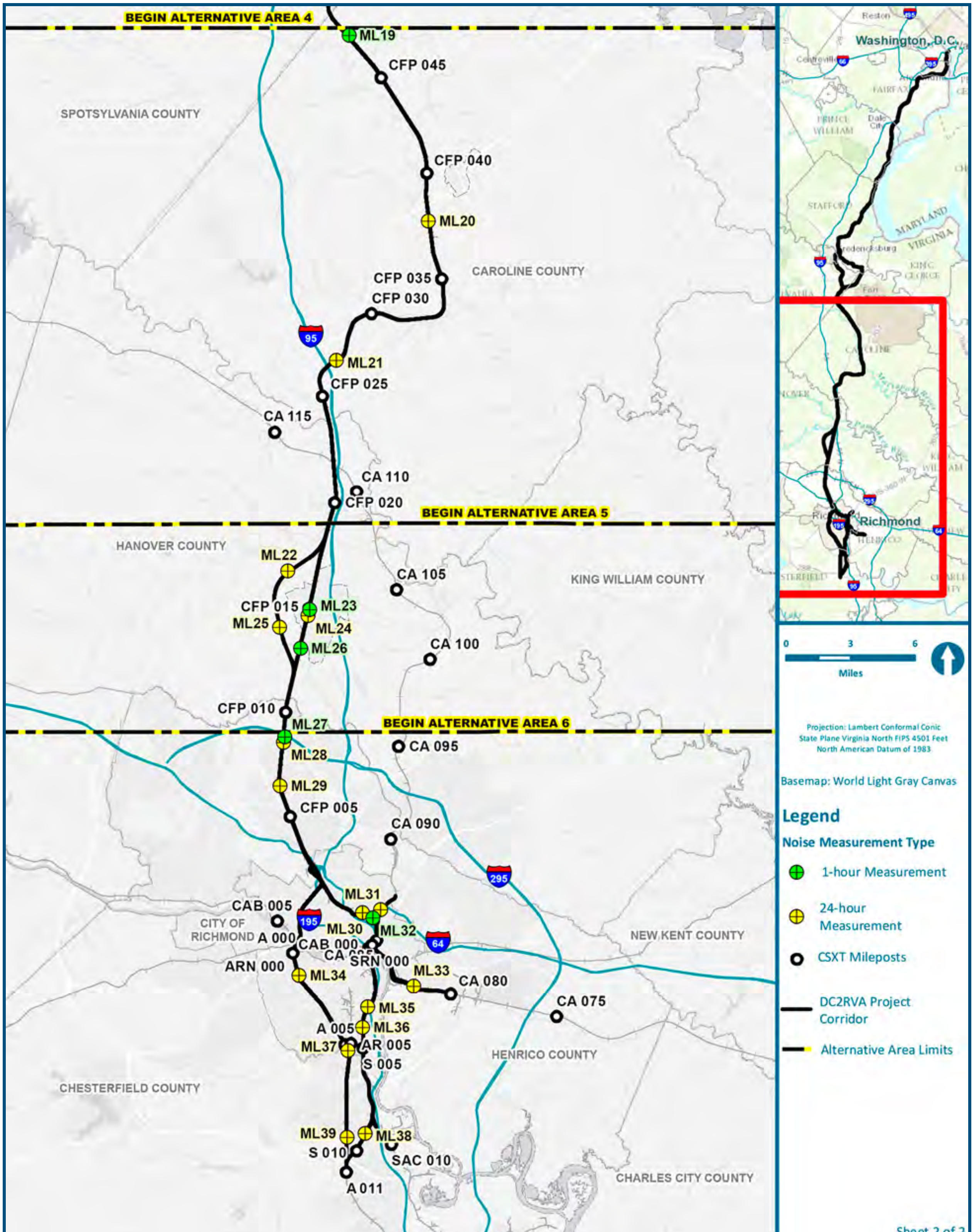


Figure 3.7-2: Noise Measurement Locations

3.7.2.1 Vibration Descriptors

Vibration amplitudes are usually expressed as either peak particle velocity (PPV) or the root mean square (RMS) velocity. PPV is used to evaluate the potential for building damage. It is defined as the maximum instantaneous peak of the vibration signal. PPV is not considered the appropriate measurement for evaluating the human response to vibration. RMS is used to evaluate human response because it takes some time for the human body to respond to vibration signals. The RMS of a signal is the square root of the average of the squared amplitude of the signal. For sources such as trucks or motor vehicles, PPV levels are typically 6 to 14 dB higher than RMS levels. FRA and FTA use the abbreviation "VdB" for vibration dBs for RMS and PPV to reduce the potential for confusion with sound dBs (FRA, 2012).

Decibel notation acts to compress the range of numbers required in measuring vibration. Similar to the noise descriptors, L_{eq} and L_{max} can be used to describe the equivalent vibration and the maximum vibration levels observed during a single vibration measurement interval.

Figure 3.7-3 illustrates common vibration sources and the human and structural responses to ground-borne vibration. As shown in Figure 3.7-3, the threshold of perception for human response is approximately 65 VdB; however, human response to vibration is not usually significant unless the vibration exceeds 70 VdB.

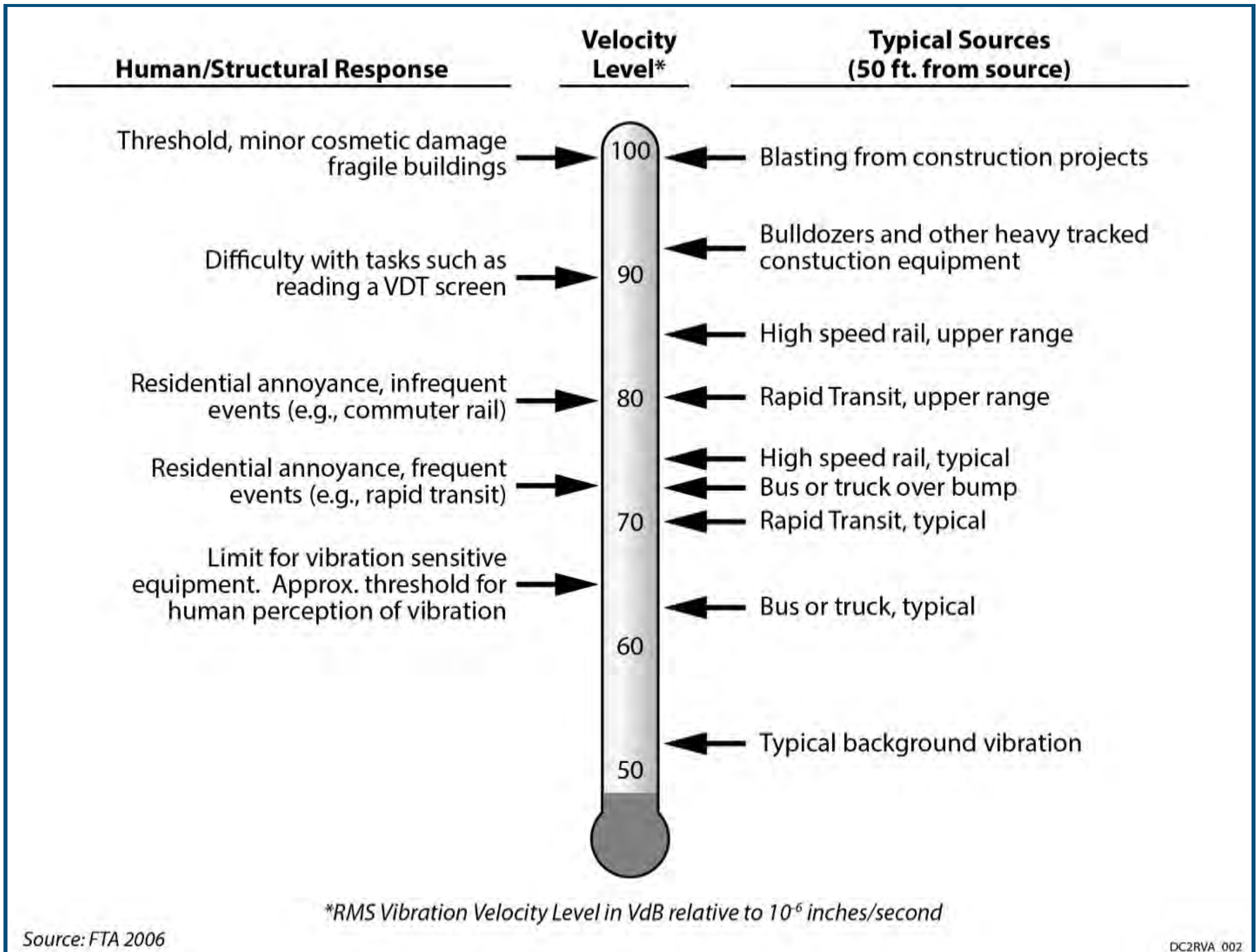


Figure 3.7-3: Example Vibration Velocity Levels

In contrast to airborne noise, neither GBV nor GBN is an everyday experience for most people. The background vibration level in residential areas is usually 50 VdB or lower—well below the threshold of perception for humans. Levels at which vibration interferes with sensitive instrumentation can be much lower than the threshold of human perception, such as for medical imaging equipment or extremely high-precision manufacturing. Most perceptible indoor vibration is caused by sources within a building, such as the operation of mechanical equipment, movement of people, or slamming of doors. Typical outdoor sources of perceptible GBV are construction equipment, steel-wheeled trains, and traffic on rough roads; though in most soils, GBV dissipates very rapidly, and it is not a common environmental concern.

Soil types and other subsurface conditions affect GBV. For example GBV can propagate more efficiently in areas where the soil is characterized by stiff shallow clay, or where there is shallow bedrock. This assessment briefly reviewed publicly available and reasonably obtainable soils and geologic data for the purpose of evaluating where GBV might propagate very efficiently. Based on this limited review, most of the soils in the corridor consist of coarse-grained unconsolidated deposits; soils of this type generally propagate GBV less efficiently than highly efficient soils such as stiff clay.

3.8 ENERGY

Current energy consumption by the four basic transportation modes—rail, automobile, bus, and air—used for intercity travel in the study corridor was calculated for this Project. Because different types of fuel are used by these modes, comparison of the energy consumed by each required conversion to a common base unit. The British Thermal Unit (BTU) was the measure used to compare the total annual energy consumed.

The following energy consumption rates were used to calculate annual consumption for the four transportation modes.

- Rail: 1,629 BTUs per passenger mile
- Automobile: 3,877 BTUs per passenger mile
- Bus: 823 BTUs per passenger mile
- Air: 2,329 BTUs per passenger mile

These rates were taken from the Office of the Assistant Secretary for Research and Technology, Bureau of Transportation Statistics, National Transportation Statistics (2016) website and are based on year 2014 data, which is the last year that data were available. These consumption rates indicate that rail travel is the most energy-efficient mode of transportation.

To determine the total BTUs consumed for each mode, the BTU rates were calculated by the corresponding annual passenger miles from the year 2015 (Table 3.8-1). As shown in the table, the rail system consumes approximately 1 percent of all energy used for intercity passenger service in the study corridor while serving 2 percent of all passenger miles of travel.

Table 3.8-1: Existing Annual Passenger Miles of Travel and Energy Consumption

Mode	Passenger Miles (millions)	Percent of All Four Modes	Energy Consumption (billions of BTUs)	Percent of All Four Modes
Rail	750	2	1,222	1
Automobile	24,909	81	96,571	90
Bus	1,620	5	1,333	1
Air	3,819	12	8,895	8
Total	31,098	100	108,021	100

3.9 AESTHETICS AND VISUAL ENVIRONMENT

Visual resources are those physical features that make up the visual landscape, including land, water, vegetation, and man-made elements. These elements are the stimuli on which one's visual experience is based. Substantial visual and aesthetic resources within the study area include historic structures, parklands, waterways, and undeveloped open space/natural areas. Potential sensitive visual receptors include people affected by negative changes in the visual and aesthetic character of the study area. The study area for visual resources is variable and includes areas from which the Project would be visible and potentially have an effect on visual quality, as well as areas visible from the rail. In general, the study area will be narrower in developed areas where adjacent buildings limit the viewshed and wider in rural areas where large expanses can be viewed.

3.9.1 Regulatory Context and Methodology

NEPA and CEQ regulations address visual effects under the heading of aesthetics. These regulations identify aesthetics as one of the elements or factors in the human environment that must be considered in determining the effects of a project. Furthermore, 23 U.S.C. 109(h) cites "aesthetic values" as a matter that must be fully considered in developing a project. FRA's *Procedures for Considering Environmental Impacts* states that an EIS should identify any significant changes likely to occur in the natural landscape and in the developed environment and any aesthetic and design quality impacts (FRA, 1999).

Aerial photography and field reconnaissance were used to identify natural landforms, topography, vegetation, water resources, and man-made developments. VDOT's CEDAR database was also consulted and a literature search conducted to identify any specific scenic or visually sensitive resources such as designated scenic rivers or byways, scenic vistas, or historic landscapes. Visually sensitive resources are those locations where there are viewers of the landscape and where a certain type of visual landscape is anticipated. Viewers in visually sensitive resource areas are typically involved in outdoor activities where their sensitivity to the surrounding visual environment may be heightened; therefore, visually sensitive resources typically include parklands and outdoor recreation areas, such as school playgrounds. Visually sensitive historic resources are identified in Section 3.13.

The DC2RVA corridor was characterized in terms of visual assessment units (VAU) based on the data collection discussed above. A VAU is an area with a distinct uniformity of landscape character.

3.9.2 Affected Environment

The rail corridor predates much of the surrounding development and has become a major component of the landscape. This established linear landform and corridor defined by the clearing of trees and absence of buildings characterizes the right-of-way. The rail corridor is divided into six alternative areas. For the visual assessment, these areas may be further divided into VAUs based on similar visual characteristics. Figure 3.9-1 depicts the VAUs. In the sections below, the visual environs of the rail corridor are initially described for each VAU. The visual environs include the typical viewsheds encountered within that VAU. These are the general views that may be experienced by residents, road users, or train passengers within the area. Representative photographs of these typical environs are included for each VAU. Visually sensitive resources and scenic views were also identified within each VAU.

Additionally, each VAU is described in terms of more-specific rail features, such as number of tracks, notable bridge structures, and visual features of the railroad itself. Photographs of notable rail visual features are included for each VAU as appropriate.

Diverse visual environs along the corridor.

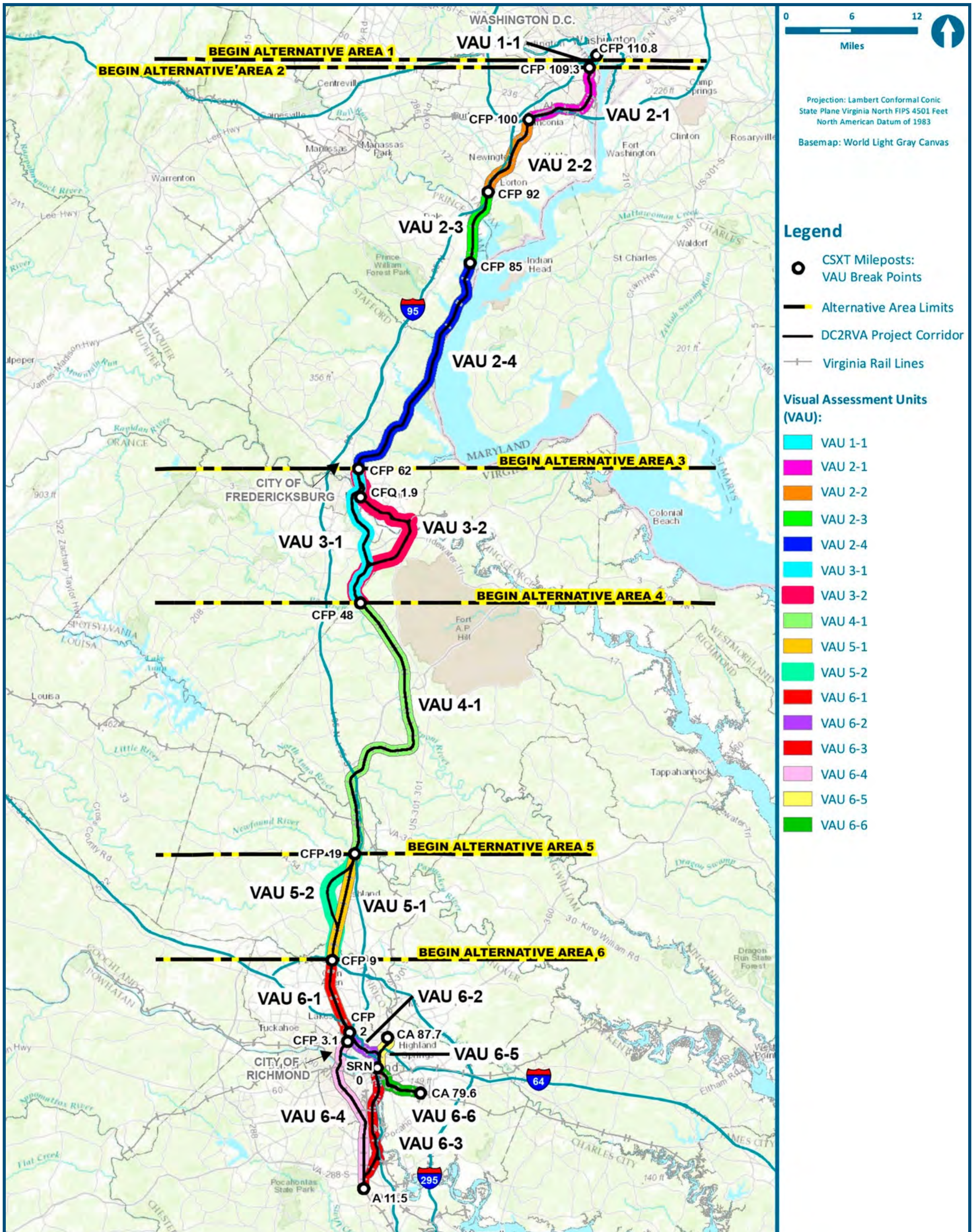


Figure 3.9-1: Visual Assessment Units

3.9.2.1 Area 1: Arlington (Long Bridge Approach)

VAU 1-1 – CFP 110 to CFP 109.3

This VAU is urban in nature but is dominated by parklands adjacent to the existing tracks. Long Bridge Park is located to the west of the tracks, and Roaches Run Wildlife Sanctuary and the George Washington Memorial Parkway are located to the east of the existing tracks.

Within this VAU, the railroad transitions from two tracks at the north end, where it leaves the Long Bridge, to four tracks (three mainline tracks and one siding track) adjacent to Long Bridge Park. The tracks are an integral part of the landscape with numerous views of the trains available from Long Bridge Park.

Sensitive Resources

1. George Washington Memorial Parkway
2. Roaches Run Wildlife Sanctuary
3. Long Bridge Park

Visual Environs: Parkland – Long Bridge Park

View of Railroad from Long Bridge Park

Roaches Run Wildlife Sanctuary

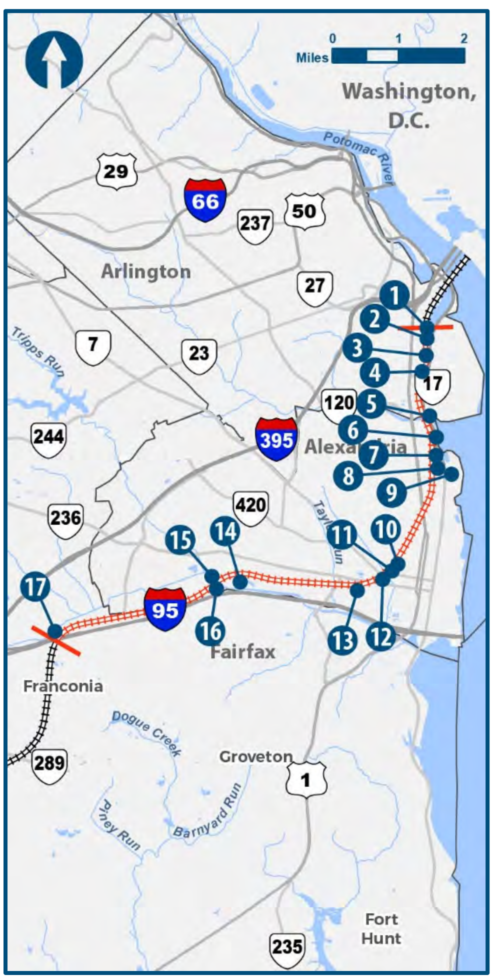
3.9.2.2 Area 2: Northern Virginia

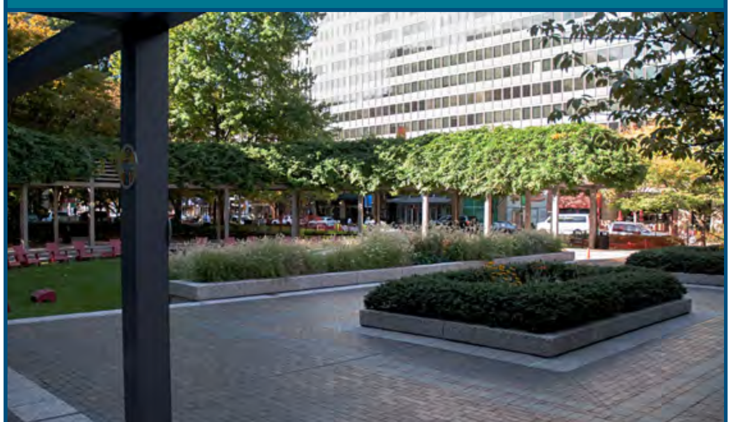
VAU 2-1 – CFP 109.3 to CFP 100

This VAU consists of urban to suburban development. Crystal City, located at the north end of this VAU, is almost exclusively populated by high-rise apartment buildings, offices, hotels, shops and restaurants. Farther south in Alexandria, development is primarily residential. Several urban parks occur in this unit. WMATA's rapid transit route shares the corridor. The existing railroad tracks pre-date much of the development and are an integral part of the community fabric. The southern portion includes the Norfolk Southern (NS) Rail Yard and WMATA rail yards.

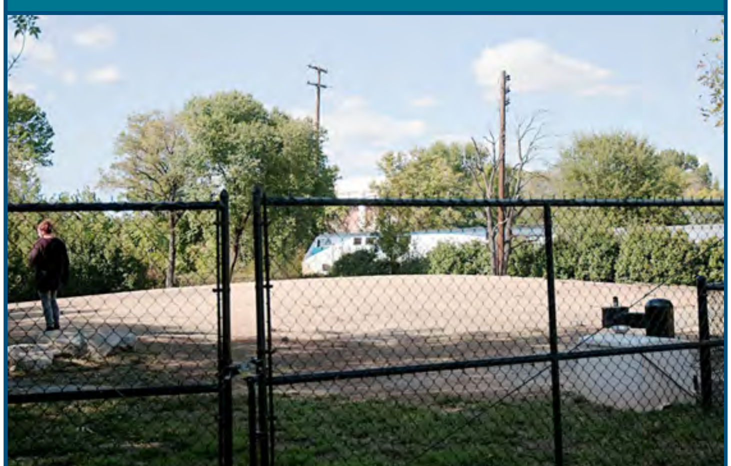
Sensitive Resources

1. Crystal Park North
2. Crystal City Water Park
3. Crystal City Courtyard Green
4. Crystal City Children's Park
5. Four Mile Run
6. George Washington Memorial Parkway
7. Potomac Greens Park
8. Potomac Yard Park
9. Daingerfield Island Park
10. Metro Linear Park
11. Hooff's Run Park and Greenway
12. Sunset Mini Park
13. Dog Run Park at Carlyle
14. Cameron Run Regional Park
15. Clermont Natural Park
16. Hensley Park
17. Backlick Stream Valley Park





Visual Environs: Urban Greenspace – Crystal City Courtyard Green



View of Tracks from Dog Run Park at Carlyle

VAU 2-2 – CFP 100 to CFP 92

This VAU is primarily industrial with large expanses of parks, and conservation lands as well as extensive wetlands. Some residential areas are located at the north end of this unit, but they are not directly adjacent to the tracks. There are also scattered institutional land uses.

The rail corridor in the northern half of this VAU consists primarily of three tracks with another two tracks located immediately to the west. The southern half transitions down to two tracks. WMATA rapid transit continues to share the alignment in this VAU. The view of the tracks is limited due to adjacent tree lines throughout much of this VAU.

Sensitive Resources

1. Accotink Stream Valley Park
2. Pohick Stream Valley Park
3. Lorton Station Elementary School

Visual Environs: Institutional Land Use – Lorton Station Elementary School

Source: Bing Map

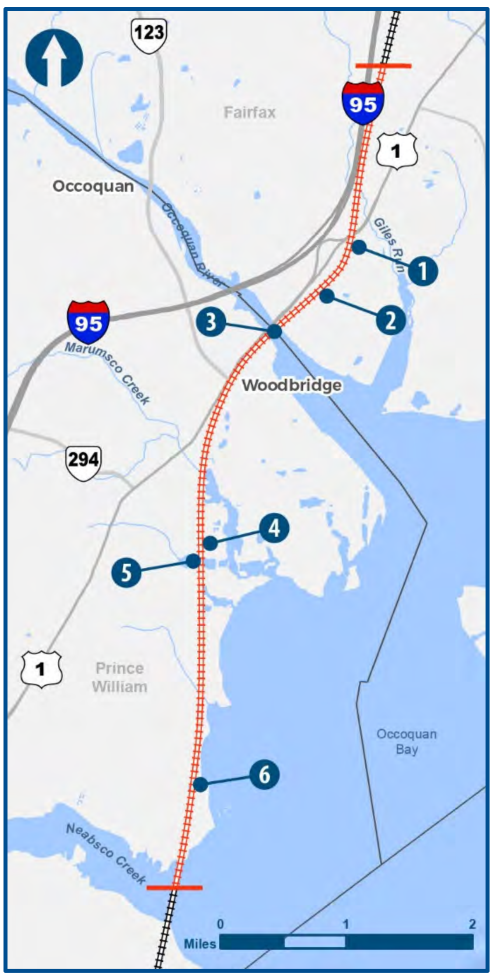
View of tree-lined tracks north of Lorton Station

Commercial Land Uses

VAU 2-3 – CFP 92 to CFP 85

This VAU includes a mix of residential, commercial, and industrial uses. In the northern half of this unit, the tracks parallel I-95. The land between the interstate and the tracks is primarily vacant/wooded, or industrial uses. Numerous parks and conservation lands are in this VAU, with the southern end of the VAU dominated by Featherstone National Wildlife Refuge.

The rail corridor consists of two tracks through most of this VAU. Where there is adjacent development, bands of tree shelter the tracks from open view. The Occoquan River Railroad Bridge is the most notable rail visual feature.



Sensitive Resources

1. Mason Neck West Park
2. Old Colchester Preserve and Park
3. Occoquan River
4. Veterans Memorial Park
5. Marumsco Acre Lake Park
6. Featherstone National Wildlife Refuge

Visual Environs: Parklands – Mason Neck West Park

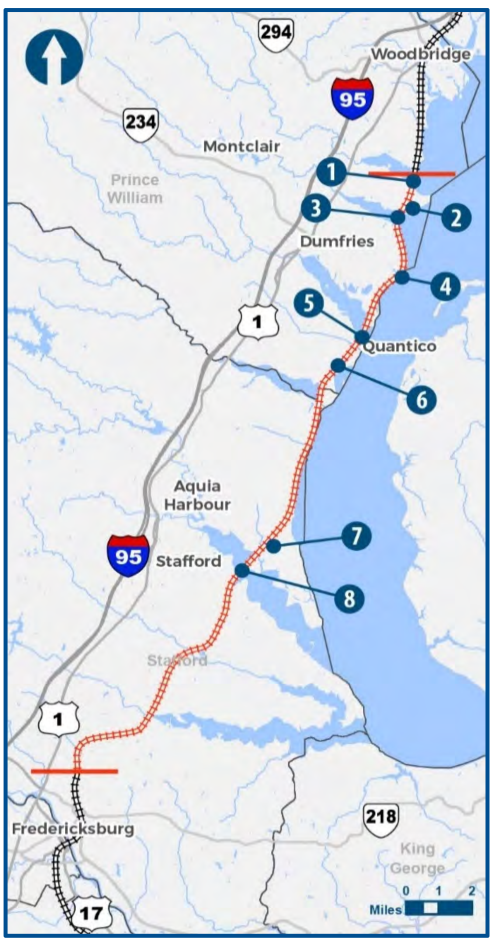
Occoquan River Railroad Bridge

Pedestrian Crossing over Tracks near Veterans Memorial Park

VAU 2-4 – CFP 85 to CFP 62

This VAU is largely undeveloped. The rail corridor generally parallels the shore of the Potomac River and crosses several large creeks. Some industrial land use pockets are located near the Potomac River. This unit includes large expanses of vacant forested lands, parks, scattered low-density residential, and some small agricultural areas. Most notably, this VAU traverses the Quantico Marine Corps Base.

The rail corridor includes two tracks throughout most of this VAU. As part of a separate project, a third track is under construction through the Arkendale to Powells Creek section of this VAU. Notable rail features are the numerous bridges, including Neabsco Creek, Powells Creek, Quantico Creek, and Aquia Creek.



Sensitive Resources

1. Neabsco Creek
2. Leesylvania State Park
3. Powells Creek
4. Cockpit Point Battlefield Heritage Park
5. Quantico Creek
6. Quantico Unnamed Recreation Area
7. Widewater State Park
8. Aquia Creek

Visual Environs: Vacant Land – Potomac Shores Area

Neabsco Creek

Source: Bing Map

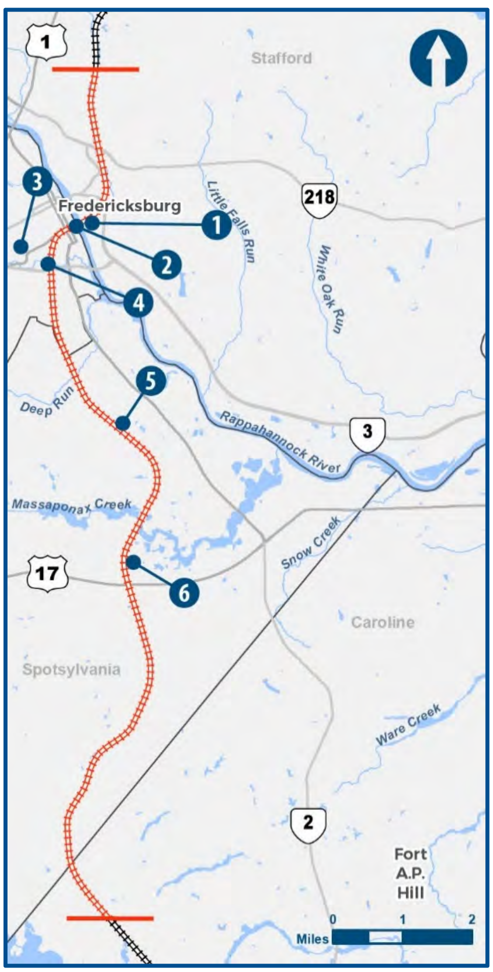
Powells Creek

3.9.2.3 Area 3: Fredericksburg

VAU 3-1 – CFP 62 to CFP 48

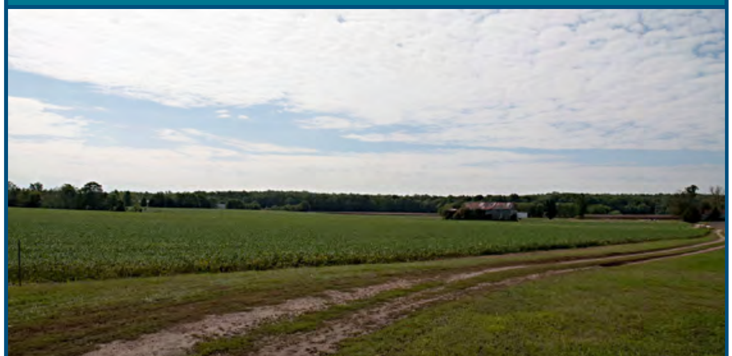
This VAU follows the existing rail corridor and consists of a variety of land uses. The northern part is primarily residential. The middle part consists of low-density commercial and industrial land uses. The southern portion of the unit is largely undeveloped and includes forested lands, parks, scattered agricultural lands, and low-density residential.

This section of the railroad corridor primarily consists of two tracks, though it broadens out to three and more on the south side of Fredericksburg. The most notable visible feature of the rail corridor is the Rappahannock River Bridge.



Sensitive Resources

1. Embry Farm
2. Rappahannock River
3. Fredericksburg and Spotsylvania National Park
4. Cobblestone Park
5. Pierson/Slaughter Pen Farm
6. Mary Lee Carter Park



Visual Environs: Historic Battlefields – Pierson/Slaughter Pen Farm

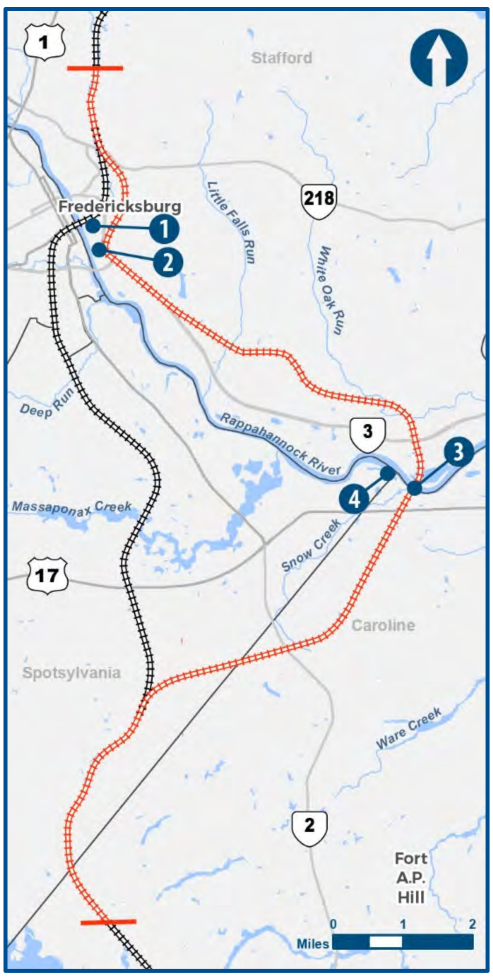
Rappahannock River Railroad Bridge

Mary Lee Carter Park

VAU 3-2 – CFP 62 to CFP 48 (Bypass)

The northern end of this VAU consists primarily of suburban residential and commercial land uses. Continuing east and south within this VAU, the land transitions to a mix of forests and agricultural lands and includes a new crossing of the Rappahannock River. The southern end of this unit consists of forested lands, scattered agricultural lands, and low-density residential.

This VAU shares common areas on the north and south end with VAU 3-1. Near CFP 61, it follows the existing single track. Most of this VAU is along new alignment, and there are no notable existing rail features.



Sensitive Resources

1. Embry Farm
2. George Washington's Ferry Farm
3. Rappahannock River
4. Alexander Berger Memorial Sanctuary

Visual Environs: Forested Land – Alexander Berger Memorial Sanctuary

George Washington's Ferry Farm

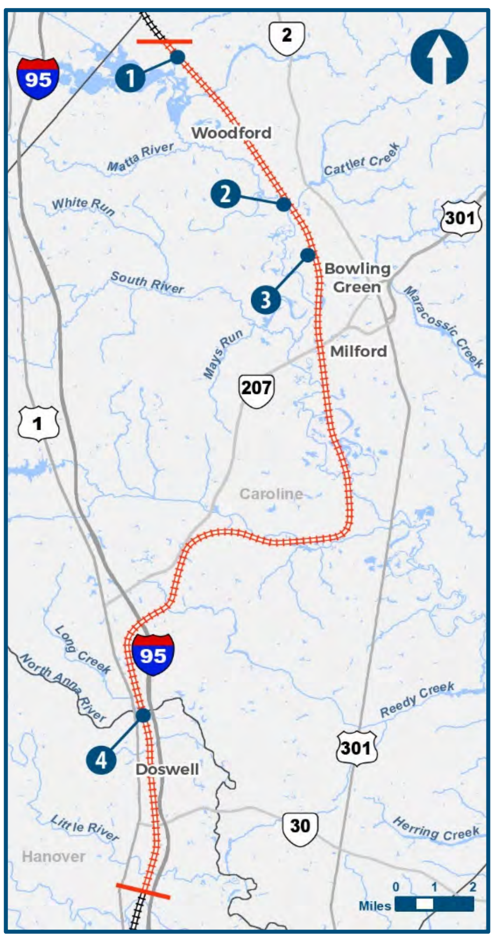
View of Corridor Looking Northeast from Kings Highway

3.9.2.4 Area 4: Central Virginia

VAU 4-1 – CFP 48 to CFP 19

This VAU is largely undeveloped. It consists primarily of forested lands with some agricultural lands interspersed. Wetlands are also extensive within this VAU. The Mattaponi River, the North Anna River, and several smaller creeks are crossed and the tracks are adjacent to portions of the Fredericksburg and Spotsylvania National Park and the Mattaponi State Wildlife Management Area. Residences are scattered and rural in nature.

There are primarily two tracks within this VAU. Notable rail features include minor bridges crossing the North Anna and Mattaponi Rivers.



Sensitive Resources

1. Fredericksburg and Spotsylvania National Park
2. Mattaponi River
3. Mattaponi State Wildlife Management Area
4. North Anna River

Visual Environs: Forested Land – Mattaponi State Wildlife Management Area

View of Tracks

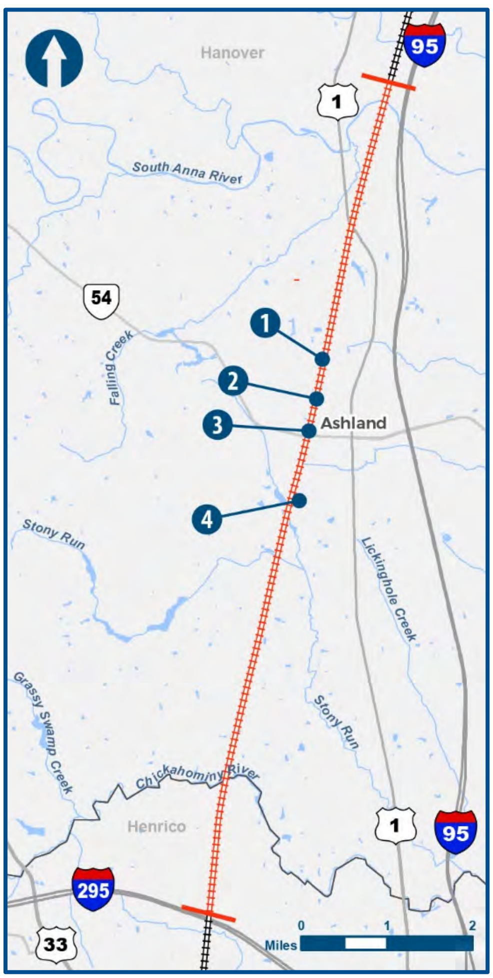
Agricultural Lands

3.9.2.5 Area 5: Ashland

VAU 5-1 – CFP 19 to CFP 9

The northern portion of this VAU is primarily vacant forested land. The middle portion consists of the town of Ashland, which includes a concentration of commercial and residential land uses. South of town, land uses are vacant and agricultural.

There are primarily two existing tracks throughout this VAU. The tracks are located in the middle of downtown Ashland along Center Street/Railroad Avenue and are a dominant feature of the landscape, with the town buildings directly abutting the tracks.

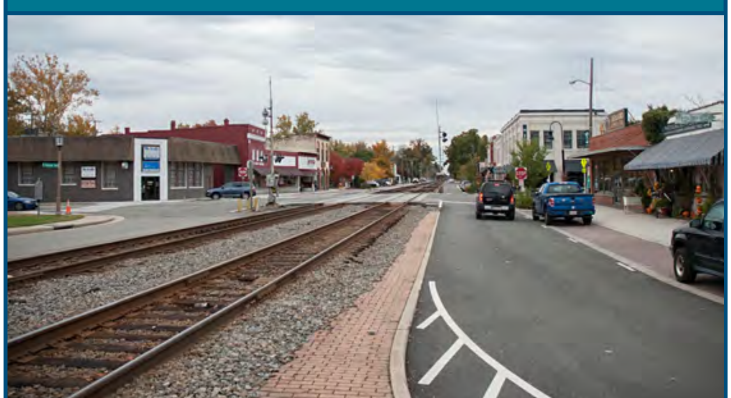


Sensitive Resources

1. North Ashland Park
2. Railside Park
3. Carter Park
4. Downtown Ashland

Visual Environs: Commercial Land Uses – Downtown Ashland

Ashland Station / Visitor Center

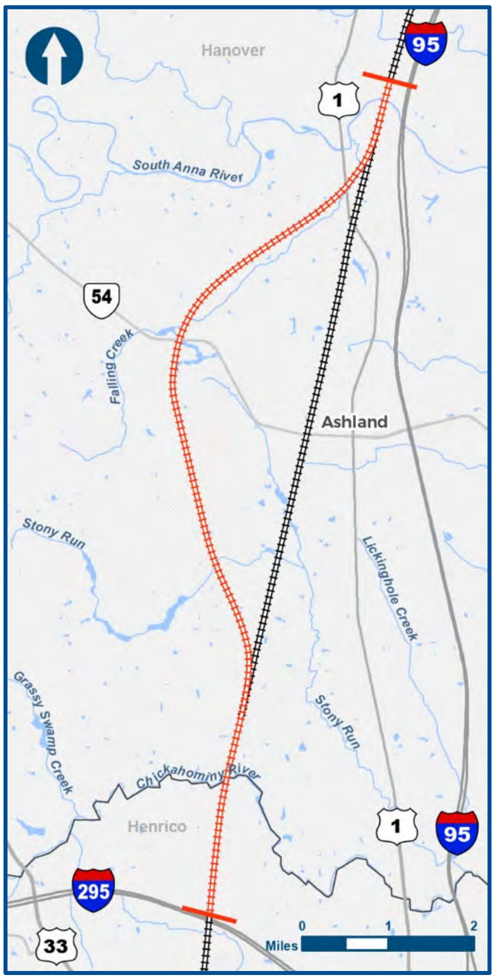


View of Tracks through Downtown Ashland

VAU 5-2 – CFP 19 to CFP 9 (Bypass)

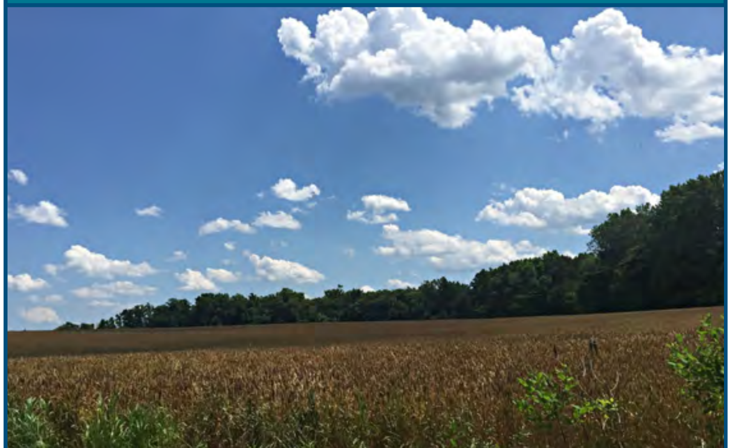
This VAU is generally rural with a mix of forested and agricultural lands and scattered low-density residential units. Residential density increases at the south end of the unit approaching Henrico County. No sensitive visual resources are identified within this unit. Large open expanses of agricultural land and older farmhouses dominate the landscape.

This VAU shares a northern terminus and southern terminus with VAU 5-1. The remainder of this VAU is along new alignment and includes no notable existing rail visual features.

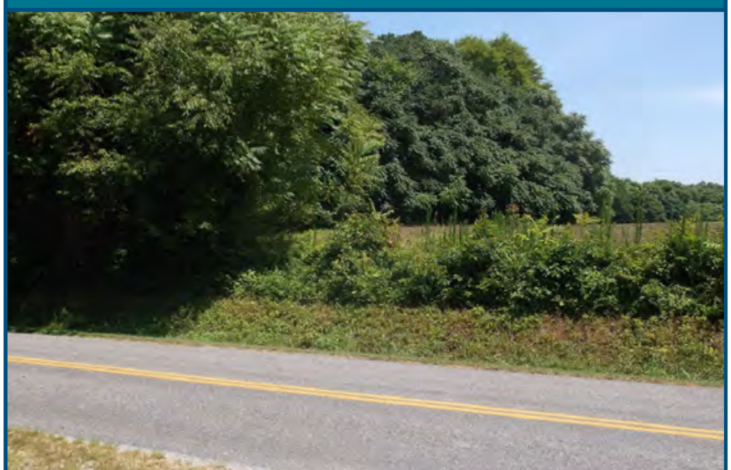


Sensitive Resources

None identified



Visual Environs: Agricultural Land – West of Ashland



Agricultural Lands

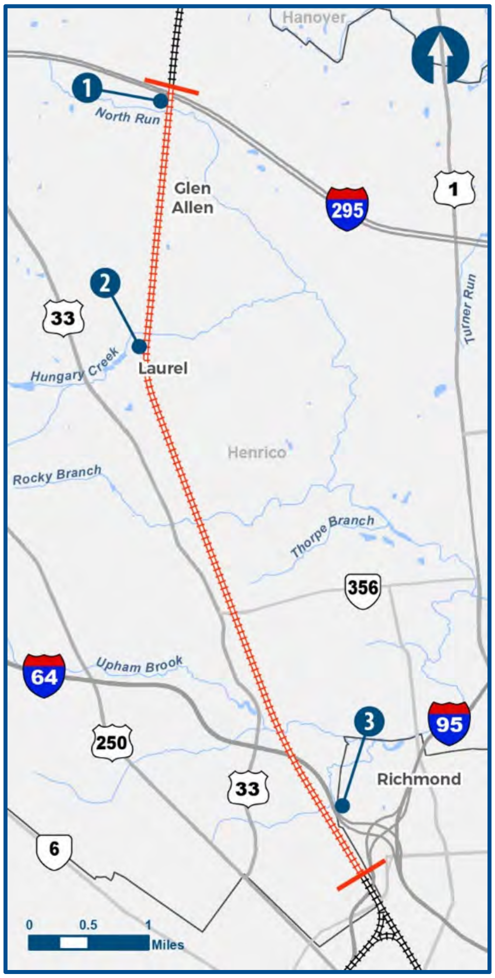
Agricultural Lands

3.9.2.6 Area 6: Richmond

VAU 6-1 – CFP 9 to CFP 2

This VAU is primarily residential land uses. There are also some commercial and industrial land use areas, as well as parks and recreation areas, dispersed throughout this unit. Several small creeks are crossed with minor bridges and culverts. The floodplains of those creeks include extensive wetlands and remain largely undeveloped.

This VAU consists of two existing tracks on the north end with an increasing number of tracks approaching the large CSXT Acca Yard. There are no notable existing rail visual features located within this unit.



Sensitive Resources

1. RF&P Park
2. Laurel Recreation Area
3. Joseph Bryan Park

Visual Environs: Mixed Land Uses – North of Richmond

Source: Bing Map

Acca Yard

RF&P Park

VAU 6-2 – CFP 2 to SRN 0

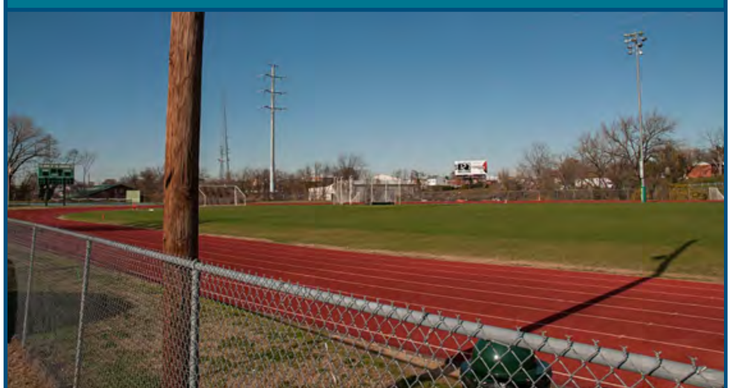
This VAU is an urban mix of residential, commercial, and industrial land uses. Redevelopment efforts have recently resulted in the conversion of some industrial land uses to residential loft apartments in the downtown area.

This VAU begins in the Acca Yard area with a large expanse of tracks. It tapers down to two existing tracks at the southern terminus. The most notable rail visual feature within this VAU is the historic Main Street Station. Main Street Station was originally opened in 1901. It is one of Richmond's most visible landmarks.

Sensitive Resources

1. Maggie Walker Governor's School Fields
2. Main Street Station

Visual Environs: Redevelopment Areas – Residential and Industrial Development



View of Tracks beyond Maggie Walker Governor's School Fields

Main Street Station

VAU 6-3 – SRN 0 to A 11 (via S-Line)

This VAU consists of a mix of residential, commercial, and industrial land uses. Near the James River, many of the industrial buildings have been converted into commercial spaces and loft apartments. Extensive walking trails are located along the banks of the river.

The historic rail viaduct is an integral part of the downtown scenic views. Most of this VAU south of the James River consists of two tracks with some areas with as many as eight tracks. The most notable rail visual features in this VAU are the James River crossing which is a single track crossing and the unique Triple Crossing.

Sensitive Resources

1. Triple Crossing
2. Canal Walk
3. James River
4. Walkers Creek Retention Basin Park
5. Falling Creek Park

Visual Environs: Redevelopment Area – Canal Walk

Source: Bing Map

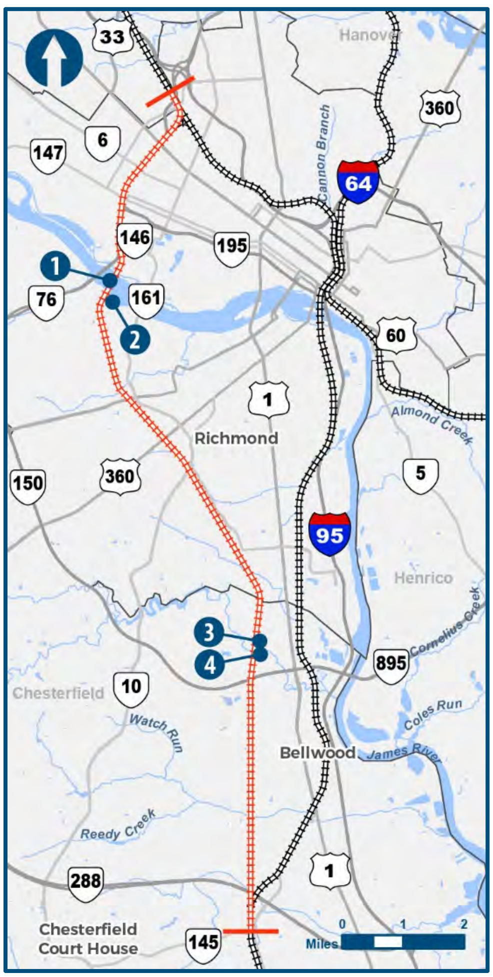
James River Railroad Bridge via S-Line

Triple Crossing

VAU 6-4 – CFP 2 to A 11 (via A-Line)

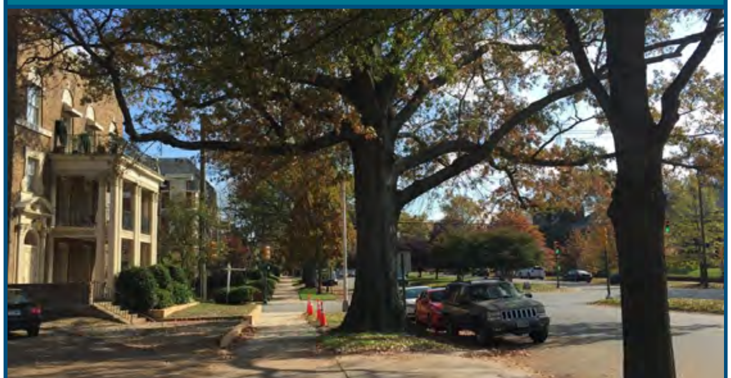
This VAU consists primarily of single-family residential with scattered commercial and industrial land uses. The Bellwood Richmond Quartermaster Depot occupies a large expanse of land at the south end of this unit.

This VAU consists primarily of two existing tracks. The most notable feature in this VAU is the scenic railroad bridge over the James River on the A-Line. This aesthetically pleasing bridge is visible from many nearby roads, parks, and residential areas, as well as from the river itself, which is highly used for recreational purposes.



Sensitive Resources

1. James River
2. James River Park
3. Gates Mill Park
4. Falling Creek Park



Visual Environs: Residential Land Uses along Monument Avenue

James River Railroad Bridge via A-Line

Falling Creek Park

VAU 6-5 – SRN 0 to CA 87

This VAU is a small section that consists of urban residential land uses at the north end transitioning to industrial land uses within the south end of the unit. The tracks are located between the interstate and an area of forested lands. Valley Road parallels the tracks for a short distance. The Richmond Juvenile Detention Center and City Sherriff's Office are located to the immediate east of the tracks.

No sensitive rail visual resources are in the DC2RVA corridor within this VAU. There is a single track within this VAU.

Sensitive Resources

None identified

Visual Environs: Industrial Area – Near Hospital Street

Juvenile Detention Center

Sherriff's Office

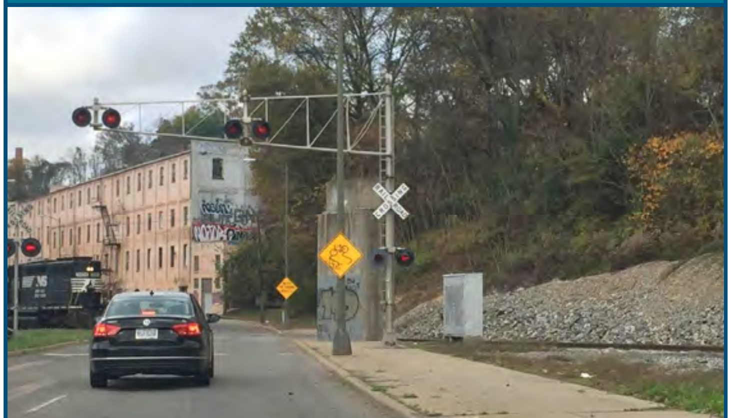
VAU 6-6 – SRN 0 to CA 80

This VAU consists of commercial, residential, and parkland land uses. Similar to other locations in the downtown Richmond area, numerous former industrial land uses have been converted into residential units. Steep elevation changes exist in this area with much of the residential development on a hill with views of the James River.

This VAU includes 2 existing tracks where it parallels the James River, expanding to more than 10 tracks to the east of Richmond. The most notable rail feature is the raised rail bridge that is parallel to the James River and highly visible to surrounding areas.

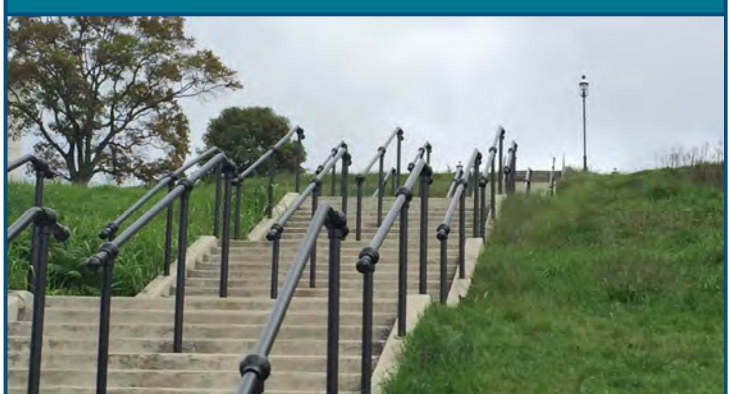
Sensitive Resources

1. James River
2. Great Shiplock Park
3. Libby Hill Park



Visual Environs: Vacant Industrial/Potential Redevelopment – Williamsburg Avenue in Richmond

Raised Rail Bridge



Steep Slopes at Libby Hill Park

3.10 BIOLOGICAL RESOURCES

EPA defines ecoregions as areas where ecosystems (and the type, quality, and quantity of environmental resources) are generally similar. Ecoregions serve as a spatial framework for the research, assessment, management, and monitoring of ecosystems and their components. There are four different hierarchical levels of ecoregions, ranging from general regions to more detailed:

- Level I—12 ecoregions in the continental United States
- Level II—25 ecoregions in the continental United States
- Level III—105 ecoregions in the continental United States
- Level IV—967 ecoregions in the conterminous United States

Most of the DC2RVA corridor is located in EPA Level III Ecoregion 65–Southern Plains (Figure 3.10-1). This ecoregion is composed of irregular plains covered by cropland, forest, and pasture. Natural vegetation consists of mostly Oak–Hickory–Pine Forest (dominants: hickory *[Carya]*, longleaf pine *[Pinus palustris]*, shortleaf pine *[Pinus echinata]*, loblolly pine, white oak *[Quercus alba],* and post oak *[Quercus stellata]*) and, in the northeast, Appalachian Oak Forest (dominated by white oak and red oak *[Quercus rubra]*). The Southern Plains area crossed by the Project is split further into two level IV ecoregions: Chesapeake Rolling Coastal Plain (65n) (north of Occoquan River) and Rolling Coastal Plain (65m) (from Occoquan River south).

The **Chesapeake Rolling Coastal Plain** is a hilly upland, with local relief ranging from 25 to 225 feet in elevation, narrow stream divides, incised streams, and well-drained loamy soils. Stream margins can be swampy, and it is common for water to be stained by tannic acid from decaying vegetation. Soils are low in nutrients and require amendments to be productive for agriculture. Urbanization is extensive along corridors connecting Baltimore, Washington, D.C., Wilmington, and Annapolis. In other areas, less-intensive agriculture, general farming, or part-time agriculture occurs.

The **Rolling Coastal Plain** is more forested than the Chesapeake Rolling Coastal Plain and is comprised of a mosaic of woodland and farmland with elevations ranging from 30 to 250 feet. Soils in this area tend to have good drainage. Stream margins can be swampy, and stained water can occur. The westernmost portion includes parts of the Fall Zone, where aquatic habitats include islands, pools, swampy streams, and cascades. The Fall Zone or Fall Line is the geomorphologic break between an upland region of relatively hard rock and a coastal plain of softer sedimentary rock.

The existing track occasionally crosses into EPA Ecoregion 45–Piedmont to the west, which is separated from the Southern Plains by the fall line (generally along I-95). This transitional area between the mountains and the coast is a mostly wooded area of irregular plains, low hills and ridges, shallow valleys, and scattered monadnocks (isolated hills of bedrock). This area traditionally supported Oak–Hickory–Pine forest (dominants: hickory, shortleaf pine, loblolly pine, white oak, and post oak); however, it has since been cultivated and is now a mixture of farmland and fields that are reverting to pine and hardwoods. The Piedmont area crossed by the Project is split further into one level IV ecoregion: Northern Inner Piedmont (45e) (north of Fredericksburg).

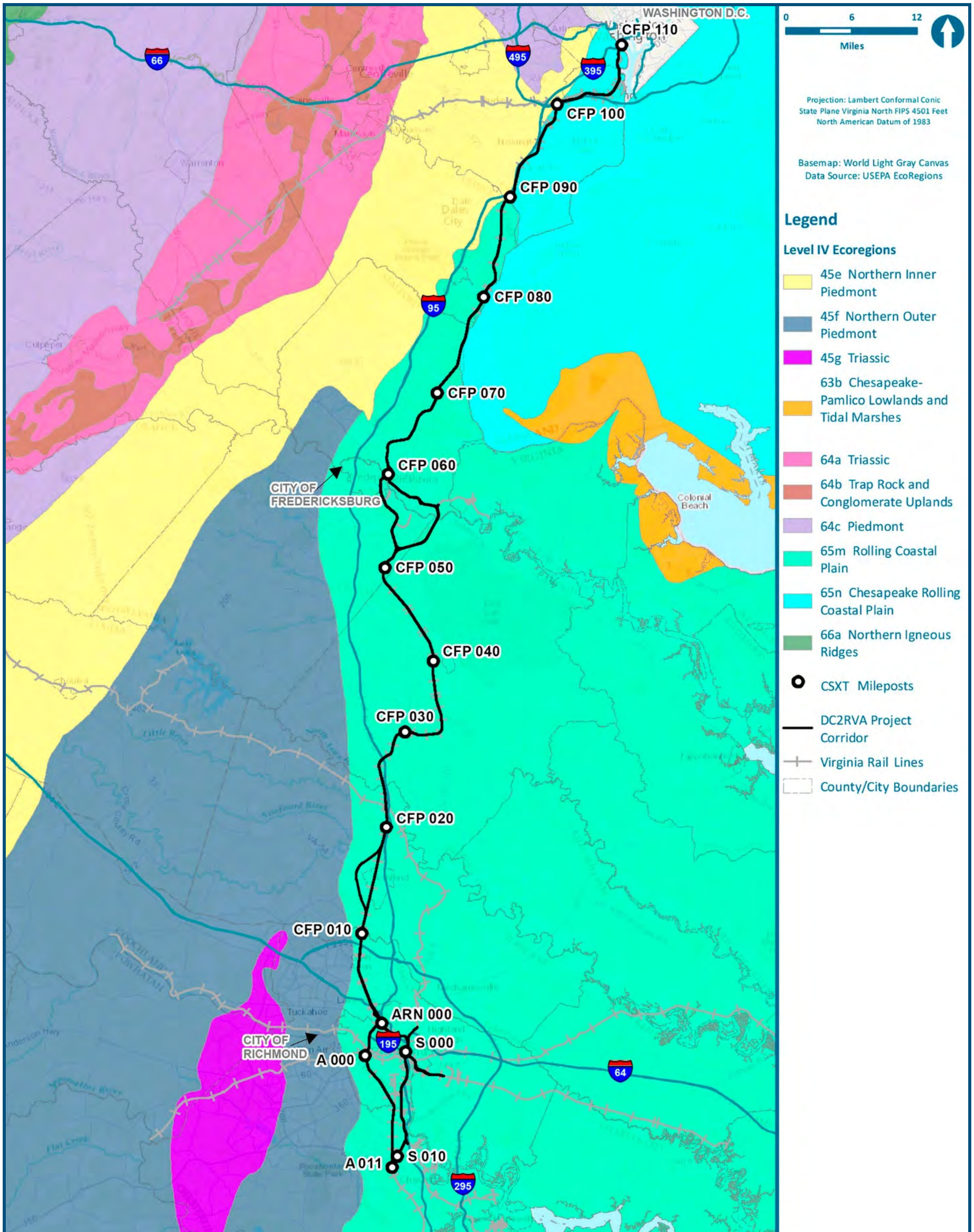


Figure 3.10-1: EcoRegions

The **Northern Inner Piedmont** ranges in elevation from 200 to 1,000 feet, including landforms such as hills, irregular plains, and isolated ridges and mountains, and monadnocks far more common than in the Northern Outer Piedmont. Streams have silt, sand, gravel, and rubble bottoms with low to moderate gradients. The landscape is comprised of forests of loblolly—shortleaf pine, agricultural activity, and in the northeast, urban and suburban areas.

A general map of habitats within a 500-foot-wide study area along the DC2RVA corridor was developed by reviewing the aerial photographs and topographic maps; Virginia Wetlands Catalog maps from the VDCR–Division of Natural Heritage; Wetlands digitized by the City of Richmond; field verified wetlands and streams; Northeast Terrestrial Habitat Map (TNC, 2014); Urban Tree Canopy Land Cover (VGEP, 2008); Municipality land cover data; NHD maps from USGS, VDOT GIS data (VDOT, 2014); and VDOT mitigation sites. A more-detailed display of the streams and wetlands mapping within the study area is provided in Appendix M.

Table 3.10-1 summarizes the general habitat types along the Project in a 500-foot-wide study area.

3.10.1 Regulated Natural Communities

The communities described below are areas intended for the preservation of habitat, plants, or wildlife. They are maintained to different degrees by regulatory agencies. These communities can be publically or privately owned. Figure 3.10-2 shows these communities.

3.10.1.1 National Wildlife Refuges

A requirement of the Secretary of the Interior is to maintain the biological integrity, diversity, and environmental health of National Wildlife Refuges, which are managed by the USFWS for the protection and conservation of our nation's wildlife resources. This network of diverse and strategically located habitats is protected by Section 4(f) of the *Department of Transportation Act of 1966* (see also Chapter 5).

Roaches Run Waterfowl Sanctuary. This sanctuary is part of the George Washington Memorial Parkway. It is located near the northern terminus of the DC2RVA corridor. The sanctuary consists of a tidal open water wetland that provides important wintering habitat for waterfowl. Osprey *(Pandion haliaetus)*, green heron *(Butorides virescens)*, red-winged blackbird *(Agelaius phoeniceus)*, and mallards *(Anas plathyrhynchos)* are all common during the summer, along with other wetland wildlife.

Occoquan Bay National Wildlife Refuge. Located on the south side of the Occoquan River where it meets Belmont Bay, this refuge offers important grassland and wetland habitats in a highly urbanized area. The purpose of this refuge is to provide a sanctuary and breeding area for migratory birds and endangered species; provide a wildlife education center to the public; and support other recreational uses, where possible. One square mile of a variety of habitat types is accessible by trails offering visitors the opportunity to view the many types of wildlife.

Featherstone National Wildlife Refuge. Established with the purpose of protecting contiguous wetland habitat, this refuge contains 325 acres of upland woodland and freshwater tidal marsh along the mouth of Neabsco Creek and Occoquan Bay. This area provides important habitat for migrating birds, wintering waterfowl, and many other wildlife species. Access to the refuge is limited to a nonmotorized boat ramp; however, it is open to the public.

Table 3.10-1: General Habitat Types (acres)

Alternative Area	Aqueous Habitat (wetlands/ streams/ open water)	Agriculture (pasture/ row crop/ grassland)	Shrub Area/Old Field	Upland Forest	Riparian/ Bottomland Forest/PFO	Urban/ Developed Lands	Total
Area 1: Arlington (Long Bridge Approach)	32 28%	0 0%	0 0%	0 0%	1 1%	81 71%	114 100%
Area 2: Northern Virginia	488 8%	196 3%	9 0%	1,890 32%	228 4%	3,059 52%	5,870 100%
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	191 5%	666 19%	0 0%	1,527 43%	359 10%	765 22%	3,508 100%
Area 4: Central Virginia (Crossroads to Doswell)	342 10%	619 17%	144 4%	1,360 38%	651 18%	451 13%	3,567 100%
Area 5: Ashland (Doswell to I-295)	26 1%	279 14%	72 4%	1,014 49%	91 4%	577 28%	2,059 100%
Area 6: Richmond (I-295 to Centralia)	103 2%	62 1%	22 0%	950 17%	316 6%	4,083 74%	5,536 100%
Total	**1,182** **6%**	**1,822** **9%**	**247** **1%**	**6,741** **32%**	**1,646** **8%**	**9,016** **44%**	**20,654** **100%**

Source: VDCR, 2014, TNC, 2014, VGEP, 2008, USGS, 2014, and VDOT, 2014.

Roaches Run Waterfowl Refuge

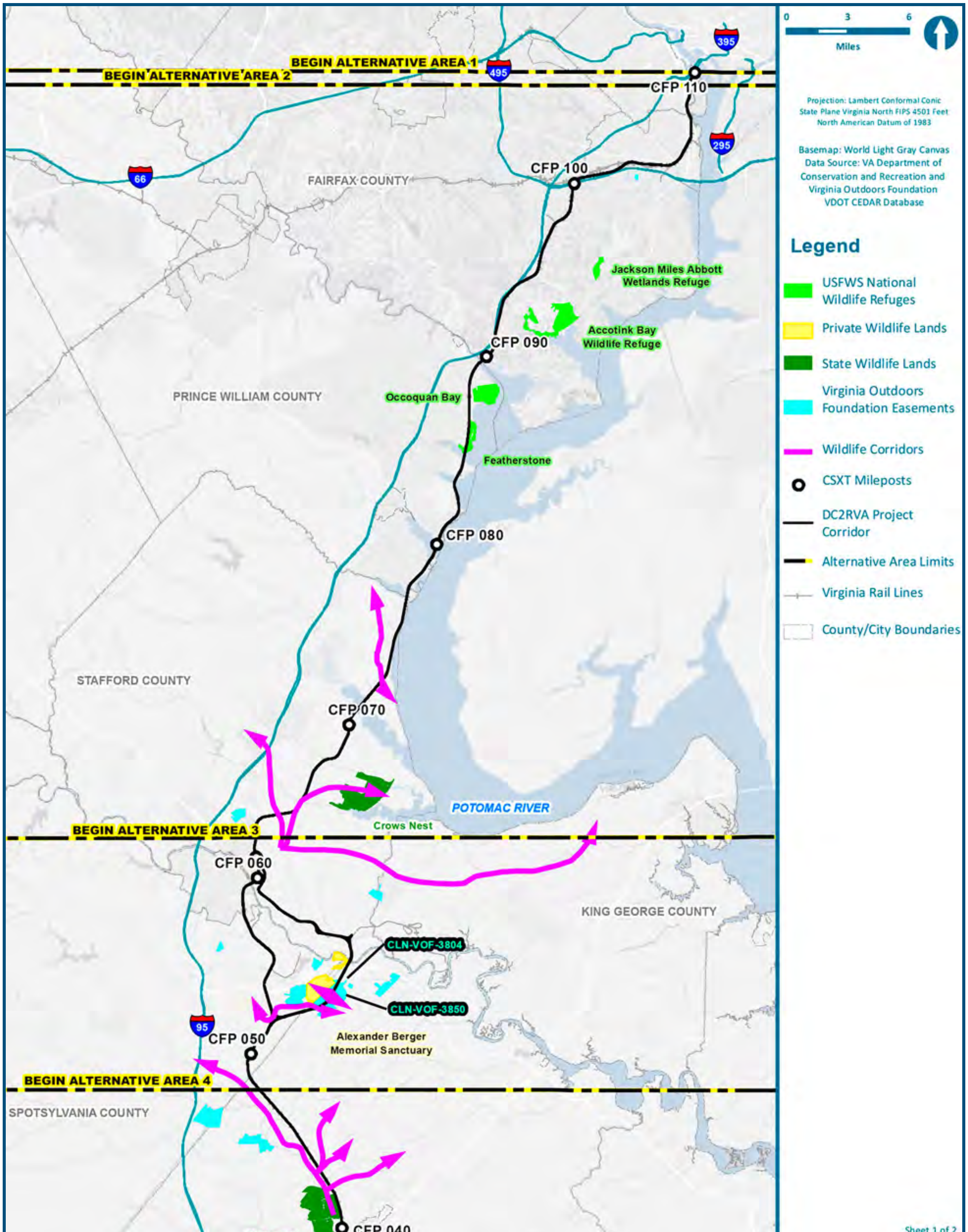


Figure 3.10-2: Designated Wildlife Areas

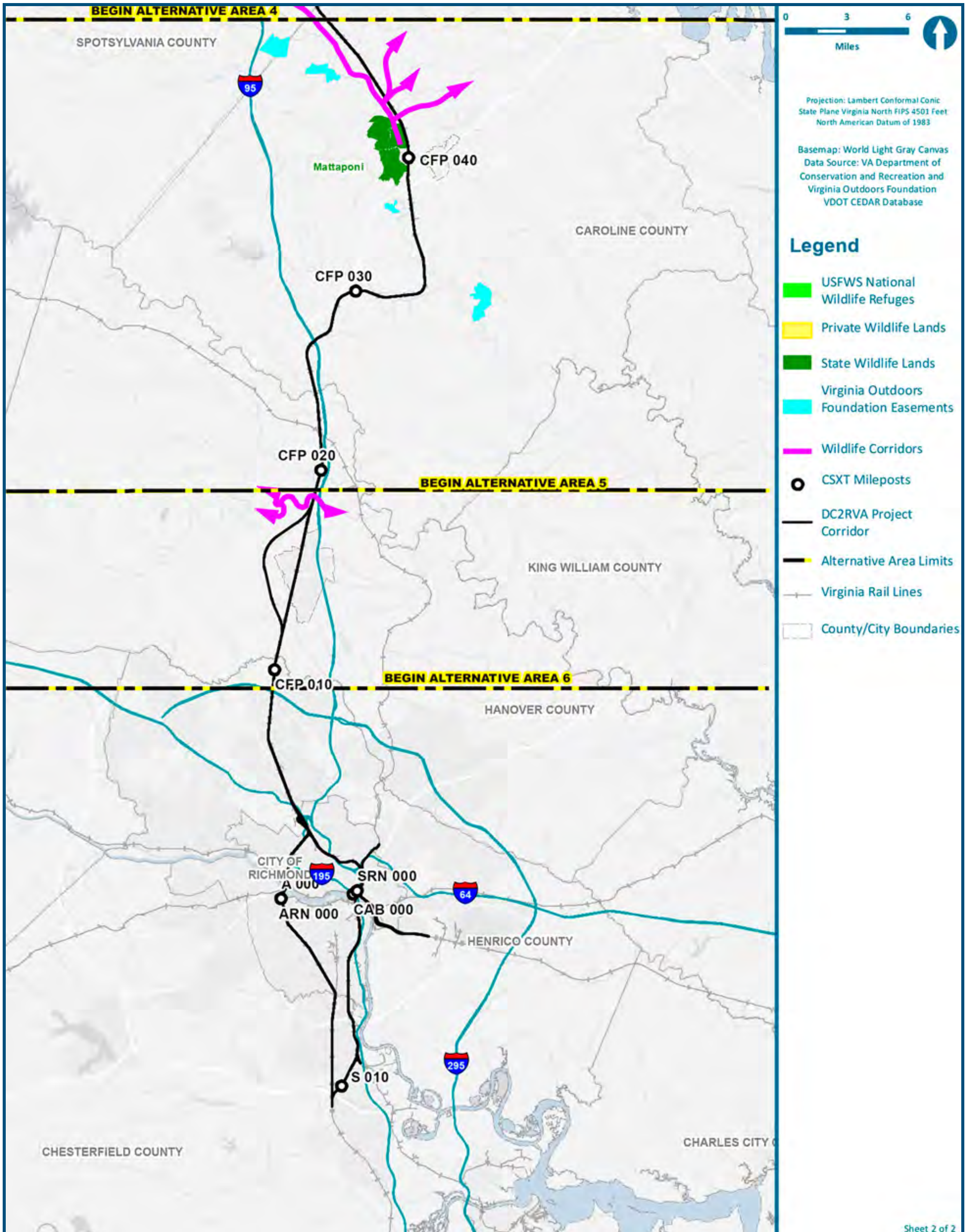


Figure 3.10-2: Designated Wildlife Areas

3.10.1.2 State Wildlife Lands

This network of diverse and strategically located habitats is also protected by Section 4(f) of the *Department of Transportation Act of 1966* (see also Chapter 5).

Crow's Nest Natural Area Preserve. Located northeast of Fredericksburg, Crow's Nest preserves 2,872 acres of natural area and habitat managed by VDCR. This resource consists of approximately 750 acres of tidal and nontidal wetlands; 21 miles of stream, riparian, and wetland buffer; and 2,200 acres of mature hardwood forest, including two forest types that are recognized as globally rare by VDCR's Natural Heritage Program. This habitat supports bald eagles *(Haliaeetus heucocephalus)*; federally listed shortnose sturgeon *(Acipenser brevirostrum)*; 22 plant species that are significant for the Coastal Plain of Virginia; approximately 60 species of neotropical migratory songbirds; spawning, nursery, and/or feeding habitat for 49 species of interjurisdictional (involving more than 1 political or management unit) fish; and 7 species of mussels and commercially valuable shellfish. This site has a biodiversity ranking from the VDCR of B2–very high significance.

Mattaponi State Wildlife Management Area. Nestled between nearly 6.5 miles of the Mattaponi and South rivers, this area conserves important upper coastal plain wildlife habitat managed by VDGIF. Diverse natural communities provide important habitat, including mature upland hardwood and mixed forests, managed loblolly pine stands, wetlands, and rivers. Wildlife-related recreation is allowed on this land, including hunting, trapping, primitive camping, fishing, hiking, and birding.

3.10.1.3 County Wildlife Lands

Pohick Seeps Conservation Site. Located adjacent the east side of the tracks and south side of Pohick Creek in Area 2, parcels owned by Fairfax County are set aside in a permanent wildlife conservation easement. The site contains a Northern Coastal Plain Terrace Gravel Bog, a saturated woodland known to occur in fewer than 10 places in the world, all of which are located just east of the fall line in Maryland and Northern Virginia. The site has been given a Biodiversity Ranking of B2–Very High Significance by VDCR and a Global Status of G1–Critically Imperiled due to its limited distribution in the Mid-Atlantic fall-line zone existing in fewer than 20 sites rangewide occurring in very small patches subject to multiple disturbances.

3.10.1.4 Private Wildlife Lands

Alexander Berger Memorial Sanctuary. Approximately 10 miles south of Fredericksburg along the proposed Fredericksburg Bypass alignment, the DC2RVA corridor bisects the larger of two areas encompassed by this approximately 868-acre preserve owned and managed by The Nature Conservancy. The sanctuary consists of mature, second-growth forest that has remained relatively undisturbed since 1864, when it was used by the Confederate army as an encampment. The two wooded parcels that were donated in 1963 were originally part of the historic Belvedere Peony Farm. The area contains trails that are open to the public year-round.

Virginia Outdoors Foundation (VOF). VOF open-space easements restrict property use to protect certain conservation values including, but not limited to, productive agricultural or timberlands, scenic vistas, rare species, caves, unique geologic features, rivers or streams, wetlands, wildlife habitat and corridors, and/or historic resources. For a property to be considered for a VOF easement, it must also have significant public benefits, which may include protection of water quality, retaining productive farm and timber land, and protecting scenic views enjoyed by travelers along public roads, rivers, or from parks. The proposed

Fredericksburg Bypass alignment bisects two VOF properties (CLN-VOF-3804, CLN-VOF-03850) totaling approximately 894 acres and comes within 1,000 feet of a third property (SPT-VOF-1597). All areas are privately owned, managed with conservation easements, and closed to the public.

3.10.1.5 Priority Conservation Areas

Priority Conservation Areas are lands identified by VDGIF as a priority for preservation, protection, or specific management action for conservation of Virginia's wildlife, plants, and natural communities.

VDGIF–Priority Wildlife Diversity Conservation Areas. VDGIF created the Priority Wildlife Diversity Conservation Areas (PWDCA) dataset to identify habitat for conservation that is important for nongame wildlife. These areas are based on recommendations from VDGIF biologists, Virginia's Wildlife Action Plan, and other sources. Areas include mapped species' habitats and recommended conservation actions to conserve riparian buffers, large blocks of habitat and forest, and wetland buffers. This mapping is part of an effort between VDGIF, VDCR–Division of Natural Heritage (DNH), and Virginia Commonwealth University's Center for Environmental Studies.

The **South Anna River** in the vicinity of the DC2RVA corridor is a PWDCA and has been designated a "Threatened and Endangered Water" for the dwarf wedgemussel *(Alasmidonta heterodon)*.

VDCR-DNH–Natural Heritage Plan Conservation Sites and Stream Conservation Units. Conservation sites represent landscape worthy of protection and stewardship action because of natural heritage resources, such as the habitat of rare, threatened, or endangered plant and animal species; unique or exemplary natural communities; and significant geologic formations. Terrestrial conservation sites are designed to include one or more rare plant, animal, or natural community and, where possible, its associated habitat and buffer or other adjacent land needed for the element's conservation. Stream Conservation Units (SCUs) include stream reaches and tributaries that contain aquatic natural heritage resources, including upstream and downstream buffer. Conservation sites and SCUs are given a biodiversity significance ranking based on the rarity, quality, and number of natural heritage resources they contain. The Natural Heritage Plan Conservation Sites and SCUs are listed in Table 3.10-2.

Table 3.10-2: Natural Heritage Conservation Areas

Conservation Site/SCU	Alternative Area/Location	VDCR Biodiversity Ranking*	Description
Pohick Seeps Conservation Site	Area 2: Northern Virginia East side of the tracks and south side of Pohick Creek	B2 Very high significance	Northern Coastal Plain Terrace Gravel Bog–A saturated woodland known to occur in less than 10 places east of the fall line in Maryland and Northern Virginia
Brent Marsh Conservation Site	Area 2: Northern Virginia Outside the right-of-way on the east side of the tracks; north of and including part of Widewater State Park	B3 High significance	Association with sensitive joint-vetch, a federally listed species
Arkendale Flatwoods Conservation Site	Area 2: Northern Virginia Including a portion of the existing tracks and to the east, much of the area includes a portion of Widewater State Park	B5 General significance	Coastal Plain Depression Swamp–A seasonally flooded forest located in depressions of the Chesapeake Bay Region

▶ *Continued – see end of table for notes.*

DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

Table 3.10-2: Natural Heritage Conservation Areas

Conservation Site/SCU	Alternative Area/Location	VDCR Biodiversity Ranking*	Description
Lower Aquia Creek Conservation Site	Area 2: Northern Virginia Adjacent to the west side of the tracks, on the north side of Aquia Creek	B4 Moderate significance	Associated with Parker's pipewort *(Eriocaulon parkeri)*, a rare plant to Virginia
Claiborne Run SCU	Area 2: Northern Virginia and Area 3: Fredericksburg Adjacent to and crossed by the DC2RVA corridor four times (once in the Northern Virginia area and three times in the Fredericksburg area)	B4 Moderate significance	
Hazel Run SCU	Area 3: Fredericksburg Route 1 to Route 2, crossed by the tracks	B3 High significance	Aquatic natural community
Little Falls Run SCU	Area 3: Fredericksburg East of the existing tracks; however, does not drain the existing track vicinity	B4 Moderate significance	Aquatic natural community
South Fredericksburg Conservation Site	Area 3: Fredericksburg Including existing tracks along the east side of the conservation site, site located mostly within the Fredericksburg Battlefield	B2 Very high significance	Non-Riverine Wet Hardwood Forest (Northern Coastal Plain Type)–Contains seasonally to nearly permanently saturated forest located in ancient floodplains on wide flat terraces
White Oak Run SCU	Area 3: Fredericksburg Crossed by the proposed bypass	B3 High significance	
Snow Creek Ravine Conservation Site	Area 3: Fredericksburg Crossed by the proposed bypass, site includes Snow Creek just south of its confluence with Rappahannock River	B4 Moderate significance	
Summit Railroad Tracks Conservation Site	Area 3: Fredericksburg Just south of Summit Crossing Road, adjacent to the east side of and including the existing tracks	B4 Moderate significance	
Polecat Creek–Penola SCU	Area 4: Central Virginia Crossed by existing tracks, west of Penola Road	B5 General significance	Association with the fine-lined emerald *(Somatochlora filose)*, a state rare dragonfly
South Anna River–Falling Creek SCU	Area 5: Ashland Crossed by existing tracks three times and the proposed bypass alignment two times	B3 High significance	Aquatic natural community and association of the yellow lance *(Elliptio lanceolata)*, a freshwater mussel
Centralia Conservation Site	Area 6: Richmond Adjacent to the west side of the tracks south of Old Lane at the southern terminus of the Project	B4 Moderate significance	

* Rating of the significance of the conservation site based on presence and number of natural heritage resources

Source: VDCR, 2014a and CEDAR.

VDCR-DNH–Ecological Cores. The Virginia Natural Landscape Assessment (VaNLA) is a landscape-scale GIS analysis tool developed to identify unfragmented natural habitats called Ecological Cores. Ecological Cores are prioritized according to their ecological value, notably their value as habitat for interior-dependent species. The habitat is ranked from Outstanding (C1) to General (C5). Most forested areas in Virginia are rated with this tool, including most of the areas along the DC2RVA corridor. This tool was used to locate core habitat and the corridors that connect them in the Project vicinity.

Wildlife Corridors. Wildlife corridors are corridors of habitat connecting larger similar areas of core habitat (i.e., large areas of similar habitat not broken up by other habitat types or urbanization) that facilitate the movement of species and genetic material between habitats. Corridors have the potential to reduce the negative genetic effects of habitat fragmentation (i.e., the breaking up of core habitat into smaller patches), such as reduced population and genetic diversity. In Virginia, core habitat and wildlife corridors generally refer to intact forested areas, many times along riparian corridors, that tend to have had fewer human alterations. These areas facilitate the movement of less common wildlife species that do not do well in areas of human alteration and species that prefer interior forested habitat away from edge dwelling predators. Wildlife corridors were located using a combination of VDCR-DNH ecological core mapping and aerial photographs of the Project vicinity. Table 3.10-3 lists the wildlife corridors identified within the DC2RVA corridor.

Table 3.10-3: Wildlife Corridors

Corridor	Alternative Area	Corridor Description
Marine Corps Base Quantico (MCBQ) to Widewater State Park	Area 2: Northern Virginia	The rail line in this location crosses a corridor approximately 8 miles long, generally over 1 mile wide and a minimum 0.5 mile wide, connecting C2 ecological core habitat on MCBQ to C3 to C4 habitat at Widewater State Park.
I-95/Route 17 to C1 Habitat east of Route 2	Area 3: Fredericksburg	The corridor is a minimum of 2,000 feet wide and connects C5 ecological core habitat southeast of I-95/Route 17 to C3 habitat to a very large area of C1 (outstanding) ecological core habitat east of Route 2.
Fort A. P. Hill	Area 3: Fredericksburg	The proposed Fredericksburg Bypass alignment and connection to main tracks crosses a large wildlife corridor consisting of a minimum of 1,000 feet connecting C1 habitat at Fort A. P. Hill to C2 and C3 habitat cores through C4 and C5 habitat areas.
I-95 to Milford	Area 4: Central Virginia	This wildlife corridor connects patches of C4-C2 habitat roughly following the Mattaponi River and one of its tributaries from I-95 northeast of Thornburg to north of Milford. The corridor width varies from 1,500 feet to over 1 mile in some places and remains on the west side of existing tracks. East of the tracks and Route 2 is a large patch of C1 (outstanding) ecological core habitat.
South Anna River	Area 5: Ashland	The riparian corridor along the South Anna River could also serve as a wildlife corridor. The forested area narrows to 500 feet in many places; however, it does provide a lengthy corridor that connects several larger habitat areas.

Source: VDCR-DNH, 2015. Google Maps, 2015.
Notes: 1. C1: Outstanding, C2: Very High, C3: High, C4: Moderate, C5: General

Forest Legacy Program. To protect environmentally important private forests that are threatened by conversion into non-forest uses, USDA Forest Service, in partnership with the states, created the Forest Legacy Program (FLP). FLP is a voluntary program that uses federal grant funds to purchase land, or conservation easements, to conserve lands that provide public benefits, including sustainable forest resources, clean water, clean air, wildlife habitat, and forested scenic views, as well as protecting sensitive sites and habitats used by threatened and endangered species. As of January 2012, 9,750 acres have been protected in Virginia through this program. No FLP land is located in the Project vicinity.

3.10.2 Invasive Species

EO 13112, *Invasive Species*, defines invasive species as non-native plant, animal, or microbial species that cause, or have the potential to cause, economic or ecological harm or harm to human health. State and local governments have also set up several laws and regulations to prevent the spread of noxious weeds and plants deemed to be detrimental to crops; surface waters, including lakes; or other desirable plants, livestock, land, or other property or to be injurious to public health or the economy. Furthermore, noxious weeds are plants designated by federal, state, or county government as detrimental to public health, agriculture, recreation, wildlife, economy, or property. The Project corridor crosses suburban and urban areas where disturbed ground depends on colonization by invasive species.

Table 3.10-4 lists the invasive species observed in the DC2RVA corridor while conducting field investigations. The table includes the VDCR ranking for invasiveness. VDCR ranks invasive species to reflect the level of threat to forests and other natural communities and native species. The ranks used are high, medium, and low, where species ranked high pose a substantial threat to native species, natural communities, or the economy.

Table 3.10-4: Invasive Species Observed in the Study Area

Scientific Name	Common Name	Invasiveness Rank
Lonicera maackii	Amur Honeysuckle	High
Ligustrum sinense	Chinese Privet	High
Dioscorea polystachya	Cinnamon Vine	High
Phragmites australis ssp. australis	Common Reed	High
Myriophyllum spicatum	Eurasian Water-milfoil	High
Alliaria petiolata	Garlic Mustard	High
Hydrilla verticillata	Hydrilla	High
Lonicera japonica	Japanese Honeysuckle	High
Reynoutria japonica	Japanese knotweed	High
Microstegium vimineum	Japanese Stiltgrass	High
Sorghum halepense	Johnson Grass	High
Pueraria montana var. lobata	Kudzu	High
Murdannia keisak	Marsh dewflower	High
Persicaria perfoliata	Mile-a-minute	High

▶ *Continued – see end of table for notes.*

Table 3.10-4: Invasive Species Observed in the Study Area

Scientific Name	Common Name	Invasiveness Rank
Rosa multiflora	Multiflora Rose	High
Celastrus orbiculatus	Oriental Bittersweet	High
Ampelopsis brevipedunculata	Porcelain-berry	High
Lythrum salicaria	Purple Loosestrife	High
Lespedeza cuneate	Sericea Lespedeza	High
Centaurea stoebe ssp. micranthos	Spotted Knapweed	High
Ailanthus altissima	Tree-of-heaven	High
Iris pseudacorus	Yellow Flag	High
Cirsium vulgare	Bull Thistle	Medium
Pyrus calleryana	Callery Pear	Medium
Agrostis capillaris	Colonial bent-grass	Medium
Hedera helix	English ivy	Medium
Akebia quinata	Five-leaf Akebia	Medium
Glechoma hederacea	Gill-over-the-ground	Medium
Persicaria longiseta	Long-bristled Smartweed	Medium
Albizia julibrissin	Mimosa	Medium
Paulownia tomentosa	Royal Paulowina	Medium
Euonymus fortune	Winter Creeper	Medium
Commelina communis	Asiatic Dayflower	Low
Perilla frutescens	Beefsteak Plant	Low
Securigera varia	Crown-vetch	Low
Phleum pratense	Timothy	Low
Morus alba	White Mulberry	Low

Source: Field Surveys, 2015-2016.

3.10.3 Wildlife

Sensitive wildlife populations can be found throughout Virginia. These populations were taken into consideration in addition to important natural communities to ensure the least disruption practicable with the implementation of proposed improvements. Sensitive wildlife populations located in the Project vicinity are discussed below.

3.10.3.1 Colonial Waterbirds

Colonial waterbirds are birds that nest in large groups during the nesting season. These groups are called rookeries or colonies. Coordination with VDGIF is required for waterbird colonies documented in the Project vicinity. Several great blue heron *(Ardea herodias)* colonies are located within 3 miles of the project corridor (Table 3.10-5); no other waterbird colonies are known to be present.

Table 3.10-5: Colonial Waterbird Colonies

Location	Distance from Existing Tracks	Closest Area	Species	Year Observed
South of Mason Neck Park on Occoquan Bay	~ 3 miles	Area 2: Northern Virginia	Great Blue Heron	2003
South of Mason Neck Park on Occoquan Bay	< 3 miles	Area 2: Northern Virginia	Great Blue Heron	2003
South of Mason Neck Park on Occoquan Bay	< 3 miles	Area 2: Northern Virginia	Great Blue Heron	1984
South side of Chopawamsic Creek upstream of tracks	~2.5 miles	Area 2: Northern Virginia	Great Blue Heron	2003
Potomac Creek downstream of tracks, north side of creek	~1.25 miles	Area 2: Northern Virginia	Great Blue Heron	1993
Potomac Creek downstream of tracks, north side of creek	~ 1.3 miles	Area 2: Northern Virginia	Great Blue Heron	2003
Potomac Creek downstream of tracks, south side of creek	~2.2 miles	Area 2: Northern Virginia	Great Blue Heron	1988
East of James River on the north side between Cornelius Creek and Coles Run (Henrico County)	~1.3 miles	Area 6: Richmond	Great Blue Heron	2003

Source: CEDAR-VDGIF, 2014.

3.10.3.2 Migratory Birds

Migratory birds are birds that fly long distances annually, often north-south, between breeding (summer) and wintering habitat, often driven by food. The *Migratory Bird Treaty Act of 1918* (MBTA) makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit. This includes disturbances to trees and structures used for nesting at the time they are occupied, or to cause a disturbance resulting in an adult abandoning its nest. The protection does not extend to preventing birds from building nests in structures. EO 13186, *Responsibilities of Federal Agencies to Protect Migratory Birds*, requires federal agencies to take action to implement the MBTA. Such actions include evaluating and identifying the potential measureable negative effects a project may have on migratory bird populations. If any such effects could occur, the federal agency must consult with USFWS before the action and mitigate the effects.

Migratory species are generally funneled into specific routes by natural barriers, causing migration patterns called fly-ways. The Project is located along the landward edge of the Atlantic Flyway, which stretches from the northeastern side of Canada, Iceland, and the western side of Greenland, along the Atlantic Coast, and down to South America. Many migratory bird species pass through the study area; however, some reside in Virginia either seasonally or year round. Coastal Virginia is an important area for Neotropical birds that breed in North America and spend winter in the Caribbean, Mexico, and Central and South America (tanagers, warblers, hummingbirds, and vireos), as well as temperate migrants (American robin, kinglests, sparrows, finches), and the birds of prey or raptors that follow them (bald eagle, peregrine falcon, merlin, hawks, American kestrel).

3.10.4 Aquatic and Marine Life

3.10.4.1 Fisheries, Anadromous Fish, and Trout Waters

The 1996 amendments to the *Magnuson-Stevens Fishery Conservation and Management Act* (Magnuson-Stevens Act) established a mandate for federal agencies to identify and protect important marine and anadromous fish habitat. Essential Fish Habitat (EFH) is defined by the Magnuson-Stevens Act as "those waters and substrates necessary to fish for spawning, breeding, feeding, or growth to maturity" (16 U.S.C. 1802 [10]). EFH regulations apply largely to marine fisheries but are also applicable to freshwater spawning waters for anadromous species. Any action funded, permitted, or carried out by federal agencies that may adversely impact EFH are required to consult with NOAA–National Marine Fisheries Service (NMFS) and respond in writing to NMFS or regional fishery management councils.

Fisheries. EFH waters include aquatic areas and their associated physical, chemical, and biological properties; substrates (natural and unnatural bottoms, structures, and biological communities); and necessary habitat required to support a sustainable fishery. No EFH waters are mapped by NOAA within the DC2RVA corridor (NOAA, 2015).

According to the Virginia Coastal Geospatial and Educational Mapping System (GEMS) and the Virginia Institute of Marine Science (VIMS), no fisheries management areas or aquaculture sites are located in the study area, and it is an area of low occurrence for clams, mussels, and crabs. No private oyster ground leases are located in the study area.

Trout. Coordination with VDGIF is required any time a Stocked Trout Water is documented within a project area. According to VDGIF mapping of trout waters, only one stocked trout water is located in the study area: Cook Lake in Cameron Run Regional Park (VDGIF, 2015b).

Anadromous Fish. Anadromous Fish Use Areas are migration pathways, spawning grounds, or nursery areas identified by VDGIF as having been used or have the potential to be used by anadromous fish. Confirmed Anadromous Fish Use Areas are those waters known to provide migratory and spawning habitats for anadromous fish. Coordination with VDGIF is required for projects in the vicinity of these waters. Table 3.10-6 provides a list of confirmed and potential Anadromous Fish Use Areas within the study area, which include the following species:

- **Alewife** *(Alosa pseudoharengus)*—Alewives are on the Virginia Wildlife Action Plan under Tier IV, "Moderate Conservation Need." Their main food sources are plankton, insects, and crustaceans. Many are now landlocked in the Great Lakes region, and several landlocked waters in Virginia contain alewives. They have a strong physical resemblance to the blueback herring *(Alosa aestivalis)*.

Table 3.10-6: Confirmed and Potential Anadromous Fish Use Waters

Water	Upstream Boundary	Confirmed Species	Alternative Area
Four Mile Run	Approximately 1,600 feet upstream of Arlington Ridge Road	Striped Bass, Yellow Perch	Area 2: Northern Virginia
Cameron Run	CSXT railroad crossing in Alexandria	Potential anadromous fish use waters	Area 2: Northern Virginia
Accotink Creek	Road crossing 2,600 feet above Field Lark Branch	Alewife, Yellow Perch	Area 2: Northern Virginia
Pohick Creek	At confluence with unnamed tributary in Pohick Stream Valley Park between Pohick Road and Kings Point Court, 300 feet above powerline	Alewife, Blueback Herring, Yellow Perch	Area 2: Northern Virginia
Occoquan River	Lower Occoquan Dam	Alewife, American Shad, Blueback Herring, Hickory Shad, Striped Bass, Yellow Perch	Area 2: Northern Virginia
Neabsco Creek	Approximately 2,300 feet below Route 1	Striped Bass	Area 2: Northern Virginia
Powells Creek	Approximately 5,600 feet below Route 1	Striped Bass, Yellow Perch	Area 2: Northern Virginia
Potomac River	Great Falls	Alewife, American Shad, Blueback Herring, Hickory Shad, Striped Bass, Yellow Perch	Area 2: Northern Virginia
Quantico Creek	No upstream boundary listed	Alewife, American Shad, Blueback Herring, Hickory Shad, Striped Bass, Yellow Perch	Area 2: Northern Virginia
Chopawamsic Creek	Approximately 9,000 feet below Route 1	Blueback Herring, Yellow Perch	Area 2: Northern Virginia
Aquia Creek	Aquia Creek Dam, confluence with Beaverdam Run	American Shad, Blueback Herring, Striped Bass, Yellow Perch	Area 2: Northern Virginia
Claiborne Run	Raised culvert at Route 218	Potential anadromous fish use waters	Area 3: Fredericksburg
Rappahannock River	Embrey Dam	Alewife, American Shad, Blueback Herring, Hickory Shad, Striped Bass, Yellow Perch	Area 3: Fredericksburg
Hazel Run	Business U.S. Route 1/Route 208	Alewife, Blueback Herring	Area 3: Fredericksburg
Mattaponi River	Route 301	American Shad, Blueback Herring, Striped Bass, Yellow Perch	Area 4: Central Virginia
North Anna River	Approximately 2.5 miles above Route 1 at 'fall hole'	American Shad, Blueback Herring, Hickory Shad, Striped Bass, Yellow Perch	Area 4: Central Virginia
Little River	Route 685 crossing	Yellow Perch	Area 4: Central Virginia
South Anna River	Ashland Mill Dam	Alewife, American Shad, Blueback Herring, Hickory Shad, Striped Bass	Area 5: Ashland
James River	Boshers Passage	American Shad, Blueback Herring, Striped Bass, Yellow Perch	Area 6: Richmond
Falling Creek	Falling Creek Reservoir Dam	Potential anadromous fish use waters	Area 6: Richmond

Source: CEDAR-VDGIF, 2014.

- **American Shad** *(Alosa sapidissima)*—American shad are listed on Virginia's Wildlife Action Plan under Tier IV with "Moderate Conservation Need." They are considered a 'sport fish' and support sport and commercial fisheries. American shad spawn in tidal freshwater, near the mouths of creeks. When not spawning, they appear in schools on the continental shelf. Their diet consists of plankton, microcrustaceans, insects, worms, and small fish.
- **Blueback Herring** *(Alosa aestivalis)*—Blueback herring are not endangered or threatened or a species of concern in Virginia. They are native to Virginia. Their diet consists of plankton, copepods, pelagic shrimp, small fish, and insects. Blueback herring very rarely spawn above the tidewater. They have a wide tolerance for different salinity levels.
- **Hickory Shad** *(Alosa mediocris)*—Hickory shad are sport and commercial fish not listed as a species of concern in Virginia. Their diet is made up mostly of small fish. They live in marine waters close to land and in tidal rivers and tributaries during spawning.
- **Striped Bass** *(Morone saxatilis)*—The Chesapeake striped bass are sport and commercial fish not listed as a species of concern in Virginia; however, it is "beleaguered" or under stress. Their diet consists of fish, mollusks, and crustaceans. They depend heavily on water quality within their habitat.
- **Yellow Perch** *(Perca flavescens)*—Yellow perch are important sport and commercial fish that are not a species of concern in Virginia. Younger yellow perches eat insects and plankton, and the adults eat mainly fish and can even be cannibalistic. Other food sources include crustaceans, copepods, algae, amphipods, and chironomids. They usually live in still or slightly turbid lakes, reservoirs, and rivers that are large and cool.

3.10.4.2 Submerged Aquatic Vegetation

Submerged Aquatic Vegetation (SAV) are widely regarded as keystone species and primary indicators of water quality conditions in the Potomac River and Chesapeake Bay. According to 4 VAC 20-337-10 *et seq.* SAV Transplantation Guidelines, any removal of SAV from state bottom would require prior approval by VMRC (VMRC, 2000).

SAV includes any of a diverse assemblage of underwater plants found in the shoal areas of Chesapeake Bay, Virginia coastal bays, and river tributaries, primarily eelgrass *(Zostera marina)* and widgeon grass *(Ruppia maritima)*, and including, but not limited to, redhead grass *(Potamogeton perfoliatus)*, wild celery *(Vallisneria americana)*, common elodea *(Elodea canadensis)*, water stargrass *(Heteranthera dubia)*, coontail *(Ceratophyllum demersum)*, water-weed *(Egeria densa)*, muskgrass *(Najas minor)*, pondweeds *(Potamogeton sp.)*, and naiads *(Najas sp.)* (VMRC, 2000).

VIMS has an online interactive mapper with downloadable GIS files that shows historic SAV beds in the Chesapeake Bay and its tributaries dating back to 1971. Vegetation can change from year to year due to environmental factors and annual fluctuations in nutrient levels and water clarity. For this Project, SAV documented within 500 feet of the existing rail in any year within the most recent 5 consecutive years (2011 to 2015) is considered an existing SAV habitat/bed. Existing SAV beds are shown in Figure 3.10-3. Areas that have not had populations mapped in the last 5 years, yet have had SAV mapped before 2011, were considered 'historic beds.' Historic beds are important because they are potential mitigation and restoration sites and have the potential of supporting SAV beds naturally in the future. According to SAV mapping provided by the VIMS SAV monitoring program, approximately 55.0 acres of existing (2011 to 2015) SAV beds and an additional 247.1 acres of historic (1971 to 2009) beds occur within the study area (Table 3.10-7).

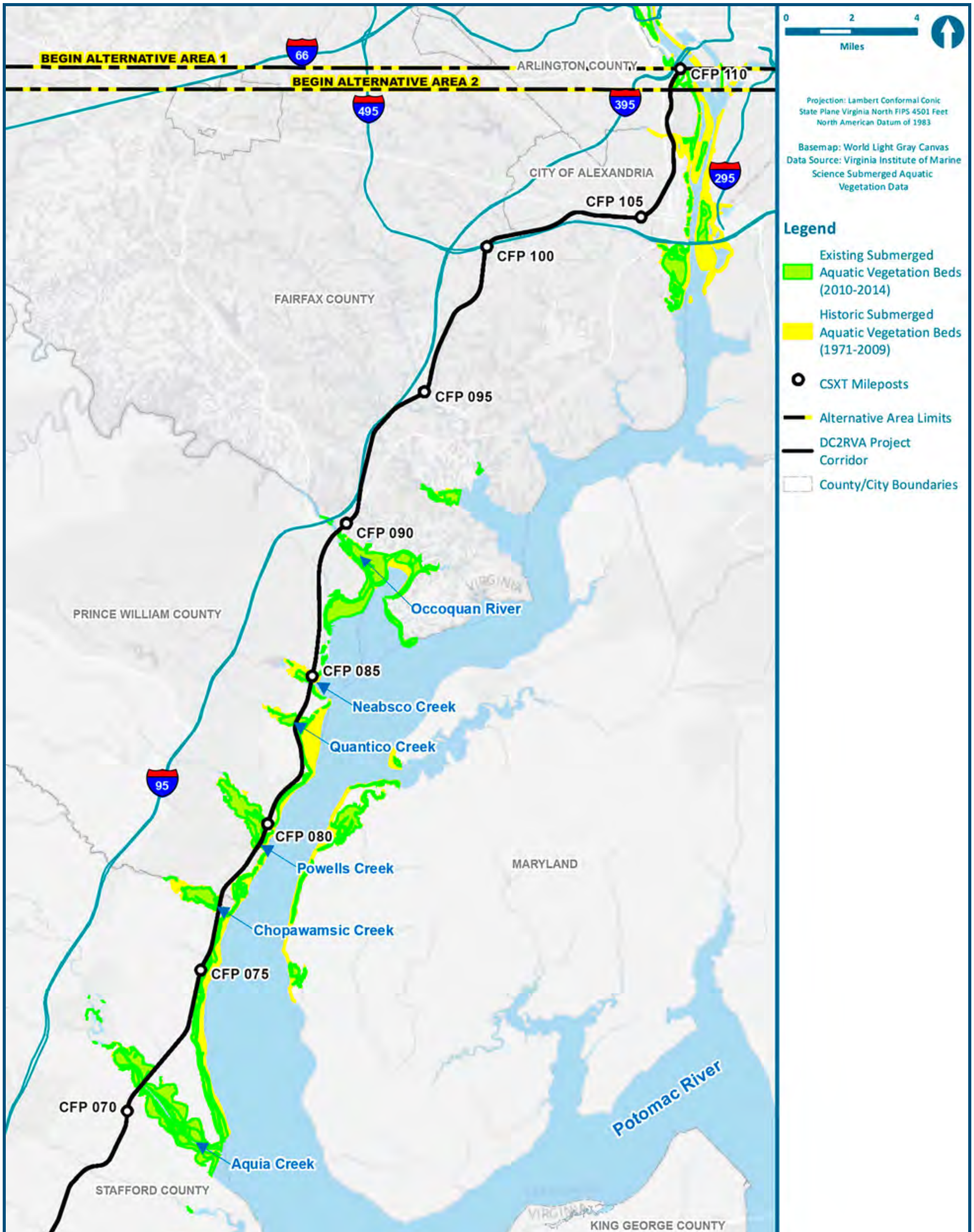


Figure 3.10-3: Submerged Aquatic Vegetation

Table 3.10-7: Mapped Existing SAV Beds

Water Body	Boundaries	Alternative Area	Year(s)	Acres Within 500 Feet of Existing Rail
Roaches Run	Adjacent to the existing tracks	Area 1: Arlington (Long Bridge Approach)	2012, 2013, 2014, 2015	12.74
Four Mile Run	Downstream from existing tracks	Area 2: Northern Virginia	2015	—
Occoquan River	From existing tracks continuing downstream	Area 2: Northern Virginia	2012, 2013, 2014, 2015	3.19
Occoquan Bay	Multiple locations along the western shore	Area 2: Northern Virginia	2011, 2012, 2013, 2014, 2015	7.52
Neabsco Creek	From 0.75 mile upstream of the existing track to Occoquan Bay	Area 2: Northern Virginia	2011, 2012, 2013, 2014, 2015	2.82
Powells Creek	From 1 mile upstream of the existing track to the Potomac River	Area 2: Northern Virginia	2011, 2012, 2013, 2014, 2015	12.73
Potomac River	Multiple locations along the western shore from Occoquan Bay continuing downstream	Area 2: Northern Virginia	2011, 2012, 2013, 2014, 2015	118.66
Quantico Creek	From 2.5 miles upstream of the existing track to the Potomac River	Area 2: Northern Virginia	2011, 2012, 2013, 2014, 2015	55.4
Chopawamsic Creek	From existing track to 2 miles upstream	Area 2: Northern Virginia	2011, 2012, 2013, 2014, 2015	10.58
Aquia Creek	Multiple locations from 3 miles upstream of existing track to the Potomac River	Area 2: Northern Virginia	2011, 2012, 2013, 2014, 2015	23.44

Source: VIMS, 1979-2015.

3.10.5 Threatened and Endangered Species

USFWS and NMFS are responsible for listing, protecting, and managing federally listed threatened and endangered species under the *Endangered Species Act of 1973* (ESA), as amended. VDCR and VDGIF are responsible for listing, protecting, and managing state-listed threatened and endangered species. An endangered species is defined as one that is in danger of extinction throughout all or in a significant portion of its range. A threatened species is one that is likely to become endangered in the foreseeable future.

Information regarding federally listed threatened and endangered species that may be impacted by the Project was obtained from USFWS via the Information, Planning, and Conservation (IPaC) system. The IPaC system is an online conservation planning tool used by USFWS to streamline the environmental review process associated with Section 7 of the ESA. Section 7 is the mechanism by which federal agencies ensure the actions they take, including those they fund or authorize, do not jeopardize the existence of any federally listed threatened, endangered, or candidate species. IPaC provides lists of federally protected species in defined study areas, as well as links to information about identified species.

Seven federally listed threatened or endangered species are reported to occur or potentially occur within the study area based on habitat requirements and information gathered from USFWS, VDGIF, Virginia Fish and Wildlife Information Service (VaFWIS), and/or VDCR. An additional five state-listed threatened or endangered species are listed as occurring in the vicinity of the study area. Four additional state endangered species were initially indicated as potentially occurring in the Project vicinity, but based on additional review of habitat in the study area, DRPT determined they were not present: Appalachian springsnail *(Fontigens bottimeri),* brook floater *(Alasmidonta varicose),* tiger salamander *(Ambystoma tigrinum)*, and Virginia Piedmont water boatman *(Sigara depressa).* These species are further discussed in the *Natural Resources Technical Report* (Appendix M). Table 3.10-8 indicates which areas each of the 13 federally and state-listed species have the potential of occurring in based on this research and coordination with regulatory agencies. Brief, general descriptions of the species that may occur within the study area and their habitat requirements are provided following the table. No critical habitat is present within the study area.

Table 3.10-8: Federally and State-Listed Threatened and Endangered Species that May Occur within the Vicinity of the Study Area

Species/Resource Name	Status*	Alternative Area					
		Area 1: Arlington (Long Bridge Approach)	Aera 2: Northern Virginia	Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	Area 4: Central Virginia (Crossroads to Doswell)	Area 5: Ashland (Doswell to I-295)	Area 6: Richmond (I-295 to Centralia)
Dwarf Wedgemussel *(Alasmidonta heterodon)*	FE	–	–	Y	Y	Y	–
Harperella *(Ptilimnium nodosum)*	FE	–	–	–	–	–	–
Indiana bat *(Myotis sodalis)*	FE	–	–	Y	Y	–	–
Northern Long-eared Bat *(Myotis septentrionalis)*	FT	–	Y	Y	Y	Y	Y
Sensitive Joint-vetch *(Aeschynome virginica)*	FT/ST	–	Y	–	–	–	Y
Small Whorled Pogonia *(Isotria medeoloides)*	FT/SE	–	–	Y	–	–	–
Swamp-pink *(Helonias bullata)*	FT/SE	–	–	–	Y	–	–
Barking Treefrog *(Hyla gratiosa)*	ST						Y
Green Floater *(Lasmigona subviridis)*	ST	–	–	Y	–	–	–
New Jersey Rush *(Juncus caesariensis)*	ST	–	–	Y	Y	–	–
Peregrine Falcon *(Falco peregrinus)*	ST	–	Y	–	–	–	Y
Wood Turtle *(Glyptemys insculpta)*	ST	–	Y	–	–	–	–

Source: USFWS, 2015 and 2016.

* FE=Federal Endangered; PFE=Proposed Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened

Note: "Y" in cells above indicates the presence of the species in the specified alternative area. Blank cells indicate that no species location data were identified from referenced sources.

References: (CEDAR-VDGIF; 12-2014 CCB – VaEagle Nest Locator; 12-2014 USFWS Bald Eagle Concentration Areas- Virginia; 11-2014 VDCR-NHD Subwatershed Search; 2016 USFWS – Official Species List).

3.10.5.1 Federally Endangered Species

Dwarf wedgemussel (*Alasmidonta heterodon*) is a small freshwater mussel, generally less than 2 inches and yellowish brown in color. They require oxygen-rich, low silt, pollution-free rivers with slow to moderate flow. This species is sensitive to pollution. They prefer sand, firm muddy sand, and gravel bottoms found in shallow riffle and shoal areas. Channelization, removal of shoreline vegetation, development, and road and dam construction threaten some populations.

Harperella *(Ptilimnium nodosum)* is an annual herbaceous plant occurring in rocky/gravelly shoals or cracks in bedrock outcrops beneath the water surface in clear, swift-flowing streams; edges of intermittent pineland ponds or low, wet savannah meadows on the Coastal Plain; and granite outcrop seeps. It is always found on saturated substrates and tolerates moderate flooding. Broad clusters of small white flowers generally bloom in July and August (USFWS, 1991a). This species is listed as federally endangered in the United States, critically imperiled in Virginia, and globally imperiled.

Indiana bat *(Myotis sodalis)* is a small bat with dark-brown to black fur and small mouse-like ears. In the winter, these bats hibernate in humid caves with cool, stable temperatures under 50 degrees Fahrenheit (°F), but above freezing (USFWS, 2015). During summer, they prefer loose bark on dead or dying trees near streams in mature forests with 50 to 100 percent canopy cover. Shagbark hickory *(Carya ovate)* and large white oaks are known preferred tree species for roosting (VDGIF, 2014b). The males roost alone in summer, while the females roost in groups of 100 bats or more.

3.10.5.2 Federally Threatened Species

Northern long-eared bat *(Myotis septentrionalis)* is a medium-sized (3 to 3.7 inches) bat generally associated with old-growth forests composed of trees 100 years old or older. It relies on intact interior forest habitat, with low edge-to-interior ratios (NatureServe, 2014); however, it has been found within city limits. They are frequently found between the shrub layer and the canopy. Males and nonreproductive females tend to prefer caves, while reproductive females roost under tree bark in spring and summer (VDGIF, 2014b). This species prefers to hibernate in very high humidity caves with little or no air flow (USFWS, 2014). Potential bat habitat was noted in Carter Park in the Ashland area while conducting wetland delineations.

Sensitive joint-vetch *(Aeschynomene virginica)*, an annual herbaceous plant in the pea family, generally grows 3 to 6 feet tall and produces yellow flowers streaked with red July through September and a fruit pod that turns dark brown when ripe (USFWS, 2014a). It is found in fresh to slightly brackish tidal river shores and estuarine-river marsh borders. It usually grows within 2 meters of low water mark on raised banks, and in peaty, sandy, or gravelly substrates. Sensitive joint-vetch typically grows in the intertidal zone of coastal marshes where plants are flooded twice daily. The species seems to prefer the marsh edge at an elevation near the upper limit of tidal fluctuation. It is usually found in areas where plant diversity is high (50 species per acre) and annual species predominate. Bare to sparsely vegetated substrates appear to be a habitat feature of critical importance to this plant (USFWS, 2011). In Virginia, populations are found along the Potomac, Mattaponi, Pamunkey, Rappahannock, Chickahominy, and James rivers and their tributaries. It is sensitive to pollution (USFWS, 2014a). This species is also listed as threatened in Virginia and imperiled globally. Potential habitat was noted in several locations in the Northern Virginia area while conducting wetland delineations, and the Brent Marsh Conservation Site north of and including part of Widewater State Park is noted for its association with sensitive joint-vetch.

Small whorled pogonia *(Isotria medeoloides)* is a small (up to 12 inches tall) orchid, with five to six leaves in a whorl near the top of the stem, under greenish-yellow flowers that bloom from May, in the southern part of its range, to mid-June in the northern part of its range. It requires damp woods and is generally found on acidic, sloping, fragipan soils in 'second growth' or successional forest communities. This species can be found in deciduous and evergreen forests. Small whorled pogonia is listed as federally threatened, endangered in Virginia, and imperiled globally (NatureServe, 2014). The small whorled pogonia occurs on upland sites in mixed-deciduous or mixed deciduous/coniferous forests that are generally in second- or third-growth successional stages. Characteristics common to small whorled pogonia sites include sparse to moderate groundcover in the species' microhabitat, a relatively open understory canopy, and proximity to features that create long persisting breaks in the forest canopy. Soils at most sites are highly acidic and nutrient poor, with moderately high soil moisture values. Light availability could be a limiting factor for this species (USFWS, 1992). Potential habitat was noted in several locations in the Northern Virginia area and the Fredericksburg area while conducting wetland delineations.

Swamp-pink *(Helonias bullata)* is an obligate wetland species restricted to forested wetlands that are groundwater influenced and are perennially water-saturated with a low frequency of inundation. These habitats include emergent portions of hummocks in and along stream channels in Atlantic white cedar *(Chamaecyparis thyoides)* swamps, headwater seepage wetlands, red maple *(Acer rubrum)* swamps, mixed hardwood/evergreen swamps, and (rarely) black spruce-tamarack *(Picea mariana-Larix laricina)* bogs. The species appears to be somewhat shade tolerant and needs enough canopy to minimize competition with other more aggressive species and herbivory by deer. It is often found at stream sources. Swamp-pink is listed as federally threatened, endangered in Virginia, and vulnerable globally (NatureServe, 2014). The major threat to the species is loss and degradation of its wetland habitat due to encroaching development, sedimentation, pollution, succession, and wetland drainage. The species also exhibits extremely low seedling establishment, which appears to be a significant limitation to the colonization of new sites. Other threats include plant collection and trampling (USFWS, 1991b).

3.10.5.3 State Threatened Species

Barking treefrog *(Hyla gratiosa)* is the United States' largest native tree frog, ranging from 2 to 2.8 inches in length. They can vary in color, including bright or dull green, brown, yellowish, or gray with dark round markings on its back. As indicated by its name, it is distinguishable by its loud barking call. This species is associated with Oak–Hickory–Pine forests, preferring sandy areas in pine savannas and low wet woods and swamps. It is state-listed as threatened due to the conversion of native pine habitat to monocultures of loblolly pine. It does not hold a federal designation and is ranked globally as "secure."

Green floater *(Lasmigona subviridis)* is a species of freshwater mussel that is usually found in fast-flowing, clean water in substrates that contain relatively firm rubble, gravel, and sand substrates swept free from siltation. The green floater is able to occupy very small creeks and streams, where other mussels are not generally found. This species is not federally listed; however, it is state threatened and globally ranked as "vulnerable."

New Jersey rush *(Juncus caesariensis)* is a perennial rush growing 2 to 3 feet tall in very acidic wetland habitats such as pine barrens and cedar swamps. The largest populations of New Jersey rush are found in the pine barrens of New Jersey; in Virginia, it can be found in sphagnous seepages along the coastal plain (NatureServe, 2014). New Jersey rush is not federally listed; however, it is state threatened and globally ranked as "imperiled."

Peregrine falcon *(Falco peregrinus)* is not federally listed and is ranked globally as "apparently secure;" however, they are listed on Tier I of the Virginia Wildlife Action Plan for "Critical Conservation Need." They generally nest on rocky cliffs near river gorges; however, they can also be found on manmade structures such as bridges/underpasses, bridge piers, utility poles, and skyscrapers. Reintroduction efforts have succeeded in establishing breeding at several coastal sites, and now efforts are focused on reintroducing breeding populations to mountains in Virginia. It is believed to breed between late May and early August (VDGIF, 2014b). Peregrine falcons generally mate for life and return to the same nest year after year.

Peregrine falcons lay three to four eggs in March or April, and the eggs incubate for 33 days. They nest on rocky cliffs near river gorges and will occasionally nest in trees. Their usual prey is pigeons and small birds such as blue jays *(Cyanocitta cristata)*, flickers, and meadowlarks *(Sturnella)*. Coastal and aquatic areas are their main habitats. They winter in coastal estuaries or intertidal mudflats along the Pacific coast, Gulf coast, and southern Florida.

Wood turtle *(Glyptemys insculpta)* is a primarily terrestrial species during the warm part of the year, making it easily accessible and a collection concern. This species has been seriously impacted by illegal collection (NatureServe, 2014). It is generally found in woodland habitat near clean ponds, streams, and bogs; it is intolerant of water pollution. Although they are highly terrestrial, they must remain near a water source, as they can easily dry out (VDGIF, 2014b). Wood turtles are approximately 5.5 to 8 inches long and have a distinct ringed pyramidal pattern on its upper shell. This species is ranked globally as vulnerable (NatureServe, 2014).

Bald eagle *(Haliaeetus leucocephalus)* is listed under Tier II of the Virginia Wildlife Action Plan for "Very High Conservation Need." The Bald eagle is no longer listed as threatened, but this discussion was left in this section since it is still protected under some laws. The James, Rappahannock, and Potomac rivers are where they are most commonly found in Virginia. Bald eagles build their nests in tall hardwood trees with open canopies near water bodies where they forage. They prefer undeveloped areas with little human activity. In Virginia, eggs are laid from January to March and incubated for 34 to 38 days. Bald eagles prey primarily on fish, but they may also eat carrion, waterfowl, rabbits, and some turtles. Their eggs are preyed on by bobcats, owls, and raccoons. Twenty-five (25) known bald eagle nest locations are near the DC2RVA corridor.

3.11 COMMUNITY RESOURCES

Data and information on demographics, community facilities, emergency services, community characteristics, employment, income, and the local economy provide a baseline for analysis of potential effects. These were compiled from aerial photos, local comprehensive and land use plans, the United States Census website (including the American Community Survey [ACS]), GIS databases, city/county tax parcel databases, conceptual drawings/engineering, and field inspections.

3.11.1 Population Characteristics

Data products from the United States Census Bureau were used for demographic information, primarily the 2009-2013 ACS. The study area traverses parts of 150 census tracts in Arlington

County (2), the City of Alexandria (10), Fairfax County (13), Prince William County (11), Stafford County (10), the City of Fredericksburg (3), Spotsylvania County (4), Caroline County (6), Hanover County (12), Henrico County (17), the City of Richmond (51), and Chesterfield County (11). One tract contains no population data due to its location at Reagan National Airport. The demographic data of census tracts in the study area were examined to determine the presence of any potential Title VI populations, environmental justice populations, and any persons with Limited English Proficiency (LEP). The census data for each census tract were compared to the census data for the city/county of that particular tract. The population of minorities, persons with low income, or persons with LEP within a particular census tract is identified as having a potential environmental justice population if it is greater than the value in its city/county. If a particular census tract has a percentage of the population of any of these groups above 50 percent, this has also been identified.

The total population in most of these jurisdictions has been increasing steadily for many years (Table 3.11-1). The City of Richmond is the only jurisdiction that has not experienced population growth in excess of 20 percent since 1990. Fairfax County is the most populous jurisdiction in the Commonwealth, and the jurisdictions in the study area, in total, represented more than 39 percent of the Commonwealth's population in 2015. The jurisdictions' populations are projected to experience a wide range of change, from a loss in Arlington County, to increases of more than 100 percent in Spotsylvania and Stafford counties (Table 3.11-2). Overall, the jurisdictions are projected to grow in population by more than 36 percent.

3.11.2 Employment and Income

Economic data, including employment, income, the industrial base, and the location of existing rail station locations, provide a baseline for analysis of potential impacts; these were compiled from local, regional, and national economic studies and databases, the Virginia Employment Commission (VEC), and preliminary design drawings. In particular, station locations and the potential economic effects to localities in the study area have been assessed.

3.11.2.1 Economic Base/Employment Patterns

The jurisdictions in the study area are all part of either the Washington–Arlington–Alexandria Metropolitan Statistical Area (MSA) or the Richmond MSA. Both MSAs are large regional employment centers. The Washington–Arlington–Alexandria MSA has an economy based primarily on the location of the nation's capital. The top 10 employers in late 2014 included federal agencies, individual jurisdictions and their respective school systems, and health care systems (VEC, 2015). The Richmond MSA has an economy based on the location of the state capital. The top 10 employers in late 2014 included Virginia Commonwealth University, federal agencies, health care agencies/systems, and individual jurisdictions (VEC, 2015).

Total employment, as reported by VEC, in Table 3.11-3, is the number of employees working within a particular local jurisdiction. This number varies widely within the study area. The Total Workers, as reported by the United States Census, is the number of people living in a particular local jurisdiction that are working. The workers do not necessarily work within their local jurisdiction of residence. The difference between the two numbers, employment, and workers is the workers in-commuting and out-commuting. Localities with more employment than workers (e.g., Arlington and Henrico counties, the city of Richmond) have a net gain of employees traveling to work within their limits. The unemployment rate in the jurisdictions in the study corridor ranges from a low of 2.7 percent in Arlington County to a high of 5.1 percent in the city of Fredericksburg.

Table 3.11-1: Total Population Over Time

City/County	1990	2000	2010	2015	Percent Change 1990-2015
Arlington County	170,936	189,453	207,627	234,678	37.29%
City of Alexandria	111,183	128,283	139,966	159,571	43.52%
Fairfax County	818,584	969,749	1,081,699	1,129,330	37.96%
Prince William County	215,686	280,813	402,002	443,463	105.61%
Stafford County	61,236	92,446	128,961	140,176	128.91%
City of Fredericksburg	19,027	19,279	24,286	26,969	41.74%
Spotsylvania County	57,403	90,395	122,397	128,998	124.72%
Caroline County	19,217	22,121	28,545	29,792	55.03%
Hanover County	63,306	86,320	99,863	104,013	64.30%
Henrico County	217,881	262,300	306,935	320,717	47.20%
City of Richmond	203,056	197,790	204,214	217,938	7.33%
Chesterfield County	209,274	259,903	316,236	333,450	59.34%
Study Area Total	2,166,789	2,598,852	3,062,731	3,269,095	50.87%

Sources: United States Census Bureau: 1990, STF1; 2000, SF3; 2010, SF1; 2015, Weldon Cooper, 2016.

Table 3.11-2: Projected Population Over Time

City/County	2015	2020	2030	2040	Percent Change 2015-2040
Arlington County	234,678	206,896	201,699	197,065	-16.03%
City of Alexandria	159,571	145,116	147,706	149,195	-6.50%
Fairfax County	1,129,330	1,182,609	1,271,995	1,350,245	19.56%
Prince William County	443,463	487,768	573,535	659,301	48.67%
Stafford County	140,176	178,152	244,410	333,654	138.03%
City of Fredericksburg	26,969	26,647	28,383	29,917	10.93%
Spotsylvania County	128,998	166,236	223,917	299,632	132.28%
Caroline County	29,792	31,400	33,447	35,259	18.35%
Hanover County	104,013	118,135	139,000	162,475	56.21%
Henrico County	320,717	352,577	400,396	450,630	40.51%
City of Richmond	217,938	206,674	208,665	210,368	-3.47%
Chesterfield County	333,450	388,894	473,842	572,693	71.75%
Study Area Total	3,269,095	3,491,104	3,946,995	4,450,434	36.14%

Sources: 2015, Weldon Cooper, 2016; 2020-2040, Weldon Cooper, 2012.

Table 3.11-3: Employment Patterns

City/County	Total Employment 2Q, 2015	Unemployment Rate January 2016
Arlington County	169,387	2.7%
City of Alexandria	96,300	3.2%
Fairfax County	587,782	3.4%
Prince William County	122,810	3.9%
Stafford County	41,358	4.2%
City of Fredericksburg	23,456	5.1%
Spotsylvania County	34,221	4.5%
Caroline County	5,585	4.9%
Hanover County	50,265	3.7%
Henrico County	184,823	4.0%
City of Richmond	149,147	4.9%
Chesterfield County	129,117	4.1%

Sources: Community Profiles, VEC, March 2016.

3.11.3 Land Use

The existing and projected future land use and land cover data in the study area are based on available planning documents from local jurisdictions and regional entities, GIS mapping from the jurisdictions, aerial photography, and any additional information received from local and regional officials.

3.11.3.1 Existing Land Use

The land uses (built environment) and land covers (natural environment) surrounding the DC2RVA corridor are typical of a densely developed urban and suburban setting. The population and employment growth of the two metropolitan regions, greater Washington, D.C. and Richmond, has directly influenced the land use/land cover and development of the local jurisdictions along the Project corridor. The counties and cities traversed by the DC2RVA corridor include a wide variety of land uses/land covers: residential, commercial, industrial, recreation/open space, and public uses (Table 3.11-4). The highest proportion of land use within 500 feet of the DC2RVA rail line is agricultural; however, within and adjacent to the Project corridor, office, retail, and industrial development are more prevalent within the urban areas and at the interchanges with I-95. Even though some areas of each jurisdiction are densely developed, each has been able to maintain parks/open space, preservation/ environmental resources, and/or recreational areas. More detailed discussions of land use and the status of local planning for each jurisdiction are in the next section.

Table 3.11-4: Land Use Acreage (Percent)

City/County	Agricultural	Commercial/ Office	Industrial	Institutional	Transportation	Preserved Open Space	Residential	Vacant
Arlington County	0	68.8 24.6%	3.36 1.2%	0	38.0 13.6%	95.4 34.0	29.6 10.6%	44.8 16.0%
City of Alexandria	0	122.1 19.4%	105.8 16.8%	67.2 10.6%	101.2 16.0%	63.2 10.0%	95.8 15.2%	75.8 12.0%
Fairfax County	0	159.9 13.4%	603.52 50.5%	13.7 1.1%	0	43.1 3.6%	134.6 11.3%	237.6 19.9%
Prince William County	23.1 1.52%	319.6 21.1%	126.9 8.4%	220.1 14.5%	0	682.1 45.1%	131.1 8.7%	0
Stafford County	1,468.9 45.7%	240.2 7.5%	56.38 1.8%	170.3 5.3%	0	540.8 16.8%	735.8 22.9%	0
City of Fredericksburg	0	21.0 11.8%	89.0 50.2%	27.8 15.7%	0	0	39.6 22.3%	0
Spotsylvania County	695.3 64.0%	185.6 17.1%	0	9.4 0.87%	0	177.9 16.4%	18.3 1.7%	0
Caroline County	2,321.2 74.4%	128.2 4.1%	220.0 7.1%	42.0 1.4%	0	0.8 0.03%	407.2 13.1%	0
Hanover County	1,448.5 65.9%	17.9 0.81%	392.9 17.9%	42.6 1.9%	0	0	252.8 11.5%	0.2 0.01%
Henrico County	0	180.8 12.9%	635.3 45.3%	6.35 0.45%	0	29.3 2.1%	256.0 18.2%	295.9 21.1%
City of Richmond	0	231.6 10.2%	886.7 39.1%	45.2 2.0%	0	55.8 2.5%	499.6 22.0%	550.9 24.3%
Chesterfield County	0	48.9 3.6%	645.8 47.5%	0	0	4.1 0.30%	659.3 48.5%	0.9 0.06%
Total	5957.0 32.3%	1,724.6 9.4%	3,765.6 20.4%	644.5 3.5%	38.1 0.21%	1,692.5 9.2%	3,259.7 17.7%	1,205.9 6.5%

Source: City and County Land Use GIS databases.

3.11.3.2 Status of Local and Regional Planning/Development Trends

The expected future land use and planned growth and development as presented by local jurisdictions and regional planning organizations are discussed below. This information has been compiled by a review of existing planning documents, comprehensive plans, and future land use maps. Transportation visions and policies, particularly as they relate to rail, are also detailed.

Local Planning Jurisdictions

Arlington County. Existing land use in Arlington County is primarily residential As stated in the most recent comprehensive plan review, one of the goals is to continue with the residential character of county (Arlington County, 2011). Arlington is intensely developed, and the primary land uses, other than residential, are commercial/office and institutional (e.g., Arlington National Cemetery, the Pentagon, Reagan National Airport).

Arlington County expects that land use and transportation changes and policies will continue to mesh as the county focuses on "development around Metrorail stations and corridors with extensive transit service" and "expanding the availability of transportation options, serving more travelers as the region continues to grow and further improving transportation facilities to promote connectivity throughout the County and the region" (Arlington County, 2007). Although there is no mention of intercity passenger rail in the Arlington Master Transportation Plan or the *Summary Report on Amendments to Arlington County's Comprehensive Plan: A Five - Year Review July 1, 2010 - June 30, 2015 (with updates from July 1, 2015 - June 30, 2016)*, the County does wish to "integrate local transportation facilities and transit services with those of neighboring jurisdictions to enhance regional connections" (Arlington County, 2007). There is already a Virginia Railway Express (VRE) station in Arlington County in Crystal City.

City of Alexandria. The city of Alexandria is similar to the other urban areas along the Project corridor; it is intensely developed, and the land use is primarily residential and commercial/ office. The city is divided into different areas for planning purposes, with Master Plans in place for the individual areas.

Due to its urban nature, the City is focused more on priorities and needs for transit, bicycle, and pedestrian modes. The city has an existing VRE station co-located with the King Street Metro Station and Amtrak's Alexandria Union Station. Intercity passenger rail is not specifically mentioned in the *Alexandria City Council's Strategic Plan* or the *City of Alexandria Comprehensive Transportation Master Plan*; however, the City's transportation vision is of a "system that encourages the use of alternative modes of transportation, reducing dependence on the private automobile" (City of Alexandria, 2008). The City also wishes to provide transit service levels that "connect with existing local and regional services including WMATA [Washington Metropolitan Area Transit Authority] Metrorail, commuter rail, other rail-based transit services, and major highway portals" (City of Alexandria, 2008).

Fairfax County. The most predominant land use in Fairfax County is residential (Fairfax County, 2014). Existing land use in the Project corridor is residential, institutional (Ft. Belvoir), and commercial (office and retail). The Fairfax County Comprehensive Plan notes that the County "should have a land use pattern which increases transportation efficiency, encourages transit use, and decreases automobile dependency" (Fairfax County, 2014). The County also wishes to "concentrate most future development in mixed-use Centers and Transit Station Areas" and "concentrate the highest level of development intensity in areas of transportation advantage (i.e., the Tysons Corner Urban Center, cores of Suburban Centers, and Transit Station Areas)" (Fairfax

County, 2014). One of these areas is the existing VRE and Amtrak Auto Station co-located in Lorton. The *Fairfax County Comprehensive Plan* also notes that due to rapid growth over the past decades, the amount of available vacant land is diminishing, and redevelopment in the identified areas (mixed-use centers, transit station areas, suburban centers) will be more prevalent in the future. Some of these areas are along the I-95 and CSXT corridors, and development could intensify in these areas in the future.

In regard to transportation, the County supports "a multi-modal transportation system that provides transportation choices, reduces single-occupancy-vehicle (SOV) use, and improves air quality" (Fairfax County, 2014). The plan also notes that "regional and local efforts to achieve a balanced transportation system through the development of rapid rail, commuter rail, expanded bus service, and the reduction of excessive reliance upon the automobile should be the keystone policy for future planning and facilities" (Fairfax County, 2014). The plan's objectives also link transportation and land use to present and future economic development within the County.

Prince William County. The county is broken up into two general land use areas: the "Development Area," where development has already happened or is expected to occur at residential densities greater than the rest of the county; and the "Rural Area," which contains agricultural, open space, forestry, large-lot residential uses, and federal and state parks. The current *Prince William County Comprehensive Plan* (2012) encourages infill development of the Development Area instead of more intense development occurring within the Rural Area. The land use along the Project corridor ranges from intensely developed residential, commercial, and industrial to open space/parks and recreation.

The County acknowledges that growth will continue to occur, but it is positioning itself to include county-specific "Smart Growth" strategies to channel and shape growth into designated growth areas within the Development Area. The County will "direct new development to areas served by transit corridors; particularly designated centers of commerce, centers of community, and Mass Transit Nodes" (Prince William County, 2012). The County also proposes "centers of commerce at appropriate locations that promote high-density, mixed-use development near existing and planned multi-modal transit centers" (Prince William County, 2012). The County has focused specific plans on several sectors (i.e., geographic areas), including several along I-95 and U.S. 1 and the Project corridor, including the Government Center, the Parkway Employment Center, and the Potomac Communities.

The concept for the Government Center is to concentrate a town center, with more dense commerce and employment opportunities south of Prince William Parkway, west of I-95 (several miles west of the Project corridor) and north of Dale City, and a County Center north of Prince William Parkway, and to include access to mass transit options. The Parkway Employment Center is north of Potomac Mills Mall and west of I-95 and is currently wooded, but it is intended to provide a transition between the intensely developed Potomac Mill area and residential areas to the north and west, while providing significant employment opportunities in the area. The Potomac Communities surround the Project corridor, and the sector plan is a refocusing on the comprehensive planning surrounding U.S. 1 and its relationship to the surrounding communities. The sector plan discusses the existing VRE stations: Quantico (also an Amtrak station), Rippon, and Woodbridge (also an Amtrak station). The Potomac Shores Station is under construction in Cherry Hill, with a planned opening in 2017. The sector plan has several action strategies that encourage "expanding existing mass transit services in Potomac Communities" (Prince William County, 2012).

Stafford County. The most predominant land use in Stafford County is residential (including three different densities of use), followed by vacant land and then military uses (institutional) (Stafford County, 2014). Existing land use along the Project corridor includes parks and recreation, residential of various densities, vacant land, and agriculture and forestry. Future land uses in the Project corridor have been identified as suburban, agricultural/rural, and business/industry (Stafford County, 2014).

The Project corridor passes through two areas that have been designated as Urban Development Areas—Leeland Town Station and Brook Station—both of which have existing VRE rail stations. The *Stafford County Virginia Comprehensive Plan 2010-2030* includes a sustainability goal to "direct growth into the Urban Services Area," like the Leeland Town Station and Brook Station areas and to "promote infill development" and to "discourage growth in the Rural areas outside the Urban Services Area" (Stafford County, 2014). The plan also states that "[t]he majority of future residential and commercial development is being recommended along the I-95 and U.S. Route 1 corridors" and that the Urban Development Areas are "located in the vicinity of primary road networks, transportation hubs, and along the rail corridor to maximize the use of public transportation" (Stafford County, 2014).

The comprehensive plan specifically discusses commuter rail due to its current existence in the county. The plan supports commuter rail and expansions to it "including: mid-day and reverse commuters, geographic extension of rail service, weekends, late evening connections to other transit programs, and additional rush hour trains" (Stafford County, 2014). The comprehensive plan also includes a transportation objective to "provide and maintain a multi-modal public transit system" including "where practical, transit systems should provide access from residential areas to commuter rail stations" (Stafford County, 2014). Even though intercity passenger rail is not specifically included in the transportation goals and objectives of the comprehensive plan, it would be supported by the modal system currently in place in the county and planned for within the county.

City of Fredericksburg. The predominant land use within the city of Fredericksburg is residential use. Within the Project corridor, land uses include industrial, residential, open space, commercial/business, and mixed-use. For planning purposes, Fredericksburg is divided into planning areas, with different goals and objectives to achieve an overall vision for the entire city. Even within the relatively limited area of the city limits, a wide variety of land uses exist, including residential, institutional (the city fairgrounds, water treatment plant, and City-owned riparian lands for water protection), as well as industrial use (Battlefield Industrial Park), agricultural use (Braehead Farm), and the intensely developed Downtown district of the city (City of Fredericksburg, 2014, 2007).

Fredericksburg Station, which is served by VRE and Amtrak, served as VRE's southern terminus until Spotsylvania Station opened in November 2015. The City plans to "work with VRE and FRED (Fredericksburg Regional Transit) to establish the railway station areas as a multi-modal center" (City of Fredericksburg, 2007).

The transportation analysis for the *Fredericksburg Comprehensive Plan* discusses "how to accommodate a high speed intercity rail service" and improvements that would be needed, such as "high-speed crossovers, improved signaling, and strategically located sections of a third track" (City of Fredericksburg, 2007). The intercity passenger rail corridor is mentioned in the 2014 draft comprehensive plan, which notes that "The DC2RVA corridor between Washington, D.C. and Petersburg is very crowded and proposed improvements consist of a third track, within the existing rail corridor" (City of Fredericksburg, 2014). The plan also has an over-arching transportation goal to "encourage the use of alternative modes of travel, to enhance mobility and accessibility, and to minimize automobile congestion" (City of Fredericksburg, 2014).

Spotsylvania County. Most of the land use in Spotsylvania County is rural residential and agricultural/forestal. Within the Project corridor, the existing/future land uses include rural residential, agricultural/forestal, employment center, mixed land use, and open space (Spotsylvania County, 2013).

The County has identified a primary development area that can be adjusted, where public water and sewer will be provided and, therefore, where additional development is provided (Spotsylvania County, 2013). The land use objectives to meet the goal of providing for this development include to plan for the orderly development of the county; to accommodate projected residential growth in a manner that is fiscally responsible; and to ensure land use policies recognize and accommodate anticipated population increases (Spotsylvania County, 2013).

There is no mention of the DC2RVA corridor within the *Spotsylvania County Comprehensive Plan*, but I-95 and the CSXT rail line are both identified as part of a Virginia Corridor of Statewide Significance.

Caroline County. Most land use in Caroline County is classified as rural in the *Caroline County Comprehensive Plan 2030* (Caroline County, 2010). This includes agricultural and rural preservation. Along the Project corridor, the land use is classified as planned development, agricultural preservation, and floodplains. More detailed land use has been identified within Carmel Church, including planned mixed use, heavy industrial, and office/industrial. The comprehensive plan also identifies a plan for an Amtrak station within Carmel Church.

In regard to future land use and transportation, the County wishes to "promote alternatives to improve travel to and from the county" and "combine the advantages of rail, geographic location, land availability, and road access to create a transit oriented development" in Carmel Church. As a jurisdiction on the outer edges of the metropolitan DC region with significant open space/rural residential land uses, the County acknowledges that "The costs to the County of not managing growth will be extremely high, thus, future development should locate in those areas of the county in which public services and facilities are planned and can most efficiently and economically be provided" (Caroline County, 2010). Nevertheless, the comprehensive plan also identifies goals and strategies to "identify and preserve high quality sites for industrial and commercial use" and that "prime industrial sites should be preserved and encouraged to develop in planned industrial parks" (Caroline County, 2010). There is land use classified as industrial within the Project corridor.

The comprehensive plan has several transportation goals regarding high speed rail and passenger rail. The County needs to "monitor and participate in the high speed rail study of the I-95 corridor between Washington, D.C., and Raleigh, NC, as well as the D.C. to Richmond Rail Study" and to "identify and preserve sites for future commuter/high speed rail stations within the County" (Caroline County, 2010). The comprehensive plan also notes that high speed passenger service would provide "options not presently available and should be monitored for potential impacts to the County" (Caroline County, 2010).

Hanover County. Land use in Hanover County is primarily agricultural with more intense land uses such as industrial, commercial, business-industrial, and suburban residential on the border with Henrico County and along I-95. Land use within the Project corridor is predominantly industrial, business-industrial, commercial, and planned business. *Comprehensive Plan Hanover County 2012-2032* states that the land use strategy is to exemplify "orderly growth and development of both residential and non-residential uses to accommodate existing and future residents while encouraging and promoting commerce" (Hanover County, 2012). The County also wishes to "maximize the use of existing infrastructure, facilities, and services, to ensure economically and financially responsible service delivery" (Hanover County, 2012).

The comprehensive plan does not specifically mention intercity passenger rail service, but it does wish to "take into consideration the existing and planned development of its regional neighbors in formulating land use and transportation policies" (Hanover County, 2012). The County has a transportation goal to have "convenient and accessible multimodal networks that allow the movement of people and goods efficiently" (Hanover County, 2012). The current multi-modal network includes an Amtrak station at Ashland.

Town of Ashland. The Town of Ashland is undergoing a comprehensive planning update. The existing *Town of Ashland Comprehensive Plan* was adopted in 2011. The town plan is based around guiding principles that represent the basic beliefs of the town residents, encouraging the continued small town character and unique features, while acknowledging that change and/or growth will happen. The plan states that land use is "a balancing act: encouraging new development while diminishing impacts on existing areas" (Town of Ashland, 2011). The plan also acknowledges that an "efficient transportation system enhances the livability of the whole community" and that "promoting safe and efficient travel by all modes of transportation" is important. The town identity is based on many aspects, including "our transportation links to the wider region and the nation: the train, Interstate 95, and Route 1 all run right through town" (Town of Ashland, 2011). One of the Town fundamentals is to "manage our transportation network to minimize congestion, and make every effort to ensure that our community continues to be walkable, bicycle-friendly, and accessible to passenger rail." The presence of this rail service "contributes to the unique character of the Town, enhances the local economy, and provides a service to the citizens of the Town and Hanover County" and the tracks and station's location in the center of town is one of the town's "unique features" that must be safeguarded and supported (Town of Ashland, 2011). The plan specifically states that the Town "supports the Southeast High Speed Rail Corridor initiatives" and "shall work with federal, state, and regional partners to ensure the success and development of this initiative" (Town of Ashland, 2011).

Randolph-Macon College, a private undergraduate institution, is located within the town of Ashland and is currently bisected by the existing railroad tracks. The college's master plan, identified within the Town's 2011 Plan, has identified areas on both sides of and adjacent to the existing rail line for new/realigned baseball and football fields, dormitories, and other facilities. Other areas slated for improvement are on Henry Street, approximately 600 feet east of the existing tracks. The College's website encourages visitors to use the Ashland Amtrak station across Railroad Avenue from the College's quad.

Henrico County. Henrico County has a wide range of land uses within its boundaries. Development intensifies closer to the city of Richmond. The greatest amount of land use acreage in the county is vacant, followed by residential uses. In the Project corridor, the most acres of land are dedicated to industrial uses, followed by residential and vacant land. The future land use is projected to stay the same, with vacant lands replaced with residential uses at various densities (Henrico County, 2009). One of the overall land use goals for the County is to respect "the unique environment, landscape, and character in the currently rural portions of the county" while balancing a "mixture of residential and non-residential uses" (Henrico County, 2009).

Staples Mill Rail Station is an existing Amtrak station located in Henrico County. The *Henrico County Vision 2026 Comprehensive Plan* does has a transportation objective to "participate in regional efforts to monitor and evaluate the potential demand for passenger train service" (Henrico County, 2009).

City of Richmond. The city of Richmond is densely developed and, as stated in the comprehensive plan, "is essentially built-out with very limited vacant and developable land" (City of Richmond, 2000). Along the Project corridor, the land uses in the city are primarily industrial and commercial, with some residential uses occurring in limited locations. Land use goals as identified in *Master Plan Richmond* include accommodating "the continuation of most land uses and patterns in Richmond as they currently exist." The only expected future changes in land use are "redevelopment and infill–as appropriate" (City of Richmond, 2000).

One of four main transportation goals identified in the comprehensive plan is "[t]he City will have access to national and international markets and metropolitan areas through a comprehensive system of efficient and modern transportation." The plan also states that "[b]oth passenger and freight rail operate in the City and they are predicted to play a more significant role in the movement of people both regionally and nationally" (City of Richmond, 2000). The existing Amtrak rail line, with a stop at Main Street Station, is recognized as the high speed rail route in the City's comprehensive plan. One of the specific transportation policies/strategies identified in the plan is to "promote the development of high-speed passenger rail service connecting Richmond to other areas in Virginia and along the East Coast."

Chesterfield County. Chesterfield County lies between two urban areas, Richmond and Petersburg. The areas of the county near these cities are therefore more intensely developed. The land use in the county is primarily residential, with dense commercial development along major roadways; however, according to *Moving Forward: The Comprehensive Plan for Chesterfield County*, 44 percent of the acreage in the county is vacant (Chesterfield County, 2012). Existing land use along the Project corridor is predominantly residential, commercial, and industrial.

The County has planned for rail improvements, and the comprehensive plan specifically mentions the high speed rail corridor under study in several sections of its comprehensive plan, most particularly as it relates to the existing Amtrak station at Ettrick. More specifically, the plan has, as a goal, to "[p]romote the economic development advantages of conventional and high speed rail through the county and develop specific strategies to take advantage of rail services for economic development promotion" (Chesterfield County, 2012). The plan also recognizes the link between the County's economy and transportation options in the goal to "[e]ncourage a range of multimodal transportation options that link businesses to their labor force, customers, and adjacent communities" (Chesterfield County, 2012).

Regional Planning Agencies

Comprehensive planning and strategy is also carried out at the regional level. The Project corridor includes three planning regions—the Washington, D.C. Metro area, the Fredericksburg area, and the Richmond region. These carry out planning at the regional level and, in some cases, aid the individual jurisdictions with comprehensive planning.

Metropolitan Washington Council of Governments. The Metropolitan Washington Council of Governments (MWCOG) is a regional planning entity that encompasses local jurisdictions in Maryland, Virginia, and the District of Columbia. As part of the transportation planning process for the region, MWCOG identifies Regional Activity Centers. These centers range across the entire region. Along or adjacent to the Project corridor are 13 such areas: the Pentagon, Pentagon City, Crystal City, Potomac Yard, Braddock Road Metro Area, King Street/Old Town, Carlyle/Eisenhower East, Huntington/Penn Daw, Landmark/Van Dorn, Springfield, Fort Belvoir North Area, North Woodbridge, and Potomac Shores. The region wishes to pursue "transportation projects that aim to better connect Regional Activity Centers" (MWCOG, 2014). In addition, one of the regional goals is to "support inter-regional and international travel and commerce" (MWCOG, 2014).

Fredericksburg Area Metropolitan Planning Organization. The Fredericksburg Area Metropolitan Planning Organization (FAMPO) is the regional transportation planning entity for Fredericksburg and the urbanized areas of Spotsylvania and Stafford counties. The 2040 Long Range Transportation Plan specifically mentions high speed rail from Washington to Richmond and from Richmond to Raleigh and discusses the Project process, including the current environmental studies (FAMPO, 2013). The plan also notes that it "is logical that the Fredericksburg station could be a stop along this proposed high speed corridor" (FAMPO, 2013). The FAMPO Policy Committee voted in July 2016 to oppose an eastern rail bypass of the city of Fredericksburg.

Richmond Area Metropolitan Planning Organization. The Richmond Area Metropolitan Planning Organization (RAMPO) is the regional transportation planning entity for the Richmond metropolitan region. Plan2035, the most recent long-range transportation plan for the RAMPO, specifically mentions high speed rail from Washington to Richmond and from Richmond to Raleigh as currently under development (RAMPO, 2012). The plan discusses in detail the national and state rail plans and the role of this Project in those plans.

3.11.4 Neighborhoods and Communities

Communities vary from those in older, well-established cities and towns to high-growth suburban areas in the counties surrounding the Washington, D.C. and Richmond metropolitan areas. The existing CSXT rail line has been part of the counties, cities, and individual communities since the early 1800s, and it has been a stimulus to community growth and development. The RF&P Railroad Company was chartered in 1834 and included most of the existing CSXT corridor between Richmond and Washington, D.C. The communities have grown and developed around these rail lines.

3.11.4.1 Communities along the DC2RVA Corridor

Crystal City is the primary community adjacent to the DC2RVA corridor in **Arlington County**. It is a retail and residential community based partially on its excellent access to the transportation network, including the rail modes in the vicinity (Metro and VRE) and to the roadway network.

In the **city of Alexandria**, several communities line the DC2RVA corridor, including Braddock, Rosemont, and Old Town Alexandria. The DC2RVA corridor turns to the west and travels through more commercial and industrial development before crossing into Fairfax County.

In **Fairfax County**, the area surrounding the DC2RVA corridor is primarily residential communities, including Mount Hebron Park, Monticello Woods, Maple Grove Estates, Franconia, Springfield Forest, Windsor Estates, Beverly Forest, Pohick Estates, Lorton, Harbor View, and Colchester. For most of these communities, the study area is either along an outer edge of residential development or part of commercial development within the community. In the case of Harbor View and Colchester, primary access is via Furnace Road. Furnace Road crosses under the DC2RVA corridor using a one-lane tunnel.

In **Prince William County**, the DC2RVA corridor is along the edge of residential neighborhoods, as well as within Marine Corps Base Quantico (MCBQ). Communities along the DC2RVA corridor include Belmont Bay, Marumsco Acres, Potomac View, Marumsco Woods, Featherstone Shores, Dawson Landing, Riverside Station, and Potomac Shores. Within MCBQ, the DC2RVA corridor is in forested areas, and the central base itself is at the mouth of Chopawamsic Creek. This creek is also the county line between Prince William and Stafford counties.

In **Stafford County**, primarily forested areas are along the DC2RVA corridor in the northern part of the county. Once south of Aquia Creek, communities that have extended toward the DC2RVA corridor include Aquia Beach, Aquia Bay Estates, Brittany Estates, and Potomac Run Farm. Between the existing VRE stations at Brooke and Leeland Road, the DC2RVA corridor continues to travel along the edges of residential development on local roads. South of the Leeland Road Station, development intensifies, and communities along the DC2RVA corridor include Northridge, Leeland Station, Mount Pleasant Estates, Heather Hills, Woodland, Bel Air, Lynwood, Clearview Heights, Dahlgren Junction, Debruyn, East Chatham Heights, Cedar Bluff, Ferry Farm, Argyle Heights, Tylerton, Little Falls, and Grandview.

In the **city of Fredericksburg**, the DC2RVA corridor passes through downtown and Hazel Hill at the existing Fredericksburg VRE station. South of Virginia Route 3, the DC2RVA corridor is along the western edge of Mayfield. The neighborhood abuts the CSXT main line track and Fredericksburg rail yard. The community is primarily single-family residential units. The DC2RVA corridor then passes through light industrial areas until it crosses into Spotsylvania County.

In **Spotsylvania County**, the communities that are along the DC2RVA corridor are characterized by sparse rural residential development within rural communities and forested areas. The communities include Hamilton Crossing at the intersection of Mine Road and Benchmark Road and Summit, where the existing CSXT rail line crosses Summit Crossing Road.

In **Caroline County**, the communities are very similar to those in Spotsylvania County—sparse rural residential development within rural communities and forested areas. These communities include Guinea, Woodford, Milford, Penola, and the southern end of Carmel Church along Jefferson Davis Highway.

In **Hanover County**, Doswell is along the DC2RVA corridor in the northern part of the county. Through the remainder of Hanover County, the communities include Ashland, where the rail corridor currently divides both the Town and Randolph-Macon College, Gwathmey, Kenwood, and Elmont.

In **Henrico County**, along the Elmont to Greendale and Greendale to South Acca Yard (SAY)/West Acca Yard (WAY) sections, the communities are typically major residential developments and include Hunton, Glen Allen, Laurel Park, Boudar, Lakeside, and Dumbarton. Along the Rivanna Junction to Beulah-Peninsula subsection, the north side of the community of Oakland is separated from the section by Almond Creek and Bickerstaff Road. East of Oakland, the area along the section is either forested or industrial.

Within the **city of Richmond**, there are four separate Project sections. The communities along these sections are established urban residential areas. Along the WAY to Centralia—A-Line section, communities include Sauer's Gardens, Scott's Addition, Malvern Gardens, the Museum District, Colonial Place, Windsor Farms, Carillon, Westover Hills, Cedarhurst, Forest View, Westover, Woodhaven, Southwood, McGuire, Hickory Hill, Deerbourne, Cherry Gardens, Broad Rock, and Walmsley. Along the SAY/WAY to AM Junction (Hermitage Lead) section, communities include Scott's Addition, Newtowne West, Virginia Union University, Carver, Southern Barton Heights, and Gilpin. Along the AM Junction to Centralia—S-Line section, communities include Mosby, Union Hill, Downtown, Tobacco Row, Manchester, Blackwell, Oak Grove, Bellemeade, Windsor, Cullenwood, Davee Gardens, and Broad Rock. Along the Rivanna Junction to Beulah-Peninsula subseection, communities include Union Hill, Downtown, Tobacco Row, Shockoe Bottom, Chimborazo, Fulton, and Fulton Hill.

In **Chesterfield County**, the WAY to Centralia—A-Line section is along Ampthill Heights, the western side of the community of Ampt Hill, Drewrys Bluff, Beulah Village, and Centralia. Along the AM Junction to Centralia—S-Line section, the community of Ampt Hill is separated from the section by forested areas. The section is then along the eastern side of the communities of Bensley Village and Bellwood before turning and is on the western side of the community of Chimney Corner. The section then travels along the edge of Bellwood Manor until crossing VA Route 288 and terminates at the community of Centralia.

3.11.5 Community Facilities and Services

There is a wide range of community facilities located along the DC2RVA corridor, including schools, religious facilities, community centers, cemeteries, police and fire stations, libraries, post offices, and medical facilities, as shown in Appendix Q. A tabulation of community facilities within 500 feet of the DC2RVA rail line is provided in Table 3.11-5.

Table 3.11-5: Community Facilities

City/ County	Cemetery	Fire Station	Medical Facility	Library	Police Station	Post Office	Religious Facility	School/ University	Community Center/ Museum
Arlington County	0	0	0	0	0	1	0	0	0
City of Alexandria	1	1	0	1	0	1	2	4	1
Fairfax County	0	0	0	0	0	0	0	0	0
Prince William County	1	2	0	0	1	1	1	1	1
Stafford County	2	1	1	0	0	0	4	1	0
City of Fredericksburg	0	0	0	0	0	0	4	1	0
Spotsylvania County	0	0	0	0	0	0	0	0	0
Caroline County	1	0	0	0	0	2	1	0	0
Hanover County	0	2	0	1	0	0	5	2	0
Henrico County	0	0	0	0	0	0	2	0	1
City of Richmond	3	1	3	1	2	0	13	10	5
Chesterfield County	0	0	0	0	0	0	0	2	0
Totals	8	7	4	3	3	5	32	21	8

3.12 TITLE VI AND ENVIRONMENTAL JUSTICE

Title VI of the Civil Rights Act of 1964 states that "No person in the United States shall, on the ground of race, color, or national origin, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance." Title VI bars intentional discrimination, as well as disparate impact discrimination (i.e., a neutral policy or practice that has an unequal impact on protected groups). Data collection to determine the presence of any Title VI groups has occurred as part of this Project.

EO 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requires that each federal agency "shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations." Minority persons include citizens or lawful permanent residents of the United States who are African-American, Hispanic or Latino, Asian-American, American Indian, or Native Alaskan. Low-income persons are defined as those whose median household income is below the United States Department of Health and Human Services (HHS) poverty guidelines.

EO 13166, *Improving Access to Services for Persons with Limited English Proficiency*, mandates that federal agencies "examine the services they provide, identify any need for services to those with limited English proficiency (LEP), and develop and implement a system to provide those services so LEP persons can have meaningful access to them" and "to ensure that the programs and activities that they [federal agencies] normally provide in English are accessible to LEP persons and thus do not discriminate on the basis of national origin in violation of Title VI of the Civil Rights Act of 1964, as amended, and its implementing regulations" (EO 13166). As part of EO 13166, the United States Department of Justice (DOJ) issued guidance for all federal agencies and departments on implementing the LEP regulations because of the connection between Title VI barring of discrimination based on national origin and EO 13166. The CEQ has compliance oversight regarding LEP regulations as part of NEPA compliance.

3.12.1 Methodology

Demographic data for the jurisdictions along the DC2RVA corridor were compiled to identify Title VI and low-income populations. As defined by Title VI and in the guidance for implementing EO 12898, minority populations include citizens or lawful permanent residents of the United States who, as defined by U.S. DOT Order 5610.2a, are:

- Black: A person having origins in any of the black racial groups of Africa;
- Hispanic or Latino: A person of Mexican, Puerto Rican, Cuban, Central, or South American or other Spanish culture or origin, regardless of race;
- Asian American: A person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent;
- American Indian and Alaskan Native: A person having origins in any of the original people of North America or South America (including Central America) and who maintains cultural identification through tribal affiliation or community recognition; or
- Native Hawaiian and Other Pacific Islander: A person having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

The U.S. DOT defines low-income as "a person whose median household income is at or below the [United States] Department of Health and Human Services (HHS) poverty guidelines" (U.S. DOT, 5610.2[a]).

The U.S. DOT definition of a low-income population is "any readily identifiable group of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed DOT program, policy, or activity" (U.S. DOT, 5610.2[a]).

The U.S. DOT definition of a minority population is "any readily identifiable groups of minority persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed/transient persons (such as migrant workers or Native Americans) who will be similarly affected by a proposed DOT program, policy, or activity" (U.S. DOT, 5610.2[a]).

The U.S. DOT definition of Adverse Effects is "the totality of significant individual or cumulative human health or environmental effects, including interrelated social and economic effects, which may include, but are not limited to bodily impairment, infirmity, illness, or death; air, noise, and water pollution and soil contamination; destruction or disruption of man-made or natural resources; destruction or diminution of aesthetic values; destruction or disruption of community cohesion or a community's economic vitality; destruction or disruption of the availability of public and private facilities and services; vibration; adverse employment effects; displacement of persons, businesses, farms, or nonprofit organizations; increased traffic congestion, isolation, exclusion, or separation of minority or low-income individuals within a given community or from the broader community; and the denial of, reduction in, or significant delay in the receipt of benefits of DOT programs, policies, or activities" (U.S. DOT, 5610.2[a]).

The U.S. DOT definition of disproportionately high and adverse effect on minority and low-income populations is an Adverse Effect that:

- "(1) is predominately borne by a minority population and/or a low-income population, or
- (2) will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population" (U.S. DOT, 5610.2[a]).

3.12.2 Title VI and Environmental Justice Populations

The jurisdictions along the DC2RVA corridor have a wide range of demographic data (Table 3.12-1). Two jurisdictions—Prince William County and the City of Richmond—contain minority populations that are more than 50 percent of the population. Low-income populations within the jurisdictions range from 5 to 25 percent. Persons with LEP range from a low of 1 percent in Caroline and Hanover counties to a high of more than 14 percent in Fairfax County. Persons with a disability range from 5 to 15 percent of the population.

Table 3.12-1: City/County Demographic Data in 2013

City/County	Minorities (%)	Low-Income (%)	Total LEP (%)*	Disabled (%)**
Arlington County	78,231 (36.41%)	16,899 (7.97%)	17,092 (8.44%)	10,939 (5.20%)
City of Alexandria	67,406 (46.91%)	11,980 (8.42%)	15,747 (11.82%)	9,013 (6.41%)
Fairfax County	507,651 (46.11%)	64,274 (5.89%)	150,041 (14.61%)	69,834 (6.42%)
Prince William County	217,574 (52.22%)	26,045 (6.34%)	45,533 (11.90%)	27,867 (6.84%)
Stafford County	43,431 (32.93%)	6,549 (5.12%)	5,051 (4.10%)	9,619 (7.67%)
City of Fredericksburg	10,331 (39.84%)	4,342 (18.57%)	1,145 (4.75%)	2,388 (9.30%)
Spotsylvania County	35,153 (28.28%)	9,383 (7.59%)	3,868 (3.33%)	12,901 (10.46%)
Caroline County	10,482 (36.45%)	3,444 (12.66%)	391 (1.45%)	3,831 (14.01%)
Hanover County	15,064 (15.01%)	5,019 (5.12%)	1,209 (1.27%)	10,187 (10.26%)
Henrico County	135,489 (43.52%)	32,877 (10.69%)	16,709 (5.74%)	30,749 (9.96%)
City of Richmond	125,893 (60.56%)	50,681 (25.61%)	8,834 (4.54%)	31,613 (15.40%)
Chesterfield County	112,981 (35.26%)	21,240 (6.74%)	12,601 (4.19%)	30,605 (9.64%)
Totals	1,359,686 (43.48%)	252,733 (8.21%)	278,221 (9.54%)	249,546 (8.11%)

Source: United States Census Bureau: 2009-2013 American Community Survey.

Note: *LEP is based on the population aged 5 years and over. **Census disability is based on the civilian noninstitutionalized population with a self-identified disability.

Individual census tracts (Table 3.12-2) were compared to the jurisdiction in which they are situated. Those census tracts with any groups greater than 50 percent of the population are highlighted in orange. Those tracts with groups greater than their respective city/county are highlighted in yellow. Any group with less than 50 persons is not displayed in accordance with United States Census Bureau guidance on privacy. The predominant language spoken by those persons who speak English less than very well is identified in Table 3.12-2. There is a wide spectrum of each demographic group. Minorities predominate in census tracts in Fairfax County, Prince William County, Henrico County, the city of Richmond, and Chesterfield County. Low-income persons predominate in Prince William County, Caroline County, Hanover County, the city of Richmond, and Chesterfield County. Persons with LEP predominate in Fairfax County, Prince William County, and Chesterfield County. Persons with a disability predominate in Henrico County, the city of Richmond, and Chesterfield County. Figure 3.12-1 also identifies the census tracts that are highlighted in Table 3.12-2.

Census tracts can have data that vary widely from other tracts based on their unique geographies. High populations in group quarters such as college dormitories, retirement communities, and correctional facilities, can affect data. For example, Census Tract 102.01 in Stafford County is MCBQ. Census Tract 2007.01 in Alexandria is predominantly a rail yard and commercial properties. Some of the census tract boundaries are also along existing roadways (i.e., sides of the same street are in separate census tracts); therefore, they may not give the most accurate picture of a community. In several jurisdictions, the CSXT rail line is the boundary between census tracts.

Table 3.12-2: Census Tract Demographic Data in 2013

Location	Total Population	Minorities	Low-Income	Total LEP * Language(s) Spoken	Disabled **
Census Tract 1034.02, Arlington County	4,981	34.07%	4.60%	3.97%	5.11%
Census Tract 2004.03, Alexandria	1,401	46.18%	–	8.40%	7.56%
Census Tract 2006, Alexandria	5,092	63.06%	8.70%	18.93% Spanish (625) Chinese (138)	11.40%
Census Tract 2007.01, Alexandria	708	24.72%	–	–	–
Census Tract 2007.02, Alexandria	4,258	28.96%	4.65%	5.30%	3.99%
Census Tract 2008.02, Alexandria	3,015	40.73%	12.44%	5.78%	7.56%
Census Tract 2013, Alexandria	3,360	29.05%	8.66%	7.55%	7.79%
Census Tract 2015, Alexandria	3,744	13.46%	1.75%	1.57%	3.54%
Census Tract 2016, Alexandria	4,774	44.57%	22.46%	–	5.75%
Census Tract 2018.01, Alexandria	5,351	27.02%	4.26%	3.17%	4.06%
Census Tract 2019, Alexandria	1,576	15.80%	4.44%	–	6.84%
Census Tract 4201, Fairfax County	4,206	69.78%	18.35%	32.22% Spanish (513) Vietnamese (220)	7.50%
Census Tract 4202.01, Fairfax County	3,682	49.35%	2.81%	12.01%	6.43%
Census Tract 4202.02, Fairfax County	2,115	50.26%	5.11%	7.56%	4.65%
Census Tract 4202.03, Fairfax County	2,615	41.76%	7.00%	7.48%	7.43%
Census Tract 4203, Fairfax County	5,593	42.00%	2.13%	13.31%	6.87%
Census Tract 4210.01, Fairfax County	3,097	58.35%	4.75%	23.92% Spanish	6.61%
Census Tract 4210.02, Fairfax County	5,210	60.83%	7.74%	23.60% Spanish (409) Vietnamese (104)	6.86%
Census Tract 4211.01, Fairfax County	5,950	57.23%	1.22%	13.21%	3.24%
Census Tract 4211.03, Fairfax County	5,004	34.49%	–	9.30%	3.72%
Census Tract 4220, Fairfax County	3,881	57.43%	5.15%	17.83% Spanish	9.72%

▶ *Continued* – Above 50%; Greater than respective jurisdiction. (*see end of table for detailed notes.*)

Table 3.12-2: Census Tract Demographic Data in 2013

Location	Total Population	Minorities	Low-Income	Total LEP * Language(s) Spoken	Disabled **
Census Tract 4221.01, Fairfax County	6,516	67.03%	3.63%	17.20% Spanish(360) Vietnamese (175)	4.72%
Census Tract 4221.02, Fairfax County	6,676	81.97%	2.47%	24.07% Spanish (518) Tagalog (202)	6.52%
Census Tract 4526, Fairfax County	5,849	60.39%	6.90%	23.83% Spanish	6.50%
Census Tract 9001, Prince William County	3,449	41.58%	5.16%	5.58%	7.51%
Census Tract 9002.01, Prince William County	1,922	69.15%	14.76%	28.40% Spanish	9.65%
Census Tract 9002.02, Prince William County	4,493	71.47%	12.82%	32.16% Spanish	9.48%
Census Tract 9002.03, Prince William County	4,431	82.40%	15.08%	21.06% Spanish	7.86%
Census Tract 9006, Prince William County	7,511	76.63%	26.11%	35.04% Spanish	4.93%
Census Tract 9007.01, Prince William County	5,553	72.86%	5.92%	9.57%	9.75%
Census Tract 9007.02, Prince William County	8,022	55.92%	6.67%	22.23% Spanish (1,226) Korean (118)	3.80%
Census Tract 9008.01, Prince William County	5,484	59.96%	2.90%	2.87%	5.63%
Census Tract 9008.02, Prince William County	6,773	84.60%	10.62%	10.22%	8.09%
Census Tract 9009.04, Prince William County	5,328	72.60%	7.87%	9.98%	5.37%
Census Tract 9011, Prince William County	6,994	35.69%	5.12%	4.94%	4.24%
Census Tract 101.05, Stafford County	7,507	37.82%	5.87%	9.22% Spanish	7.02%
Census Tract 101.06, Stafford County	3,178	7.55%	2.56%	–	9.77%
Census Tract 101.07, Stafford County	3,017	17.40%	3.31%	–	9.26%
Census Tract 102.01, Stafford County	2,315	38.14%	–	–	–
Census Tract 104.03, Stafford County	2,899	24.39%	4.02%	3.96%	9.11%
Census Tract 104.04, Stafford County	6,289	28.72%	5.57%	1.55%	8.75%
Census Tract 104.05, Stafford County	6,350	27.12%	1.59%	1.08%	7.65%
Census Tract 104.06, Stafford County	3,086	33.38%	12.42%	1.89%	9.62%

▶ *Continued* – Above 50%; Greater than respective jurisdiction. (*see end of table for detailed notes.*)

Table 3.12-2: Census Tract Demographic Data in 2013

Location	Total Population	Minorities	Low-Income	Total LEP * Language(s) Spoken	Disabled **
Census Tract 105.02, Stafford County	4,381	14.29%	2.93%	1.38%	8.21%
Census Tract 105.04, Stafford County	1,584	8.96%	9.83%	–	15.78%
Census Tract 1, Fredericksburg City	2,948	21.78%	11.70%	–	10.53%
Census Tract 3.02, Fredericksburg City	4,849	33.37%	17.34%	3.48%	7.75%
Census Tract 4, Fredericksburg City	2,935	62.62%	17.43%	–	16.70%
Census Tract 202.01, Spotsylvania County	5,640	37.75%	9.22%	6.11% Spanish	5.99%
Census Tract 202.02, Spotsylvania County	5,045	33.89%	4.33%	5.07% Spanish (112) Chinese (94)	10.42%
Census Tract 202.03, Spotsylvania County	4,882	34.97%	7.56%	3.58% Laotian (46) Korean(28)	12.45%
Census Tract 202.05, Spotsylvania County	4,297	35.86%	8.73%	3.15%	14.22%
Census Tract 301, Caroline County	4,617	36.45%	13.97%	3.36% Polish (62) Korean (55)	16.34%
Census Tract 302.01, Caroline County	2,447	33.67%	5.96%	–	13.23%
Census Tract 303, Caroline County	2,952	41.23%	13.87%	–	12.38%
Census Tract 304, Caroline County	1,654	20.50%	19.35%	–	20.80%
Census Tract 305, Caroline County	12,182	34.53%	12.70%	1.24%	11.98%
Census Tract 306, Caroline County	3,097	54.89%	11.26%	2.34% Persian	15.57%
Census Tract 3201, Hanover County	5,677	12.45%	11.04%	–	10.94%
Census Tract 3204, Hanover County	4,507	16.86%	10.12%	1.46% Spanish	11.54%
Census Tract 3205, Hanover County	3,200	6.50%	2.36%	–	10.95%
Census Tract 3206.01, Hanover County	4,258	38.00%	9.81%	4.31% Korean	17.73%
Census Tract 3206.02, Hanover County	3,024	13.16%	7.47%	–	11.30%
Census Tract 3207.01, Hanover County	2,828	11.88%	2.77%	–	9.60%
Census Tract 3208.01, Hanover County	2,503	17.86%	9.46%	–	7.03%

▶ *Continued* – Above 50%; Greater than respective jurisdiction. (*see end of table for detailed notes.*)

Table 3.12-2: Census Tract Demographic Data in 2013

Location	Total Population	Minorities	Low-Income	Total LEP * Language(s) Spoken	Disabled **
Census Tract 3208.03, Hanover County	5,342	13.44%	3.31%	–	3.10%
Census Tract 3208.04, Hanover County	5,340	12.00%	–	–	6.49%
Census Tract 3208.05, Hanover County	2,912	9.17%	4.61%	–	9.06%
Census Tract 3209, Hanover County	7,863	13.98%	3.45%	2.14% Spanish	9.61%
Census Tract 3211, Hanover County	5,660	11.82%	4.77%	3.55% Spanish	10.28%
Census Tract 2004.06, Henrico County	9,236	28.80%	6.59%	4.09%	8.43%
Census Tract 2005.02, Henrico County	2,062	23.96%	10.09%	3.96%	11.87%
Census Tract 2005.03, Henrico County	3,919	19.80%	10.49%	1.77%	10.14%
Census Tract 2006, Henrico County	4,792	33.41%	16.96%	9.48% Spanish	9.91%
Census Tract 2007, Henrico County	3,911	33.80%	23.97%	–	24.39%
Census Tract 2008.01, Henrico County	2,983	43.51%	13.81%	5.48%	18.30%
Census Tract 2008.02, Henrico County	2,127	46.83%	9.40%	5.20%	11.38%
Census Tract 2008.04, Henrico County	5,828	87.54%	17.71%	6.52% Spanish	11.41%
Census Tract 2008.05, Henrico County	4,640	97.41%	48.66%	8.21% African (140) Native North American (134)	14.14%
Census Tract 2009.03, Henrico County	7,195	41.72%	5.23%	3.58%	8.36%
Census Tract 2009.04, Henrico County	6,820	69.09%	5.43%	4.40%	10.27%
Census Tract 2009.05, Henrico County	4,912	62.48%	15.77%	3.69%	15.85%
Census Tract 2009.06, Henrico County	4,422	24.81%	6.31%	3.52%	10.65%
Census Tract 2010.01, Henrico County	6,151	89.06%	10.17%	1.70%	7.62%
Census Tract 2010.02, Henrico County	2,986	86.47%	14.07%	–	8.71%
Census Tract 2015.01, Henrico County	10,616	81.56%	17.16%	1.26%	8.89%
Census Tract 2016.02, Henrico County	4,727	43.11%	5.36%	–	13.48%

▶ *Continued* – Above 50%; Greater than respective jurisdiction. (*see end of table for detailed notes.*)

Table 3.12-2: Census Tract Demographic Data in 2013

Location	Total Population	Minorities	Low-Income	Total LEP * Language(s) Spoken	Disabled **
Census Tract 102, Richmond	4,283	26.69%	11.20%	1.51%	20.40%
Census Tract 103, Richmond	1,771	97.52%	24.90%	–	11.07%
Census Tract 104.01, Richmond	3,207	35.52%	15.96%	–	17.42%
Census Tract 104.02, Richmond	2,917	38.60%	15.37%	4.06%	12.93%
Census Tract 105, Richmond	1,309	79.37%	12.76%	–	10.16%
Census Tract 106, Richmond	2,098	84.80%	9.76%	–	16.37%
Census Tract 107, Richmond	2,708	97.78%	22.45%	–	19.98%
Census Tract 108, Richmond	3,979	93.77%	23.97%	–	19.34%
Census Tract 109, Richmond	2,545	88.49%	21.34%	–	25.34%
Census Tract 110, Richmond	2,198	93.63%	24.45%	–	30.42%
Census Tract 111, Richmond	3,047	79.72%	34.19%	–	14.76%
Census Tract 201, Richmond	1,627	97.11%	68.22%	–	22.15%
Census Tract 204, Richmond	4,679	98.01%	49.52%	–	18.64%
Census Tract 205, Richmond	3,695	44.28%	30.18%	–	8.67%
Census Tract 208, Richmond	1,368	44.81%	10.38%	–	12.57%
Census Tract 211, Richmond	1,382	86.54%	22.10%	–	20.69%
Census Tract 212, Richmond	1,767	88.00%	12.85%	–	13.87%
Census Tract 301, Richmond	2,898	98.41%	71.77%	–	25.28%
Census Tract 302, Richmond	2,512	48.53%	37.80%	–	12.66%
Census Tract 305, Richmond	3,295	53.90%	43.32%	6.68% Chinese	5.60%
Census Tract 402, Richmond	3,296	50.39%	45.70%	2.55%	9.13%
Census Tract 403, Richmond	3,509	46.34%	62.97%	1.99%	3.13%
Census Tract 404, Richmond	3,717	28.11%	56.77%	–	11.14%

▶ *Continued* – Above 50%; Greater than respective jurisdiction. (*see end of table for detailed notes.*)

Table 3.12-2: Census Tract Demographic Data in 2013

Location	Total Population	Minorities	Low-Income	Total LEP * Language(s) Spoken	Disabled **
Census Tract 405, Richmond	3,367	15.09%	16.48%	–	10.92%
Census Tract 406, Richmond	1,756	14.75%	25.00%	–	13.27%
Census Tract 407, Richmond	2,687	24.64%	11.44%	5.33%	5.78%
Census Tract 408, Richmond	1,679	18.46%	17.03%	10.51% Spanish	10.48%
Census Tract 409, Richmond	2,708	17.80%	17.35%	1.95%	14.93%
Census Tract 410, Richmond	2,776	8.47%	9.55%	–	7.12%
Census Tract 411, Richmond	4,339	24.98%	34.48%	2.00%	7.26%
Census Tract 412, Richmond	1,309	19.17%	39.04%	–	6.57%
Census Tract 413, Richmond	2,952	78.66%	35.37%	3.80%	22.02%
Census Tract 414, Richmond	2,062	60.09%	20.24%	–	16.41%
Census Tract 416, Richmond	1,482	48.79%	12.19%	–	8.97%
Census Tract 501, Richmond	2,806	13.33%	10.36%	–	12.05%
Census Tract 502, Richmond	2,844	6.58%	4.54%	–	2.43%
Census Tract 503, Richmond	1,247	12.91%	6.90%	–	8.87%
Census Tract 506, Richmond	2,474	4.77%	2.55%	–	6.83%
Census Tract 602, Richmond	2,194	91.34%	28.58%	–	29.67%
Census Tract 604, Richmond	5,292	84.79%	37.85%	2.18%	25.25%
Census Tract 605, Richmond	6,328	54.58%	15.58%	1.85%	22.40%
Census Tract 606, Richmond	2,374	14.57%	3.50%	2.68%	6.02%
Census Tract 607, Richmond	5,110	93.11%	49.99%	–	20.16%
Census Tract 608, Richmond	3,266	88.73%	30.36%	24.38% Spanish	16.39%
Census Tract 609, Richmond	1,633	78.93%	36.13%	23.27% Spanish	12.05%
Census Tract 610, Richmond	3,360	71.28%	34.40%	–	9.47%

▶ *Continued* – Above 50%; Greater than respective jurisdiction. (*see end of table for detailed notes.*)

Table 3.12-2: Census Tract Demographic Data in 2013

Location	Total Population	Minorities	Low-Income	Total LEP * Language(s) Spoken	Disabled **
Census Tract 706.01, Richmond	6,367	93.01%	37.64%	43.32% Spanish	15.65%
Census Tract 706.02, Richmond	2,432	83.63%	14.22%	5.65% Spanish	20.39%
Census Tract 709, Richmond	6,834	81.64%	30.65%	4.70% Spanish	21.08%
Census Tract 710.02, Richmond	3,390	82.74%	20.50%	13.33% Spanish (206) Korean (114)	18.41%
Census Tract 711, Richmond	4,866	51.95%	7.41%	2.73%	16.12%
Census Tract 1003, Chesterfield County	1,844	53.74%	16.38%	5.69% Spanish	18.28%
Census Tract 1004.04, Chesterfield County	2,500	69.04%	23.28%	38.66% Spanish	12.60%
Census Tract 1004.05, Chesterfield County	2,373	68.44%	30.97%	32.74% Spanish	10.85%
Census Tract 1004.06, Chesterfield County	1,301	77.09%	31.59%	–	11.22%
Census Tract 1004.07, Chesterfield County	2,731	40.31%	12.23%	4.09%	21.38%
Census Tract 1004.09, Chesterfield County	6,174	22.40%	9.59%	2.88%	7.76%
Census Tract 1008.04, Chesterfield County	4,413	64.58%	9.73%	7.92% Gujarati (119) Vietnamese (116)	11.21%
Census Tract 1008.06, Chesterfield County	3,525	72.85%	15.95%	9.81% Spanish	14.21%
Census Tract 1008.07, Chesterfield County	1,818	58.97%	4.31%	5.96% Spanish	12.32%
Census Tract 1008.15, Chesterfield County	4,098	36.21%	6.50%	3.46%	7.63%
Census Tract 1008.16, Chesterfield County	4,919	35.41%	4.56%	7.92% Spanish	12.50%

Sources: United States Census Bureau: 2009-2013 American Community Survey.

Notes: Data for each demographic group are not mutually exclusive and do not total 100 percent. *Based on the population aged 5 years and over. In most census tracts, more than one LEP language is spoken. Where applicable, the most common LEP language(s) is listed. For census tracts where two LEP languages are common, both languages are listed with their respective number of speakers. **Census disability is based on the civilian noninstitutionalized population with a self-identified disability. –Totals less than 50 persons not shown. Above 50%; Greater than respective jurisdiction.

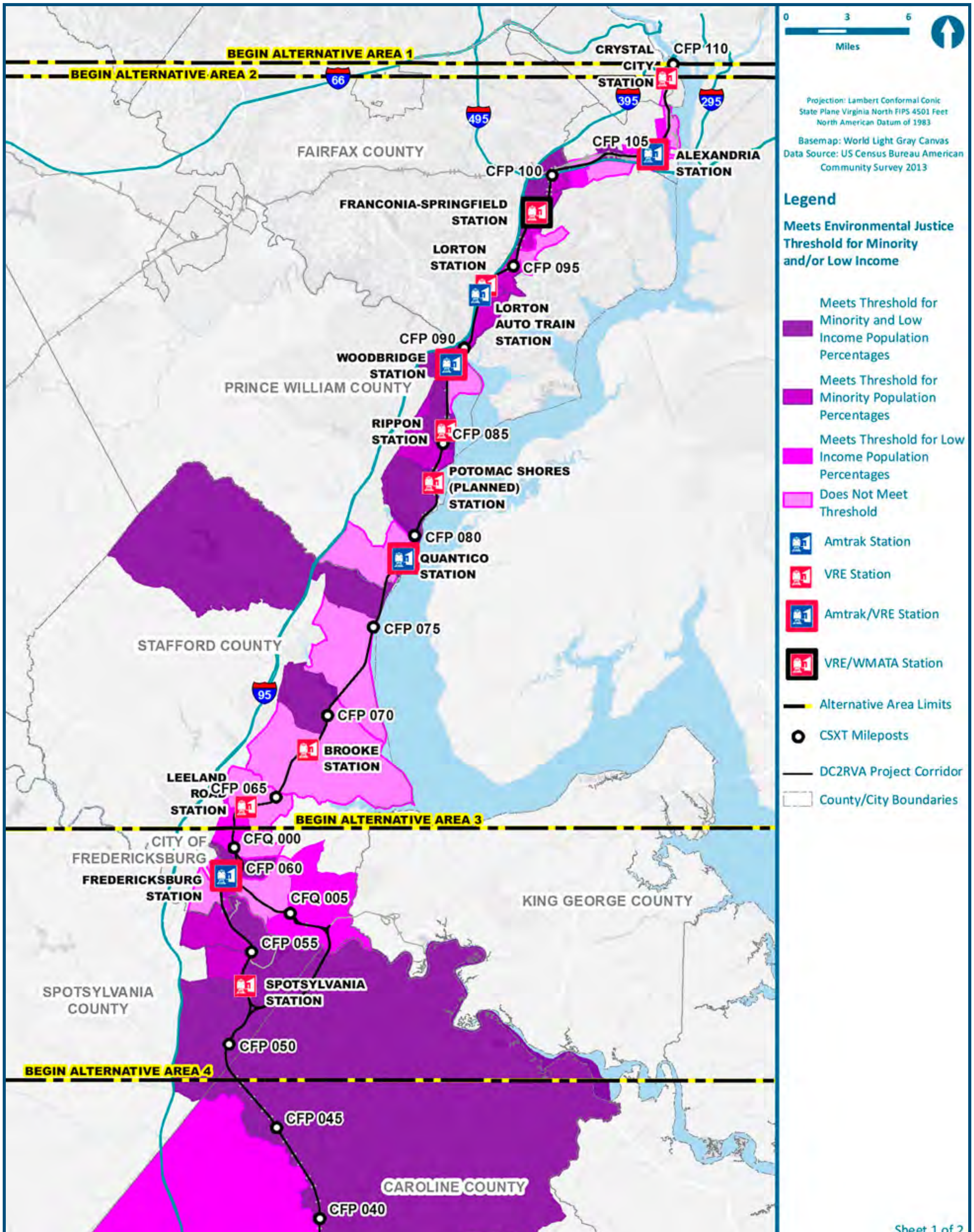


Figure 3.12-1: Environmental Justice Census Tracts

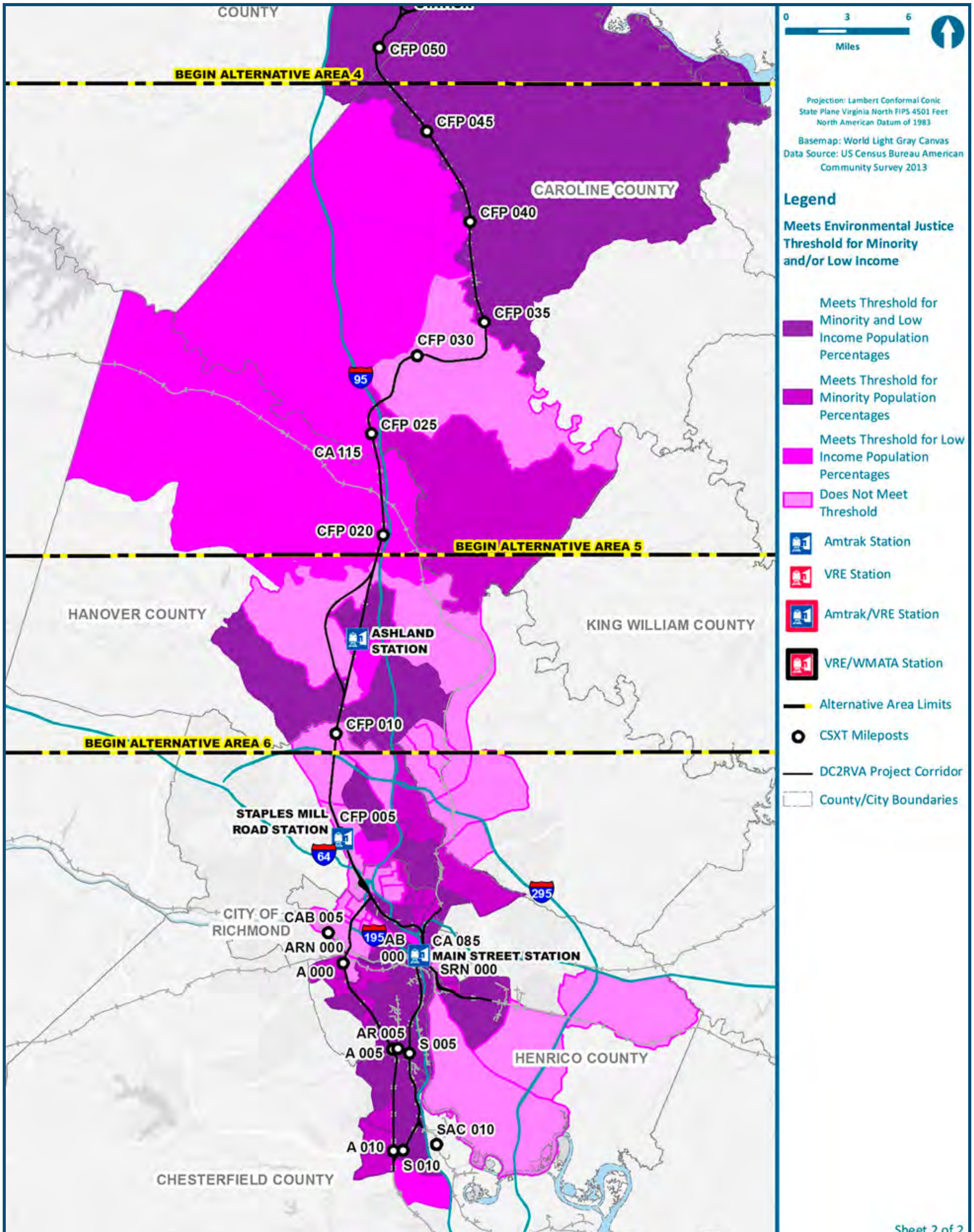


Figure 3.12-1: Environmental Justice Census Tracts

3.13 ARCHAEOLOGICAL AND ABOVEGROUND CULTURAL AND HISTORIC RESOURCES

The DC2RVA project depends on the requirements of Section 106 of the *National Historic Preservation Act of 1966* (NHPA), as amended (16 U.S.C. 306108), and implementing regulations (see 36 CFR Part 800), which require federal agencies to consider the effects of federally funded, licensed, or permitted actions on properties listed on or eligible for the National Register of Historic Places (NRHP). Section 106 also gives the Advisory Council on Historic Preservation (ACHP) an opportunity to comment on such actions. The cultural resource surveys were also done pursuant to Section 4(f) of the *Department of Transportation Act of 1966*, which provides additional protection for listed or eligible historic resources (see Chapter 5).

The following section identifies archaeological and aboveground resources located within the DC2RVA corridor and describes the methods used to identify them. See Appendix R for technical reports and mapping related to cultural resource studies and historic properties.

The NRHP is a list of the nation's cultural resources that are considered worthy of preservation. Listed and eligible resources must meet at least one of the four NRHP key criteria:

- Criterion A–Associated with events that have made a significant contribution to the broad patterns of our history; or
- Criterion B–Associated with the lives of persons significant in our past; or
- Criterion C–Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or
- Criterion D–Have yielded or may be likely to yield, information important in prehistory or history.

They must also retain their integrity of location, design, setting, materials, workmanship, feeling, and association.

Section 106 coordination for the Project was conducted with the Virginia Department of Historic Resources (DHR) and Section 106 consulting parties (Table 5.7-1 in Chapter 5). The National Park Service (NPS) was also consulted regarding Civil War battlefields.

Figure 3.13-1 identifies the location of the historic properties identified in the DC2RVA corridor.

3.13.1 Archaeological Resources

Per 36 CFR 800.4(b)(2), a phased approach was developed to determine the eligibility of archaeological sites within the Area of Potential Effects (APE) for the Project. The APE is the geographic area within which the seven aspects of integrity of a resource (i.e., location, design, setting, materials, workmanship, feeling, and association) and/or its use may be diminished as a result of the Project. The current APE extends 50 feet on either side of the proposed railroad centerline in areas where the proposed rail alignment is within the existing rail right-of-way, 100 feet for areas where construction is outside of the rail right-of-way, 50 feet beyond the limits of disturbance for new overpasses, and equal to the limits of disturbance for road modification areas. The limits of disturbance cover the extent of construction activities and associated earthwork. The DHR concurred with this APE in February 2015 (see Appendix R for DHR coordination documents and cultural resource reports).

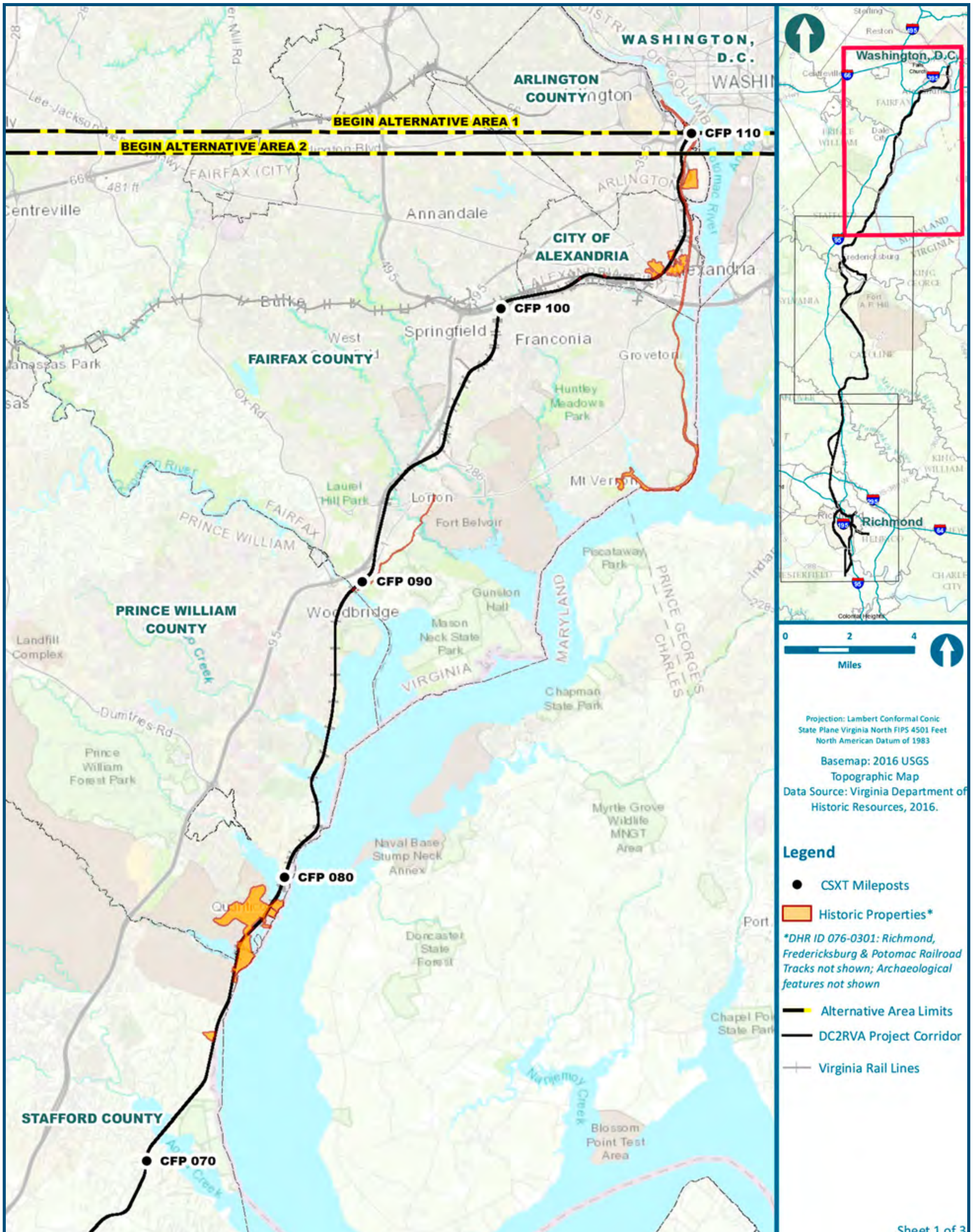


Figure 3.13-1: Cultural Resources

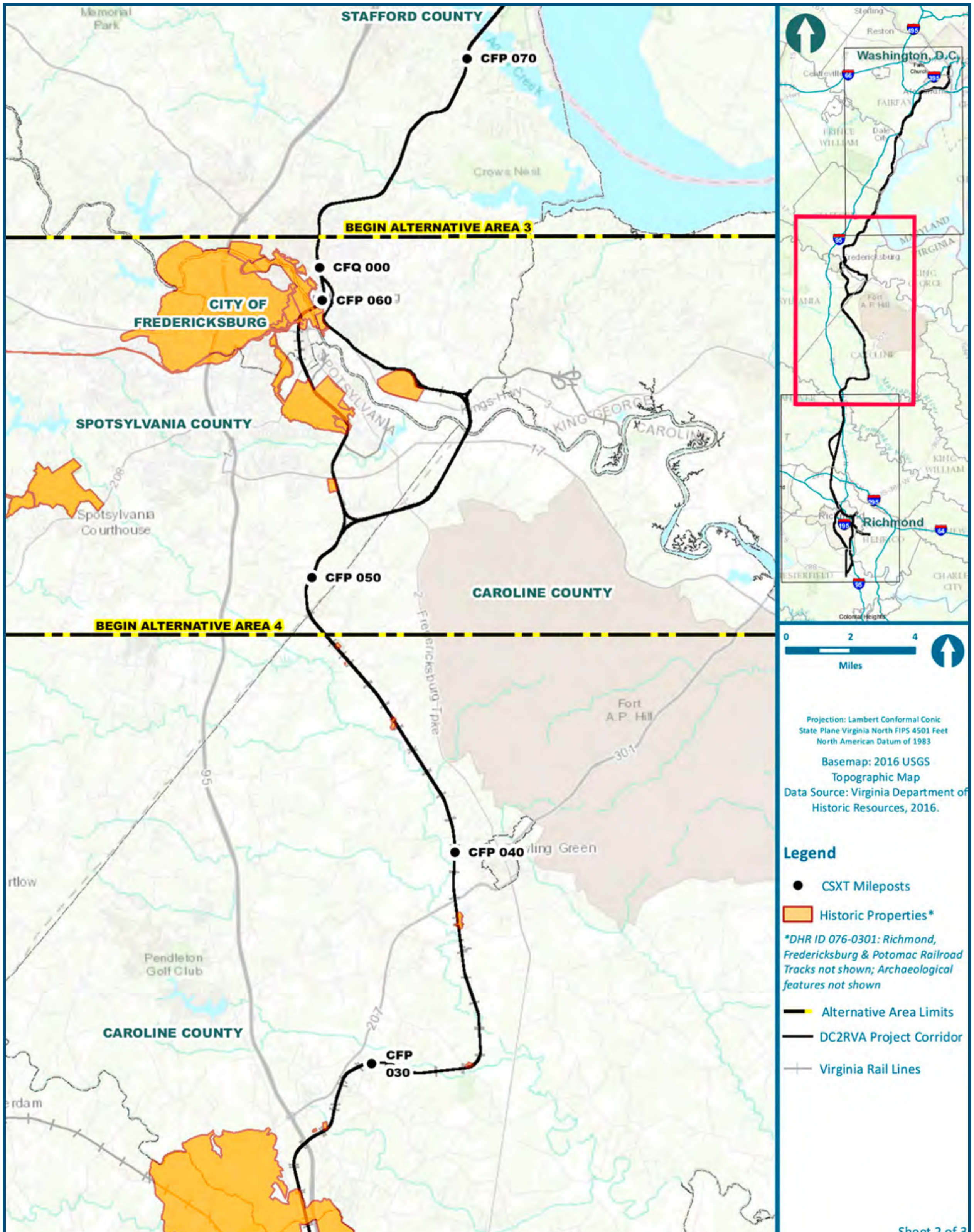


Figure 3.13-1: Cultural Resources

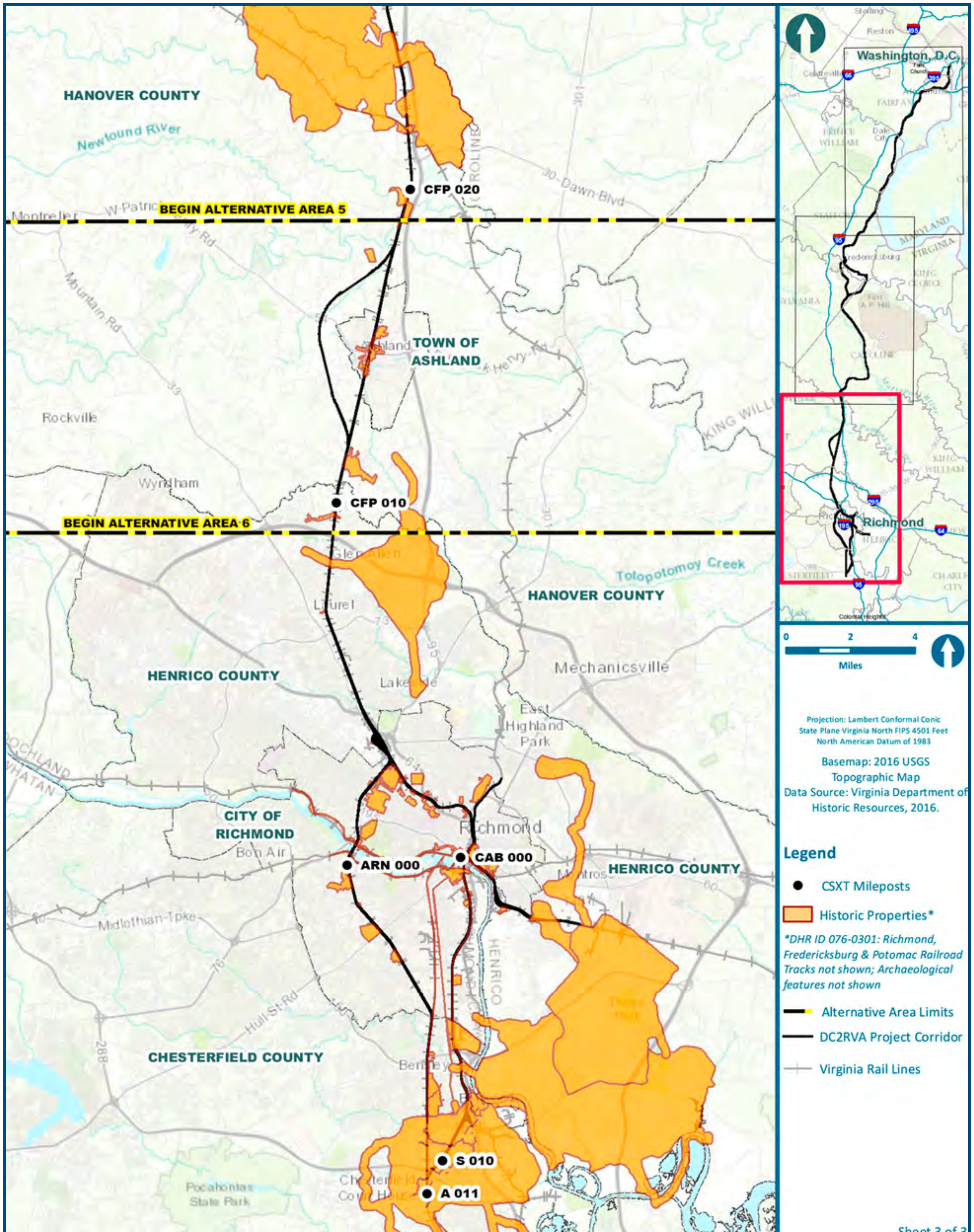


Figure 3.13-1: Cultural Resources

The DC2RVA corridor has been the subject of previous archaeological investigations. In 2010, McCormick Taylor conducted Phase I cultural resource investigations within a portion of the Northern Virginia area between Powells Creek and Arkendale (McCormick Taylor 2010a, 2010b). During this work, no intact archaeological sites were recorded within the APE, and the DHR concurred that no additional archaeological field work was warranted. One abandoned cemetery, a small family interment area that was not eligible for the NRHP, was noted and was avoided during construction. The architectural APE included five above-ground properties listed in or eligible for the NRHP: the Richmond, Fredericksburg, & Potomac (RF&P) Railroad (076-0301, later renumbered 500-0001 for the current survey), Quantico Marine Corps Base Historic District (297-0010), Richland (089-0019), Town of Quantico (287-5147), and Cockpit Point (076-0302). DHR concurred that the undertaking would have No Effect on Quantico Marine Corps Base Historic District (297-0010), Richland (089-0019), Town of Quantico (287-5147), and Cockpit Point (076-0302). It was further determined that the project would have No Adverse Effect on the RF&P Railroad.
In addition, the eastern and southern sections of the Richmond area (AM Junction to Centralia–S-Line) section of the DC2RVA corridor overlaps the Richmond to Raleigh section of the SEHSR. The DC2RVA corridor between Richmond and Raleigh has been the subject of several cultural resource investigations over the past decade. This includes the APE surrounding the rail corridor itself as well as the APE of all road modification areas associated with the rail line. Work was conducted between 2004 and 2012 by Mattson, Alexander and Associates, Inc.; Legacy Research Associates, Inc.; Louis Berger Group, Inc.; and Dovetail Cultural Resource Group (Dovetail). Per DHR guidance presented in November 2014 and March 2016, these sections were not the subject of additional archaeological field study, though the results are included in this analysis. Any sites determined to be eligible for or listed in the NRHP as part of this work, or any other previous surveys, are included in the current evaluation.

The archaeological field studies used one methodology along the main line corridor and associated alternatives and a separate methodology for the Fredericksburg and Ashland bypass alignments. The different methodologies were used for several reasons. The main line and the majority of the alternatives were the subject of a full Phase IB survey due to their relative limited geographic coverage and the ensuing scope of work required to complete the studies. In these instances, extant rail and road segments facilitated the survey. Moreover, the presence of these areas along extant lines suggested a higher potential for cultural resource impacts that required immediate evaluation, as avoidance would be challenging since options to shift off alignment from the existing rail are limited. Along the bypass alignments, the corridor traverses primarily open land with a much smaller degree of development. Exact placement of the rail components would be more fluid here due to the geographic setting. As such, historic properties had a much higher potential to be avoided during alternative design in these areas, rendering full knowledge of resources, especially below-ground sites, less of a fatal flaw during design. Due to these conditions and an evaluation on other preliminary environmental data on these two alternatives, the standard multi-alignment survey protocol was followed as established by the DRPT and VDOT wherein only preliminary data was gathered to avoid unneeded disturbances to subsurface resources and undue project delays. DHR concurred with both methodologies. The DHR concurred with this methodology in February 2016.

The archaeological studies along the main line of the Project included two phases of work: a Phase IA predictive model/reconnaissance study and a Phase IB identification survey. In 2015, DRPT examined the entire DC2RVA corridor through an archaeological background review and predictive model (Klein *et al.*, 2015), the purpose of which was to guide the Phase IB archaeological study. Previous studies throughout the region provided a basis for projection of relative probability of discovering terrestrial archaeological sites using standard Phase I survey techniques in the DC2RVA project corridor. Information gathered from a variety of sources allowed the characterization of the settings by a high, moderate, or low probability of discovering archaeological sites, as well as identifying areas where previous disturbance, development, previous archaeological survey, or soil attributes indicate that archaeological sites would not be discovered.

DRPT submitted the report to DHR for review on July 17, 2015, with a recommendation that all high and moderate probability areas and a 10 percent sample of the low probability areas should be the subject of systematic and judgmental shovel test pit and metal detector survey, where appropriate. In a letter dated August 28, 2015, DHR concurred with this approach. Feedback on the model was also received from several Project consulting parties, notably the City of Alexandria, Arlington County, Prince William County, and the City of Fredericksburg. Their comments were also incorporated into the ensuing Phase IB Project methodology.

The 2016 Phase IB survey of the main line corridor included a pedestrian survey of the entire APE and systematic shovel testing in 100 percent of the areas determined to have a high or moderate potential for archaeological sites and 10 percent of the areas determined to have a low potential for sites. (See *Klein et al., 2015* in Appendix R for a full discussion of model development and probability criteria). All previously recorded sites were revisited to determine eligibility and, as appropriate, assure that the characteristics that rendered them eligible for the NRHP remain. The results were coordinated with DHR, and they concurred with the mapping and proposed Phase IB approach in a letter dated August 28, 2015.

For the Fredericksburg and Ashland bypasses, the survey work included a Phase IA reconnaissance study. The work involved a pedestrian and vehicular study of the DC2RVA corridor to document current conditions and note areas that would require future survey. No subsurface investigations were completed during this work. Archaeological sites listed in this Draft EIS include previously recorded resources and those noted during the pedestrian study only.

Based on the archaeological studies completed on the Project to date, 15 archaeological sites in the Project APE are recorded as eligible for or listed on the NRHP. All of these sites are located in Area 3 (Fredericksburg) and Area 6 (Richmond) along the existing main line. Two sites (089-0016/44ST0084, Ferry Farm, and 111-0147, Fredericksburg & Spotsylvania National Military Park, are also within the APE of the Fredericksburg Bypass, both located near the intersection of the existing main line and the potential bypass alignment. There are no previously recorded sites only within the APE of the Fredericksburg Bypass or the Ashland Bypass alignments. Given the paucity of recorded sites within the bypass areas, all sites are described together in this section.

Table 3.13-1 summarizes the archaeological sites by location. Table 3.13-2 provides site descriptions and eligibility criteria. The information has been organized by area and then by site number within each area.

The Project corridor winds through several urban areas with dense development. Since development of the DC2RVA corridor in the early 1830s, the use of the parcels surrounding the tracks has been modified over the years. During the nineteenth and early-twentieth centuries, these lots were the sites of warehouses, industrial buildings, and rail-related structures. In the age of the automobile, especially in the mid-twentieth century, many of these buildings were destroyed to make way for parking lots and roads. The archaeological remains of these once-extant buildings exist under several of these paved surfaces. The APE for archaeological resources only includes the limits of disturbance. In urban areas, proposed improvements are limited to extending existing rail platforms, installation of new pier supports for superstructures, creation of stations where existing buildings or other extant development is located, or other minor modifications. As such, the archaeological APE along the entire corridor is narrow, resulting in relatively few archaeological resources that are listed as historic properties falling within the APE. This accounts for the general absence of archaeological historic properties in the APE in places such as Alexandria, Fredericksburg, and Ashland.

Table 3.13-1: Summary of Eligible Archaeological Sites

Alternative Area	NRHP Listed Sites	NRHP Eligible Sites	Total Sites
Area 1: Arlington (Long Bridge Approach)	0	0	0
Area 2: Northern Virginia	0	0	0
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3	2	5
Area 4: Central Virginia (Crossroads to Doswell)	0	0	0
Area 5: Ashland (Doswell to I-295)	0	0	0
Area 6: Richmond (I-295 to Centralia)	2	8	10

In Richmond, several sites have been recorded in the general vicinity of Main Street Station—what was the downtown core of the city for centuries. Four archaeological sites are located within the APE in this area: 44HE1092, 44HE1094, 44HE1097, and 44HE1098. All four sites were recorded based on the mapped projections of historic warehouses. Two significant sites in the general area—Lumpkins Jail (44HE1053) and Burial Ground for Negroes (44HE1089)—are located outside of the APE, well to the west of the Project footprint (Figure 3.13-2). The Project would not impact these two sites or any associated resources. As such, these two resources, and similarly placed sites in other urban areas, are not on the list of historic properties. Should the limits of disturbance be expanded, the list will be revisited.

Archaeological and Aboveground Resources

Table 3.13-2: Description of Eligible Archaeological Sites

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 3: Fredericksburg (main line and bypass)	089-0016/ 44ST0084	Ferry Farm	Stafford County	1738	This site is the location of George Washington's boyhood home. Archaeological excavations have uncovered the foundation of the dwelling, as well as numerous other features related to the Washington occupation, later family tenancy, and the Civil War.	Listed National Historic Landmark (NHL), NRHP. and Virginia Landmarks Registry (VLR) under Criteria A, B, and D
Area 3: Fredericksburg (main line only)	44SP0187	Bridge	Spotsylvania County	19th Century	Includes cut stone piers that are now located under the waters of the Rappahannock River. They may be associated with earlier railroad structures or nearby mills that are no longer extant.	Potentially Eligible under Criteria A and D
Area 3: Fredericksburg (main line only)	111-0145	Fredericksburg Gun Manufactory	City of Fredericksburg	ca. 1775	The Fredericksburg Gun Manufactory is an archaeological site that is at least 75 percent intact. The remains of the manufacturing facility are located beneath a paved asphalt parking lot for a public school.	Listed NRHP and VLR under Criteria A and D
Area 3: Fredericksburg (main line and bypass)	111-0147	Fredericksburg & Spotsylvania Co. Battlefields National Military Park & Cemetery, Lee Drive	City of Fredericksburg	1862	The resource is a Civil War battlefield park composed of earthworks, cannons, and informational markers in addition to 429 nonarchaeological cultural resources, 350 of which are considered contributing to its significance.	Listed NRHP and VLR under Criteria A and D
Area 3: Fredericksburg (main line only)	44SP0468-extension	Earthwork/ Jackson's Earthwork	Spotsylvania County	1861	This resource includes a set of earthworks within a larger archaeological site. The area is almost totally enclosed by lines of military shelter trenches constructed before or following the First Battle of Fredericksburg.	Eligible/Potentially Eligible under Criteria A, C and D
Area 6: Richmond	020-0007	Bellwood, Sheffields, Auburn Chase, Building 42, Defense Supply Center Richmond, 8000 Jefferson Davis Highway	Chesterfield County	1804	This resource is significant as a representative of an early-nineteenth century antebellum plantation that has evolved into a modern, twentieth century farm and dairying operation. The main house is an excellent example of vernacular interpretation of the Early Classical Revival style in the piedmont area constructed in an I-form. Numerous archaeological resources are located on the parcel.	Listed NRHP and VLR under Criteria A, C, and D

▶ *Continued.*

Table 3.13-2: Description of Eligible Archaeological Sites

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond	020-0063	Falling Creek Ironworks Archaeological Site	Chesterfield County	1619	The Falling Creek Ironworks archaeological site was originally recorded as the location of the Virginia Company Ironworks. Subsequent investigation suggests that it could also be Cary's Ironworks, destroyed in 1781 during the American Revolution.	Listed NRHP and VLR under Criterion D
Area 6: Richmond	020-5336	The Bellwood-Richmond Quartermaster Depot Historic District, United States Department of Defense Supply Center Historic District	Chesterfield County	post-1942	The district is a group of residential, industrial, and military buildings dating from the construction Sheffield/Bellwood Manor (020-0007), circa 1804, to development of the Korean Conflict-era buildings in 1952.	Eligible under Criteria A, B, C, D
Area 6: Richmond	127-6245/ 44CF0724	Williams Bridge Company, Emergency Fleet Corporation Factory, 700 East 4th Street	City of Richmond	1919	Built in 1919 to assist with World War I war efforts; also used by the United States government during World War II; eligible boundary contains main factory and apartment structures used to house workers during both world wars.	Eligible under Criteria A, C, and D
Area 6: Richmond	44CF0680	Fort Darling/Battlefield, Earthworks, Fort	Chesterfield County	1861-1865	The battlefield includes the area of fighting, as well as associated landscape features. The most notable feature is a series of earthworks, portions of which are still visible on the surface.	Eligible under Criteria A, C, and D
Area 6: Richmond	44HE1092	Warehouse	Henrico County	19th Century	Archaeological site of unknown date. Recorded based on map projections. Potential for intact remains below pavement is high. Railroad elevation structure is located in the parking lot. If the proposed rail is located on the structure, there will be no subsurface disturbances.	Potentially Eligible under Criteria A and D; under parking lot (Assuming Eligibility for this Project)
Area 6: Richmond	44HE1094	Warehouse	Henrico County	19th Century	Archaeological site of unknown date. Recorded based on map projections. Potential for intact remains below pavement is high. Railroad elevation structure is located in the parking lot. If the proposed rail is located on the structure, there will be no subsurface disturbances.	Potentially Eligible under Criteria A and D; under parking lot (Assuming Eligibility for this Project)

▶ *Continued.*

Table 3.13-2: Description of Eligible Archaeological Sites

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond	44HE1095	Storage facility	Henrico County	19th Century	Archaeological site of unknown date. Recorded based on map projections. Potential for intact remains below pavement is high. Railroad elevation structure is located in the parking lot. If the proposed rail is located on the structure, there will be no subsurface disturbances.	Potentially Eligible under Criteria A and D; under parking lot (Assuming Eligibility for this Project)
Area 6: Richmond	44HE1097	Railroad, Warehouse	Henrico County	19th Century	Archaeological site of unknown date. Recorded based on map projections. Potential for intact remains below pavement is high. Railroad elevation structure is located in the parking lot. If the proposed rail is located on the structure, there will be no subsurface disturbances.	Potentially Eligible under Criteria A and D; under parking lot (Assuming Eligibility for this Project)
Area 6: Richmond	44HE1098	Main Street Station Parking Lot/ Railroad	City of Richmond	19th Century	Archaeological site of unknown date. Recorded based on map projections. Potential for intact remains below pavement is high. Railroad elevation structure is located in the parking lot. If the proposed rail is located on the structure, there will be no subsurface disturbances.	Potentially Eligible under Criteria A and D; under parking lot (Assuming Eligibility for this Project)

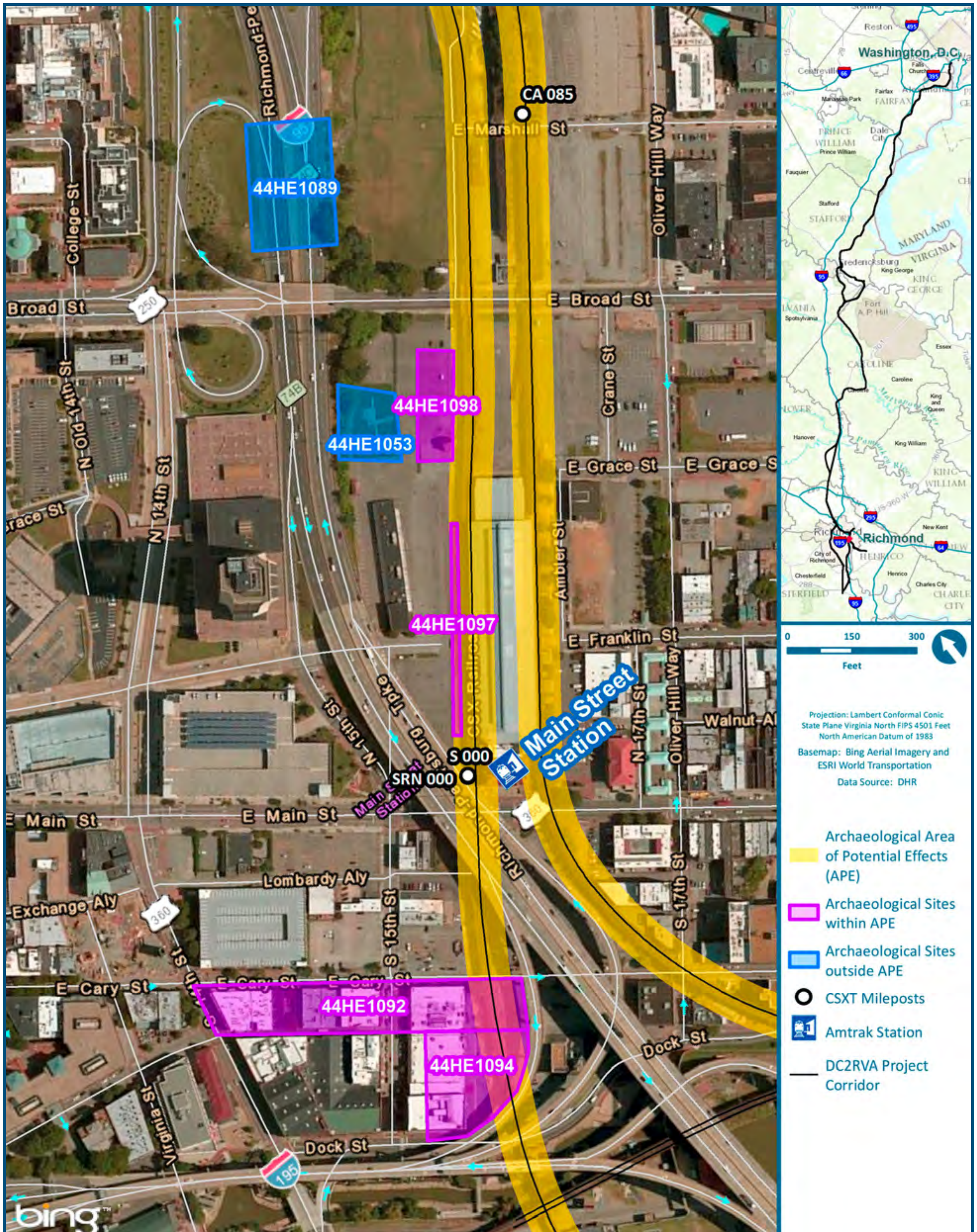


Figure 3.13-2: Archaeological Sites in the General Vicinity of Main Street Station

3.13.2 Aboveground Resources

As with the archaeological studies, a phased approach was used to identify and evaluate aboveground resources within the Project APE. The APE for potential historical resources in the study area extends 500 feet on either side of the DC2RVA corridor centerline in those areas where the proposed corridor would remain within existing rail right-of-way; however, in town or urban settings, the APE was reduced to one city block because dense modern development would often limit the effect of the proposed railroad on any historic resources. The APE was expanded to 1,000 feet in areas where any overpasses were recommended by DRPT and also expanded as needed in areas of new roadways to capture viewshed and any potential visual impacts (areas where alterations to a resource's setting and feeling could occur). This APE was approved by DHR in March 2015.

Architectural studies for the Project corridor incorporated the previous studies by McCormick Taylor in the Northern Virginia Area/Powells Creek to Arkendale section of Area 2 and by the Richmond to Raleigh High Speed Rail Project (R2R) team in the Richmond Area/AM Junction to Centralia–S-Line section of Area 6. Similar to archaeology, different methodologies were used on the main line corridor and the bypasses due to the limited footprint and flexibility of the main line alternatives versus the bypass areas. For the main line corridor and associated alternatives, a background literature and records review was completed by DRPT to identify all properties within the APE that were previously determined by DHR to be listed on or eligible for the NRHP. Investigators for DRPT then performed an identification-level field study on all previously recorded resources that had not received an eligibility determination and on any unrecorded resources in the Project APE greater than 48 years in age (the age limit was developed to correspond to the anticipated 2017 architectural study completion date). All properties that had been previously determined to be eligible for or are listed on the NRHP were also briefly revisited as part of this effort to assure that the resources retained the characteristics that rendered them eligible for the NRHP. The APE was visually inspected through a vehicular and pedestrian reconnaissance to identify buildings, objects, and districts. Once identified, each resource was preliminarily evaluated for architectural significance and historic and physical integrity and documented through photographs, written notes, and maps.

Any resource determined to be potentially eligible for the NRHP and/or require additional data to render an NRHP determination was then the subject of an intensive-level evaluation. This included archival research, in-depth fieldwork, and development of a statement of significance.

For the Fredericksburg and Ashland bypasses, a different methodology was used. The survey work included a Phase IA reconnaissance study per approval by DHR in March 2016. The work involved a background review to note resources that were previously recorded with DHR, a pedestrian and vehicular study of the DC2RVA corridor to visit the previously recorded resources to assure they were extant, and creation of a list of properties to be recorded at the identification level should this alternative be selected. No formal identification or evaluation studies were completed during this work.

3.13.2.1 Buildings, Districts, Structures, and Objects

Based on the architectural studies completed on the Project to date, 138 buildings, districts, structures, and objects eligible for or listed on the NRHP are in the APE as recorded (see Appendix R for DHR coordination documents and cultural resource reports). This number includes Civil War-related resources such as individually eligible earthworks and buildings/structures that are eligible for their Civil War association, but it does not include battlefields (see Section 13.3.2.2 for details on battlefields). Table 3.13-3 summarizes the 138 buildings, districts, structures, and objects by location. Table 3.13-4 provides resource descriptions and eligibility criteria. The information has been organized by area and then by resource number within each area.

Table 3.13-3: Summary of Buildings, Districts, Structures and Objects

Alternative Area	NRHP Listed Resources	NRHP Eligible Resources	Total Resources
Area 1: Arlington (Long Bridge Approach)	2	0	2
Area 2: Northern Virginia	6	8	14
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	4	11	15
Area 4: Central Virginia (Crossroads to Doswell)	0	18	18
Area 5: Ashland (Doswell to I-295)	2	17	19
Area 6: Richmond (I-295 to Centralia)	30	39	69
Located in all areas	0	1	1
Total	44	94	138

Note: One resource listed in the Central Virginia area also extends into the Ashland area.

Historic Structures in Doswell Historic District

Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 1: Arlington (Long Bridge Approach)	000-0045	Washington National Airport (Reagan National Airport)	Arlington County	1941	The primary/historic building is a four-story, multi-bay, airline passenger terminal constructed in the Moderne style. Property also includes six c 1941 airplane hangars and associated runways and other landscape elements.	Listed under Criteria A and C
Area 1: Arlington (Long Bridge Approach)	029-0218	Mount Vernon Memorial Highway (portion of George Washington Memorial Parkway)	Fairfax, Arlington	ca. 1929	Mount Vernon Memorial Highway is an 8.5-mile section of George Washington Memorial Parkway from Fairfax County to the southern boundary of Alexandria. The four-lane-wide highway was constructed with concrete slab construction and much of the concrete remains intact.	Listed under Criteria A and C
Area 2: Northern Virginia	100-0124	Alexandria Depot, 110 Callahan Drive	City of Alexandria	1905	The train depot, known as Alexandria Union Station at 110 Callahan Drive, is a one-and-one-half-story, multi-bay, passenger depot constructed in the Colonial Revival style.	Listed under Criteria A and C
Area 2: Northern Virginia	100-0128	George Washington National Masonic Memorial	City of Alexandria	ca. 1922	The resource at 101 Callahan Drive is a nine-story, multi-bay, memorial and museum sitting on a designed knoll constructed in the Classical Revival style.	Listed Criterion C and Criteria Consideration F
Area 2: Northern Virginia	100-0133	Parker-Gray Historic District/Uptown	City of Alexandria	ca. 1810	The district covers more than 45 blocks in the northwestern quadrant of Old Town Alexandria and abuts the Alexandria Historic District. It consists mainly of small row houses and townhomes built in the mid-to-late nineteenth century.	Listed under Criteria A and C
Area 2: Northern Virginia	100-0137	Rosemont Historic District	City of Alexandria	ca. 1900	The district is a planned, residential subdivision that is located northwest of Old Town Alexandria. It consists mainly of small, middle-class houses built between 1908 and 1940.	Listed under Criteria A and C
Area 2: Northern Virginia	100-0160	George Washington Junior High School, 1005 Mt. Vernon Avenue	City of Alexandria	1935	The resource is a three-story, multi-bay school building constructed in the Art Deco style originally in a rectangular form. The building is constructed of large, cut, grey sandstone and brick laid in an irregular bond.	Potentially Eligible under Criterion C

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Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 2: Northern Virginia	TBD	RF&P Bridge over Holmes Run in Cameron Run Park	City of Alexandria	1946	The resource is a single-span railroad bridge built with concrete abutments, wing walls, and curb. Although it is made of concrete, it is an arch form with a brick intrados, which is unique to the area.	Potentially Eligible under Criterion C
Area 2: Northern Virginia	029-0043	Colchester Arms, Fairfax Arms, 10712 Old Colchester Road	Fairfax County	ca. 1756	The building is a one-and-a-half story, four-bay tavern constructed with an irregular four-room plan. The timber-framed structural system rests on a continuous, raised-basement, stone foundation.	Listed under Criteria A and C
Area 2: Northern Virginia	029-0953	Old Colchester Road, Potomac Path, King's Highway	Fairfax County	ca. 1664	This two-lane asphalt road runs northeast from the Occoquan River for approximately 4 miles to the intersection with Route 1 in Lorton. Old Colchester Road played an important role in the county's early transportation history.	Eligible under Criterion A
Area 2: Northern Virginia	029-5741	Hannah P. Clark House/Enyedi House, 10605 Furnace Road	Fairfax County	ca. 1876	This resource is a two-story, three-bay dwelling built in a vernacular style. Additionally, in 1986 artist Janos Enyedi purchased the property and lived and worked there until his death in 2011.	Potentially Eligible under Criterion B and Criteria Consideration B and G
Area 2: Northern Virginia	089-0019	Richland/Richlands; 945 Widwater Road	Stafford County	ca. 1790	Richlands is a two-and-a-half-story frame dwelling with a side gable roof and a widows walk. It has an association with the Brent and Fitzhugh families. An RF&P section house is located on the property.	Eligible for the NRHP under Criteria B and C
Area 2: Northern Virginia	100-0277	Phoenix Mill, 3642 Wheeler Avenue	City of Alexandria	ca. 1776	The building is a two-story, three-bay, industrial building. It is purportedly the "sole remaining example of a mill structure in Alexandria."	Potentially Eligible under Criteria A and C
Area 2: Northern Virginia	287-0010	Marine Corps Base Quantico (Current), Quantico Marine Corps Base Historic District (NRHP Listing)	Prince William County	post-1918	The district includes more than 100 buildings and landscape features associated with this early military base, including many air-related structures. Pre-twentieth century resources also include archaeological sites and cemeteries.	Listed NRHP and VLR under Criteria A and C
Area 2: Northern Virginia	287-5147	Town of Quantico (Historic/Current), Town of Quantico Historic District (Current)	Prince William County	post-1918	Located west of the military base, the district includes numerous commercial and other social structures related to the development of the base and increase in area population. Many buildings are clustered around the railroad.	Eligible under Criterion A

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Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 2: Northern Virginia	TBD	RF&P Bridge over Occoquan River	Prince William County	1915	The resource is a through-truss, camelback railroad bridge constructed close to the middle of the height of this type of structure, 1870-1930. Although once common, few have survived.	Potentially Eligible under Criterion C
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	029-5876	Fredericksburg & Gordonsville Railroad Bed District (Virginia Central Railroad)	multiple	1853	The district is a 38-mile-long railroad corridor that extends west from the CSXT railroad (formerly the RF&P) in Fredericksburg to the town of Orange encompassing rail-related structures, sites, and landscape features. The 3.5-mile-long eastern section is eligible.	Eligible under Criterion A
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	088-0039	La Vue, 3232 LaVue Lane (Prospect View)	Spotsylvania County	ca. 1848	La Vue, also known as Prospect View, is a two-story, three-bay, single-family dwelling constructed in the Greek Revival style with an L-plan.	Listed under Criterion C
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	089-0014	Sherwood Forest (Historic)	Stafford County	1810	This resource includes a two-story, five-bay plantation home and surrounding outbuildings, including an intact duplex slave quarter. This quarter is one of only a handful of extant quarters in the county.	Eligible under Criterion C
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	089-0016/ 44ST0084	Ferry Farm	Stafford County	1738	This site is the location of George Washington's boyhood home. Archaeological excavations have uncovered the foundation of the dwelling, as well as numerous other features related to the Washington occupation, later family tenancy, and the Civil War.	Listed NHL, NRHP and VLR under Criteria A, B, and D
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	089-0045	RF&P Bridge over Potomac Creek at Leland Road	Stafford County	1872	The resource is comprised of two abutment remnants situated approximately 100 feet from the southern bank of Potomac Creek. The remains are notable for their distinct connection to Civil War activities in the area and their association with General Herman Haupt.	Potentially Eligible under Criteria A and B
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	089-0080	RF&P Bridge over Naomi Road	Stafford County	1931	The bridge is a double-vault arched structure rumored to be the oldest documented and identified reinforced concrete bridge in the Commonwealth.	Potentially Eligible under Criterion C

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Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	111-0009	Fredericksburg Historic District Extension	City of Fredericksburg	post 1775	The district extension is a large area that includes a wide variety of resources immediately surrounding the city's downtown core, including residences, commercial buildings, and churches dating to the nineteenth and twentieth centuries.	Potentially Eligible under Criteria A and C
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	111-0009-0795	Pulliam's Service Station, 411 Lafayette Boulevard	City of Fredericksburg	ca. 1935	This resource is a one-story filling station constructed in the Spanish Revival style. It still retains its original materials and configuration.	Potentially Eligible under Criterion C
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	111-0132	Fredericksburg Historic District	City of Fredericksburg	post 1727	The district is a 200-acre area that comprises the city's downtown commercial area, adjacent industrial area, and some of the surrounding residential blocks. This part of Fredericksburg boasts a wide variety of infrastructure that ranges in date from the early eighteenth century through the late twentieth century.	Listed under Criterion C
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	111-0132-0020	Purina Tower	City of Fredericksburg	1916	The resource is a one-and-one-half story commercial building with a tall grain elevator at the northwest corner. The tower has become an important landscape landmark within the community.	Potentially Eligible under Criteria A and C
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	111-0132-0025	Rappahannock River Railroad Bridge	City of Fredericksburg	1927	This multiple-span, open-spandrel, concrete-arch bridge is an excellent and rare surviving example of a reinforced-concrete arch railroad bridge within this region of Virginia. It was erected when the station and tracks were elevated for automobile traffic pass through in downtown Fredericksburg.	Potentially Eligible under Criterion C
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	111-0132-0522	House, 314–316 Frederick Street	City of Fredericksburg	1851	This is a two-story, four-bay vernacular brick duplex. Oral history states that the building was used as a slave jail in the antebellum period.	Potentially Eligible under Criteria A and C
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	111-0132-0704	Fredericksburg Train Station, 200 Lafayette Boulevard	City of Fredericksburg	1910	The depot is a two-story, five-bay building constructed in the Neoclassical style designed by notable local architect Peck Heflin. The adjacent rail tracks were raised in 1927.	Potentially Eligible under Criteria A and C

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Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	111-0147	Fredericksburg & Spotsylvania Co. Battlefields National Military Park & Cemetery, Lee Drive	City of Fredericksburg	1862	The resource is a Civil War battlefield park composed of earthworks, cannons, and informational markers in addition to 429 nonarchaeological cultural resources, 350 of which are considered contributing to its significance.	Listed under Criteria A and D
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	44SP0468 - extension	Earthwork/ Jackson's Earthwork	Spotsylvania County	1861	This resource includes a set of earthworks within a larger archaeological site. The area is almost totally enclosed by lines of military shelter trenches constructed before or following the First Battle of Fredericksburg.	Eligible/Potentially Eligible under Criteria A, C, and D
Area 4: Central Virginia (Crossroads to Doswell)	016-0092	Fairfield Plantation Office, Jackson Shrine, 12019 Stonewall Jackson Road	Caroline County	ca. 1820	The resource is a one-and-a-half-story frame building; it once served as the office for the 740-acre Fairfield Plantation and is the only surviving building. On May 2, 1863, Confederate General Thomas Jonathan "Stonewall" Jackson died at the site after being wounded at the Battle of Chancellorsville.	Potentially Eligible under Criteria A, B, and C
Area 4: Central Virginia (Crossroads to Doswell)	016-0208	House, 12096 Guinea Drive	Caroline County	ca. 1900	The resource is a one-and-a-half-story vernacular dwelling with Queen Anne and Craftsman elements. The house was built from a kit purchased from the Sears & Roebuck Company.	Potentially Eligible under Criterion C
Area 4: Central Virginia (Crossroads to Doswell)	016-0220	Carolina Mansion, 11146 Woodford Road	Caroline County	ca. 1900	The ornate, two-and-a-half-story, wood-framed dwelling was designed in the Queen Anne style with Classical detailing. The building represents housing constructed in the area in the early-twentieth century, when the RF&P and new manufacturing enterprises brought economic prosperity to the local region.	Potentially Eligible under Criterion C
Area 4: Central Virginia (Crossroads to Doswell)	016-0222	Woodford Freight & Passenger Depot, Woodford Road	Caroline County	ca. 1900	The resource is a long, rectangular, one-story, framed building constructed circa 1900. The building served a combined function as a freight depot and a passenger depot and was one of five original stops along the RF&P in Caroline County.	Potentially Eligible under Criterion C
Area 4: Central Virginia (Crossroads to Doswell)	016-0223	Woodford Excelsior Company Office, Lake Farm Road	Caroline County	ca. 1896	This small frame office building is located immediately adjacent to the railroad and is associated with the Woodford Excelsior Company, Caroline County's first excelsior manufacturer. It was the focal point of the operation.	Potentially Eligible under Criterion A

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Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 4: Central Virginia (Crossroads to Doswell)	016-0224	Glenwood House, 11102 Woodford Road	Caroline County	ca. 1925	The resource is a two-story, Colonial Revival dwelling. The multi-colored brick building is embellished with brick quoining, fluted columns, and a patio with molded concrete balustrade.	Potentially Eligible under Criterion C
Area 4: Central Virginia (Crossroads to Doswell)	016-0270	Milford State Bank, 15461 Antioch Road	Caroline County	ca. 1910	The bank is a two-story brick building constructed in the Classical Revival style. The building's façade is divided into five distinct bays via brick pilasters. It is the only Classical Revival building, as well as the only bank, in the village of Milford.	Potentially Eligible under Criterion C
Area 4: Central Virginia (Crossroads to Doswell)	016-0286	Coleman's Store, 22275 Penola Road; Penola, 16095 Polecat Lane	Caroline County	ca. 1900	The resource is a two-story, wood-framed commercial building. It is the only surviving commercial building in the largely abandoned village of Penola and is representative of the small country stores once found in crossroads communities and railroad stops throughout the area.	Potentially Eligible under Criterion C
Area 4: Central Virginia (Crossroads to Doswell)	016-5129	Woodford Historic District	Caroline County	ca. 1890–1969	The district is a partially abandoned community in rural Caroline County. The village is centered along the RF&P and was one of five original stations in Caroline County. Resources span the heyday of the rail use.	Potentially Eligible under Criteria A and C
Area 4: Central Virginia (Crossroads to Doswell)	016-5136	Milford Historic District	Caroline County	ca. 1880–1960	The district was originally established in the late-eighteenth century as a tobacco trading center. In 1836, the RF&P Railroad was constructed through the area, and Milford soon became the largest of the small communities in the county situated along the railroad.	Potentially Eligible under Criteria A and C
Area 4: Central Virginia (Crossroads to Doswell)	016-5165	Excelsior Industry of Caroline County MPD	Caroline County	ca. 1896– ca. 1950	This is a thematic collection of resources constructed between circa 1896 and circa 1950 that are associated with the manufacture of excelsior, Caroline County's largest industry in the early-twentieth century.	Potentially Eligible under Criteria A and C
Area 4: Central Virginia (Crossroads to Doswell)	042-0093	Doswell Depot and Tower, 10577 Doswell Road	Hanover County	ca. 1928	The current depot is a well-balanced design with classical-styled architectural features. The nearby, contemporaneous "HN tower" housed electrical systems managing an interlocking device permitting safe crossing of trains over both railroads.	Potentially Eligible under Criterion C

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Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 4: Central Virginia (Crossroads to Doswell)	042-0469	Tri-County Bank, Doswell branch (part of Squashapenny Antiques), 10561 Doswell Road	Hanover County	ca. 1920	This building is the only example of an early-twentieth-century, brick commercial building in the community of Doswell and is said to have walls three-wythes thick.	Potentially Eligible under Criterion C
Area 4: Central Virginia (Crossroads to Doswell)	042-0470	House/Squashapenny Store, 10570 Doswell Road	Hanover County	ca. 1898	The Squashapenny Junction Store is a two-and-a-half-story, three-bay, vernacular commercial building. Located adjacent to the tracks, the store was a commercial hub for the Doswell community.	Potentially Eligible under Criteria B and C
Area 4: Central Virginia (Crossroads to Doswell)	042-0836	Earthworks, Little River	Hanover County	1862	The earthworks were constructed by Confederate troops to help protect the RF&P corridor during the Civil War. The features are in good condition, as they are located in a wooded area.	Eligible under Criteria A and C
Area 4: Central Virginia (Crossroads to Doswell)	042-5448	Doswell Historic District	Hanover County	ca. 1840–1950	Doswell Historic District encompasses a rural community that was once a center of major activity along road and rail networks. Nearly a dozen historic properties are located within the district's boundaries.	Potentially Eligible under Criteria A and C
Area 4: Central Virginia (Crossroads to Doswell)	TBD	RF&P Bridge over Little River	Hanover County	1923	The resource is a four-span railroad bridge built on three concrete piers with concrete abutments. It is unique for the area due to the extensive length of the superstructure for a bridge of that era.	Potentially Eligible under Criterion C
Area 4: Central Virginia (Crossroads to Doswell)	042-5307	Taylorsville Road Historic District	Hanover County	ca. 1900–1935	The community was settled in the early–nineteenth century and has remained active to present day. Most built features are residential and agricultural in nature within the district and reflect architectural styles and construction methods from the late-nineteenth to mid-twentieth century.	Potentially Eligible under Criteria A and C
Area 5: Ashland (Doswell to I-295)	042-0392	Montevideo	Hanover County	1790	The resource is a two-story Federal-style dwelling with notable flemish bond brickwork. It is notable for its architectural merit and its association with the local development of area agricultural economy.	Eligible under Criteria A and C
Area 5: Ashland (Doswell to I-295)	042-0557	Dry Bridge, 10411 Old Bridge Road	Hanover County	ca. 1850	Said to have been used as a residence and store by members of the Baker family, the home is a two-story, three-bay, I-house with excellent historical integrity.	Potentially Eligible under Criteria A and C

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Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 5: Ashland (Doswell to I-295)	042-5048	Elmont Historic District	Hanover County	ca. 1870–1950	The district contains a mix of residential, commercial, agricultural, and religious properties dating from the late-nineteenth century to the mid-twentieth century. Architectural styles include Folk Victorian, Free Classic, Colonial Revival, and commercial vernacular buildings.	Potentially Eligible under Criterion C
Area 5: Ashland (Doswell to I-295)	043-0693	Mill Road Historic District	Henrico County	ca. 1870–1950	This historic district spans a portion of Mill Road, between Old Washington Highway in the east and Meadow Drive to the west. This area of Mill Road is lined with 28 vernacular buildings constructed during the late-nineteenth to the early-twentieth century.	Potentially Eligible under Criterion C
Area 5: Ashland (Doswell to I-295)	043-0694	Hunton Treasures, 11701 Greenwood Road	Henrico County	ca. 1930	This resource is a two-story, three-bay commercial building constructed with attributes from the Spanish Revival/Eclectic style. It is an outstanding example of the style.	Potentially Eligible under Criterion C
Area 5: Ashland (Doswell to I-295)	043-5646	House, 11501 Old Washington Highway	Henrico County	ca. 1937	This home is a one-and-one-half-story, Craftsman-style, single-family dwelling. It was built for the General Station Master for Hunton Station and has notable architectural characteristics.	Potentially Eligible under Criterion C
Area 5: Ashland (Doswell to I-295)	166-0001	Ashland Historic District	Hanover County	1850-1950	The Ashland Historic District, with its large collection of late-Victorian and Edwardian frame dwellings and its brick commercial core, all set among hundreds of trees, survives as a fine example of a railroad and streetcar suburb, preserving much of its turn-of-the-century character.	Listed under Criteria A and C
Area 5: Ashland (Doswell to I-295)	166-0001-0008	Ashland Station Depot, 112 N. Railroad Avenue	Hanover County	1910	The one-story, five-bay, brick depot is said to have been designed by W. P. Lee to replace a previous circa-1890 station that had burned. The building appears little altered and is a good example of a Colonial Revival-styled depot.	Potentially Eligible under Criteria A and C
Area 5: Ashland (Doswell to I-295)	166-0001-0015	Business Office, Randolph-Macon, 310 N. Center Street	Hanover County	ca. 1895	Historically known as the Blackwell House, it is an elaborate and outstanding example of Queen Anne-styled architecture with Eastlake elements in this historic community.	Potentially Eligible under Criterion C

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Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 5: Ashland (Doswell to I-295)	166-0001-0055	House, 702 S. Center Street	Hanover County	ca. 1850	Historically known as the Emily Gray House, this one-and-a-half-story, three-bay resource is an outstanding example of Second Empire-styled architecture.	Potentially Eligible under Criterion C
Area 5: Ashland (Doswell to I-295)	166-0001-0060	House, 708 S. Center Street	Hanover County	ca. 1894	Historically known as the Fleming Fox House, this two-and-a-half-story, four-bay dwelling is an outstanding example of a Colonial Revival-styled dwelling with Free Classic elements.	Potentially Eligible under Criterion C
Area 5: Ashland (Doswell to I-295)	166-0001-0077	House, 1005 S. Center Street	Hanover County	ca. 1890	This two-and-a-half-story, four-bay, Folk Victorian dwelling possesses characteristics of Queen Anne while its form and orientation suggest an earlier construction date.	Potentially Eligible under Criterion C
Area 5: Ashland (Doswell to I-295)	166-0002	Randolph-Macon College Historic District	Hanover County	1872–1950	The district includes the 85-acre college campus and all associated buildings, structures, and landscape features. This is the oldest Methodist-related college in the United States still in operation.	Listed VLR and NRHP under Criteria A and C
Area 5: Ashland (Doswell to I-295)	166-0036	MacMurdo House, 713 S. Center Street	Hanover County	ca. 1858	This two-story, three-bay, Greek Revival, single-family dwelling is one of the few buildings of its style in Ashland, and it has excellent historic integrity.	Potentially Eligible under Criterion C
Area 5: Ashland (Doswell to I-295)	166-0037	Hugo House, 11208 Gwathmey Church Road	Hanover County	ca. 1886	This two-story, three-bay, Queen-Anne, frame dwelling is an elaborate and outstanding example of Queen Anne-styled architecture in the community.	Potentially Eligible under Criterion C
Area 5: Ashland (Doswell to I-295)	166-5041	Priddy House, 107 Stebbins Street	Hanover County	ca. 1926	This one-and-a-half-story, four-bay, single-family dwelling is an outstanding example of Craftsman-styled domestic architecture in this community.	Potentially Eligible under Criterion C
Area 5: Ashland (Doswell to I-295)	166-5072	Randolph-Macon College Historic District Expansion	Hanover County	ca. 1900–1960	The Randolph-Macon College Historic District Expansion highlights a significant part of campus that developed between the early-twentieth century up to the mid-1960s when a substantial building boom occurred.	Potentially Eligible under Criteria A and C
Area 5: Ashland (Doswell to I-295)	166-5073	Berkleytown Historic District	Hanover County	ca. 1900–1965	The district is typical of many small-town, twentieth-century, African-American neighborhoods in that it was relatively isolated from the formal downtown core and is dotted by small vernacular dwellings.	Potentially Eligible under Criteria A and C

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Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 5: Ashland (Doswell to I-295)	166-5073-0010	House, Dabney Funeral Home, 600 B Street	Hanover County	1955	The funeral home is a one-story, masonry structure. Its design builds upon that of a vernacular single-family dwelling and has grown over time to serve the various needs of a small, African-American, family-owned, funeral home.	Potentially Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	020-0007	Bellwood, Sheffields, Auburn Chase, Building 42, Defense Supply Center Richmond, 8000 Jefferson Davis Highway	Chesterfield County	1804	This resource is significant as a representative of an early-nineteenth century antebellum plantation that has evolved into a modern, twentieth-century farm and dairying operation. The main house is an excellent example of vernacular interpretation of the Early Classical Revival style in the piedmont area constructed in an I-form. Numerous archaeological resources are located on the parcel.	Listed NRHP and VLR under Criteria A, C, and D
Area 6: Richmond (I-295 to Centralia)	020-0013	House, 3619 Thurston Road	Chesterfield County	1913	This resource is a one-and-a-half-story Colonial Revival dwelling with a gambrel roof and flared eaves. It retains a high degree of architectural integrity.	Eligible under Criterion C
Area 6: Richmond (I-295 to Centralia)	020-0022/ 44CF0680	Centralia Earthworks	Chesterfield County	1861	The earthworks were developed by Confederate troops as part of the Outer Line of defenses for Drewry's Bluff. Although some sections of the earthworks have been destroyed, the extant areas remain in excellent condition, and the remaining elements of the artillery battery, trenches, and gun emplacements are representative of earthworks developed in this area during the Civil War.	Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	020-0140	Circle Oaks, 4510 Centralia Road	Chesterfield County	1840	This resource is a two-story, wood-frame single-family dwelling featuring a two-story, wrap-around veranda. Property includes a small tenant house (perhaps servant's quarters) and a kitchen. Circle Oaks is the oldest and largest building in the community.	Eligible under Criterion C
Area 6: Richmond (I-295 to Centralia)	020-0552	Centralia Post Office	Chesterfield County	1905	The one-story building was the center of the community of Centralia. It was constructed to face east onto the rail tracks to accommodate rail travelers through this area during the economic boom of the pre-World War I days.	Eligible under Criterion A

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Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond (I-295 to Centralia)	020-5336	The Bellwood-Richmond Quartermaster Depot Historic District, United States Department of Defense Supply Center Historic District	Chesterfield County	post-1942	The district is a group of residential, industrial, and military buildings dating from construction of the Sheffield/Bellwood Manor (020-0007), circa 1804, to the development of the Korean Conflict-era buildings in 1952.	Eligible under Criteria A, B, C, and D
Area 6: Richmond (I-295 to Centralia)	020-5351	Richmond & Petersburg Electric Railway	Chesterfield County	1902	This resource contains the alignment of the regional trolley system. Creation of this line was the direct impetus for large-scale modifications to settlement patterns in central Virginia.	Eligible under Criterion A
Area 6: Richmond (I-295 to Centralia)	020-5378	VEPCo Power Transmission Line	Chesterfield County	ca. 1910	The VEPCo Line was built sometime between 1910 and 1930, likely between 1925 and 1927, providing high-voltage electric power service to the people in the area. It is approximately 1 mile long, and it is the only remaining portion of the line that once extended from Richmond to Petersburg.	Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	020-5474	DuPont Spruance	Chesterfield County	1929	The first of several buildings on the DuPont Spruance Plant was constructed under the ownership of DuPont Rayon Co. This large factory has played a significant role in the development of textiles and plastics in the United States.	Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	043-0292	Laurel Industrial School Historic District, Hungary Road	Henrico County	1892	The district consists of a complex of buildings that were part of a school founded under the patronage of the Prison Association of Virginia, a group of private citizens who sought to reform the state's penal system, by establishing a self-supporting model industrial reformatory for boys.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	043-0292-0001	Main Building/Robert Stiles Building/Bluford Office Building, 2900 Hungary Road	Henrico County	1895	This resource is a two-story, seven-bay, main school building constructed in the Romanesque Revival style. The resource, now used as an office building, acted as the main dormitory, chapel, school, and dining hall for the incarcerated boys during the school's tenure.	Potentially Eligible under Criteria A and C

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Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond (I-295 to Centralia)	043-0439	Aviation General Supply Depot, 508 Bickerstaff Road	Henrico County	1917	The large U-shaped warehouse at the equipment depot, the focal point of the complex, was constructed as an aviation general supply depot for the Aviation Section of the United States Army's Signal Corps.	Eligible under Criterion A
Area 6: Richmond (I-295 to Centralia)	043-0690	Lewis-McLeod House, 2945 Mountain Road	Henrico County	ca. 1921	The dwelling is a two-story, three-bay, Colonial Revival-style single-family home. The building is an outstanding example of the Colonial Revival style and retains integrity of materials and design.	Potentially Eligible under Criterion C
Area 6: Richmond (I-295 to Centralia)	043-5313	James River Steam Brewery Cellars, 4920 Old Main Street	Henrico County	1866	Resource includes vaulted tunnels with a granite block façade pierced by round-arched openings. They were constructed as the below-grade storage and fermentation space for the five-story brick James River Steam Brewery building above (no longer extant).	Listed on the NRHP and VLR under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	043-5636	Integrated Power Sources of VA, 2260 Dabney Road	Henrico County	ca. 1940	This resource is a two-story, two-bay, commercial building moved to its current location during the 1930s when Fort A.P. Hill was established. It is purportedly the only surviving building moved at this time.	Potentially Eligible under Criterion A
Area 6: Richmond (I-295 to Centralia)	043-5657	Darling Smokestack, Old Washington Highway	Henrico County	ca. 1910	The resource is formed of brick, features a corbeled cap, and 'Darling' is marked in painted white bricks, most likely referring to a business name. It is one of only three smokestacks to be individually recorded in Virginia.	Potentially Eligible under Criterion C
Area 6: Richmond (I-295 to Centralia)	127-0119	John Woodward House, 3017 Williamsburg Avenue	City of Richmond	pre-1782	This resource is a two-and-a-half-story, single-family dwelling with an older one-story core. It is one of the city's oldest surviving buildings.	Listed on the NRHP and VLR under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-0171	James River and Kanawha Canal Historic District	City of Richmond	1795	Circa 1785, the canal improved navigation on the James River from Richmond to Botetourt County, a distance of approximately 200 miles; District comprises the canal and canal towpath.	NRHP Listing, VLR Listing Criteria A and C

▶ *Continued.*

Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond (I-295 to Centralia)	127-0172	Main Street Station and Trainshed, New Union Station, Seaboard Airline & Chesapeake & Ohio Railroad Depot	City of Richmond	1901	This multi-story, multi-bay monumental structure symbolizes the importance of the rail terminal as an entrance gateway to Richmond; example of the influence of the French Ecole des Beaux Arts on American building.	Listed NHL, NRHP and VLR under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-0192	St. John's Church Historic District	City of Richmond	18th Century to 1940	Located northeast of the city core, the district is made up of mostly residences and is said to contain the some of the oldest extant buildings in Richmond.	Listed under Criterion C
Area 6: Richmond (I-295 to Centralia)	127-0192-0322	Libby Hill Park and Park House, 2801 East Franklin Street	City of Richmond	ca. 1873	The park is made up of grassy areas, monuments, fountains, walkways, and benches and includes a one-story, Queen Anne building originally constructed as the Libby Hill Park keeper's house.	Potentially Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-0197	Philip Morris Leaf Storage Warehouse, 1717-1721 East Cary Street	City of Richmond	1914	Built as a warehouse in the early-twentieth century, this building stands as an excellent example of the sparingly ornamented yet functionally designed commercial structure of the turn-of-the-century that served as the forerunner and inspiration for the International style.	Potentially Eligible under Criterion C
Area 6: Richmond (I-295 to Centralia)	127-0219	Shockoe Slip Historic District and Expansions	City of Richmond	1780	Circa late-nineteenth and early-twentieth century, erected as wholesale food or tobacco warehouses, with some serving light industry; buildings generally are modified Italianate in style.	Listed NRHP and VLR under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-0226	Science Museum of Virginia, 2500 Broad Street West	City of Richmond	1919	This building is a 3-story, 11-bay, monumental Neoclassical style train station that now houses the Science Museum of Virginia. This resource was designed by architect John Russell Pope and is constructed of dressed ashlar with a large, central, copper dome.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-0257	Bridge #8067	City of Richmond	1938	This is a three-span, concrete, vehicular bridge that is unique as a pre-1950 continuous beam structure and for the classical style balustrade.	Potentially Eligible under Criterion C

▶ *Continued.*

Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond (I-295 to Centralia)	127-0282	Henrico County Courthouse, 2127 Main Street East	City of Richmond	1896	The courthouse is a three-story, three-bay, Romanesque Revival-style civic building. It is a good example of Romanesque Revival civic architecture in the city and is an important site in the history of Henrico County.	Potentially Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-0343	Chestnut Hill/ Plateau Historic District	City of Richmond	1889–1950	This district is one of Richmond's early streetcar suburbs that features 659 contributing resources composed mainly of single-family, frame dwellings constructed in the Queen Anne, Craftsman, Colonial Revival, and Gothic Revival styles.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-0344	Shockoe Valley & Tobacco Row Historic District	City of Richmond	post 1737	This district encompasses the area of Richmond's earliest residential, commercial, and manufacturing activity; architectural styles ranging from Federal through twentieth-century industrial vernacular.	Listed NRHP and VLR under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-0344-0123	Railroad Y.M.C.A., 1552 East Main Street	City of Richmond	1907	The resource is a three-story, three-bay, rectangular, French Renaissance Revival-style commercial building. It is in good condition and was originally designed by Wilson, Harris, and Richards to provide recreational space for railroad workers and their families in the area.	Potentially Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-0353	Richmond Nursing Home, 210 Hospital Street	City of Richmond	1860	This resource is a three-story, multi-bay, institutional building in the Italianate style. It was built by the City of Richmond as an almshouse for the poor and represents the social reform movements that were prevalent throughout Antebellum America.	Listed under Criterion C
Area 6: Richmond (I-295 to Centralia)	127-0354	Virginia Union University Historic District, 1500 North Lombardy Street	City of Richmond	1899	The district consists of 11 acres of the Virginia Union University campus that contain the original collegiate buildings built in a simplified Richardsonian Romanesque style. The university was originally established to educate newly emancipated freedman following the Civil War.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-0414	Governor's School, 1000 North Lombardy Street	City of Richmond	1938	The building is a three-story, multi-bay, school built in the Art Deco style. The school was designed by prominent Richmond architects Carneal, Johnson, & Wright as the first vocational high school in Richmond for African-Americans.	Listed under Criteria A and C

► *Continued.*

Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond (I-295 to Centralia)	127-0428	George W. Carver Elementary School, 1110 West Leigh Street	City of Richmond	1887	The resource is a two-and-a-half-story, five-bay school built in the Italianate style. The school was purpose-built as a public school for African-American students and saw a notable increase in use in the early-twentieth century.	Eligible under Criterion C
Area 6: Richmond (I-295 to Centralia)	127-0457	Manchester Warehouse Historic District	City of Richmond	1880–1960	The district comprises 42 blocks of industrial development associated with the growth and development of the community of Manchester, an area south of the James River that was once a separate town but later incorporated within the city of Richmond.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-0742	West of Boulevard Historic District	City of Richmond	ca. 1895	This district is composed of residences, churches, schools, and commercial buildings that range in date from around 1895 to 1943. It is an excellent example of a streetcar suburb.	Listed under Criteria A and C.
Area 6: Richmond (I-295 to Centralia)	127-0822	Carver Residential Historic District	City of Richmond	pre-1958	This district is a working class neighborhood adjacent to Jackson Ward (127-0237), featuring 320 contributing resources composed of mainly single-family, frame dwellings constructed during the late-nineteenth and early-twentieth centuries in a vernacular form with Greek Revival, Italianate, and Queen Anne elements.	Listed under Criterion C
Area 6: Richmond (I-295 to Centralia)	127-0854	Bridge #1850, E. Main Street, spanning Southern Railway	City of Richmond	ca. 1913	This is a two-span, concrete, vehicular structure and is an early Virginia example of the use of reinforced concrete technology for bridges.	Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-5679	Barton Heights Cemetery, 1600 Lamb Avenue	City of Richmond	1814	This area is a 12-acre parcel that contains six contiguous, but originally separate, cemeteries laid out in a grid pattern with hundreds of markers of differing materials, sizes, and styles. The cemeteries are significant because they represent early efforts by the African-American population in Richmond to establish their own cemeteries.	Listed under Criteria A and B and Criteria Consideration D

▶ *Continued.*

Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond (I-295 to Centralia)	127-5808	Bridge #1857, South 14th Street; Mayo Bridge South	City of Richmond	1911	The Mayo Bridge is a closed spandrel reinforced concrete arch bridge consisting of two sections (127-5808, south sections, and 127-5809, north section) extending between the north and south banks of the James River and separated in the middle by Mayo Island.	Potentially Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-5809	Bridge #1857, North 14th Street; Mayo Bridge North	City of Richmond	1911	The Mayo Bridge is a closed spandrel reinforced concrete arch bridge consisting of two sections (127-5808, south section, and 127-5809, north section) extending between the north and south banks of the James River and separated in the middle by Mayo Island.	Potentially Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-5978	Todd Lofts, 1128 Hermitage Road	City of Richmond	1892	The structure is a five-story, multi-bay commercial building. Originally built as the Richmond Brewery, the E.M. Todd Company bought the building in 1919 and expanded it into a meat production facility. Until 1998, this resource housed the county's oldest meat processor in continuous business.	Listed under Criterion A
Area 6: Richmond (I-295 to Centralia)	127-6129	Winfree Cottage, East Main Street	City of Richmond	ca. 1866	This dwelling is a one-story cottage constructed in no discernible style. The cottage was constructed for Emily Winfree by her former owner and moved to its current location in 2002.	Potentially Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6136	Scott's Addition Historic District	City of Richmond	post-1900	This area is a 152-acre industrial and commercial district in Richmond featuring 287 contributing resources built primarily between 1900 and 1956 in the Colonial Revival, Classical Revival, Mission, Moderne, International, and Art Deco styles.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6145	Southern Stove Works, 1215 Hermitage Road	City of Richmond	1905	This resource is an industrial complex of four brick buildings and a water tower built during the time of rapid industrialization in Richmond. Southern Stove Works was one of the two largest and most important stove-making plants in Richmond and the South.	Listed under Criteria A and C

▶ *Continued.*

Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond (I-295 to Centralia)	127-6165	Cookie Factory Lofts, 900 Terminal Place	City of Richmond	1927	The building, previously known as Southern Biscuit Company, Interbake Foods, and Famous Foods of Virginia, is a six-story, multi-bay industrial building with a water tower on the roof that was constructed with Colonial Revival attributes.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6166	Hebrew Cemetery, 320 Hospital Street	City of Richmond	1816	Previously known as the Hebrew Burying Ground, this resource is an 8.4-acre cemetery with approximately 2,600 interments that is still in active use today. The Hebrew Cemetery is the oldest active Jewish cemetery in continuous use on the South, as well as being the oldest cemetery in continuous use in Richmond.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6171	Richmond and Chesapeake Bay Railway Barn), Richmond-Ashland Railway Company Car Barn	City of Richmond	1907	The resource is a utilitarian industrial building with a T-plan building, structural steel frame, and a Fink Truss roof. It is one of the few surviving buildings associated with the independent electric railway that provided service between the city of Richmond and the town of Ashland from 1907 to 1938.	Listed NRHP and VLR under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6188	Movieland Bowtie Cinema, 1331 North Boulevard	City of Richmond	1887	The building, previously known as the Richmond Locomotive & Machine Works, the American Locomotive Company, and Richmond Works, is an industrial complex with two buildings, the brass foundry and the iron foundry, that are both steel-framed resources with masonry walls.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6193	J.P. Taylor Leaf Tobacco, Southern Stove Works, 516 Dinwiddie Avenue	City of Richmond	1920	This resource mirrors other early-twentieth century factories in the area: all brick construction, with regularly spaced and relatively large windows, and sections of light monitor on the pitched roof apex for allowing natural light for the workers. It was used as a stove factory and then for tobacco processing.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6213	Davee Gardens Historic District	City of Richmond	1947	This district is a planned, symmetrical suburb of Richmond, established in 1947. Homes in the neighborhood retain a high degree of historic integrity, and the street plan is emblematic of post-World War II design.	Eligible under Criteria A and C

▶ *Continued.*

Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond (I-295 to Centralia)	127-6245/ 44CF0724	Williams Bridge Company, Emergency Fleet Corporation Factory, 700 East 4th Street	City of Richmond	1919	Built in 1919 to assist with World War I war efforts; also used by the United States government during World War II; eligible boundary contains main factory and apartment structures used to house workers during both world wars.	Eligible under Criteria A, C, and D
Area 6: Richmond (I-295 to Centralia)	127-6248	Pure Oil Company, 1314 Commerce Street, Transmontaigne	City of Richmond	1936	This property has been used to refine, store, ship, and process oil extracts for almost 80 years; founded in 1928 as Gulf Refinery Company; associated with the history of oil production and transport in Richmond.	Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6251	Atlantic Coast Line Railroad Corridor, Richmond and Petersburg Railroad	City of Richmond	post 1833	Historic railroad corridor that represents the origins and growth of the railroad industry in the Richmond to Petersburg corridor; reflects the post-Civil War trend of merging smaller operations to provide better service while being more economical.	Eligible under Criterion A
Area 6: Richmond (I-295 to Centralia)	127-6255	Fulton Gas Works, Williamsburg Avenue	City of Richmond	ca. 1925	A notable complex of industrial buildings that provided utilities to Richmond citizens during the first half of the twentieth century that, despite years of vacancy, appears to retain its historic integrity.	Eligible under Criterion A
Area 6: Richmond (I-295 to Centralia)	127-6271	Seaboard Air Line Railroad Corridor	City of Richmond	1900	Historic railroad corridor that represents the origins and growth of the railroad industry in the Richmond to Petersburg corridor; reflects the post-Civil War trend of merging smaller operations to provide better service while being more economical.	Eligible under Criterion A
Area 6: Richmond (I-295 to Centralia)	127-6514	Kent Road Village, 905 Kent Road	City of Richmond	1942	Kent Road Village is a group of 11 two-story, brick garden apartment buildings on a flat, wedge-shaped, 3.4-acre property. The buildings represent the dominance of the Colonial Revival style in Richmond and were designed by Richmond architect E. Tucker Carlton.	Listed on the NRHP and VLR under Criterion C
Area 6: Richmond (I-295 to Centralia)	127-6569	Central National Bank, 3501 W Broad Street	City of Richmond	1956	The building is a two-story, seven-bay commercial bank and office building. It is rectangular in form, in good condition, and reflects the International and modern movements in styling.	Potentially Eligible under Criterion C

▶ *Continued.*

Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond (I-295 to Centralia)	127-6570	West Broad Street Industrial and Commercial Historic District	City of Richmond	1890–1960	The district comprises an area of approximately 40 acres; it reflects the development of the industrial capabilities of Richmond, and the allied development of commercial resources, culminating in the embrace of large-scale consumer economy by the middle of the twentieth century.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6629	Cedarhurst Neighborhood Historic District	City of Richmond	post-1941	The neighborhood is a planned residential neighborhood that is significant for its design characteristics, including its Colonial Revival, Minimal Traditional, Ranch, and Tudor Revival architectural styles. Many of the homes in the development maintain a high level of architectural integrity.	Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6693	Armitage Manufacturing Company, 3200 Williamsburg Avenue	City of Richmond	1900	The original 2-story, 14-bay section of the building's front (south) wing was designed by the architectural firm of Noland & Baskerville. A third story was added in the 1920s. The warehouse has a notable importance to late-nineteenth and early twentieth century local industry.	Listed on the NRHP and VLR under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6730	Hermitage Road Warehouse Historic District	City of Richmond	1930–1958	This industrial district is characterized by roughly a dozen medium- to large-scale one-story warehouse buildings set on a gridded block pattern. Most of the buildings have large footprints that occupy most of the block on which they sit. The buildings are typically one-story, clad in brick, and covered with flat roofs.	Listed under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6756	Carillon Neighborhood Historic District	City of Richmond	1859	The neighborhood encompasses approximately 140 acres and contains approximately 475 resources, most of which are residential buildings. It represents 2 centuries of suburban growth and urban planning.	Potentially Eligible under Criteria A and C
Area 6: Richmond (I-295 to Centralia)	127-6757	Woodstock Historic District	City of Richmond	ca. 1950–1960	Woodstock is a post-World War II-era, suburban neighborhood containing approximately 91 parcels, 7 of which were inventoried as part of this survey. The dwellings were constructed in the Minimal Traditional style.	Potentially Eligible under Criterion C

▶ *Continued.*

Table 3.13-4: Description of Eligible Buildings, Districts, Structures, and Objects

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond (I-295 to Centralia)	127-6792	Southern Railway	City of Richmond	ca. 1850	A railroad corridor that dates to the mid-nineteenth century and was key in Richmond's development for more than a century.	Potentially Eligible under Criterion A
Area 6: Richmond (I-295 to Centralia)	127-6793	C&O Railroad	City of Richmond	Pre-1851	The C&O Railroad that is primarily made up of two parallel steel tracks that is notable for its role in Richmond's transportation history.	Potentially Eligible under Criterion A
Area 6: Richmond (I-295 to Centralia)	127-6840	Warehouse, 2728 Hermitage Road	City of Richmond	ca. 1955	Unknown; No access granted during Phase I study	Indeterminate; Could not access; Phase II needed
Area 6: Richmond (I-295 to Centralia)	TBD	Broad Run House, 2011 S. Kinsley Avenue	City of Richmond	ca. 1770	This two-story, Federal-style, frame dwelling was constructed with a central-passage plan. It is a rare and exceptional, surviving example of a late-eighteenth century dwelling in this area of Richmond.	Potentially Eligible under Criterion C
Area 6: Richmond (I-295 to Centralia)	Temp 402	House, 351 W. 49th Street	City of Richmond	ca. 1958	Unknown; No access granted during Phase I study	Not accessible; Further Survey Required
Area 6: Richmond (I-295 to Centralia)	TBD	Rolando Historic District	City of Richmond	ca. 1946–1950	The district is a post-World War II-era, suburban neighborhood containing approximately 142 parcels. The dwellings were constructed in the Minimal Traditional style. The neighborhood and contributing dwellings have been generally unchanged since its subdivision in 1946.	Potentially Eligible under Criterion C
All	076-0301	RF&P Railroad	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	1836	The RF&P opened in 1836 and eventually spanned from the Potomac River to Richmond. The DC2RVA corridor includes the main rail line, spurs, and associated elements, such as station houses, bridges, and other structures.	Eligible under Criterion A

3.13.2.2 Battlefields

Spanning the area between the Union capital in Washington, D.C. and the Confederate capital in Richmond, the Project area was the site of numerous Civil War battles, skirmishes, and occupations as the two armies fought for control of this important land. Although development has consumed many historic landscapes once associated with the war, DHR and the American Battlefield Protection Program (ABPP) have identified 11 battlefields in the architectural APE. Each comprises a unique set of features and represents different aspects of the war between 1861 and 1865.

In Virginia, battlefields are recorded as aboveground historic districts. Each encompasses hundreds, if not thousands, of acres, and many of these battlefields are now located in areas of urban and suburban development. As such, many of the elements and conditions extant at the time of the battle are no longer in existence. This is especially notable for archaeological sites, where disturbances from development, transportation improvements, and other forms of large-scale earth movement have greatly diminished the potential for intact archaeological sites related to their period of significance. Because of this, and due to the nature of these vast resources, in Virginia, they are evaluated primarily as landscapes for their aboveground integrity and significance. Individual buildings, structures, objects, and sites within each battlefield are evaluated as both individual resources and for their contribution to the larger landcape. However, because of their size, complexity, and quantity, battlefields are regularly separated from other aboveground and belowground resources during environmental evaluations to aid the discussion. (Note: Archaeological resources recorded as individual sites within the APE have been listed in the Archaeological results section above.)

In light of the above concepts and per DHR guidelines, each battlefield was surveyed in a manner similar to other aboveground resources. Because they have already been determined to be eligible by DHR prior to the current study (Table 3.13-6), they were briefly revisited through a vehicular identification-level survey to photo document their general condition and confirm the previous eligibility determinations.

Battlefields, as recorded in the APE, are enumerated in Tables 3.13-5 and 3.13-6 and a description is provided. The ABPP boundaries for all resources have been used per DHR guidance.

Table 3.13-5: Summary of Battlefields

Alternative Area	NRHP Listed Resources	NRHP Eligible Resources	Total Resources
Area 1: Arlington (Long Bridge Approach)	0	0	0
Area 2: Northern Virginia	0	0	0
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	0	3	3
Area 4: Central Virginia (Crossroads to Doswell)	0	1	1
Area 5: Ashland (Doswell to I-295)	0	0	0
Area 6: Richmond (I-295 to Centralia)	0	7	7

Note: One resource listed in the Richmond area also extends into the Ashland area.

Historic Battlefields

3.13.2.3 Tribal Land

The Pamunkey are the sole federally recognized tribe in Virginia. In addition, 11 state-recognized tribes are in the Commonwealth: Mattaponi, Pamunkey, Chickahominy, Eastern Chickahominy, Rappahannock, Upper Mattaponi, Nansemond, Monacan Indian Nation, Cheroenhaka (Nottoway), Nottoway of Virginia, and Patawomeck. None of these tribes has established tribal lands within or adjacent to the Project area. In addition, no prehistoric sites have been recorded in the APE. As such, no recorded tribe-associated properties are within the APE or surrounding area. The Pamunkey tribe was invited to be a consulting party to the Section 106 process.

Outside of the Commonwealth, the Catawba Indian Tribe was also invited to be a consulting party as they have a stated interest in projects along the I-95 corridor (see Appendix U for Tribal invitation letters).

Neither invited tribe has elected to participate in the process; however, DRPT is assuming consulting party status for the Pamunkey Tribe. Comments have not been submitted by any of the tribes on any Project documents to date. Chapter 5 provides full details on the tribal coordination efforts completed for this Project.

Table 3.13-6: Description of Battlefields

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	088-5181	Salem Church Battlefield (Banks Ford Battlefield)	Spotsylvania County, City of Fredericksburg	1863	The battlefield includes the land where Hay's and Hoke's brigades attacked the Union Sixth Corps in 1863. It includes Confederate earthworks, Salem Church, and the path of the Plank Road.	Eligible under Criterion A (Federal determination of eligibility by the ABPP in 2007 during statewide battlefield study initiative)
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	111-5295	Battle of Fredericksburg I	City of Fredericksburg	1862	The battlefield is the location of a Civil War battle that occurred between December 11 and December 15, 1862. Union Major General Ambrose Burnside and his troops battled General Robert E. Lee's Confederate men, resulting in a Confederate victory. The battlefield continues to retain a high level of integrity.	Eligible/Potentially Eligible under Criterion A (Federal determination of eligibility by the NPS in 1993 during statewide battlefield study)
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	111-5296	Battle of Fredericksburg II	City of Fredericksburg	1863	The Battlefield is a 12,694.2-acre battlefield associated with a Civil War battle of the same name, which took place on May 3, 1863. Despite expansive residential, commercial, and industrial development around the battlefield and Fredericksburg, it continues to retain a high level of integrity.	Eligible/Potentially Eligible under Criterion A (Federal determination of eligibility by the ABPP in 2007 during statewide battlefield study initiative)
Area 4: Central Virginia (Crossroads to Doswell)	042-0123	North Anna Battlefield	Hanover County	1864	The North Anna Battlefield was the location of one of the most important Civil War campaigns in the state. It was the culminating point of the 1864 Overland Campaign. The battlefield is composed of defensive earthworks and trenches, as well as other elements predating and contemporaneous with the battle.	Eligible under Criterion A (Federal determination of eligibility by the ABPP in 2007 during statewide battlefield study initiative)
Area 6: Richmond (I-295 to Centralia)	043-5108	Yellow Tavern Battlefield	Henrico County	1864	The battlefield is the location of a Civil War battle that took place in May 1864 (Dollins, 2014). Major General J.E.B. Stuart was wounded and died, and the battle ended in a Union victory.	Eligible/Potentially Eligible under Criterion A (Federal determination of eligibility by the ABPP in 2007 during statewide battlefield study initiative)

▶ *Continued.*

Table 3.13-6: Description of Battlefields

Alternative Area	DHR ID	Name	City/County	Date	Description	Eligibility
Area 6: Richmond (I-295 to Centralia)	020-0147	Drewry's Bluff Battlefield (Fort Darling, Fort Drewry), Fort Darling Road	Chesterfield County, Henrico County	1862	Drewry's Bluff encompasses 42.4 acres of land. The Civilian Conservation Corps (CCC) camp based at Fort Harrison rehabilitated the site in 1935, clearing brush and trees and stabilizing the earthworks.	Eligible/Potentially Eligible under Criterion A (Federal determination of eligibility by the ABPP in 2007 during statewide battlefield study initiative)
Area 6: Richmond (I-295 to Centralia)	020-5320	Proctor's Creek Battlefield	Chesterfield County, Colonial Heights	1864	Currently, the battlefield consists of monuments, interpretive markers (state and freeman markers/park service interpretation at Fort Darling unit/county interpretation at Fort Stephens), a cemetery, historic roadbeds, period structures (Wooldridge, Willis, Halfway houses), and trenches/field fortifications.	Eligible/Potentially Eligible under Criterion A (Federal determination of eligibility by the ABPP in 2007 during statewide battlefield study initiative; State determination in 2009 during SEHSR R2R Study)
Area 6: Richmond (I-295 to Centralia)	043-0307	Battle of Chaffin's Farm (New Market Heights Battlefield), New Market Road	Chesterfield County, Henrico County, Richmond City	1862	The Battle of New Market Heights is nationally significant because of the all-important role played by Black soldiers in this fight and the recognition of their gallantry by the United States government through the award of 14 Medals of Honor to participants.	Eligible/Potentially Eligible under Criterion A (Federal determination of eligibility by the ABPP in 2007 during statewide battlefield study initiative; State determination in 2011 during SEHSR R2R Study)
Area 6: Richmond (I-295 to Centralia)	043-5071	Darbytown & New Market Roads Battlefield, Route 5	Henrico County	1864	The battlefield is the location of this notable 1864 engagement. Most of the area has been subsumed by development.	Eligible/Potentially Eligible under Criteria A (Federal determination of eligibility by the ABPP in 2007 during statewide battlefield study initiative)
Area 6: Richmond (I-295 to Centralia)	123-5025	Assault on Petersburg (Petersburg Battlefield II), Bermuda Hundred Road (Alt Route 697)	Charles City County, Chesterfield County, Colonial Heights City, Hopewell City, Petersburg City, Prince George County	1865	This resource includes a Civil War battlefield that represents part of the Richmond Petersburg campaign in and around Petersburg. Today, the battlefield consists of earthworks, roadways, and other features, as well as interpretive materials.	Eligible/Potentially Eligible under Criterion A (Federal determination of eligibility by the ABPP in 2007 during statewide battlefield study initiative)
Area 6: Richmond (I-295 to Centralia)	44CF0680	Fort Darling/Battlefield, Earthworks, Fort	Chesterfield County	1861–1865	The battlefield includes the area of fighting, as well as associated landscape features. The most notable feature is a series of earthworks, portions of which are still visible on the surface.	Eligible under Criteria A, C, and D (State determination of eligibility in 2012 as part of the SEHSR R2R study)

3.14 PARKLANDS, RECREATIONAL AREAS, AND REFUGES

This section describes the parklands, recreational areas, and wildlife refuges within the study area. Those parklands with special protection under Section 4(f) of the *Department of Transportation Act of 1966* or Section 6(f) of the *Land and Water Conservation Fund Act* are also identified. The study area for Section 4(f) resources, Section 6(f) resources, and other parks and recreational areas is 500 feet to each side of the existing rail line, comprising a 1,000-foot-wide study area. Within the Fredericksburg and Ashland Bypass areas, the study area is a 1,000 feet wide surrounding the proposed rail line. Tables 3.14-1 through 3.14-4 describe federally owned parkland, state parkland, local county or city parkland, and wildlife and waterfowl refuges. For each parkland resource, the name, size, ownership and general features are described. Because they may span across city and county boundaries and have different levels of ownership, linear facilities such as trails are discussed in a separate section, Section 3.14.5. Section 4(f) of the *U.S. DOT Act of 1966* (23 U.S.C. 138) affords additional protection to public parks, recreation areas, and wildlife or waterfowl refuges. Section 6(f) of the *Land and Water Conservation Fund Act* affords additional protection to property acquired or developed with Land and Water Conservation Funds (LWCF). Sections 3.14.6 and 3.14.7 describe regulations relating to Sections 4(f) and 6(f) in more detail and describe those parkland resources that meet those criteria for additional protection. Figure 3.14-1 identifies the locations of all parklands, recreational areas and wildlife refuges discussed in this section.

3.14.1 Federal Parklands

Table 3.14-1 describes the federal parklands within the study area including size, ownership, and park features.

Table 3.14-1: Federal Parklands

Resource Name	Alternative Area	Size (acres)	Ownership	Features
George Washington Memorial Parkway	Northern Virginia	1105	NPS	▪ Transportation and recreational driving ▪ Walking trails
Quantico Recreation Area (Unnamed)	Northern Virginia	9	MCBQ	▪ Access is limitied to those with military identification ▪ Basketball courts ▪ Soccer fields ▪ Playgrounds
Fredericksburg and Spotsylvania National Military Park	Fredericksburg and Central Virginia	8374	NPS	▪ Comprised of several differenct sections ▪ Encompasses four major Civil War battlefields and preserves four historic buildings ▪ Contains Stonewall Jackson Shrine

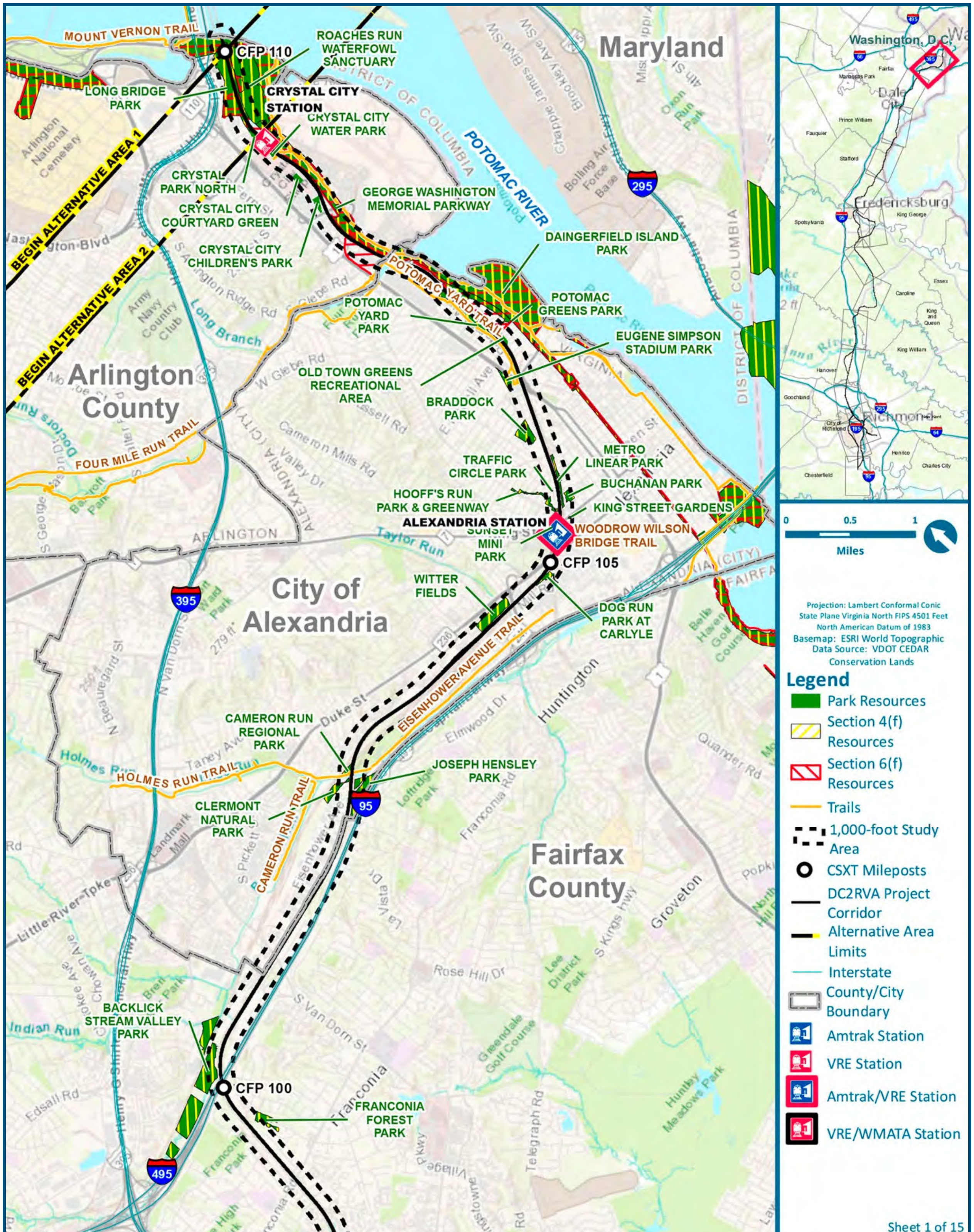


Figure 3.14-1: Park Resources

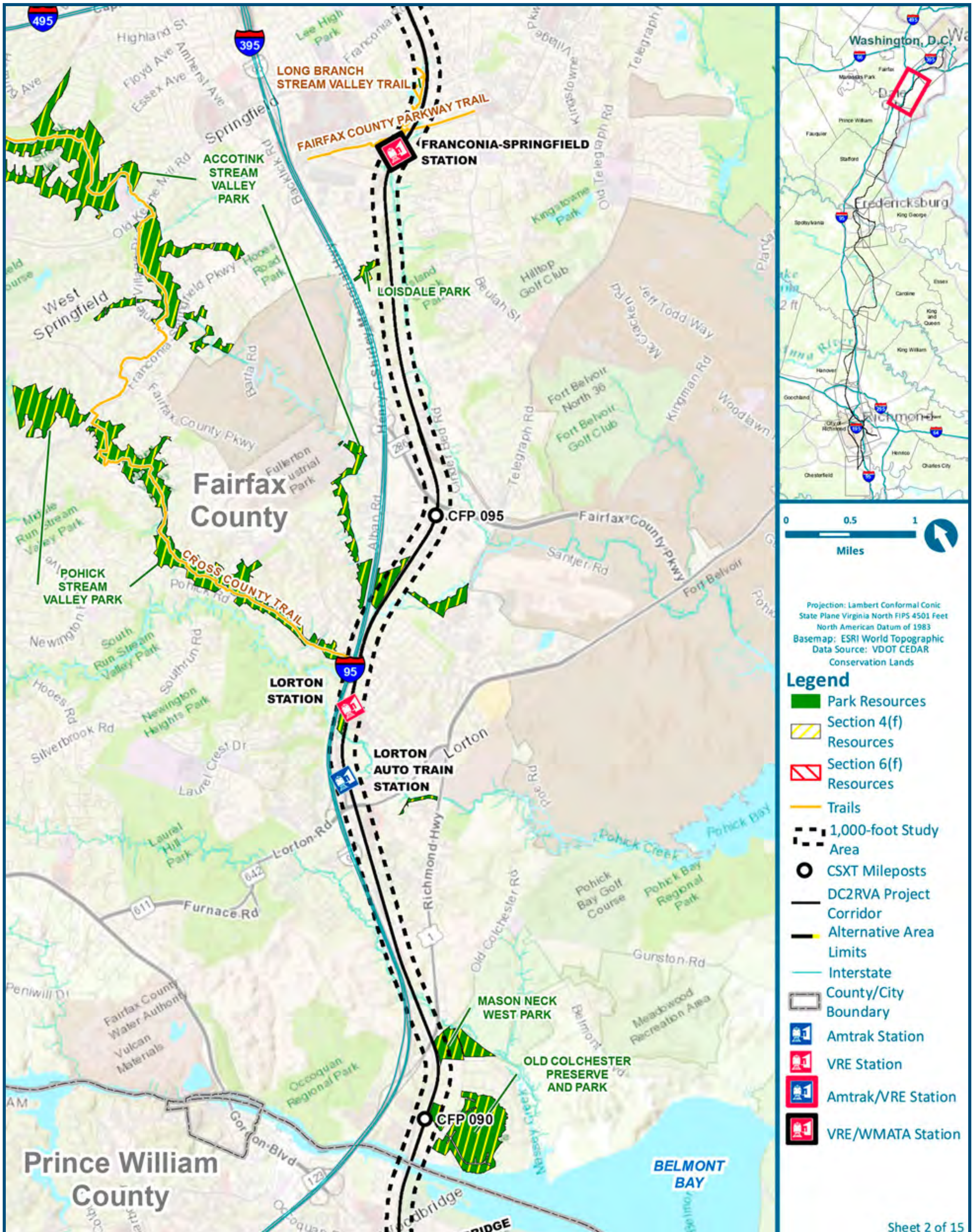


Figure 3.14-1: Park Resources

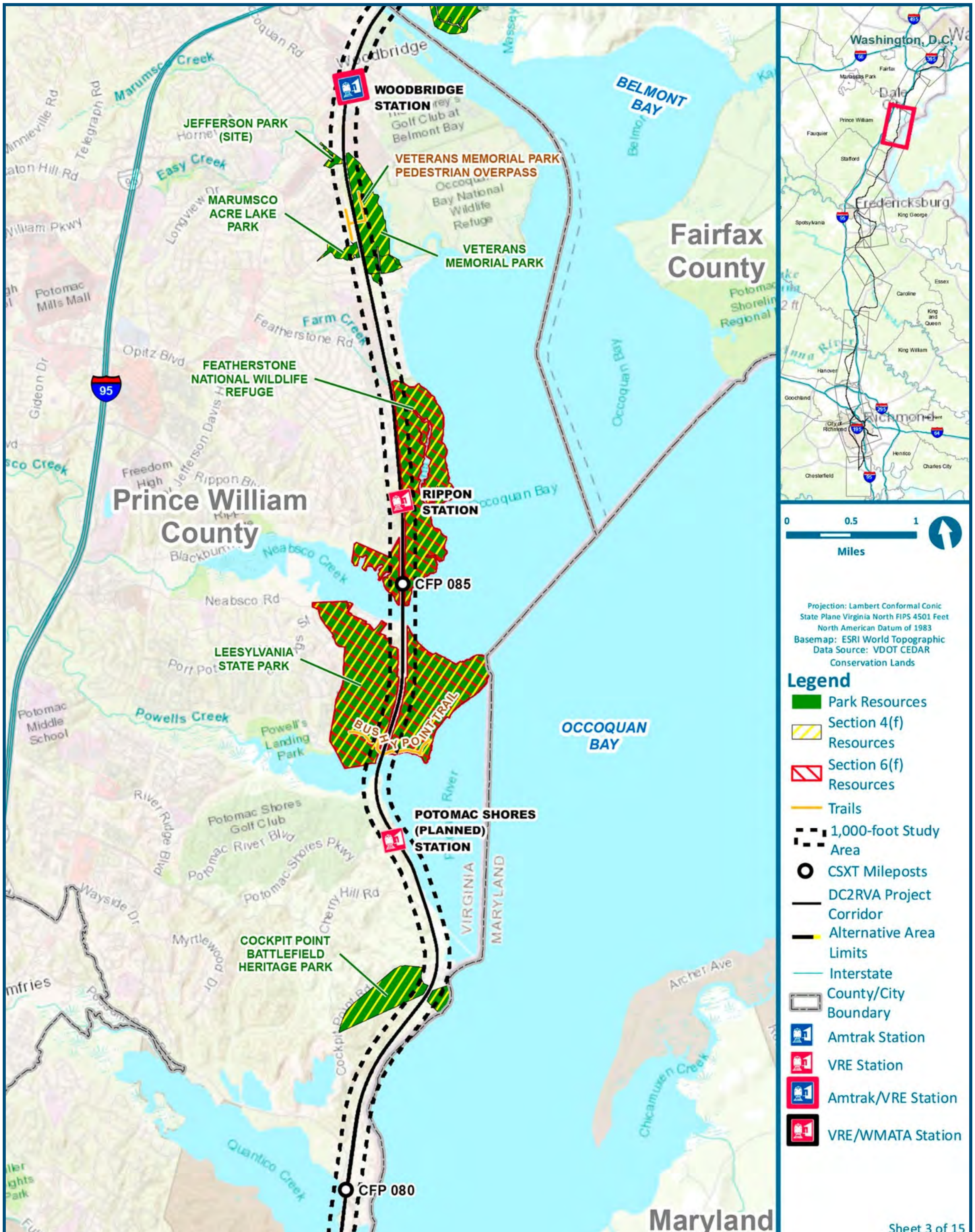
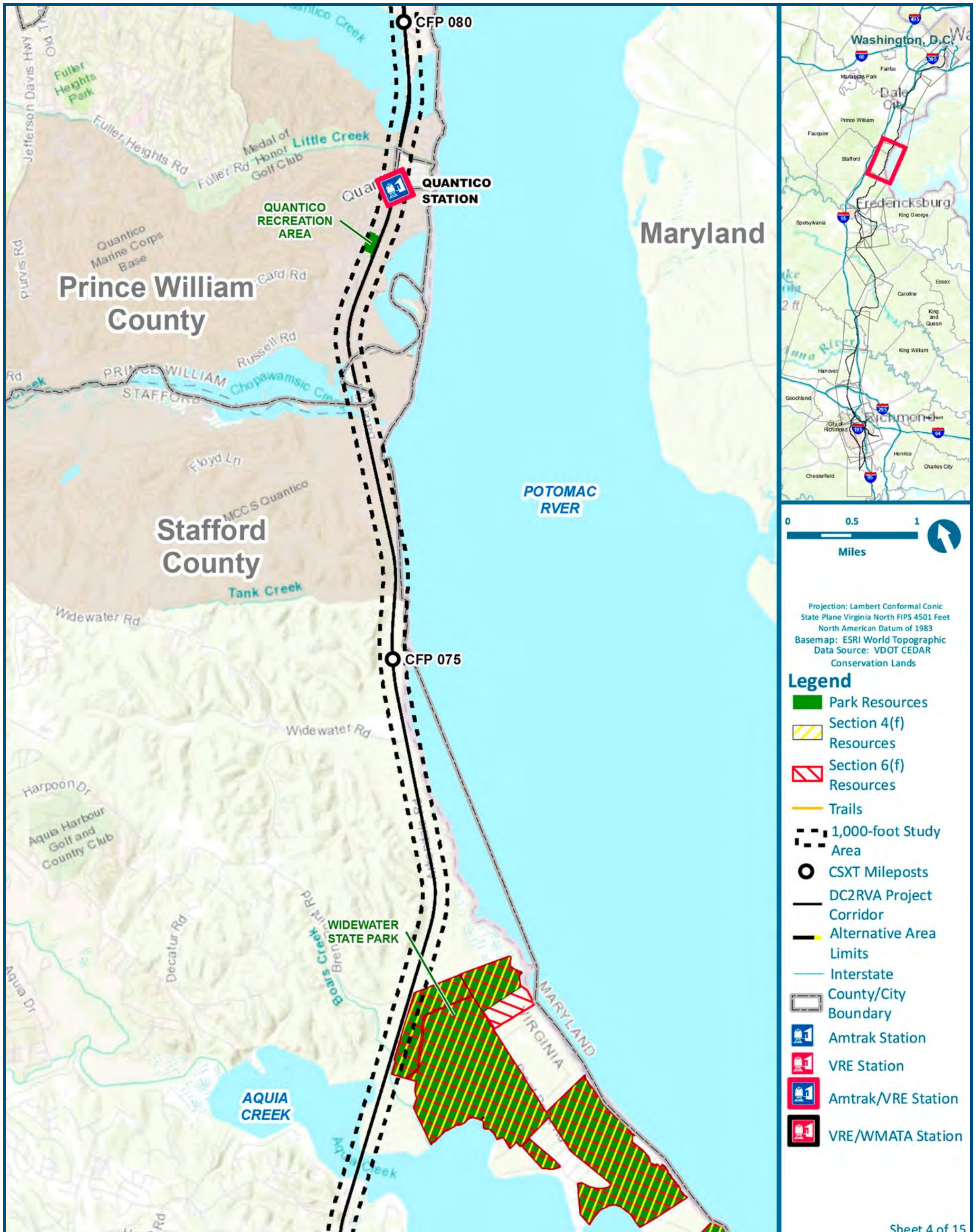


Figure 3.14-1: Park Resources

DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL



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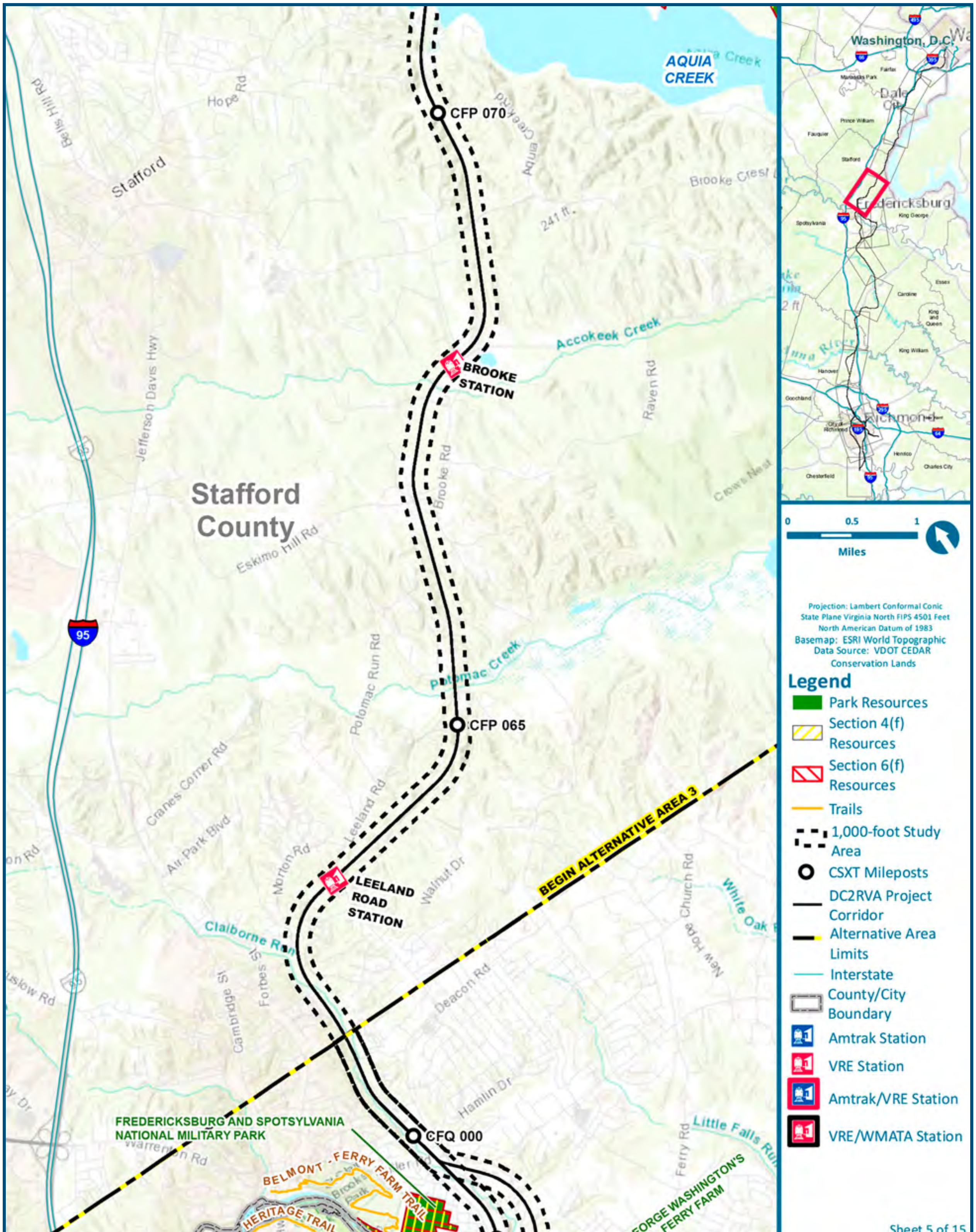

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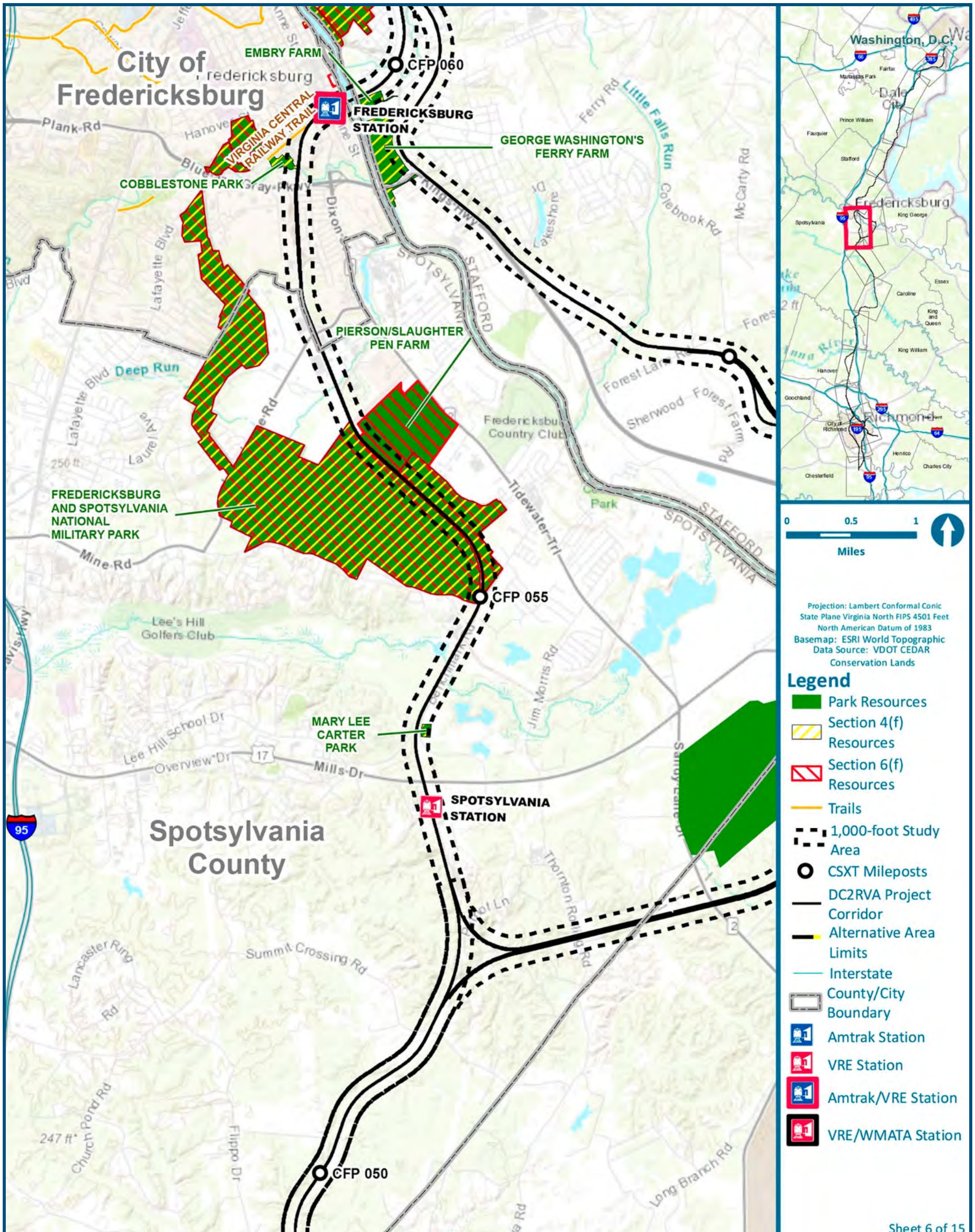

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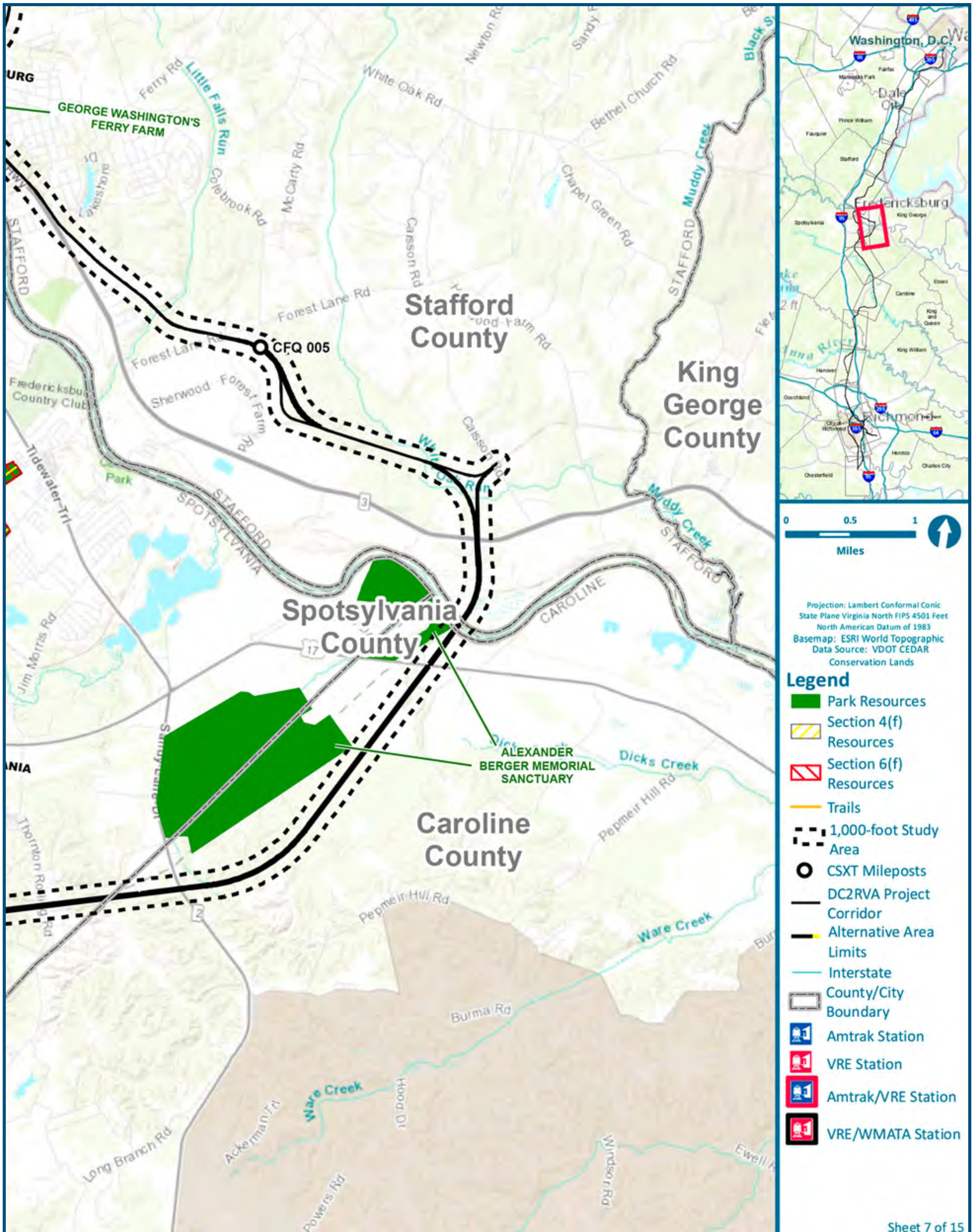

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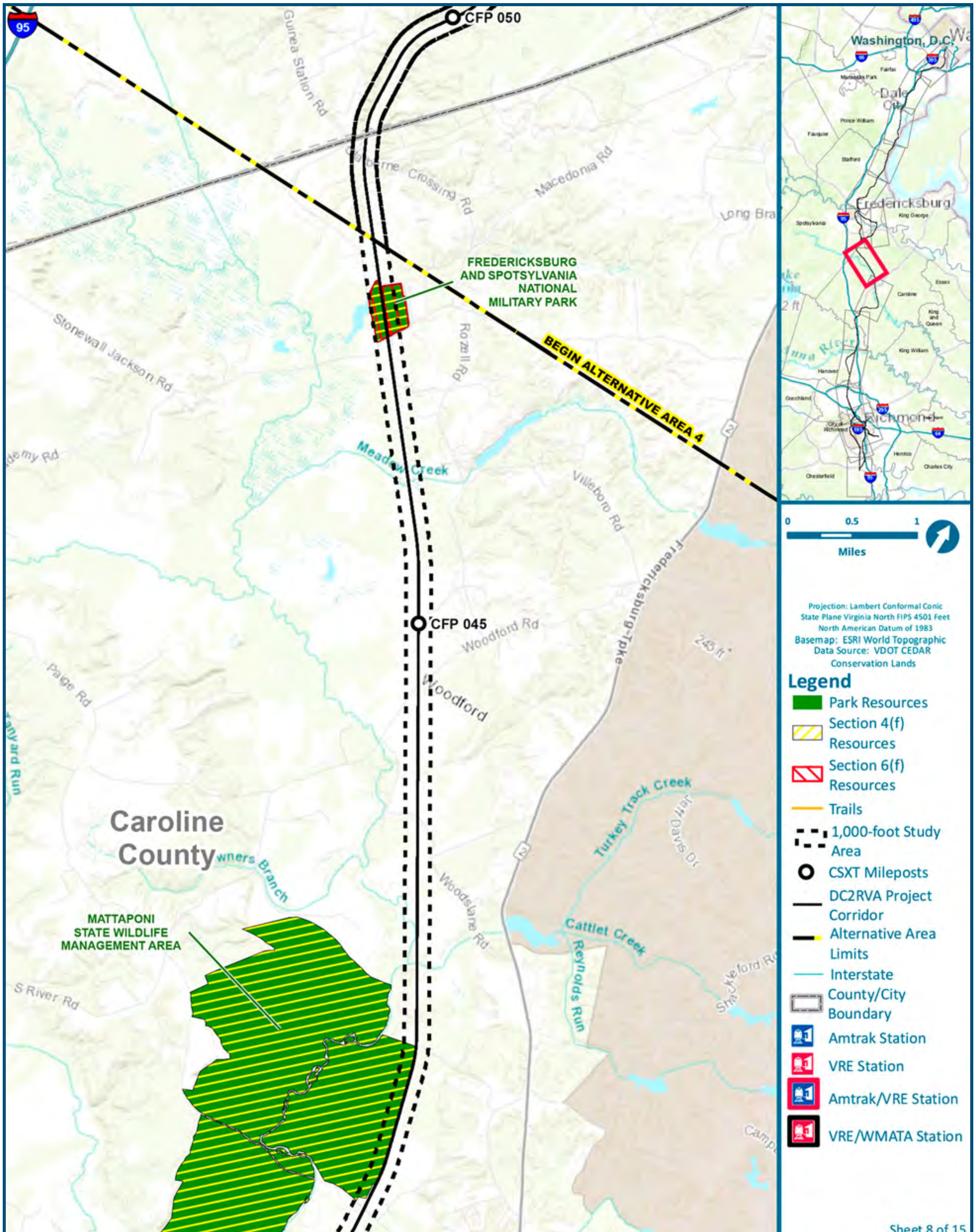

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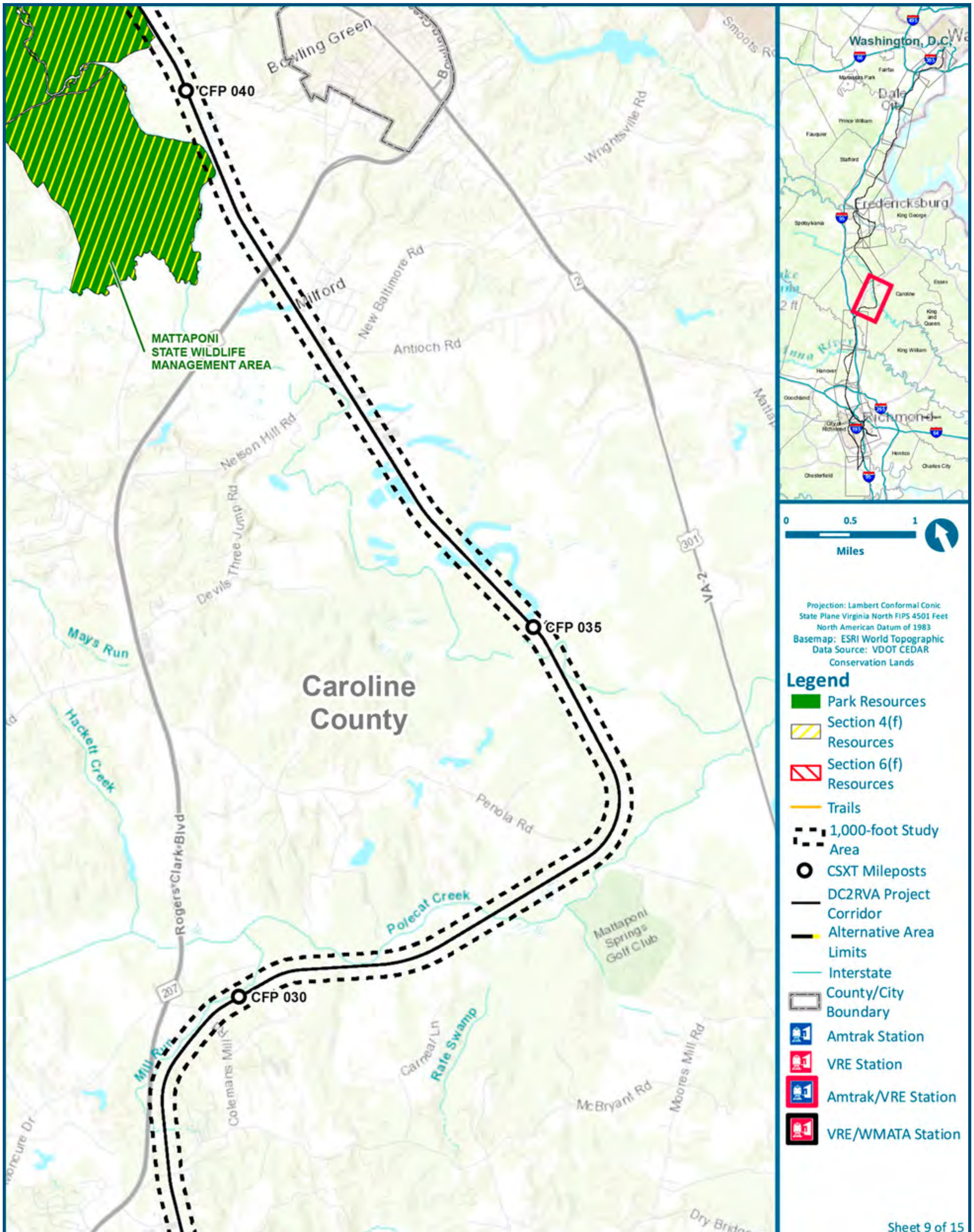

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DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

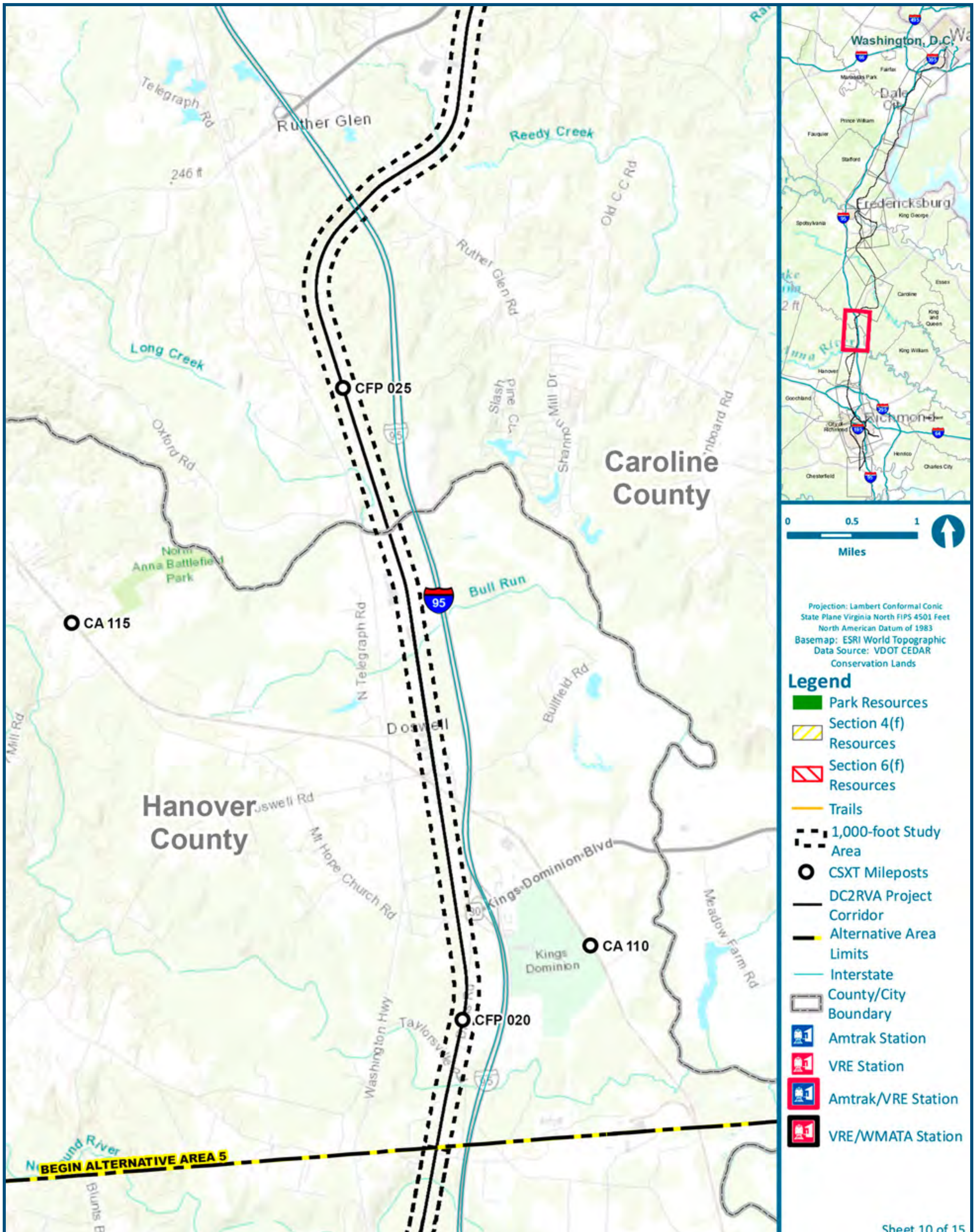


Figure 3.14-1: Park Resources

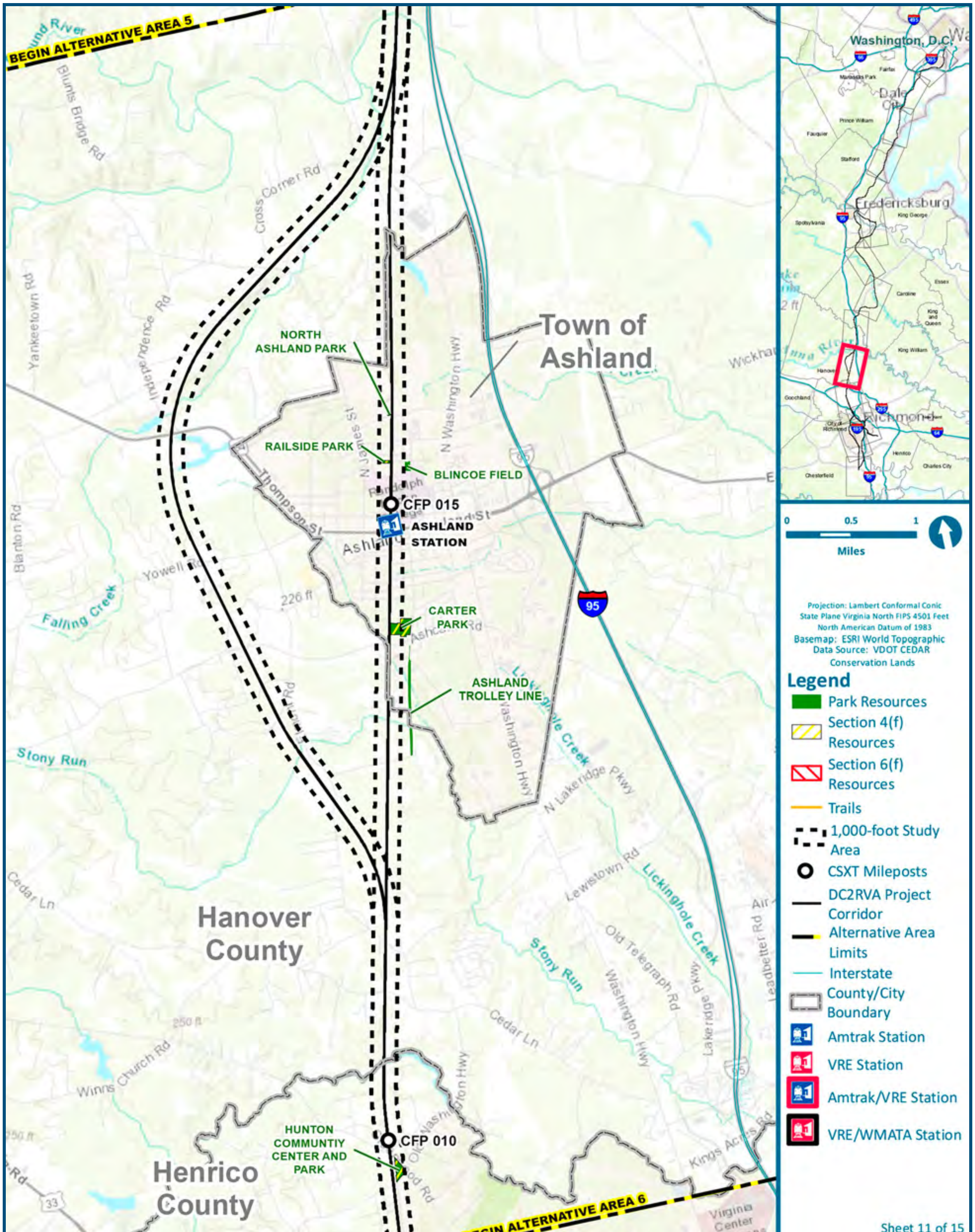
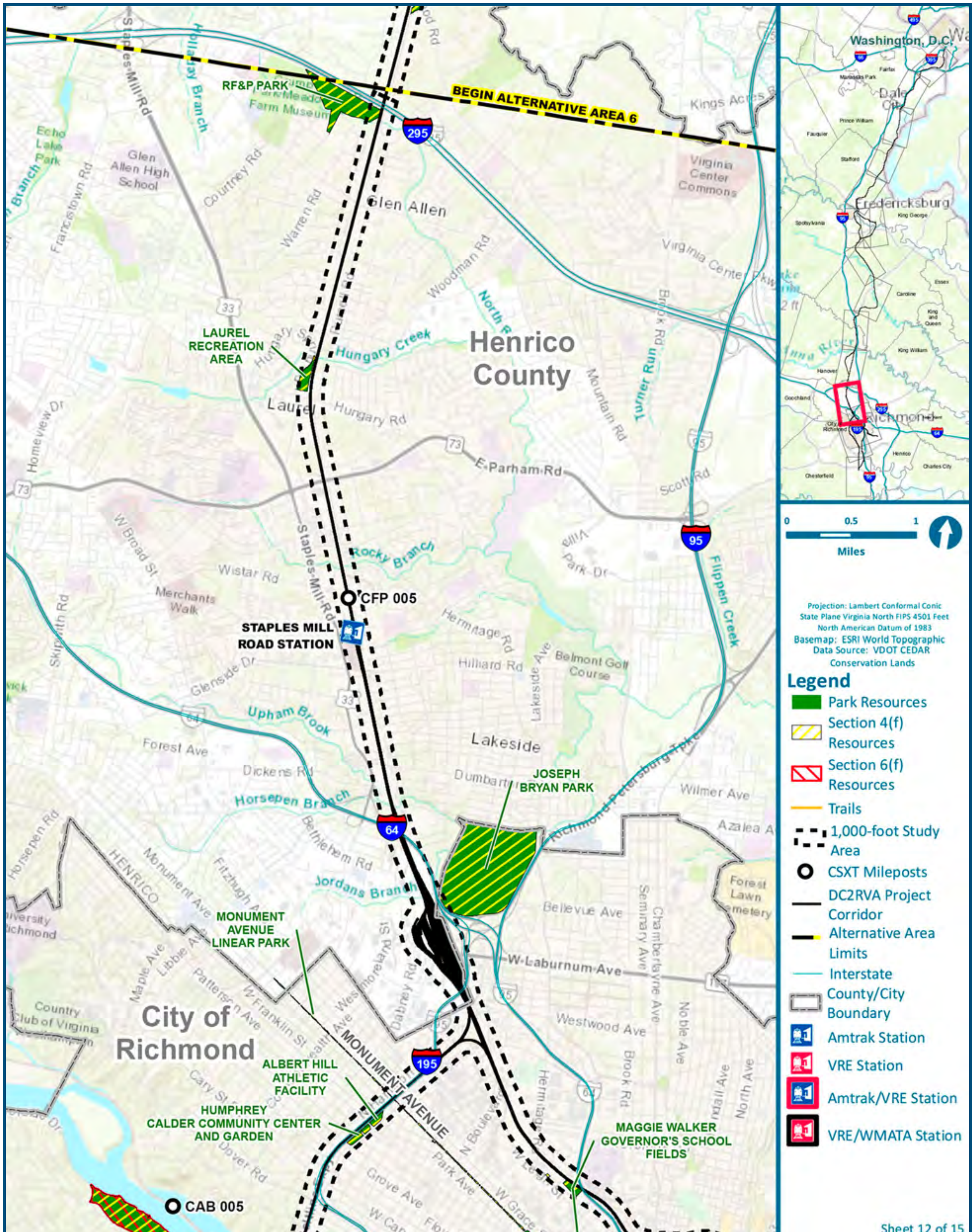


Figure 3.14-1: Park Resources



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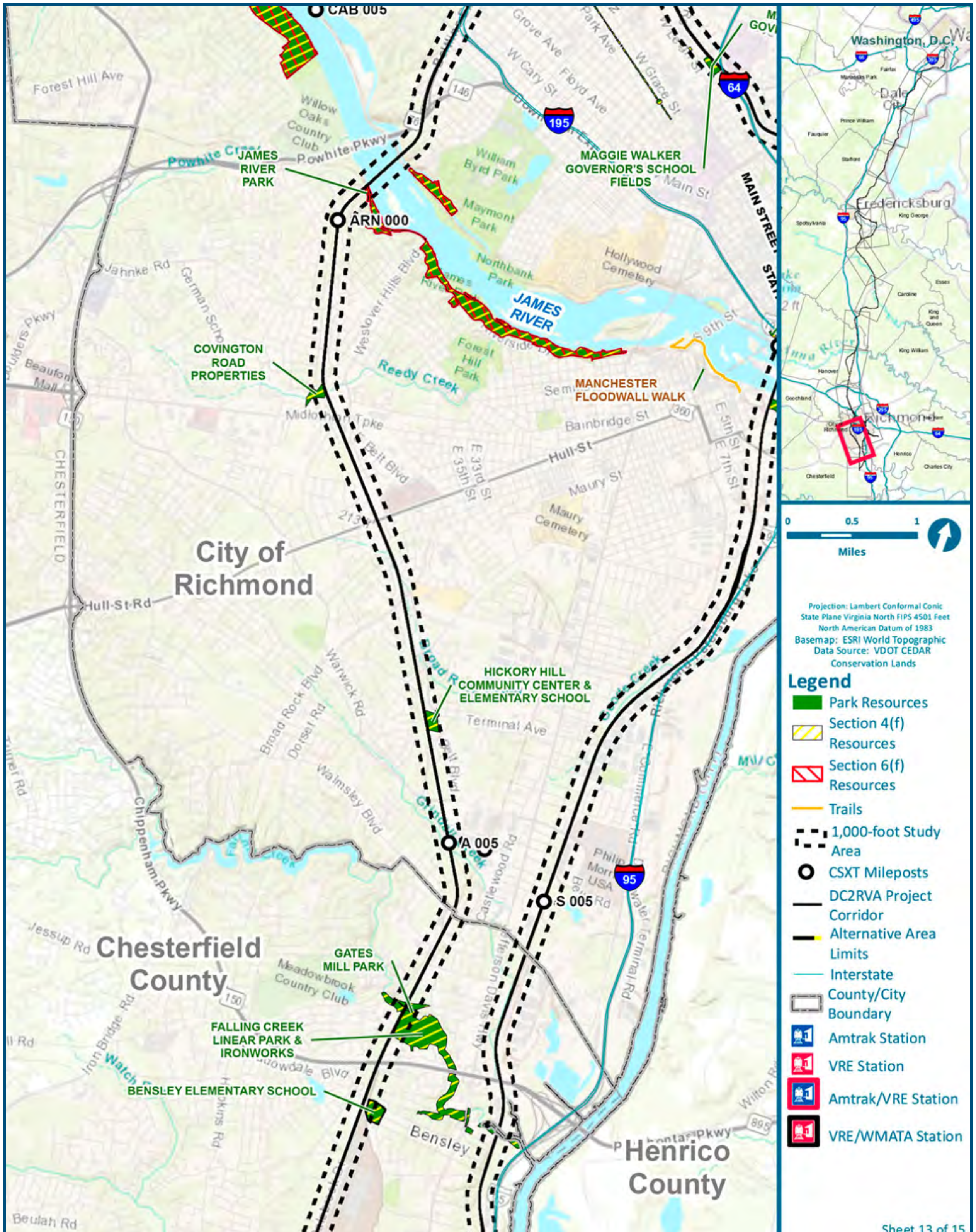


Figure 3.14-1: Park Resources

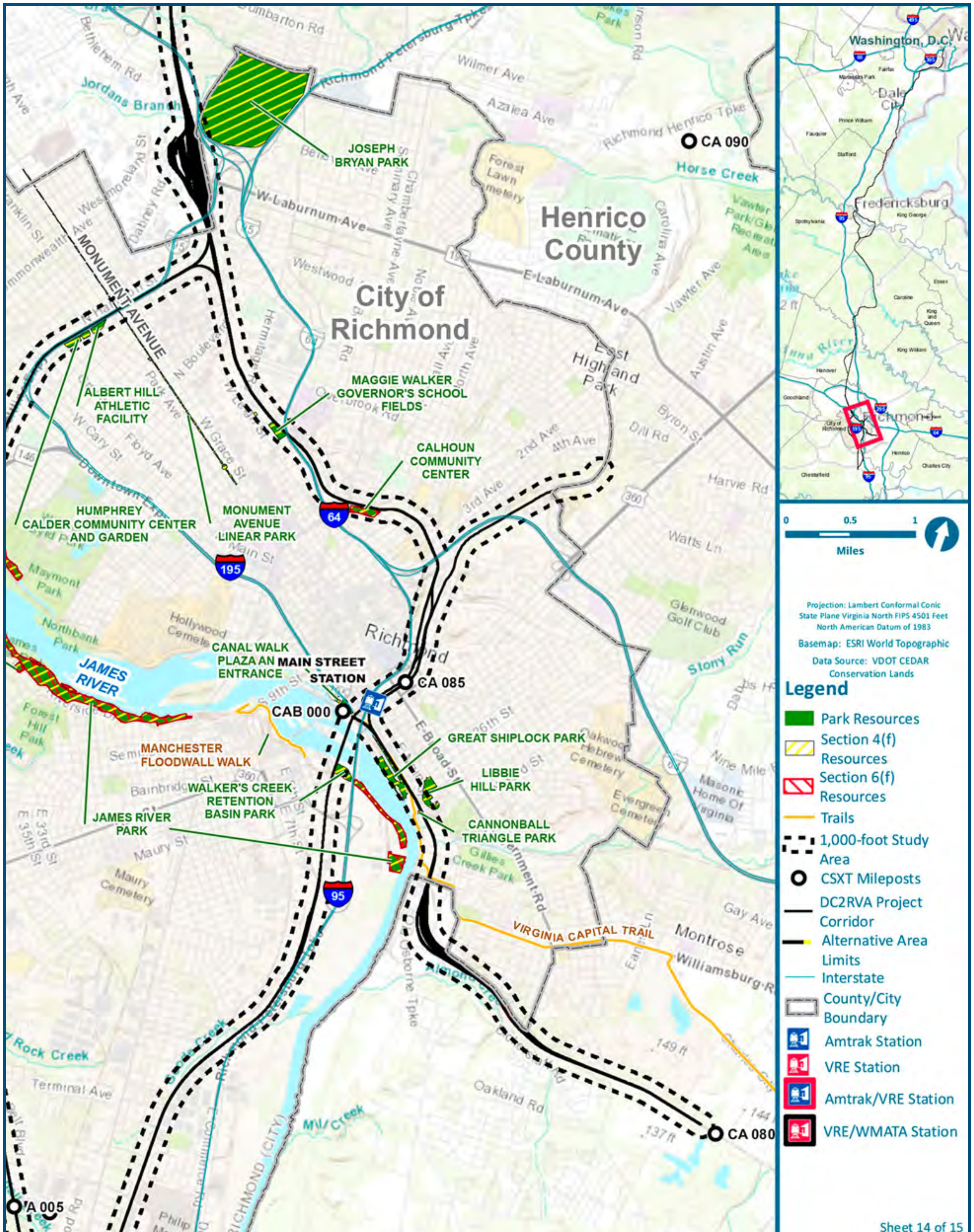


Figure 3.14-1: Park Resources

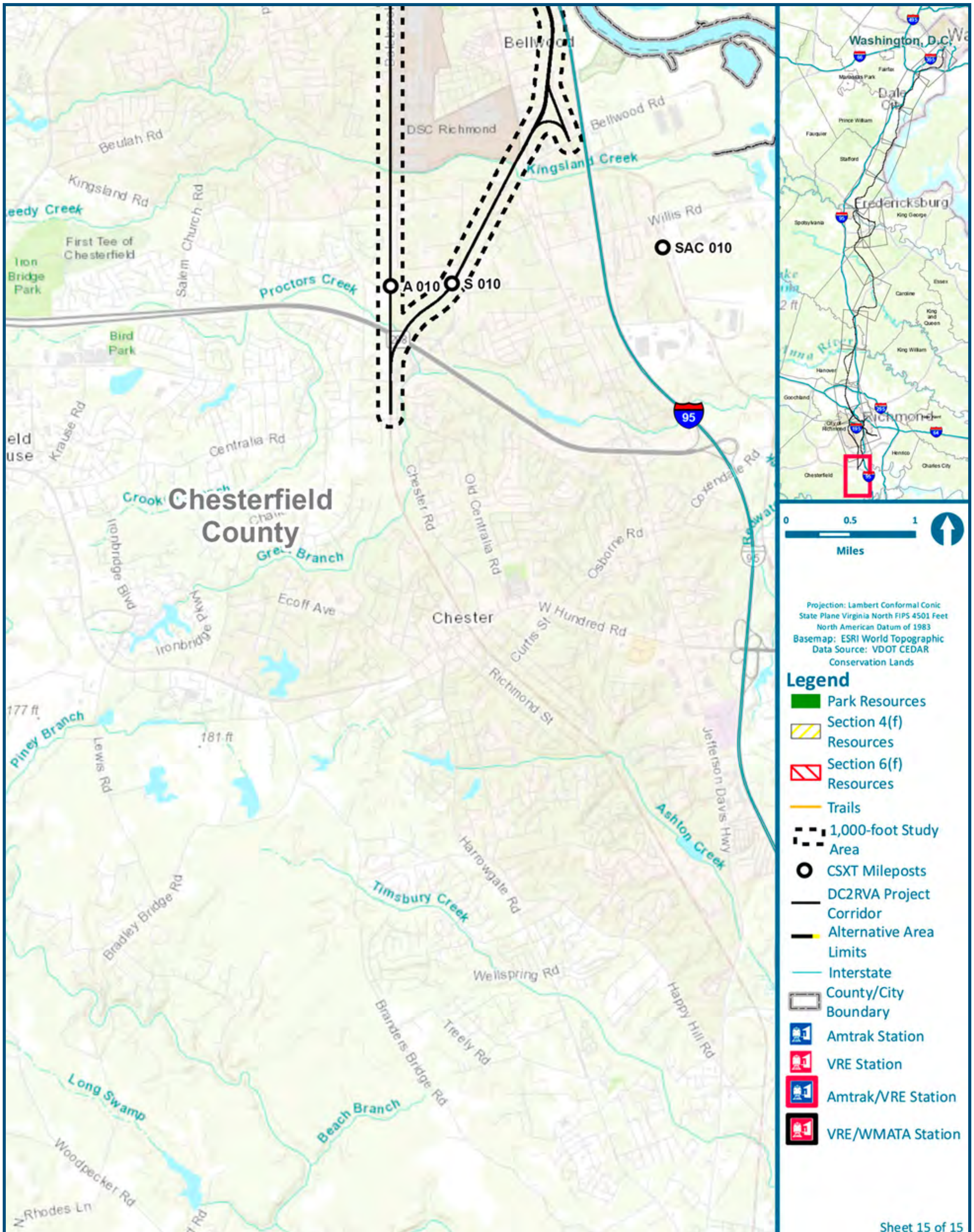


Figure 3.14-1: Park Resources

3.14.2 State and Regional Parklands and Recreation Areas

Table 3.14-2 describes the state and regional parklands and recreation areas including size, ownership, and park features.

Table 3.14-2: State and Regional Parklands and Recreation Areas

Resource Name	Alternative Area	Size (acres)	Ownership	Features
Leesylvania State Park	Northern Virginia	553	VDCR	▪ Playgrounds ▪ Boat launch and boat storage area ▪ Snack bar, store, and visitor center ▪ Fitness trail ▪ Universally accessible fishing pier
Widewater State Park	Northern Virginia	1042	VDCR	▪ Park is in development ▪ Land purchased in 2006 ▪ Features will be similar to Leesylvania State Park
Cameron Run Regional Park	Northern Virginia	30	Operated by Northern Virginia Regional Park Authority (NVRPA) Owned by City of Alexandria	▪ Waterpark ▪ Café ▪ Playgrounds ▪ Batting cage ▪ Mini-golf

State and Regional Parklands–Cameron Run Regional Park

3.14.3 County/City and Other Local Parklands

Table 3.14-3 describes the County/City and other local parklands including size, ownership, and park features.

Table 3.14-3: County/City and Other Local Parklands

Resource Name	Alternative Area	Size (acres)	Ownership	Features
Arlington County				
Long Bridge Park	Arlington	29	Arlington County	▪ Multi-sport, lighted, athletic fields, ▪ Walkways ▪ Greenspace ▪ Playgrounds
Crystal Park North	Northern Virginia	2	Private ownership – open to the public, no fee for access	▪ Small urban park ▪ Part of Crystal City development
Crystal City Water Park	Northern Virginia	2.5	Private ownership – open to the public, no fee for access	▪ Urban park ▪ Landscaped gardens ▪ Large water fountains ▪ Seating areas ▪ Part of Crystal City development
Crystal City Courtyard Green	Northern Virginia	4.3	Private ownership – open to the public, no fee for access	▪ Urban greenspace ▪ Flower gardens ▪ Trails and park benches ▪ Part of Crystal City development
Crystal City Children's Park	Northern Virginia	4.4	Private ownership – no fee for access during non-business hours	▪ Facility was built primarily for use by the resident day-care facility but it is open to use by area families during non-business hours ▪ Playrgrounds ▪ Part of Crystal City development
City of Alexandria				
Daingerfield Island Park	Northern Virginia	162	City of Alexandria	▪ Located adjacent to the George Washington Memorial Parkway ▪ Sailing and fishing are available at the park ▪ Popular destination for fireworks viewing on the 4th of July
Potomac Greens Park	Northern Virginia	18	City of Alexandria	▪ Playgrounds ▪ Seating areas ▪ Wooded trails
Potomac Yard Park	Northern Virginia	13	Private ownership – open to the public, no fee for access	▪ Playground equipment ▪ Interactive fountain for water play ▪ Walking/biking trails
Old Town Greens Recreational Area	Northern Virginia	1.7	Private ownership – for Old Town Greens residents use only	▪ Tennis courts ▪ Greenspace

▶ *Continued.*

Table 3.14-3: County/City and Other Local Parklands

Resource Name	Alternative Area	Size (acres)	Ownership	Features
Eugene Simpson Stadium Park	Northern Virginia	18	City of Alexandria	▪ Includes Eugene Simpson Stadium ▪ Soccer fields
Braddock Park	Northern Virginia	7.1	City of Alexandria	▪ Baseball/softball fields ▪ Football fields
Metro Linear Park	Northern Virginia	3.8	City of Alexandria	▪ Linear pathway that connects the Buchanan Street neighborhood with the metro stations at Braddock Road and King Street
King Street Gardens	Northern Virginia	0.4	City of Alexandria	▪ Consists primarily of gardens for the public's enjoyment
Traffic Circle Park	Northern Virginia	0.1	City of Alexandria	▪ Small greenspace with minimal landscaping
Hooff's Run Park and Greenway	Northern Virginia	4.5	City of Alexandria	▪ Portion of the park closest to the railroad consists of only walking trails
Buchanan Park	Northern Virginia	2.8	City of Alexandria	▪ Adjacent to Jefferson Houston Elementary School ▪ Includes the Olde Town Pool ▪ Playground facilities
Sunset Mini Park	Northern Virginia	1.4	City of Alexandria	▪ Playground
Dog Run Park at Carlyle	Northern Virginia	3.0	City of Alexandria	▪ Fenced dog exercise area ▪ Tennis courts
Witter Fields	Northern Virginia	13	City of Alexandria	▪ Obtained by the City as a result of the Woodrow Wilson Bridge Settlement Agreement Record of Decision between the City of Alexandria and the Federal Highway Administration (FHWA) ▪ Includes lighted diamond field, two lighted synthetic turf rectangular fields, restrooms, park pavilions, and pedestrian trail
Clermon Natural Area	Northern Virginia	6.0	City of Alexandria	▪ Consists solely of a wooded area
Joseph Hensley Park	Northern Virginia	22	City of Alexandria	▪ Soccer and softball fields ▪ Picnic shelters
Fairfax County				
Backlick Stream Valley Park	Northern Virginia	75	Fairfax County Park Authority (FCPA)	▪ Passive recreation such as hiking
Franconia Forest	Northern Virginia	6.7	FCPA	▪ Hiking/biking trails

▶ *Continued.*

Table 3.14-3: County/City and Other Local Parklands

Resource Name	Alternative Area	Size (acres)	Ownership	Features
Loisdale Park	Northern Virginia	8.6	FCPA	▪ Playgrounds ▪ Tennis courts ▪ Multi-use courts ▪ Soccer fields
Accotink Stream Valley Park	Northern Virginia	475	FCPA	▪ Passive recreation such as hiking
Pohick Stream Valley Park	Northern Virginia	323	FCPA	▪ Passive recreation such as hiking
Mason Neck West	Northern Virginia	76	FCPA	▪ In development ▪ 44 acres are planned for sporting facilities ▪ 32 acres have been acquired but future use remains unplanned, currently unimproved
Old Colchester Preserve and Park	Northern Virginia	141	FCPA	▪ Natural preserve with rare communities and animal species ▪ Includes a variety of archaeological resources
Prince William County				
Jefferson Park Site	Northern Virginia	6.9	Prince William County	▪ Identified as a future neighborhood park ▪ Currently open space
Veterans Memorial Park	Northern Virginia	110	Prince William County	▪ Outdoor athletic fields ▪ Walking trails and picnic pavilions ▪ Skate park
Marumsco Acre Lake Park	Northern Virginia	20	Prince William County	▪ Basketball court ▪ Picnic pavilion ▪ Playground area
Cockpit Point	Northern Virginia	96	Prince William County	▪ In development ▪ Not open yet; will be open to visitors on a limited basis at first ▪ Part of a rezoning agreement with the Potomac Shores community
Stafford County				
Embry Farm	Fredericksburg	11	Private ownership by the George Washington Foundation - not open to the public	▪ Historic preservation ▪ Not open to the public
George Washiongton's Ferry Farm	Fredericksburg	75	Private ownership by the George Washington Foundation - open to the public for a fee	▪ George Washington's boyhood home

▶ *Continued.*

Table 3.14-3: County/City and Other Local Parklands

Resource Name	Alternative Area	Size (acres)	Ownership	Features
City of Fredericksburg				
Cobblestone Park	Fredericksburg	10	City of Fredericksburg	▪ Wooded area with pedestrian trails ▪ Adjacent to Hazel Run Creek
Pierson/Slaughter Pen Farm	Fredericksburg	200	Private ownership by the Civil War Preservation Trust – open to the public without a fee	▪ Acquired in 2006 ▪ Key historic part of the nearby Fredericksburg Battlefield
Spotsylvania and Caroline Counties				
Mary Lee Carter Park	Fredericksburg	4.5	Spotsylvanic County	▪ Multi-use athletic fields ▪ Walking trails ▪ Playground ▪ Picnic areas
Alexander Berger Memorial Sanctuary	Fredericksburg	865	Private ownership by the Nature Conservancy – open to the public without a fee	▪ Includes recreational trails near the Rappahannock River ▪ Includes remnants of a Civil War encampment
Hanover County				
North Ashland Park	Ashland	0.2	Town of Ashland	▪ Open greenspace ▪ Picnic shelter ▪ Under development and is likely to expand in size ▪ Part of a much larger 29-acre parcel owned by the Town that includes a sewage treatment facility and maintenance/ storage areas
Railside Park	Ashland	1.0	Town of Ashland	▪ Connects to Vaughan Road by a 1/3-mile-long path along the rail tracks ▪ Remains largely open space ▪ Picnic table and park benches for viewing passing trains
Blincoe Field	Ashland	116	Private ownership by Randolph Macon College – not regularly open to the public	▪ Athletic stadium at Randolph Macon College ▪ Open to the public for a fee during special events ▪ Primarily for use by faculty and students
Carter Park	Ashland	13.5	Town of Ashland	▪ Junior Olympic-size swimming pool ▪ One-half basketball court ▪ Picnic shelter ▪ Playground ▪ Gravel walking trails through the wooded areas

▶ *Continued.*

Table 3.14-3: County/City and Other Local Parklands

Resource Name	Alternative Area	Size (acres)	Ownership	Features
Ashland Trolley Line	Ashland	6.7	Hanover County and Town of Ashland	▪ 0.5 miles in length ▪ Walkway and park ▪ Part of the historic Ashland-Richmond Trolley Line ▪ Northern portion includes Walder Lane
Henrico County				
Hunton Community Center	Ashland	4.9	Henrico County	▪ Playground ▪ Ball fields ▪ Pavilion
RF&P Park	Richmond	60	Henrico County	▪ Includes four restored RF&P train cars ▪ Picnic shelters ▪ Athletic fields including The Glen Allen Stadium at RF&P Park
Laurel Recreation Area	Richmond	10	Henrico County	▪ Skate park ▪ Athletic fields ▪ Picnic shelter
City of Richmond				
Joseph Bryan Park	Richmond	250	City of Richmond	▪ Extensive open space ▪ Walking trails ▪ Disc golf course ▪ Home to many festivals and events
Maggie Walker Governor's School Athletic Fields	Richmond	4.9	Maggie L Walker Governor's School Regional School Board	▪ Outdoor athletic fields
Calhoun Community Center	Richmond	6.6	Richmond Redevelopment and Housing Authority (RRHA)	▪ Basketball courts ▪ Football field ▪ Baseball field ▪ Playground
Canal Walk Plaza and Entrance	Richmond	3.8	City of Richmond	▪ Recreational trails and walking areas near the James River
Walker's Creek Retention Basin Park	Richmond	6.4	City of Richmond, Public Works	▪ Provides access to the walk along the floodwall south of the James River
Monument Avenue Linear Park	Richmond	13	City of Richmond	▪ In the median along Monument Avenue ▪ Well-known Richmond landmark punctuated by statues memorializing Virginian Confederate generals and the Richmond native and tennis star Arthur Ashe

▶ *Continued.*

Table 3.14-3: County/City and Other Local Parklands

Resource Name	Alternative Area	Size (acres)	Ownership	Features
Albert Hill Athletic Facility	Richmond	3.2	City of Richmond	▪ Adjacent to the Humphrey Calder Community Center and Garden ▪ Includes athletic fields
Humphrey Calder Community Center and Garden	Richmond	5.4	City of Richmond	▪ Includes some outdoor recreational areas and a community garden
James River Park	Richmond	550	City of Richmond	▪ Richmond's largest park ▪ System of parks along both sides of the James River as it passes through the city
Covington Road Properties	Richmond	6.6	City of Richmond	▪ Currently consists of undeveloped land with a mix of open space and trees ▪ No recreational facilities are provided at this location
Hickory Hill Community Center and Elementary School	Richmond	7,2	City of Richmond	▪ Basketball court ▪ Playground ▪ Ball field ▪ Walking trail
Libby Hill Park	Richmond	11	City of Richmond	▪ One of the three original parks in Richmond's park system ▪ Includes an ornamental fountain and small park house ▪ Includes a monument erected in 1894 for Confederate soldiers and sailors
Cannonball Triangle Park	Richmond	0.2	City of Richmond	▪ Central element of the park is a stone monument to the Confederate Naval Yard in the James River just to the south of the monument
Great Shiplock Park	Richmond	18	City of Richmond	▪ Located along the northern bank of the James River ▪ Includes the lowest of the historic Kanawha Canal locks as well as an interpretive display
Chesterfield County				
Falling Creek Linear Park	Richmond	93	Chesterfield County	▪ In development ▪ Ironworks are open for free tours by reservation only ▪ Remainder of the park is adjacent to Falling Creek and is primarily wooded

▶ *Continued.*

Table 3.14-3: County/City and Other Local Parklands

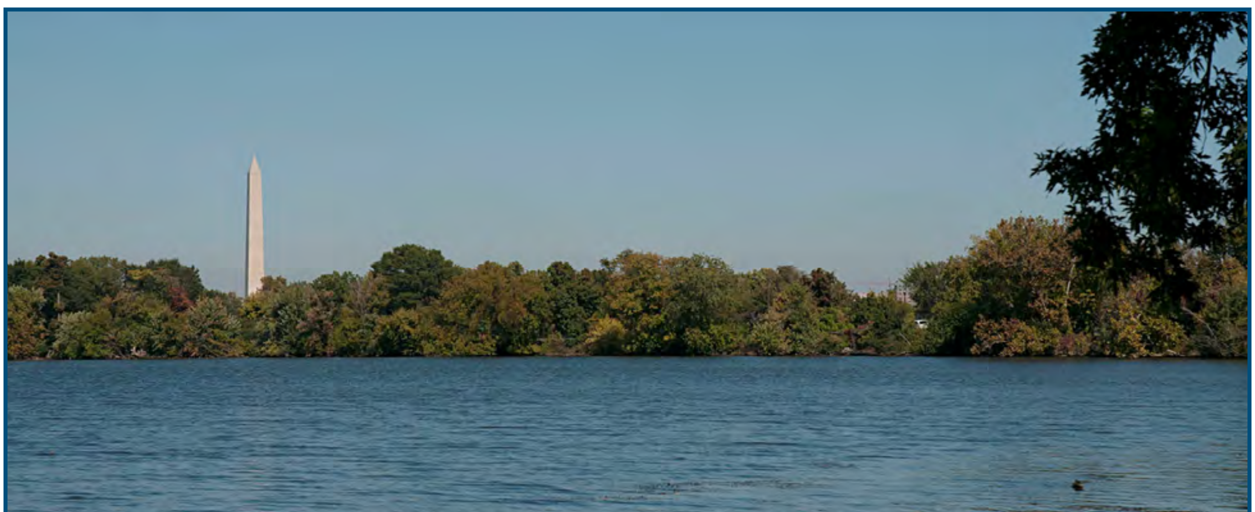
Resource Name	Alternative Area	Size (acres)	Ownership	Features
Bensley Elementary School	Richmond	3.8	Chesterfield County	▪ Athletic fields ▪ Playgrounds ▪ Separated from railroad by sliver of land belonging to Bellwood Supply Depot, which is part of an active military installation ▪ School playground is fenced with no access to Bellwood Supply Depot land or the railroad tracks
Gates Mill Park	Richmond	11	Chesterfield County	▪ Hiking trails

3.14.4 Wildlife Refuges

Wildlife refuges are lands set aside for conservation, restoration, or management of wildlife or waterfowl species and habitats. Refuges may be part of the National Wildlife Refuge System or state- or locally owned. Wildlife refuges may or may not allow public access. Wildlife management areas are similar but some may allow hunting. Table 3.14-4 describes the wildlife refuges and management areas located in the DC2RVA study area.

Table 3.14-4: Wildlife Refuges

Resource Name	Alternative Area	Size (acres)	Ownership	Features
Roaches Run Waterfowl Sanctuary	Arlington	59	NPS	▪ Waterfowl protection area ▪ Adjacent to the George Washington Memorial Parkway
Featherstone National Wildlife Refuge	Northern Virginia	332	USFWS	▪ National Wildlife Refuge
Mattaponi State Wildlife Management Area	Central Virginia	2652	VDGIF	▪ State wildlife management area



Roaches Run Waterfowl Sanctuary

3.14.5 Trails

Recreational trail facilities are described in Table 3.14-5. Trails that use existing roadway facilities or bikeways along existing roads that are used primarily for transportation are not discussed here as recreational trails. Trails within the parklands previously discussed are not included in Table 3.14-5 as they are afforded protection through the parklands within which they are located.. fOwnership of trails is typically varied due to their length. Portions may be on public lands or roadway rights-of-way and portions may be on private lands.

Trails–Virginia Central Railway Trail

Table 3.14-5: Trails

Resource Name	Alternative Area	Length (miles)	Ownership	Features
Mount Vernon Trail	Northern Virginia	18	Various	▪ Connects Theodore Roosevelt Island Park with George Washington's Estate at Mount Vernon ▪ Heavy use by bikers and pedestrians ▪ Connects with several other local and regional trails, including the Woodrow Wilson Bridge Trail, the Four Mile Run Trail, and the Custis Trail.
Four Mile Run Trail	Northern Virginia	7	Various	▪ Traverses the Four Mile Run stream valley ▪ Connects with the Mount Vernon Trail near Ronald Reagan Washington Airport at eastern end ▪ Connects with the Bluemont Junction Trail at western end
Potomac Yard Trail	Northern Virginia	1.4	Various	▪ Multi-use trail that begins in Potomac Yard Park and connects to the Braddock Road Metro Station
Holmes Run Trail	Northern Virginia	5	Various	▪ Begins near Cameron Run Regional Park, parallels Holmes Run stream, and continues northwest to end at State Route 244

▶ *Continued.*

Table 3.14-5: Trails

Resource Name	Alternative Area	Length (miles)	Ownership	Features
Eisenhower Avenue Trail	Northern Virginia	2	Various	▪ Follows along Eisenhower Avenue and is adjacent to Cameron Run for much of its length. ▪ West end is in Hensley Park ▪ East end is near the Eisenhower Metro Station
Fairfax County Parkway Trail	Northern Virginia	28	Various	▪ Adjacent to Fairfax County Parkway ▪ Paved trail connects to other trails, including the Washington and Old Dominion Trail and the Cross County Trail
Long Branch Stream Valley Trail	Northern Virginia	0.5	WMATA	▪ Unpaved natural surface trail ▪ Connects the Springfield Forest neighborhood to the Fairfax County Parkway Trail and the Franconia-Springfield Metro Station
Cross County Trail	Northern Virginia	40	Various	▪ Extends from Great Falls National Park on the north end south to the Occoquan River ▪ Some sections are wheelchair/mobility scooter accessible and some are suitable for horseback riding ▪ Pedestrians and bikers may use the entire length
Potomac Heritage Trail	Northern Virginia	Network of Trails	Various	▪ Network of locally managed trails between the mouth of the Potomac River and the Allegheny Highlands
Veterans Memorial Park Pedestrian Overpass	Northern Virginia	0,03	Within right-of-way	▪ Pedestrian overpass crossing over the railroad ▪ Connects the Marumsco Acre Lake Park and the Marumsco Acres neighborhood on the west side of the railroad to the Veterans Memorial Park on the east side
Bushy Point Trail	Northern Virginia	0.1	Within right-of-way	▪ Primarily located within Leesylvania State Park ▪ Small section crosses the CSXT right-of-way on the south side of Daniel K. Ludwig Drive ▪ Crosses under existing bridge
Belmont-Ferry Farm Trail	Fredericksburg	2	Various	▪ Existing meandering paved trail is approximately 2 miles in length and connects Belmont and the Historic Park of Falmouth to John Lee Pratt Park ▪ Proposed future phase would extend from the eastern terminus to follow along River Road and Kings Highway to connect to George Washington's Ferry Farm Park
Virginia Central Railway Trail	Fredericksburg	5	Private ownership – open to the public without a fee	▪ Existing section within the study area begins west of the tracks near Lafayette Boulevard and extends west through the neighborhood of Idlewild

▶ Continued.

Table 3.14-5: Trails

Resource Name	Alternative Area	Length (miles)	Ownership	Features
Virginia Capital Trail	Richmond	53	Various	▪ Follows along the James River and State Route 5 from downtown Richmond to Jamestown and Williamsburg to the Southeast ▪ The Richmond Riverfront section, which parallels Dock Street through Shockoe Bottom, begins at the Canal Walk
Proposed James River Heritage Trail	Richmond	Network of Trails	Various	▪ Proposed braided trail system will encompass the James River and its banks from the headwaters in the Allegheny Mountains to the mouth of the river at the Chesapeake Bay ▪ Will consist of land and water trails passing through rural areas, numerous small towns, and urban areas ▪ Within the study area, the James River Park system, the Canal Walk, and the Virginia Capital Trail all contribute to the James River Heritage Trail
James River Water Trail Lower Section	Richmond	20	Water	▪ Mapped water trail that extends west from downtown Richmond through Presquille Wildlife Refuge
Captain John Smith Historic Trail	Richmond	Network of Trails	Water	▪ Water trail on the James River throughout the study area
East Coast Greenway	Richmond	Network of Trails	Various	▪ Runs along the Atlantic Coast of the United States connecting Maine with Key West, FL ▪ In Virginia, the trail goes south from Washington, D.C. through Fredericksburg to Richmond and then south to Raleigh, NC ▪ Currently a loose network of existing trails, roadway links, and future trails
Retention Basin Park Walkway	Richmond	0.9	Various	▪ Retention Basin Park allows access to the walkway along the flood wall on the south side of the James River ▪ Walkway continues west of the park under the tracks.

3.14.6 Section 6(f) Resources

Section 6(f) of the *Land and Water Conservation Fund Act* prohibits the conversion of property acquired or developed with Land and Water Conservation Funds (LWCF) to a nonrecreational purpose without approval of the Department of the Interior's NPS. State and local governments often obtain grants to acquire or make improvements to parks and recreation areas through this Act. Section 6(f) directs the United States Department of Interior (DOI) to assure that replacement lands of equal value, location, and usefulness are provided as conditions to such conversions. Consequently, where conversions of Section 6(f) lands are proposed for transportation projects, replacement lands will be necessary.

Table 3.14-6 lists the parks and wildlife refuges within the study area that have been identified as receiving LWCF and are therefore afforded special protection under Section 6(f).

Table 3.14-6: Section 6(f) Resources

City/County	Alternative Area	Resource
Arlington County, City of Alexandria	Northern Virginia	George Washington Memorial Parkway
Prince William County	Northern Virginia	Featherstone National Wildlife Refuge
Prince William County	Northern Virginia	Leesylvania State Park
Stafford County	Northern Virginia	Widewater State Park
City of Fredericksburg	Fredericksburg	Pierson Farm/Slaughter Pen Farm
Spotsylvania County, City of Fredericksburg	Fredericksburg and Central Virginia	Fredericksburg and Spotsylvania National Military Park
City of Richmond	Richmond	Calhoun Community Center
City of Richmond	Richmond	James River Park

3.14.7 Section 4(f) Resources

Section 4(f) of the *U.S. DOT Act of 1966* (23 U.S.C. 138) prohibits use of land from a public park, recreation area, wildlife or waterfowl refuge, or any significant historic site unless it can be demonstrated that there are no feasible and prudent alternatives to avoid the property and the Project included all possible planning to minimize impacts.

- Section 4(f) applies only to publicly owned parks, recreation areas, and wildlife and waterfowl refuges. Similar resources that are privately owned yet open to the public are not considered Section 4(f) resources.
- Section 4(f) also applies to historic sites listed on or eligible for listing on the NRHP, regardless of whether the site is in public or private ownership.
- Section 4(f) applies to all archaeological sites listed on or eligible for inclusion on the NRHP, including those discovered during construction. The exception to this is when FRA, in consultation with DHR, determines that the archaeological resource is important chiefly because of what can be learned by data recovery and has minimal value to preservation in place.
- Section 4(f) applies to protected resources when a "use" occurs. This "use" can be permanent, such as the permanent acquisition of a property, or temporary, such as the use of the property for construction staging purposes. Section 4(f) also applies when a "constructive use" occurs, such as when the noise, vibration, air quality, or visual effects of a project are so great that the use of the property is substantially impaired, even though it is not physically affected by the Project.

Table 3.14-7 lists the parkland, recreational, and wildlife refuge facilities that are likely to meet the criteria for protection under Section 4(f). Architectural and archaeological resources that may fall under Section 4(f) protection are discussed in Section 3.13. Additional information on Section 4(f) resources can be found in Chapter 5.

Table 3.14-7: Section 4(f) Resources

City/County	Alternative Area	Resource
Arlington County	Arlington	Long Bridge Park
Arlington County	Arlington	Roaches Run Waterfowl Sanctuary
Arlington County, City of Alexandria	Northern Virginia	George Washington Memorial Parkway
Arlington County, City of Alexandria	Northern Virginia	Mount Vernon Trail
Arlington County	Northern Virginia	Four Mile Run Trail
City of Alexandria	Northern Virginia	Daingerfield Island Park
City of Alexandria	Northern Virginia	Potomac Greens Park
City of Alexandria	Northern Virginia	Holmes Run Trail
City of Alexandria	Northern Virginia	Eisenhower Avenue Trail
City of Alexandria	Northern Virginia	Braddock Park
City of Alexandria	Northern Virginia	Metro Linear Park
City of Alexandria	Northern Virginia	King Street Gardens
City of Alexandria	Northern Virginia	Traffic Circle Park
City of Alexandria	Northern Virginia	Hooff's Run Park and Greenway
City of Alexandria	Northern Virginia	Cameron Run Regional Park
City of Alexandria	Northern Virginia	Buchanan Park
City of Alexandria	Northern Virginia	Sunset Mini Park
City of Alexandria	Northern Virginia	Dog Run Park at Carlyle
City of Alexandria	Northern Virginia	Witter Fields
City of Alexandria	Northern Virginia	Clermont National Park
City of Alexandria	Northern Virginia	Joseph Hensley Park
Fairfax County	Northern Virginia	Fairfax County Parkway Trail
Fairfax County	Northern Virginia	Unnamed WMATA Metro Trail near Springfield Forest
Fairfax County	Northern Virginia	Cross County Trail
Fairfax County	Northern Virginia	Backlick Stream Valley Park
Fairfax County	Northern Virginia	Franconia Forest Park
Fairfax County	Northern Virginia	Loisdale Park
Fairfax County	Northern Virginia	Accotink Stream Valley Park
Fairfax County	Northern Virginia	Pohick Stream Valley Park

▶ *Continued.*

Table 3.14-7: Section 4(f) Resources

City/County	Alternative Area	Resource
Fairfax County	Northern Virginia	Mason Neck Park
Fairfax County	Northern Virginia	Old Colchester Preserve and Park
Prince William County	Northern Virginia	Featherstone National Wildlife Refuge
Prince William County	Northern Virginia	Leesylvania State Park
Prince William County	Northern Virginia	Jefferson Park Site
Prince William County	Northern Virginia	Veteran Memorial Park
Prince William County	Northern Virginia	Marumsco Acre Lake Park
Prince William County	Northern Virginia	Cockpit Point Battlefield Heritage Park
Stafford County	Northern Virginia	Widewater State Park
City of Fredericksburg	Fredericksburg	Cobblestone Park
City of Fredericksburg	Fredericksburg	Virginia Central Railway Trail
Spotsylvania County, City of Fredericksburg	Fredericksburg and Central Virginia	Fredericksburg and Spotsylvania National Military Park
Spotsylvania County	Fredericksburg	Mary Lee Carter Park
Caroline County	Central Virginia	Mattaponi State Wildlife Management Area
Hanover County	Ashland	North Ashland Park
Hanover County	Ashland	Railside Park
Hanover County	Ashland	Carter Park
Hanover County and Town of Ashland	Ashland	Ashland Trolley Line
Henrico County	Ashland	Hunton Community Center and Park
Henrico County	Richmond	RF&P Park
Henrico County	Richmond	Laurel Recreation Area
City of Richmond	Richmond	Joseph Bryan Park
City of Richmond	Richmond	Maggie Walker Governor's School Fields
City of Richmond	Richmond	Calhoun Community Center
City of Richmond	Richmond	Canal Walk Plaza and Entrance
City of Richmond	Richmond	Monument Avenue Linear Park
City of Richmond	Richmond	Libby Hill Park

▶ *Continued.*

Table 3.14-7: Section 4(f) Resources

City/County	Alternative Area	Resource
City of Richmond	Richmond	Cannonball Triangle Park
City of Richmond	Richmond	Great Shiplock Park
City of Richmond	Richmond	Walker's Creek Retention Basin Park
City of Richmond	Richmond	Albert Hill Athletic Facility
City of Richmond	Richmond	Humphrey Calder Community Center and Garden
City of Richmond	Richmond	James River Park
City of Richmond	Richmond	Hickory Hill Community Center and Elementary School
City of Richmond	Richmond	Covington Road Properties
City of Richmond	Richmond	Virginia Capital Trail
City of Richmond	Richmond	Retention Basin Park Walkway
Chesterfield County	Richmond	Falling Creek Linear Park and Iron Works
Chesterfield County	Richmond	Bensley Elementary School
Chesterfield County	Richmond	Gates Mill Park

3.15 TRANSPORTATION FACILITIES

The existing transportation facilities in the DC2RVA corridor were evaluated at two geographic scales, as shown in Figure 3.15-1. The first scale is regional, focusing on the broader transportation network and transportation modes that provide the overall context for the existing railroad service, as well as the proposed DC2RVA service. It includes portions of every county and city that the proposed service will traverse, and its extents include I-95 and U.S. Route 1, which run roughly parallel to the corridor, as well as their interchanges with other interstates and U.S. routes and primary roadways in the region. The second scale is focused on a 1-mile-wide study area centered on the rail line (0.5 mile on either side of the track). The purpose of the two geographic scales is to enable the evaluation of potential effects of the DC2RVA project at the appropriate level. For example, the regional scale data reflect larger trends due to regional growth or shifts in travel modes. The DC2RVA corridor scale data, however, reflect more localized influences on individual roadways; analysis at the DC2RVA corridor scale reflects the importance of connections in the transportation network across and on both sides of the DC2RVA corridor. The existing transportation environment is described in the following pages in the context of these two geographic scales.

The terms "grade crossing" and "at-grade crossing" are often used interchangeably, both colloquially and within federal documentation, to refer to the intersection of a roadway and railroad at ground level (i.e., vehicles on the roadway travel across the railroad tracks; trains on the railroad tracks travel across the roadway travel lanes). This Draft EIS documentation uses the term "at-grade crossing" to ensure a distinct and readily understandable difference from the term "grade-separated crossing."

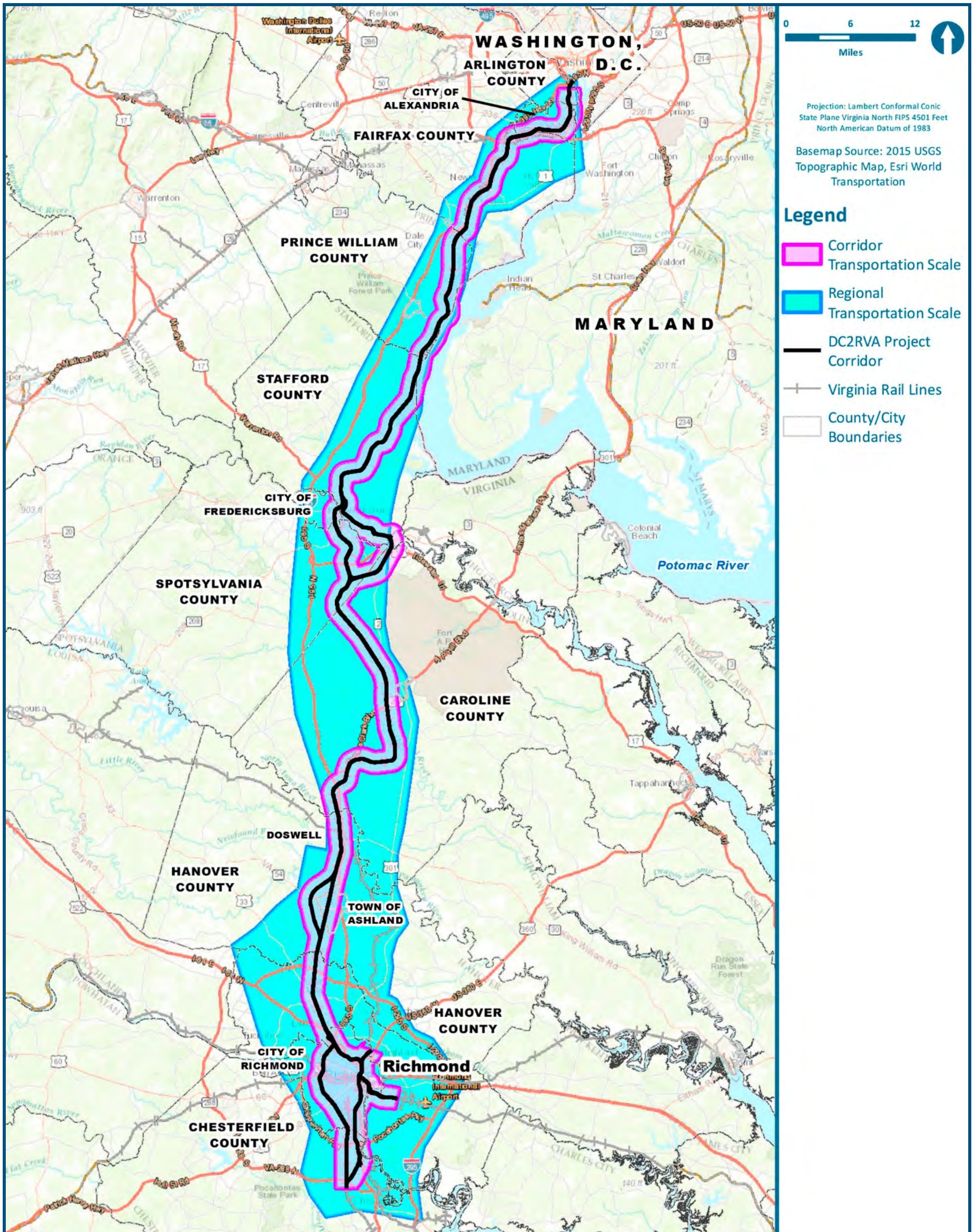


Figure 3.15-1: Transportation Analysis Scales

3.15.1 Regional Scale

3.15.1.1 Regional Roadway Network

The DC2RVA corridor passes through nine counties and three cities from Arlington County, VA, at the D.C. jurisdictional line to Chesterfield County, VA. Running roughly parallel to the railroad tracks over nearly the entire 123-mile stretch are I-95 and/or U.S. Route 1. Through Fairfax County, I-95 has eight general purpose lanes, four northbound and four southbound, and three express high-occupancy vehicle (HOV) lanes. From Prince William County to Aquia Harbour in Stafford County, I-95 has six general purpose lanes, three northbound and three southbound, and two express (HOV) lanes. From Aquia Harbour through Chesterfield County, I-95 typically has six general purpose lanes, three northbound and three southbound.

In Arlington County, U.S. Route 1 is mainly a six-lane road, three northbound and three southbound. As it moves down into Alexandria County, it remains mostly six lanes, and it splits to two one-way roads, Henry Street (southbound) and Patrick Street (northbound), and merges together again at the Capital Beltway. At Buckman Road in Fairfax County, U.S. Route 1 becomes a four-lane road, two northbound and two southbound. It continues as a four-lane road until the city of Richmond. In Richmond, when U.S. Route 1 passes over I-64, it becomes a six-lane road, three northbound and three southbound. It remains at six lanes until it passes over Chippenham Parkway in Chesterfield County, where it becomes a four-lane road.

Other interstate highways and major U.S. and state routes in each county are summarized below:

- Arlington County: I-395, George Washington Memorial Parkway
- City of Alexandria: I-395, I-495, George Washington Memorial Parkway
- Fairfax County: I-395, I-495, Franconia–Springfield Parkway, Telegraph Road
- Prince William County: Dumfries Road, Joplin Road
- Stafford County: U.S. 17, Route 3
- City of Fredericksburg: U.S. 17, Route 3
- Spotsylvania County: U.S. 17, Courthouse Road
- Caroline County: U.S. 301, Route 2, Route 30
- Hanover County: I-295, U.S. 33, U.S. 360, Route 2
- Henrico County: I-64, I-195, I-295, U.S. 33, U.S. 60, U.S. 250, U.S. 360
- City of Richmond: I-64, I-195, U.S. 33, U.S. 60, U.S. 250, U.S. 360
- Chesterfield County: I-295, U.S. 60, U.S. 360

Within the regional area, as shown in Figure 3.15-1, approximately 2,000 miles of roadway carry 79 million vehicle-miles[1] each day in existing conditions. Table 3.15-1 summarizes the roadway system on a county-by-county basis at the regional scale, presenting total length of roadway miles by type of roadway and average daily traffic (ADT) on those facilities. The I-95 facility is approximately 280 miles in length (including I-395) between Washington, D.C. and Richmond within the DC2RVA corridor regional roadway network; I-95 carries approximately 38 million vehicle-miles each day in existing conditions.

[1] These estimates of roadway (centerline) miles and vehicle miles traveled (VMT) comprise all Interstate and U.S. highways, as well as major state routes. Secondary and urban roads that serve primarily as access to individual properties were not included.

Table 3.15-1: Regional Roadway Network—Existing Conditions Daily Traffic

City/County	Directional Measure[1]	Interstate and U.S. Routes	State Primary Route	State Secondary Route	Urban Routes	Total
Arlington	ADT	3,484,932	1,471,860	137,323	–	5,094,115
	Length	17.9	29.9	5.5	–	53.3
	VMT	2,612,262	1,546,065	50,117	–	4,208,444
City of Alexandria	ADT	4,429,146	2,184,942	3,264	116,484	6,733,836
	Length	31.8	35.8	0.6	9.6	77.8
	VMT	3,948,393	1,079,649	2,017	92,377	5,122,436
Fairfax	ADT	8,925,306	1,220,430	2,287,758	6,732	12,440,226
	Length	79.9	63.8	51.1	0.3	195.1
	VMT	11,739,358	1,927,020	1,127,223	1,833	14,795,434
Prince William	ADT	4,202,502	1,032,138	998,519	734	6,233,893
	Length	66.8	16.2	39.8	1.5	124.3
	VMT	7,066,087	586,450	602,247	1,131	8,255,915
Stafford	ADT	2,707,488	409,836	262,201	–	3,379,525
	Length	63.7	25.1	70.6	–	159.4
	VMT	5,359,030	447,369	295,487	–	6,101,886
City of Fredericksburg	ADT	804,576	913,104	–	24,072	1,741,752
	Length	19.3	10.0	–	1.6	30.9
	VMT	911,434	351,615	–	9,644	1,272,693
Spotsylvania	ADT	1,916,682	240,006	100,001	–	2,256,689
	Length	58	11	26	–	95.0
	VMT	3,360,737	486,396	107,256	–	3,954,389
Caroline	ADT	753,372	186,762	51,407	–	991,541
	Length	77.1	45.6	80.5	–	203.2
	VMT	3,172,676	348,945	84,603	–	3,606,224
Hanover	ADT	3,368,917	220,912	151,735	21,349	3,762,913
	Length	100.4	26.5	58.9	5.7	191.5
	VMT	5,746,204	174,503	102,633	12,602	6,035,942

▶ *Continued – see end of table for notes.*

Table 3.15-1: Regional Roadway Network—Existing Conditions Daily Traffic

City/County	Directional Measure[1]	Interstate and U.S. Routes	State Primary Route	State Secondary Route	Urban Routes	Total
Henrico	ADT	8,698,325	1,297,369	1,542,852	–	11,538,546
	Length	222.5	78.5	74.1	–	375.1
	VMT	9,360,405	1,010,272	1,180,790	–	11,551,467
City of Richmond	ADT	6,857,644	2,734,008	–	860,472	10,452,124
	Length	101	82	–	52	235.0
	VMT	4,504,821	1,939,012	–	501,262	6,945,095
Chesterfield	ADT	1,707,990	2,833,631	213,649	–	4,755,270
	Length	55.9	106.1	14.8	–	176.8
	VMT	3,034,399	4,005,856	106,099	–	7,146,354
Total	**ADT**	**47,856,880**	**14,744,998**	**5,748,709**	**1,029,843**	**69,380,430**
	Length	**894.3**	**530.5**	**421.9**	**70.7**	**1,917.4**
	VMT	**60,815,806**	**13,903,152**	**3,658,472**	**618,849**	**78,996,279**

Source of ADT and Length Data: VDOT, GIS online database for Annual Average Daily Traffic with Vehicle Classification for 2014. Accessed January 2016.

1. ADT = Average Daily Traffic; VMT = Vehicle Miles Traveled; calculated for individual roadway sections. VMT is calculated for individual roadway sections, which is required due to the range of section ADT and differing section lengths. The VMT shown for each County is the sum of the products of the individual sections within the County (i.e., not the calculation of County-wide ADT and length).

3.15.1.2 Regional Rail Network

The DC2RVA corridor is a shared use corridor, with freight trains (operated by CSXT and NS railways), intercity passenger trains (operated by Amtrak), and local commuter trains (operated by VRE) commingled on the same tracks. These uses within the DC2RVA corridor and their operations are summarized below; refer to Appendix A, *Alternatives Technical Report,* for full details.

CSX Transportation. CSXT, the principal operating subsidiary of CSX Corporation, is the track owner and operator of the DC2RVA corridor. 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 most of the DC2RVA corridor.

The DC2RVA project limits include components of three critical rail corridors in the larger CSXT freight rail network:

- *I-95 Freight Rail Corridor*. The I-95 Freight Rail Corridor is a 1,400-mile-long rail line running the length of the eastern seaboard between New York and Miami, FL, that roughly parallels I-95 and serves many urban, port, industrial, and rural areas along the eastern seaboard and includes the RF&P Subdivision.

- *National Gateway*. The National Gateway is a public-private partnership to improve the transportation of shipping containers to population centers in the Midwestern United States. Projects to upgrade three rail corridors are part of the initiative, including the Virginia Avenue Tunnel clearance improvement project in Washington, D.C.
- *Coal Network*. In Richmond, the DC2RVA project area includes a small component of the CSXT Peninsula Subdivision east to Beulah, which is part of CSXT's Coal Network that connects coal mines in the Appalachian Mountains to electric power generating stations and export coal docks.

Norfolk Southern (NS) Railway. NS operates approximately 20,000 route miles in 22 states and Washington, D.C., 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 (approximately 60 percent of the state's total rail network), including a rail line from Manassas that connects to the DC2RVA corridor in Alexandria. Additionally, NS has trackage rights from Alexandria north to Washington, D.C. on the DC2RVA corridor.

Amtrak. Amtrak operates intercity passenger rail service throughout the United States and generally operates over the tracks of the private freight railroads. Amtrak operates 24 daily trains and 2 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 trips north to Washington Union Station. The four types of passenger train serve that Amtrak operates in the DC2RVA corridor are summarized below (see Chapter 2 for full details):

- Northeast Regional (Virginia) Amtrak service provides regional passenger rail service along the length of the Northeast Corridor from Boston and New York and continues south to serve routes in Virginia. Trains make local station stops.
- Interstate Corridor (Carolinian) Amtrak operates between New York and North Carolina (one single daily round trip) through Virginia, making fewer stops in the DC2RVA corridor than the Northeast Regional service.
- Long Distance Amtrak service operates from New York and continues through Washington, D.C. and Virginia to other out-of-state locations. Long distance trains serve the fewest of Amtrak station stops within the DC2RVA corridor.
- Auto Train Amtrak service operates as a daily nonstop, overnight train between dedicated station facilities in Lorton, VA and Florida, and carries passengers and their automobiles.

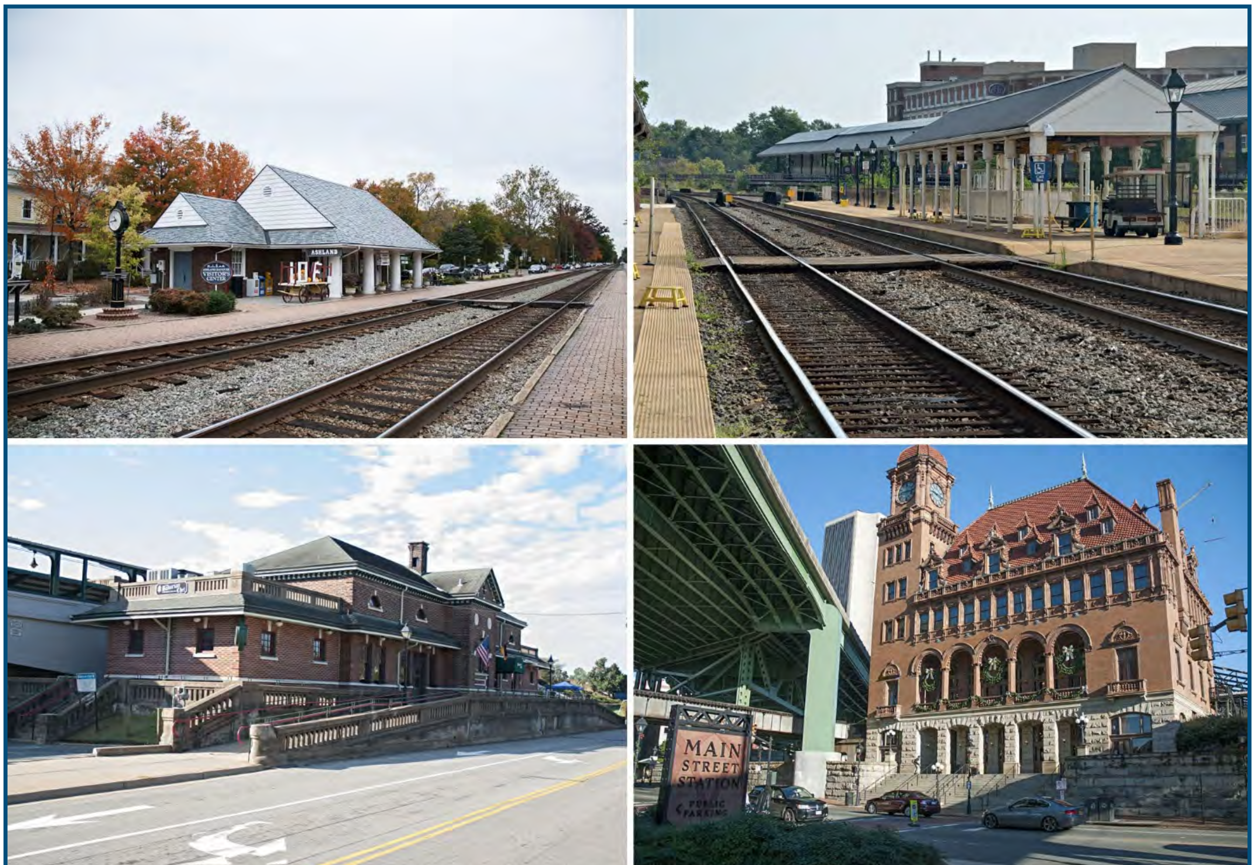
Virginia Railway Express. VRE is a transportation partnership of the Northern Virginia Transportation Commission (NVTC) and the Potomac and Rappahannock Transportation Commission (PRTC) and has been providing commuter rail service to the residents of Northern Virginia since 1992. VRE commuter trains operate on two lines—the Fredericksburg Line and the Manassas Line—that join at Alexandria and continue into Washington Union Station.

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 revenue[2] round trips between Washington, D.C. and Spotsylvania (60 miles).
- *Manassas Line*: Eight weekday-only revenue round trips and one weekday-only nonrevenue 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 Manassas Line 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.

3.15.1.3 Stations and Other Regional Transportation Facilities

Station Location, Service, and Connection. Amtrak and VRE stations that currently serve the DC2RVA corridor are summarized in Table 3.15-2 and are included in Figure 3.15-2. Full details of these stations are provided in Appendix A, *Alternatives Technical Report*.



Existing Passenger Stations

[2] A revenue trip is a trip that carries paying passengers. A non-revenue trip is a trip that does not carry paying passengers, for example for the purposes of moving crew or empty trains.

Table 3.15-2: Amtrak and VRE Stations in the DC2RVA Corridor

City/County	Station Name	Amtrak Service	VRE Service	Nearest Major Highway	Transit Connections
Arlington	Crystal City		X	0.35 mile to U.S. Route 1 0.5 mile to I-395 1 mile to George Washington Memorial Parkway	VRE Fredericksburg and Manassas Lines Metrorail Blue and Yellow Lines Metrobus, ART, Fairfax Connector, PRTC OmniRide buses
Alexandria	Alexandria	X	X	Less than 2 miles to I-95/I-495	VRE Fredericksburg and Manassas Lines Metrorail Blue and Yellow Lines (nearby) Metrobus, Dash, King St. Trolley, Richmond Highway Express Buses
Fairfax	Franconia-Springfield		X	0.75 mile to I-95 2 miles to U.S. Route 1 On Franconia-Springfield Parkway	VRE Fredericksburg Line Metrorail Blue Line Metrobus, Fairfax Connector, PRTC OmniRide buses Greyhound intercity bus
	Lorton (VRE)		X	1 mile to U.S. Route 1 1.5 miles to I-95	VRE Fredericksburg Line Fairfax Connector bus Vamoose intercity bus
	Lorton Auto Train	X		0.13 mile to I-95 1 mile to U.S. Route 1	None
Prince William	Woodbridge	X	X	Adjacent to U.S. Route 1 Less than 3 miles to I-95	VRE Fredericksburg Line PRTC OmniRide, OmniLink and Prince William Metro Direct buses Greyhound intercity bus
	Rippon		X	2 miles to U.S. Route 1 4 miles to I-95	VRE Fredericksburg Line
	Potomac Shores		X	3 miles to U.S. Route 1 4.5 miles to I-95	VRE Fredericksburg Line *(station planned to open in 2018; not shown in Figure 3.15-2)*
	Quantico	X	X	5 miles to I-95 3 miles to U.S. Route 1	VRE Fredericksburg Line PRTC OmniLink bus
Stafford	Brooke		X	4 miles to U.S. Route 1 4.5 miles to I-95	VRE Fredericksburg Line
	Leeland Road		X	Less than 2 miles to U.S. Route 1 4 miles to I-95	VRE Fredericksburg Line
Fredericksburg	Fredericksburg	X	X	1 mile to VA Route 3 Less than 2 miles to U.S. Route 1 3 miles from I-95	VRE Fredericksburg Line Fredericksburg Transit (FRED) bus
Spotsylvania	Spotsylvania		X	3.6 miles to U.S. Route 1 4.3 miles to I-95	VRE Fredericksburg Line
Hanover	Ashland	X		2 miles to I-95	None
Henrico	Staples Mill Road	X		2 miles to I-64 2.6 miles to U.S. Route 1 5 miles to I-95	GRTC bus
Richmond	Main Street Station	X		0.6 mile to I-95	GRTC bus, Megabus intercity bus

Note: While rail service extends to Union Station and L'Enfant Plaza Station in Washington, D.C., the data in this table are for current (existing and under construction) stations that are located within the DC2RVA corridor in Virginia.

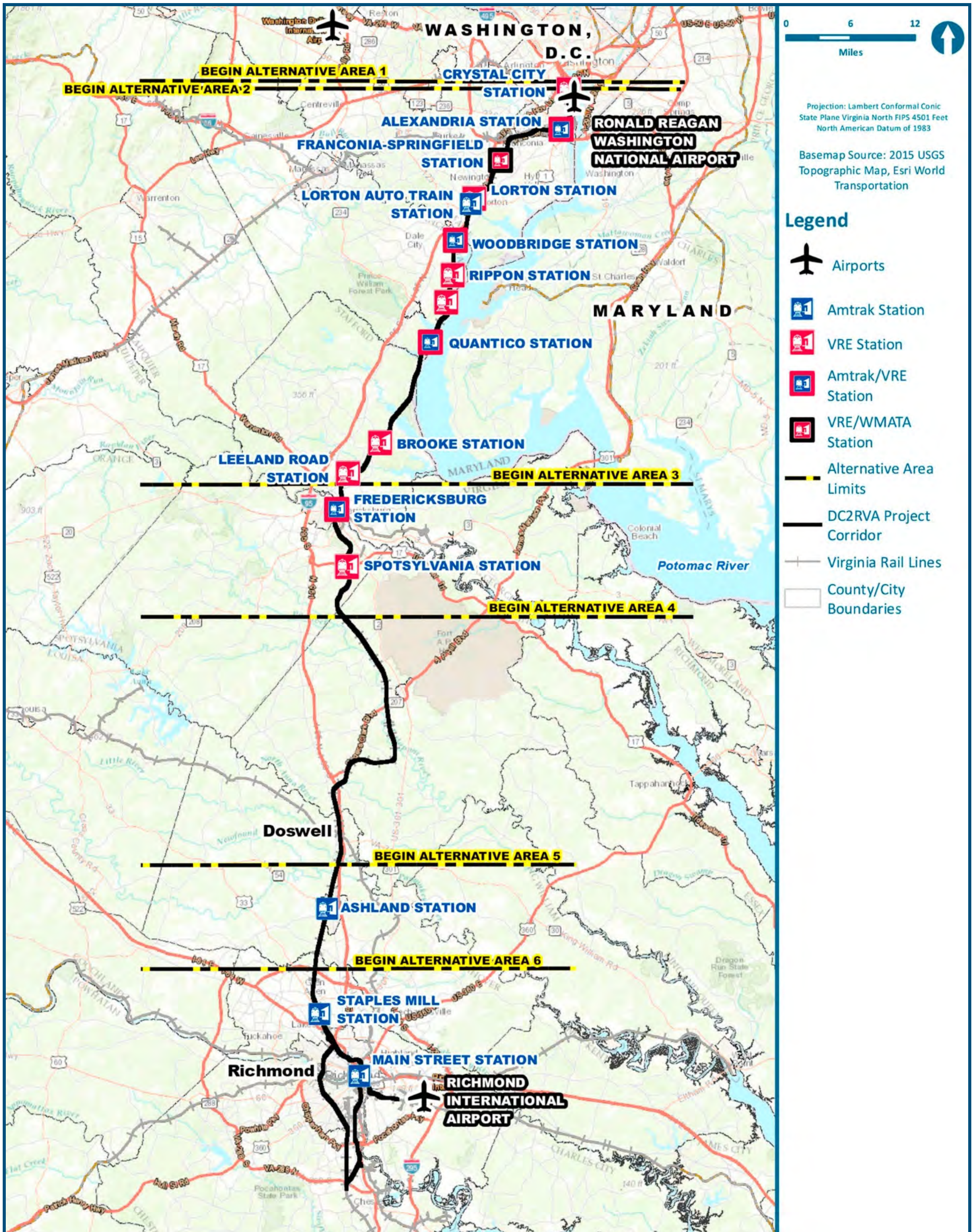


Figure 3.15-2: Airports and Train Stations in Project Corridor

Parking at Stations Served by Amtrak. The existing parking that is provided at each station in the DC2RVA corridor that is served by Amtrak is summarized in Table 3.15-3 below. Typically, long-term parking spaces are daily and/or overnight spaces, and short-term spaces have hourly limits. The majority of the provided parking spaces in the corridor are free for riders, unless otherwise noted; the exceptions are the long-term parking provided at the Main Street and Staples Mill Road stations in Richmond.

Table 3.15-3: Existing Parking Inventory by Amtrak Station

Amtrak Station Name	Number of Spaces[1]	Facilities Notes
Alexandria	25 Short-Term 25 Long-Term	Surface parking lot. General parking available in City of Alexandria (public parking garages, street parking, etc.).
Lorton Auto Train	20 Short-Term 0 Long-Term	Surface parking lot. Additional ADA-accessible dedicated spaces available.
Woodbridge	150 Ground Level Lot 738 Parking Garage	Short- and Long-Term spaces are combined. Parking facilities estimated at 65% capacity.
Quantico	210 Short-Term 60 Long-Term	Surface parking lot. Additional ADA-accessible dedicated spaces available. Parking facilities estimated at 70% capacity. Bicycle racks are provided.
Fredericksburg	810 Total *684 VRE Only* *124 City Resident Only*	Surface parking lots located near the station. Additional ADA-accessible dedicated spaces and motorcycle parking available. Parking facilities estimated at 47% capacity.
Ashland	0	No dedicated parking lot. General parking available throughout the Town (parallel parking on streets, etc.).
Staples Mill Road	20 Short-Term (1-3 hours free) 288 Long-Term (Paid)	Pre-paid parking via third party vendor required. Parking provided in surface parking lots. Additional ADA-accessible dedicated spaces available. 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.
Main Street	30 Long-Term (Paid) *First 30 minutes Free*	Parking provided in surface parking lots.

1. Inventory as of July 2016

Other Regional Transportation Facilities. In addition to the stations that specifically serve the DC2RVA corridor, various other transportation facilities connect to and through the DC2RVA corridor, as summarized below. For full details, refer to Appendix S, *Transportation Technical Report*.

Public Transit

- WMATA Metrorail and Metrobus serving Washington, D.C. and Northern Virginia
- Arlington Transit (ART) serving Arlington County, VA
- Alexandria Transit Company (ATC) DASH system serving connection to Metrobus, Metrorail, VRE, and other local bus routes in Alexandria, VA
- Fairfax Connector Bus serving routes connecting to Fairfax County, VA
- OmniRide and OmniLink (PRTC) serving Prince William, Stafford, and Spotsylvania Counties and the City of Fredericksburg
- FRED serving the City of Fredericksburg and connecting to Stafford, Spotsylvania, and Caroline counties
- GRTC (Greater Richmond Transit Company) Transit System serving the City of Richmond and Henrico County and connecting to Chesterfield County

*Aviation (*Airport locations are shown in Figure 3.15-2.)

- Ronald Reagan Washington National Airport (Arlington, VA)
- Richmond International Airport (Richmond, VA)

Bicycle and Pedestrian Facilities On and/or Adjacent to Public Roadways

- Potomac Yard Trail (Alexandria, VA)
- Mount Vernon Trail (Northern Virginia)
- Richmond Capital Trail (from Williamsburg, VA, to Richmond, VA)
- Cannon Creek Greenway (Richmond Henrico Turnpike in Richmond, VA)
- Bike lanes (various streets in Richmond, VA, and Alexandria, VA)
- U.S. Bike Routes 1 and 76
- Ashland Trolley Line Trail

3.15.1.4 Regional Highway–Rail Crossing Accident Data

FRA data show that 96 percent of rail-related fatalities, most of which are considered preventable, are the result of accidents at highway–rail crossings and by vehicles trespassing onto the tracks[3]. Highway–rail accident data for public crossings from the FRA Office of Safety Analysis (OSA)[4] were reviewed for types of highway–rail crossing accidents[5] as well as overall incident trends.

[3] https://www.fra.dot.gov/eLib/Details/L17371

[4] Data obtained online reporting databases (accessed February 2017 for the most recently available data for each report type).

[5] Train accidents that do not affect the public highway system, the causes of which range from human operation factors to mechanical/track and electrical failures. These types of train-only accidents are not included in the data presented in this section; however, in the state of Virginia from 2013 to November 2016, there were a total of 33 train (non-highway) accidents.

The tables below present the data for total number of accidents for highway–rail incidents (Tables 3.15-4 and 3.15-5. Refer to Appendix S, *Transportation Technical Report* for more details.

As shown in Tables 3.15-4 and 3.15-5, the highway–rail crossing accident data for specific counties within the DC2RVA corridor are reported and compared to all other counties within the state. If a DC2RVA county is not listed, no documented collisions in that county were reported during the reporting dates. All counties that have experienced highway–rail-related accidents but are not located in the DC2RVA corridor are grouped together as “Other Counties.”

Throughout the Commonwealth of Virginia for the four-year period through the end of 2016, there were 21 highway–rail accidents. Highway–rail accidents consist of an accident between a train and any type of motor vehicle at a public highway–rail crossing. Table 3.15-4 provides the county-by-county breakdown of these accidents.

In the DC2RVA corridor, seven public at-grade crossings had at least one accident in the four-year period through the end of 2016, as reported in Table 3.15-5. All accidents involved a train striking a highway user, six of which were automobile vehicles and one of which was a motorcycle; one accident involved pedestrians and resulted in two fatalities. Seven of the eight total accidents occurred at crossings that have non-four-quadrant gates. Any discrepancies between the data in Tables 3.15-4 and 3.15-5 are due to the use of different FRA OSA data systems and their source data reporting time periods that were available.

3.15.2 Corridor Scale

The following section describes the transportation network for a 1-mile-wide study area that is centered on the existing CSXT rail line within the EIS alternative areas[6]; the DC2RVA corridor scale is shown in Figure 3.15-1. The transportation network is presented as a county-by-county overview of general characteristics of land use and facilities, as well as a more-focused description of the roadway network that is targeted on the highway–rail crossings and their operations. Refer to Appendix S, *Transportation Technical Report,* for more details on the summaries provided below.

3.15.2.1 Transportation Corridor Network (by City/County)

The following paragraphs describe the general transportation characteristics of the DC2RVA corridor, including a summary of total highway–rail crossings (both public and private, at grade and grade separated) within each County and/or City. Refer to Section 3.15.2.2 for more-detailed descriptions and data of the DC2RVA corridor crossings.

[6] The extents of the Peninsula Subdivision rail line, which serves passenger trains between Richmond and Newport News, that are located within the Draft EIS limits were included in the preliminary identification of roadway crossings. It was the intent of the at-grade crossing evaluation methodology (refer to Appendix OO of the *Alternatives Technical Report*) to evaluate all public roadway crossings and any private roadway crossings that could have an impact on the public (either through public use of a private crossing or private ownership by a citizen of a parcel that has and/or needs crossing access). Within the Draft EIS limits on the Peninsula Subdivision rail line, there is a single at-grade roadway crossing that functions as private exclusive railroad access, as well as several existing grade-separated crossings. However, the DC2RVA project was not anticipated to have build alternative effects that would affect roadway crossings to the same levels as along the RF&P line, A-Line, and S-Line because the Peninsula Subdivision rail line is not proposed to have an additional track and does not serve trains to the same level through the entire corridor between Washington, D.C. and Richmond. Accordingly, the short segment of the Peninsula Subdivision rail line was not included in further transportation affected environment or environmental consequences. This does not, however, preclude the addition of any safety measures at the existing crossings in coordination with FRA.

Table 3.15-4: Highway–Rail Accidents at Public Crossings in Virginia

County/City	Total		Total Calendar Year (CY) Accidents				% Change over Time		
	Accidents	Percent of Total	CY 2013	CY 2014	CY 2015	CY 2016*	CY 2013 to CY 2015	CY 2014 to CY 2015	Month-to-Month % Change CY 2015 to CY 2016
Caroline	1	4.8	–	–	1	–	–	–	–
Henrico	1	4.8	–	1	–	–	–	–	–
Richmond	3	14.3	–	1	1	1	–	–	–
Chesterfield	3	14.3	–	–	3	–	–	–	–
Other Counties	13	61.8	1	6	3	3	–	–	–
State Total	**21**	**100**	**1**	**8**	**8**	**4**	**700**	–	**-50.0**

Source: FRA OSA, Query Accident/Incident Trends—Highway–Rail Crossings. CY = Calendar Year
*2016 accident data reported from FRA month-to-month for the CY.

Table 3.15-5: Highway–Rail Accidents at Public Crossings in DC2RVA Corridor

Crossing	City/County	Total	Year	Warning Device	Circumstance (User)	User Injuries (Fatalities)
Featherstone Road	Prince William	1	2015	Four-Quadrant Gates	Train Struck Highway User (Auto)	1 (0)
Myrtle Street	Hanover	1	2012	Gates	Train Struck Highway User (Auto)	1 (0)
Hungary Road	Henrico	1	2014	Gates	Train Struck Highway User (Auto)	0 (0)
Broad Rock Boulevard	Richmond	2	2015	Gates	Train Struck Highway User (Pedestrian)	0 (2)
			2011	Gates	Train Struck Highway User (Motorcycle)	1 (0)
Terminal Avenue	Richmond	1	2011	Gates	Train Struck Highway User (Auto)	0 (0)
Hospital Street/N. 7th Street	Richmond	1	2015	Gates	Train Struck Highway User (Auto)	0 (0)
Bells Road	Richmond	1	2014	Gates	Train Struck Highway User (Auto)	0 (0)

Source: FRA OSA, Web Accident Prediction System.

Arlington County/City of Alexandria (Arlington and Northern Virginia Areas). Starting from the northern extent of the DC2RVA corridor at the Long Bridge connecting into Washington, D.C., the Project corridor parallels U.S. Route 1 and the George Washington Memorial Parkway and the southern edge of the Capital Beltway through Arlington County and the city of Alexandria, a section of just greater than 7 rail miles. The rail in this area consists of three main line tracks. The Northern Virginia area is one of the most urban in the DC2RVA corridor, with dense development surrounding the DC2RVA corridor. All highway–rail crossings (a total of 11 within this section, 10 public and 1 private) are grade separated with typically less than 1 mile between adjacent crossings. In downtown Alexandria, adjacent roadway crossings can be within a few hundred feet of each other. Daily vehicle volumes on the crossing roadways range from less than 10,000 vehicles in downtown Alexandria to more than 60,000 vehicles on the George Washington Parkway and on Telegraph Road near where it interchanges with I-95. Also adjacent to the DC2RVA corridor is Ronald Reagan Washington National Airport, which is served by Metrorail to the Crystal City Station (VRE only) in Arlington County and the Alexandria Station (Amtrak and VRE, adjacent to Metrorail station) in the city of Alexandria.

Fairfax County. The DC2RVA corridor in Fairfax County parallels the eastern side of I-95, with U.S. Route 1 running farther to the east. The 13 miles of this section consist of either two or three main line tracks. Land use transitions in this Fairfax County section from dense urban south of Alexandria into more suburban, typically housing-based development, in the southern part of the county; many of the commercial land uses are directly adjacent to I-95 and its interchanges with the crossing roadways of the DC2RVA corridor. All 12 highway–rail crossings within the County are grade separated and, outside of the city of Alexandria, adjacent crossings are typically 1 to 2 miles apart. The highway–rail crossing with the highest daily vehicle volume in the entire DC2RVA corridor is the crossing of I-95 in the northern part of Fairfax County, just south of the city of Alexandria, with a daily volume of more than 184,000 vehicles. Other crossing roadway volumes range from almost 50,000 daily vehicles on those principal arterial roadways that connect and interchange with I-95 (Franconia Road and Franconia-Springfield Parkway) to less than 5,000 daily vehicles on the smaller two-lane local roadways in the suburban southern parts of the County. The Franconia-Springfield and Lorton stations (VRE), as well as the Lorton Auto Train Station (Amtrak), are located within the DC2RVA corridor in Fairfax County.

Prince William County. The 12 miles of DC2RVA corridor in Prince William County run parallel to I-95 and consist of either two or three main line tracks. For the southern half of the county, the DC2RVA corridor runs within 0.5 mile or less of the west bank of the Potomac River. Much of the land use throughout the DC2RVA corridor is suburban housing development. Crossing roadways typically provide access to these developments, extending from the Potomac River to I-95 and areas to the west. There are 11 crossings in Prince William County. Four of the six public crossings are grade separated, with most of the at-grade crossings located in the southern part of the county; all private crossings are at grade. The only public at-grade crossing with at least 10,000 daily vehicles is Featherstone Road. The smaller local roadway crossings, such as Daniel K. Ludwig Drive and Possum Point Road, have less than 500 vehicles per day. The DC2RVA corridor passes through two denser urban areas within the county: Woodbridge and MCBQ. Crossings that are located within military installations were categorized by DRPT as private crossings for analysis in the DC2RVA Project; Potomac Avenue, which is located in the Town of Quantico (and not within the MCBQ installation), is a public crossing within Prince William County. Adjacent crossings are within a few hundred feet of each other within these urban areas. As the DC2RVA corridor progresses south, adjacent crossings are farther apart (up to 3 miles apart). Woodbridge and Quantico Stations (Amtrak and VRE) and Rippon Station (VRE) are located within the DC2RVA corridor in Prince William County. Potomac Shores Station (VRE) is currently under construction.

Stafford County. In the Stafford County section of the DC2RVA corridor on the RF&P Line, which is approximately 18 miles of either two or three main line tracks, the rail alignment runs along the coast of the Potomac River until it reaches Arkendale/Widewater State Park, where it then shifts to the west toward U.S. Route 1 and I-95, which run parallel to each other in close proximity. Within most of this section, land use is generally rural, with large areas of undeveloped, forested land interspersed with relatively small residential communities. The public crossing roadways in the rural areas generally connect these communities together and to U.S. Route 1 and/or I-95. There are 18 roadway crossings of the DC2RVA corridor; 11 are public crossings (most of which are grade separated), and 7 are private crossings. Private crossings typically provide access to residential properties. Land use transitions to suburban as the DC2RVA corridor approaches the city of Fredericksburg. Volumes on the crossing roadways are representative of the adjacent land use densities with the highest volume crossing at Kings Highway (grade separated) located just north of the city of Fredericksburg; this road is a 4-lane median-separated minor arterial roadway with more than 25,000 daily vehicles. The lowest volume roadways typically carry several hundred daily vehicles, often providing sole access into small residential communities. In these rural areas, adjacent crossings tend to be located 1 to 3 miles apart. The Brooke and Leeland Road VRE stations are located in the county.

The portion of the DC2RVA corridor that bypasses the city of Fredericksburg on the bypass alignment splits from the main line track just north of Fredericksburg at Butler Road in Stafford County, along a CSXT single-track rail line called the Dahlgren Branch. It continues to the east of the city along Kings Highway, then crosses over the Rappahannock River. From there, it heads west to meet the main corridor just south of the Spotsylvania VRE Station. This bypass is approximately 13 rail miles long, with 6 miles of existing rail corridor along the CSXT Dahlgren Branch and 7 miles of new track alignment. At the beginning of the split north of Fredericksburg, the area is mostly suburban, but as the DC2RVA corridor moves farther away from the city, it becomes more rural. Along the existing Dahlgren Branch track, there are five existing at-grade highway–rail crossings. The roadways in this area carry daily traffic volumes ranging from 150 vehicles on local roadways to 21,000 vehicles on principal arterial roadways. Additionally, the Fredericksburg Bypass alignment crosses five public and four private roadways that are not existing rail crossings on the portion of the alignment that would be new track.

City of Fredericksburg. The DC2RVA corridor runs through the eastern part of the city of Fredericksburg for approximately 2 rail miles; the line in the city typically consists of either two or three main line tracks (with sections of three to four tracks that provide yard access in the southern portion of the city) and includes a two-track crossing of the Rappahannock River. This section has dense urban development, typical of a city, on both sides of the DC2RVA corridor. In the most downtown portion of the DC2RVA corridor, adjacent crossings are located within a few hundred feet of each other. Six public roadways cross the DC2RVA corridor, all but one of which are grade-separated (Landsdowne Road, with almost 9,000 vehicles per day, is at grade). The Fredericksburg Station (Amtrak and VRE) is located between Lafayette Boulevard (to the northwest) and Frederick Street (to the southeast); these two streets generally parallel the DC2RVA corridor through downtown. The Blue and Gray Parkway (U.S. Route 3), a principal arterial roadway that crosses the DC2RVA corridor, carries more than 40,000 vehicles per day. Other crossing roadways in the City limits generally carry between 2,000 and 10,000 vehicles per day.

Spotsylvania County. The RF&P Line portion of the DC2RVA corridor traverses 8 miles of either two or three main line tracks through the eastern corner of Spotsylvania County, with sections of three to four tracks through the area near the US-17 (Mills Drive) crossing to provide yard access. This part of the county is generally rural, with large areas of the DC2RVA corridor crossing through undeveloped, forested land and farms. Four roadways cross the DC2RVA corridor in the county; two are at-grade crossings of local roads and two are grade-separated crossings. The Spotsylvania Station (VRE) is located within Spotsylvania County. The Fredericksburg Bypass alignment crosses through a portion of the county as it connects back to the RF&P Line; there are no existing highway–rail crossings on this portion of the bypass alignment as it would be new track.

Caroline County. The RF&P Line portion of the DC2RVA corridor travels through central Caroline County, consisting of 25 rail miles consisting of two main line tracks. The DC2RVA corridor begins veering to the east toward Bowling Green and the Richmond Turnpike before making its way back toward U.S. Route 1 and I-95 in Ruther Glen and continues to run south between the two roadways. Most of the land use in this long section of corridor is rural, with large areas of the DC2RVA corridor crossing through undeveloped, forested land and farms. There are 22 roadway crossings in the county: 12 public roadway crossings and 10 private crossings, which typically provide access to residences and farm lands. Most of the public crossings are at grade, which is typical of a more rural area, with adjacent crossings ranging from 1.5 to 5 miles apart. In the southern part of the county, the DC2RVA corridor crosses I-95; this grade-separated crossing is one of the highest volume crossings in the DC2RVA corridor, with almost 100,000 daily vehicles.

Additionally, the Fredericksburg Bypass alignment crosses through a portion of the northwestern corner of the county as it connects back to the RF&P Line; there are no existing highway–rail crossings on this portion of the bypass alignment as it would be new track.

Hanover County. The RF&P Line of the DC2RVA corridor traverses central Hanover County for a section of just over approximately 13 miles of two main line tracks. The DC2RVA corridor runs between U.S. Route 1 and I-95 until just north of the town of Ashland where it crosses over U.S. Route 1 and continues on the west side of both of these roadways. Outside the town of Ashland, which includes development typical of a small-town business district that extends approximately two blocks in either direction, land use in the DC2RVA corridor is generally rural or suburban. There are 17 roadway crossings of the DC2RVA corridor in the county, 11 of which are at-grade public crossings and 5 of which are public grade-separated crossings (there is also one private grade-separated crossing in the county). Seven of the public at-grade crossings are within the limits of the town of Ashland. Through Ashland, the rail line runs down the median of Center Street through the downtown commercial area, as well as the campus of Randolph-Macon College and residential areas north and south of the commercial district. Adjacent roadway crossings within the town are less than 0.5 mile apart, with some located within a few hundred feet of each other. Center Street operates as two one-way roadways (one on each side of the rail line). The main roadway in the town is England Street/Thompson Street (Route 54), which crosses the DC2RVA corridor adjacent to the Ashland Station at a five-way roadway intersection that includes both sides of Center Street and Hanover Avenue. This roadway crossing is one of the highest volume (14,000 daily vehicles) at-grade crossings in the DC2RVA corridor. There are also 11 at-grade pedestrian crossings of the DC2RVA corridor within the town of Ashland. The 11 pedestrian crossings consist of approximately 3-foot-wide wood or composite platforms placed between the tracks and rails. The pedestrian crossings do not have active warning devices (i.e., flashing lights, bells, and crossing gates activated by approaching trains), although many of the pedestrian crossings are located near or adjacent to at-grade roadway crossings with approach-activated flashing lights, bells, and gates. Outside of the town of Ashland, the roadway crossings generally carry a few hundred to several thousand vehicles per day, depending on the type of roadway served, and they are typically located within 1 to 2 miles of each other.

The Ashland Bypass alignment splits from the RF&P Line after the Old Ridge Road crossing just north of the town of Ashland. It runs west of the town toward the intersection of West Patrick Henry Road and Independence Road. After passing between Kings Pond and Lucks Pond, the alignment begins to veer back to the east toward the main corridor where it merges just before the Elmont Road crossing. This section consists of just more than 7 miles of new construction. Most of the roads in this area are either minor collector or local roads with daily volumes ranging from 500 to 900 vehicles, or major collector or minor arterial roads with daily volumes ranging from 2,000 to 8,000 vehicles. There are no existing highway–rail crossings on the Ashland Bypass alignment as the entire alignment would be new track; the bypass alignment would cross eight public and seven private roadways.

Henrico County. The DC2RVA corridor in Henrico County quickly transitions from more rural and light suburban land use patterns into denser suburban residential and commercial development as it moves toward the city of Richmond. This section, which consists of just more than approximately 8 miles of either two or three main line tracks, is typified by residential areas and collector-type crossing roadways that connect neighborhoods to the major roadway arteries of Staples Mill Road (Route 33), U.S. Route 1, and I-95. The DC2RVA corridor generally parallels Route 33 for the southern portion of the county and crosses I-295 and I-64. There are 10 public roadway crossings in the county, 6 of which are grade separated. Roadway crossings in the county are typically located within 1 mile or less of an adjacent crossing. In general, the at-grade crossings are located within the more suburban northern areas of the county, transitioning to mostly grade-separated crossings closer to the city of Richmond. Henrico County has one of the highest volume at-grade crossings in the DC2RVA corridor (Hungary Road with 16,000 daily vehicles), as well as one of the highest volume grade-separated crossings (I-64 with 140,000 daily vehicles). The Staples Mill Road Amtrak Station serves Henrico County and is located just north of I-64 along Staples Mill Road. The Richmond International Airport is located approximately 8 miles east of the DC2RVA corridor in the county.

City of Richmond. The DC2RVA corridor splits just north of Richmond into two lines, one to the east and one to the west of the city. The A-Line runs west of the city along I-195 and Route 76 until it crosses over the James River, where it runs parallel to Westover Hills Boulevard and Belt Boulevard. This line is approximately 9.5 miles long and consists of 2 main line tracks with 23 public highway–rail crossings (5 at grade and 18 grade separated). The S-Line runs east of the city along I-64 and then continues south through downtown Richmond along I-95. The Main Street Amtrak Station is located along this line. The S-Line is just more than approximately 10 miles long and consists of either 1 or 2 main line tracks with 34 highway–rail crossings (30 public and 4 private). This jurisdiction consists of the city of Richmond, as well as the more suburban area of Richmond south of the James River. In the city, adjacent crossings are generally within 0.3 mile of each other and are mostly grade separated; as the two rail lines move away from the city to the more suburban areas, adjacent crossings are typically between 0.3 and 1 mile. Of all the at-grade crossings in the DC2RVA corridor, Broad Rock Boulevard in Richmond on the A-Line has the highest daily volume of 19,000 vehicles. There are two main interstates in Richmond—I-95 and I-64—with multiple crossings that have some of the highest daily vehicle volumes for grade-separated crossings in the DC2RVA corridor (I-95 carries volumes greater than 130,000 vehicles per day and I-64 carries more than 95,000 vehicles per day).

Chesterfield County. There are two different lines of the DC2RVA corridor in Chesterfield County, the A-Line, to the west, and the S-Line, to the east. The A-Line runs west of and parallel to U.S. Route 301. This line is approximately 5 rail miles of two main line tracks with nine public crossings (three at grade and six grade separated). The northern portion of this line is more suburban with mostly grade-separated crossings that are within 0.3 mile of each other, whereas the southern portion is rural and consists of at-grade crossings approximately 0.5 mile from each other. The S-Line runs parallel between U.S. Route 301 and I-95. This line is approximately 5.5 rail miles of either 1 or 2 main line tracks with 11 highway–rail crossings (7 public crossings and 4 private crossings). The northern portion of this line is more suburban or industrial with private crossings or public grade-separated crossings, while the southern portion is rural with at-grade crossings. The crossings in Chesterfield County consist of either major freeways/ expressways or principal arterial roads with daily volumes greater than 20,000 vehicles, or local roads or major collectors with volumes less than 5,000 vehicles per day. The A-Line and S-Line meet between Route 288 and Old Lane, which is the southern terminus of the DC2RVA project.

3.15.2.2 Roadway Network–Corridor Crossings

This section summarizes the roadway network by highway–rail corridor crossings of all public and private facilities. Full details on all crossings, including information on adjacent land uses and connectivity to adjacent crossings, are located in Appendix S, *Transportation Technical Report.*

Following the summary of the existing crossings, additional details of the at-grade crossings are provided. While the proposed DC2RVA project may affect crossings in the DC2RVA corridor that are currently grade separated (*e.g.*, by increasing or decreasing roadway traffic on these crossings), potential effects are likely to be greater at locations that are currently at-grade because some of these locations could become candidates for crossing elimation (*i.e.*, constructing a roadway (or rail) bridge to separate the rail traffic from the roadway traffic or crossing closure), which could affect existing traffic conditions and/or operations. Accordingly, the discussion in this section, therefore, focuses on the at-grade crossings because of the higher potential effects compared to grade-separated crossings.

Summary of Existing Crossings. The highway–rail crossings in the DC2RVA corridor include at-grade crossings and grade-separated crossings, with public and private crossings of both types. There are 200 existing highway–rail crossings in the DC2RVA corridor, as summarized in Table 3.15-6. The locations of all existing roadway crossings are shown in Figure 3.15-3.

Table 3.15-6: Existing Highway–Rail Crossings in the DC2RVA Corridor

Alternative Area	Public		Private		Totals (By Area)
	At Grade	Grade Separated	At Grade	Grade Separated	
Area 1: Arlington (Long Bridge Approach)	0	1	0	0	1
Area 2: Northern Virginia	4	29	5	9	47
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	9	11	5	2	27
Area 4: Central Virginia (Crossroads to Doswell)	7	7	10	1	25
Area 5: Ashland (Doswell to I-295)	11	4	0	0	15
Area 6: Richmond (I-295 to Centralia)	24	53	4	4	85
Totals (by Crossing Type):	**55**	**105**	**24**	**16**	**200**

Note that the I-295 crossing is located at the boundary between the Ashland area and the Richmond area; it is included in the total for the Richmond area only in this table. This table includes the existing public crossing(s) in the Franconia to Occoquan Project (which is the subject of a separate Categorical Exclusion) as well as in the Powell's Creek to Arkendale section.

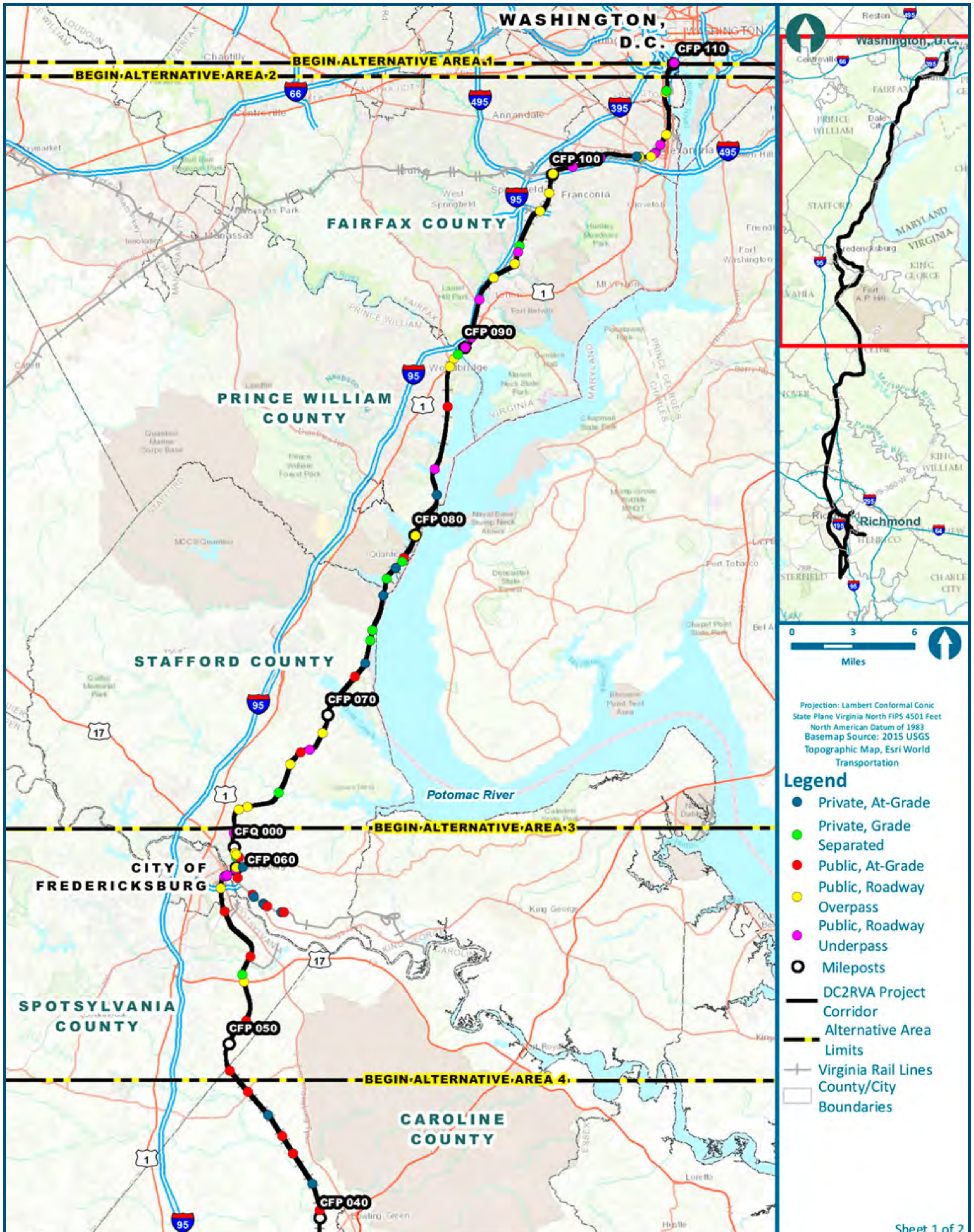


Figure 3.15-3: Roadway Rail Crossings in Project Corridor

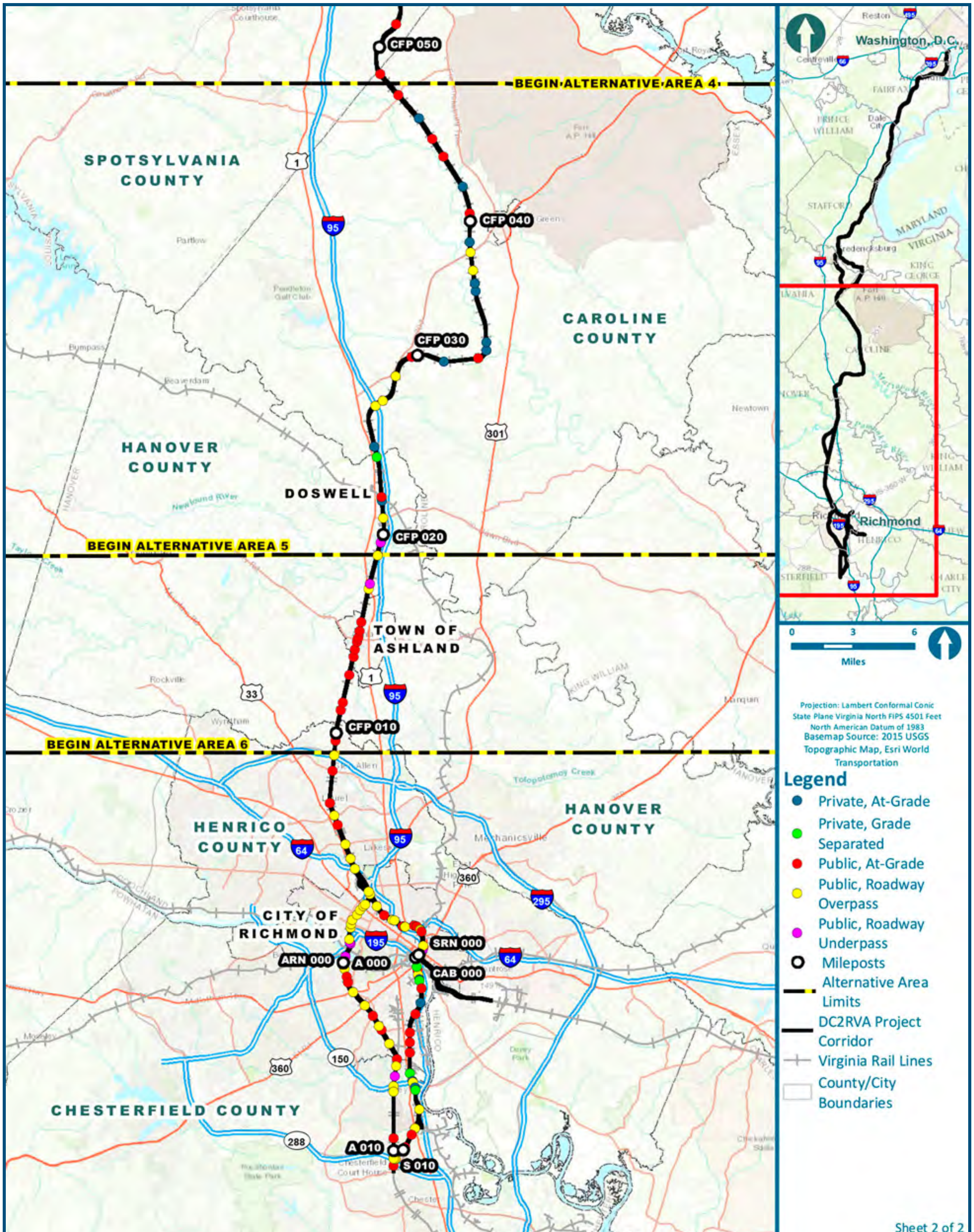


Figure 3.15-3: Roadway Rail Crossings in Project Corridor

In addition to the existing crossings of the DC2RVA corridor, the new track sections of the two bypass alignments would cross roadways that are not currently railroad crossings. Note that Virginia state code[7] restricts the creation of new at-grade crossings, so all new crossings would be grade separated, with potential roadway realignment and/or closure. The Fredericksburg Bypass alignment would cross five public roadways, and the Ashland Bypass alignment would cross eight public roadways that are not currently highway–rail crossings; both bypass alignments would additionally cross numerous private roadways that mainly act as driveways and access to private property.

The 160 public at-grade and grade-separated crossings are summarized in Table 3.15-7, which is located at the end of this section, in addition to the 13 new public highway–rail crossings that would be created as part of the bypass alignments; data includes rail line, crossing type, roadway functional classification per VDOT, and daily traffic.

Public At-Grade Crossings. There are 55 public at-grade crossings within the DC2RVA corridor. These public at-grade roadway crossings range from urban, median-separated, multi-lane facilities that carry more than 15,000 vehicles daily to rural, unstriped local crossings with 100 daily vehicles (representative examples are shown in Figure 3.15-4).

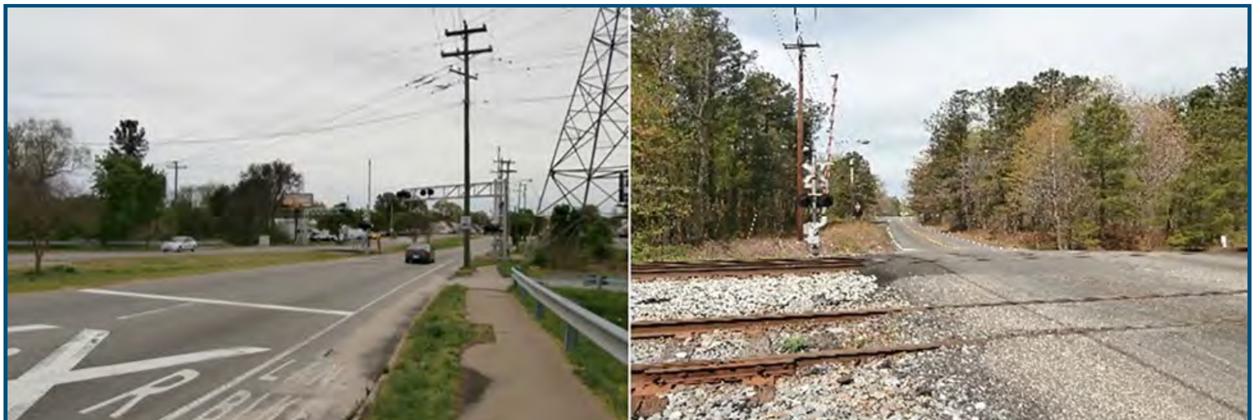


Figure 3.15-4. Examples of Public At-Grade Crossings in the DC2RVA Corridor

All public highway–rail crossings are required to have warning/control devices, just as roadway intersections are required to have stop signs or traffic signals. These warning/control devices are specified in the *Manual of Uniform Control Devices* (MUTCD) and include passive and active types. "Passive" warning devices are the basic devices used at all highway–rail crossings; they include the crossbuck (the X-shaped signs that identify a crossing), signage, and roadway approach pavement markings. "Active" control devices are activated by the passage of a train over detection circuit in the track and are intended to physically warn and/or impede vehicles from the tracks when a train is approaching or occupying the crossing. Typical active traffic control devices include flashing light signals, bells, automatic gates, and highway traffic signals.

In the DC2RVA corridor, most public at-grade two-lane crossings have active flashing signal lights with automatic gates on the roadway approach lanes (termed a two-quadrant gate system). An automatic gate serves as a physical barrier across the roadway travel lanes when a train is

[7] The applicable state law can be found at: https://vacode.org/56-363/.

approaching or occupying a crossing; however, when automatic gates are located on the approach lanes only, vehicles are able to cross the centerline pavement marking and navigate around an activated gate with little difficulty.

The larger multi-lane roadway crossings in the DC2RVA corridor typically have active control devices that include either four-quadrant gates or median separation.

- Four-quadrant gates are a system of automatic flashing light signals and automatic gates in which the gates extend across both the approach and the departure sides of roadway. By inhibiting nearly all traffic movements over the crossing when the gates are activated by an approaching train, four-quadrant gates provide an additional measure of safety.
- Median separation and/or treatment, which includes barrier wall systems, wide raised medians, and mountable raised curb systems with vertical median separators, can be used with a two-quadrant gate system to impede vehicles from traversing a crossing when the automatic gate is activated by disallowing vehicles from using the roadway lane serving traffic flowing in the opposite direction. The barrier provided by the median treatment also provides an additional measure of safety compared to the two-quadrant gate system.

Additionally, there are six public at-grade crossings that are currently designated[8] as part of a 24-hour "Quiet Zone," which is a section of a rail line that contains one or more consecutive public crossings at which locomotive horns are not routinely sounded:

- Prince William Quiet Zone:
  - Featherstone Road crossing
- Ashland Quiet Zone:
  - West Patrick Street crossing
  - College Avenue/Henry Clay Street crossing
  - England Street/Thompson Street crossing
  - Myrtle Street crossing
  - East Francis Street crossing

FRA's regulations governing train horn use at grade crossings are found at 49 CFR Part 222[9] and mandate that a horn be sounded at every public at-grade crossing (i.e., horns are not required to be sounded at locations where the crossing is grade separated). 49 CFR Part 222 also establishes the procedures necessary for a public authority to establish a Quiet Zone. The Quiet Zone program was established so that communities can opt-out of the mandatory horn signaling, excluding emergency situations. Even in existing Quiet Zones that are based on the "grandfather" provision in the regulation, the locomotive bell must still be rung as a train approaches an at-grade highway–rail crossing. Quiet Zones that may be proposed by local governments in the future would be based on local needs. They must be designed, however, in accordance with FRA standards and approved by FRA. Localities would also fund all improvements, equipment, and signage, and they would provide ongoing maintenance for all Quiet Zones within their jurisdictions.

[8] There are 28 Quiet Zone locations in Virginia per the *Quiet Zone FRAWeb Report* (https://www.fra.dot.gov/eLib/details/L05204). Individual crossings that are included as part of the Quiet Zone designation are verified per the U.S DOT Crossing Inventory Form for each crossing (accessed per http://fragis.fra.dot.gov/GISFRASafety/).

[9] 49 CFR; Part 222; Part 229 can be found in its entirety on the FRA website at: http://www.fra.dot.gov/eLib/Details/L02809.

Private At-Grade Crossings. Private at-grade crossings are defined as highway–rail crossings located on roadways that are not intended for use by the public nor maintained by a public authority. There are 24 private at-grade crossings that operate within the DC2RVA corridor. These private at-grade roadway crossings typically serve as driveways to residences, provide access between farm or undeveloped land tracts on both sides of the railroad, or provide access to industrial properties (representative examples shown in Figure 3.15-5).

Figure 3.15-5. Examples of Private At-Grade Crossings in the DC2RVA Corridor

The private at-grade crossings within the DC2RVA corridor are typical of private crossings in general, located on narrow or unpaved roadways with minimal warning devices. Most residential, farm, and industrial private crossings provide sole access to the property (i.e., there are no alternate routes to access the property across the railroad tracks). In general, the private crossings with active control devices (i.e., automatic gates) are those serving industrial areas. Residential and farm crossings typically have signage as the sole passive warning device. Private crossings can be controlled by a barrier gate, which is a moveable gate (manual or automatic) that is kept in the controlled position (i.e., blocking the travel lanes) and opening only on demand; however, none of the private crossings in the DC2RVA corridor currently use barrier gates.

Table 3.15-7: Summary of Public Crossings (By Alternative Area)

Jurisdiction	Crossing Name	Rail Line[1]	CFP Milepost	Crossing Type	Functional Classification[2]	AADT[3] (2015)
Area 1: Arlington (Long Bridge Approach)						
Arlington County	George Washington Parkway	RF&P	CFP 110.07	Roadway Underpass	Other Freeway/ Expressway	63,240
Area 2: Northern Virginia						
Arlington County	VA 233/Airport Access	RF&P	CFP 108.48	Roadway Overpass	Minor Arterial	23,460
Alexandria City	U.S. Route 1/ N. Henry Street	RF&P	CFP 106.44	Roadway Overpass	Other Principal Arterial	47,940
Alexandria City	E. Braddock Road	RF&P	CFP 105.84	Roadway Underpass	Minor Arterial	7,344
Alexandria City	Commonwealth Avenue/Daingerfield Road	RF&P	CFP 105.38	Roadway Underpass	Major Collector	6,222
Alexandria City	King Street	RF&P	CFP 105.33	Roadway Underpass	Other Principal Arterial	16,320
Alexandria City	Duke Street	RF&P	CFP 105.10	Roadway Overpass	Other Principal Arterial	22,440

▶ *Continued – see end of table for notes.*

Table 3.15-7: Summary of Public Crossings (By Alternative Area)

Jurisdiction	Crossing Name	Rail Line[1]	CFP Milepost	Crossing Type	Functional Classification[2]	AADT[3] (2015)
Alexandria City	Telegraph Road	RF&P	CFP 104.54	Roadway Overpass	Minor Arterial	61,200
Alexandria City	Eisenhower Avenue	RF&P	CFP 102.55	Roadway Underpass	Minor Arterial	12,240
Alexandria City	Eisenhower Avenue Connector	RF&P	CFP 102.37	Roadway Underpass	Major Collector	14,280
Fairfax County	S. Van Dorn Street	RF&P	CFP 101.14	Roadway Underpass	Minor Arterial	48,960
Fairfax County	I-95/ I-495	RF&P	CFP 100.04	Roadway Overpass	Interstate	185,640
Fairfax County	Franconia Road	RF&P	CFP 99.10	Roadway Overpass	Minor Arterial	32,640
Fairfax County	Franconia - Springfield Parkway	RF&P	CFP 98.06	Roadway Overpass	Other Principal Arterial	48,960
Fairfax County	Newington Road	RF&P	CFP 95.75	Roadway Underpass	Major Collector	9,588
Fairfax County	Backlick Road	RF&P	CFP 95.15	Roadway Overpass	Local	2,142
Fairfax County	Fairfax County Parkway	RF&P	CFP 95.10	Roadway Overpass	Other Principal Arterial	37,740
Fairfax County	Pohick Road	RF&P	CFP 93.85	Roadway Overpass	Minor Arterial	12,240
Fairfax County	Lorton Road	RF&P	CFP 92.56	Roadway Underpass	Minor Arterial	21,420
Fairfax County	Jefferson Davis Highway	RF&P	CFP 90.66	Roadway Underpass	Other Principal Arterial	37,740
Fairfax County	Furnace Road	RF&P	CFP 90.04	Roadway Underpass	Minor Collector	1,326
Prince William County	Railroad Avenue	RF&P	CFP 89.23	Roadway Overpass	Local	510
Prince William County	Dawson Beach Road	RF&P	CFP 88.79	Roadway Overpass	Major Collector	7,344
Prince William County	Featherstone Road	RF&P	CFP 86.85	At Grade	Major Collector	10,200
Prince William County	Daniel K Ludwig Drive/Powells Creek	RF&P	CFP 83.66	Roadway Underpass	Local	194
Prince William County	Possum Point Road	RF&P	CFP 80.02	Roadway Overpass	Local	326
Prince William County	Potomac Avenue	RF&P	CFP 78.79	At Grade	Local	7,140
Stafford County	Brent Point Road	RF&P	CFP 72.35	At Grade	Local	541
Stafford County	Courthouse Road	RF&P	CFP 69.09	Roadway Overpass	Major Collector	561
Stafford County	Andrew Chapel Road	RF&P	CFP 68.01	Roadway Underpass	Major Collector	5,406
Stafford County	Mount Hope Church Road	RF&P	CFP 67.54	At Grade	Local	214
Stafford County	Eskimo Hill Road	RF&P	CFP 66.77	Roadway Overpass	Major Collector	1,632
Stafford County	Leeland Road	RF&P	CFP 63.47	Roadway Overpass	Major Collector	11,220
Stafford County	Primmer House Road	RF&P	CFP 63.02	Roadway Overpass	Major Collector	10,200

▶ *Continued – see end of table for notes.*

Table 3.15-7: Summary of Public Crossings (By Alternative Area)

Jurisdiction	Crossing Name	Rail Line[1]	CFP Milepost	Crossing Type	Functional Classification[2]	AADT[3] (2015)
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)						
Stafford County	Harrell Road	RF&P	CFP 61.79	Roadway Underpass	Minor Collector	3,876
Stafford County	Butler Road/ White Oak Road	RF&P	CFP 60.81	Roadway Overpass	Minor Arterial	15,300
Stafford County	Kings Highway	RF&P	CFP 60.04	Roadway Overpass	Minor Arterial	26,520
Stafford County	Naomi Road	RF&P	CFP 59.97	Roadway Underpass	Local	663
Fredericksburg City	Sophia Street	RF&P	CFP 59.46	Roadway Underpass	Major Collector	5,712
Fredericksburg City	Caroline Street	RF&P	CFP 59.40	Roadway Underpass	Minor Arterial	2,346
Fredericksburg City	Princess Anne Street	RF&P	CFP 59.33	Roadway Underpass	Minor Arterial	2,754
Fredericksburg City	Charles Street	RF&P	CFP 59.27	Roadway Underpass	Major Collector	5,916
Fredericksburg City	Blue and Gray Parkway	RF&P	CFP 58.68	Roadway Overpass	Other Principal Arterial	40,800
Fredericksburg City	Landsdowne Road	RF&P	CFP 57.51	At Grade	Major Collector	8,772
Spotsylvania County	Mine Road	RF&P	CFP 54.77	At Grade	Major Collector	5,202
Spotsylvania County	Mills Drive	RF&P	CFP 53.45	Roadway Overpass	Other Principal Arterial	14,280
Spotsylvania County	Summit Crossing Road	RF&P	CFP 51.45	At Grade	Local	408
Caroline County	Claiborne Crossing Road	RF&P	CFP 48.63	At Grade	Local	479
Stafford County	Cool Spring Road	FBP	CFQ 0.37	Roadway Overpass	Major Collector	13,260
Stafford County	Debruen Lane	FBP	CFQ 0.53	At Grade	Local	510
Stafford County	Ferry Road	FBP	CFQ 1.70	At Grade	Major Collector	9,180
Stafford County	Federal Drive	FBP	CFQ 2.89	At Grade	Local	1,326
Stafford County	Little Falls Road	FBP	CFQ 3.80	At Grade	Local	153
Stafford County	Forest Lane Road	FBP	CFQ 4.68	At Grade	Local	1,428
Stafford County	Kings Highway–Route 3	FBP	*(new)*	*No Existing Crossing*	Other Principal Arterial	21,420
Spotsylvania County	Mills Drive–Route 17	FBP	*(new)*	*No Existing Crossing*	Other Principal Arterial	6,324
Spotsylvania County	Fredericksburg Turnpike–Route 2	FBP	*(new)*	*No Existing Crossing*	Minor Arterial	5,100
Spotsylvania County	Thorton Rolling Road–Route 609	FBP	*(new)*	*No Existing Crossing*	Minor Collector	2,652
Spotsylvania County	Patriot Lane	FBP	*(new)*	*No Existing Crossing*	Local	510
Area 4: Central Virginia (Crossroads to Doswell)						
Caroline County	Stonewall Jackson Road	RF&P	CFP 47.27	At Grade	Major Collector	1,938
Caroline County	Woodford Road	RF&P	CFP 44.54	At Grade	Local	388
Caroline County	Woodslane Road	RF&P	CFP 43.51	At Grade	Local	102
Caroline County	Paige Road	RF&P	CFP 40.40	At Grade	Minor Collector	479

▶ *Continued – see end of table for notes.*

Table 3.15-7: Summary of Public Crossings (By Alternative Area)

Jurisdiction	Crossing Name	Rail Line[1]	CFP Milepost	Crossing Type	Functional Classification[2]	AADT[3] (2015)
Caroline County	Route 207	RF&P	CFP 38.49	Roadway Overpass	Other Principal Arterial	11,220
Caroline County	Nelson Hill Road	RF&P	CFP 37.60	Roadway Overpass	Major Collector	1,836
Caroline County	Penola Road	RF&P	CFP 33.00	At Grade	Local	428
Caroline County	Colemans Mill Road	RF&P	CFP 29.70	At Grade	Local	449
Caroline County	Dry Bridge Road	RF&P	CFP 28.38	Roadway Overpass	Local	949
Caroline County	Ruther Glen Road	RF&P	CFP 26.93	Roadway Overpass	Major Collector	2,142
Caroline County	I-95	RF&P	CFP 26.51	Roadway Overpass	Interstate	99,960
Hanover County	Doswell Road	RF&P	CFP 21.88	At Grade	Local	316
Hanover County	Kings Dominion Boulevard	RF&P	CFP 20.81	Roadway Overpass	Minor Arterial	5,100
Hanover County	Taylorsville Road	RF&P	CFP 19.59	Roadway Underpass	Local	184
Area 5: Ashland (Doswell to I-295)						
Hanover County	Old Ridge Road	RF&P	CFP 18.96	Roadway Overpass	Major Collector	1,122
Hanover County	Elletts Crossing Road	RF&P	CFP 17.51	Roadway Underpass	Minor Collector	133
Hanover County	U.S. Route 1	RF&P	CFP 17.23	Roadway Overpass	Minor Arterial	8,160
Hanover County	W. Vaughan Road/ Henry Street	RF&P	CFP 15.64	At Grade	Local	1,326
Hanover County	W. Patrick Street	RF&P	CFP 15.21	At Grade	Minor Collector	304
Hanover County	College Avenue/ Henry Clay Street	RF&P	CFP 14.90	At Grade	Major Collector	1,326
Hanover County	England Street / Thompson Street	RF&P	CFP 14.77	At Grade	Minor Arterial	14,280
Hanover County	Myrtle Street	RF&P	CFP 14.66	At Grade	Major Collector	1,836
Hanover County	E. Francis Street	RF&P	CFP 14.22	At Grade	Local	1,428
Hanover County	Ashcake Road	RF&P	CFP 13.85	At Grade	Minor Arterial	7,752
Hanover County	Gwathmey Church Road	RF&P	CFP 12.94	At Grade	Minor Collector	163
Hanover County	Elmont Road	RF&P	CFP 11.54	At Grade	Major Collector	2,142
Hanover County	Cedar Lane	RF&P	CFP 11.15	At Grade	Major Collector	1,938
Henrico County	Greenwood Road	RF&P	CFP 9.94	Roadway Overpass	Major Collector	1,530
Henrico County	Mill Road	RF&P	CFP 9.65	At Grade	Major Collector	2,754
Henrico County	I-295 (Northbound only)	RF&P	CFP 8.94	Roadway Overpass	Interstate	62,220
Hanover County	Washington Highway–Route 1	ABP	(new)	*No Existing Crossing*	Minor Arterial	8,160
Hanover County	Cross Corner Road–Route 641	ABP	(new)	*No Existing Crossing*	Minor Collector	530
Hanover County	Blunts Bridge Road	ABP	(new)	*No Existing Crossing*	Minor Collector	551
Hanover County	Independence Road	ABP	(new)	*No Existing Crossing*	Minor Collector	949

▶ *Continued – see end of table for notes.*

Table 3.15-7: Summary of Public Crossings (By Alternative Area)

Jurisdiction	Crossing Name	Rail Line[1]	CFP Milepost	Crossing Type	Functional Classification[2]	AADT[3] (2015)
Hanover County	W. Patrick Henry Road	ABP	(new)	*No Existing Crossing*	Minor Arterial	6,834
Hanover County	Yowell Road	ABP	(new)	*No Existing Crossing*	Local	775
Hanover County	Ashcake Road–Route 657	ABP	(new)	*No Existing Crossing*	Minor Arterial	5,406
Hanover County	Elmont Road–Route 626	ABP	(new)	*No Existing Crossing*	Major Collector	2,346
Area 6: Richmond (I-295 to Centralia)						
Henrico County	I-295 (Southbound only)	RF&P	CFP 8.94	Roadway Overpass	Interstate	62,220
Henrico County	Mountain Road	RF&P	CFP 8.15	At Grade	Minor Arterial	5,304
Henrico County	Hungary Road	RF&P	CFP 6.59	At Grade	Minor Arterial	16,320
Henrico County	E. Parham Road	RF&P	CFP 5.94	Roadway Overpass	Other Principal Arterial	26,520
Henrico County	Hermitage Road	RF&P	CFP 5.43	At Grade	Major Collector	4,284
Henrico County	Hilliard Road	RF&P	CFP 4.44	Roadway Overpass	Minor Arterial	16,320
Henrico County	Dumbarton Road	RF&P	CFP 3.70	Roadway Overpass	Minor Arterial	15,300
Henrico County	I-64	RF&P	CFP 3.15	Roadway Overpass	Interstate	140,760
Richmond	I-195	RF&P	CFP 1.84	Roadway Overpass	Interstate	77,520
Richmond	Westwood Avenue/ Saunders Avenue	RF&P	CFPD 1.73	Roadway Overpass	Minor Arterial	12,240
Richmond	I-195 Northbound	A-Line	ARN 3.17	Roadway Overpass	Interstate	74,460
Richmond	W. Broad Street	A-Line	ARN 3.02	Roadway Overpass	Other Principal Arterial	9,690
Richmond	Monument Avenue	A-Line	ARN 2.77	Roadway Overpass	Minor Arterial	24,480
Richmond	Patterson Avenue	A-Line	ARN 2.49	Roadway Overpass	Other Principal Arterial	8,772
Richmond	Grove Avenue	A-Line	ARN 2.18	Roadway Overpass	Minor Arterial	11,220
Richmond	W. Cary Street	A-Line	ARN 1.92	Roadway Overpass	Other Principal Arterial	15,300
Richmond	I-195 Southbound	A-Line	ARN 1.79	Roadway Overpass	Interstate	9,078
Richmond	Douglasdale Road	A-Line	ARN 1.21	Roadway Overpass	Major Collector	510
Richmond	Powhite Parkway Southbound	A-Line	ARN 1.07	Roadway Underpass	Other Freeway/ Expressway	26,520
Richmond	Powhite Parkway Northbound	A-Line	ARN 1.01	Roadway Underpass	Other Freeway/ Expressway	94,860
Richmond	Riverside Drive	A-Line	ARN 0.32	Roadway Underpass	Local	510
Richmond	Forest Hill Avenue	A-Line	A 0.31	Roadway Overpass	Minor Arterial	20,400
Richmond	Jahnke Road	A-Line	A 0.68	At Grade	Minor Arterial	12,240

► *Continued – see end of table for notes.*

Table 3.15-7: Summary of Public Crossings (By Alternative Area)

Jurisdiction	Crossing Name	Rail Line[1]	CFP Milepost	Crossing Type	Functional Classification[2]	AADT[3] (2015)
Richmond	Bassett Avenue	A-Line	A 1.01	At Grade	Local	1,399
Richmond	Midlothian Turnpike	A-Line	A 1.54	Roadway Overpass	Other Principal Arterial	22,440
Richmond	Hull Street Road	A-Line	A 2.43	Roadway Overpass	Other Principal Arterial	24,480
Richmond	Broad Rock Boulevard	A-Line	A 3.08	At Grade	Other Principal Arterial	19,380
Richmond	Hopkins Road	A-Line	A 3.67	Roadway Overpass	Minor Arterial	8,772
Richmond	Terminal Avenue	A-Line	A 3.88	At Grade	Major Collector	683
Richmond	Warwick Road	A-Line	A 4.66	Roadway Overpass	Minor Arterial	11,220
Richmond	Walmsley Boulevard	A-Line	A 5.54	At Grade	Minor Arterial	4,998
Chesterfield County	Castlewood Road/ Cardwell Road	A-Line	A 5.85	Roadway Overpass	Local	1,122
Chesterfield County	Cogbill Road	A-Line	A 6.37	Roadway Underpass	Major Collector	3,876
Chesterfield County	Chippenham Parkway	A-Line	A 6.84	Roadway Overpass	Other Freeway/ Expressway	60,180
Chesterfield County	S. Beulah Road/ Dundas Road	A-Line	A 7.13	Roadway Overpass	Major Collector	5,100
Chesterfield County	Kingsland Road	A-Line	A 9.37	At Grade	Major Collector	2,142
Chesterfield County	Thurston Road	A-Line	A 10.00	At Grade	Local	459
Chesterfield County	Route 288 Northbound	A-Line	A 10.36	Roadway Overpass	Other Freeway/ Expressway	19,890
Chesterfield County	Route 288 Southbound	A-Line	A 10.38	Roadway Overpass	Other Freeway/ Expressway	19,890
Chesterfield County	Old Lane	A- and S-Line	A 10.74	At Grade	Major Collector	4,896
Richmond	N Boulevard	S-Line	SRNX 3.94	Roadway Overpass	Other Principal Arterial	21,420
Richmond	Hermitage Road	S-Line	SRN 3.37	At Grade	Minor Arterial	10,200
Richmond	I-64/I-95	S-Line	SRN 2.93	Roadway Overpass	Interstate	138,720
Richmond	N. Lombardy Street	S-Line	SRN 2.83	Roadway Overpass	Major Collector	7,752
Richmond	Brook Road	S-Line	SRN 2.34	At Grade	Minor Arterial	8,262
Richmond	N. Belvidere Street	S-Line	SRN 2.24	Roadway Overpass	Other Principal Arterial	22,440
Richmond	Chamberlayne Parkway	S-Line	SRN 2.20	Roadway Overpass	Major Collector	7,548
Richmond	St James Street	S-Line	SRN 1.75	At Grade	Local	1,000
Richmond	N. 1st Street	S-Line	SRN 1.64	Roadway Overpass	Major Collector	3,774
Richmond	N. 2nd Street/ Valley Road	S-Line	SRN 1.60	At Grade	Local	2,142
Richmond	N. 5th Street	S-Line	SRN 1.36	Roadway Overpass	Major Collector	3,978
Richmond	I-64	S-Line	SRN 1.30	Roadway Overpass	Interstate	95,880
Richmond	Hospital Street/ N. 7th Street	S-Line	SRN 1.24	At Grade	Minor Arterial	5,814

▶ *Continued – see end of table for notes.*

Table 3.15-7: Summary of Public Crossings (By Alternative Area)

Jurisdiction	Crossing Name	Rail Line[1]	CFP Milepost	Crossing Type	Functional Classification[2]	AADT[3] (2015)
Richmond	Leigh Street	S-Line	CA S 85.7	Roadway Overpass	Minor Arterial	11,220
Richmond	I-95 Off-Ramp to 17th Street	S-Line	SRN 0.43	Roadway Overpass	Interstate Ramp	6,018
Richmond	E. Marshall Street	S-Line	SRN 0.30	Roadway Underpass	Local	510
Richmond	E. Broad Street	S-Line	SRN 0.23	Roadway Underpass	Other Principal Arterial	26,520
Richmond	E. Main Street	S-Line	SRN 0.00	Roadway Underpass	Other Principal Arterial	21,420
Richmond	I-95	S-Line	S 0.15	Roadway Overpass	Interstate Ramp	130,560
Richmond	E. Cary Street	S-Line	S 0.08	Roadway Underpass	Local	510
Richmond	Dock Street	S-Line	S 0.16	Roadway Underpass	Major Collector	510
Richmond	Ramps between I-195 and I-95	S-Line	S 0.17	Roadway Overpass	Interstate Ramp	24,480
Richmond	Byrd Street	S-Line	S 0.19	Roadway Underpass	Local	510
Richmond	Maury Street	S-Line	S 0.78	At Grade	Local	2,589
Richmond	I-95/Maury Street Ramp	S-Line	S 0.97	Roadway Overpass	Interstate Ramp	19,951
Richmond	Goodes Street	S-Line	S 1.66	At Grade	Local	204
Richmond	E. Commerce Road	S-Line	S 2.98	At Grade	Minor Arterial	4,284
Richmond	Ruffin Road	S-Line	S 3.98	At Grade	Major Collector	1,836
Richmond	Bells Road	S-Line	S 4.46	At Grade	Minor Arterial	8,976
Richmond	Dale Avenue/ Trenton Avenue	S-Line	S 4.98	At Grade	Local	0
Chesterfield County	Chippenham Parkway	S-Line	S 6.47	Roadway Overpass	Other Freeway/ Expressway	58,140
Chesterfield County	Elliham Avenue	S-Line	S 7.85	Roadway Overpass	Local	520
Chesterfield County	Jefferson Davis Highway	S-Line	S 8.8	Roadway Overpass	Other Principal Arterial	20,400
Chesterfield County	Kingsland Road	S-Line	S 9.14	At Grade	Major Collector	2,040
Chesterfield County	Brinkley Road	S-Line	S 9.83	At Grade	Local	1,836
Chesterfield County	Route 288 Northbound	S-Line	S C 10.60	Roadway Overpass	Other Freeway/ Expressway	19,890
Chesterfield County	Route 288 Southbound	S-Line	S C 10.62	Roadway Overpass	Other Freeway/ Expressway	19,890

[1]: The Rail Line includes the following terminology for purposes of the transportation analyses:
- "FBP" is the Fredericksburg Bypass alignment and includes the existing crossings on the Dahlgren spur as well as new crossings along the proposed new track alignment.
- "ABP" is the Ashland Bypass and includes the new crossings along the proposed new track alignment (there are no existing crossings of the proposed Ashland Bypass.)

[2]: Source of Functional Classification: VDOT 2014 Approved Functional Classification, http://www.arcgis.com/home/webmap/viewer.html?webmap=3eca6c9adb6649c988d98734f85baddb (accessed January 2016).

[3]: Source of ADT: VDOT, GIS online database for Annual Average Daily Traffic with Vehicle Classification for 2014 (accessed January 2016), Grown to 2015 (Refer to Section 4 of the Draft EIS details on growth rates).

Note that this table includes the existing public crossing(s) in the Franconia to Occoquan Project (which is the subject of a separate Categorical Exclusion) as well as in the Powell's Creek to Arkendale section for reference. The Dale Avenue/Trenton Avenue at-grade crossing is not open to public vehicles in existing conditions.

3.16 UTILITIES AND RELATED SERVICES

Utilities are, by definition, a commodity or service provided for public use. The DC2RVA corridor contains municipal, regional, interstate and private utility systems, including sanitary sewer collection and treatment; stormwater collection and discharge; electric power generation and distribution; communications facilities and cabling; natural gas storage and distribution; petroleum storage and transportation; solid waste collection and management facilities; and interstate pipelines. DRPT mapped existing utilities along the DC2RVA corridor based on available information from CSXT and other local sources.

3.17 PUBLIC HEALTH AND SAFETY

3.17.1 Community Safety and Access

FRA is the agency primarily responsible for rail safety oversight. FRA promulgates and enforces safety regulations (49 CFR 200-299) covering many aspects of rail operations. Public safety is assessed based on the safety of passengers and employees on trains, in stations, and along the rail line, and construction workers during construction of any approved rail improvements. Safety is also considered for any persons or vehicles at any rail facilities, access points to the rail right-of-way, or to the rail system itself (stations). Detailed rail operations safety and security information is available in the *System Safety Plan and System Security Plan*. Detailed grade crossing safety assessments are available in Appendix S, *Transportation Technical Report*.

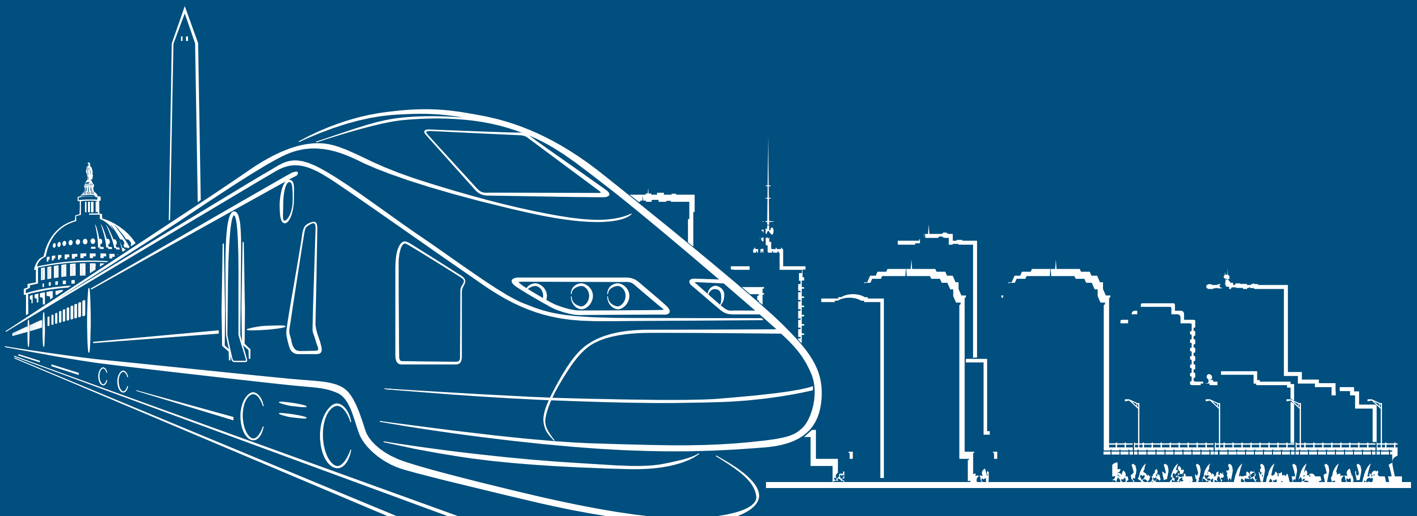
Within the individual communities, safety and security along the rail line encompasses physical access around the rail right-of-way, as well as the safety of residents and businesses due to rail operations (e.g., accidents, hazardous materials transport). As stated previously, the communities have grown and developed around the existing railroad right-of-way. This includes the roadway network, which has also developed around the railroad right-of-way and is used by residents, businesses, school transportation, and emergency services. CSXT has strict safety procedures, including extensive safety training and certification, regarding access to the right-of-way. Physical barriers are used in those parts of the DC2RVA corridor where those persons other than CSXT workers can easily access the right-of-way.

3.17.2 At-Grade Crossing Safety

Crossings are divided into categories: public crossings are those on highways under the jurisdiction of and maintained by a public authority and open to the traveling public; private crossings are those on roadways privately owned and used only by the landowner or licensee; and pedestrian crossings are those used solely by pedestrians. There are 200 crossings with roadways in the DC2RVA corridor. Of these crossings, 160 are with public roads and 40 are with private roads. Crossings are either at grade (79) or grade separated (121). Private at-grade crossings are primarily residential, farm, or industrial. Section 3.15.2.2 provodes additional detail on at-grade crossings in the corridor.

DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

4 ENVIRONMENTAL CONSEQUENCES



4 ENVIRONMENTAL CONSEQUENCES

The discussion on environmental consequences summarizes potential effects on the human, physical, and natural environments that may result from construction and operation of the Washington, D.C. to Richmond Southeast High Speed Rail Project (DC2RVA Project). The existing environment within the study area was described in Chapter 3. The effects presented in this chapter are based on the conceptual engineering developed for the Build Alternatives. Effects are identified for each alternative within the six areas defined for the Project in detail in Chapter 2 and summarized below in Table 4.0-1.

Table 4.0-1: Summary of Build Alternatives

Alternative Area	Alternative	Description
Area 1: Arlington (Long Bridge Approach)	1A	Add Two Tracks on the East
	1B	Add Two Tracks on the West
	1C	Add One Track East and One Track West
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	Add One Track/Improve Existing Track
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	Maintain Two Tracks Through Town
	3B	Add One Track East of Existing
	3C	Add Two-Track Bypass East
Area 4: Central Virginia (Crossroads to Doswell)	4A	Add One Track/Improve Existing Track
Area 5: Ashland (Doswell to I-295)	5A	Maintain Two Tracks Through Town
	5A–Ashcake	Maintain Two Tracks Through Town (Relocate Station to Ashcake)
	5B	Add One Track East of Existing
	5B–Ashcake	Add One Track East of Existing (Relocate Station to Ashcake)
	5C	Add Two-Track West Bypass
	5C–Ashcake	Add Two-Track West Bypass (Relocate Station to Ashcake)
	5D–Ashcake	Three Tracks Centered Through Town (Add One Track, Relocate Station to Ashcake)
Area 6: Richmond (I-295 to Centralia)	6A	Staples Mill Road Station Only
	6B–A-Line	Boulevard Station Only, A-Line
	6B–S-Line	Boulevard Station Only, S-Line
	6C	Broad Street Station Only
	6D	Main Street Station Only
	6E	Split Service, Staples Mill Road/Main Street Stations
	6F	Full Service, Staples Mill Road/Main Street Stations
	6G	Shared Service, Staples Mill Road/Main Street Stations

For this Environmental Impact Statement (EIS), the Federal Railroad Administration (FRA) and the Virginia Department of Rail and Public Transportation (DRPT) established two important planning dates. The first planning date is 2025, which is FRA and DRPT's current best estimate of when construction of the DC2RVA infrastructure could be completed and the new DC2RVA service would be placed in operation. FRA and DRPT's estimate of the year 2025 as the "opening day" is dependent on many factors, not the least of which is finalizing the EIS and Record of Decision. The date also assumes that federal funding in addition to other funding sources will be available at the level required to build all of the proposed infrastructure improvements and acquire the necessary equipment and trainsets. DRPT based this date on an aggressive but potentially achievable schedule assumption that all necessary permits, approvals, agreements, and funding could be finalized by 2020, final design would take one year (2021), right-of-way acquisition (if needed) would take one year (2022), and construction would take three years (2023–2025). FRA and DRPT also used 2025 as the date when the physical impacts associated with DC2RVA Project construction would take place. Thus, all of the physical impact analyses within this Draft EIS on human and natural resources are estimated for 2025, and compared to the No Build Alternative conditions projected for 2025.

The second key planning date established by FRA and DRPT is the planning horizon date of 2045, 20 years after the projected implementation of the new intercity passenger rail service in 2025. Both the Passenger Rail Investment and Improvement Act (PRIIA) and FRA guidance require that DRPT demonstrate that the proposed project is sufficient to deliver the proposed passenger rail benefits and an efficient and reliable multimodal rail corridor over a 20-year time horizon following the completion of the passenger project. DRPT uses operational simulations analysis, as discussed in Section 2.6, to test the proposed alternatives to determine if the rail capacity is adequate for both the opening day (2025) levels of projected freight, commuter, and passenger rail traffic and to determine if the infrastructure remains adequate over the 20-year planning horizon or until 2045. DRPT also used the 2045 planning horizon date to estimate some of the longer term effects of the proposed service, such as ridership, energy use, and effects on air quality, as well as indirect and cumulative effects.

Proposed mitigation is identified throughout this chapter as a way to avoid, minimize, reduce, or eliminate potential effects of the Project. As part of the identified mitigation, applicable best management practices (BMPs) are also identified. BMPs are existing practices and measures required by law, regulation, or policy that reduce the environmental impacts of designated activities, functions, or processes. Although BMPs mitigate potential impacts by avoiding, minimizing, or reducing/eliminating impacts, BMPs are distinguished from mitigation measures because BMPs are inherently part of the Project and are not additional mitigation measures proposed because of this environmental review process. Examples of typical BMPs include permanent seeding, use of native vegetation, sediment and erosion control, silt fences, check dams, and sediment basins. DRPT will refine the mitigation measures during final design and ensure that they are incorporated into the DC2RVA Project.

4.1 WATER RESOURCES

Several federal laws protect water resources, which include the Clean Water Act (CWA), Safe Drinking Water Act (SDWA), and the Rivers and Harbors Act (RHA). These laws protect water resources from pollutants, discharges, fill materials, dredging, and encroachments. Water resources are regulated by the United States Environmental Protection Agency (EPA), the United

States Army Corps of Engineers (USACE), United States Coast Guard (USCG), and state departments of environment.

Under the No Build Alternative, CSX Transportation (CSXT) would continue maintenance and repairs of the existing infrastructure, and infrastructure improvements that are already planned for the DC2RVA corridor, as defined in Section 2.5.1.1, would move forward. Anticipated effects of the No Build Alternative are discussed below in comparison with the Build Alternatives, including potential permits required. Existing factors that affect water quality, such as impervious surfaces and pollutants washed from the existing surfaces into receiving water bodies, would continue with the No Build Alternative. No changes to floodplains or hydraulic conditions are anticipated with the No Build Alternative.

Due to the linear nature and length of the DC2RVA corridor, each Build Alternative would include unavoidable effects to water resources. Effects were calculated in Geographic Information System (GIS) based on the limits of disturbance (LOD) developed for each Build Alternative. Permanent effects include all areas where infrastructure would physically replace existing conditions. Temporary effects are areas required for construction of the Build Alternatives, such as for movement, access, or storage of equipment, that would be regraded and seeded with an approved seed mixture by the contractor and allowed to renaturalize after completion of the Project. Water resources potentially affected by the Build Alternatives are shown in the *Natural Resources Technical Report* (Appendix M).

4.1.1 Surface Waters, Rivers, Streams, and Floodplains

Effects to surface waters resulting from construction of the proposed improvements are similar between the Build Alternatives. Typical effects would include:

<u>Temporary</u>

- Increased erosion from disturbed areas, resulting in increased sedimentation and decreased water clarity
- Disturbance of in-stream habitat and aquatic species from in-stream construction

<u>Long-Term Temporary</u>

- Clearing and grubbing of stream banks, resulting in increased erosion, decreased bank stabilization, and potential slope failure
- Removal of riparian canopy, resulting in increased water temperatures

<u>Permanent</u>

- Decreased groundwater recharge due to increased impervious surfaces
- Increased nutrient loading from increased runoff and fertilizer application during the replanting process
- Increased potential for toxic compounds entering the water system from construction equipment, increased train traffic, application of snow and ice removal chemicals, and application of herbicides to keep tracks clear of vegetation
- Altered stream locations (including intentional stream relocations), flow patterns, and morphology
- Use of resource (culverted streams and filled wetlands) for infrastructure placement

The extent of effects is generally related to the length or area of the resource affected. The extent of potentially permanent and temporary encroachments on the water resources identified in Chapter 3 are listed in Table 4.1-1. The more severe impacts are associated with new or rehabilitated structures spanning major waterways. These types of crossings would require several spans and new piers or substructure to be constructed in the waterway itself. For smaller waterway crossings, single-span bridges or bottomless or properly embedded culverts are recommended. In most cases, the short-term or temporary nature of the effects caused by construction would allow renaturalization of the resource. The locations of all water crossings and the approximate LOD associated with each are presented in detail the *Natural Resources Technical Report* (Appendix M). Depending on the combination of Build Alternatives, between 152 and 191 streams would be permanently affected by the proposed improvements. Linear and parallel encroachments to these streams are estimated between 26,377 and 35,422 linear feet.

Table 4.1-1: Stream Resource Effects

Alternative Area	Alternative	Number of Streams	Stream Length (Linear Feet)	Navigable Waters (Linear Feet)	State Scenic Rivers (Linear Feet)	Nationwide Rivers Inventory (Linear Feet)	Chesapeake Bay RPA (Acres)	Floodplains (Acres)
Area 1: Arlington (Long Bridge Approach)	1A	–	–	–	–	–	P: 4.0 T: 1.2	P: 0.3 T: 1.0
	1B	–	–	–	–	–	P: 4.8 T: 1.5	P: 0.1 T: 0.3
	1C	–	–	–	–	–	P: 6.0 T: 0.6	P: 0.1 T: 0.4
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	P: 52 T: 68	P: 7,198 T: 4,022	P: 205.7 T: 232.9	P: 44.4 T: 50.2	–	P: 67.9 T: 50.2	P: 15.1 T: 18.1
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	P: 16 T: 21	P: 1,101 T: 1,771	–	–	–	P: 36.9 T: 17.7	P: 7.7 T: 5.7
	3B	P: 20 T: 26	P: 1,506 T: 1,894	P: 45.0 T: 50.1	P: 45.0 T: 50.1	–	P: 41.0 T: 17.9	P: 10.5 T: 6.4
	3C	P: 43 T: 45	P: 4,597 T: 1,693	P: 44.5 T: 102.7	P: 44.5 T: 102.7	–	P: 57.9 T: 18.6	P: 8.0 T: 3.8
Area 4: Central Virginia (Crossroads to Doswell)	4A	P: 32 T: 43	P: 3,627 T: 2,798	P: 64.8 T: 265.9	P: 40.5 T: 20.8	P: 40.5 T: 20.8	P: 69.7 T: 31.9	P:17.2 T: 17.3
Area 5: Ashland (Doswell to I-295)	5A	P: 23 T: 25	P: 6,928 T: 1,623	–	P: 40.1 T: 15.7	P: 40.1 T: 15.7	P: 16.6 T: 12.9	P: 5.9 T: 2.5
	5A–Ashcake	P: 22 T: 25	P: 6,928 T: 1,623	–	P: 40.1 T: 15.7	P: 40.1 T: 15.7	P: 17.7 T: 12.8	P: 7.1 T: 2.4
	5B	P: 24 T: 27	P: 9,114 T: 2,151	–	P: 40.1 T: 15.7	P: 40.1 T: 15.7	P: 19.4 T: 14.4	P: 6.5 T: 3.3

▶ *Continued (see end of table for detailed notes.)*

Table 4.1-1: Stream Resource Effects

Alternative Area	Alternative	Number of Streams	Stream Length (Linear Feet)	Navigable Waters (Linear Feet)	State Scenic Rivers (Linear Feet)	Nationwide Rivers Inventory (Linear Feet)	Chesapeake Bay RPA (Acres)	Floodplains (Acres)
Area 5: Ashland (Doswell to I-295)	5B–Ashcake	P: 23 T: 28	P: 9,101 T: 2,132	–	P: 40.1 T: 15.7	P: 40.1 T: 15.7	P: 23.4 T: 14.7	P: 10.7 T: 3.8
	5C	P: 26 T: 26	P: 9,005 T: 1,410	–	P: 40.1 T: 15.7	P: 40.1 T: 15.7	P: 31.6 T: 13.9	P: 9.2 T: 2.4
	5C–Ashcake	P: 26 T: 26	P: 9,005 T: 1,410	–	P: 40.1 T: 15.7	P: 40.1 T: 15.7	P: 32.6 T: 13.9	P: 10.4 T: 2.4
	5D–Ashcake	P: 28 T: 31	P: 8,163 T: 2,958	–	P: 40.1 T: 15.7	P: 40.1 T: 15.7	P: 25.7 T: 15.4	P: 11.5 T: 4.0
Area 6: Richmond (I-295 to Centralia)	6A	P: 30 T: 30	P: 7,523 T: 3,384	–	–	–	P: 53.5 T: 15.5	P: 8.1 T: 3.5
	6B–A-Line	P: 34 T: 34	P: 9,650 T: 3,609	–	–	–	P: 59.3 T: 17.4	P: 11.3 T: 6.1
	6B–S-Line	P: 36 T: 30	P: 8,819 T: 2,333	P: 31.7 T: 49.5	P: 31.7 T: 49.7	–	P: 55.1 T: 11.5	P: 48.6 T: 12.4
Area 6: Richmond (I-295 to Centralia)	6C	P: 35 T: 34	P:10,886 T: 3,349	–	–	–	P: 63.3 T: 17.0	P: 16.1 T: 5.8
	6D	P: 36 T: 30	P: 8,819 T: 2,333	P: 31.7 T: 49.5	P: 31.7 T: 49.5	–	P: 55.0 T: 11.5	P: 51.9 T: 13.0
	6E	P: 30 T: 30	P: 7,952 T: 3,169	–	–	–	P: 55.3 T: 15.4	P: 22.2 T:20.2
	6F	P: 36 T: 31	P: 8,869 T: 2,333	P: 29.2 T: 51.9	P: 29.2 T: 51.9	–	P: 57.2 T: 11.3	P: 50.7 T: 13.1
	6G	P: 34 T: 29	P: 8,235 T: 2,288	P: 29.2 T: 51.9	P: 29.2 T: 51.2	–	P: 57.8 T: 11.1	P: 48.1 T: 13.1

Notes: P = Permanent Effect; T=Temporary Effect.

4.1.1.1 Designated Waters

Navigable Waters

Although construction of the proposed project would not have any effect on this designation, work in navigable waters requires special consideration under Section 9 and Section 10 of the Rivers and Harbors Act (see Permits 4.1.5). Depending on the Build Alternative, the LOD would cross five to seven of the eight Coast Guard regulated navigable waters within the study area:

- Occoquan River
- Neabsco Creek
- Powells Creek
- Aquia Creek
- Rappahannock River
- Mattaponi River
- James River

State Scenic Rivers and Nationwide Rivers Inventory

The existing rail corridor was in place long before much of the surrounding development in the DC2RVA corridor; as such, new construction would be consistent with existing land uses and controlling regulations for designated waters. The most notable changes due to the proposed improvements would be the construction of new bridges built adjacent to and/or replacing existing bridges. However, the new bridges would generally reflect the horizontal and vertical profiles of existing structures; therefore, DRPT anticipates that the landscape and viewsheds from designated waters will be similar in context to existing conditions. The Fredericksburg Bypass (Build Alternative 3C) would require a new bridge over the Rappahannock River in a new location; however, the new bridge would not be in an area where the Rappahannock River is designated a State Scenic River. The State Scenic River designation ends north of the proposed bypass near Ferry Farm. Consistent with the guidelines for protecting designated waters, the use of BMPs would ensure the preservation of the ecological resources within the waterways and their local watersheds. The DC2RVA Project is not expected to affect river designations.

Chesapeake Bay Preservation Act (CBPA)

Transportation projects, including rail lines, are conditionally exempt from the Chesapeake Bay Preservation Area Designation and Management Regulations. By constructing improvements in accordance with the Virginia Erosion and Sediment Control Law (§10.1-560 *et seq.* of the Code of Virginia), the *Stormwater Management Act* (§10.1-603. 1 *et seq*. of the Code of Virginia), and the terms and conditions of water quality permits required by USACE, Virginia Department of Environmental Quality (Virginia DEQ), and Virginia Marines Resources Commission (VMRC), and an erosion and sediment control plan and a stormwater management plan approved by Virginia DEQ, all of the Build Alternatives would be consistent with the CBPA and its implementing regulations.

Virginia Coastal Zone Management Act (CZMA)

Each Build Alternative would be consistent with the established Virginia Coastal Zone Enforceable Policies as related to fisheries management, subaqueous lands management, wetlands management, dunes management, nonpoint source pollution control, point source pollution control, shoreline sanitation, air pollution control, and coastal lands management. The FRA would submit a Federal Consistency Determination for the recommended Preferred Alternative that analyzes the coastal effects of the Project in light of the enforceable policies of the Virginia CZMA program and provides commitment to comply with those policies. The recommended Preferred Alternative would be designed and constructed in accordance with the Virginia Erosion and Sediment Control Law and the terms and conditions of water quality permits required by USACE, Virginia DEQ, and VMRC, and an erosion and sediment control plan and a stormwater management plan approved by Virginia DEQ. Implementation of proposed mitigation measures and any required permits would ensure consistency with the enforceable policies of the Virginia CZMA program.

4.1.1.2 Floodplains and Floodways

As indicated in Table 4.1-1, each Build Alternative would potentially affect Federal Emergency Management Agency (FEMA) 100-year floodplains. There is considerable variation in the acres of encroachments (both longitudinal and parallel) among the various combinations of the Build Alternatives – ranging from 62.4 to 124.8 acres. None of the floodplain encroachments would represent a "significant encroachment" (as defined in 23 *Code of Federal Regulations* [CFR] 650.105[q]) because of the following reasons:

- It would pose no significant potential for interruption or termination of a transportation facility that is needed for emergency vehicles or provides a community's only evacuation route. These rail lines are not considered the only emergency evacuation route, nor do they support emergency vehicles.
- It would not pose a significant flooding risk. The Build Alternatives would be designed consistent with procedures for the location and hydraulic design on floodplains contained in 23 CFR 650 Subpart A. Accordingly, the Build Alternatives are not expected to increase flood height elevations, the probability of flooding, or the potential for property loss and hazard to life.
- It would not have significant adverse effects on natural and beneficial floodplain values. Avoidance and minimization efforts, including spanning floodplains where practicable and minimizing wetland impacts, would be made during design to avoid or minimize impacts on natural and beneficial floodplain values.

Portions of the study area are also vulnerable to tidal flooding from major storms, such as hurricanes and northeasters. Both types of storms produce winds that push large volumes of water against the shore. Hurricanes, with their high winds and heavy rainfall, are the most severe storms to which the study area is subjected and can produce local to widespread flooding in the study area. The study area also contains tidally influenced waters that are subject to tidal flooding in their lower reaches and fluvial flooding on the upper reaches.

Each Build Alternative is consistent with the transportation elements of local comprehensive use plans and are not projected to either encourage or accelerate any growth or changes in land use that are not already expected. The Project would not encourage, induce, allow, serve, support, or otherwise facilitate incompatible base floodplain development.

4.1.1.3 Stormwater/Drainage

Increased stormwater runoff from construction of the Project improvements can impact receiving streams and associated land surfaces in two forms: long-term impacts caused by runoff from increased impervious surfaces and short-term impacts caused by land disturbance during construction. Stormwater from railroad corridors can potentially carry increased quantities of silt; heavy metals; petroleum products from railroad equipment; chemicals associated with snow and ice removal; herbicides associated with vegetation maintenance; and other chemicals associated with railroad cars and machinery. The proposed Build Alternatives would increase impervious surfaces by constructing additional rail bed and track, as well as ancillary facilities associated with stations, grade crossings, and bridges. The increase in stormwater runoff could increase erosion, silt, and chemicals entering the waterways. These materials can potentially degrade water quality and aquatic habitat integrity. The effects on water quality depend on the size of the receiving waterways crossed and the number of such crossings (see Table 4.1-1). Streams with low flow are more severely affected because they have less volume to dilute the runoff.

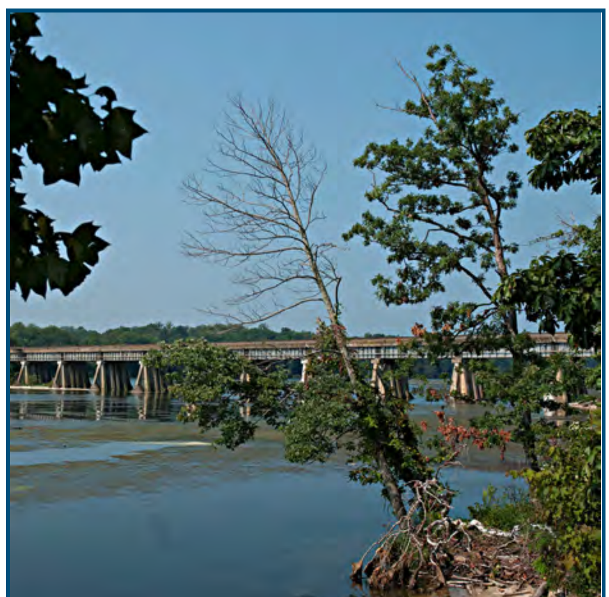
Additional runoff as a result of the Build Alternatives would be minimal because the increases in impervious surface are small. Stormwater runoff from railways is generally less pronounced than that from roadways because much of the rail bed is permeable to rainfall (i.e., ballast and side slopes). Impervious surfaces have a runoff coefficient of 0.80, or about 80 percent runoff and about 20 percent infiltration. Roadways have runoff coefficients of 0.85 to 0.95, while the runoff coefficient for ballasted track is calculated between 0.50 to 0.55. Although ballast is considered to be permeable, some runoff would collect in adjacent drainage ditches and may carry similar pollutants to and have similar effects to surface waters as runoff associated with paved roadways.

Short-term adverse impacts on water quality within the study area may result from soil erosion and sedimentation because of land-disturbing activities during construction. Land-disturbing activities include construction of the rail bed, tracks, bridges, signal and communication facilities, and other related structures and facilities of the railroad, including grade crossings, clearing of right-of-way, staging areas, access roads, and borrow/spoil areas. Construction-related effects are likely to be similar for road and rail (see Section 4.19 for descriptions of construction activities). Uncontrolled erosion and sedimentation can affect aquatic algae and submerged aquatic vegetation, benthic macroinvertebrate habitat, and fish spawning habitat, and it can remove food resources for some stream species.

The recommended Preferred Alternative would be designed and constructed in accordance with the Virginia Erosion and Sediment Control Law (§10.1-560 *et seq.* of the Code of Virginia), the *Stormwater Management Act* (§10.1-603. 1 *et seq.* of the Code of Virginia), and the terms and conditions of water quality permits required by USACE, Virginia DEQ, and VMRC. By upgrading older stormwater facilities along the DC2RVA corridor, the Project could improve drainage in the study area.

4.1.2 Wetlands

As noted in Chapter 3, various wetland systems are located along extensive stretches throughout the 123-mile railroad corridor. Many of these systems pre-date the rail corridor and are bisected by the rail line itself. Existing drainage facilities beneath the rail bed have maintained hydraulic connections between the systems and, in many cases, allowed the persistence of these systems on both sides of the rail line. Preliminary designs to widen the rail bed attempted to minimize encroachments on these resources by widening on sides opposite of wetlands when practicable. However, complete avoidance could not be achieved, and DRPT anticipates permanent impacts to wetlands with any of the Build Alternatives. Permanent impacts resulting from such encroachments range from 22.14 to 49.64 acres depending on the combination of Build Alternatives (see Table 4.1-2). Temporary impacts during construction would be similar between the Build Alternatives, ranging from 25.25 to 30.86 acres. The most measurable difference in effects among the alternatives is found in the effects associated with construction of the Fredericksburg and Ashland bypasses on greenfield alignments that cross rural areas less altered by human activities (Alternatives 3C and 5C, respectively). The approximate limits of disturbance and locations of potential wetlands effects for each alternative are shown in detail in the *Natural Resources Technical Report* (Appendix M).



Powells Creek Crossing

Table 4.1-2: Wetland Effects (acres)

Alternative Area	Alternative	PEM[1]	PEM/ PSS	PEM/ PFO	PEM/ PSS/ PFO	PSS[2]	PSS/ PFO	PFO[3]	Total
Area 1: Arlington (Long Bridge Approach)	1A	–	–	–	–	P: 0.02 T: 0.67	–	–	P: 0.02 T: 0.67
	1B	–	–	–	–	P: — T:0.01	–	–	P: — T: 0.01
	1C	–	–	–	–	P: 0.01 T: 0.11	–	–	P: 0.01 T: 0.11
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	P: 1.36 T: 0.62	P: 0.15 T: 0.19	P: 1.71 T: 1.53	P: 0.67 T: 0.37	–	–	P: 1.31 T: 0.83	P: 5.19 T: 3.54
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	P: 1.57 T: 1.11	P: 0.42 T: 0.21	P: 2.40 T: 1.30	–	P: 0.13 T: 0.34	P: 0.04 T: —	P: 0.70 T: 1.49	P: 5.24 T: 4.45
	3B	P: 1.61 T: 1.16	P: 0.42 T: 0.21	P: 2.39 T: 1.29	–	P: 0.13 T: 0.34	P: 0.04 T: —	P: 0.71 T: 1.52	P: 5.29 T: 4.52
	3C	P: 1.92 T: 0.92	P: 0.54 T: 0.10	P: 3.92 T: 0.90	–	P: 0.42 T: 0.36	–	P: 17.03 T: 4.24	P: 23.82 T: 6.53
Area 4: Central Virginia (Crossroads to Doswell)	4A	P: 2.51 T: 1.66	P: 0.78 T: 0.17	P: 2.67 T: 7.55	P: 0.71 T: 1.15	P: 0.04 –	P: 0.25 T: 0.90	P: 1.43 T: 3.31	P: 8.39 T: 14.74
Area 5: Ashland (Doswell to I-295)Z	5A	P: 0.16 T: 0.08	–	P: 0.21 T: 0.46	–	–	P: — T: 0.08	P: 0.04 T: 0.86	P: 0.41 T: 1.48
	5A–Ashcake	P: 0.16 T: 0.08	–	P: 0.21 T: 0.46	–	–	P: — T: 0.08	P: 0.04 T: 0.86	P: 0.41 T: 1.48
	5B	P: 0.16 T: 0.08	–	P: 0.21 T: 0.51	–	–	P: — T: 0.08	P: 0.04 T: 0.86	P: 0.41 T: 1.53
	5B–Ashcake	P: 0.20 T: 0.05	–	P: 0.21 T: 0.51	–	–	P: — T: 0.08	P: 0.04 T: 0.86	P: 0.45 T: 1.50
	5C	P: 2.66 T: 0.78	–	P: 2.10 T: 0.92	–	–	P: — T: 0.08	P: 3.69 T: 1.70	P: 8.44 T: 3.47
	5C–Ashcake	P: 2.70 T: 0.78	–	P: 2.10 T: 0.92	–	–	P: — T: 0.08	P: 3.69 T: 1.70	P: 8.48 T: 3.47
	5D–Ashcake	P: 0.20 T: 0.05	–	P: 0.21 T: 0.46	–	–	P: — T: 0.08	P: 0.04 T: 0.93	P: 0.45 T: 1.51
Area 6: Richmond (I-295 to Centralia	6A	P: 1.59 T: 0.29	–	P: 1.07 T: 0.33	P: 0.36 T: 0.10	P: 0.01 T: 0.40	–	P: 0.18 T: 0.77	P: 3.21 T: 1.89
	6B–A-Line	P: 1.30 T: 0.31	–	P: 1.07 T: 0.33	P: 0.36 T: 0.10	P: 0.01 T: 0.40	–	P: 0.18 T: 0.77	P: 2.91 T: 1.91
	6B–S-Line	P: 2.48 T: 0.64	P: 0.20 T: 0.01	P: 0.28 T: 0.05	P: 0.13 T: 0.06	P: 0.08 T: 0.05	–	P: 0.30 T: 0.22	P: 3.47 T: 1.03

▶ *Continued (see end of table for detailed notes.)*

Table 4.1-2: Wetland Effects (acres)

Alternative Area	Alternative	PEM[1]	PEM/ PSS	PEM/ PFO	PEM/ PSS/ PFO	PSS[2]	PSS/ PFO	PFO[3]	Total
Area 6: Richmond (I-295 to Centralia	6C	P: 1.37 T: 0.30	–	P: 1.07 T: 0.33	P: 0.36 T: 0.10	P: 0.01 T: 0.40	–	P: 0.18 T: 0.77	P: 2.99 T: 1.90
	6D	P: 2.48 T: 0.64	P: 0.20 T: 0.01	P: 0.28 T: 0.05	P: 0.13 T: 0.06	P: 0.08 T: 0.05	–	P: 0.30 T: 0.22	P: 3.47 T: 1.03
	6E	P: 1.59 T: 0.29	–	P: 1.18 T: 0.33	P: 0.36 T: 0.10	P: 0.01 T: 0.40	–	P: 0.18 T: 0.77	P: 3.31 T: 1.89
	6F	P: 2.53 T: 0.64	P: 0.20 T: 0.01	P: 0.28 T: 0.05	P: 0.13 T: 0.06	P: 0.08 T: 0.05	–	P: 0.30 T: 0.22	P: 3.52 T: 1.03
	6G	P: 2.75 T: 0.64	P: 0.20 T: 0.01	P: 0.28 T: 0.05	P: 0.13 T: 0.06	P: 0.08 T: 0.05	–	P: 0.30 T: 0.22	P: 3.74 T: 1.03

Notes: 1. PEM=Palustrine Emergent (freshwater emergent wetland); 2. PSS=Palustrine Scrub-Shrub (freshwater shrub wetland); 3. PFO = Palustrine Forested (freshwater forested wetland); P = Permanent Effect, T=Temporary Effect.

Typical impacts to wetlands from construction projects such as this include:

Temporary

- Increased erosion from disturbed areas, resulting in increased sedimentation and decreased water filtering abilities
- Increased nutrient loading from increased runoff and fertilizer application (during the replanting process)
- Disturbance of habitat and aquatic species

Long-term temporary

- Clearing and grubbing of vegetated wetland buffers
- Introduction of invasive species
- Decreased groundwater recharge due to increased impervious surfaces
- Increased potential for toxic compounds entering the wetland system from construction equipment, increased train traffic, application of snow and ice removal chemicals, and application of herbicides to keep tracks clear of vegetation
- Altered hydrologic patterns

A small portion of the wetlands in the northern section of the alignment are tidally influenced. These wetlands mostly occur along larger waterways. Impacts to these waters would be minimized by designing water crossings to span waterways, placing as little infrastructure in the waters as practicable. All tidal wetlands crossed in the DC2RVA corridor are along Build Alternatives 1 and 2A.

4.1.3 Water Quality

Under the CWA, a permit is necessary to discharge any pollutant from a point source into Waters of the U.S. through EPA's National Pollutant Discharge Elimination System (NPDES) program, including pollutants carried by stormwater discharges. The permits contain industry-specific, technology-based, and/or water quality-based limits and establish pollutant monitoring and reporting requirements. Water quality-based limits and monitoring and reporting requirements could be stricter for those streams that do not meet water quality standards (on the Section 303[d] list) and already have regulated total maximum daily loads (TMDLs) of pollutants. Impaired waters crossed by the DC2RVA Project are listed in the *Natural Resources Technical Report* (Table 3-9 in Appendix M).

4.1.3.1 Temporary Effects

Despite protective measures, the Project could potentially result in short-term effects, such as increased sedimentation; increase in turbidity from in-stream work; increased likelihood of potential spills; and non-point source pollutants entering groundwater or surface water from stormwater runoff. Construction activities that could affect stormwater runoff include excavation to widen 'cut' sections and to remove unsuitable (organic) material from 'fill' sections; filling and placing ballast to support new track; relocating access roads; relocating or creating new trackside swales; and any substructure work required for the signal and communication equipment foundations, bridge or culvert installation, or station improvements. Construction-phase staging areas and haul roads, if needed, could also disturb the ground, potentially causing erosion and sedimentation.

4.1.3.2 Long-Term Effects

All Build Alternatives cross impaired waters, and DRPT assumes that the Project would have some effect on water quality. Minor long-term water quality impacts could occur as a result of increases in impervious surfaces and consequent increases in pollutants washed from the railroad surface into receiving water bodies; leaking fluids from trains; and an increase in non-point source pollutants from infrastructure, grease, oil, metals, maintenance chemicals, vegetation management chemicals, and suspended solids and other elements associated with railways. The greatest effect would occur with the Fredericksburg and Ashland bypasses, which would convert green space to railroad facilities in locations where none currently exist. The remaining alternatives would be located adjacent to existing facilities and incorporate BMPs and improved stormwater facilities, which would mitigate new conditions and may improve existing conditions.

4.1.3.3 Impaired Waters

The DC2RVA corridor includes 51 water crossings that have been assessed and found to have more contamination than allowed to support one or more of its designated uses. Most Build Alternatives cross the same water bodies; however, the Fredericksburg Bypass (Build Alternative 3C) would cross two fewer impaired water bodies than Build Alternatives 3A or 3B which pass through town. In the Richmond area, the S-Line crosses two more impaired water bodies than the A-Line. The *Natural Resources Technical Report* (Appendix M) provides a list of impairments, probable causes, and the potential for the DC2RVA Project to add to these impairments. The potential for additional contaminants is similar for all waters; however, waters that are already impaired may have additional restrictions in the form of TMDLs in an effort to restore designated uses.

4.1.4 Drinking Water/Aquifers/Water Supply

Contamination of groundwater resources occurs when man-made chemicals such as gasoline, oil, and road salts enter aquifers and render their water unsafe and unfit for human use. Some of the major sources of these contaminants include storage tanks, septic systems, hazardous waste sites, landfills, and the widespread use of road salts and chemicals. Release of chemicals during construction, release of transported chemicals, salts and chemicals used for snow and ice removal, and chemicals used for the maintenance of vegetation are the main sources of contamination to public water supplies along rail lines. These chemicals can leach through the soil and into the water table from which public water supplies are drawn.

In accordance with 1996 *Safe Drinking Water Act* (SDWA) amendments, Virginia adopted a protection zone around all groundwater public sources. Virginia Department of Health (VDH) recommends private wells not be located within 100 feet of known contamination sources such as, but not limited to, sewage disposal systems, dump stations, abandoned wells, pesticide treated soils, underground storage tanks (USTs), and other sources of physical, chemical, or biological contamination; and any potential contamination sources within 200 feet should be investigated (VDH, 2012). The LOD for the Build Alternatives fall within the following prescribed protection zones:

- Zone 1 (5-mile radius) of 3 public surface water supply intakes: Fairfax County Water Authority, Hanover County Suburban Water System, and City of Richmond. Fairfax County Water Authority and City of Richmond water supplies are located upstream of the existing tracks.
- Zone 2 (1-mile wellhead protection zone) of 14 public groundwater sources.
- Zone 1 (1,000-foot radius in which land use activities should be assessed for their potential to contaminate water supplies) of three public groundwater sources.
- Within 100 feet of 14 private wells.

Although the existing railroad facilities that fall within the wellhead protection zones are exempt, work required for the DC2RVA Project would include new permanent and temporary impacts within the wellhead protection zones for public and private wells. Construction of the new facilities and subsequent operation within these protection zones have the potential to introduce contamination to existing wells. Before construction, DRPT will evaluate the potential for contamination. The area of each Build Alternative within these drinking water protection zones is shown in Table 4.1-3.

4.1.5 Permits

Wetland and water quality permits would be required for construction of any of the Build Alternatives. The controlling regulations and permits required at the local, state, and federal level are addressed below.

Table 4.1-3: Estimated Area within Drinking Water Protection Zones

Alternative Area	Alternative	Public Surface Water Zone 1[1] (acres)			Public Groundwater Sources (acres)		Private Wells (square feet)	
		Fairfax County*[2]	Hanover County[2]	City of Richmond*[2]	Zone 1[3]	Zone 2[4]	100-foot radius (31,416 square feet)	200-foot radius (125,664 square feet)
Area 1: Arlington (Long Bridge Approach)	1A	–	–	–	–	–	–	–
	1B	–	–	–	–	–	–	–
	1C	–	–	–	–	–	–	–
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	P: 32.75 T: 31.05	–	–	–	P: 26.37 T: 15.94	P: 7,822 T: 8,726	P: 72,243 T: 23,146
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	–	–	–	–	P: 16.91 T: 6.39	P: 3,343 T: 6,406	P: 57,106 T: 13,279
	3B	–	–	–	–	P: 16.91 T: 6.39	P: 16,365 T: 8,397	P:105,610 T: 16,996
	3C	–	–	–	–	P: 13.98 T: 9.72	P: 279 T: 414	P: 41,238 T: 3,762
Area 4: Central Virginia (Crossroads to Doswell)	4A	–	P: 42.48 T: 23.36	–	P: 0.81 T: 1.07	P: 37.55 T: 27.73	P: 4,117 T: 25,446	P: 18,088 T: 45,750
Area 5: Ashland (Doswell to I-295)	5A	–	P: 8.36 T: 6.08	–	–	P: 9.25 T: 5.52	–	P: 13,688 T: —
	5A–Ashcake	–	P: 8.36 T: 6.08	–	–	P: 11.59 T: 5.32	–	–
	5B	–	P: 8.36 T: 6.08	–	–	P: 9.33 T: 6.04	P: 609 –	P: 26,018 T: 138
	5B–Ashcake	–	P: 8.36 T: 6.08	–	–	P: 15.21 T: 6.65	P: 609 –	P: 15,411 T: 2,727
	5C	–	P: 31.06 T: 9.59	–	P: 4.70 T: 1.51	P: 44.09 T: 11.24	P: 4,205 T: 1,693	P: 19,098 T: 2,181
	5C–Ashcake	–	P: 31.06 T: 9.59	–	P: 4.70 T: 1.51	P: 46.53 T: 11.24	P: 4,205 T: 1,693	P: 5,410 T: 2,181
	5D–Ashcake	–	P: 8.36 T: 6.08	–	–	P: 16.12 T: 7.07	–	P: 17,321 T: 251

▶ *Continued (see end of table for detailed notes.)*

Table 4.1-3: Estimated Area within Drinking Water Protection Zones

Alternative Area	Alternative	Public Surface Water Zone 1[1] (acres)			Public Groundwater Sources (acres)		Private Wells (square feet)	
		Fairfax County*[2]	Hanover County[2]	City of Richmond*[2]	Zone 1[3]	Zone 2[4]	100-foot radius (31,416 square feet)	200-foot radius (125,664 square feet)
Area 6: Richmond (I-295 to Centralia)	6A	–	–	P: 51.70 T: 17.53	–	–	–	P: 21,701 T: 3,275
	6B–A-Line	–	–	P: 121.10 T: 46.69	–	–	–	P: 16,364 T: 2,932
	6B–S-Line	–	–	P: 125.26 T: 31.24	–	–	P: 3.73 T: —	P: 28,214 T: 10,324
	6C	–	–	P: 153.22 T: 47.50	–	–	P: 23,773 T: 1,938	P: 55,761 T: 7,887
	6D	–	–	P: 119.50 T: 31.96	–	–	P: 3.73 –	P: 28,214 T: 10,324
	6E	–	–	P: 80.04 T: 40.18	–	–	–	P: 21,701 T: 3,275
	6F	–	–	P: 129.47 T: 32.53	–	–	P: 3.73 –	P: 28,214 T: 10,324
	6G	–	–	P: 129.84 T: 30.76	–	–	–	P: 31,558 T: 13,595

Source: VDOT-CEDAR, 2014; DMME, 2016.

Notes: *These public water supplies are located upstream from the study area; 1. 5-mile radius; 2. Fairfax County Water Authority, Hanover Suburban Water System, and City of Richmond; 3. Zone 1 includes a 1,000-foot radius (~72 acres) in which land use activities should be assessed for their potential to contaminate water supplies; 4. Zone 2 Virginia adopted a 1-mile wellhead protection zone around all groundwater public sources. P = Permanent Effect, T=Temporary Effect.

4.1.5.1 Section 401– Certification (Water Quality Certification [WQC])

Section 401 of the CWA states that "any activity including, but not limited to, the construction or operation of facilities, which may result in any discharge into the navigable waters, shall provide the licensing or permitting agency a certification from the state in which the discharge originates or will originate, or, if appropriate, from the interstate water pollution control agency having jurisdiction over the navigable waters at the point where the discharge originates or will originate." Section 401 of the CWA requires any applicant for a federal license or permit for any activity that may result in a discharge into waters to obtain a certification that discharge will not adversely affect water quality from the state in which the discharge will occur. Section 401 requires certification by Virginia that prospective permits comply with the state's applicable effluent limitations and water quality standards. Impacts to water resources would require a Joint Permit Application (JPA) to regulatory agencies. The JPA is submitted to VMRC who then distributes it to USACE, Virginia DEQ, and Local Wetlands Boards.

4.1.5.2 Section 402–-National Pollution Discharge Elimination System (NPDES)

Permits for the discharge of any pollutant or combination of pollutants into navigable waters are regulated by Virginia DEQ.

4.1.5.3 Section 404–Dredge and Fill Materials

Section 404 of the CWA regulates activities that may affect the chemical, physical, or biological integrity of Waters of the U.S. Permits for activities that result in the discharge of dredged materials or fill into jurisdictional waters are administered by USACE. Permits issued under Section 404 of the CWA must comply with the Section 404(b)(1) Guidelines developed by EPA.

4.1.5.4 Subaqueous Stream Bed Bottom

Subaqueous land is defined in Virginia as ungranted beds of the bays, rivers, creeks, and shores of the sea owned by the state. Through this regulatory framework, activities requiring permits include building, dumping, or otherwise trespassing upon or over, encroach upon, take or use any material from the beds of the bays, oceans, and jurisdictional rivers, streams, or creeks. VMRC issues permits for activities in, on, or over subaqueous lands in Virginia (Code of Virginia Chapter 2, Title 62.1).

4.1.5.5 Section 9–United States Coast Guard

Section 9 of the *Rivers and Harbors Act* prohibits construction of any dam, dike, bridge, or causeway across navigable waters without approval of the USCG.

4.1.5.6 Section 10–USACE

Section 10 of the *Rivers and Harbors Act* regulates dredging and filling activities related to construction of any structure or type of obstruction in navigable waters of the United States. Permits for these activities are administrated by USACE.

4.1.5.7 Virginia Water Protection Permit

The Virginia Water Protection Permit Program was designed to protect surface waters, including tidal and non-tidal water bodies and wetlands. Virginia DEQ has regulatory authority over most activities affecting these waters. Virginia's authority to protect water resources is independent of other state and federal regulatory agencies.

4.1.5.8 MS4 Permit–Small Municipal Separate Storm Sewer Systems

Discharges from municipal separate storm sewer systems (MS4s) are regulated under the Virginia *Stormwater Management Act,* the Virginia Stormwater Management Program (VSMP) Permit regulations, and the CWA as point source discharges. MS4 programs must be designed and implemented to control the discharge of pollutants from their storm sewer system to the maximum extent practicable in a manner that protects the water quality in nearby streams, rivers, wetlands, and bays. MS4 permits are administrated by Virginia DEQ.

4.1.5.9 Joint Permit Application–USACE, VMRC, Virginia DEQ, Local Wetlands Board

In Virginia, for permitting involving water, wetlands, and dune/beach resources where fill, flooding, or alteration of flow occurs, USACE, VMRC, Virginia DEQ, and Local Wetlands Boards (LWB) use a joint permitting process. Non-tidal resources use a Standard Joint Permit Application (JPA) form, while a Tidewater JPA form is used for most projects involving tidal waters, tidal wetlands, and coastal primary sand dunes and beaches.

4.1.5.10 Chesapeake Bay Preservation Act

Projects located within "Tidewater Virginia" are subject to requirements of the CBPA. Land disturbance or vegetation removal in Resource Protection Areas (RPAs) require approval from local government and completion of Appendix C in the JPA. Individual localities are responsible for enforcing CBPA requirements. Local permits are not issued through the JPA process.

Transportation projects, including rail lines, are conditionally exempt from the Chesapeake Bay Preservation Area Designation and Management Regulations.

4.1.6 Avoidance, Minimization, and Mitigation Evaluation

4.1.6.1 Wetlands, Streams, and Water Resources

Efforts have been made throughout the planning and preliminary design process, and they will continue to be made in later designs to further avoid and minimize impacts to the extent practicable. Avoidance of impacts to water resources will be accomplished by selecting the alternative that best avoids such impacts and/or by routing a selected alignment around wetlands or by completely spanning streams rather than building through them. These measures will be made while also balancing potential impacts to other resources, such as residences and businesses. General minimization measures incorporated into the preliminary designs for the Build Alternatives include:

- Minor alignment shifts to avoid or minimize impacts
- Reduction of construction footprint to the extent practicable in areas with water resources
- Construction of bridges over wetland areas, substantially reducing impacts in comparison to causeways with culverts
- Use of bridges and open bottom culverts designed to the proper hydraulic opening to maintain stream morphology and integrity and that are wide enough to carry baseflow without altering stream depth, facilitate passage of wildlife and aquatic species, and decrease erosion
- The use of stabilized side slopes and retaining walls to minimize encroachment
- Temporary and permanent stormwater management measures
- Use of natural stream design for unavoidable stream relocations, which means that the channel would mimic the characteristics of an appropriate reference stream
- Prompt revegetation of disturbed area, in particular stream banks, immediately after construction to stabilize soil and reduce erosion

Impacts to water resources would require submittal of a JPA to USACE, Virginia DEQ, and VMRC. Mitigation for unavoidable impacts would be developed in coordination with these agencies during the permitting process and incorporated into final design for both temporary and permanent impacts. Permanent impacts to wetlands and streams from construction activities will require compensatory mitigation. Guidance for compensatory mitigation from the regulatory agencies can be found in the July 2004 Joint USACE and Virginia DEQ Recommendations for Wetland Compensatory Mitigation: Including Site Design, Permit Conditions, Performance Criteria, and Monitoring Criteria and associated Mitigation Checklist; the March 2008 Off-Site Mitigation Location Guidelines; and the USACE and EPA jointly issued Compensatory Mitigation for Losses of Aquatic Resources; Final Rule from June 2008. The mitigation rule indicates the agencies' preferred hierarchy for mitigation options as follows:

1. Purchase of compensatory mitigation bank credits.
2. Purchase of an approved in-lieu fee fund's credits.
3. Watershed approach-based mitigation by the permittee.
4. Onsite mitigation/in-kind mitigation by the permittee.
5. Offsite mitigation/out-of-kind mitigation by the permittee.

Virginia DEQ has also adopted this preferred sequence. Factors to be considered in deviating from the preference for banks include the likelihood for ecological success and sustainability, the location of the compensation site(s) relative to the impact site and their significance within the watershed, and the costs of the compensatory mitigation project. The final compensatory mitigation plan will be determined during the permitting process, in coordination with the regulatory agencies, and will likely include a combination of types of mitigation. Wetland mitigation requirements vary by wetland type. Typical replacement ratios of area disturbed are Palustrine Emergency Wetlands (PEM) (1:1), Palustrine Scrub-Shrub Wetlands (PSS) (1.5:1), and Palustrine Forested Wetlands (PFO) (2:1). Compensation is approved on a case-by-case basis, and requirements may vary.

Compensatory mitigation for unavoidable stream impacts would be based on the Unified Stream Methodology (USM) form. Impacts greater than 300 linear feet typically require compensation; however, for projects with multiple stream impacts, compensation for all impacts is often required regardless of the length of individual crossings. Although compensatory mitigation is generally not required for impacts to jurisdictional ditches or open waters, impacts will be reviewed on a case-by-case basis, and compensation will be determined during the permitting process.

4.1.6.2 Floodplains and Stormwater/Drainage

The design of this Project would include the use of stormwater management practices to address issues such as post-development storm flows and downstream channel capacity. The Project would be constructed in accordance with Executive Order (EO) 11988–Floodplain Management, the Virginia Erosion and Sediment Control Regulations, and the Virginia Stormwater Management Law and regulations and include an erosion and sediment control plan and a stormwater management plan approved by the Virginia DEQ, or local water quality protection criteria at least as stringent as the above state requirements.

Existing stormwater facilities would be upgraded and new stormwater facilities would be implemented to capture and treat run-off. Stormwater management measures, including detention basins, would be installed to reduce or detain discharge volumes, to compensate for increased impervious surfaces. Major bridge crossings built to accommodate the additional rail line are designed to match horizontal clearances of existing bridges and will be built in parallel to avoid altering hydraulics. Storm surge protection measures will be taken in areas along the Potomac River where practicable. During final design, a detailed hydraulic survey and study would evaluate specific impacts on stormwater discharges. This evaluation would adhere to the aforementioned specifications ensuring that no substantial increases to flooding would occur.

4.1.6.3 Water Quality

Minor long-term water quality impacts could occur as a result of increases in impervious surfaces, increases in train traffic, and consequent increases in pollutants washed from the railroad and bridges into receiving water bodies. Stormwater management measures, including detention basins, vegetative controls, and other measures, would be implemented to minimize water quality impacts. These measures would reduce or detain discharge volumes and remove pollutants, thus avoiding substantial further degradation of impaired water bodies in the study area vicinity.

Appropriate erosion and sediment control practices would be implemented in accordance with the Virginia Erosion and Sediment Control Regulations and the Virginia Stormwater Management Law and regulations. Virginia's Erosion and Sediment Control Law requires soil-disturbing projects to be designed to reduce soil erosion during and after construction. Implementation of BMPs would minimize increases in turbidity of waters downstream of construction activities. Preconstruction sediment quality assessments and water quality monitoring during construction may be conducted to address potential resuspension of contaminants and nutrients into overlying water. Further efforts to avoid and/or minimize water quality impacts would be made during final design.

Such efforts to prevent impacts could include:

- Designing the project to minimize the LOD and subsequent impacts to water resources
- Silt fencing and measures to prevent soil erosion from earthwork entering water bodies
- Temporary and permanent stormwater management measures
- Conducting stream work in the dry
- Native revegetation of disturbed areas
- Taking practicable measures to prevent spills of fuels, lubricants, or other pollutants into water bodies
- Elimination of weep hole devices that allow runoff to drip directly into waterways from bridges
- Use of vegetated buffers and vegetated swales to intercept runoff
- Use of holding basins to reduce pollution content, temperature, and intensity of runoff entering the water supply

These laws have specifications that also prohibit contractors from discharging any contaminant that may impact water quality. If accidental spills occur, the contractor is required to immediately notify all appropriate local, state, and federal agencies and to take immediate action to contain and remove the contaminant. Additionally, the requirements and special conditions of any required permits for work in and around surface waters would be incorporated into construction contract documents, so that the contractor would be required to comply with such conditions. The number, locations, and abatement capacities of stormwater management facilities will be determined during later phases of Project design. Pollutant removal efficiencies will be used as a factor in determining the location and design of stormwater management facilities.

Impaired Waters

DRPT will ensure that BMPs and other stormwater techniques would be employed to minimize further impacts on impaired waters. Construction techniques designed to reduce water quality impacts will be employed. Clearing practices should be limited to the greatest extent practicable around impaired waters to limit further degradation. The DC2RVA Project will adhere to additional restrictions in accordance with any TMDLs developed for impaired waters.

4.1.6.4 Drinking Water/Aquifers/Water Supply

Efforts would be made throughout the final design process to avoid and minimize impacts to drinking waters to the extent practicable. Minimization measures could involve modifications, such as further alignment shifts to avoid or minimize impacts; the use of BMPs; the use of retaining walls; and temporary and permanent stormwater management measures to reduce transportation of chemicals by stormwater, and they should include limited or avoidance of snow removal and vegetation maintenance chemicals near Source Protection Areas and well locations.

4.2 TOPOGRAPHY, GEOLOGY, AND SOILS

The No Build Alternative would not affect topography, geology, or soils in the DC2RVA corridor. Most of the proposed improvements associated with the Build Alternatives are located adjacent to existing railroad tracks in areas where the land has already been disturbed. There is little difference between the Build Alternatives for these resources, and aside from the proposed bypasses, the Build Alternatives are not anticipated to affect local topography or geology. The proposed Fredericksburg and Ashland bypasses would be new greenfield alignments and would involve the use of a greater portion of previously undisturbed areas.

4.2.1 Topography

Small localized changes in topography would occur with the Build Alternatives in the form of excavation and fill for tracks to have a smooth and gradual change in elevation in areas where local topographic changes are sudden. These proposed localized changes are not expected to have an effect on area topography.

4.2.2 Geology

Geology includes the underlying material (rock) the local earth is composed of and the process by which it was created and continues to change. DRPT does not anticipate that the Build Alternatives would affect area geology, aside from minor excavation, and would not affect the processes exerting change on area geology.

4.2.3 Soils

Most of the land within the LOD of the Build Alternatives was previously disturbed with construction and maintenance of the existing railroad. Soils with construction-limiting qualities within the proposed LOD are listed in Table 4.2-1. The Natural Resources Conservation Service (NRCS) provides the soils classifications listed in Table 4.2-1 as defined in Chapter 3, Section 3.2.3.

Table 4.2-1: Construction-Limiting Soils within Build Alternatives (acres)

Alternative Area	Alternative	Suitability for Building Local Roads and Streets				Hydric Soils			
		Not Rated	Not Limited[1]	Somewhat Limited[2]	Very Limited[3]	Unknown	Not Hydric	Partially Hydric	100% Hydric
Area 1: Arlington (Long Bridge Approach)	1A	P: 5.1 T: 2.2	–	–	–	P: 5.1 T: 2.2	–	–	–
	1B	P: 8.9 T: 3.2	–	–	–	P: 8.9 T: 3.2	–	–	–
	1C	P: 9.1 T: 2.1	–	–	–	P: 9.1 T: 20.1	–	–	–
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	P:87.2 T: 73.5	P: 2.2 T: 1.6	P: 37.8 T: 31.7	P: 107.4 T: 111.7	P: 87.6 T: 73.9	P: 120.2 T: 117.1	P: 12.9 T:12.4	P: 13.8 T: 15.1
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	P: 9.1 T: 10.5	P: 4.6 T: 2.3	P: 22.6 T: 13.4	P: 66.9 T: 32.3	P: 8.8 T: 10.3	P: 45.0 T: 24.7	P: 37.2 T: 19.3	P: 12.2 T: 4.3
	3B	P: 16.2 T: 9.3	P: 6.7 T: 2.5	P: 28.3 T: 14.4	P: 77.2 T: 38.1	P: 15.6 T: 8.6	P: 53.2 T: 27.7	P: 46.4 T: 23.7	P: 13.2 T: 4.4
	3C	P: 9.5 T: 6.7	P: 16.1 T: 5.6	P: 79.9 T: 22.8	P: 146.8 T: 45.9	P: 9.5 T: 6.7	P: 141.2 T: 44.6	P: 73.7 T: 21.5	P: 27.9 T: 8.3
Area 4: Central Virginia (Crossroads to Doswell)	4A	P: 3.2 T: 3.3	P: 20.7 T: 10.4	P: 58.7 T: 34.6	P: 75.4 T: 47.6	P: 0.7 T: 0.2	P: 56.4 T: 33.0	P: 51.8 T: 28.6	P: 49.2 T: 34.0
Area 5: Ashland (Doswell to I-295)	5A	–	P: 1.9 T: 1.8	P: 25.5 T: 15.5	P: 24.3 T: 12.0	–	P: 21.4 T: 12.8	P: 25.3 T: 12.1	P: 5.0 T: 4.3
	5A–Ashcake	P: 0.5 T: –	P: 1.9 T: 1.8	P: 23.8 T: 13.3	P: 25.0 T: 12.0	–	P: 22.1 T: 12.7	P: 25.6 T: 12.1	P: 3.5 T: 4.3
	5B	–	P: 1.9 T: 1.8	P: 33.1 T: 16.6	P: 27.3 T: 13.6	–	P: 25.7 T: 14.2	P: 30.3 T: 13.2	P: 6.3 T: 4.7
	5B–Ashcake	P: 0.5 T: –	P: 1.9 T: 1.8	P: 33.2 T: 17.3	P: 30.0 T: 13.9	–	P: 29.0 T: 14.6	P: 30.9 T: 13.5	P: 5.7 T: 5.0

▶ *Continued (see end of table for detailed notes.)*

Table 4.2-1: Construction-Limiting Soils within Build Alternatives (acres)

Alternative Area	Alternative	Suitability for Building Local Roads and Streets				Hydric Soils			
		Not Rated	Not Limited[1]	Somewhat Limited[2]	Very Limited[3]	Unknown	Not Hydric	Partially Hydric	100% Hydric
Area 5: Ashland (Doswell to I-295)	5C	P: 1.5 T: 0.3	P: 36.3 T: 8.2	P: 58.3 T: 19.3	P: 62.8 T: 20.4	–	P: 33.4 T: 13.6	P: 114.4 T: 28.3	P: 11.1 T: 6.3
	5C–Ashcake	P: 2.1 T: 0.3	P: 36.3 T: 8.2	P: 56.7 T: 19.3	P: 63.5 T: 20.4	–	P: 24.1 T: 13.6	P: 114.8 T: 28.3	P: 9.7 T: 6.3
	5D–Ashcake	P: 0.5 T: –	P: 1.9 T: 1.8	P: 44.8 T: 17.4	P: 32.2 T: 14.3	–	P: 33.8 T: 15.0	P: 37.7 T: 13.6	P: 8.0 T: 4.8
Area 6: Richmond (I-295 to Centralia)	6A	P: 9.3 T: 1.8	P: 5.9 T: 1.6	P: 35.2 T: 17.9	P: 117.6 T: 55.8	P: 5.7 T: 3.9	P: 95.8 T: 45.0	P: 28.7 T: 12.5	P: 37.7 T: 15.7
	6B–A-Line	P: 29.9 T: 11.3	P: 7.3 T: 1.8	P: 40.5 T: 19.9	P: 161.8 T: 74.5	P: 8.4 T: 4.9	P: 126.8 T: 60.0	P: 73.0 T: 25.8	P: 31.3 T: 15.9
	6B–S-Line	P: 24.6 T: 10.5	P: 5.9 T: 1.3	P: 16.5 T: 3.5	P: 173.7 T: 41.8	P: 0.0 –	P: 154.1 T: 43.5	P: 44.2 T: 8.0	P: 22.4 T: 5.7
	6C	P: 30.8 T: 10.9	P: 7.3 T: 1.8	P: 41.6 T: 19.0	P: 192.0 T: 75.7	P: 9.6 T: 4.4	P: 131.6 T: 60.0	P: 98.8 T: 27.3	P: 31.7 T: 15.8
	6D	P: 24.6 T: 10.5	P: 5.9 T: 1.4	P: 16.5 T: 3.6	P: 168.0 T: 48.9	P: 0.1 –	P: 154.1 T: 46.8	P: 38.5 T: 11.9	P: 22.4 T: 5.7
	6E	P: 9.3 T: 1.8	P: 5.9 T: 1.6	P: 35.2 T: 18.6	P: 145.9 T: 77.7	P: 5.7 T: 4.6	P: 121.3 T: 67.0	P: 30.7 T: 12.5	P: 38.5 T: 15.6
	6F	P: 25.6 T:10.6	P: 5.8 T: 1.5	P: 16.8 T: 3.6	P: 176.7 T: 49.3	P: 0.1 –	P: 158.3 T: 47.2	P: 36.7 T: 12.0	P: 29.9 T: 5.7
	6G	P: 26.3 T: 9.9	P: 6.0 T: 1.5	P: 17.1 T: 3.7	P: 175.6 T: 48.2	P: 0.1 –	P: 160.7 T: 45.6	P: 34.3 T: 12.0	P: 30.1 T: 5.6

Source: CEDAR, 2015.

Notes: 1. Not Limited–Soil works well for specified use, good performance/low maintenance required; 2. Limitations can be overcome/ minimized through planning, design, and installation, fair performance/moderate maintenance; 3. Limitations may require major soil reclamation, special design, or expensive installation procedures to be overcome, poor performance/high maintenance.

P=Permanent Effect; T=Temporary Effect.

4.2.4 Avoidance, Minimization, and Mitigation Evaluation

Before the acquisition of right-of-way and construction associated with any of the Build Alternatives, thorough site investigations would be conducted to determine if mitigation would be required for limiting soil characteristics. A geologic hazard assessment will be made to establish potential impacts of soil characteristics to bridges, walls, trackbed, and roadway subgrades, and geotechnical engineering parameters will be developed for soil conditions along the corridor. Bridge, wall, trackbed, and roadway recommendations will be developed according to the specific conditions of each site. Preliminary geotechnical engineering recommendations and a more detailed analysis can be found in the DC2RVA Geotechnical Engineering Report.

Compensation for soil, geologic, and topographic limitations could include:

- The use of cut or fill to compensate for topographic changes
- The use of retaining walls to stabilize soils
- Removal or encapsulation of unsuitable soils
- Blending neutralizing material into acidic soils
- Engineering structures to compensate for limiting conditions adjustment of slope ratios, design heights, and depth of embedment
- Use of stabilizing materials

4.3 AGRICULTURAL LANDS

4.3.1 Farmland Soils

The No Build Alternative requires no right-of-way acquisition; therefore, it requires no land use conversion and has no direct effects to farmland soils.

The Build Alternatives require permanent right-of-way acquisition that contains prime farmland and statewide and locally important soils (Table 4.3-1). The transition of these soils to transportation use is a direct effect of the Project. No unique farmland soils occur within the LODs of the Build Alternatives.

Within Alternative Area 3 (Fredericksburg), the Fredericksburg Bypass (Build Alternative 3C) converts the most prime and the most statewide/locally important soils of the three alternatives.

Within Alternative Area 5 (Ashland), the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) converts the most prime and the most statewide/locally important soils of the seven alternatives.

Within Alternative Area 6 (Richmond), the Build Alternatives along the CSXT A-Line (Build Alternatives 6A, 6B–A-Line, 6C, and 6E) convert similar amounts of prime and statewide/locally important soils and almost twice as much of these soils than the Build Alternatives along the CSXT S-Line (Build Alternatives 6B–S-Line, 6D, 6F, and 6G).

As required by the *Farmland Protection Policy Act of 1981* (FPPA), Form CPA-106, Farmland Conversion Impact Rating for Corridor Type Projects, is being completed for the DC2RVA alternatives, and the first round of submissions to the NRCS is complete. Representatives of NRCS completed the required agency portions of the forms. The final corridor assessment for each Build Alternative is also complete; the forms appear in Appendix N. The corridor assessment is based on the types of farmland soils present in the Build Alternatives, the existing agricultural uses in an individual jurisdiction, the existing agricultural uses adjacent to and within the Build Alternatives, and other criteria such as farm support services.

Alternative Area 1 (Arlington): The land affected by Build Alternatives 1A, 1B, and 1C has been committed to urban use, which results in a Corridor Assessment Score of 0.

Table 4.3-1: Farmland Soils Converted within Build Alternatives and Farmland Corridor Assessment Score

Alternative Area	Alternative	Prime Farmland Soils (Acres)	Statewide and Locally Important Soils (Acres)	Total (Acres)	Corridor Assessment Score
Area 1: Arlington (Long Bridge Approach)	1A	0.00	0.00	0.00	0
	1B	0.00	0.00	0.00	0
	1C	0.00	0.00	0.00	0
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	53.56	52.37	105.93	66
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	26.84	17.83	44.67	80
	3B	34.01	20.62	54.63	80
	3C	69.05	84.17	153.22	118
Area 4: Central Virginia (Crossroads to Doswell)	4A	99.17	49.91	149.08	93
Area 5: Ashland (Doswell to I-295)	5A	27.18	24.83	52.01	51
	5A–Ashcake	28.04	23.57	51.61	46
	5B	31.20	28.30	59.50	51
	5B–Ashcake	33.82	28.02	61.84	51
	5C	89.83	35.10	124.93	171
	5C–Ashcake	90.88	33.82	124.70	171
	5D–Ashcake	39.38	32.28	71.66	52
Area 6: Richmond (I-295 to Centralia)	6A	45.20	7.22	52.42	29
	6B–A-Line	49.04	10.06	59.10	23
	6B–S-Line	30.79	4.59	35.38	22
	6C	49.93	10.62	60.55	22
	6D	30.93	4.59	35.52	22
	6E	45.20	14.22	59.42	24
	6F	31.78	4.65	36.43	19
	6G	32.48	4.81	37.29	19

Source: VDOT; Forms NRCS-CPA-106. No Unique Farmland Soils occur within the Build Alternatives.

Alternative Area 2 (Northern Virginia): There is a wide variety of land uses within and adjacent to Build Alternative 2A. There are farmland soils present within the Build Alternative, but the score is 66 due to the urban uses of land within the Build Alternative and the amount of agricultural activity within the Build Alternative.

Alternative Area 3 (Fredericksburg): Build Alternatives 3A and 3B that pass through Fredericksburg have Corridor Assessment Scores of 80. The Fredericksburg Bypass (Build Alternative 3C) has a score of 118 due to the presence of multiple farms within the alternative.

Alternative Area 4 (Central Virginia): Build Alternative 4A has a score of 93.

Alternative Area 5 (Ashland): Build Alternative 5A–Ashcake has the lowest score of 46, Build Alternatives 5A, 5B, and 5B–Ashcake have scores of 51, and Build Alternative 5D–Ashcake has a score of 52. These are all fairly low scores due to the alternatives' locations along the existing

CSXT rail line. The Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) has scores of 171 due to the existing farms and the Stanley Agricultural District within both alternatives.

Alternative Area 6 (Richmond): The Build Alternatives in Area 6 have lower scores than in other areas due to the high amount of land already committed to urban use. The full service and shared service Build Alternatives that use both existing Staples Mill and Main Street stations—Build Alternative 6F (full service) and Build Alternative 6G (shared service)—have the lowest scores of 19. The single-station Build Alternatives at Boulevard (Build Alternatives 6B–S-Line), Broad Street (Build Alternative 6C), and Main Street (Build Alternative 6D) have scores of 22. Similarly, the single-station Build Alternative at Boulevard (Build Alternative 6B–A-Line) has a score of 23. The two-station alternative serving both Staples Mill and Main Street stations (Build Alternative 6E) has a slightly higher score of 24. Build Alternative 6A that serves Staples Mill only via the A-Line has the highest score of 29.

Table 4.3-1 lists the Corridor Assessment Scores for each of the Build Alternatives. The NRCS recommends selecting the Build Alternatives with the lowest score within each alternative area as part of the recommended Preferred Alternative. The alternatives with the lowest scores within each alternative area are the Build Alternatives that primarily utilize the existing railroad right-of-way (Build Alternatives 1A/1B/1C, 2A, 3A/3B, 4A, and 5A–Ashcake) and the two-station alternatives in Richmond using both the existing Staples Mill and Main Street stations—Build Alternative 6F (full service) and Build Alternative 6G (shared service).

4.3.2 Agricultural and Forestal Districts

The No Build Alternative requires no right-of-way acquisition; therefore, it requires no land use conversion and has no direct effects to agricultural and forestal districts.

There is one agricultural/forestal district, the Stanley District in Hanover County, within a Build Alternative. Originally approved in 1978, the Stanley District is made up of seven parcels, owned by multiple landowners, and totals 713 acres. The district was renewed by the Hanover County Planning Commission in July 2015. The transition of 73.7 acres of this agricultural/ forestal district to a transportation use is a direct effect of the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) (Figure 4.3-1). A previous preliminary design for these Build Alternatives affected a greater acreage of the Stanley District. The design was shifted east to minimize the impacts to the district. One farm within the Stanley District, White Oak Farm, is also a Century Farm, as designated by the Virginia Department of Agriculture and Consumer Services. This designation provides no formal protection at the state level but is a recognition of continuous farming for 100 years at a particular farm. There are two other Century Farms within the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake), but they are not within the Stanley Agricultural District.

The state regulations detail a process for land acquisition or construction within a designated district, including coordination with landowners and the locality. Notice to landowners and the locality includes a report detailing the proposed action (this Draft EIS). The agricultural/forestal district advisory committee, county board of supervisors, and local planning commission review the report and the effects the Project would have on an individual district. If the locality determines that the Project "might have an unreasonably adverse effect on either state or local policy", the locality can issue an order to direct the DRPT not to take the proposed action for a period of 150 days and then hold a public hearing. Before the end of the 150 days, the locality must issue a final order on the action, based on a majority vote of the members.

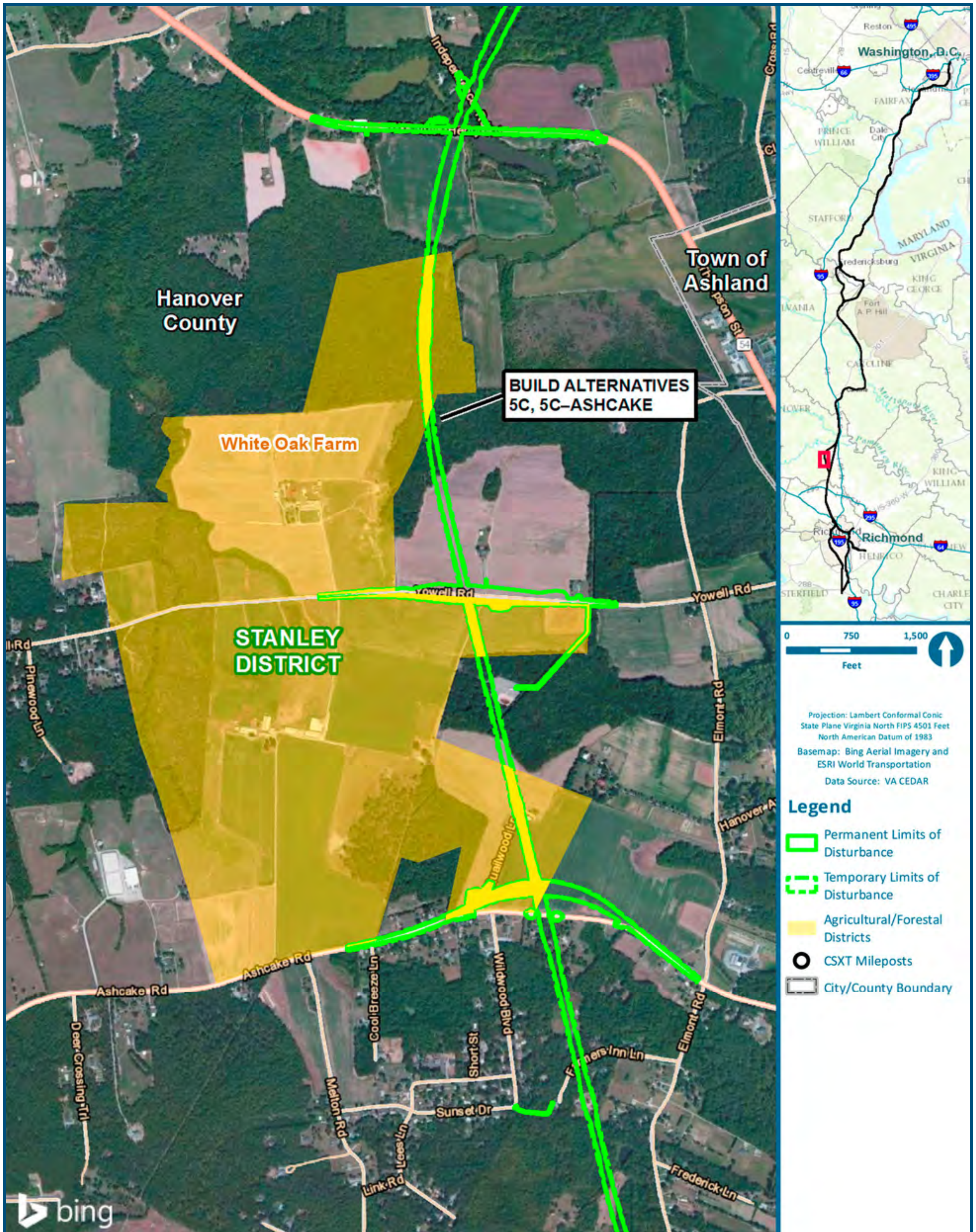


Figure 4.3-1: Agricultural/Forestal Districts Impacts – Build Alternatives 5C, 5C–Ashcake

4.4 MINERAL RESOURCES

4.4.1 Effects

According to information available from the Virginia Department of Mines, Minerals, and Energy (DMME), several active and inactive mines and mineral resources are located in the DC2RVA corridor. Mines could be affected by direct use of the area for railroad construction or any other construction activity associated with the Build Alternatives, such as new grade separations. DRPT has determined that no mines located in the study area would be affected by the No Build Alternative or Build Alternatives because they are outside of the LOD.

One known mineral resource is crossed by the Fredericksburg Bypass (Build Alternative 3C). This site—Massaponax S. & G. (VA DMM permit 08288AA)—is a former sand and gravel pit. It appears to have been subdivided and sold for residential use. One parcel had a residence added in 2004 (Figure 4.4-1).

4.4.2 Avoidance, Minimization, and Mitigation Evaluation

Although the potentially affected mineral resource located along the Fredericksburg Bypass (Build Alternative 3C) is no longer in use, DRPT will ensure that additional efforts will be made, to the extent practicable, throughout the final design process to avoid and minimize impacts to the potential reuse of this resource. Minor alignment shifts or reducing the LOD could minimize or avoid impacts to this resource.

4.5 SOLID WASTES AND HAZARDOUS MATERIAL

4.5.1 Effects

Under the No Build Alternative, CSXT would continue maintenance and repairs of the existing infrastructure, and infrastructure improvements that are already planned for the DC2RVA corridor, as defined in Section 2.5.1.1, would move forward. DRPT anticipates that the No Build Alternative would not affect hazardous material sites. Anticipated effects of the Build Alternatives are presented in Table 4.5-1 and Figure 4.5-1. The estimated number of sites affected by the Build Alternatives is based on the number of sites mapped within the LOD (permanent and temporary) that may contain hazardous materials or wastes. Contaminated sites may affect the Project by:

- Affecting the environment during construction
- Creating significant construction impacts
- Incurring cleanup liability to Project owners

Additionally, areas of contaminated soil are likely to exist along the DC2RVA corridor. Contamination is generally due to residual contamination that can be found along any part of the DC2RVA corridor or contamination associated with adjacent industrial uses. The greatest potential of contaminated soils being disturbed is during excavation. Areas requiring fill are unlikely to unearth unknown contaminants. Earthwork along the DC2RVA corridor has the potential of encountering the following contaminants:

- Railroad ties, usually treated with chemicals such as creosote
- Coal ash and cinder containing lead (Pb) and arsenic

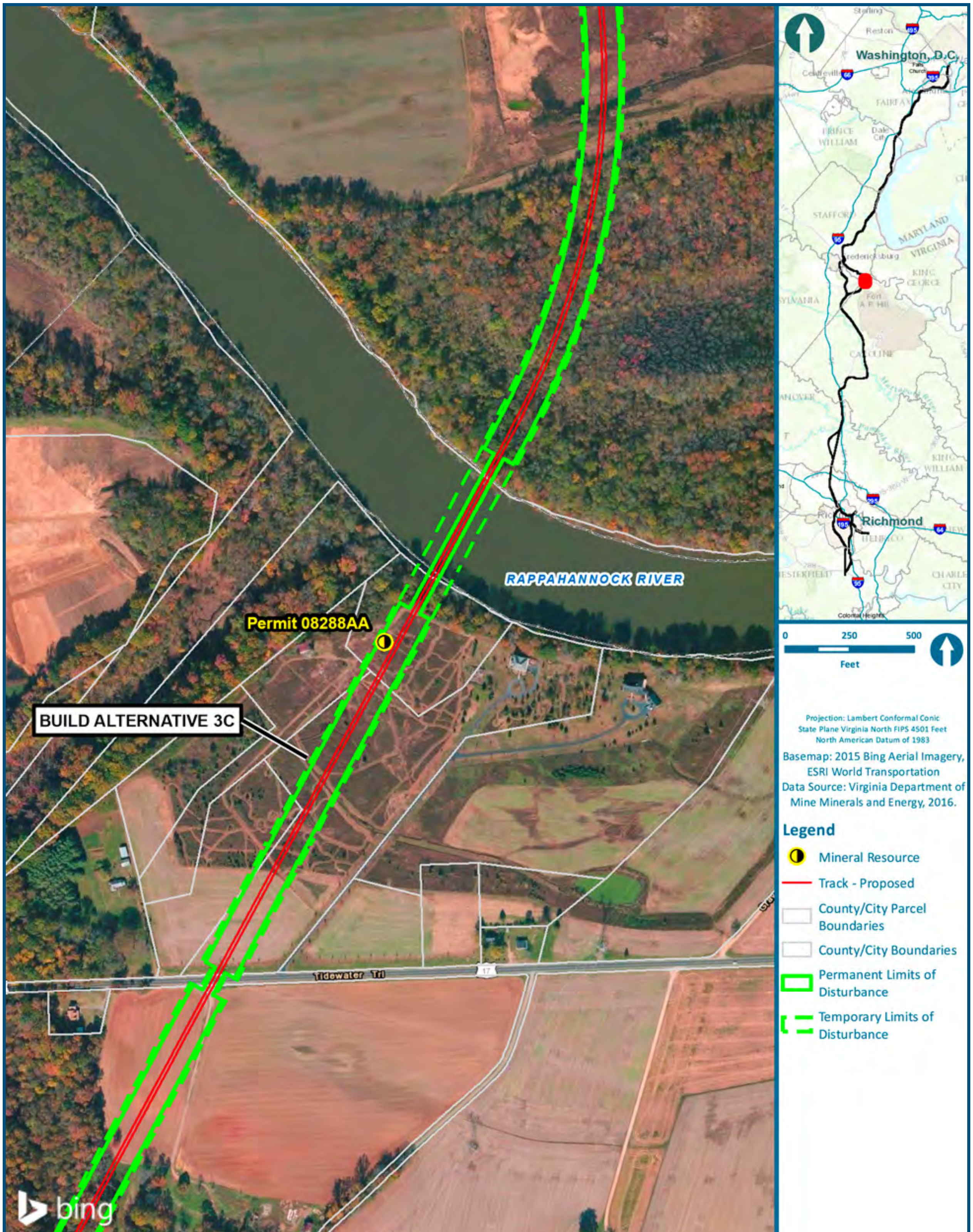


Figure 4.4-1: Mineral Resource Impact – Build Alternative 3C

Table 4.5-1: Hazardous Materials Sites within Build Alternatives

Alternative Area	Alternative	Superfund/ CERCLA/ SEMS/NPL[1]	Known HAZMAT Release[2]	Potential HAZMAT Contamination[3]	Petroleum Release[4]	HAZMAT Facility[5]	Petroleum Storage Tanks[6]
Area 1: Arlington (Long Bridge Approach)	1A	–	n/a	–	–	–	–
	1B	–	n/a	–	2	–	–
	1C	–	n/a	–	2	–	–
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	–	–	8	4	2	1
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	1	–	5	2	–	–
	3B	–	–	7	3	4	3
	3C	–	–	8	3	1	1
Area 4: Central Virginia (Crossroads to Doswell)	4A	1	n/a	–	–	–	–
Area 5: Ashland (Doswell to I-295)	5A	n/a	n/a	1	4	–	1
	5A–Ashcake	n/a	n/a	1	4	–	1
	5B	n/a	n/a	1	4	1	3
	5B–Ashcake	n/a	n/a	1	4	1	3
	5C	n/a	n/a	2	3	–	2
	5C–Ashcake	n/a	n/a	2	3	–	2
	5D–Ashcake	n/a	n/a	1	7	1	5
Area 6: Richmond (I-295 to Centralia)	6A	–	–	5	8	4	7
	6B–A-Line	–	–	8	15	4	14
	6B–S-Line	–	1	16	22	7	8
	6C	–	–	9	18	6	16
	6D	1	1	16	23	6	6
	6E	1	1	6	10	6	7
	6F	1	1	14	23	6	5
	6G	1	1	14	23	6	5

Source: VDOT GIS database, 2014.

Notes: 1. Sites proposed or already on the National Priority List. Sites in the United States eligible for long-term remedial action (cleanup) financed under the federal Superfund program. 2. Area known to be contaminated by HAZMAT or has had a toxic release of unlisted chemical. 3. Area with history of use for HAZMAT or has had a release that has been closed or remediated. These areas may be okay for their current use; however, there could be potential for uncovering contamination through construction. 4. Area where a petroleum product is known to have been released. The case may be closed; however, there is the potential for uncovering contaminated soil through construction. 5. Facilities that generate, transport, treat, store, and/or dispose of hazardous waste. 6. Facilities with above ground and underground storage tanks that store petroleum or hazardous substances, the vast majority store petroleum products. n/a – No records found in study area.

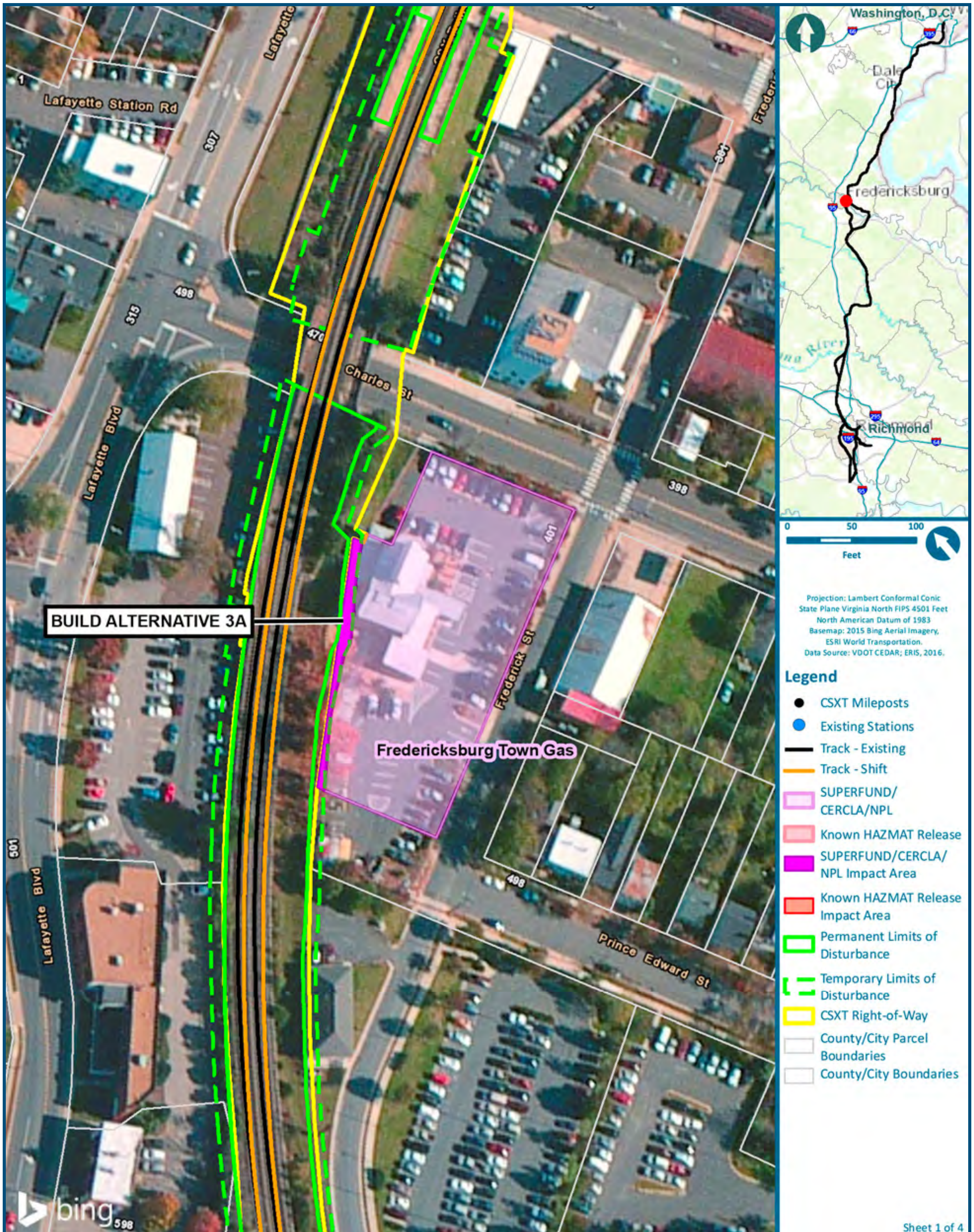


Figure 4.5-1: Critical Hazardous Materials Impacts – Build Alternative 3A

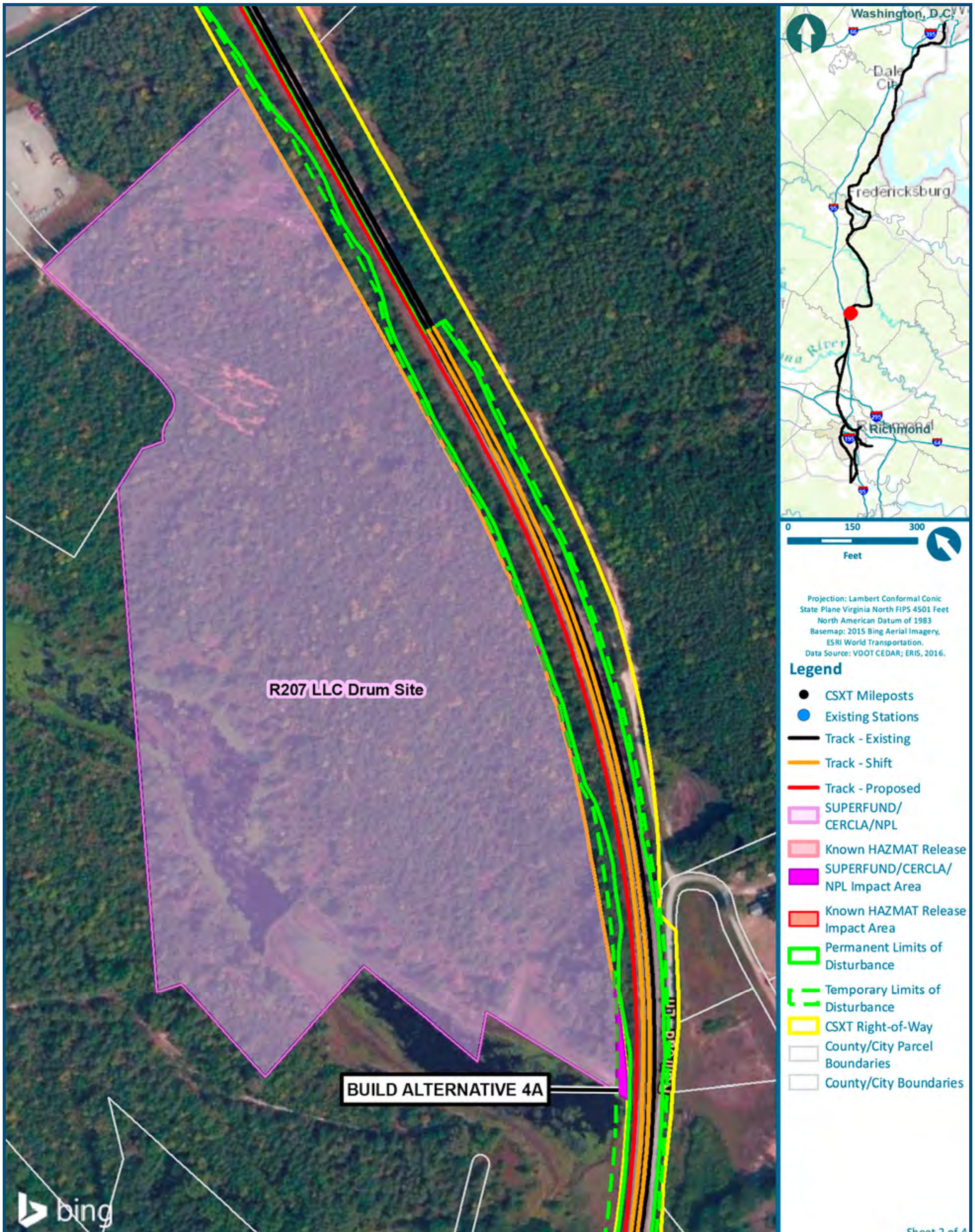


Figure 4.5-1: Critical Hazardous Materials Impacts – Build Alternative 4A

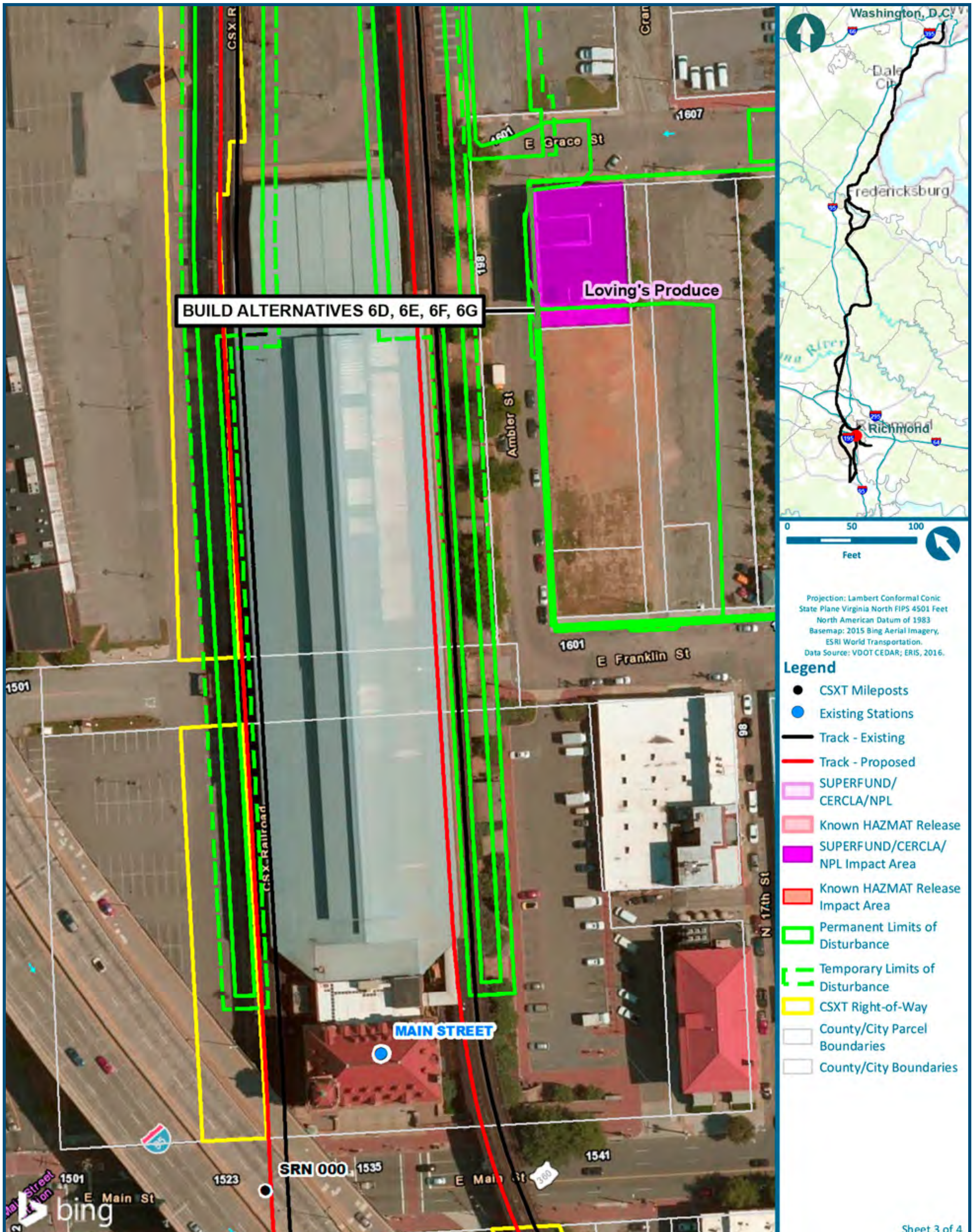


Figure 4.5-1: Critical Hazardous Materials Impacts – Build Alternatives 6D, 6E, 6F, 6G

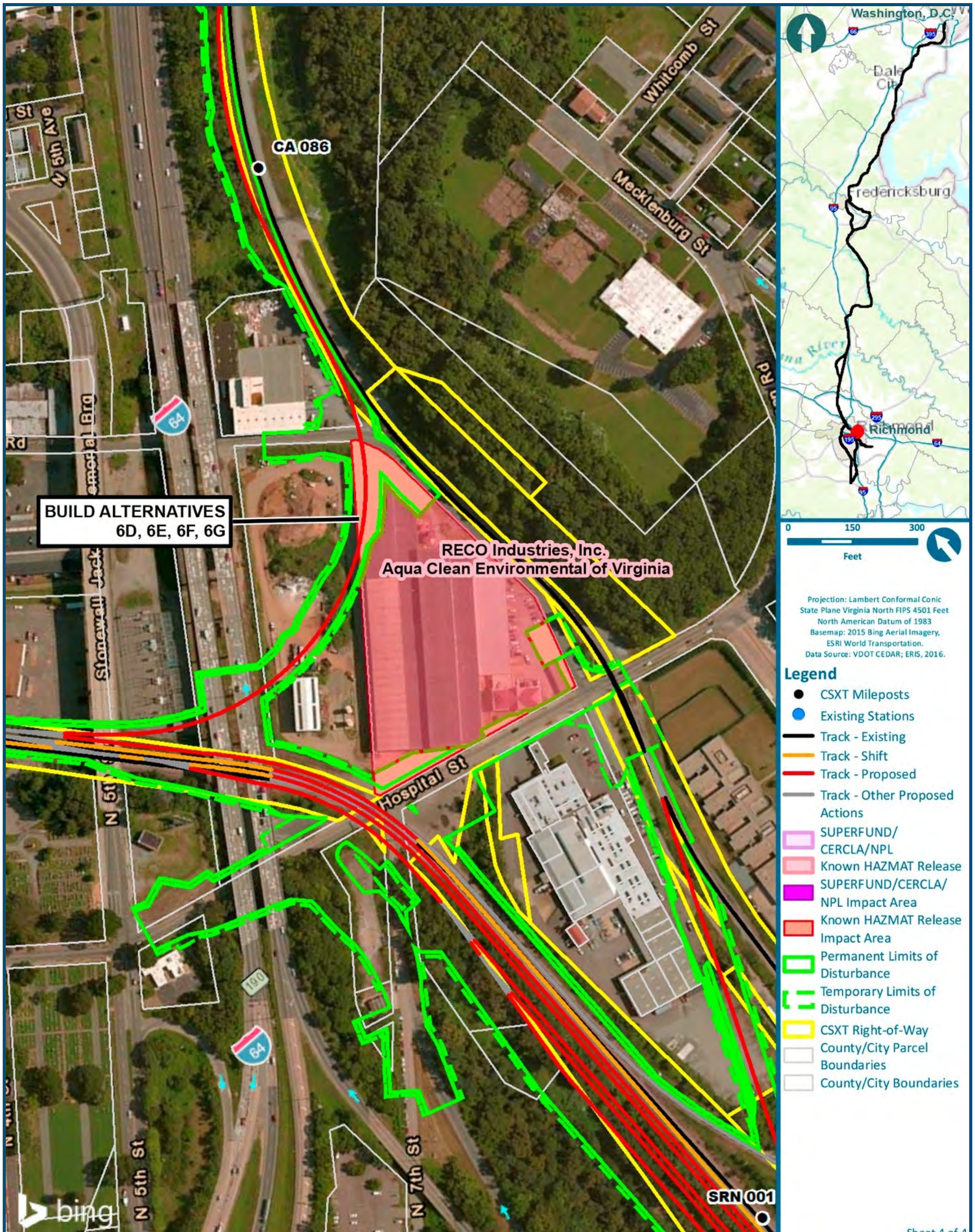


Figure 4.5-1: Critical Hazardous Materials Impacts – Build Alternatives 6D, 6E, 6F, 6G

- Spilled or leaked liquids such as oil, gasoline, and cleaning solvents
- Herbicides
- Fossil fuel combustion products (polycyclic aromatic hydrocarbons [PAHs])
- Roofing shingles (asbestos)
- Transformers and capacitors containing polychlorinated biphenyls (PCBs)
- Heavy metals such as lead, cadmium, copper, zinc, mercury, iron, cobalt, chromium, and molybdenum

It is the responsibility of the owner to determine if any of the waste created meets the criteria of a 'hazardous waste' and must be managed as such. All hazardous waste or solid waste should be tested and removed in accordance with Virginia Solid Waste Management Regulations (VSWMR) (9 *Virginia Administrative Code* [VAC] 20 - 60) and or (9 VAC 20 - 80). Asbestos, lead, or contaminated residues generated must be handled and disposed of in accordance with VSWMR or Virginia Hazardous Waste Management Regulations (VHWMR), as applicable.

Figure 4.5-1 depicts sites along the corridor that have the greatest chance of requiring costly mitigation or causing project delays if a hazardous material is located within the LOD. Appendix O includes a list of all recorded sites within the LOD.

4.5.2 Avoidance, Minimization, and Mitigation Evaluation

Before the acquisition of right-of-way and construction, thorough site investigations would be conducted to determine whether any of the sites are actually contaminated, and, if so, the nature and extent of that contamination. All solid waste material resulting from clearing and grubbing, demolition, or other construction operations will be removed and disposed of according to regulations. Any additional hazardous materials discovered during construction of a Build Alternative or demolition of existing structures will be removed and disposed of in compliance with all applicable federal, state, and local regulations. All necessary remediation would be conducted in compliance with applicable federal, state, and local environmental laws and would be coordinated with EPA, Virginia DEQ, and other federal or state agencies as necessary.

Types of remediation could include:

- **Excavation or dredging**–Removal of contamination generally to a regulated landfill, but also to be treated (commonly used for petroleum contamination, which is the most likely form of contamination to be found in a project such as this)
- **Thermal desorption**–Use of a chemical to vaporize contamination which is them collected or destroyed in an off-gas treatment system
- **Surfactant enhanced aquifer remediation (SEAR)**–Use of chemicals to decrease water surface tension to allow the contamination to de-absorb and be removed from the medium
- **Pump and treat**–Pumping out contaminated groundwater and passing it through a filtration system designed to absorb contamination from the groundwater
- **Solidification and stabilization**–Using a binder and soil to stop, prevent, or reduce the mobility of contaminants that are left in place

- **In situ oxidation**–Injection of oxygen or air to promote the growth of aerobic bacteria and accelerate natural destruction of organic contaminants
- **Soil vapor extraction**–Treatment of the off-gas volatile organic compounds (VOCs) generated after vacuum removal of air and vapors (and VOCs) from the subsurface
- **Nanoremediation**–Use of nano-sized reactive agents to degrade or immobilize contaminants
- **Bioremediation**–Use of biological methods, such as seeding the site with specific plants, fungus (mycelia), or bacteria, to remove contamination

4.6 AIR QUALITY

This section analyzes criteria pollutant air emissions associated with the proposed Project. Additionally, while mobile source air toxics (MSATs) and greenhouse gases (GHGs) are not criteria pollutants nor subject to conformity requirements, they are also considered in this section in accordance with EPA guidance. Potential air quality effects of the proposed DC2RVA Project include:

- Changes in rail-related emissions due to an increase in train operations each day and a change in equipment.
- Changes in the overall regional emissions due to travelers shifting from one mode of transportation to another.
- Changes in local (microscale) emissions, including changes at various crossings that could handle additional traffic due to nearby highway-railroad crossing closures, experience additional delay due to an increase in train operations, and changes in vehicular delay around stations due to increased traffic resulting from increased ridership.

4.6.1 Locomotive Operations–NO_x, VOC, and PM

EPA established a comprehensive program to dramatically reduce emissions from locomotives, including line-haul, switch, and passenger engines (40 CFR Part 1033). The program establishes emission standards with applicability dependent on the date a locomotive is first manufactured. The first set of standards (Tier 0) applies to most locomotives originally manufactured before 2001. The most stringent set of standards (Tier 4) applies to locomotives manufactured in 2015 and later. Additional intercity passenger locomotives operating under the DC2RVA Project will, at a minimum, meet the emissions standards set by EPA. EPA has published expected fleet average pollutant emission rates in their *Technical Highlights: Emission Factors for Locomotives USEPA-420-F-09-025* (EPA, 2009).

The DC2RVA Project is subject to federal air quality general conformity regulations (40 CFR Part 93, Subpart B). These regulations require that an evaluation of Project-generated emissions within the study area's nonattainment and maintenance areas be conducted to assess potential air quality effects. Annual pollutant emissions were calculated for the one nonattainment area in the study area (i.e., the Washington, D.C.-Maryland-Virginia ozone nonattainment area). The emissions were calculated using the expected EPA emission rates, along with projected locomotive fuel consumption, which was developed as part of the rail operations modeling conducted for this Project (Table 4.6-1). The emissions inventory listed in Table 4.6-1 represents the expected Project-generated emissions under the Build Alternatives (i.e., emissions generated from the additional intercity passenger trains from this Project). Fuel consumption in the nonattainment and maintenance areas would not be substantially different among the different Build Alternatives.

Table 4.6-1: Predicted Build Alternative Project-Generated Locomotive Emissions

Metropolitan Planning Organization	Annual Emissions (tons/year)	
	NO_x	VOC
Washington, D.C.-Maryland-Virginia[1]	13.7	0.3
De minimis (allowable) levels in the nonattainment/maintenance areas according to 40 CFR 51.853	100	50

Notes: 1. Predicted emissions listed are for those generated from the additional intercity passenger trains from this Project.

Table 4.6-1 shows that Project-generated predicted annual pollutant emissions, from the Southeast High Speed Rail (SEHSR) trains added by this Project, in nonattainment and maintenance areas, are all below general conformity *de minimis* threshold values. Pursuant to the General Conformity Rule, EPA considers project-generated emissions below these *de minimis* values to be minimal. Such projects do not require formal conformity determinations. These numbers are considered conservatively high because they do not account for any reduction in automobile emissions related to travelers diverting from auto to rail travel.

4.6.2 Mobile Source Air Toxics

Currently, FRA does not have any guidelines related to MSAT analysis, including hot-spot analyses. A hot-spot analysis is known as a "microscale" analysis because it focuses on a relatively small geographic area. In the absence of FRA MSAT guidelines, regional MSAT effects associated with the Project are discussed qualitatively. The qualitative assessment presented below is based on the Federal Highway Administration's (FHWA) *Interim Guidance Update on Air Toxic Analysis in NEPA Documents,* released December 6, 2012, and in part from a study conducted by FHWA entitled *A Methodology for Evaluating Mobile Source Air Toxic Emissions among Transportation Project Alternatives* (FHWA, 2010). It is provided as a basis for identifying and comparing the potential differences in MSAT emissions, if any, among the alternatives.

4.6.2.1 Regional MSAT Effects

MSAT emissions would be similar among the Build Alternatives because the regional change in vehicle emissions would be similar. This analysis qualitatively compares the Build Alternatives to the No Build Alternative. In 2045, the Build Alternatives are projected to have up to 1.12 million more rail passenger trips annually (compared to the No Build Alternative). By shifting this travel to rail, it is expected that up to 2,700 vehicles per day (VPD) and 322,000 vehicle miles would be removed from the parallel roads of I-95 and U.S. Route 1 in the 123-mile Project corridor in the year 2045. Assuming an average fuel efficiency of 22 miles per gallon, this equates to a reduction of approximately 5.3 million gallons of fuel per year. In comparison, the additional intercity passenger trains that would operate as a result of this project are estimated to consume approximately 2.3 million gallons of fuel per year. Therefore, overall fuel consumption would be reduced in the DC2RVA corridor. The Build Alternatives would also result in a reduction in passenger miles of travel by air and bus, which could ultimately lead to a reduction in vehicle miles from these two modes; however, the ridership forecasting completed for this Project does not include projections related to reduced vehicle trips for air or bus travel.

Beginning in 2025, through 2045, and beyond, the Build Alternatives would decrease regional vehicle miles traveled (VMT) and MSAT emissions compared to the No Build Alternative. The availability of improved intercity passenger rail service would reduce the number of vehicle trips on a regional basis. Because the Build Alternatives would not substantially change the regional traffic mix, the amount of MSATs emitted from highways and other roadways within the study area would be proportional to the VMT. Because the regional VMT estimated for the Build Alternatives would be less than the No Build Alternative in 2045, MSAT emissions from regional vehicle traffic would be less for the Build Alternatives compared to the No Build Alternative in 2045. Regardless of the Build Alternatives, emissions would also likely be lower than present levels in 2045 because of EPA's national control programs that are projected to reduce annual priority MSAT emissions by 83 percent between 2010 and 2050 even if VMT increases by 102 percent over that same period.

Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures; however, the magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in nearly all cases. Further information on highway vehicle MSATs is included in Appendix T.

4.6.2.2 Local MSAT Effects

The potential MSAT emission sources directly related to Project operation would be from trains operating along the DC2RVA corridor, vehicles used at maintenance facilities, passenger vehicles traveling to and from the train stations, and passenger vehicles delayed at grade crossings. Localized increases in MSAT emissions would occur as a result of all of these activities.

DRPT expects that the differences in local MSAT effects amongst the Build Alternatives would be minor. The Fredericksburg Bypass (Build Alternative 3C) and the Ashland Bypass (Build Alternative 5C and 5C–Ashcake) would shift freight trains and some intercity passenger trains outside of those towns, through less populated areas. While there would be fewer local MSAT emissions through town under the bypass alternatives, there would be greater local MSAT emissions along the bypasses themselves.

In Ashland, Build Alternatives 5A–Ashcake, 5B–Ashcake, and 5D–Ashcake would relocate the rail passenger station south of town in a less populated area. Passengers driving to and from the new station would result in a reduction in local MSAT emissions in downtown Ashland, and an increase in local MSAT emissions in the area surrounding the Ashcake Station.

In Richmond, local MSAT emissions will vary based on the route used (i.e., A-Line or S-Line) and station location. Nonetheless, DRPT does not anticipate a noticeable difference in local MSAT emissions between the Build Alternatives.

The localized increases in MSAT emissions would likely be most pronounced at maintenance facilities, where in-yard diesel-fueled switch locomotives would be used to pull in or pull out the trainsets for maintenance. The only maintenance facility along the DC2RVA corridor is proposed at Brown Street, north of Main Street Station in Richmond. Local MSAT emissions around this maintenance facility would increase with additional DC2RVA trains. There is no residential development or other sensitive land uses directly adjacent to the proposed maintenance facility. Therefore, DRPT expects any local MSAT effects to be minor.

Localized Project-related emissions would be substantially reduced due to implementation of EPA's vehicle and fuel regulations. The Build Alternatives would decrease regional MSAT emissions compared to the No Build Alternative.

4.6.3 Highway Vehicle Operations–CO

Carbon monoxide (CO) emissions are associated with large volumes of slow-moving traffic, such as highly congested intersections. Areas experiencing high levels of CO are referred to as CO "hot spots." The purpose of a CO hot-spot analysis is to determine if CO emissions generated by a proposed project would cause or contribute to an exceedance of the air quality standard for CO as promulgated by EPA.

The Build Alternatives would result in an increase in vehicular delay at grade crossings because more trains would be operating over these crossings; however, given the relatively short length and rapid passages of intercity passenger trains and modest predicted increases in the rates of train service, it is unlikely that these delays would result in any substantial effect on air quality levels. Additionally, at the locations where highway-rail grade separations are proposed, vehicles would no longer have to stop to wait for trains to pass, and CO emissions would be reduced. Proposed grade separation locations are identified in Section 4.15.2.

Additionally, the Build Alternatives are anticipated to increase vehicular traffic near station locations; however, while the Project would enhance passenger train travel speeds over an extended route, the frequency of service would be relatively modest. This would tend to reduce the temporal concentration of motor vehicles associated with trips to and from train stations along the DC2RVA corridor. Many stations also have direct connections to local and regional transit. Particularly, all intercity passenger rail stations in Northern Virginia share service with Virginia Railway Express (VRE). Other stations in Northern Virginia have convenient or direct connection to the Washington Metro Area Transit Authority (WMATA), including Franconia-Springfield, Alexandria, Crystal City, L'Enfant Plaza, and Washington Union Station. In Richmond, Main Street Station has multiple local and regional bus services, and the Greater Richmond Transit Company (GRTC) has plans for a 7.6-mile bus rapid transit (BRT) system along Broad Street and Main Street. These multimodal connections can help offset vehicular traffic at these stations.

The federal ambient air quality standards for CO are 35 parts per million (ppm) (1-hour) and 9 ppm (8-hour). DRPT ran a computer model to determine the CO concentrations at the worst-case grade crossings along the DC2RVA corridor. DRPT selected these locations because the locations have the highest projected amount of traffic and/or the greatest amount of delay. Based on traffic operations analysis conducted for this Project (see Section 4.15), the following worst-case traffic locations were selected:

- England Street/Thompson Street–where all intercity passenger and freight train traffic would continue to operate through town, which would contribute to the worst-case traffic conditions in Ashland (Build Alternatives 5A and 5B)
- Jahnke Road–where most intercity passenger and freight train traffic would use the CSXT A-Line between ACCA Yard and Centralia, which would contribute to the worst-case traffic conditions on the A-Line in Richmond (Build Alternatives 6A, 6B–A-Line, 6C, and 6E)
- Hermitage Road–where most intercity passenger train traffic would use all or a portion of the CSXT S-Line between Main Street Station and Centralia, which would contribute to the worst-case traffic conditions on the S-Line in Richmond (Build Alternatives 6C, 6D, 6F, and 6G)

The CO hot-spot analysis compared the 2015 Existing (Base), 2025 Interim (Opening) Build and No Build, and 2045 Design Year Build and No Build scenarios. DRPT used CAL3QHC, which is a standard EPA dispersion model, to estimate CO concentrations. Model input parameters included MOVES2014 emissions factors, CO background levels, persistence factors, peak-hour volumes, free-flow speeds, and estimated gate down time. Simulated meteorological conditions designed to yield worst-case concentrations were used in the analysis.

The results of the analyses indicated that the 1-hour and 8-hour concentrations at the locations analyzed in any scenario were well below the National Ambient Air Quality Standards (NAAQS). Based on these results, no mitigation is required, and no additional analysis is recommended (Table 4.6-2).

Table 4.6-2: Predicted CO Concentrations (including background)

Worst-Case Intersection/Crossing	Analysis Scenario									
	2015 Existing		2025 No Build		2025 Build		2045 No Build		2045 Build	
	1-hour	8-hour	1-hour	8-hour	1-hour	8-hour	1-hour	8-hour	1-hour	8-hour
England Street/Thompson Street	4.2	2.9	3.4	2.4	3.6	2.5	3.1	2.2	3.2	2.2
Jahnke Road	4.1	2.9	3.3	2.3	3.3	2.3	2.9	2.0	2.9	2.0
Hermitage Road	3.6	2.5	2.9	2.0	2.9	2.0	2.4	1.7	2.4	1.7

Note: NAAQS: 35 ppm (1-hour) and 9 ppm (8-hour).

4.6.4 Greenhouse Gas Emissions

Carbon dioxide (CO_2) is the primary GHG associated with the combustion of transportation fuels, accounting for more than 95 percent of transportation GHG emissions based on global warming potential. CO_2 is emitted in direct proportion to fuel consumption, with different emission levels associated with different fuel types. Other notable GHGs include methane (CH_4) and nitrous oxide (N_2O), which together account for 2 percent of transportation GHG emissions, and hydrofluorocarbons (HFCs), which comprise approximately 3 percent of transportation GHG emissions. N_2O and CH_4 are not directly related to fuel consumption, but instead are dependent on engine operating conditions (i.e., vehicle speeds) and emissions control technologies. HFCs are also emitted from vehicle air conditioners and refrigeration used in some freight shipments; these emissions do not come from the tailpipe and depend on factors such as the age of the vehicle and how often air conditioners are used. Given the relatively small percentage of these gases in comparison to CO_2, CH_4, N_2O, and HFC, emissions were not calculated for this Project.

The projected change in 2045 CO_2 emissions for the Build Alternatives relative to the No Build Alternative is shown in Table 4.6-3 by mode of passenger travel. These emission values were derived from mass emission rates per passenger mile published in a report prepared for the American Bus Association (Bradley, 2014) and projected changes in annual passenger miles of travel from Table 4.8-1 of this Draft EIS.

Increases in CO_2 emissions associated with additional intercity passenger rail service are expected to be more than offset by reductions in CO_2 emissions due to reduced use of other transportation modes, as shown in Table 4.6-3. The results in Table 4.6-3 are presented by the Build Alternatives in Richmond but reflect the projected changes through the entire DC2RVA corridor. DRPT derived the CO_2 emissions from the passenger ridership estimates for the entire DC2RVA corridor. The ridership forecasts for the Build Alternatives only differ based on which station option is used in Richmond.

Table 4.6-3: Change in Projected CO_2 Emissions in the DC2RVA Corridor by Mode Compared to the No Build Alternative (tons per year)–Year 2045

Build Alternative	Rail	Automobile	Bus	Air	Total
6A (Staples Mill Road Station Only)	64,552	-43,206	-10,527	-17,516	-6,696
6B–A-Line (Boulevard Station Only, A-Line)	58,536	-39,281	-9,715	-15,543	-6,003
6B–S-Line (Boulevard Station Only, S-Line)	58,536	-39,281	-9,715	-15,543	-6,003
6C (Broad Street Station Only)	56,711	-37,568	-9,310	-15,496	-5,663
6D (Main Street Station Only)	58,975	-39,752	-9,677	-15,493	-5,947
6E (Split Service, Staples Mill Road/Main Street Stations)	60,496	-40,475	-9,693	-16,379	-6,051
6F (Full Service, Staples Mill Road/Main Street Stations)	60,155	-41,187	-9,854	-15,632	-6,518
6G (Shared Service, Staples Mill Road/Main Street Stations)	60,597	-41,658	-9,995	-15,813	-6,869

Note: Results in this table are for the entire DC2RVA corridor. The results for the entire DC2RVA corridor only differ by which Build Alternative station option is considered in Richmond.

4.6.5 Construction Effects

Demolition and construction activities can result in short-term increases in fugitive dust and equipment-related particulate emissions in and around the study area. (Equipment-related particulate emissions can be minimized if the equipment is well maintained.) The potential air quality effects would be short-term, occurring only while demolition and construction work is in progress and local conditions are appropriate. The potential for fugitive dust emissions typically is associated with building demolition, ground clearing, site preparation, grading, stockpiling of materials, onsite movement of equipment, and transportation of materials. The potential is greatest during dry periods, periods of intense construction activity, and high wind conditions. There is not enough information regarding construction activity, equipment, and duration to estimate emissions from construction in this Draft EIS. If required, DRPT will perform this analysis during final design to demonstrate general conformity. DRPT will also identify the appropriate BMPs to minimize air quality effects during construction.

GHG emissions would also be generated during the construction phase of the program; however, these emissions are likely to be relatively minor given the nature and size of the program and the limited duration of the construction activities.

4.6.6 Conclusion

The Project-generated net increases in predicted annual pollutant emissions, from new SEHSR passenger service, in nonattainment areas would all be below general conformity *de minimis* threshold values. Pursuant to the General Conformity Rule, EPA considers project-generated emissions below these *de minimis* values to be minimal. Such projects do not require formal conformity determinations. With regard to GHG emissions, the Build Alternatives would reduce CO_2 emissions versus the No Build Alternative. As a result, DRPT anticipates that the DC2RVA Project will not result in significant adverse effects to public health related to air pollutants and air toxics or contributions to GHG emissions.

4.6.7 Mitigation

DRPT will identify the appropriate BMPs to minimize air quality effects during construction. Air quality mitigation is discussed in Section 4.19.2.3 in the Construction Impacts section.

4.7 NOISE AND VIBRATION

This section describes potential Project-related noise and vibration effects and identifies mitigation measures to offset Project-related impacts. These analyses only evaluated noise and vibration from the additional intercity passenger trains proposed under this project, except where noted.

Noise and vibration effects were assessed based on the methods and criteria included in FRA's *High Speed Ground Transportation Noise and Vibration Impact Assessment* guidance manual (September 2012) for sections of the study corridor where passenger train speeds can reach 90 miles per hour (mph). On sections where all train speeds are below 90 mph, this assessment used the noise and vibration impact assessment methods published in the Federal Transit Administration (FTA) *Transit Noise and Vibration Impact Assessment* (May 2006) manual per FRA guidance. The assessment addresses both operational and construction effects from the proposed alternatives.

The noise and vibration study area consists of lands adjacent to the project corridor; it was not defined by the FTA/FRA screening methods. Rather, the noise and vibration analyses conservatively determined the distances at which noise and vibration impacts would no longer occur. Noise and vibration-sensitive land uses within the study area were categorized for analysis purposes according to FRA and FTA land use categories. Land use was identified from GIS databases, digital aerial photographs, field surveys, and information on planned development from local planning departments where publicly available and reasonably obtainable.

4.7.1 Noise

4.7.1.1 Noise Impact Criteria

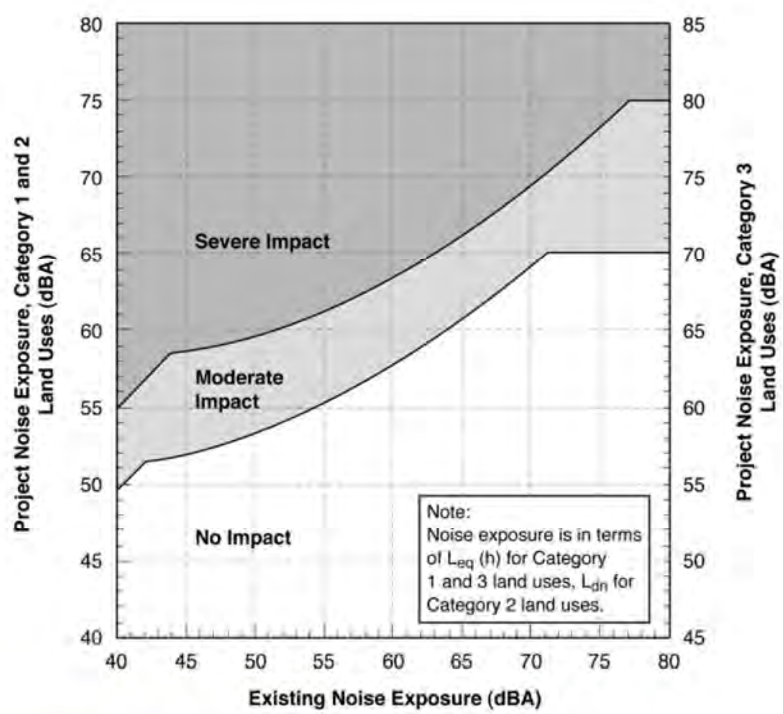
According to FRA and FTA, noise-sensitive land uses are divided into one of three categories.

- **Category 1**: Land where quiet is an essential element (e.g., amphitheaters and concert pavilions). This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks (NHLs) with significant outdoor use.
- **Category 2**: Residences and buildings where people sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
- **Category 3**: Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios, and concert halls, fall into this category. Places for meditation or study associated with cemeteries, monuments, and museums. Certain historical sites, parks, and recreational facilities are also included.

Category 1 and 3 receptors are evaluated using the equivalent-average sound level (L_{eq}) from the noisiest hour of train-related activity during hours of noise sensitivity. The L_{eq} represents a constant sound that, over the hour, has the same acoustic energy as the time-varying signal. Category 2 receptors are evaluated using the day-night sound level (L_{dn}), because Category 2 receptors are sensitive to noise during all hours of the 24-hour day. The L_{dn} describes a receiver's cumulative noise exposure from all events over a full 24 hours, with events between 10:00 p.m. and 7:00 a.m. penalized by adding an additional 10 decibels (dB) to account for greater nighttime sensitivity to noise.

This analysis followed the FTA/FRA noise impact assessment methodology in which measurements of existing noise levels are used to determine the noise impact threshold. Project-related noise is then calculated using FTA and FRA methods, and the resulting noise levels are compared with the FTA/FRA noise impact criteria to determine if noise impacts are expected to occur.

Figure 4.7-1 from the FTA guidance manual shows the noise impact criteria used by both FTA and FRA, which are based on the land use category and the existing noise exposure in the area. No impact indicates Project noise levels are unlikely to cause annoyance. A moderate noise impact is a noise level increase that is noticeable to most people, yet generally not enough to cause adverse reactions. A severe noise impact is a noise level increase that could cause annoyance to a significant percentage of people. FTA guidance requires consideration and adoption of noise mitigation measures for moderate and severe noise impacts when noise mitigation is feasible and reasonable.



Source: Federal Transit Administration, https://www.transit.dot.gov/regulations-and-guidance/environmental-programs/fta-noise-and-vibration-impact-assessment

DC2RVA_083

Figure 4.7-1: FTA/FRA Noise Impact Criteria for Transit Projects

4.7.1.2 Noise Prediction Methodology

Sound Exposure Level (SEL) is an acoustical descriptor that contains all acoustical energy associated with a single event such as the passby of a locomotive, railcar, or a locomotive horn use event. SEL values are used as the noise emissions terms in the train noise models; they are expressed in units of dBA (A-weighted decibel). Actual noise levels from passenger trains between Poughkeepsie and Albany, New York (the Empire Line) that are similar to the trains proposed on this Project were measured to calculate projected noise levels on the DC2RVA corridor. Noise measurements were performed in areas where Empire Line trains were expected to reach speeds of 90 mph. Due to track maintenance and other unknown factors, none of the Empire Line trains were traveling at or above 90 mph during measurements of passby noise; therefore, SEL values measured along the Empire Line were used to calculate noise from all other passenger trains (at speeds below 90 mph). The SEL values for freight locomotives and railcars were obtained from FRA's *CREATE Noise and Vibration Assessment Manual* (FRA, 2013). The SEL for CSXT locomotive horns was obtained from the *Final EIS for the Acquisition of Conrail by Norfolk Southern Railroad and CSX Railroad* (United States Surface Transportation Board, 1998). Noise from freight trains on the proposed bypasses and passenger trains traveling at speeds below 90 mph were modeled using FTA's general noise assessment methods. SEL values for proposed intercity passenger trains traveling at 90 mph were obtained from Appendix E of the FRA guidance manual. This analysis used the maximum allowable speed on each rail section to calculate train noise. Characteristics of the SEHSR passenger trains that were used in the noise analysis are shown in Table 4.7-1. Figure 2.2-3 in Chapter 2 of this Draft EIS provides additional information about the proposed increases in intercity passenger rail service in the DC2RVA corridor.

Table 4.7-1: Intercity Passenger Train Characteristics used in the Noise Assessment

Characteristics	Proposed DC2RVA Train
Train speed (mph)[1]	90
Train Length (feet)	665
Number of locomotives per train	2
Number of railcars per train	8
Throttle setting	8
Locomotive length (feet)	70
Length of train railcars (feet)	85

Notes: 1. Maximum train speed varies by rail section; the maximum allowable speed per section was modeled.

Growth in the passenger (non-SEHSR) and freight trains that currently use the corridor will occur independently from the proposed Project; therefore, the noise analysis only modeled the proposed additional intercity passenger trains on most rail sections in the study area. The exceptions to this are the Fredericksburg Bypass (Build Alternative 3C) and the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake). In these areas, the distribution of freight and/or passenger (non-SEHSR) trains that currently use the corridor may change and was, therefore, modeled.

The proposed bypasses in Fredericksburg and Ashland are expected to have unique combinations of freight and intercity passenger trains and were modeled based on the way trains are proposed to use the bypasses. In Fredericksburg, only freight trains are expected to use the proposed bypass alignment (Build Alternative 3C); therefore, noise from freight trains was evaluated on that bypass alignment. The proposed additional intercity passenger trains that will bypass downtown

Fredericksburg were also modeled on the existing alignment under the Fredericksburg Bypass alternative. In Ashland, under the bypass alternatives (Build Alternatives 5C and 5C–Ashcake), freight trains and intercity passenger trains that do not stop in Ashland are expected to use the bypass alignment while other passenger trains would use the existing alignment. This results in a net reduction in train noise on the existing alignment and is considered a benefit of the proposed Project. Noise from freight trains was not evaluated in areas other than on the proposed bypass alignments because freight train traffic would continue to operate and expand on the existing corridor in the Build Alternatives as it would in the No Build Alternative.

Trains operate on five different rail sections in each of the eight Richmond Build Alternatives. In addition to operating on different sections, sometimes passenger train length increases under different Richmond alternatives; therefore, each alternative was evaluated individually, and noise from all trains on all five sections was calculated for each alternative. Noise from freight trains was not included in the evaluation of Project-related noise under each Richmond alternative because freight trains currently operate on those lines (unlike the proposed bypass alternatives), and changes in freight train volume and size will occur based on market forces and in a manner that is unrelated to the proposed Project.

Table 4.7-2 shows other train characteristics used to evaluate noise from trains on the proposed bypasses in Fredericksburg (Build Alternative 3C) and Ashland (Build Alternatives 5C and 5C–Ashcake) and on the eight Richmond Build Alternatives.

Table 4.7-2: Characteristics of Existing Trains Analyzed in the Noise Assessment

	Amtrak Auto Train	Amtrak Long Distance	Amtrak Interstate Corridor Carolinian	Interstate Corridor (SEHSR) and Regional (Virginia and SEHSR)	Freight Train[1]
SEL for locomotive at 50 feet[2, 3]	97	97	97	97	97[4]
SEL for railcar at 50 feet[2, 3]	82	82	82	82	100[4]
SEL for locomotive horn at 50 feet[2, 3]	108	108	108	108	110[5]
Maximum train speed (mph)[6]	90	90	90	90	60[7]
Train length (feet)	4390	1075	750	992	7083
Number of locomotives per train	2	2	1	2	2
Number of railcars per train	50	11	8	10	73[8]
Throttle setting	8	8	8	8	8
Locomotive length (feet)	70	70	70	70	74
Length of train railcars (feet)	85	85	85	85	95

Notes: 1. Freight trains were only modeled on the proposed bypasses. 2. Source: HDR Engineering, Inc. 3. SEL for 90 mph trains from FRA (September 2012). 4. Source: FRA CREATE. 5. Source: United States Surface Transportation Board, 1998. 6. Varies by rail section; the maximum allowable speed per section was modeled. 7. Maximum freight train speed is 60 mph. 8. Based on an average of cars on intermodal trains and coal and merchandise trains.

Under FRA safety rules, locomotive horns are required to be used at public at-grade crossings. CSXT operating rules also require locomotive horns to be used when trains:

- Approach public crossings
- Approach tunnels, yards, or locations where railroad employees may be working
- Approach roadway workers
- Approach standing trains
- Approach passenger stations
- When warning people or animals near the track

This analysis utilized FRA methods to evaluate locomotive horn noise at public at-grade crossings, yards, and near passenger stations. FRA has studied locomotive horn noise and had determined that horn noise contours exhibit the general cone-like shape shown in Figure 4.7-2. Locomotive horn use increases as trains approach the crossing, and therefore, the noise contour flares outward at the crossing. The locomotive horn contours created during this noise analysis exhibit a similar shape; refer to the noise contour figures in *Noise and Vibration Technical Report* (Appendix P).

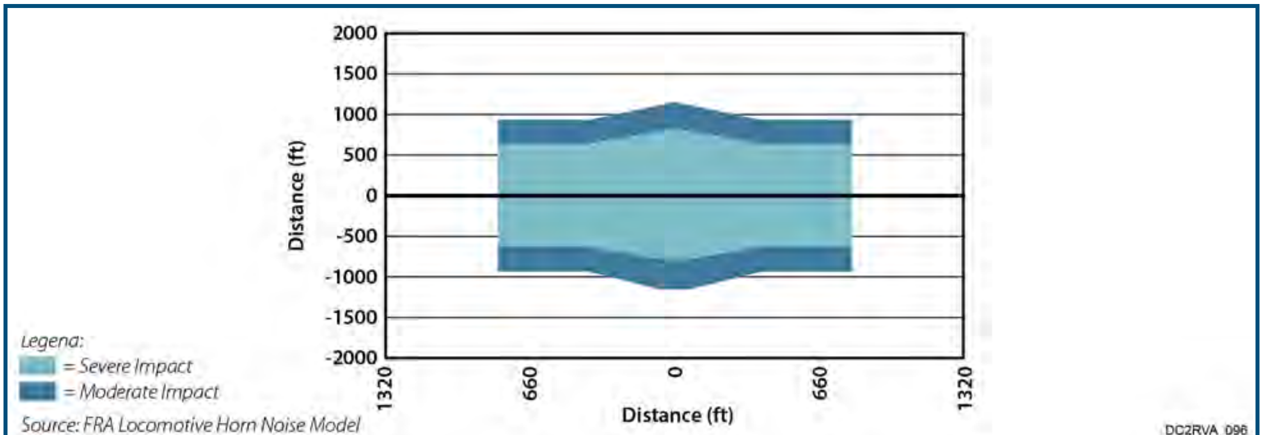


Figure 4.7-2: FRA Sample Train Noise Contour

4.7.1.3 Predicted Noise Levels

Using the information in Tables 4.7-1 and 4.7-2, train noise levels under the Build Alternatives were calculated throughout the study area. These calculations accounted for project-related wayside noise (locomotive and wheel-rail noise) and locomotive horn use at public at-grade crossings. Existing locomotive horn use is incorporated into the noise analysis via the existing noise measurements. FRA locomotive horn use rules do not require locomotive horn use at private at-grade crossings. The analysis assumed that freight trains would use the Fredericksburg Bypass (Build Alternative 3C), and the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) would be used by freight trains and passenger trains that do not stop in Ashland. Analysis results were used to determine the distance from the tracks at which train noise levels equal the noise impact thresholds for moderate and severe noise impacts at Category 1, 2, and 3 land uses. Noise impacts are identified at the noise-sensitive land uses within those distances to the track.

4.7.1.4 Noise Impact Assessment

This section presents the results of the assessment of Project-related noise during operation and construction. The *Noise and Vibration Technical Report* (Appendix P) includes figures that show the noise impact contours.

Operational Noise Impacts

The noise impact assessment results are presented in Table 4.7-3; this includes both locomotive horn and wayside horn noise. The values shown in the table represent the number of noise-sensitive land use receptors projected to experience noise impacts under the Build Alternatives. Category 1, Category 2, and Category 3 refer to land use categories evaluated in the noise assessment, as explained previously. The noise analysis did not account for terrain or buildings that block train noise from reaching noise-sensitive parcels; therefore, the results are considered to be conservatively high, over-estimating the number of likely train noise impacts.

The proposed project has potential to reduce existing horn noise through new grade separations and crossing closures. Closing an at-grade crossing reduces locomotive horn noise. Adding new at-grade crossings where locomotive horns must be used increases outdoor noise levels near the new crossing. Section 4.15.2 provides the recommended grade crossing treatments for all of the alternatives.

Increases in intercity passenger trains results in a corresponding increase in locomotive horn use in most portions of the project corridor. Exceptions to this include the proposed bypasses of Fredericksburg (Build Alternative 3C) and Ashland (Build Alternatives 5C and 5C–Ashcake) where train volumes will decrease on the exising alignment. Horn noise impacts are distinguishable from wayside noise impacts on the noise impact contour figures shown in the *Noise and Vibration Technical Report*, Appendix P.

Build Alternatives 1A, 1B, and 1C (Arlington). DRPT does not anticipate that Build Alternatives 1A, 1B, and 1C will cause any noise impacts.

Build Alternative 2A (Northern Virginia). Build Alternative 2A would result in noise impacts at 775 sensitive receptors. The most severe impacts generally occur at residences located immediately adjacent to the DC2RVA corridor, including a trailer park just south of Woodbridge Station and several other residential neighborhoods in Prince William County.

Build Alternatives 3A, 3B, and 3C (Fredericksburg). Build Alternatives 3A and 3B that pass through town would impact 75 and 76 sensitive receptors, respectively. Projected noise impacts along the Fredericksburg Bypass (Build Alternative 3C) are substantially higher due to noise from freight trains on the bypass, which would run through areas that currently have no train traffic.

Build Alternative 4A (Central Virginia). Build Alternative 4A is projected to cause noise impacts at 70 sensitive receptors.

Build Alternatives 5A through 5D (Ashland). Projected noise impacts are similar among Build Alternatives that pass through town (Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake), ranging from 154 to 159 sensitive receptors. The Ashland Bypass (Build Alternatives 5C and 5C–Ashcake), would impact 329 sensitive receptors. The higher number of impacts is due to the addition of freight train noise along the proposed bypass, which runs through areas that do not have trains under existing conditions.

One of the severe Category 3 impacts is at the Ashland Library, located adjacent to the tracks; however, the proximity of the nearby station means that intercity passenger and freight trains would actually be traveling slower than modeled. This is one example where use of the highest train speed on each section results in conservatively high analysis results.

The impacts identified with the Ashland area alternatives assume that passenger trains would operate at 90 mph through the Town of Ashland. In reality, the trains would slow down through town, even if they are not stopping at the station. Any reduction in speed would reduce the noise impacts from the Project. As a result, the noise analysis results are conservative.

Build Alternatives 6A through 6G (Richmond). Projected noise impacts through Richmond range from 313 to 439 sensitive receptors under Build Alternatives 6A through 6G.

Table 4.7-3: Operational Noise Impact Summary by Alternative

		Operational Noise Impacts						
		Category 1		Category 2		Category 3		
Alternative Area	Alternative	Moderate	Severe	Moderate	Severe	Moderate	Severe	Total
Area 1: Arlington (Long Bridge Approach)	1A	0	0	0	0	0	0	0
	1B	0	0	0	0	0	0	0
	1C	0	0	0	0	0	0	0
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	0	0	670	99	6	0	775
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	0	0	66	8	1	0	75
	3B	0	0	67	8	1	0	76
	3C	2	1	2,392	1,524	8	5	3,932
Area 4: Central Virginia (Crossroads to Doswell)	4A	0	0	51	18	1	0	70
Area 5: Ashland (Doswell to I-295)	5A	0	0	135	14	1	4	154
	5A–Ashcake	0	0	135	14	1	4	154
	5B	1	0	133	20	1	4	159
	5B–Ashcake	1	0	133	20	1	4	159
	5C	0	0	272	51	2	4	329
	5C–Ashcake	0	0	272	51	2	4	329
	5D–Ashcake	1	0	135	18	1	4	159
Area 6: Richmond (I-295 to Centralia)	6A	0	0	366	8	6	0	380
	6B–A-Line	0	0	386	9	6	0	401
	6B–S-Line	1	0	416	15	7	0	439
	6C	0	0	387	9	7	0	403
	6D	1	0	416	15	7	0	439
	6E	0	0	379	9	6	0	394
	6F	1	0	416	15	7	0	439
	6G	1	0	298	10	4	0	313

The noise impact locations are shown in the Noise and Vibration Technical Report (Appendix P).

Construction Noise Impacts

Construction of the Build Alternatives would result in a temporary increase in noise levels. Equipment used to move soil and other earthen materials is often the loudest construction noise source. FTA and FRA both recommend construction noise limits of 90 dBA (daytime) and 80 dBA (nighttime) on a 1-hour L_{eq} basis in residential areas.

Typical equipment used for different phases of railroad construction with typical noise levels, quantities, and estimated utilizations for each type of equipment used are presented in Table 4.7-4. The table shows the calculated construction noise sound pressure levels (SPL) at different distances. These are estimates of construction noise at different distances from the center of a construction site.

Table 4.7-4: Estimated Construction Equipment Noise Levels

Construction Phase	Equipment	Number	Hours/day	Utilization	SWL/unit	Total SWL	SPL (dBA) at distance (feet)		
							100	500	1,000
Clearing	Off-Highway Trucks	4	6	50%	124	127	108	94	88
	Rubber Tired Dozers	3	8	67%	122	125	106	92	86
	Rubber Tired Loaders	2	6	50%	121	121	102	88	82
	Tractors/Loaders/Backhoes	3	5	42%	118	119	100	86	80
	Trenchers	2	4	33%	117	115	96	82	76
Utility Relocation	Cranes	1	6	50%	121	118	100	86	80
	Dumper/Tender	2	4	33%	110	108	89	75	69
	Off-Highway Trucks	2	6	50%	124	124	105	91	85
	Rubber Tired Dozers	3	8	67%	122	125	106	92	86
	Rubber Tired Loaders	2	6	50%	121	121	102	88	82
	Tractors/Loaders/Backhoes	3	5	42%	118	119	100	86	80
	Trenchers	2	6	50%	117	117	98	84	78
	Welders	3	6	50%	114	116	97	83	77
Earthwork	Excavators	2	8	67%	120	121	102	88	82
	Graders	1	8	67%	120	118	100	86	80
	Off-Highway Trucks	4	8	67%	124	128	109	95	89
	Off-Highway Trucks	1	4	33%	123	118	100	86	80
	Rollers	2	6	50%	117	117	98	84	78
	Rubber Tired Dozers	1	8	67%	122	120	101	87	81
	Rubber Tired Loaders	2	6	50%	121	121	102	88	82
	Scrapers	2	8	67%	123	125	106	92	86
	Signal Boards	3	8	67%	106	109	90	76	70
	Tractors/Loaders/Backhoes	3	6	50%	118	119	101	87	81

▶ *Continued*

Table 4.7-4: Estimated Construction Equipment Noise Levels

Construction Phase	Equipment	Number	Hours/day	Utilization	SWL/unit	Total SWL	SPL (dBA) at distance (feet)		
							100	500	1,000
Bridge Construction for Overpasses	Cranes	1	7	58%	121	119	100	86	80
	Excavators	2	8	67%	120	121	102	88	82
	Forklifts	3	8	67%	117	120	102	88	82
	Generator Sets	1	8	67%	117	115	97	83	77
	Graders	1	8	67%	120	118	100	86	80
	Impact Pile Driver	1	6	50	n/a	n/a	95	81	75
	Pavers	2	8	67%	119	120	101	87	81
	Paving Equipment	2	8	67%	119	120	101	87	81
	Rollers	2	8	67%	117	118	99	85	79
	Rubber Tired Dozers	1	8	67%	122	120	101	87	81
	Scrapers	2	8	67%	123	125	106	92	86
	Tractors/Loaders/Backhoes	2	8	67%	118	119	100	86	80
	Welders	1	8	67%	114	113	94	80	74
Retaining Walls	Excavators	2	8	67%	120	121	102	88	82
	Forklifts	3	8	67%	117	120	102	88	82
	Generator Sets	1	8	67%	117	115	97	83	77
	Graders	1	8	67%	120	118	100	86	80
	Impact Pile Driver	1	6	50	n/a	n/a	95	81	75
	Rubber Tired Dozers	1	8	67%	122	120	101	87	81
	Rubber Tired Loaders	2	7	58%	121	121	103	89	83
	Scrapers	2	8	67%	123	125	106	92	86
	Tractors/Loaders/Backhoes	3	7	58%	118	120	101	87	81
Signals	Cranes	1	7	58%	121	119	100	86	80
	Forklifts	3	8	67%	117	120	102	88	82
	Generator Sets	1	8	67%	117	115	97	83	77
	Tractors/Loaders/Backhoes	2	8	67%	118	119	100	86	80
	Welders	1	8	67%	114	113	94	80	74

▶ *Continued*

Table 4.7-4: Estimated Construction Equipment Noise Levels

Construction Phase	Equipment	Number	Hours/day	Utilization	SWL/unit	Total SWL	SPL (dBA) at distance (feet)		
							100	500	1,000
Track Installation	Air Compressors	1	6	50%	117	114	95	81	75
	Cranes	1	7	58%	121	119	100	86	80
	Forklifts	3	8	67%	117	120	102	88	82
	Generator Sets	1	8	67%	117	115	97	83	77
	Track Laying Machine	1	8	67%	129	128	109	95	89
	Track Tamper	1	8	67%	121	119	100	86	80
	Track Stabilizer	1	8	67%	126	124	106	92	86
	Tractors/Loaders/Backhoes	2	8	67%	118	119	100	86	80
	Welders	1	8	67%	114	113	94	80	74
Demolish Existing Bridge	Concrete/Industrial Saws	1	8	67%	117	115	96	82	76
	Excavators	2	8	67%	120	121	102	88	82
	Graders	1	8	67%	120	118	100	86	80
	Rubber Tired Dozers	1	8	67%	122	120	101	87	81
	Scrapers	2	8	67%	123	125	106	92	86
	Tractors/Loaders/Backhoes	2	8	67%	118	119	100	86	80
Signal Work	Cranes	1	7	58%	121	119	100	86	80
	Forklifts	3	8	67%	117	120	102	88	82
	Generator Sets	1	8	67%	117	115	97	83	77
	Tractors/Loaders/Backhoes	2	8	67%	118	119	100	86	80
	Welders	1	8	67%	114	113	94	80	74
Install Track and Subballast over Bridge	Air Compressors	1	6	50%	117	114	95	81	75
	Cranes	1	7	58%	121	119	100	86	80
	Forklifts	3	8	67%	117	120	102	88	82
	Generator Sets	1	8	67%	117	115	97	83	77
	Track Laying Machine	1	8	67%	129	128	109	95	89
	Track Tamper	1	8	67%	121	119	100	86	80
	Track Stabilizer	1	8	67%	126	124	106	92	86
	Ballast Regulator	1	8	67%	119	118	99	85	79
	Tractors/Loaders/Backhoes	2	8	67%	118	119	100	86	80
	Welders	1	8	67%	114	113	94	80	74
Final Cut-Over and Removal of Turnouts	Cranes	1	7	58%	121	119	100	86	80
	Forklifts	3	8	67%	117	120	102	88	82
	Generator Sets	1	8	67%	117	115	97	83	77
	Tractors/Loaders/Backhoes	3	7	58%	118	120	101	87	81
	Welders	1	8	67%	114	113	94	80	74

The results presented in Table 4.7-4 conservatively overestimate actual expected construction noise levels by assuming that all equipment (i.e., all dump trucks or all pickup trucks) operate at the same location. Typically, construction equipment is spread throughout the construction work zone. Given the linear nature of the Project and relatively confined width of the railroad right-of-way, it is reasonable to assume that all equipment would not operate next to each other in the same (stationary) location for 1 hour. On this basis, construction noise levels in Table 4.7-4 somewhat overestimate noise levels for construction phases that would use more than one piece of equipment at a particular location. In all other cases, the results are assumed to be within 3 dBA of likely construction noise levels, if the equipment has been properly maintained and the mufflers are in good condition.

Construction noise analysis results shown in Table 4.7-4 indicate the total combined noise for all equipment types and construction phases never exceeds the FTA/FRA recommended limit of a 1-hour L_{eq} of 90 dBA at 200 feet, even using a conservative approach to the evaluation. Because the conservatively calculated construction noise is not anticipated to exceed 90 dBA at 200 feet, construction noise is not expected to be adverse in most locations; however, DRPT will ensure that construction noise mitigation measures will be evaluated when an analysis of construction noise based on the actual construction plan can be completed. At the preliminary design phase, construction noise mitigation measures are not recommended due to the overly conservative nature of these calculation results.

FRA and FTA do not have standardized criteria for construction; however, FTA suggests reasonable criteria that can be used for assessment purposes. The criteria for residential land uses are 1-hour L_{eq} of 90 dBA during the day and 80 dBA during the night; therefore, it would be prudent to limit construction to daytime hours whenever feasible.

4.7.1.5 Noise Mitigation Measures

Potential noise mitigation measures are broadly categorized as applied at the source, in the pathway (the path that sound travels), or at the receiver. The source of most train noise is the interaction of steel wheels and the steel rail; this is called wayside noise. In addition to wayside noise, railcars (particularly, freight cars) sometimes rattle and produce noticeable amounts of noise. Locomotives also emit noise from the engine casing and from the cooling and exhaust vents. Maintaining wheels and rails is an effective way to manage and reduce wayside noise. Use of continuously welded rail (CWR or rail with no joints) also minimizes wayside noise (joints and gaps in the rail produce noise when trains roll over them). As part of the Build Alternatives, DRPT assumes that all track will be CWR.

Locomotive horns are another loud source of train noise; however, their use is mostly limited to at-grade crossings and other areas required by CSXT operating rules where they are used to warn people that trains are approaching. Locomotive horn use at public at-grade crossings is required under FRA safety regulations. FRA does not require locomotive horn use at private at-grade crossings. Grade crossing closure, grade separations, and installation of wayside horns (stationary horns located where trains cross public at-grade crossings, whose use eliminates the use of locomotive horns) are potential measures to mitigate locomotive horn use. These have been evaluated and are incorporated into the Project to the extent deemed reasonable and appropriate within the design, operating, and financial constraints of the Project. FRA regulations also allow the creation of quiet zones, where locomotive horn use at public at-grade crossings is not required due to the installation of supplemental safety measures. Under those regulations, municipalities can coordinate the design and development of quiet zones. Section 4.15.2.2 (Relevance of Build Alternatives on Quiet Zones) provides additional information on quiet zones.

Noise barriers, while not commonly used on rail projects, can block train noise and reduce noise levels in areas behind them. To be effective, noise barriers must block the line of sight between the noise source and the receiver. Raising the height of the noise barrier above that line of sight increases the amount of noise reduction the noise barrier provides, but the cost of a noise barrier is directly related to the size of the noise barrier. Cost effectiveness is sometimes used to evaluate whether the noise reduction provided by a noise barrier justifies the expense of designing, constructing, and maintaining the barrier. This type of evaluation also considers the number of noise-sensitive land uses expected to experience a noise reduction due to the noise barrier. FRA does not have criteria for evaluating cost effectiveness of noise barriers. VDOT does, however, and their criteria could be useful for evaluating the cost effectiveness of noise barriers on this Project. At this early phase of Project development (Draft EIS and preliminary design), it is premature to discuss specific details of potential noise mitigation options before a recommended Preferred Alternative is selected.

Receiver-based mitigation is rarely implemented on rail projects because it is not cost effective to treat multiple individual locations across large areas.

Noise mitigation during construction is discussed in Section 4.19.2.4 in the Construction Impacts section.

4.7.2 Vibration

This section describes potential Project-related vibration effects and identifies mitigation measures to offset projected impacts. Vibration effects were assessed based on the methods and criteria included in FRA's *High Speed Ground Transportation Noise and Vibration Impact Assessment* guidance manual (September 2012) as well as those included in FTA's *Transit Noise and Vibration Impact Assessment* (May 2006) manual, where applicable.

4.7.2.1 Vibration Impact Criteria

The FRA and FTA vibration impact criteria are identical and are used to predict future vibration impacts from train operations. There are separate criteria for both ground-borne vibration (GBV) and ground-borne noise (GBN). GBN is a rumble sound created by GBV and is often masked by airborne-noise; therefore, GBN criteria are primarily applied to subway operations in which airborne noise is negligible. The basis for evaluating rail vibration impact thresholds is the highest expected root mean square (RMS) vibration levels for repeated vibration events from the same source. As presented in Table 4.7-5, the thresholds are differentiated between vibration-sensitive land uses and the frequency of the events.

The Category 1 vibration impact threshold is acceptable for most moderately sensitive equipment; other highly sensitive equipment would require a detailed analysis to determine the acceptable vibration levels and the effect of the Project on the equipment. There are no GBN impact thresholds for Category 1 land uses because equipment sensitive to GBV is generally not sensitive to GBN; however, other special Category 1 land uses, such as concert halls, television and recording studios, and theaters, can be very sensitive to GBV and GBN. FTA has developed special vibration impact thresholds for these Category 1 land uses, but these land uses were not encountered within the vibration impact contour distances. Category 2 and 3 land uses exist within the vibration impact distances discussed below.

Table 4.7-5: Ground-Borne Vibration (GBV) and Ground-Borne Noise (GBN) Impact Criteria for General Assessment

Land Use Category	GBV Impact Levels (VdB re 1 µin/s)			GBN Impact Levels (dBA re 20 µPa)		
	Frequent Events [1]	Occasional Events [2]	Infrequent Events [3]	Frequent Events [1]	Occasional Events [2]	Infrequent Events [3]
Category 1: Buildings where vibration would interfere with interior operations.	65 VdB [4]	65 VdB [4]	65 VdB [4]	n/a [5]	n/a [5]	n/a [5]
Category 2: Residences and buildings where people normally sleep.	72 VdB	75 VdB	80 VdB	35 dBA	38 dBA	43 dBA
Category 3: Institutional land uses with primarily daytime use.	75 VdB	78 VdB	83 VdB	40 dBA	43 dBA	48 dBA

Source: FRA, 2012.

Notes: 1. Frequent Events is defined as more than 70 vibration events of the same kind per day; 2. Occasional Events is defined as between 30 and 70 vibration events of the same kind per day; 3. Infrequent Events is defined as fewer than 30 vibration events of the same kind per day; 4. This criterion limit is based on levels that are acceptable for most moderately sensitive equipment such as optical microscopes. Vibration-sensitive manufacturing or research would require detailed evaluation to define the acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the heating, ventilation, and air conditioning (HVAC) systems and stiffened floors; 5. Vibration-sensitive equipment is not sensitive to GBN.

4.7.2.2 Vibration Prediction Methodology

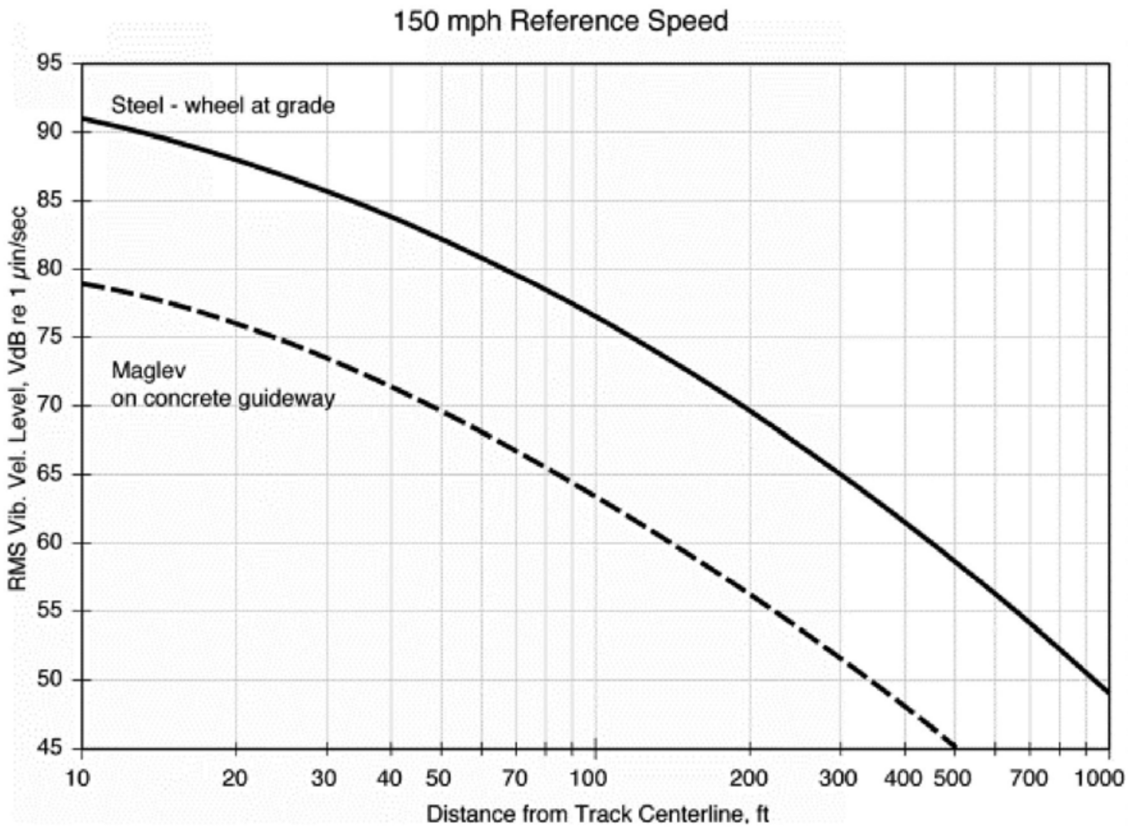
The vibration assessment consists of the following general steps:

1. Establish the study area and identify vibration-sensitive land uses. The FTA/FRA vibration screening assessment was not performed. Rather, the lands adjacent to the rail line were considered part of the study area, and the vibration study conducted for this Project identified the distance from the rail line at which vibration impacts would no longer occur. The *Noise and Vibration Technical Report* (Appendix P) provides additional detail regarding the vibration study conducted.
2. Evaluate the railroad traffic conditions and set corresponding impact thresholds.
3. Select the base generalized vibration curve, and then apply appropriate adjustments for factors such as speed.
4. Determine the propagation from Project-related vibration sources to the impact thresholds.
5. Identify receptors anticipated to experience vibration impacts.

The FRA and FTA General Assessment methodologies are nearly identical and are intended to predict approximate magnitude of impact, and those with the highest magnitude of impact may merit a more-detailed assessment during subsequent engineering phases. Noise and vibration-sensitive land uses within the study area were identified according to FRA categories. Land use was identified from GIS databases, field surveys, and information on planned development from local planning departments.

The vibration prediction begins with selection of a generalized base curve, depending on the mode considered. These curves represent typical ground-surface vibration as a function of distance from the source, based on many GBV measurements of numerous transit sources.

The generalized ground surface vibration curves suitable for assessing the high speed passenger trains (not the existing passenger or freight) are shown in Figure 4.7-3. They represent the upper range of the measurement data from equipment in good condition and were adjusted to account for projected operating speeds as described below.



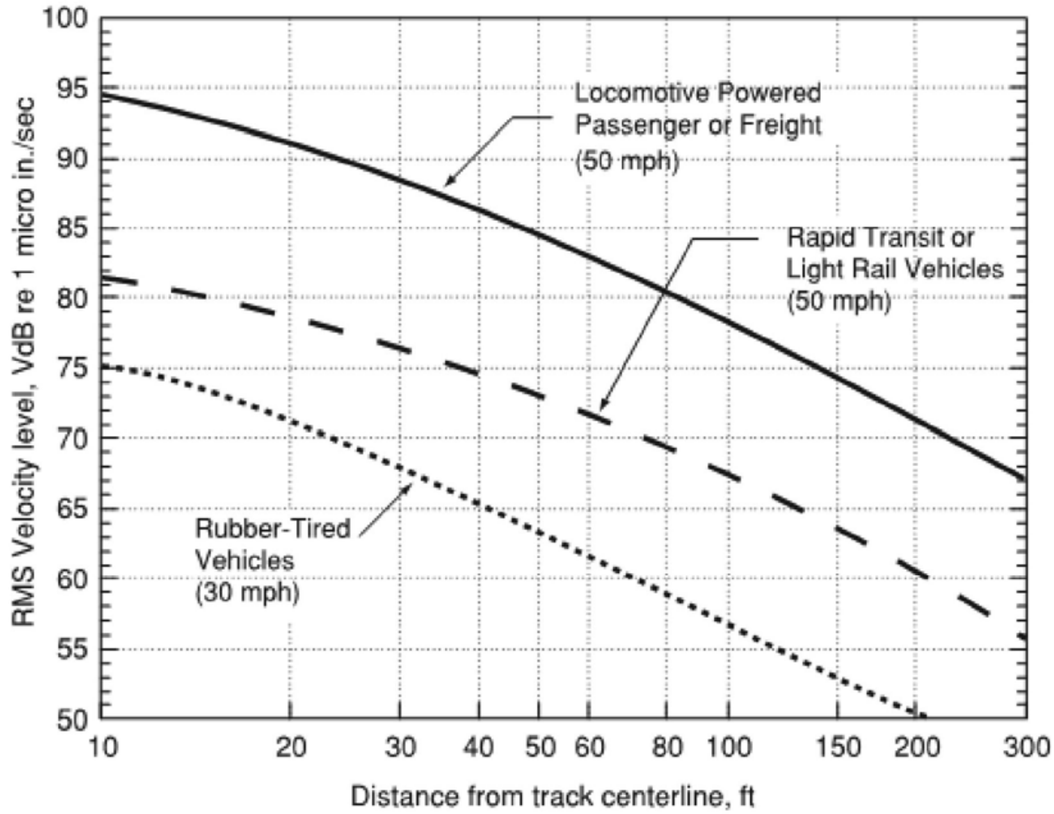
Source: FRA, 2012.

DC2RVA_088

Figure 4.7-3: FRA Generalized Ground Surface Vibration Curves

The generalized ground surface vibration curves suitable for assessing existing intercity passenger and freight trains (for the segments on which they are modeled) are shown in Figure 4.7-4. These curves similarly represent the upper range of the measurement data from equipment in good condition. The top curve represents trains that are powered by diesel-electric locomotives, and the middle curve represents fixed-guideway steel-wheel transit vehicles such as light-rail vehicles and streetcars.

The base curves must then be adjusted to account for Project-specific vibration factors that differ from the conditions of the base curve. Adjustment parameters are given in the FRA and FTA guidance and include train speed, wheel and rail type and condition, and type of track support system, among other adjustments. The adjustment parameters are based on typical vibration spectra and are given as generalized single numbers to be applied to the base curve.



Source: FTA, 2006.

DC2RVA_089

Figure 4.7-4: FRA Generalized Ground Surface Vibration Curves Suitable for Assessing Transit and Freight Trains

The adjustments are arithmetically added to the reference vibration curve, and the resulting levels are compared to the impact thresholds. This is algebraically equivalent to subtracting the same adjustments from the impact threshold and comparing it to the unadjusted reference curve. In this way, the graphical curves shown in Figures 4.7-3 and 4.7-4 can be used to find the distance to vibration impact. For this assessment, the distance to vibration impact was determined by looking up the level of the adjusted criterion curve on the y-axis and then finding the distance on the x-axis from the generalized vibration curve.

Computation Assumptions and Input Data

The vibration assessment used the same passenger and freight rail data as the noise assessment (Tables 4.7-1 and 4.7-2). The FRA generalized vibration curve "Steel-wheel at-grade" was used as the base curve for the impact assessment of the proposed additional intercity passenger trains (Figure 4.7-3). Freight trains already run through the DC2RVA corridor and are not modeled for any of the track in the existing corridor; however, where freight trains are being introduced, such as on the proposed bypass sections, the FTA generalized vibration curve "Locomotive powered passenger and freight" (Figure 4.7-4) was used as the base curve for the impact assessment of freight trains.

Specific modeling considerations for each Build Alternative are provided in Table 4.7-6.

Table 4.7-6: Vibration Analysis Modeling Assumptions

Alternative Area	Alternative	Modeling Assumption
Area 1: Arlington (Long Bridge Approach)	1A, 1B, and 1C	There are three alternatives, but no vibration-sensitive receptors within 500 feet of the Project; therefore, no vibration assessment was completed for Build Alternatives 1A, 1B, and 1C.
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	There is only one alternative along the existing passenger rail corridor. The additional intercity passenger trains were modeled using the FRA generalized vibration curve for steel-wheel at-grade high speed trains.
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A and 3B	Build Alternatives 3A and 3B would route Project-related trains through the existing passenger rail corridor. The additional intercity passenger trains were modeled using the FRA generalized vibration curve for steel-wheel at-grade high speed trains.
	3C	The Fredericksburg Bypass (Build Alternative 3C) would route freight trains and potentially some of the passenger trains along a new alignment that bypasses Fredericksburg. The additional intercity passenger trains were modeled through the existing corridor using the FRA generalized vibration curve for steel-wheel at-grade high speed trains. Even at a lower speed, the freight trains generate more vibration than the passenger trains; therefore, the freight trains were modeled in the bypass corridor using the FTA generalized vibration curve for locomotive-powered passenger or freight trains.
Area 4: Central Virginia (Crossroads to Doswell)	4A	There is only one alternative along the existing passenger rail corridor. The additional intercity passenger trains were modeled using the FRA generalized vibration curve for steel-wheel at-grade high speed trains.
Area 5: Ashland (Doswell to I-295)	5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake	Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake would route Project-related trains through the existing passenger rail corridor. The additional intercity passenger trains are modeled using the FRA generalized vibration curve for steel-wheel at-grade high speed trains.
	5C and 5C–Ashcake	Build Alternatives 5C and 5C–Ashcake would route the through passenger trains and the freight trains along a new alignment that bypasses the Town of Ashland, while passenger trains that stop in Ashland would use the bypassed area of the existing corridor. Even at a lower speed, the freight trains generate more vibration than the passenger trains; therefore, the freight trains were modeled in the bypass corridor using the FTA generalized vibration curve for locomotive-powered passenger or freight trains. The planned number of future passenger trains is the same as the number of passenger trains that currently use this portion of the DC2RVA corridor, and the planned future trains are on average shorter than the average length of existing trains, plus there would be no freight traffic. These changes represent a benefit to vibration effects; therefore, vibration contours were not calculated for the bypassed area of the existing corridor.
Area 6: Richmond (I-295 to Centralia)	6A, 6B–A-Line, 6C, and 6E	Alternatives 6A, 6B–A-Line, 6C, and 6E would route Project-related trains via the current CSXT North End Subdivision (sometimes referred to as the A-line) between West Acca Yard in Richmond and Centralia, VA. The CSXT Bellwood Subdivision (sometimes referred to as the S-line) between Control Point Hermitage in Richmond and Centralia, VA, would not see any increase in passenger train traffic, so the trains were not modeled as a consequence of this Project on that section. The additional intercity passenger trains are modeled using the FRA generalized vibration curve for steel-wheel at-grade high speed trains.
	6B–S-Line, 6D, 6F, and 6G	Alternatives 6B–S-Line, 6D, 6F, and 6G would route Project-related trains via the current S-line. The A-line would see a reduction in passenger trains, which represents a Project benefit, so the trains are not modeled as a consequence of this Project on that section. The additional intercity passenger trains were modeled using the FRA generalized vibration curve for steel-wheel at-grade high speed trains.

4.7.2.3 Predicted Vibration Levels

Estimates of Project-related, train-induced GBV were developed based on the methodology described above. The predicted vibration levels were used to develop distance-to-vibration-impact contours.

4.7.2.4 Vibration Impact Assessment

This section presents the results of the vibration impact assessment during operation and construction.

Operational Vibration Impacts

Using site-specific and project-specific data as explained above, DRPT conducted the vibration assessment by calculating the distance from the rail line at which train-induced vibration levels equal the FRA ground-borne vibration impact thresholds. Vibration impact contour lines were then overlaid upon digital aerial photographs (refer to Appendix P) to delineate the areas projected to experience vibration impacts. (See the *Noise and Vibration Technical Report*, Appendix P.) Vibration-sensitive land uses inside the vibration contours are projected to experience vibration impacts as defined by FRA. Table 4.7-7 shows the number of receptors anticipated to experience vibration impacts associated with each Build Alternative.

Table 4.7-7: Vibration Impact Summary by Alternative

Alternative Area	Alternative	Vibration Impacts			
		Category 1	Category 2	Category 3	Total
Area 1: Arlington (Long Bridge Approach)	1A	0	0	0	0
	1B	0	0	0	0
	1C	0	0	0	0
Area 2: Northern Virginia	2A	0	15	0	15
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	0	0	0	0
	3B	0	0	0	0
	3C	0	43	0	43
Area 4: Central Virginia (Crossroads to Doswell)	4A	0	2	0	2
Area 5: Ashland (Doswell to I-295)	5A	0	25	1	26
	5A–Ashcake	0	25	1	26
	5B	0	30	1	31
	5B–Ashcake	0	30	1	31
	5C	0	35	1	36
	5C–Ashcake	0	35	1	36
	5D–Ashcake	0	30	1	31
Area 6: Richmond (I-295 to Centralia)	6A	0	8	0	8
	6B–A-Line	0	8	0	8
	6B–S-Line	0	8	0	8
	6C	0	8	0	8
	6D	0	8	0	8
	6E	0	8	0	8
	6F	0	8	0	8
	6G	0	8	0	8

Build Alternatives 1A, 1B, and 1C (Arlington). There are no vibration-sensitive receptors within 500 feet of Build Alternatives 1A, 1B, or 1C; therefore, vibration impact contours were not calculated, and there are no receptors anticipated to experience vibration impacts for these Build Alternatives.

Build Alternative 2A (Northern Virginia). Under Build Alternative 2A, 15 receptors are projected to experience vibration impacts. Additionally, there is a structure on National Register of Historic Places (NRHP)—the historic Alexandria Union Station—which is within all vibration impact contours; however, this structure was designed to stand next to rail transportation. Furthermore, the vibration levels are currently being compared to human-comfort criteria, which is much lower than vibration levels necessary to cause damage to even old, fragile structures. Therefore, while this structure is within the vibration impact contours, it is not considered an impact and is not included in Table 4.7-7.

Build Alternatives 3A, 3B, and 3C (Fredericksburg). No receptors are projected to experience vibration impacts under Build Alternatives 3A or 3B that pass through town. Under the Fredericksburg Bypass (Build Alternative 3C), 43 receptors are projected to experience vibration impacts as a result of freight trains operating along new alignment.

Build Alternative 4A (Central Virginia). Under Build Alternative 4A, two residential receptors are projected to experience vibration impacts.

Build Alternatives 5A through 5D (Ashland). Under the Build Alternatives in the Ashland area, 26 to 36 receptors are projected to experience vibration impacts. These impacts, including the Category 3 impact at the Ashland Library, are based on the assumption that passenger trains are operating at 90 mph through Ashland. In reality, trains would slow down through town, even if they are not stopping at the station. At this point, the tabulation of vibration impacts is considered a conservative overestimate. The addition of freight traffic on the proposed bypass alignment is the primary source of vibration impacts for Build Alternatives 5C and 5C–Ashcake.

Build Alternatives 6A through 6G (Richmond). Projected vibration impacts in the Richmond area are the same for all Build Alternatives. Vibration impacts are projected in areas where all trains operate on the same alignment. Refer to the *Noise and Vibration Technical Report* (Appendix P) for figures showing the locations of these impacts.

Construction Vibration Impacts

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods employed. Operation of construction equipment causes ground vibrations that spread through the ground and diminish in strength with distance. Buildings near construction can respond to these vibrations, with varying results ranging from no perceptible effects at the lowest levels; low rumbling sounds and perceptible vibrations at moderate levels; and slight damage at the highest levels.

Ground vibrations from construction activities do not often reach the levels that can damage structures, but they can reach the range of perceptible vibration or audible sound in buildings very close to the site. A possible exception is the case of fragile buildings where special care must be taken to avoid damage. The construction vibration criteria include special consideration for fragile buildings. The damage criteria published by FTA, using units of peak particle velocity (PPV) expressed in inches per second, are presented in Table 4.7-8.

Table 4.7-8: Construction Vibration Damage Criteria

Building Category	Description	Damage Criteria, PPV (in./sec.)
I	Reinforced concrete, steel, or timber (no plaster)	0.5
II	Engineered concrete and masonry (no plaster)	0.3
III	Non-engineered timber and masonry buildings	0.2
IV	Buildings extremely susceptible to vibration damage	0.12

Ground vibrations from construction activities can be audible and perceptible in buildings near the construction limits. Some buildings are more sensitive to vibration than others; they might have recording or broadcast facilities or vibration-sensitive equipment in them. FRA advocates a separate set of vibration criteria for buildings with vibration-sensitive uses or equipment inside of them. The criteria used for vibration-sensitive equipment is presented in Table 4.7-9.

Table 4.7-9: Construction Vibration Damage Criteria–Vibration-Sensitive Equipment

Type of Building or Room	Max Lv, VdB [1]
TV Studios	65
Recording Studios	65
Theaters	65
Vibration-Sensitive Lab	48

Notes: 1. RMS velocity in decibels (VdB) re 1 micro-inch/second.

PPVs associated with typical construction equipment, as published by FTA, are presented in Table 4.7-10. These vibration emission levels and factors represent a conservatively high usage because it is not anticipated that all this machinery is to be used at any one particular location at the same time.

Table 4.7-10: Construction Equipment PPV

Equipment		PPV at 25 ft (in./sec.)	Approx. Lv[1] at 25 ft.
Pile Driver (impact)	Upper range	1.518	112
	Typical	0.644	104
Pile Driver (sonic)	Upper range	0.734	105
	Typical	0.17	93
Clam shovel drop		0.202	94
Hydromill	In soil	0.008	66
	In rock	0.017	75
Vibratory Roller		0.21	94
Hoe Ram		0.089	87
Large bulldozer		0.089	87
Caisson drilling		0.089	87
Loaded trucks		0.076	86
Jackhammer		0.035	79
Small bulldozer		0.003	58

Source: FTA, May 2006.

Notes: 1. RMS velocity in decibels (VdB) re 1 micro-inch/second.

4.7.2.5 Vibration Mitigation

Vibration mitigation options are limited due to the presence of freight trains in the DC2RVA corridor. Mitigation strategies, such as floating slabs, are not feasible options for tracks that also carry freight. Where freight trains operate, the only feasible options for mitigation of the trains are track and wheel maintenance measures, strategic location of special trackwork, and buffer zones between the tracks and the receptors. DRPT has no control over the implementation of these mitigation measures by the freight railroads. Passenger train maintenance can also be implemented to reduce ground-borne vibration; modification of the passenger rail vehicle suspension is also a potential mitigation option. DRPT will identify the necessary mitigation measures during the final design process.

- **Track and wheel maintenance:** Maintenance procedures reduce vibration effects through regularly scheduled rail grinding, wheel truing programs, vehicle reconditioning programs, and implementation of flat-wheel detectors. These maintenance procedures minimize the vibration sources before they can affect vibration-sensitive receptors.
- **Location of special trackwork:** Effects of special trackwork has not been evaluated in this assessment because the locations are likely to change as Project design progresses. It is crucial that vibration effects on sensitive receptors are evaluated when locating special trackwork.
- **Vehicle suspension:** Changing the vehicle suspension of the passenger trains is normally an option only when creating a new fleet of passenger trains. It is not feasible for the freight train traffic, and it is unlikely that the existing passenger train fleet will modify their suspension.

Construction-related vibration mitigation measures include BMP’s such as equipment selection, finding alternatives to traditional impact pile driving, and limiting the hours of operation and locations where sources of construction-related vibration will occur. DRPT will develop the details of these BMPs during the final design process.

4.8 ENERGY

4.8.1 Energy Consumption during Operation

DRPT evaluated the Build Alternatives in terms of their potential to realize savings in energy consumed by all major modes of transportation in the DC2RVA corridor compared to the No Build Alternative. As noted in Section 3.8, travel by rail is the most energy-efficient mode of transportation. As a result, any substantial increase in rail ridership associated with any of the Build Alternatives that would shift ridership from the other less-efficient modes of transportation would result in conservation of travel-related energy.

The estimated change in intercity passenger miles of travel of the Build Alternatives relative to the No Build Alternative are shown in Table 4.8-1 by mode of travel. The results in Table 4.8-1 represent the benefit to other modes only from intercity passenger ridership accommodated by the DC2RVA project. Auto, bus, and air travel will continue to grow under the No Build Alternative and Build Alternatives, however, at a lesser rate under the Build Alternatives.

When comparing the Build Alternatives with the No Build Alternative, there would be an increase in intercity passenger rail miles, while the other three modes of transportation would experience a decrease, as shown in Table 4.8-1. This can be attributed to a shift in ridership from the other three modes to rail.

DRPT estimated the future energy use of all modes in the DC2RVA corridor by calculating the total passenger miles of travel projected for 2045 by mode for the No Build Alternative and Build Alternatives and then applying the energy consumption rates by mode that are presented in Section 3.8. The estimated change in annual energy consumption of the Build Alternatives compared to the No Build Alternative is summarized in Table 4.8-2 by mode of travel.

The results in Table 4.8-2 show that the total energy consumption from intercity passenger travel under the No Build Alternative would be higher than the Build Alternatives. By expanding intercity passenger rail service, the Build Alternatives would result in an increase in energy consumption compared to the No Build Alternative with regard to rail transportation; however, the other three modes would experience a decrease, which would result in an overall net decrease in energy consumption. As previously mentioned, this can be attributed to a shift in ridership from the other three less energy-efficient modes to rail.

Table 4.8-1: Change in Annual Passenger Miles of Travel Compared to the No Build Alternative (millions)–Year 2045

Build Alternative	Rail	Automobile	Bus	Air	Total
6A (Staples Mill Road Station Only)	315	-164	-31	-68	52
6B–A-Line (Boulevard Station Only, A-Line)	286	-149	-29	-60	48
6B–S-Line (Boulevard Station Only, S-Line)	286	-149	-29	-60	48
6C (Broad Street Station Only)	277	-143	-27	-60	47
6D (Main Street Station Only)	288	-151	-29	-60	48
6E (Split Service, Staples Mill Road/Main Street Stations)	295	-154	-29	-63	49
6F (Full Service, Staples Mill Road/Main Street Stations)	293	-156	-29	-61	47
6G (Shared Service, Staples Mill Road/Main Street Stations)	296	-158	-29	-61	47

Note: The results reflected in this table represent all passenger travel to, from, and within the DC2RVA corridor. Corridor-wide ridership forecasts for the Build Alternatives only differ based on which station option is used in Richmond (*Ridership Technical Report*, Appendix J).

Table 4.8-2: Change in Annual Energy Consumption Compared to the No Build Alternative (billions of BTUs)–Year 2045

Build Alternative	Rail	Automobile	Bus	Air	Total
6A (Staples Mill Road Station Only)	513	-636	-26	-158	-307
6B–A-Line (Boulevard Station Only, A-Line)	465	-578	-24	-140	-277
6B–S-Line (Boulevard Station Only, S-Line)	465	-578	-24	-140	-277
6C (Broad Street Station Only)	451	-553	-23	-140	-265
6D (Main Street Station Only)	469	-585	-23	-140	-280
6E (Split Service, Staples Mill Road/Main Street Stations)	481	-596	-23	-148	-286
6F (Full Service, Staples Mill Road/Main Street Stations)	478	-606	-24	-141	-293
6G (Shared Service, Staples Mill Road/Main Street Stations)	481	-613	-24	-143	-299

Note: The results reflected in this table represent all passenger travel to, from, and within the DC2RVA corridor. Corridor-wide ridership forecasts for the Build Alternatives only differ based on which station option is used in Richmond (*Ridership Technical Report*, Appendix J).

When comparing the Build Alternatives with the No Build Alternative, there would be an increase in intercity passenger rail miles, while the other three modes of transportation would experience a decrease, as shown in Table 4.8-1. This can be attributed to a shift in ridership from the other three modes to rail.

DRPT estimated the future energy use of all modes in the DC2RVA corridor by calculating the total passenger miles of travel projected for 2045 by mode for the No Build Alternative and Build Alternatives and then applying the energy consumption rates by mode that are presented in Section 3.8. The estimated change in annual energy consumption of the Build Alternatives compared to the No Build Alternative is summarized in Table 4.8-2 by mode of travel.

The results in Table 4.8-2 show that the total energy consumption from intercity passenger travel under the No Build Alternative would be higher than the Build Alternatives. By expanding intercity passenger rail service, the Build Alternatives would result in an increase in energy consumption compared to the No Build Alternative with regard to rail transportation; however, the other three modes would experience a decrease, which would result in an overall net decrease in energy consumption. As previously mentioned, this can be attributed to a shift in ridership from the other three less energy-efficient modes to rail.

4.8.2 Energy Consumption during Construction

The No Build Alternative would not require any construction; therefore, no changes in energy consumption are expected. During construction of the Build Alternatives, additional energy would be expended beyond what would be used for normal rail operations. This additional energy would be consumed on a short-term basis by construction of improvements required to implement the Project and by construction-related delays to existing rail service in the DC2RVA corridor; however, once the Project is complete and additional improved passenger rail service is provided, long-term energy savings would be realized.

4.9 AESTHETIC AND VISUAL ENVIRONMENT

4.9.1 Effects

This section addresses the visual effects of the proposed Build Alternatives. To assess potential changes to the visual environment, a qualitative visual impact rating system was used that considers those changes from the perspective of viewers from the rail corridor (e.g., train passengers), as well as viewers looking toward the rail corridor.

In accordance with FRA's *Procedures for Considering Environmental Impacts* (FRA, 1999), DRPT identified major changes likely to occur in the natural landscape and in the developed environment as a result of this Project. The assessment considers the visual changes associated with the Build Alternatives, such as track improvements, bridges, grade crossings/separations, roadway improvements, stations and maintenance facilities, and other permanent improvements associated with the Project.

The level of visual impact was assessed by combining the severity of the change in visual quality with the degree to which people are sensitive to the change.

Visual quality considers landscape qualities related to natural and/or man-made features, specifically:

- Natural features, including topography, water courses, rock outcrops, and natural vegetation;
- The positive and negative effects of man-made alterations to the environment and built structures on visual quality; and
- Visual composition, including an assessment of the complexity and vividness of patterns that exist in the landscape.

Visual sensitivity is based on the number and types of users, viewers, or sensitive receptors typically found in the study area. Generally, viewers in parks and residential areas are assumed to be the most sensitive to visual and aesthetic changes, and viewers in industrial areas would be the least sensitive.

For each visual assessment unit, a High, Moderate, or Low Visual Impacts rating was assigned for the No Build Alternative and Build Alternatives. These ratings are described below:

- **Low Visual Impacts:** The alternative is consistent with the existing visual elements in the landscape, such as line, form, texture, and color, and the alternative blends with the existing visual character. Viewers are generally not very sensitive to these changes.
- **Moderate Visual Impacts:** The project is notably visible in the landscape but does not dominate or detract from the existing visual features. Viewers may notice these changes, but the changes are generally not seen as negative.
- **High Visual Impacts:** The project elements are obvious and dominate the landscape detracting from the existing landscape characteristics or scenic qualities. Viewers are sensitive to these changes and may perceive them negatively.

The following sections describe the visual changes associated with the Build Alternatives by the Visual Assessment Units (VAU). The No Build Alternative would not have visual effects associated with the DC2RVA Project. The Build Alternatives were described in detail in Chapter 2. The existing conditions within each VAU were described in Section 3.9. A summary of effects within each VAU by alternative are provided in Table 4.9-1.

4.9.1.1 Arlington: Build Alternatives 1A, 1B, and 1C

VAU 1-1 (CFP 110 to CFP 109.3)—Long Bridge Approach. There are two existing tracks throughout this VAU with up to four tracks in some areas. The addition of one to two tracks on either side of the existing tracks would not result in major visual changes within this VAU. The existing tracks are already part of the landscape. Additionally, changes to the views from the train would be minimal. The visual impact rating is low for Build Alternatives 1A, 1B, and 1C.

4.9.1.2 Northern Virginia: Build Alternative 2A

VAU 2-1 (CFP 109.3 to CFP 100)—Crystal City through Franconia. Within this VAU, the number of tracks is generally three along the main line with up to ten or more in the Norfolk Southern (NS) Yard area south of Alexandria. The addition of one track on one side of the existing tracks, with the side varying, would not result in major changes within this VAU. Additionally, changes to the views from the train would be minimal. The visual impact rating is low for Build Alternative 2A.

VAU 2-2 (CFP 100 to CFP 92)—Franconia through Lorton. The northern half of this VAU consists primarily of three tracks, with another two WMATA tracks located immediately to the west. The southern half transitions down to two tracks. The addition of one track on one side of the existing tracks, with the side varying, would not result in major changes within this VAU. Additionally, changes to the views from the train would be minimal. The visual impact rating is low for Build Alternative 2A.

VAU 2-3 (CFP 92 to CFP 85)—Lorton through Neabsco Creek. There are two tracks through most of this VAU. The Occoquan River Railroad Bridge is the most notable rail visual feature within this VAU. Build Alternative 2A adds one track on one side of the existing tracks, with the side varying. It would also add a bridge on the east side of the existing Occoquan River Railroad Bridge that would generally reflect the horizontal and vertical profiles of the existing bridge to minimize the visual impacts. The views from the train would only differ slightly. The visual impact rating is moderate for Build Alternative 2A.

VAU 2-4 (CFP 85 to CFP 62)—Neabsco Creek through north of Fredericksburg. The rail corridor includes two tracks throughout most of this VAU. Notable rail features are the numerous bridges in this section, including Neabsco Creek, Powells Creek, Quantico Creek, and Aquia Creek. Build Alternative 2A adds one track on one side of the existing tracks, with the side varying. It would also add bridges at each creek crossing except Quantico Creek, where two bridges currently carry three tracks at this location. The new bridges would generally reflect the horizontal and vertical profiles of the existing bridges to minimize the visual impacts. The views from the train would only differ slightly. The visual impact rating is moderate for Build Alternative 2A.

4.9.1.3 Fredericksburg: Build Alternatives 3A, 3B, and 3C

VAU 3-1 (CFP 62 to CFP 48)—through Fredericksburg. This section primarily consists of two tracks, though it broadens out to up to six tracks at the Fredericksburg rail yard on the south side of Fredericksburg. The most notable visible feature of the railroad is the Rappahannock River Bridge and station platforms. There would be a new raised station platform, parking deck, and station building for all Build Alternatives. These facilities would generally reflect the horizontal and vertical profiles of the existing facilities to minimize the visual impacts. Build Alternative 3A has a low visual impact rating because it does not add any track. Build Alternative 3B has a high visual impact rating because it adds one additional track to the east and an additional bridge over the Rappahannock River. The new bridge would be constructed with one additional track and include width for two tracks. Additionally, the new bridge would generally reflect the horizontal and vertical profiles of the existing bridge to minimize the visual impacts. Build Alternative 3B also includes a new grade separation at Landsdowne Road. The Fredericksburg Bypass (Build Alternative 3C) is not within this VAU but is listed in VAU 3-2.

VAU 3-2 (CFP 62 to CFP 48)—Fredericksburg Bypass. This VAU shares common areas on the north end and south end with VAU 3-1. Near CFP 61, it turns east and follows the existing single-rail track Dahlgren Spur. The Fredericksburg Bypass (Build Alternative 3C) would cross the Rappahannock River on new alignment and is on new alignment until reconnecting with the existing tracks near CFP 52. Much of the Fredericksburg Bypass (Build Alternative 3C) is on new alignment, except where following the Dahlgren Spur rail feature and where it ties into the CSXT main line at the north and south ends. Most passenger trains would still use the alignment through Fredericksburg, so views from the train would not be greatly altered. Only certain intercity passenger trains not serving Fredericksburg would use the bypass. The new bridge over the Rappahannock River would generally reflect the horizontal and vertical profiles of the existing upstream railroad bridge in downtown Fredericksburg to minimize the visual impacts. Given the new bridge over the Rappahannock River and the two tracks on new alignment, Build Alternative 3C has a high visual impact rating in this VAU. Four new highway-rail grade separations are also included along the new alignment section of Fredericksburg Bypass (Build Alternative 3C). The Build Alternatives that pass through town (Build Alternatives 3A and 3B) are not within this VAU but are listed in VAU 3-1.

4.9.1.4 Central Virginia: Build Alternative 4A

VAU 4-1 (CFP 48 to CFP 19)—South of Fredericksburg through Doswell. There are primarily two tracks within this VAU. The new bridges over the Mattaponi River and North Anna River would generally reflect the horizontal and vertical profiles of the existing bridges to minimize the visual impacts and are in areas where the number of viewers of the bridge structures are low. The addition of one track on one side of the existing tracks, with the side varying, and the new bridges would not result in major changes within this VAU. No new highway-rail grade separations are included with Build Alternative 4A. Additionally, changes to the views from the train would be minimal. The visual impact rating is low for Build Alternative 4A.

4.9.1.5 Ashland: Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, 5C, 5C–Ashcake, and 5D–Ashcake

VAU 5-1 (CFP 19 to CFP 9)—through Ashland. There are primarily two existing tracks throughout this VAU. The tracks are in the middle of the main downtown area in Ashland along Railroad Avenue (also called Center Street) and are a dominant feature of the landscape with the town buildings and roadways developed around the tracks. The Build Alternatives that pass through town (Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake) would include new grade separations at Ashcake Road and Vaughan Road; however, these grade separations would be located outside of downtown Ashland. Build Alternative 5A would not add track, but it would have a visual change to the landscape due to the grade separations and would therefore have a moderate visual impact rating. Similarly, Build Alternative 5A–Ashcake would include the visual intrusion of a new station south of Ashcake Road but would still have a moderate visual impact rating. Build Alternatives 5B and 5B–Ashcake would add a single track adjacent to the existing tracks in a sensitive visual area through town and would have moderate visual impact. The visual impact of Build Alternative 5B–Ashcake would be slightly greater than Build Alternative 5B due to the station relocation at Ashcake but would still have a moderate visual impact rating. Similar to

Build Alternative 5B–Ashcake, Build Alternative 5D–Ashcake would add a third track through downtown Ashland, which is a sensitive visual area. The impacts would be slightly less than Build Alternative 5B–Ashcake as the existing two tracks and the added third track would be centered through town; however, there would be the visual intrusion of a new station at Ashcake Road resulting in a moderate visual impact rating. The Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) are not within this VAU but are listed in VAU 5-2.

VAU 5-2 (CFP 19 to CFP 9)—Ashland Bypass. This VAU shares a northern terminus and southern terminus with VAU 5-1. The remainder of the section is on new alignment, where there are no existing rail features. The Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) would add two tracks on a new alignment in this VAU. This would be a major change in the visual landscape, and the six proposed highway-rail grade separations would be highly visible. Build Alternative 5C–Ashcake would also have the visual intrusion of a new station facility south of Ashcake Road. There are no sensitive resources, but several residences would experience major changes in their viewshed with Build Alternatives 5C and 5C–Ashcake, resulting in a high visual impact. Views from the long distance trains would be altered by no longer traveling through the Town of Ashland. The Build Alternatives that pass through town (Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake) are not within this VAU but are listed in VAU 5-1.

4.9.1.6 Richmond: Build Alternatives 6A, 6B–A-Line, 6B–S-Line, 6C, 6D, 6E, 6F, and 6G

VAU 6-1 (CFP 9 to CFP 2)—South of Ashland through ACCA Yard. This VAU has two existing tracks on the north end with an increasing number of tracks approaching the Acca Yard. A new highway-rail grade separation at Hungary Road, located in a primarily suburban residential setting, would be included with all the Richmond Build Alternatives (Build Alternatives 6A through 6G) in this VAU. Some visual changes to views from the train would also occur. Staples Mill Station is located within this VAU. Build Alternatives 6A, 6E, 6F, and 6G would include a new two story station at Staples Mill and a new pedestrian bridge across the tracks to access the platforms. These alternatives would have a moderate visual impact rating based on these visual changes associated with the station. Build Alternatives 6B–A-Line, 6B–S-Line, 6C, and 6D would close the existing Staples Mill Station. These alternatives would have a low visual impact rating within this VAU because the visual changes to and from the train are minimal.

VAU 6-2 (CFP 2 to SRN 0)—Acca Yard through Main Street along the S-Line. This approximately 4-mile long VAU begins in the Acca Yard area with a large expanse of tracks. It tapers down to two existing tracks at the southern terminus near Main Street Station in downtown Richmond. The historic rail viaduct is an integral part of the scenic views. There are several notable rail visual features in the section, including Main Street Station and the Triple Crossing. New highway-rail grade separations would be included at Hermitage Road under Build Alternative 6B–S-Line and at Hospital Street/North 7th Street under Build Alternatives 6B–S-Line, 6D, 6F, and 6G. Three of the DC2RVA intercity passenger rail route and station alternatives utilize the CSXT S-Line (Build Alternatives 6D, 6F, and 6G) and would involve the restoration of intercity passenger service on the west side of Main Street Station, and require the construction of one to two multistory parking garages within the viewshed of the main station building and also require alterations to historic platforms, thus diminishing the integrity of design, setting, materials, workmanship, feeling, and association. Build Alternative 6B–S-Line would also utilize the CSXT S-Line adjacent to Main Street Station but would bypass the station and result in a disuse of the station for intercity passenger rail purposes. Build Alternative 6E would maintain and slightly expand intercity passenger rail service at Main Street Station with the expansion of and alteration to the historic platforms. The single-station alternatives at Boulevard (Build Alternatives 6B–A-Line and 6B–S-Line) would also include a new station building and pedestrian overpass at Boulevard Station. The single-station alternative at Broad Street (Build Alternative 6C) would include a new station building and pedestrian overpass at Broad Street Station. Four single-station alternatives (Build Alternatives 6A, 6B–A-Line, 6B–S-Line, and 6C) would close Main Street Station to passenger rail service, but there would be no major visual changes to the station building itself. Each of the Richmond Build Alternatives (6A through 6G) would have an impact within this VAU. Some visual changes to views from the train would occur. Build Alternative 6A would have a moderate visual impact rating within this VAU. Build Alternatives 6B–A-Line, 6B–S-Line, 6C, 6D, 6E, 6F, and 6G would have a high visual impact rating within this VAU because there is extensive trackwork coupled with sensitive resources.

VAU 6-3 (SRN 0 to A 11)—Main Street through Centralia via the S-Line. Build Alternatives that route intercity passenger trains via the S-Line between Main Street Station and Centralia operate through this VAU, each of which consists of adding a single track to the existing James River crossing. Most of the section south of the James River consists of two tracks with some limited areas widening out to as many as eight tracks. A new highway-rail grade separation would be included with Build Alternatives 6B–S-Line, 6D, 6F, and 6G. The most notable rail visual feature is the James River crossing. Some visual changes to views from the train would occur. The new bridge on the James River S-line would generally reflect the horizontal and vertical profiles of the existing bridge to minimize the visual impacts. Build Alternatives 6B–S-Line, 6D, 6F, and 6G would have a high visual impact rating due to the additional bridge across the James River.

VAU 6-4 (CFP 2 to A 11)—Acca Yard through Centralia via the A-Line. The Build Alternatives that route intercity passenger trains via the A-Line between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, 6C, and 6E) operate through this VAU, which primarily consists of two existing tracks. New highway-rail grade separations would be included at Broad Rock Boulevard and Walmsley Boulevard under Build Alternatives 6A, 6B–A-Line, 6C, and 6E. The most notable feature in this VAU is the scenic railroad bridge over the James River on the A-line. This bridge is visible from many nearby parks and residential areas, as well as from the river itself, which is highly used for recreational purposes; no change is proposed to the existing bridge. Some visual changes to views from the train would occur. All Build Alternatives would have a low visual impact rating because minimal track work and no additional bridge across the James River are proposed in this VAU.

VAU 6-5 (SRN 0 to CA 87)—Main Street Station through Hospital Wye. There is a single track within this VAU. There are no notable rail visual features. The Build Alternatives do not involve any track work within this VAU. There would be no effect on views to or from the railroad. All Build Alternatives have a low visual impact rating within this VAU.

VAU 6-6 (SRN 0 to CA 80)—Main Street Station through Fulton Yard/Eastern Henrico County. This VAU includes two existing tracks where it parallels the James River, expanding to more than ten tracks to the east of Richmond. The most notable rail feature is the raised rail bridge that is parallel to the James River. The Build Alternatives do not involve any track work within this VAU. There would be no effect on views to or from the railroad. All Build Alternatives have a low visual impact rating within this VAU.

The High, Moderate, or Low Visual ratings for each VAU and each Build Alternative are provided in Table 4.9-1.

Table 4.9-1: Visual Impact Rating by Visual Assessment Unit

Alternative Area	Alternative	Visual Assessment Unit (VAU)															
		1-1	2-1	2-2	2-3	2-4	3-1	3-2	4-1	5-1	5-2	6-1	6-2	6-3	6-4	6-5	6-6
Area 1: Arlington (Long Bridge Approach)	1A	L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	1B	L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	1C	L	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	–	L	L	M	M	–	–	–	–	–	–	–	–	–	–	–
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	–	–	–	–	–	L	–	–	–	–	–	–	–	–	–	–
	3B	–	–	–	–	–	H	–	–	–	–	–	–	–	–	–	–
	3C	–	–	–	–	–	–	H	–	–	–	–	–	–	–	–	–
Area 4: Central Virginia (Crossroads to Doswell)	4A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Area 5: Ashland (Doswell to I-295)	5A	–	–	–	–	–	–	–	–	M	–	–	–	–	–	–	–
	5A–Ashcake	–	–	–	–	–	–	–	–	M	–	–	–	–	–	–	–
	5B	–	–	–	–	–	–	–	–	M	–	–	–	–	–	–	–
	5B–Ashcake	–	–	–	–	–	–	–	–	M	–	–	–	–	–	–	–
	5C	–	–	–	–	–	–	–	–	–	H	–	–	–	–	–	–
	5C–Ashcake	–	–	–	–	–	–	–	–	–	H	–	–	–	–	–	–
	5D–Ashcake	–	–	–	–	–	–	–	–	M	–	–	–	–	–	–	–
Area 6: Richmond (I-295 to Centralia)	6A	–	–	–	–	–	–	–	–	–	–	M	M	L	L	L	L
	6B–A-Line	–	–	–	–	–	–	–	–	–	–	L	H	L	L	L	L
	6B–S-Line	–	–	–	–	–	–	–	–	–	–	L	H	H	L	L	L
	6C	–	–	–	–	–	–	–	–	–	–	L	H	L	L	L	L
	6D	–	–	–	–	–	–	–	–	–	–	L	H	H	L	L	L
	6E	–	–	–	–	–	–	–	–	–	–	M	H	L	L	L	L
	6F	–	–	–	–	–	–	–	–	–	–	M	H	H	L	L	L
	6G	–	–	–	–	–	–	–	–	–	–	M	H	H	L	L	L

L = Low Visual Impact; M = Moderate Visual Impact; H = High Visual Impact

4.9.2 Mitigation Evaluation

DRPT will work with affected communities during the final design process to obtain public review and comment on the nature and style of design for new physical structures, such as major waterway crossings, highway-rail grade separations, and station improvements. DRPT anticipates that new bridges and buildings would generally reflect the horizontal and vertical profiles of existing bridges and building in their environs to minimize the visual impact.

Constructing tracks adjacent to the existing tracks would also minimize visual impacts and would occur for the Build Alternatives through most of the DC2RVA corridor, except for the Fredericksburg Bypass (Build Alternative 3C) and Ashland Bypass (Build Alternatives 5C and 5C–Ashcake). These Build Alternatives would construct a railroad with highway-rail grade separations along new alignment. With these strategies, DRPT has determined that most of the Build Alternatives have low to moderate visual impact ratings.

Other visual impact mitigation strategies that DRPT will consider during the final design process include:

- Incorporating landscaping to screen undesirable features
- Using other screening techniques for undesirable features
- Adding architectural design features in character with existing visual environs
- Minimizing tree and shrub removal
- Enhancing or creating visually pleasing designs

4.10 BIOLOGICAL RESOURCES

Under the No Build Alternative, CSXT would continue maintenance and repairs of the existing infrastructure, and infrastructure improvements that are already planned for the DC2RVA corridor, as defined in Section 2.5.1.1, would move forward. Anticipated effects of the No Build Alternative are discussed below in comparison with the Build Alternatives. All practicable measures would be taken to avoid and minimize impacts; however, due to the length and linear nature of the DC2RVA Project, impacts to habitats would be unavoidable. For this EIS, estimated impacts to habitats and natural communities are calculated using a conservative assumption and are categorized as permanent or temporary.

4.10.1 Habitat and Natural Communities

Construction of any of the Build Alternatives would result in effects to the general ecology of its surroundings. The Build Alternatives would affect terrestrial natural communities and associated wildlife habitat through conversion of existing land coverage to railroad structures and maintained right-of-way. Depending on the combination of Build Alternatives, between 31 and 264 acres of habitat are estimated to be permanently converted by the proposed improvements within and outside of the existing railroad right-of-way. This conversion would result in the loss of wildlife habitat. Permanent (converted to use by the railroad) and temporary (able to renaturalize after construction completion) impacts to general habitat types within the LOD of each Build Alternative are summarized in Table 4.10-1. Most of the area affected by the Build Alternatives, aside from the bypasses, is already developed. Habitats that would be affected are directly adjacent to the existing rail line and are already altered by local activities, including operation of the railroad, with the exception of the bypass alternatives (i.e., Build Alternatives 3B and 5C). Disturbance or loss of these upland habitats adjacent to the existing railroad would not result in substantial impacts to wildlife due to their location and widespread availability of such habitats within the study area and the region.

Table 4.10-1: Habitat Impacts (acres)

Alternative Area	Alternative	Agriculture (pasture/row crop/ grassland)	Aqueous Habitat (wetlands/streams/ open water)	Upland Forest	Crosses Internal Forest Habitat*	Shrub Area/Old Field	Riparian/Bottomland Forest/PFO	Urban/Developed Lands	Total
Area 1: Arlington (Long Bridge Approach)	1A	–	–	–	No	–	–	P: — T: 0.6	P: — T: 0.6
	1B	–	–	–	No	–	–	P: 1.5 T: 0.9	P: 1.5 T: 0.9
	1C	–	–	–	No	–	–	P: 0.4 T: 0.7	P: 0.4 T: 0.7
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	P: 2.1 T: 1.6	P: 1.1 T: 2.0	P: 15.0 T: 7.2	No	P: 0.2 T: 0.1	P: 1.3 T: 0.9	P: 13.2 T: 11.8	P: 32.9 T: 23.6
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	P: 0.1 T: 1.1	P: 0.1 T: 0.4	P: 0.4 T: 3.2	No	–	P: 0.1 T: 1.4	P: 1.5 T: 3.4	P: 2.2 T: 9.5
	3B	P: 2.3 T: 1.4	P: 1.9 T: 0.9	P: 2.1 T: 3.5	No	–	P: 0.1 T: 1.4	P: 13.4 T: 5.2	P: 19.8 T: 12.4
	3C	P: 32.7 T: 8.2	P: 8.5 T: 3.1	P: 66.9 T:17.4	Yes	–	P: 13.2 T: 4.0	P: 19.3 T: 5.4	P: 140.6 T: 38.1
Area 4: Central Virginia (Crossroads to Doswell)	4A	P: 0.9 T: 7.4	P: 0.3 T: 5.1	P: 0.5 T:10.1	No	P: 0.1 T: 1.0	P: 0.1 T: 9.4	P: 0.7 T: 7.6	P: 2.6 T: 40.6
Area 5: Ashland (Doswell to I-295)	5A	P: 1.2 T: 0.5	P: — T: 0.2	P: 2.4 T: 4.7	No	P: — T: 0.2	P: 0.2 T: 0.6	P: 18.1 T: 6.7	P: 21.9 T: 12.9
	5A–Ashcake	P: 1.2 T: 0.5	P: — T: 0.2	P: 2.4 T: 4.7	No	P: — T: 0.2	P: 0.2 T: 0.6	P: 16.4 T: 6.7	P: 20.2 T: 12.9
	5B	P: 1.2 T: 0.5	P: — T: 0.2	P: 2.4 T: 4.7	No	P: — T: 0.2	P: 0.6 T: 0.9	P: 25.6 T: 7.6	P: 29.4 T: 14.1
	5B–Ashcake	P: 1.2 T: 0.5	P: — T: 0.2	P: 2.4 T: 4.8	No	P: — T: 0.2	P: 0.6 T: 0.9	P: 25.9 T: 8.7	P: 29.7 T: 15.3
	5C	P: 29.3 T: 5.7	P: 2.3 T: 0.3	P: 64.0 T:20.7	Yes	P:11.0 T: 2.4	P: 4.7 T: 0.9	P: 36.5 T: 8.9	P: 147.8 T: 38.9
	5C–Ashcake	P: 29.3 T: 5.7	P: 2.3 T: 0.3	P: 64.0 T:20.7	Yes	P:11.0 T: 2.4	P: 4.7 T: 0.9	P: 34.8 T: 8.9	P: 146.1 T: 38.9
	5D–Ashcake	P: 1.2 T: 0.5	P: — T: 0.2	P: 2.0 T: 4.9	No	P: — T: 0.2	P: 0.2 T: 0.9	P: 32.3 T: 9.1	P: 36.1 T: 15.8

▶ *Continued (see end of table for detailed notes.)*

Table 4.10-1: Habitat Impacts (acres)

Alternative Area	Alternative	Agriculture (pasture/row crop/ grassland)	Aqueous Habitat (wetlands/streams/ open water)	Upland Forest	Crosses Internal Forest Habitat*	Shrub Area/Old Field	Riparian/Bottomland Forest/PFO	Urban/Developed Lands	Total
Area 6: Richmond (I-295 to Centralia)	6A	–	–	P: 3.7 T: 2.7	No	–	P: 1.5 T: 0.7	P: 70.8 T: 35.5	P: 76.0 T: 38.9
	6B–A-Line	–	–	P: 3.9 T: 2.8	No	–	P: 1.5 T: 0.7	P: 95.6 T: 48.3	P: 101.0 T: 51.8
	6B–S-Line	–	P: 0.7 T: 0.7	P: 6.5 T: 3.3	No	–	P: 2.5 T: 0.6	P: 68.9 T: 17.6	P: 78.6 T: 22.2
	6C	–	–	P: 4.4 T: 2.8	No	–	P: 1.5 T: 0.7	P: 122.1 T: 48.6	P: 128.0 T: 52.1
	6D	–	P: 0.7 T: 0.7	P: 6.5 T: 3.3	No	–	P: 2.5 T: 0.6	P: 63.9 T: 17.7	P: 73.6 T: 22.3
	6E	–	–	P: 6.4 T: 3.5	No	–	P: 2.2 T: 0.8	P: 80.5 T: 57.1	P: 89.1 T: 61.4
	6F	–	P: 0.6 T: 0.7	P: 6.7 T: 3.3	No	–	P: 2.5 T: 0.6	P: 73.1 T: 18.3	P: 82.9 T: 22.9
	6G	–	P: 0.6 T: 0.7	P: 6.3 T: 3.3	No	–	P: 2.5 T: 0.6	P: 71.5 T: 17.6	P: 80.9 T: 22.2

P = Permanent Impact, T=Temporary Impact.
*Areas of internal forest that are a minimum of 300 feet from the edge of the forested area.

Due to the new area crossed by the Build Alternatives that includes new bypasses, more habitat not already affected by human activities would be affected. A greater amount of all habitat types would be permanently converted, and larger areas of intact forested habitat would be bisected, removing a large portion of interior forest and fragmenting habitat. Interior forest habitats are located 300 feet or farther from the forest edge and are commonly composed of mature trees. These areas are important to forest interior dwelling species (FIDS), especially Neotropical migrant songbirds that utilize these habitats for foraging, breeding, and nesting. FIDS can also include certain mammals, especially certain species of bats, reptiles, and amphibians that prefer unbroken forested tracts.

The Fredericksburg Bypass (Build Alternative 3C) crosses an area of 1,200+ acres of continuous forest southwest of the Rappahannock. This area includes Virginia Outdoors Fund Easements and the Alexander Berger Memorial Sanctuary, discussed in Section 4.10.1.1. This area also includes at least 750 acres of interior habitat defined as 'high' by the VDCR Ecological Core model that is connected to a very large area of 'outstanding' habitat associated with Fort A. P. Hill. The Virginia Outdoors Fund Easements and the Alexander Berger Memorial Sanctuary, including the majority of the forest mentioned above, would be cut off from the Fort A. P. Hill habitat by the construction of the Fredericksburg Bypass (Build Alternative 3C), and a large portion of the interior habitat would be lost and/or degraded due to the introduction of the railroad through the habitat.

The Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) cross several smaller wildlife corridors associated with waterways, and three larger tracts of forested habitats (approximately 140, 380, and 180 acres) with interior habitat that would be bisected by the proposed alignment resulting in a decrease of interior habitat.

Station upgrades would occur in urban areas. Although the LODs are wider in these locations, only small additional amounts of urban tree canopy would be affected.

4.10.1.1 Conservation Areas

DRPT have made efforts, to the extent practicable, to avoid impacts to existing conservation areas (federal and state) and priority conservation areas (areas of habitat designated as worthy of conservation). Aside from temporary impacts to Mattaponi Wildlife Management Area, the alternatives avoid existing conservation areas. Due to the linear nature of the Project and the location of the existing tracks through rural areas, some of the habitat areas adjacent to the DC2RVA corridor have been determined worthy of conservation for a variety of qualities. Unavoidable impacts to these areas are outlined below (Table 4.10-2). As previously mentioned, impacts listed are the total area of predicted temporary and permanent impacts within the proposed LOD, unless otherwise noted. A more detailed discussion of conservation area impacts can be found in the *Natural Resources Technical Report* (Appendix M).

State Wildlife Lands

DRPT anticipates that Build Alternatives 4A would result in unavoidable temporary impacts to Mattaponi State Wildlife Management Area. Approximately 2.54 acres adjacent to existing railroad right-of-way would be disturbed for construction and then replanted and encouraged to renaturalize. Coordination with the Virginia Department of Game and Inland Fisheries (VDGIF) would be necessary.

County Wildlife Lands

DRPT anticipates that Build Alternative 2A would result in approximately 0.55 acre of temporary impacts to Pohick Seeps Conservation Area. The site is located on parcels owned by Fairfax County that have a Permanent Wildlife Conservation Easement. Depending on the type of impacts proposed, temporary impacts could potentially be considered permanent for the rare habitat located there. Proposed work in this area will require coordination with Fairfax County.

Private Wildlife Lands

Two parcels containing open-space easements managed by the Virginia Outdoors Foundation (VOF) are crossed by the Fredericksburg Bypass (Build Alternative 3C). DRPT anticipates that VOF conservation area CLN-VOF-3804 would have 1.22 acres of permanent impacts and 0.32 acre of temporary impacts, and area CLN-VOF-03850 would have 21.09 acres of permanent impact and 5.37 acres of temporary impact. The Fredericksburg Bypass (Build Alternative 3C) would bisect intact interior forested habitat in these locations. Coordination with VOF may be necessary.

Table 4.10-2: Conservation Area Impacts (acres)

Alternative Area	Alternative	USFWS National Wildlife Refuges	State Wildlife Lands	County Wildlife Lands	Private Wildlife Lands	Priority Conservation Areas
Area 1: Arlington (Long Bridge Approach)	1A	–	n/a	n/a	n/a	n/a
	1B	–	n/a	n/a	n/a	n/a
	1C	–	n/a	n/a	n/a	n/a
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	–	–	P: —— T: 0.55	n/a	P: 0.01 T: 0.78
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	n/a	n/a	n/a	–	P: 0.03 T: 1.52
	3B	n/a	n/a	n/a	–	P: 0.10 T: 1.61
	3C	n/a	n/a	n/a	P: 22.31 T: 5.69	P: 83.36 T: 18.63
Area 4: Central Virginia (Crossroads to Doswell)	4A	n/a	P: —— T: 2.54	n/a	n/a	P: —— T: 2.48
Area 5: Ashland (Doswell to I-295)	5A	n/a	n/a	n/a	n/a	P: 0.59 T: 0.01
	5A–Ashcake	n/a	n/a	n/a	n/a	P: 0.59 T: 0.01
	5B	n/a	n/a	n/a	n/a	P: 0.59 T: 0.01
	5B–Ashcake	n/a	n/a	n/a	n/a	P: 0.59 T: 0.01
	5C	n/a	n/a	n/a	n/a	P: 4.80 T: 21.13
	5C–Ashcake	n/a	n/a	n/a	n/a	P: 4.80 T: 21.13
	5D–Ashcake	n/a	n/a	n/a	n/a	P: 0.59 T: 0.01
Area 6: Richmond (I-295 to Centralia)	6A	n/a	n/a	n/a	n/a	P: 0.15 T: 0.05
	6B–A-Line	n/a	n/a	n/a	n/a	P: 0.15 T: 0.05
	6B–S-Line	n/a	n/a	n/a	n/a	P: 0.15 T: 0.05
	6C	n/a	n/a	n/a	n/a	P: 0.15 T: 0.05
	6D	n/a	n/a	n/a	n/a	P: 0.15 T: 0.05
	6E	n/a	n/a	n/a	n/a	P: 0.15 T: 0.05
	6F	n/a	n/a	n/a	n/a	P: 0.15 T: 0.05
	6G	n/a	n/a	n/a	n/a	P: 0.15 T: 0.05

Source: VDOT-CEDAR, 2015.

P = Permanent Impact, T=Temporary Impact, n/a = no resources located in that Area

Priority Conservation Areas including Wildlife Corridors

Details about unavoidable impacts to Priority Conservation Areas are described in the *Natural Resources Technical Report* (Appendix M). These areas are recommended for preservation. Temporary impacts may be permanent depending on the type of impact and the potential to disrupt sensitive resources that may not have the ability to recover (e.g., clearing and grubbing of an area with a rare plant community).

Aside from the proposed Fredericksburg Bypass (Build Alternative 3C), which bisects a large forested area and wildlife corridor, all impacts to wildlife corridors would result from widening the existing railroad. In some of these areas, wildlife are able to use areas under bridges that span waterways and dry culverts. Larger animals may be able to successfully cross existing tracks if no fencing or other additional barriers exist; however, an increased track area and increased train traffic would result in a decreased ability for wildlife to cross and increased mortality rates. Figure 3.10-2 in Chapter 3 identifies the existing wildlife corridors. Overall, DRPT does not anticipate a substantial amount of wildlife crossing.

4.10.1.2 Invasive Species

The Build Alternatives could increase the spread of invasive species. Construction equipment used could carry seeds or propagative plant parts from other construction projects or infested areas. Removal of sediment and soil to offsite locations could spread invasive species, and placement of fill from borrow sites could introduce invasive species to the study area. Exposed soil also allows invasive species to spread, which could contribute to encroachment of invasive species on vegetation communities adjacent to the LOD.

In accordance with EO 13112, Invasive Species, the potential for the establishment of invasive plant species during construction of any Build Alternative would be minimized by prompt seeding of disturbed areas with seeds that are tested in accordance with the Virginia Seed Law to ensure that seed mixes are free of noxious species. To prevent the introduction of new invasive species and to prevent the spread of existing populations, BMPs would also be followed and could include washing machinery before it enters the area, minimizing ground disturbance, and reseeding disturbed areas. While the LOD is vulnerable to colonization by invasive plant species from adjacent properties, implementation of the stated provisions would reduce the potential for the establishment and proliferation of invasive species.

4.10.1.3 Submerged Aquatic Vegetation

Due to the need to expand existing bridge crossings of major waterways where submerged aquatic vegetation (SAV) exists, the proposed Project would have unavoidable impacts on these plant species. Permanent impacts would include areas converted for the use of piers or infrastructure, while temporary impacts would include disturbed areas with the ability to support SAV again after construction completion. Impacts to SAV are only anticipated to occur with Build Alternative 2A. No SAV beds occur in the DC2RVA corridor south of Aquia Creek, and proposed improvements included with Build Alternatives 1A, 1B, and 1C would not require work in waters containing SAV. Estimated acres of impacts to SAV are presented in Table 4.10-3 (Figure 4.10-1). A request to remove SAV from or plant SAV on state-administered benthic surfaces would be submitted with a JPA to VMRC. In determining whether to grant approval for SAV removal or planting, VMRC shall be guided by §28.2-1205 of the Code of Virginia and the SAV Transplantation Guidelines, or any new and improved methodologies as approved by VMRC (VMRC, 2000).

Table 4.10-3: Submerged Aquatic Vegetation Impacts (acres)

Alternative Area	Alternative	Existing	Historic	Total
Area 1: Arlington (Long Bridge Approach)	1A	P: —— T: 0.03	–	P: —— T: 0.03
	1B	P: —— T: 0.01	–	P: —— T: 0.01
	1C	–	–	–
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	P: 1.33 T: 1.91	P: 0.37 T: 0.35	P: 1.70 T: 2.26

P = Permanent Impact, T=Temporary Impact.
There is no SAV south of Aquia Creek; therefore, there are no impacts listed for the Build Alternatives in Alternative Areas 3, 4, 5, and 6.

4.10.1.4 Avoidance, Minimization, and Mitigation Evaluation

Minimization measures to protect natural habitats and communities could involve modifications to later designs such as:

- Minor alignment shifts to avoid or minimize impacts
- Minimizing clearing and grubbing, in particular in riparian areas
- Development of a mitigation plan that includes landscaping and planting detail for onsite replacement of any trees removed
- Native revegetation, including native shrub plantings and native reseeding of disturbed areas to prevent the spread of invasive species, and additional erosion during storm events due to exposed soil
- Using bridges or open bottom culverts in streams to minimize the disruption of natural stream bottoms

Invasive Species

To avoid the introduction of new invasive species and prevent the spread of existing populations, BMPs should be followed, including washing machinery before it enters the area to prevent the spread of seeds and minimizing ground disturbance. Prompt seeding of disturbed areas with native seeds or seeds that are tested in accordance with the Virginia Seed Law to ensure that seed mixes are free of noxious species will decrease the ability for invasive species to take root and outcompete native species.

Submerged Aquatic Vegetation

Mitigation for areas of temporary disturbance to SAV would be coordinated with VMRC. The following procedures are suggested by the Chesapeake Bay Program (Chesapeake Bay Program, 1995) for the protection of SAV areas:

- Protect existing, historic, and potential SAV areas from physical disruption
- Avoid or minimize dredging within SAV areas
- Avoid nearby construction activities that create additional turbidity
- Avoid reduction in Secchi depths (measure of water clarity) compared to predisturbance levels

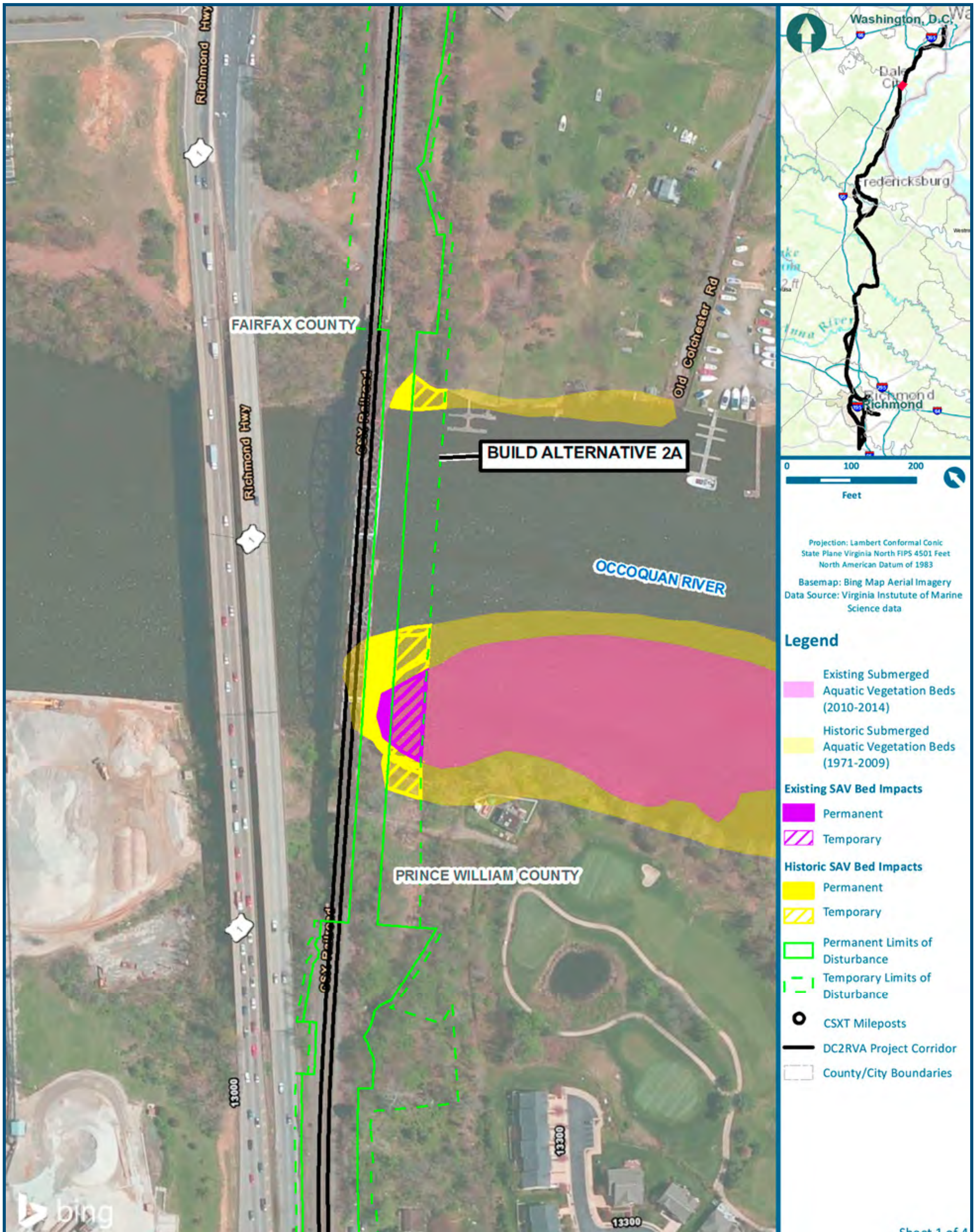


Figure 4.10-1: Submerged Aquatic Vegetation Impacts – Build Alternative 2A

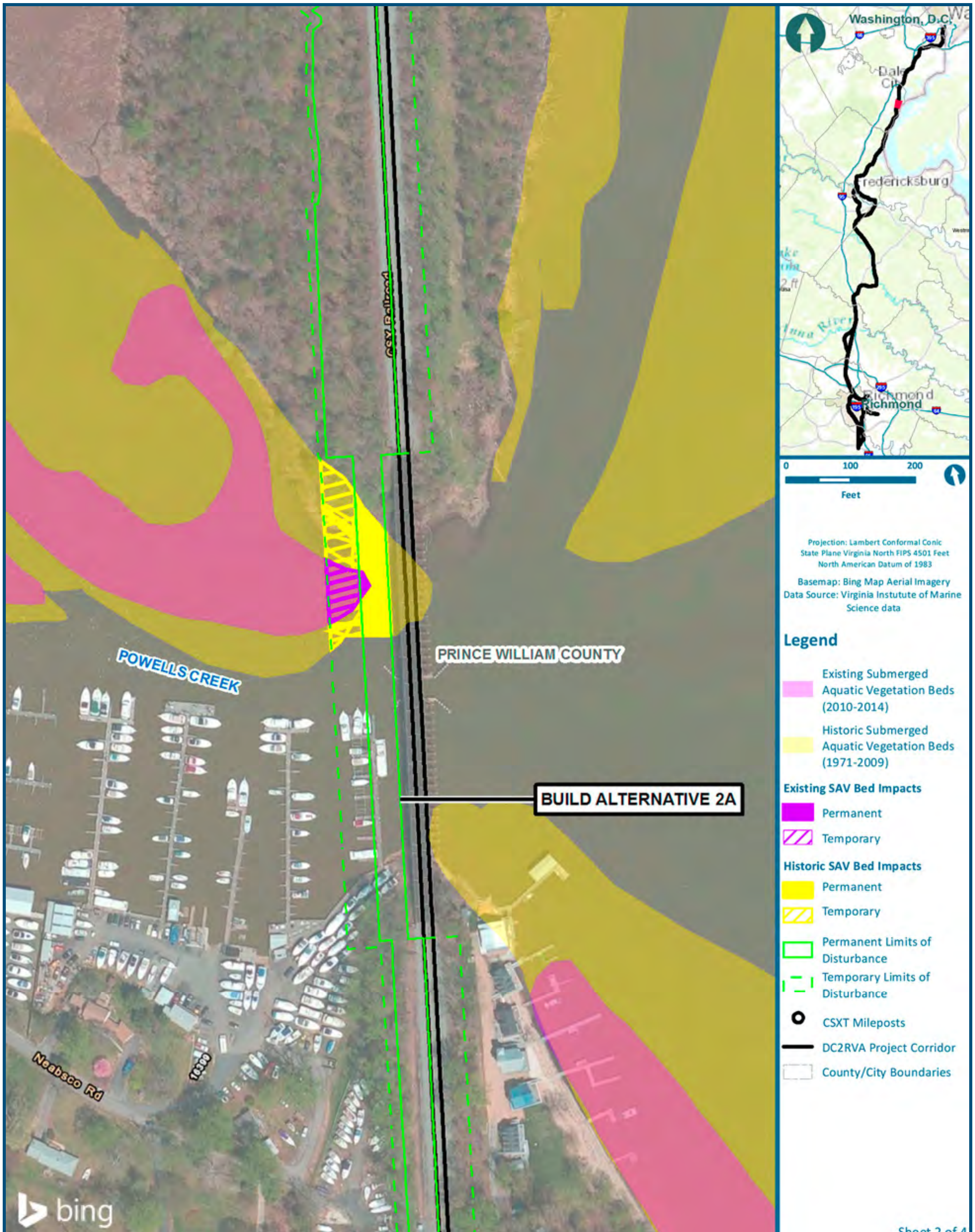


Figure 4.10-1: Submerged Aquatic Vegetation Impacts – Build Alternative 2A

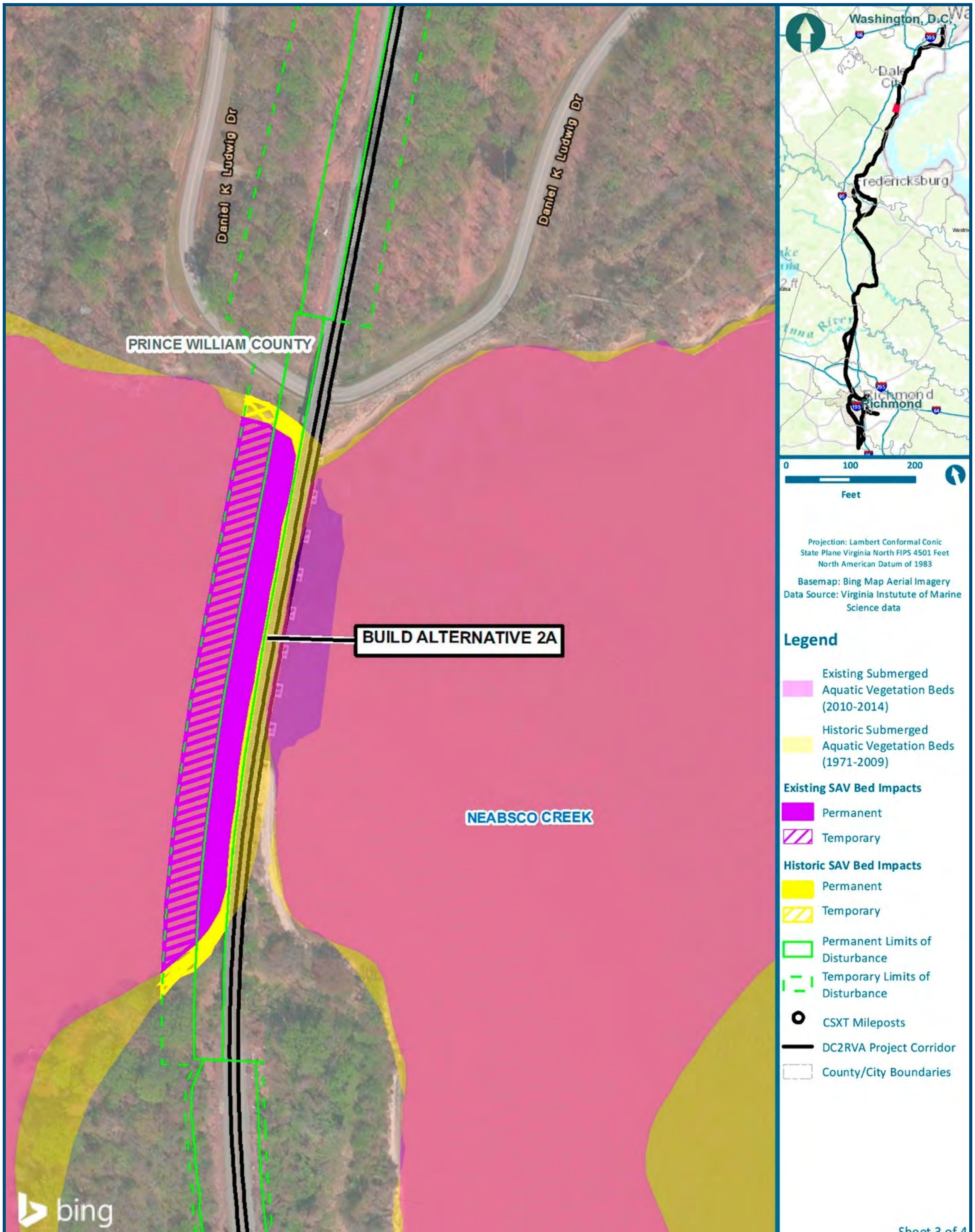


Figure 4.10-1: Submerged Aquatic Vegetation Impacts – Build Alternative 2A

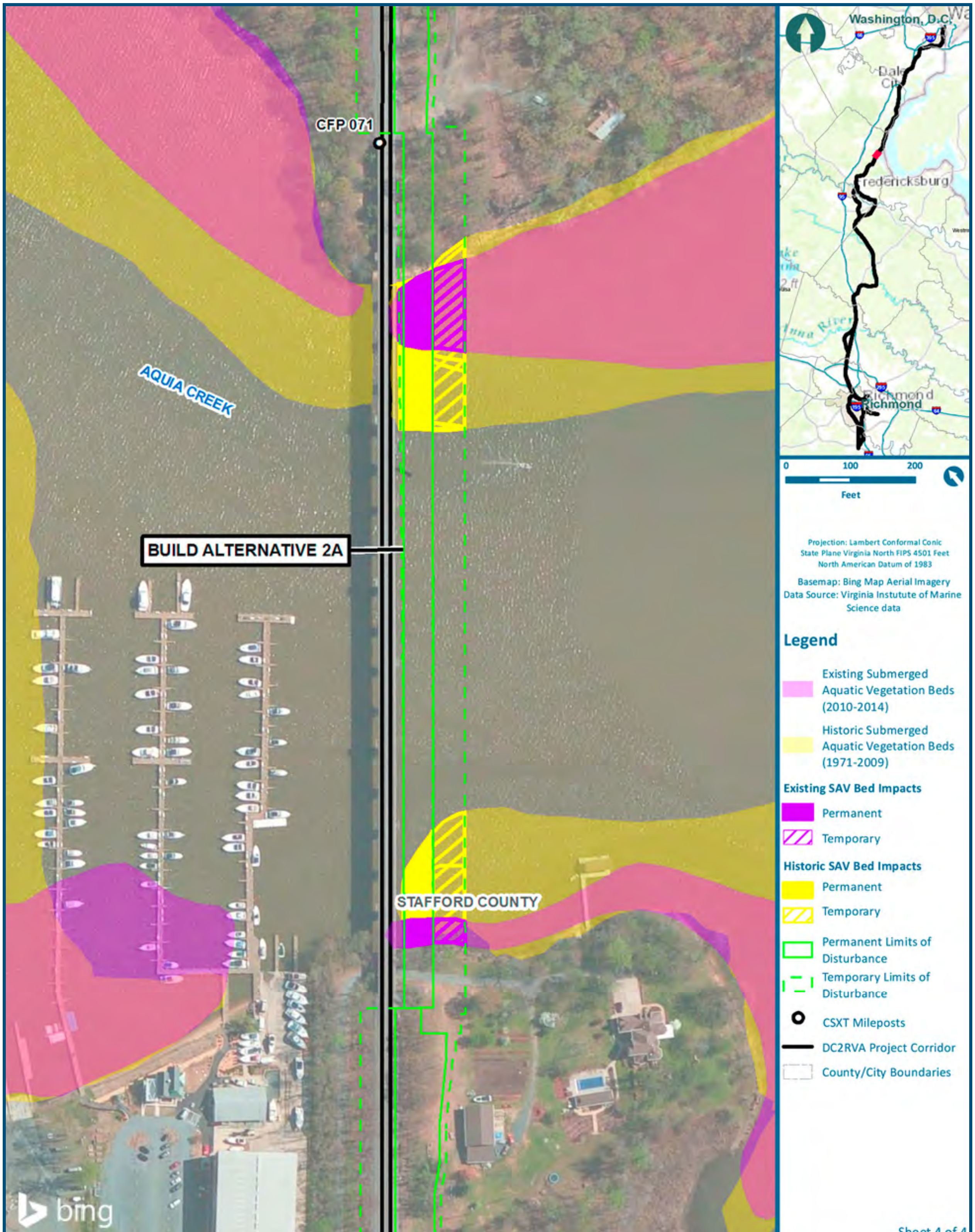


Figure 4.10-1: Submerged Aquatic Vegetation Impacts – Build Alternative 2A

- Establish an undisturbed buffer around SAV beds
- If construction must occur near or in beds, avoid activities during the growing season (April–October for most species)
- Preserve natural shorelines through stabilization with marsh plantings

Further efforts to avoid and/or minimize disturbance and removal of SAV would be made during final design as part of obtaining the VMRC permit. Erosion and sediment control measures would minimize potential impacts to water quality within adjacent SAV areas. Construction within or adjacent to SAV areas would avoid the growing season for representative plant species to the extent practicable. Mitigation for SAV loss would be developed in coordination with VMRC and may include enhancement (increase aerial coverage of SAV beds or improvement in habitat quality) or restoration (return SAV to unvegetated bottom, which historically supported SAV) of SAV beds.

4.10.2 Wildlife

Construction activities associated with the build alternatives, including clearing and grubbing and direct use of adjacent habitat, could result in the disturbance of local wildlife species such as birds, reptiles and amphibians, deer, foxes, squirrels, rabbits, raccoons, groundhogs, and other common mammals associated with these areas. Mobile species, such as adult birds, mammals, and some reptiles, would be displaced during construction. Loss of less mobile animals may result from construction. These species would return and repopulate the area once construction has been completed.

Additional loss of wildlife may occur due to mortality from collisions with trains, increased habitat fragmentation (discussed further in Section 4.10.1, Habitat and Natural Communities), impacts to aqueous habitats due to decreased water quality (discussed further in Section 4.1.3, Water Quality), and habitat loss through the introduction of invasive species (discussed further in Section 4.10.1.2, Invasive Species). As noted in Section 4.10.1, DRPT does not anticipate a substantial amount of wildlife crossing.

4.10.2.1 Colonial Waterbirds

All mapped colonial waterbird colonies are located more than 1 mile from the proposed Project. Due to the distance of the rail corridor from known colonies, DRPT does not anticipate that any activities associated with the build alternatives would have any impact on colonial waterbirds.

4.10.2.2 Migratory Birds

The migratory birds of primary concern in the study area are migratory songbirds, commonly referred to as Neotropical migrants. Short-term adverse impacts from construction noise and disturbance may mask territorial vocalizations of birds and breeding calls, and they may temporarily disturb breeding pairs. Important stopover habitat for migratory songbirds includes forested areas with dense undergrowth that provides cover from predators. Migratory birds could be affected through habitat degradation and loss associated with this Project. Most of the lost habitat associated with this Project, aside from proposed bypasses, would be directly adjacent to the existing rail line and is lower quality edge habitat already impacted by local activities. Nearby conservation areas, such as federal, state, and private wildlife lands, are more likely to provide optimal habitat for these species.

The proposed Fredericksburg Bypass (Build Alternative 3C) and Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) would use larger areas of habitat, each affecting approximately 80 acres of forested areas, and would bisect a large area of interior forested habitat (located 300 feet or farther from the forest edge and commonly composed of mature trees). These areas provide important habitat to many migratory species and protect them from predators that prefer the forest edge. The Fredericksburg Bypass would cut through two VOF easements, a large forested area including wildlife corridors, and may represent important sites for FIDS, which need large, relatively unfragmented tracts of hardwood or mixed hardwood forest to successfully breed and maintain viable populations. FIDS prefer tracts in excess of 100 acres or they require large contiguous linear tracts of hardwood or mixed hardwood forest that are a minimum of 600 feet wide, as many of these species prefer nest sites to be located greater than 300 feet from the forest edge. This diverse group includes Neotropical migrant songbirds such as tanagers, warblers, and vireos that breed in North America and winter in the Caribbean, Central America, and South America, as well as residents and short-distance migrants such as woodpeckers, some raptors, and owls (Jones, *et. al.*, 2001). Songbirds using these areas may be displaced and would disperse to nearby areas with suitable habitat, which may create greater competition.

4.10.2.3 Aquatic and Marine Life

Due to the number and type of water crossings involved, direct disturbance of aquatic communities would be unavoidable. In-stream work and use of wetland areas would result in the elimination of some aqueous habitat and species that would be unable to relocate. Additional impacts to aqueous habitats due to decreased water quality (discussed further in Section 4.1.3, Water Quality) and habitat loss through the introduction of invasive species could occur (discussed further in Section 4.10.1.2, Invasive Species).

Fisheries, Anadromous Fish, and Trout Waters

Cook Lake in Cameron Run Regional Park, the only mapped trout water in the Project vicinity (VDGIF, 2015b), is not located near the LOD and is not expected to be affected. Anticipated impacts to waters containing anadromous fish are dependent on the size of the water body and the type of crossing required. Depending on the combination of build alternatives selected, DRPT estimates there would be between 8,235 and 14,420 linear feet of permanent impacts to anadromous fish waters. Temporary and permanent impacts are detailed in Table 4.10-4.

Table 4.10-4: Confirmed Anadromous Fish Use Waters

Water	Alternative	Confirmed Species	Anticipated Impacts (Linear Feet)
Four Mile Run	2A	Striped Bass, Yellow Perch	P: 189 T: 692
Occoquan River	2A	Alewife, American Shad, Blueback Herring, Hickory Shad, Striped Bass, Yellow Perch	P: 1,161 T: 1,275
Neabsco Creek	2A	Striped Bass	P: 1,201 T: 1,332
Powells Creek	2A	Striped Bass, Yellow Perch	P: 1,592 T: 1,908

▶ *Continued (see end of table for detailed notes.)*

Table 4.10-4: Confirmed Anadromous Fish Use Waters

Water	Alternative	Confirmed Species	Anticipated Impacts (Linear Feet)
Aquia Creek	2A	American Shad, Blueback Herring, Striped Bass, Yellow Perch	P: 2,085 T: 3,641
Claiborne Run	3A	Potential anadromous fish use waters	P: 227 T: 318
	3B		P: 1,231 T: 682
	3C		P: 362 T: 507
Rappahannock River	3B	Alewife, American Shad, Blueback Herring, Hickory Shad, Striped Bass, Yellow Perch	P: 914 T: 922
	3C		P: 1,034 T: 2,094
Mattaponi River	4A	American Shad, Blueback Herring, Striped Bass, Yellow Perch	P: 715 T: 1,167
North Anna River	4A	American Shad, Blueback Herring, Hickory Shad, Striped Bass, Yellow Perch	P: 252 T: 386
Little River	4A	Yellow Perch	P: 179 T: 228
South Anna River	5A, 5A–Ashcake, 5B, 5B–Ashcake, 5C, 5C–Ashcake, 5D–Ashcake	Alewife, American Shad, Blueback Herring, Hickory Shad, Striped Bass	P: 230 T: 329
James River	6B–S-Line	American Shad, Blueback Herring, Striped Bass, Yellow Perch	P: 2,940 T: 6,162
	6D		P: 2,940 T: 6,162
	6F		P: 3,905 T: 5,197
	6G		P: 3,905 T: 5,197
Falling Creek	6A	Potential anadromous fish use waters	P: 242 T: 174
	6B–A-Line		P: 242 T: 174
	6C		P: 242 T: 174
	6E		P: 242 T: 174

P = Permanent Impact, T=Temporary Impact.

4.10.2.4 Avoidance, Minimization, and Mitigation Evaluation

Wildlife

DRPT will evaluate further minimization of impacts to wildlife during the final design process by decreasing LOD in habitat areas. This will include considering conservative use of staging areas and limiting access roads to reduce habitat loss. Wildlife passage can be facilitated through wildlife crossings. Wildlife crossings are man-made structures that allow animals to safely cross barriers. These crossings allow the connection or reconnection between habitats mitigating the impacts of habitat fragmentation, allow greater access to resources, and avoid wildlife/train collisions. DRPT will evaluate providing oversized culverts and extended bridges in areas where habitat fragmentation would occur. If pipes are used, they should be countersunk a minimum of 3 inches for pipes under 24 inches and a minimum of 6 inches for pipes 24 inches or greater.

Migratory Birds

General time-of-year (TOY) restrictions on construction activities to avoid impacts on migratory and resident songbirds in Virginia are from mid-March through mid-August and for migrant passerines and non-passerines from the beginning of May through the end of July (VDGIF, 2016). To the maximum extent practicable, DRPT will avoid grading and construction during the breeding season. If construction is necessary during the breeding season, DRPT will conduct nest surveys, if necessary, and will avoid activities within 100 feet of active nests, where possible. DRPT will not plant food sources within the right-of-way, which will make the right-of-way less attractive to birds decreasing the likelihood of collisions with trains.

Aquatic and Marine Life

DRPT will work with VDGIF, National Marine Fisheries Service (NMFS), and United States Fish and Wildlife Service (USFWS) during the design process to develop specific measures for avoidance, minimization, and mitigation of impacts to aquatic wildlife. DRPT will implement BMPs, including use of silt curtains and limiting overflow from dredging equipment, which will minimize increases in turbidity of waters downstream of in-water activities. Erosion and sediment control measures will also minimize potential impacts to water quality during construction.

Bottomless culverts and single-span bridges will be considered at smaller streams to maintain fish passage and channel morphology and to avoid instream work to the extent practicable. If pipes are used, they should be countersunk a minimum of 3 inches for pipes under 24 inches and a minimum of 6 inches for pipes 24 inches or greater. Preconstruction sediment quality assessments and water quality monitoring during construction will be considered to address potential resuspension of contaminants and nutrients into overlying waters.

TOY restrictions will be considered to avoid or minimize impacts on fish during early life stages. VDGIF typically recommends restrictions on all in-stream work within Anadromous Fish Use Areas and their tributaries between February 15 and June 30. Exact restrictions will vary depending on the species, type of work, and location and will be developed with VDGIF. Stormwater management measures, including detention basins, vegetative controls, and other measures, will be implemented to minimize water quality impacts, if necessary. These measures will reduce or detain discharge volumes and remove pollutants, thus avoiding substantial further degradation of impaired water bodies in and downstream of the study area. With implementation of these BMPs, DRPT anticipates the proposed Project will not adversely affect downstream species.

4.10.3 Threatened and Endangered Species

Potential impacts to federal- or state-listed threatened or endangered species that may be present within the study area could occur for the build alternatives where planned improvements affect areas where species or their habitat may be found.

Based on research through regulatory agency online databases, agency input regarding threatened and endangered species that may be present within the study area, and field surveys of potentially suitable habitat, DRPT determined that the build alternatives could potentially impact seven federally endangered and/or threatened species and eight state-listed endangered and/or threatened species (Table 4.10-5 and 4.10-6). Potential impacts depend on the species and range, including, but not limited to, elimination of the species from the area, removal or alteration of habitat, elimination of access to important life stage areas, disruption of breeding season, or disturbance resulting in a species leaving the area. The build alternatives for the Fredericksburg Bypass (Build Alternative 3C) and Ashland Bypass (Build Alternatives 5C and 5C–Ashcake), which would bisect forested habitat, wildlife corridors, and use rural areas with far less alteration, would have the greatest chance of impacting wildlife, including threatened and endangered species. All other alternatives would be in mostly urban or already disturbed, although in some cases naturalized, areas adjacent to the existing tracks.

Coordination with USFWS and NMFS pursuant to Section 7 of the *Endangered Species Act of 1973* (ESA), as amended, for potential impacts to federally listed species would be conducted where required after the Draft EIS is published. Preliminary coordination with USFWS has consisted of obtaining the current list of federally listed threatened and endangered species that could potentially be found in the study area. DRPT anticipates that future coordination will cover the need for additional field surveys and discussion regarding the potential Project effects.

Table 4.10-5: Potential for Federally Listed Species to be Affected by Project

Species/ Resource Name	Status*	Conclusion	Notes
Alternatives 1A, 1B, and 1C			
No species indicated; however, the tidal wetland in the waterfowl sanctuary may provide suitable habitat for sensitive joint-vetch and is recommended for future surveys, if impacted by a build alternative.			
Alternative 2A			
Dwarf Wedgemussel *(Alasmidonta heterodon)*	FE	Potential habitat present, and no current survey conducted; may affect	Known or likely to occur within the Lower Aquia Creek subwatershed (VDGIF, 2014)
Harperella *(Ptilimnium nodosum)*	FE	Potential habitat does not appear to be present, and no suitable habitat was identified during field surveys; not likely to adversely affect.	Known or likely to occur only in Stafford County (USFWS, 2014a) in the Lower Potomac (02070011) watershed (NatureServe, 2014)
Northern Long-eared Bat *(Myotis septentrionalis)*	FT	Potential habitat present, and no current survey conducted; may affect	It is generally agreed by the regulatory agencies that this species can be found throughout Virginia
Sensitive Joint-vetch *(Aeschynome virginica)*	FT	Habitat present, and no current survey conducted; may affect	Habitat recorded during field surveys
Small Whorled Pogonia *(Isotria medeoloides)*	FT	Habitat present, and no current survey conducted; may affect	Habitat recorded during field surveys

▶ *Continued (see end of table for detailed notes.)*

Table 4.10-5: Potential for Federally Listed Species to be Affected by Project

Species/ Resource Name	Status*	Conclusion	Notes
Alternatives 3A, 3B, and 3C			
Dwarf Wedgemussel *(Alasmidonta heterodon)*	FE	Potential habitat present, and no current survey conducted; may affect	Existing populations in the Lower Rappahannock (02080104) watershed (NatureServe, 2014)
Indiana bat *(Myotis sodalis)*	FE	Potential habitat present, and no current survey conducted; may affect	Known or likely to occur in Caroline County (USFWS-ECOS, 2016)
Northern Long-eared Bat *(Myotis septentrionalis)*	FT	Potential habitat present, and no current survey conducted; may affect	It is generally agreed by the regulatory agencies that this species can be found throughout Virginia
Small Whorled Pogonia *(Isotria medeoloides)*	FT	Habitat present, and no current survey conducted; may affect	Habitat recorded during field surveys
Alternative 4A			
Dwarf Wedgemussel *(Alasmidonta heterodon)*	FE	Species present; may affect	Existing populations in the Mattaponi (02080105) watershed (NatureServe, 2014); Po River, upstream of this Project, has been listed by VDGIF as endangered waters for the dwarf wedgemussel; this species is known or likely to occur within the Poni River subwatershed (VDGIF, 2014); this species is known or likely to occur within the South Anna River–Cedar Creek subwatershed (VDGIF, 2014 and VDCR, 2014)
Indiana bat *(Myotis sodalis)*	FE	Species potentially present, and no current survey conducted; may affect	Known or likely to occur in Caroline County (USFWS-ECOS, 2016)
Northern Long-eared Bat *(Myotis septentrionalis)*	FT	Potential bat habitat present, and no current survey conducted; may affect	It is generally agreed by the regulatory agencies that this species can be found throughout Virginia
Swamp-pink *(Helonias bullata)*	FT	Potential habitat present, and no current survey conducted; may affect	There are historic records of the potential of this species occurring in the Campbell Creek-Mattaponi River subwatershed (VDCR, 2014) in Caroline County (USFWS, 2014a) crossed by this alternative area
Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, 5C, 5C–Ashcake, and 5D–Ashcake			
Dwarf Wedgemussel *(Alasmidonta heterodon)*	FE	Species present; may affect	South Anna River has been listed by VDGIF as endangered waters for the dwarf wedgemussel; this species is known or likely to occur within the South Anna River–Cedar Creek subwatershed (VDGIF, 2014 and VDCR, 2014)
Northern Long-eared Bat *(Myotis septentrionalis)*	FT	Potential bat habitat present, and no current survey conducted; may affect	Bat habitat was noted during field surveys in Carter Park; it is generally agreed by the regulatory agencies that this species can be found throughout Virginia
Alternatives 6A, 6B–A-Line, 6B–S-Line, 6C, 6D, 6E, 6F, and 6G			
Northern Long-eared Bat *(Myotis septentrionalis)*	FT	Species potentially present, and no current survey conducted; may affect	It is generally agreed by the regulatory agencies that this species can be found throughout Virginia
Sensitive Joint-vetch *(Aeschynome virginica)*	FT	Species unlikely to be present in the project area	It is generally agreed by the regulatory agencies that this species can be found throughout Virginia, but no habitat in in the Richmond area would be affected

*FE – Federal Endangered; FT – Federal Threatened; SE – State Endangered; ST – State Threatened.

Table 4.10-6: Potential for State-Listed Species to be Affected by Project

Species/ Resource Name	Status*	Conclusion	Notes
Alternatives 1A, 1B, and 1C			
No species indicated; however, the tidal wetland in the waterfowl sanctuary may provide suitable habitat for sensitive joint-vetch and is recommended for future surveys, if impacted by a build alternative.			
Alternative 2A			
Peregrine Falcon *(Falco peregrinus)*	ST	Species potentially present; and no current survey conducted; may affect	This species has been recorded in Huntly Meadows Park (CEDER-VDGIF); the Project is separated from Huntly Meadows Park by more than 1.5 miles of urban development
Sensitive Joint-vetch *(Aeschynome virginica)*	ST	Habitat present, and no current survey conducted; may affect.	Four wetlands recommended for further sensitive joint-vetch survey
Small Whorled Pogonia *(Isotria medeoloides)*	SE	Habitat present, and no current survey conducted; may affect.	Habitat recorded during field surveys
Wood Turtle *(Glyptemys insculpta)*	ST	Species potentially present; and no current survey conducted; may affect	Known or likely to occur in the Cameron Run (VDGIF, 2014b) subwatershed and the Accotink Creek-Gunston Cove subwatershed (VDGIF, 2014b and VDCR-NHD, 2014)
Alternatives 3A, 3B, and 3C			
Green Floater *(Lasmigona subviridis)*	ST	Species present; may affect; coordination with VDGIF required	The Rappahannock River has been listed by VDGIF as endangered waters for the green floater; coordination with VDGIF is required
New Jersey Rush *(Juncus caesariensis)*	ST	Potential habitat present, and no current survey conducted; may affect	There are historic records of the potential of this species occurring in the Poni River subwatershed (VDCR, 2014) in Caroline County (USFWS, 2014a and NatureServe, 2014) and the Lower Rappahannock (02080104) and Mattaponi (02080105) watersheds (NatureServe, 2014)
Small Whorled Pogonia (*Isotria medeoloides*)	SE	Habitat present, and no current survey conducted; may affect	Habitat recorded during field surveys
Alternative 4A			
New Jersey Rush *(Juncus caesariensis)*	ST	Potential habitat present, and no current survey conducted; may affect	There are historic records of the potential of this species occurring in the Poni River and Campbell Creek-Mattaponi River, Reedy Creek, and Polecat Creek subwatersheds (VDCR, 2014) in Caroline County (USFWS, 2014a and NatureServe, 2014) within the Mattaponi (02080105) watershed and the Lower Rappahannock (02080104) watershed (NatureServe, 2014)
Swamp-pink *(Helonias bullata)*	FT	Potential habitat present, and no current survey conducted; may affect	There are historic records of the potential of this species occurring in the Campbell Creek-Mattaponi River subwatershed (VDCR, 2014) in Caroline County (USFWS, 2014a) crossed by this alternative area
Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, 5C, 5C–Ashcake, and 5D–Ashcake			
No species indicated			
Alternatives 6A, 6B–A-Line, 6B–S-Line, 6C, 6D, 6E, 6F, and 6G			
Barking Treefrog *(Hyla gratiosa)*	ST	Potential habitat present, and no current survey conducted; may affect	This species is known or likely to occur in the Falling Creek (VDCR, 2014 and VDGIF, 2014b) and Proctors Creek-James River (VDGIF, 2014b) subwatersheds in Chesterfield County (NatureServe, 2014)
Peregrine Falcon *(Falco peregrinus)*	ST	Species present; may affect; coordination with VDGIF required	Several active nests were recorded in 2009 within 3 miles of this alternative area near River Front Plaza in Richmond
Sensitive Joint-vetch *(Aeschynome virginica)*	ST	Species unlikely to be present in the project area	It is generally agreed by the different regulatory agencies that this species can be found throughout Virginia, but no habitat in in the Richmond area would be affected

*ST – State Threatened.

4.10.3.1 Bald Eagle and Golden Eagle Protection Act

Bald eagle (Haliaeetus leucocephalus) is listed under Tier II of the Virginia Wildlife Action Plan for "Very High Conservation Need." The Bald eagle is no longer listed as threatened, but this discussion was left in this section since it is still protected under some laws. Table 4.10-7 lists bald eagle nests that would have their buffer zones encroached on by construction of the Build Alternatives (Figure 4.10-2). Disturbance of nesting bald eagles is unlikely to occur if the following guidelines are followed:

- Clearing, grubbing, and construction activities within 660 feet, but outside 330 feet, can be restricted to outside of the breeding season (mid-December to June), even if these activities are occurring within railroad right-of-way
- A buffer of at least 660 feet can be maintained between all activities and the nest (including active and alternate nests)
  - If a similar activity is closer than 660 feet, then a distance buffer as close to the nest as the existing tolerated activity may be maintained
- A buffer of at least 0.5 mile, or 1 mile in open areas, can be maintained for blasting and other activities that produce extremely loud noises, or restricted to outside the breeding season (USFWS, 2007)
- Construction activities in Bald Eagle Concentration Areas may also negatively affect bald eagles. Bald eagles congregate in these locations for feeding and sheltering (roosting) because of their proximity to food sources. Construction activities may prevent bald eagles from foraging and roosting in these locations, resulting in disturbance that may stress or relocate the species to less optimal habitat. Permanent alterations at these sites can eliminate or reduce essential feeding and sheltering habitat. Bald Eagle Concentration Areas are intersected near Aquia Creek, Potomac River, Quantico Creek, Powells Creek, Neabsco Creek, and Occoquan River. TOY restrictions are listed in Table 4.10-8.

Nesting Bald Eagles

Table 4.10-7: Number of Bald Eagle Nests within Buffer Zones

Alternative Area	Alternative	2,640 feet or up to 5,280 feet in open areas[1]	660 feet[2]	330 feet[3]
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	18	8	4
Area 6: Richmond (I-295 to Centralia)	6A	1	–	–
	6B–A-Line	1	–	–
	6B–S-Line	1	–	–
	6C	1	–	–
	6D	–	–	–
	6E	1	–	–
	6F	–	–	–
	6G	1	–	–

Source: CCB, 2016.

Notes; 1. For projects that have blasting or other loud noise components. 2. Clearing, external construction, and landscaping between 330 and 660 feet should be done outside breeding season. 3. 330 feet, or as close as existing tolerated activity of similar scope.

None of the Build Alternatives are within bald eagle nest buffer zones in Alternative Areas 1, 3, 4, or 5.

Table 4.10-8: Listed Time-of-Year Restrictions for Threatened and Endangered Species with Potential to Occur in the DC2RVA Corridor

Species	Status	Recommended Time-of-Year Restrictions
Dwarf Wedgemussel (*Alasmidonta heterodon*)	FE	March 15–May 31; August 15–October 15
Indiana bat (*Myotis sodalis*)	FE	The standard TOY restrictions are June 1–July 31 for the "pup season," April 15–September 15 outside of the 5.5-mile-radius buffer for hibernacula, and April 1–November 15 within a hibernaculum buffer
Northern Long-eared Bat (*Myotis septentrionalis*)	FT	Compliance with the USFWS ESA 4(d) rule. VDGIF's standard recommendations are to prohibit tree removal within 150 feet of a documented maternity roost from June 1–July 31 and to prohibit tree removal within 0.25 mile of a documented hibernaculum
Bald Eagle (*Haliaeetus leucocephalus*)	ST	Nest Sites: December 15–July 15; Concentration Areas and Roost Sites: Summer: May 15–August 31; Winter: December 15–March 15
Barking Treefrog (*Hyla gratiosa*)	ST	None listed
Green Floater (*Lasmigona subviridis*)	ST	April 15–June 15 (release of glochidia); August 15–September 30 (spawning)
Peregrine Falcon (*Falco peregrinus*)	ST	February 15–July 15 for activities within 600 feet of nest
Wood Turtle (*Glyptemys insculpta*)	ST	For instream work: October 1–March 31; For work within 900 feet of stream (zone of concern): April 1–September 30. Maintain undisturbed naturally vegetated buffer of at least 300 feet (preferably larger) on stream

Source: VDGIF, 2016.

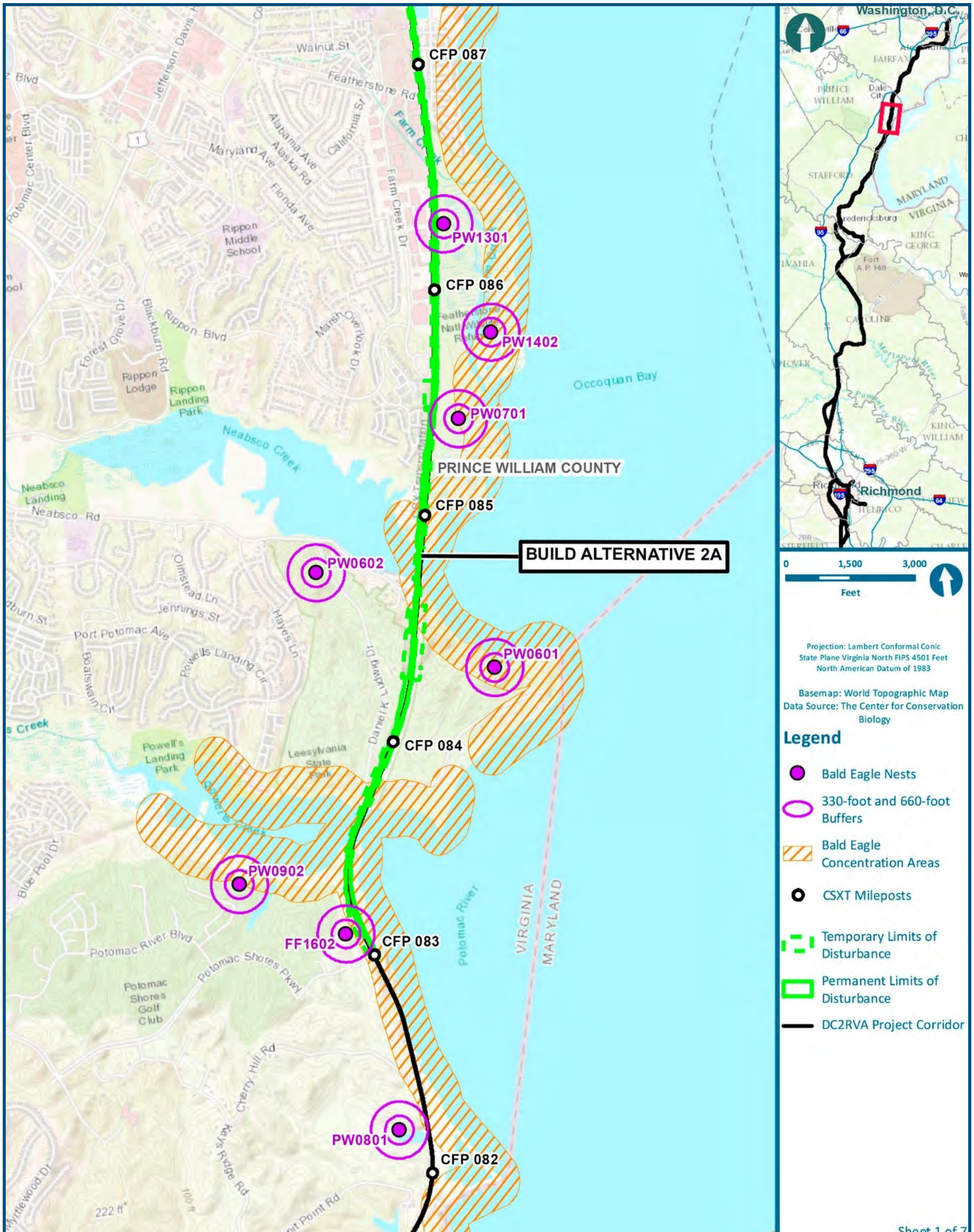


Figure 4.10-2: Bald Eagle Nest Impacts – Build Alternative 2A

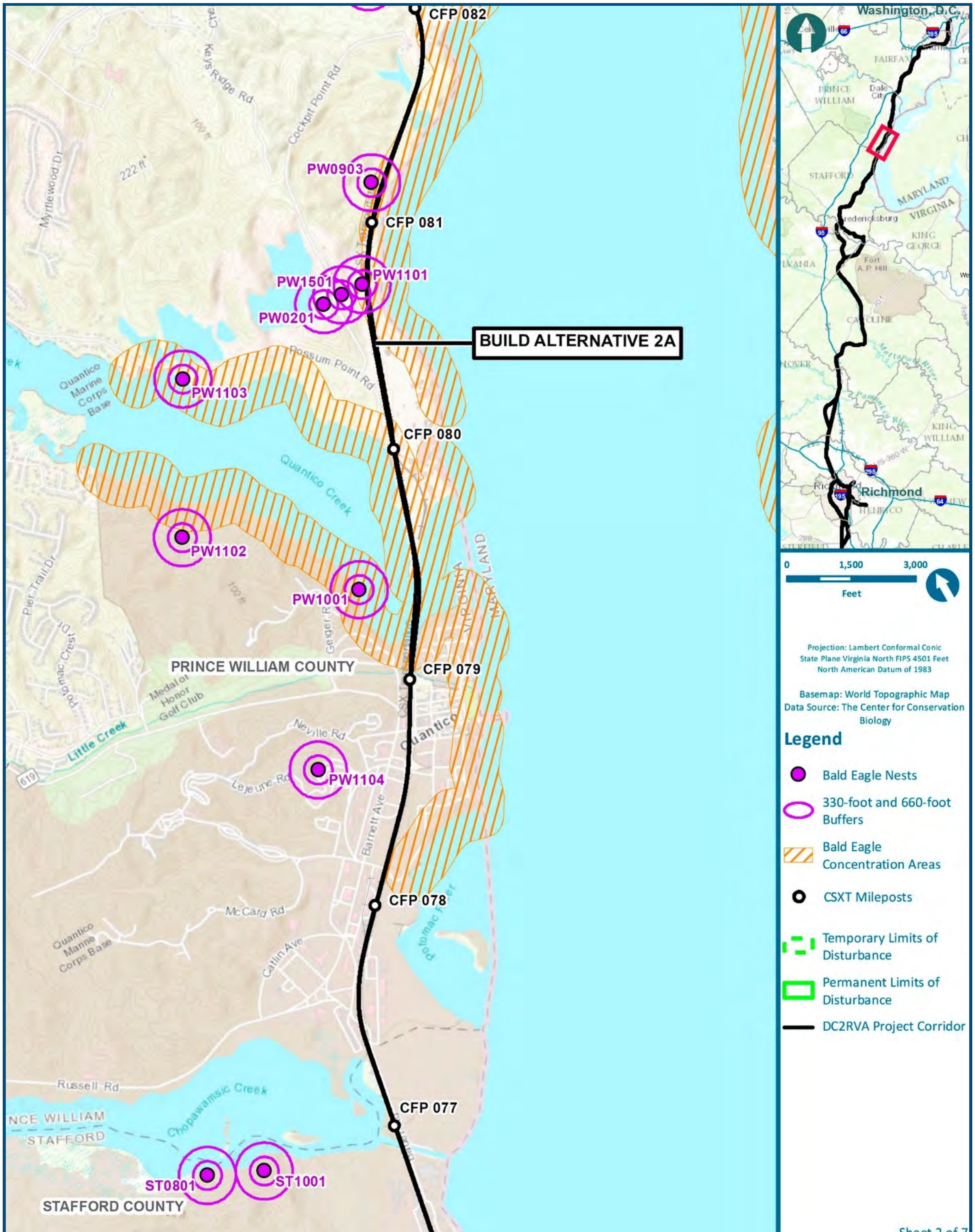


Figure 4.10-2: Bald Eagle Nest Impacts – Build Alternative 2A

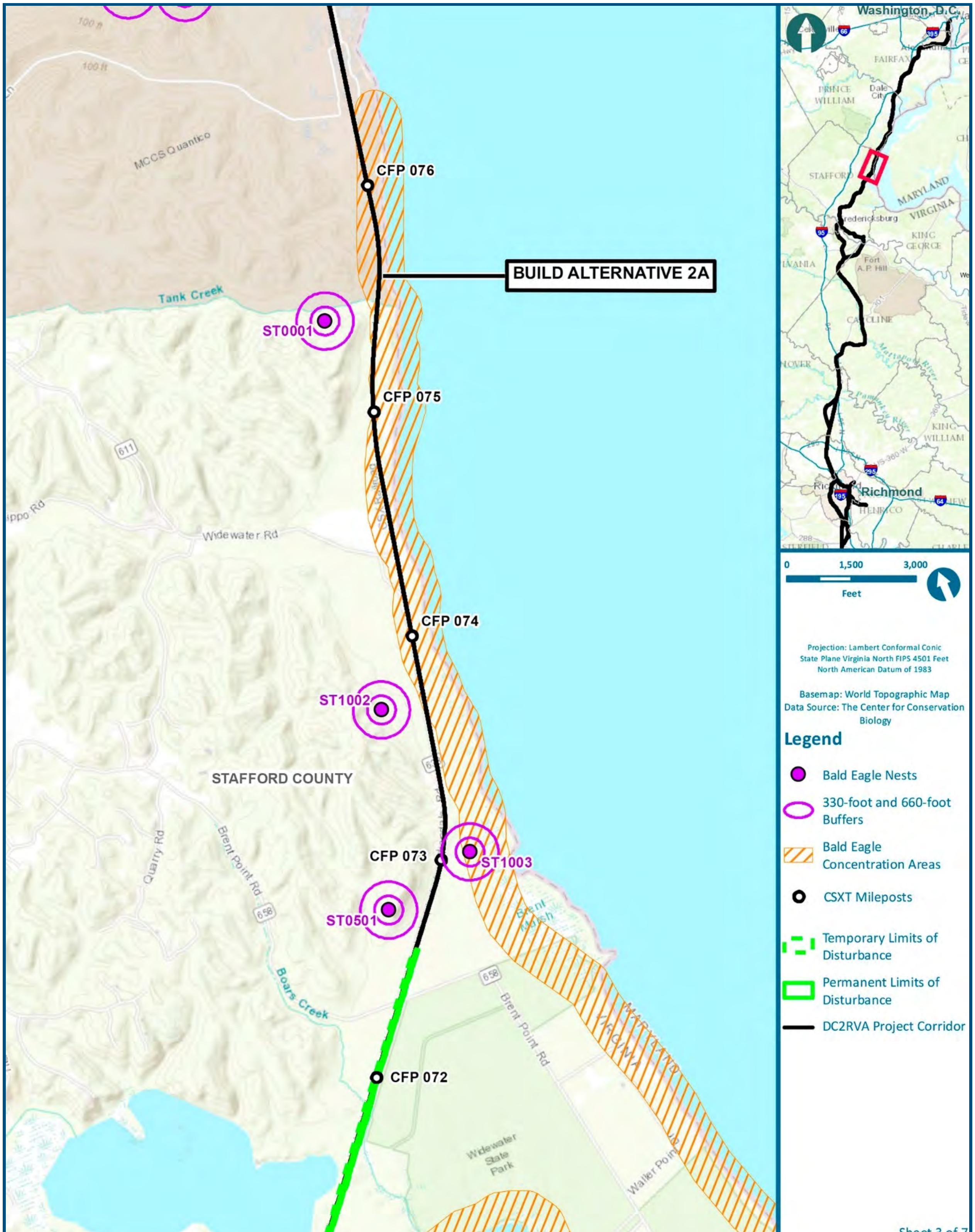


Figure 4.10-2: Bald Eagle Nest Impacts – Build Alternative 2A

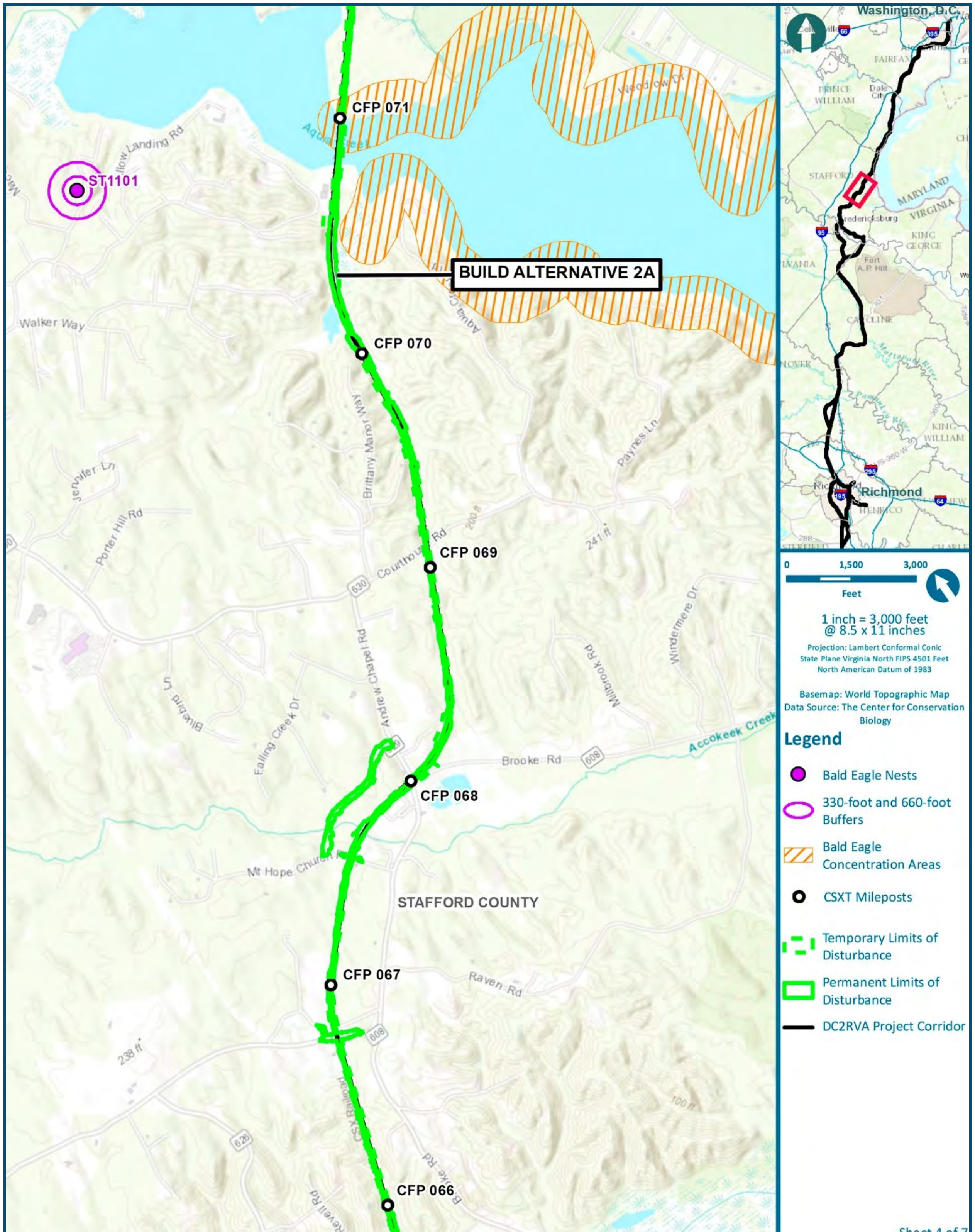


Figure 4.10-2: Bald Eagle Nest Impacts – Build Alternative 2A

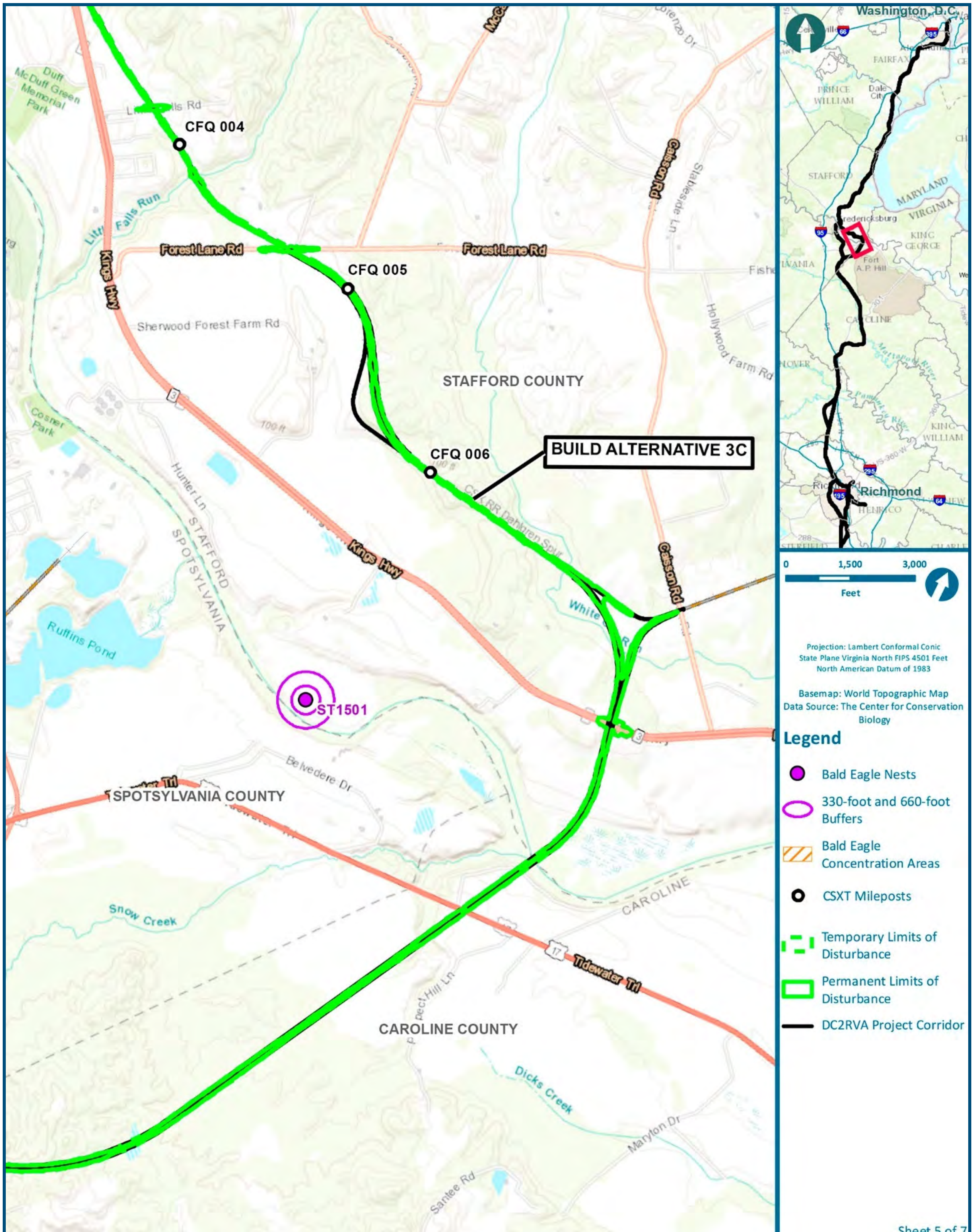


Figure 4.10-2: Bald Eagle Nest Impacts – Build Alternative 3C

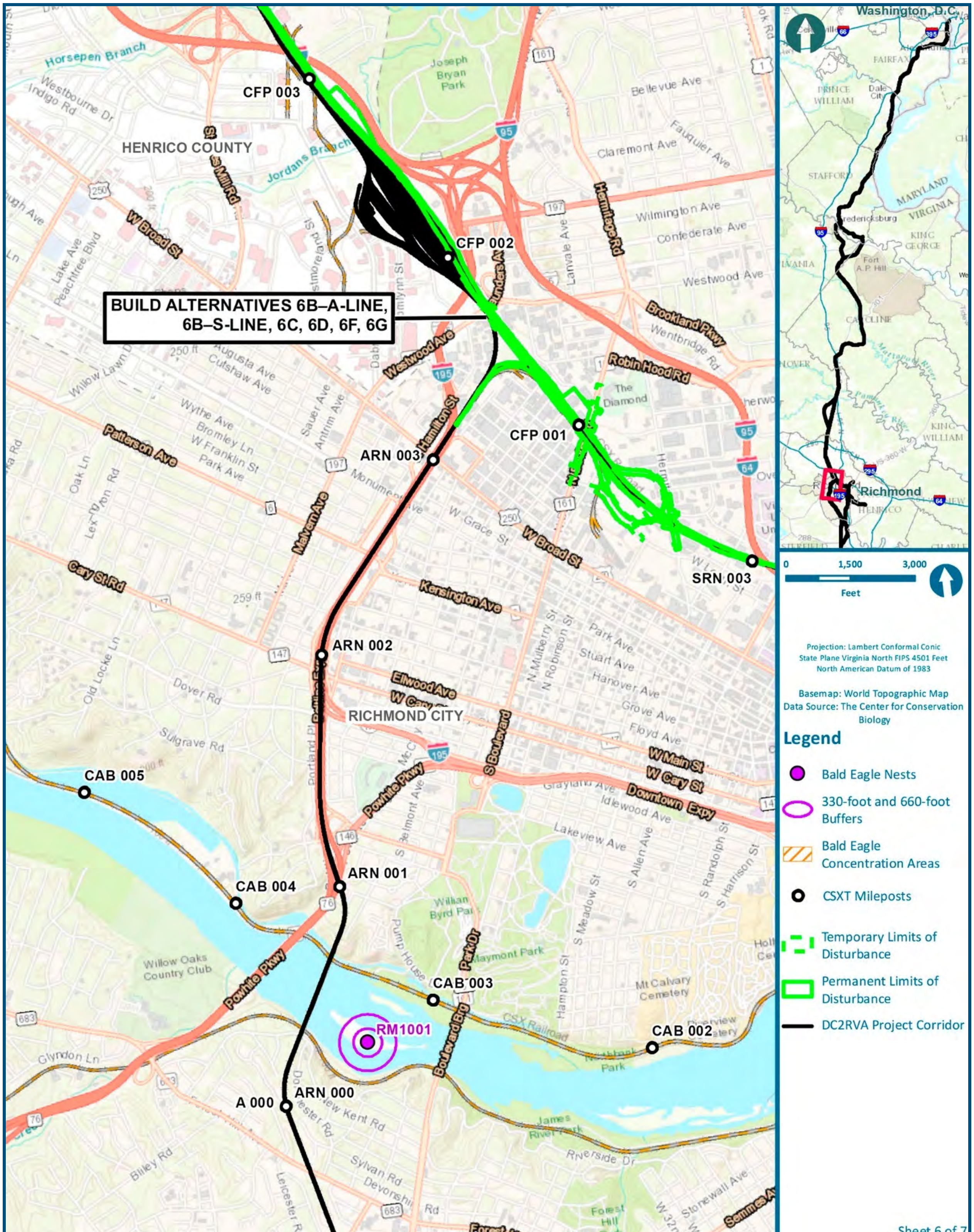


Figure 4.10-2: Bald Eagle Nest Impacts – Build Alternatives 6B–A-Line, 6B–S-Line, 6D, 6F, 6G

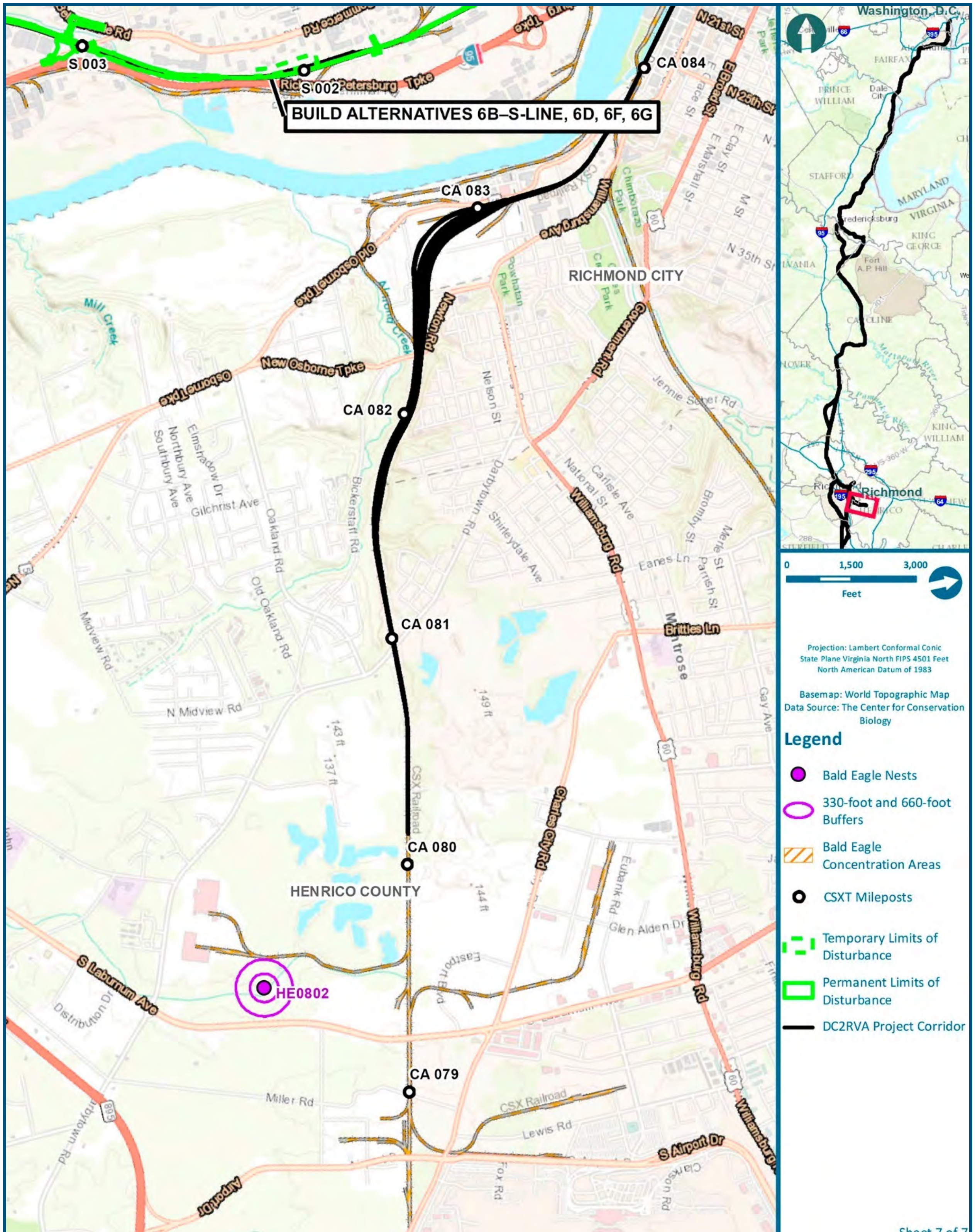


Figure 4.10-2: Bald Eagle Nest Impacts – Build Alternatives 6B–S-Line, 6D, 6F, 6G

4.10.3.2 Avoidance, Minimization, and Mitigation Evaluation

DRPT will coordinate with USFWS, EPA, VDCR, VDGIF, and other regulatory agencies regarding habitat and wildlife—rare, threatened, and endangered species, bald eagles, migratory birds, anadromous fish, and SAV in particular—to ensure impacts are avoided to the extent practicable through the final design process and appropriate mitigation is developed where impacts are unavoidable. DRPT will reduce the likelihood of adverse effects through use of these measures:

- Minimizing the LOD through design
- Following appropriate BMPs for sediment and erosion control during construction
- Using infiltration stormwater management
- Minimizing clearing and grubbing
- Prompt reseeding of disturbed areas with native vegetation
- TOY restrictions (Table 4.10-8)

Bald Eagle

According to the USFWS National Bald Eagle Management Guidelines to minimize disturbance, activities should be conducted outside of the breeding season, if possible, and kept as far away from nests as possible. Loud and disruptive activities should be limited to periods when eagles are not nesting, and activity between the nest and nearest foraging area should be avoided. General guidance for Category A activities, such as constructing roads and other linear facilities, and Category H, such as blasting and other loud, intermittent noises, is outlined in Table 4.10-9 (USFWS, 2007). It may be necessary to also obtain a permit issued under the *Bald and Golden Eagle Act* (16 United States Code [U.S.C.] 668-668c, 54 Stat. 250), as amended, for activities located in Bald Eagle Concentration Areas. This would be determined during the design process. Specific avoidance, minimization, and mitigation would be developed in coordination with USFWS and VDGIF and may require development of an eagle conservation plan.

Table 4.10-9: Bald Eagle Management Guidelines

<table>
<tr><th colspan="2"></th><th>If there is no similar activity within 1 mile of the nest</th><th>If there is similar activity closer than 1 mile from the nest</th></tr>
<tr><td rowspan="2">Category A activities, such as constructing roads and other linear facilities</td><td>If the activity will be visible from the nest</td><td>660 feet. Landscape buffers are recommended.</td><td>660 feet, or as close as existing tolerated activity of similar scope. Landscape buffers are recommended.</td></tr>
<tr><td>If the activity will not be visible from the nest</td><td>330 feet. Clearing, external construction, and landscaping between 330 and 660 feet should be done outside breeding season.</td><td>330 feet, or as close as existing tolerated activity of similar scope. Clearing, external construction, and landscaping within 660 feet should be done outside breeding season.</td></tr>
<tr><td>Category H, such as blasting and other loud, intermittent noises</td><td colspan="3">Avoid blasting and other activities that produce extremely loud noises within 0.5 mile of active nests (or within 1 mile in open areas), unless greater tolerance to the activity (or similar activity) has been demonstrated by the eagles in the nesting area.</td></tr>
</table>

Source: USFWS, 2007.

4.11 COMMUNITY RESOURCES

4.11.1 Economic Effects

The Build Alternatives would have direct effects on economic activity through business/ commercial relocations, as shown in Table 4.11-1.

Table 4.11-1: Commercial Relocations by Build Alternative

Alternative Area	Alternative	Stafford County		Hanover County	Henrico County	City of Richmond				Total
		O	GC	GC	GC	GC	S/W	M/A	O	
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3B	–	–	–	–	–	–	–	–	1
	3C	–	–	–	–	–	–	–	–	1
Area 5: Ashland (Doswell to I-295)	5A	–	–	1	–	–	–	–	–	1
	5A–Ashcake	–	–	1	–	–	–	–	–	1
	5B	–	–	1	–	–	–	–	–	1
	5B–Ashcake	–	–	1	–	–	–	–	–	1
	5C	–	–	1	–	–	–	–	–	1
	5C–Ashcake	–	–	1	–	–	–	–	–	1
	5D–Ashcake	–	–	1	–	–	–	–	–	1
Area 6: Richmond (I-295 to Centralia)	6A	–	–	–	5	1	0	4	0	10
	6B–A-Line	–	–	–	5	2	4	7	0	18
	6B–S-Line	–	–	–	5	0	2	2	1	10
	6C	–	–	–	5	1	1	5	3	15
	6D	–	–	–	5	0	2	2	1	10
	6E	–	–	–	5	1	0	4	0	10
	6F	–	–	–	5	0	2	2	1	10
	6G	–	–	–	5	0	2	2	1	10

This table includes only the Build Alternatives with commercial relocations.
O=Other; GC=General Commercial; S/W=Storage/Warehousing; M/A=Manufacturing/Auto Repair

The nonresidential relocations were broken down into types of businesses with similar relocation/ structural needs: general commercial, storage and warehousing, manufacturing, and other. The category "Other" includes an apartment building as well as a variety of government properties (city, county, or university-owned). The government properties include a Department of Motor Vehicles, Commonwealth of Virginia Workers' Compensation Department, and City of Richmond Department of Public Works properties. The general commercial businesses within the Build Alternatives include technical services and entertainment services. The warehousing and storage facilities include food and container storage. The manufacturing facilities include auto service and repair, and electrical manufacturing and repair. In Alternative Area 5, the Town of Ashland could be adversely affected economically by Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake. There are few business relocations, due to these Build Alternatives, but the short-term effects of construction within town, particularly central downtown along Railroad Avenue and Center Street, could cause local businesses to suffer loss of commerce and, potentially, closure. In addition to the short-term effects of construction, Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake could close South Center Street between England Street and Maiden Street. Access to the businesses and residences would still be provided from other public rights-of-way. However, the long-term effects of the closure and change in access could also cause loss of commerce and potential closure of businesses. This in turn could cause negative effects on the economic vitality of downtown Ashland.

Based on the number of nonresidential relocations and the types of businesses potentially being relocated, adequate replacement properties would be available for relocation purposes. The acquisition of right-of-way and the relocation of displaced persons and businesses would be conducted in accordance with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970,* as amended, and 24 VAC 30 - 41. DRPT assures that relocation resources would be available to all displaced businesses and nonprofit entities without discrimination.

4.11.2 Neighborhood and Community Effects

4.11.2.1 Community Effects

DRPT assessed impacts to communities based on potential right-of-way acquisition of residences and community facilities, partial acquisitions of parcels, potential changes in community cohesion, changes in access to community facilities, and changes in access for emergency services.

More-detailed information on right-of-way acquisition and relocation can be found in Section 4.12, Title VI and Environmental Justice. Effects based on changes to the transportation network are summarized in the next section, discussed in the Transportation Section (Section 4.15), and discussed in more detail in the *Transportation Technical Report* (Appendix S).

The No Build Alternative would not require any right-of-way acquisition or result in any neighborhood and community effects.

In Alternative Area 1 (Arlington), DRPT does not expect direct effects to communities from relocations and right-of-way acquisition. There are no relocations, and none of the Build Alternatives require more than 1.5 acres of right-of-way. There are no adverse effects to community facilities, access to these facilities, or access for emergency services.

In Alternative Area 2 (Northern Virginia), Build Alternative 2A would require two residential relocations in part of the Belmont Bay community along Railroad Avenue (Prince William County). Access to this community is currently through the condominiums at Belmont Bay and would not change under the Build Alternative 2A. DRPT has determined that there would be no adverse effects to community facilities, access to these facilities, or access for emergency services.

The community of Brooke (Stafford County) would be affected by Build Alternative 2A. Partial acquisition of residential property would occur due to an additional roadway connection north of and parallel to the CSXT line to continue to provide access to the street network for residents via Brooke Road and Andrew Chapel Road. DRPT has determined that access to and from the area for emergency services, school transportation, and religious facilities on Andrew Chapel Road would not be adversely affected by Build Alternative 2A. Additional effects to this community include partial acquisition of residential property around the Eskimo Hill Road crossing of the CSXT line.

In Alternative Area 3 (Fredericksburg), Build Alternatives 3A and 3B that pass through town would not require residential relocations, and only partial acquisition of primarily residential parcels would be required in the communities in this area. DRPT has determined that the Fredericksburg Bypass (Build Alternative 3C) would adversely affect the community of Little Falls (Stafford County). The adverse effects would be due to partial acquisition of residential parcels on Little Falls Road and Forest Lane Road, as well as an increase in the frequency of trains along the existing Dahlgren Spur. There are currently very few train movements on this line (one per day). Additional freight trains would use the bypass as part of future train operations. Existing crossings of these roads would be improved with median treatments to provide additional safety measures for residents.

The communities that would be affected by the Fredericksburg Bypass (Build Alternative 3C) include the residential development along Sandy Lane Drive, Swan Lane, Thornton Rolling Road, and Patriot Lane and the community of Summit (Spotsylvania County). As rural communities, they may not be as well defined as urban or suburban communities, but they would still be adversely affected by residential relocations. The Fredericksburg Bypass (Build Alternative 3C) would bisect the residential development along Thornton Rolling Road and Patriot Lane. Community cohesion could be adversely affected by this alternative. None of these communities are currently on a rail line, and the introduction of a rail line and freight rail traffic would undoubtedly result in an adverse effect on this currently rural area. DRPT does not, however, anticipate adverse effects to community facilities, access to these facilities, or access for emergency services since roadway crossings along the new alignment bypass would be grade-separated.

In Alternative Area 4 (Central Virginia), to the east and south of Carmel Church and Patersons Corner, access to the residential development along Railroad Lane (Caroline County) would not be affected by Build Alternative 4A since only one low-volume roadway (Colemans Mill Road) would be closed. DRPT has determined that there would be no adverse effects to community facilities, access to these facilities, or access for emergency services.

In Alternative Area 5 (Ashland), within the Town of Ashland, the proximity of the community to the existing CSXT rail line makes adverse effects to the community difficult to avoid. The Build Alternatives that pass through town (Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake) would have similar effects on the community. There would be no residential relocations, one commercial relocation, and partial acquisitions of parcels. The communities affected include downtown Ashland, southern Ashland, Gwathmey, and Elmont.

The Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) would result in 20 residential relocations, 1 community facility relocation (Calvary Pentecostal Tabernacle and camp), 2 commercial relocations, and partial acquisition of more than 50 parcels. The communities affected include Blunts Bridge Road, Independence Road, Ashcake Road and Wildwood Boulevard, and Elmont. As noted above, one community facility would be adversely affected, but DRPT does not expect any other adverse effects to community facilities, access to community facilities, or access for emergency services since roadway crossings along the new alignment bypass would be grade-separated.

Within Alternative Area 6 (Richmond), direct effects to communities from residential relocations would occur in Laurel Park in Henrico County and in McGuire in the City of Richmond. The Build Alternatives that use the A-Line between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, 6C, and 6E) would affect both communities through these residential relocations and the relocation of a church, the Rock Christian Center. The Build Alternatives that use the S-Line between Main Street Station and Centralia (Build Alternatives 6B–S-Line, 6D, 6F, and 6G) would only affect the community of Laurel Park. One community facility would be adversely affected, but no other adverse effects to community facilities, access to these facilities, or access for emergency services are expected.

More-detailed information on community effects can be found in the *Community Impact Assessment Technical Report* (Appendix Q).

4.11.2.2 Effects from Changes to the Transportation Network

Effects on communities from changes to the transportation network have been assessed based on physical changes to the roadway network and increased intercity passenger rail service in the DC2RVA corridor. The methodology used to determine the proposed crossing improvements at each at-grade crossing is provided in the *Transportation Technical Report* (Appendix S). Types of crossing treatments were identified at each at-grade highway-rail crossing to improve safety and road and rail traffic flow (see Section 4.15.2.1). Most existing public at-grade crossings are proposed to remain at-grade with the addition of four-quadrant gates or gates with center median treatment; there are fewer locations with proposed grade separations and closures. New grade separations would reduce vehicular delay at those locations. DRPT evaluated all crossing improvement effects on connectivity and accessibility (see Section 4.15.2.2) and completed a crossing closure diversion analysis (see Section 4.15.2.3) to determine the effects the proposed roadway closures would have on traffic operations. Crossings proposed to be closed are typically lower volume roadways with nearby alternate new or existing access across the rail corridor, or were determined due to safety concerns and/or the requirements of the physical or operational infrastructure of the Project. All new crossings of roads as part of the Build Alternatives would be grade-separated, except for two new at-grade roadway crossings that are proposed as part of the station improvement designs for Build Alternative 6C. Additionally, some existing public at-grade crossings would be grade-separated which would reduce vehicular delay at those locations.

In Alternative Area 1 (Arlington), DRPT does not expect direct effects to the local transportation network as a result of construction of the proposed Project because there are no at-grade crossings in this alternative area.

In Alternative Area 2 (Northern Virginia), Build Alternative 2A would not change access to the communities of Harbor View and Colchester (Fairfax County), via Furnace Road, and would therefore not adversely affect these communities. The community of Brooke (Stafford County) would be affected by Build Alternative 2A. Mount Hope Church Road would be closed at the CSXT rail line, and an additional roadway connection would be added north of and parallel to the CSXT line to provide access to the street network for residents via Brooke Road and Andrew Chapel Road. More detail appears in the *Transportation Technical Report* (Appendix S). DRPT has determined that access to and from the area for emergency services, school transportation, and the religious facilities in Brooke would not be adversely affected by Build Alternative 2A.

In Alternative Area 3 (Fredericksburg), DRPT expects that the Project will result in direct effects to the transportation network. The improved station at Fredericksburg would provide better access to the transportation network with a larger station building, additional parking, and improved handicapped parking, which are all positive effects. The end of Patriot Lane (Spotsylvania County) would also be acquired as part of right-of-way acquisition for the Fredericksburg Bypass (Build Alternative 3C). The roadway would terminate at the new wye junction required for joining the bypass to the main line.

In Alternative Area 4 (Central Virginia), the Colemans Mill Road (Caroline County) crossing of the CSXT rail line would be closed under Build Alternative 4A. DRPT does not expect adverse effects to access for emergency response, school transportation, or the roadway network as a result of this road closure. The north side of Colemans Mill Road would continue to be accessed by Rogers Clark Boulevard. The south side would maintain access through Dry Bridge Road to Colemans Mill Road. Access to the eastern section of Railroad Lane (Caroline County) would remain in place under Build Alternative 4A.

In Alternative Area 5 (Ashland), closure of College Avenue/Henry Clay Street would occur under Build Alternatives 5A, 5B, and 5C if the existing platforms at the Ashland Station were extended. DRPT expects that there would be no adverse effects to access to community facilities or for emergency response, school transportation, or access to the roadway network as a result of this road closure. West Vaughan Road would provide an alternative for emergency medical services and would be improved with a grade separation under the Build Alternatives that pass through town (Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake). This would improve safety and emergency response time. The Volunteer Rescue Squad on Duncan Street would still have access to both sides of the rail line, as would the Ashland Police Department on England Street. Closure of Independence Road at West Patrick Henry Road would occur under the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake). An alternate alignment that uses existing West Patrick Henry Road and Blanton Road would be less than 1 mile.

DRPT does, however, expect adverse effects due to road closure in Ashland. Closure of the northbound portion of South Railroad Avenue between England Street and Maiden Lane, due to the addition of a third track, under Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake, would adversely affect the community of Ashland and, in particular, the community cohesion of the area of town south of England Street.

In Alternative Area 6 (Richmond), direct effects to the transportation network are expected as a result of construction of the Build Alternatives. The station improvements at Staples Mill would provide expanded mobility and better access to the transportation network with an expanded building, additional parking, and a designated pick-up and drop-off area, which would all be positive effects of the Project. Some at-grade roadway crossings would also be closed under the Build Alternatives, which are summarized in the following paragraphs.

The Boulevard single-station alternative (Build Alternative 6B–S-Line) includes the closure of the Ownby Lane/Hermitage Road intersection in the Diamond/Newtowne West area to accommodate the Hermitage Road grade separation. The area is generally in commercial and industrial uses. Access to Ownby Lane would still be available via Overbrook Road and Botetourt Street.

The Build Alternatives that use the A-Line between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, 6C, and 6E) include the closure of Bassett Avenue in Westover . Access to the east side of this crossing would still be available via Westover Hills Boulevard. Access to the west side of the crossing would still be available through Jahnke Road, which would be improved with four-quadrant gates to increase safety at the crossing.

The Build Alternatives that use the A-Line between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, 6C, and 6E) include the closure of the Terminal Avenue at-grade crossing in Hickory Hill. Access on the eastern side of Terminal Avenue is available via Belt Boulevard. Access on the western side of Terminal Avenue is available via Hopkins Road. A signal study of the intersection of Terminal Avenue and Hopkins Road would also occur under these alternatives.

The Build Alternatives that use the A-Line between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, 6C, and 6E) include the closure of Thurston Road in the community of Chimney Corner. Access to the western side of Thurston Road would still be available via Hopkins Road. Access to the eastern side of Thurston Road would still be available via Dorsey Road. Access to and from the community for emergency services and school transportation would not be adversely affected by the alternatives.

The Build Alternatives that use the S-Line between Main Street Station and Centralia (Build Alternatives 6B–S-Line, 6D, 6F, and 6G) include the closure of St James Street and North Second Street/Valley Road between the communities of Gilpin and Southern Barton Heights. Based on the proximity to and connections to the existing roadway network via North First Street and North Fifth Street, access to and from the communities for emergency services and school transportation would not be adversely affected by the alternatives.

The Build Alternatives that use the S-Line between Main Street Station and Centralia (Build Alternatives 6B–S-Line, 6D, 6F, and 6G) include the closure of the at-grade crossing at Dale Avenue/Trenton Avenue in the community of Ampthill Heights. It primarily provides access to the DuPont plant, and alternate access is available.

The Build Alternatives that use the S-Line between Main Street Station and Centralia (Build Alternatives 6B–S-Line, 6D, 6F, and 6G) include the closure of Brinkley Road in Chimney Corner. Access to Brinkley Road would still be available via Dorsey Road and Thurston Road via Hopkins Road.

Old Lane in the community of Centralia would be closed under all Build Alternatives. Access to and from the community for school transportation would not be adversely affected by the alternatives. An increase in response time for emergency services could occur if the response were from Fire Station 17 in Centralia, but it would be less than a 5-minute increase. If the response were from Fire Station 1, there would be no difference in response time.

4.11.3 Community Facilities and Services

The No Build Alternative would have no direct effects on community facilities.

In Alternative Areas 1 through 4, the Build Alternatives would have no direct effects on community facilities.

In Alternative Area 5 (Ashland), one community facility, the Calvary Pentecostal Tabernacle camp in Hanover County, would be relocated due to Build Alternatives 5C and 5C–Ashcake. The facility would be relocated in a manner that would enable access to remain similar to the existing access.

Build Alternatives 5A, 5A–Ashcake, 5B, and 5B–Ashcake would require a minor temporary easement of two parcels from the Gwathmey Baptist Church. The temporary easement would not affect activities at the church, and DRPT does not expect the temporary easement to have adverse effects to the church.

All Build Alternative would require a temporary easement from Patrick Henry Branch of the YMCA in Ashland due to alignment changes along Ashcake Road. DRPT does not expect the temporary easement to have adverse effects to the facility.

In Alternative Area 6 (Richmond), the Build Alternatives that use the A-Line between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, 6C, and 6E) would require the relocation of the Rock Christian Center as a part of the grade separation of the intersection of Broad Rock Boulevard and the CSXT rail line. The facility would be relocated in a manner that would enable access to remain similar to the existing access. In addition, partial acquisition of the parcel containing Hunter Holmes McGuire Veterans Affairs Medical Center would also occur in this location. The partial acquisition of this parcel is minor in nature (0.10 acre) and would not affect the functioning of the center.

4.11.4 Right-of-Way and Relocations

The acquisition of right-of-way and the relocation of displacees would take place in accordance with the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970,* as amended (42 U.S.C. 4601). Data and information were collected on social demographics and potential relocations, including individual tax parcel data, within the Build Alternatives. This information was compiled from city/county tax parcel databases, United States Geological Survey (USGS) mapping, aerial photos, the United States Census website, GIS databases, conceptual drawings/engineering, and field inspections. All field inspections were conducted from within public right-of-way. Given that potential property effects are only being estimated at this time, local citizens/property owners were not contacted for any data to determine family size, household size, property value, owner/renter status, or any other demographic information. Similarly, individual businesses potentially subject to relocation were not contacted to determine their number of employees. These data were estimated using the sources noted above.

Potential relocations were determined based on overlaying the estimated LOD of the Build Alternatives on county/city tax parcel digital data through the use of GIS. The individual parcel data were then compiled, and the area that may be acquired with implementation of a Build Alternative was computed. Potential relocations were identified as residential (individuals/families), community facilities, and commercial. The relocations can be classified as total acquisitions or partial acquisitions:

- **Total Acquisition:** This occurs when the primary improvement (house, business, nonprofit, or farm) is within the right-of-way or access to the parcel is removed and cannot be restored. The owner is compensated for the fair market value of the entire parcel and provided relocation assistance.
- **Partial Acquisition:** This occurs when a portion of a parcel is acquired and that portion does not include a primary improvement. The owner is compensated for the fair market value of the portion of their parcel and minor improvements that would be acquired.

This document represents a preliminary examination of the potential relocations; therefore, direct contact with individual residents, landowners, and business owners did not occur. Coordination with affected property owners will begin with the Public Hearing and continue into the final design process. Social and economic characteristics of the displaced population are based on United States Census data from the 2009 - 2013 American Community Survey (ACS) and from the National Center for Education Statistics.

Residential relocations by Build Alternative are detailed in Table 4.11-2. The No Build Alternative requires no residential relocations. Specific communities within which these relocations occur were discussed in Section 4.11.2.1.

In Alternative Area 1 (Arlington) Build Alternatives 1A, 1B, and 1C would have no residential relocations.

In Alternative Area 2 (Northern Virginia), the single Build Alternative 2A would have two residential relocations.

In Alternative Area 3 (Fredericksburg), the Fredericksburg Bypass (Build Alternative 3C) would have 19 residential relocations.

In Alternative Area 4 (Central Virginia), the single Build Alternative 4A would have no residential relocations.

In Alternative Area 5 (Ashland), the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) would have 21 residential relocations. These alternatives would relocate one community facility, the Calvary Pentecostal Tabernacle camp in Hanover County. This facility would be relocated due to severing the parcel and lack of access to the remaining part of the parcel.

In Alternative Area 6 (Richmond), residential relocations would occur under all Build Alternatives. The Build Alternatives that use the A-Line between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, and 6E would have 12 relocations. Build Alternative 6C, which also uses the A-Line, has 12 single-family residence relocations and an apartment building relocation with 100 units. The Build Alternatives that use the S-Line between Main Street Station and Centralia (Build Alternatives 6B–S-Line, 6D, 6F, and 6G) would have seven relocations.

Right-of-way acquisitions may be further minimized as design progresses. Easements may be used in lieu of acquiring new right-of-way for some properties. Temporary easements may also be needed on adjacent property to gain access to the existing rail line and right-of-way during construction activities and for construction staging. If necessary, these temporary easements could be obtained for a short duration, and the land would be returned to its original condition before easement lease termination.

DRPT has the ability and, if necessary, is willing to provide housing of last resort, including the purchase of land or dwellings; repair of existing dwellings to meet decent, safe, and sanitary conditions; relocation or remodeling of dwellings purchased by DRPT; or construction of new dwellings. DRPT assures that all displaced families and individuals would be relocated to suitable replacement housing, and that all replacement housing would be fair housing available to all persons without regard to race, color, religion, sex, or national origin and would be within the financial means of the displacees. Each person would be given enough time to negotiate for and obtain possession of replacement housing. No residential occupants would be required to move from property needed for the Build Alternatives until comparable decent, safe, and sanitary replacement dwellings have been made available to them.

Table 4.11-2: Residential Relocations by Build Alternative

Alternative Area	Alternative	City/County												
		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	Chesterfield County	Total
Area 1: Arlington (Long Bridge Approach)	1A	0	–	–	–	–	–	–	–	–	–	–	–	0
	1B	0	–	–	–	–	–	–	–	–	–	–	–	0
	1C	0	–	–	–	–	–	–	–	–	–	–	–	0
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	–	0	0	2	0	–	–	–	–	–	–	–	2
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	–	–	–	–	0	0	0	–	–	–	–	–	0
	3B	–	–	–	–	0	0	0	–	–	–	–	–	0
	3C	–	–	–	–	—	—	18	0	–	–	–	–	19
Area 4: Central Virginia (Crossroads to Doswell)	4A	–	–	–	–	–	–	–	–	–	–	–	–	0
Area 5: Ashland (Doswell to I-295)	5A	–	–	–	–	–	–	–	–	–	–	–	–	0
	5A–Ashcake	–	–	–	–	–	–	–	–	–	–	–	–	0
	5B	–	–	–	–	–	–	–	–	–	–	–	–	0
	5B–Ashcake	–	–	–	–	–	–	–	–	–	–	–	–	0
	5C	–	–	–	–	–	–	–	–	–	–	–	–	21
	5C–Ashcake	–	–	–	–	–	–	–	–	–	–	–	–	21
	5D–Ashcake	–	–	–	–	–	–	–	–	–	–	–	–	0
Area 6: Richmond (I-295 to Centralia)	6A	–	–	–	–	–	–	–	–	–	7	5	0	12
	6B–A-Line	–	–	–	–	–	–	–	–	–	7	5	0	12
	6B–S-Line	–	–	–	–	–	–	–	–	–	7	0	0	7
	6C	–	–	–	–	–	–	–	–	–	7	105	0	112
	6D	–	–	–	–	–	–	–	–	–	7	0	0	7
	6E	–	–	–	–	–	–	–	–	–	7	5	0	12
	6F	–	–	–	–	–	–	–	–	–	7	0	0	7
	6G	–	–	–	–	–	–	–	–	–	7	0	0	7

The acquisition of right-of-way and the relocation of displacees would be in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, as amended. Assurance is given that relocation resources would be available to all residential, business, farm, and nonprofit displacees without discrimination.

4.11.5 Land Use Planning

4.11.5.1 Changes in Land Use

The No Build Alternative requires no right-of-way acquisition; therefore, it requires no land use conversion and has no direct impacts to land use.

The Build Alternatives require different amounts of right-of-way acquisition (Table 4.11-3). The transition of these land uses to transportation use is a direct effect, but it is an extension of the existing adjacent transportation land use and is not out of character with the area.

In Alternative Area 1 (Arlington), the only land use in transition to a transportation use is currently vacant. The transition of this land to a transportation use would not be incompatible with the current use.

In Alternative Area 2 (Northern Virginia), the greatest amount of land use transition to a transportation use is from residential uses. The transition of residential use to a transportation use would be incompatible; however, it is an extension of the existing adjacent transportation land use and is not out of character with the area.

In Alternative Area 3 (Fredericksburg), Build Alternatives 3A and 3B pass through town and involve transition from commercial/office and residential uses to a transportation land use. This conversion is not incompatible with the current land use. The Fredericksburg Bypass (Build Alternative 3C) bypasses the City of Fredericksburg to the east. It begins in Stafford County and is along the Dahlgren Spur, an existing rail line that is surrounded by commercial land uses at the junction with the main rail line. At Ferry Farm, the land use along Build Alternative 3C transitions to residential uses, and then rural residential and rural uses, with some commercial uses near the former Renaissance Faire. Build Alternative 3C turns south and crosses the Rappahannock River at the Spotsylvania County/Caroline County line. The land use in both counties along this alternative is predominantly agricultural, forested, and rural residential. Stafford County comprehensive planning is focusing growth within the urban service areas and does not recommend "increasing land use intensity" in other areas (Stafford County, 2014). Build Alternative 3C is not in one of the urban service areas. The Caroline County comprehensive plan states that agricultural and forested uses are "the primary land uses to be protected" (Caroline County, 2010). The Spotsylvania County comprehensive plan fosters "the preservation of agricultural and forestal land" and states that "the primary goal of the Future Land Use Element in the rural portion of the County is the preservation of farms, forestland, and open space" (Spotsylvania County, 2013). Based on the current land use planning within these counties, conversion of the existing land uses along Build Alternative 3C to a transportation land use is not compatible with the adjacent land uses.

In Alternative Area 4 (Central Virginia), the greatest amount of land use transitioning to transportation use is currently in agricultural use. The transition of this land to a transportation use would be incompatible with the current use.

Table 4.11-3: Land Use Acreage within Build Alternatives

Alternative Area	Alternative	Agricultural	Commercial/Office	Industrial	Institutional	Transportation	Preserved Open Space	Residential	Vacant
Area 1: Arlington (Long Bridge Approach)	1A	–	–	–	–	–	–	–	0
	1B	–	–	–	–	–	–	–	1.5
	1C	–	–	–	–	–	–	–	0.4
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	4.3	1.9	0.63	1.96	–	10.2	12.1	0.1
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	0.2	0.3	–	1.9	–	0.05	0.4	–
	3B	0.2	10.7	–	2.0	–	3.4	12.6	–
	3C	66.4	22.0	–	1.9	–	5.6	75.2	–
Area 4: Central Virginia (Crossroads to Doswell)	4A	0.9	0.1	–	0.1	0.3	–	0.1	–
Area 5: Ashland (Doswell to I-295)	5A	4.2	0.5	2.7	0.5	11.2	–	3.6	–
	5A–Ashcake	4.2	–	3.8	–	9.7	–	3.6	–
	5B	4.2	0.5	2.7	2.2	15.2	–	5.5	–
	5B–Ashcake	4.2	0.1	3.8	1.9	15.3	–	5.5	–
	5C	150.8	0.5	6.5	0.5	37.3	–	0.6	–
	5C–Ashcake	150.8	–	7.6	–	35.8	–	0.5	–
	5D–Ashcake	4.2	0.4	3.9	1.4	21.1	–	6.3	–
Area 6: Richmond (I-295 to Centralia)	6A	–	8.5	17.1	0.2	–	0.2	19.5	6.8
	6B–A-Line	–	16.0	25.7	0.2	–	0.2	19.5	7.6
	6B–S-Line	–	8.7	22.5	0.2	–	0.01	4.8	12.7
	6C	–	38.6	18.4	7.1	–	0.4	21.3	7.3
	6D	–	9.5	17.7	0.2	–	0.01	4.6	13.0
	6E	–	9.2	19.9	0.2	–	0.4	19.5	9.4
	6F	–	12.4	23.1	0.2	–	0.01	4.6	14.1
	6G	–	11.8	22.2	0.2	–	0.01	4.6	13.6

Source: City and County Land Use GIS databases.

In Alternative Area 5 (Ashland), the greatest amount of land use transitioning to a transportation use for Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake is from land already in transportation use, such as the additional right-of-way required along Railroad Avenue. The transition of this land to a transportation use would not be incompatible with the current use. The Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) to the west of the Town of Ashland lies completely within Hanover County. The Ashland Bypass alternatives begin north of town and turn southwest and then southeast to return to the main rail line south of Gwathmey. The land use along the bypass alternatives is currently in agricultural use. The Hanover County comprehensive plan states that in the existing agricultural land use category, such as along the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake), “appropriate uses would be farming, forestry, Agricultural Forestal Districts, public or semi-public uses that serve the community,” or rural residential uses. Based on the current land use planning within the county, conversion of existing land uses along the Ashland Bypass to a transportation land use is not compatible with the adjacent land uses. An existing Agricultural/Forestal District, the Stanley District, is also within Build Alternatives 5C and 5C–Ashcake and is adversely affected by those alternatives (see Section 4.3, Agricultural Lands).

In Alternative Area 6 (Richmond), the greatest amount of land use transitioning to transportation use for most of the Build Alternatives is currently in commercial and industrial use. The transition of this land to a transportation use would not be incompatible with the current use. The single-station Broad Street alternative (Build Alternative 6C) involves transition of almost 40 acres of commercial/office land use to a transportation use. This is primarily near the historic Broad Street Station.

4.11.5.2 Compatibility with Future Land Use

Many of the local jurisdictions have directly addressed the importance of rail service, and in some cases this particular Project, to local and regional mobility in their respective comprehensive planning processes. In Alternative Area 1 (Arlington), future land use adjacent to the Build Alternatives is expected to remain in a similar use to current uses.

In Alternative Area 2 (Northern Virginia), in Prince William County, future land use is projected to intensify within the Development Area (where development has already occurred) and remain similar to existing land uses within the Rural Area. The single Build Alternative 2A is compatible with these land uses. Within Stafford County, future land use is expected to stay similar to existing land use, with development intensifying in the Urban Service Areas.

In Alternative Area 3 (Fredericksburg), Build Alternatives 3A and 3B, which pass through Fredericksburg, are compatible with future land uses. In the City of Fredericksburg, future land use is expected to remain similar to existing land use, due to the city’s developed nature. Build Alternatives 3A and 3B are compatible with these land uses. In Spotsylvania and Caroline counties, future land use within Build Alternatives 3A and 3B is expected to remain similar to the existing rural residential and agricultural/forested uses. In both counties, I-95 and the CSXT rail line are acknowledged as important transportation corridors. The Fredericksburg Bypass (Build Alternative 3C) is also compatible with future land uses for those sections along existing rail. The 7.1-mile new alignment portion of this bypass alternative is inconsistent with the future rural land use planned for that area. However, DRPT does not expect Build Alternative 3C to affect future land use outside of the Project right-of-way.,

In Alternative Area 4 (Central Virginia), future land use in Caroline County is discussed in Alternative Area 3. In Hanover County, future land use is projected to remain similar to existing land uses, while providing “orderly growth” (Hanover County, 2012).

In Alternative Area 5 (Ashland), the Build Alternatives, other than the Ashland Bypass (Build Alternative 5C and Build Alternative C–Ashcake), are compatible with future land uses.

In Alternative Area 6 (Richmond), existing land uses surrounding the Build Alternatives are expected to remain similar. The Build Alternatives are compatible with these uses.

4.11.5.3 Compatibility with Multimodal Transportation Planning

Many of the intercity passenger stations along the DC2RVA corridor have direct connections to local and regional transit. Particularly, all intercity passenger rail stations in Northern Virginia share service with VRE. Other stations in Northern Virginia have convenient or direct connection to the WMATA, including Franconia-Springfield, Alexandria, Crystal City, L'Enfant Plaza and Washington Union Station. In Richmond, Main Street Station has multiple local and regional bus services and the planned Broad Street bus rapid transit system. These multimodal connections can help offset vehicular traffic at these stations.

Many of the jurisdictions have recognized the importance of rail and multimodal transportation options within their transportation networks to residents, local businesses, regional connections, and economic vitality. In several of the jurisdictions, improved passenger rail and planning for it is specifically mentioned (Fairfax County, Stafford County, the City of Fredericksburg, Caroline County, the Town of Ashland, the City of Richmond, and Chesterfield County). Within the counties that have existing rail stations, focusing new development, particularly transit-oriented, in these areas is a priority.

Nevertheless, two entities, the Fredericksburg Area Metropolitan Planning Organization (MPO) and the Hanover County Board of Supervisors, have expressed opposition to the Fredericksburg Bypass (Build Alternative 3C) and Ashland Bypass (Build Alternatives 5C and 5C–Ashcake), respectively. Because these alternatives are not supported by specific government-entity resolutions, they are not compatible with planning in these areas.

4.12 TITLE VI AND ENVIRONMENTAL JUSTICE

The environmental justice analysis is based on whether the percentage of minority or low-income populations within a census tract impacted by an alternative is greater than the percentage of minority or low-income populations within that census tract's county. For example, Fairfax County has a minority population of 46.11 percent. If the percentage of minority population in a census tract in Fairfax County is higher than 46.11 percent, the tract has the potential to contain an environmental justice population. Instead of a regional population across the entire corridor, this method provides a more accurate representation of potential environmental justice populations in diverse areas such as the DC2RVA corridor. Data and information from other sources, such as free and reduced school lunch programs and the public involvement process, have also been used to refine the identification of potential environmental justice communities not identified by United States Census data. The number of relocations, changes in community cohesion, relocations of community facilities, changes of access to these facilities, changes in response times for emergency services, and noise and vibration effects are all examined to assess effects. The trigger for an environmental justice effect is defined as "disproportionately high and adverse human health or environmental effects" (EO 12898). These effects are then compared to impacts in those census tracts that do not meet the thresholds for environmental justice populations.

The U.S. DOT definition of Adverse Effects is "the totality of significant individual or cumulative human health or environmental effects, including interrelated social and economic effects, which may include, but are not limited to: bodily impairment, infirmity, illness or death; air, noise, and water pollution and soil contamination; destruction or disruption of man-made or natural resources; destruction or diminution of aesthetic values; destruction or disruption of community cohesion or a community's economic vitality; destruction or disruption of the availability of public and private facilities and services; vibration; adverse employment effects; displacement of persons, businesses, farms, or nonprofit organizations; increased traffic congestion, isolation, exclusion or separation of minority or low-income individuals within a given community or from the broader community; and the denial of, reduction in, or significant delay in the receipt of, benefits of DOT programs, policies, or activities" (U.S. DOT, 5610.2[a]).

The U.S. DOT definition of disproportionately high and adverse effect on minority and low-income populations is an Adverse Effect that:

1. "is predominately borne by a minority population and/or a low-income population, or
2. will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population" (U.S. DOT, 5610.2[a]).

4.12.1 Corridor-Wide Impacts

The No Build Alternative requires no right-of-way acquisition; therefore, it requires no relocations and has no direct adverse impacts to Title VI or environmental justice populations. Under the No Build Alternative, beneficial impacts also would not be realized. Congestion and lack of mobility would continue to affect individuals and communities. These problems also would continue to impact businesses and economic activity along the DC2RVA corridor, which would, in turn, result in additional impacts to individuals and communities.

Under all Build Alternatives, more-frequent and more-reliable intercity passenger rail service in the DC2RVA corridor would provide better access and mobility to all communities and populations, including environmental justice populations. Access to a wider geographic area for educational, medical, and employment opportunities would be improved as well.

4.12.2 Community-Level Impacts

United States Census information and preliminary relocation data was supplemented with information from public involvement activities for this Project and from federal education statistical information, and regional and local agency planning information on communities.

4.12.2.1 Relocations and Displacements

Seven of the Build Alternatives that significantly alter the natural or railroad operating environments on the Fredericksburg Bypass (Build Alternative 3C), Ashland Bypass (Build Alternatives 5C and 5C–Ashcake), or CSXT A-Line in the City of Richmond (Build Alternatives 6A, 6B–A-Line, 6C, and 6E) have the potential to impact six census tracts with low-income and minority populations, out of a total of 10 census tracts with residential relocations (Table 4.12-1 and Figure 4.12-1). Implementation of a Build Alternative would impact communities with environmental justice populations by requiring the acquisition of right-of-way and the displacement of residences. DRPT considers displacements to be adverse effects.

In Alternative Area 3 (Fredericksburg), the Fredericksburg Bypass (Build Alternative 3C) has the potential for disproportionately high and adverse effects on potential environmental justice populations. All 19 residential relocations would occur in census tracts that have low-income populations, and 18 would occur in a census tract with low-income and minority populations. In the latter tract, in Spotsylvania County, the elementary school that students in the area are zoned for, Cedar Forest, is also a Title 1 school based on the high percentage of students that receive free and reduced-price lunches.

In Alternative Area 5 (Ashland), the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) does not have the potential for disproportionately high and adverse effects on potential environmental justice populations. Of the 21 residential relocations, only five would occur in a census tract that has high low-income and minority populations.

In Alternative Area 6 (Richmond), three of the four Build Alternatives that use the A-Line between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, and 6E) would have five residential relocations that occur in census tracts with high minority populations (Table 4.12-1). However, this is not disproportionate since seven potential residential relocations would also occur with these alternatives in census tracts with lower proportions of the population that are low-income or minority. The fourth Build Alternative that uses the A-Line (Build Alternative 6C) would have 112 relocations, 105 of which would be in census tracts with high minority or low-income populations. DRPT has, therefore, determined that Build Alternative 6C has the potential for disproportionately high and adverse effects on potential environmental justice populations. The Build Alternative 6C relocations include a 100-unit apartment building.

The potential impacts to environmental justice populations could be avoided and/or minimized by using a Build Alternative that does not have relocations occurring in a census tract with high percentages of low-income and minority populations.

4.12.2.2 Noise and Vibration

The Build Alternatives were also analyzed to determine any disproportionate and adverse noise and vibration effects to environmental justice populations. The potential noise receptors that were assessed for this analysis were residential receptors and other places for sleeping (Category 2) and were those receptors with moderate and severe impacts. A full discussion of noise impacts appears in Section 4.7, Noise and Vibration.

In Alternative Area 1 (Arlington), there are no affected noise receptors.

In Alternative Area 2 (Northern Virginia), there are more than 700 noise receptors affected by the single Build Alternative 2A. Fifty-five (55) percent of these noise receptors occur in census tracts with a high proportion of minority and low-income populations in the communities of Springfield Forest, Lorton, Colchester, Marumsco Acres, Marumsco Woods, and Leeland. This Build Alternative would not have a disproportionately high and adverse effect on potential environmental justice populations in these communities.

In Alternative Area 3 (Fredericksburg), there are less than 100 noise receptors affected by Build Alternatives 3A and 3B; however, 88 percent of these occur in census tracts with a high proportion of minority and low-income populations. These occur in the communities of Mayfield, Hazel Hill, Patriot Lane, Summit, and Claiborne Crossing. This would be a disproportionately high and adverse effect on potential environmental justice populations in these communities. There are almost 4,000 noise receptors affected by the Fredericksburg Bypass (Build Alternative 3C), primarily due to the addition of freight trains along the new bypass. Forty-five (45) percent of these noise receptors occur in census tracts with a high proportion of minority and low-income populations. The affected receptors occur throughout the entire bypass, not just clustered in one community. This alternative would not have a disproportionate effect on environmental justice populations. Mitigation for these effects could include noise barriers for affected receptors. Additional information regarding noise mitigation is provided in Section 4.7.1.5, Noise Mitigation Measures; however, detailed recommendations for noise mitigation will be developed during the final design process.

Table 4.12-1: Residential Relocations by Environmental Justice Census Tracts

Alternative Area	Alternative	City/County: Prince William County Tract 9001	Stafford County Tract 105.04	Spotsylvania County Tract 202.05	Hanover County Tract 3205	Hanover County Tract 3204	Henrico County Tract 2005.03	Henrico County Tract 2009.06	City of Richmond Tract 402	City of Richmond Tract 706.02	City of Richmond Tract 710.02	Total
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	2	–	–	–	–	–	–	–	–	–	2
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3C	–	1	18	–	–	–	–	–	–	–	19
Area 5: Ashland (Doswell to I-295)	5C	–	–	–	16	5	–	–	–	–	–	21
	5C–Ashcake	–	–	–	16	5	–	–	–	–	–	21
Area 6: Richmond (I-295 to Centralia)	6A	–	–	–	–	–	3	4	0	4	1	12
	6B–A-Line	–	–	–	–	–	3	4	0	4	1	12
	6B–S-Line	–	–	–	–	–	3	4	0	0	0	7
	6C	–	–	–	–	–	3	4	100*	4	1	112
	6D	–	–	–	–	–	3	4	0	0	0	7
	6E	–	–	–	–	–	3	4	0	4	1	12
	6F	–	–	–	–	–	3	4	0	0	0	7
	6G	–	–	–	–	–	3	4	0	0	0	7
% Minorities in City/County		52	33	28	15		44		61			–
% Minorities in Census Tract		42	9	36	7	17	20	25	50	84	83	–
% Low-Income in City/County		6	5	8	5		11		26			–
% Low-Income in Census Tract		5	10	9	2	10	10	6	46	14	21	–

Above 50%; Greater than respective jurisdiction. *This is an apartment building with 100 units.

Build Alternatives 1A, 1B, 1C, 3A, 3B, 4A, 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake, have no residential relocations; therefore, they do not appear in this table.

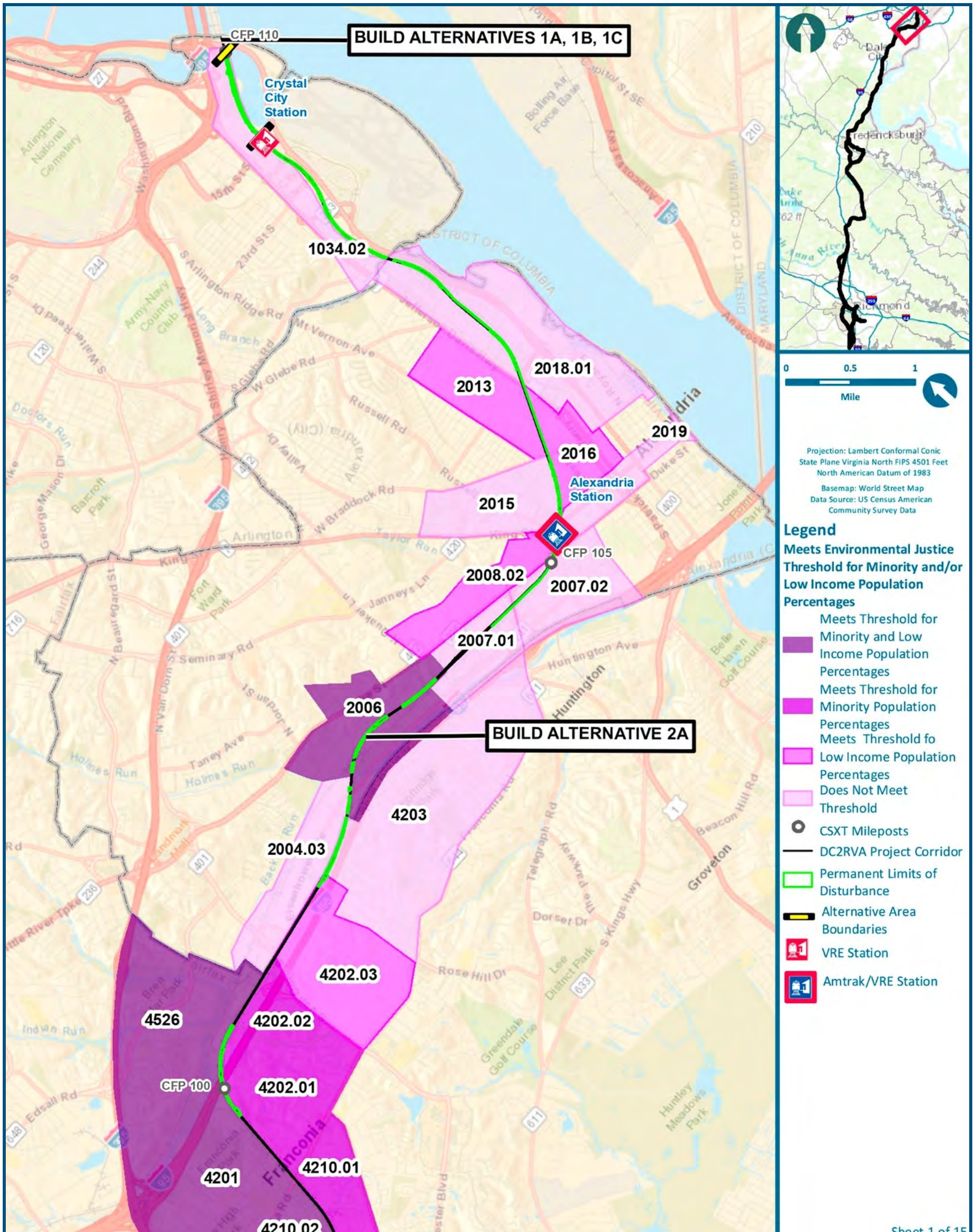


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternatives 1A, 1B, 1C, 2A

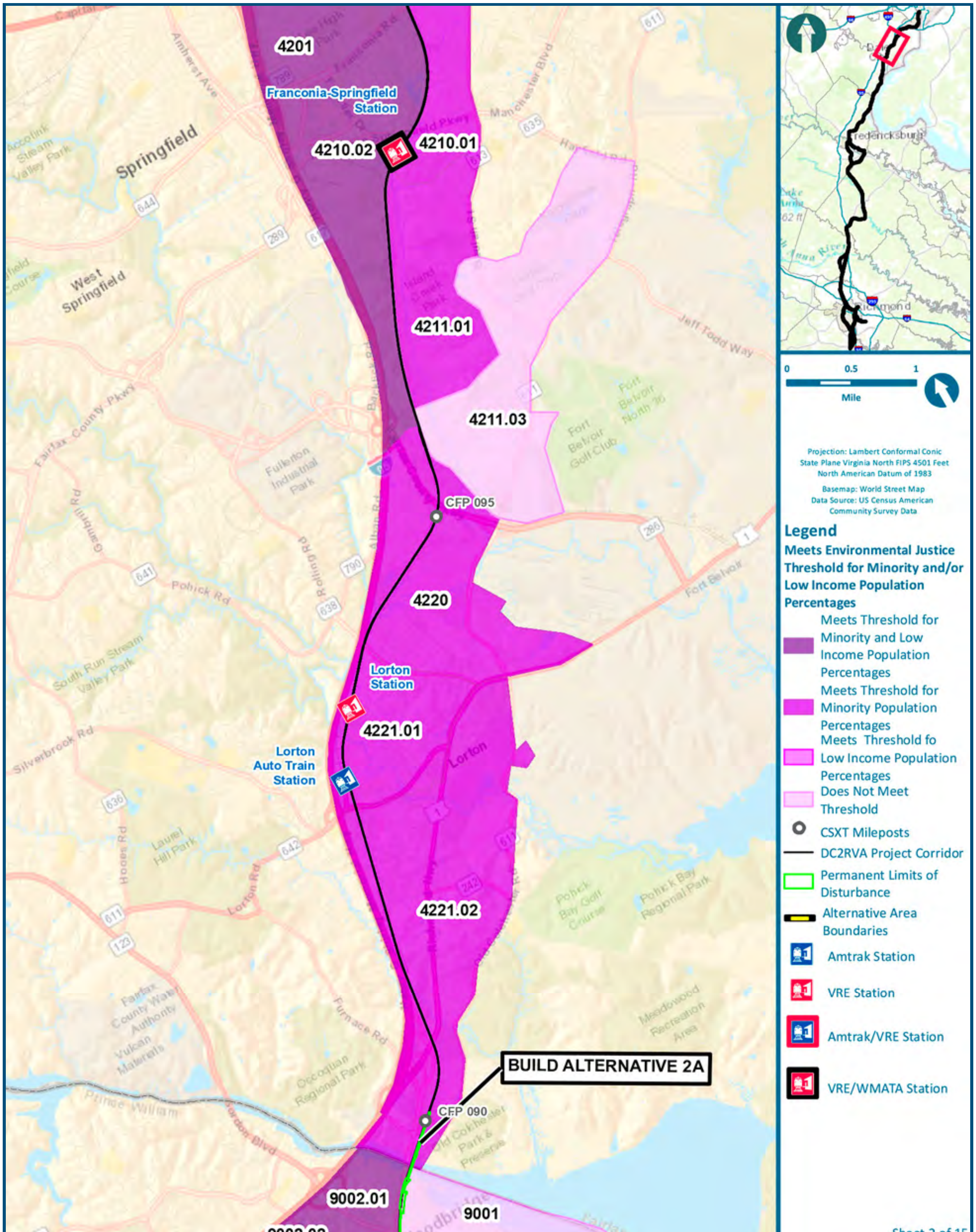


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternative 2A

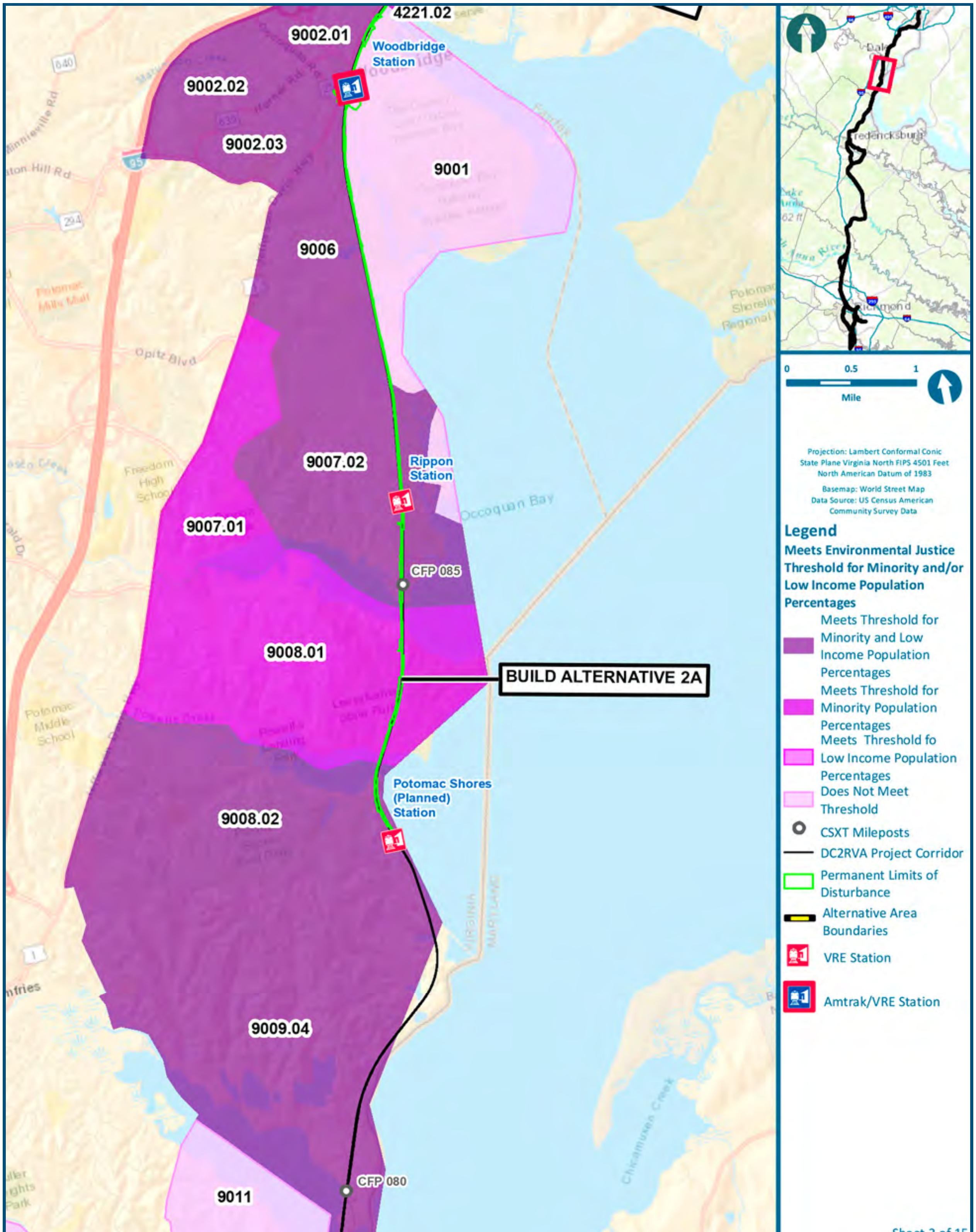


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternative 2A

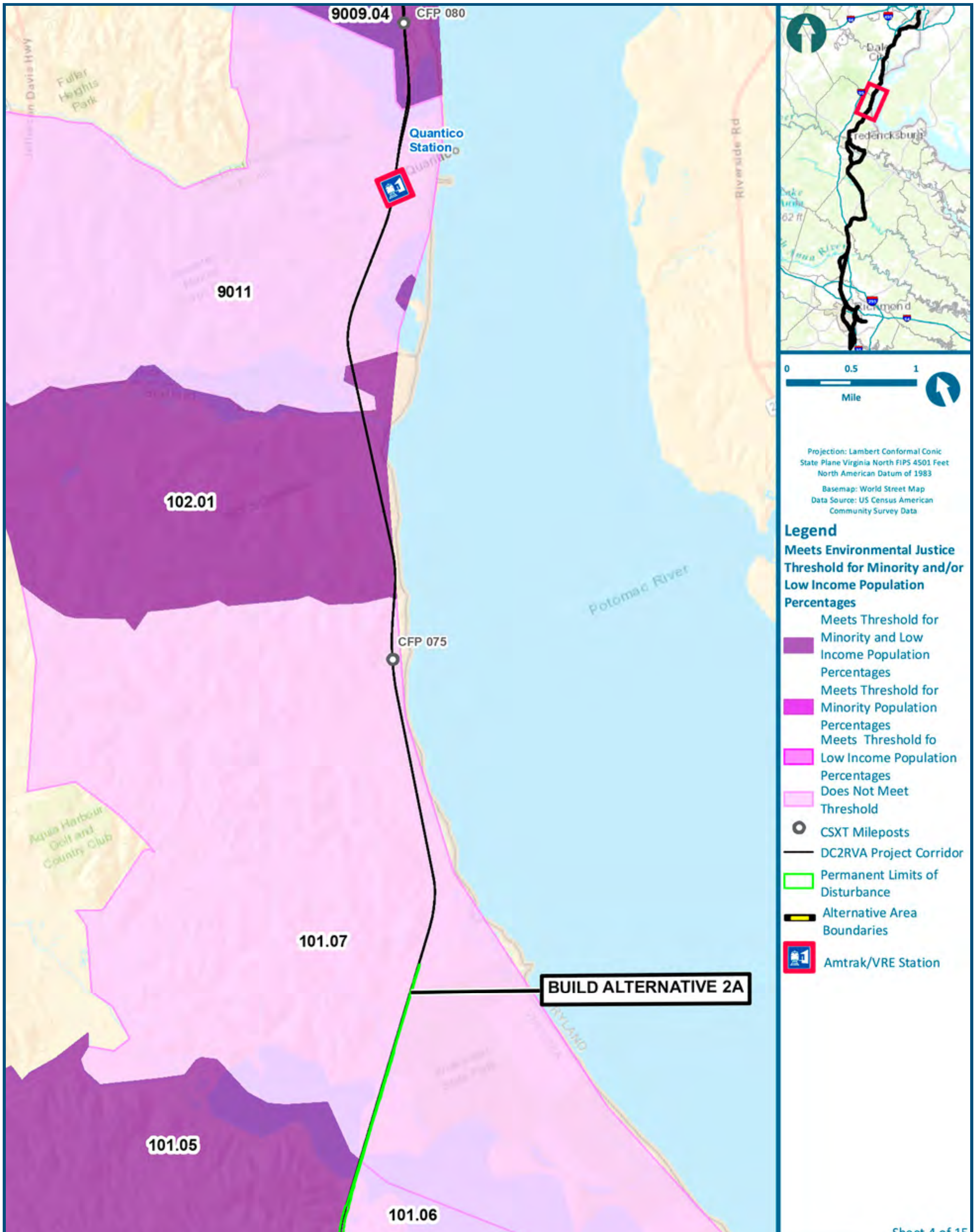


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternative 2A

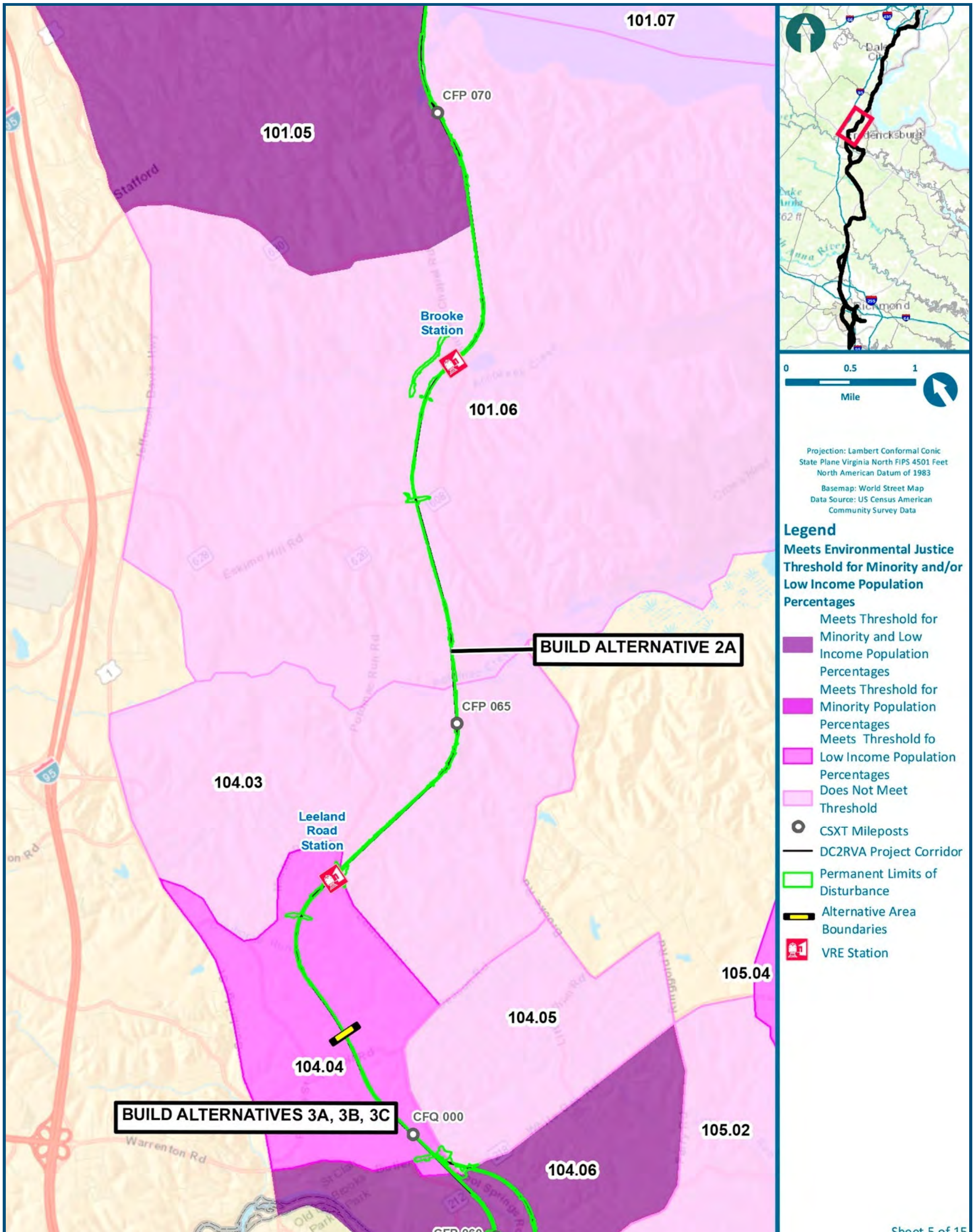


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternatives 2A, 3A, 3B, 3C

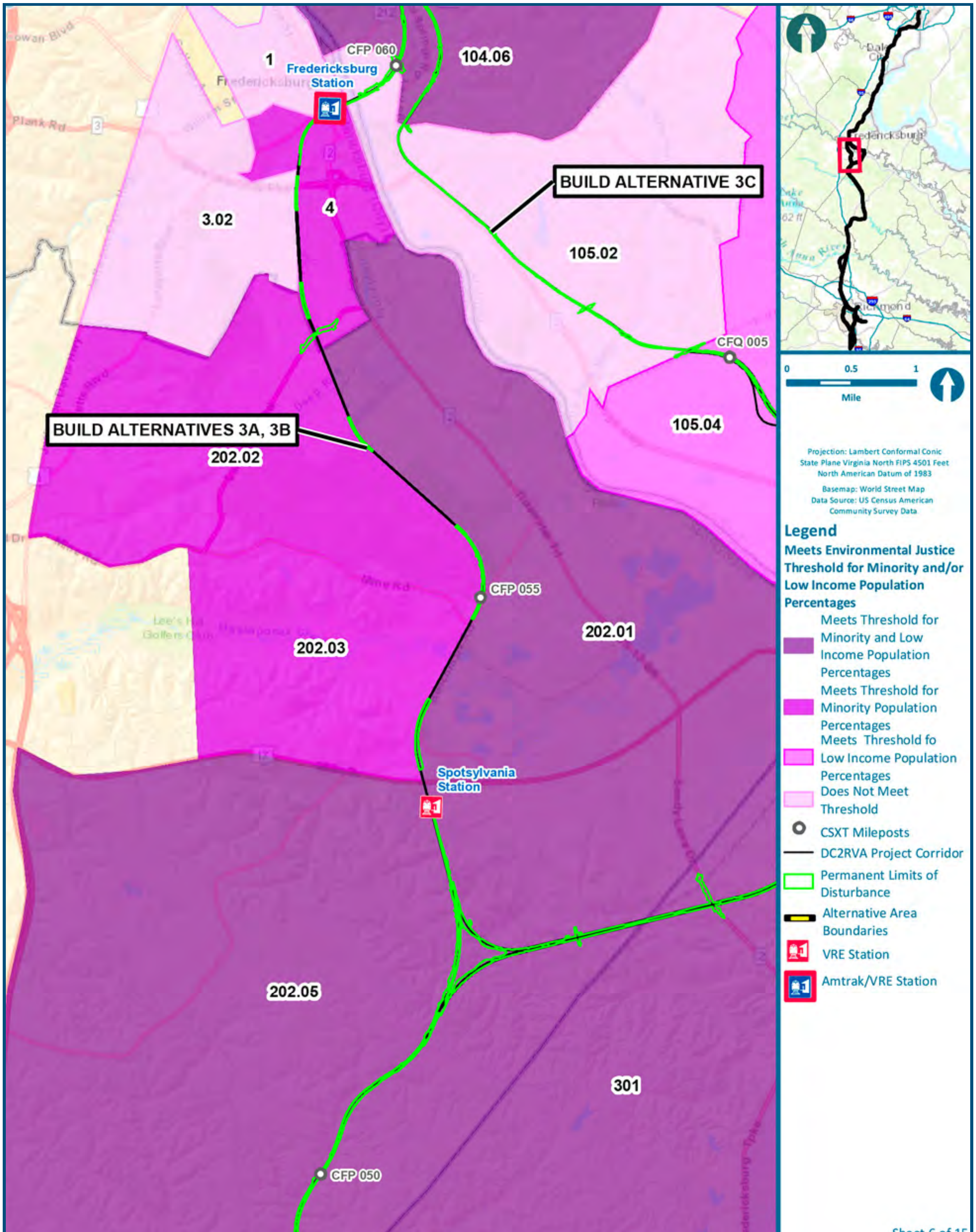


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternatives 3A, 3B, 3C

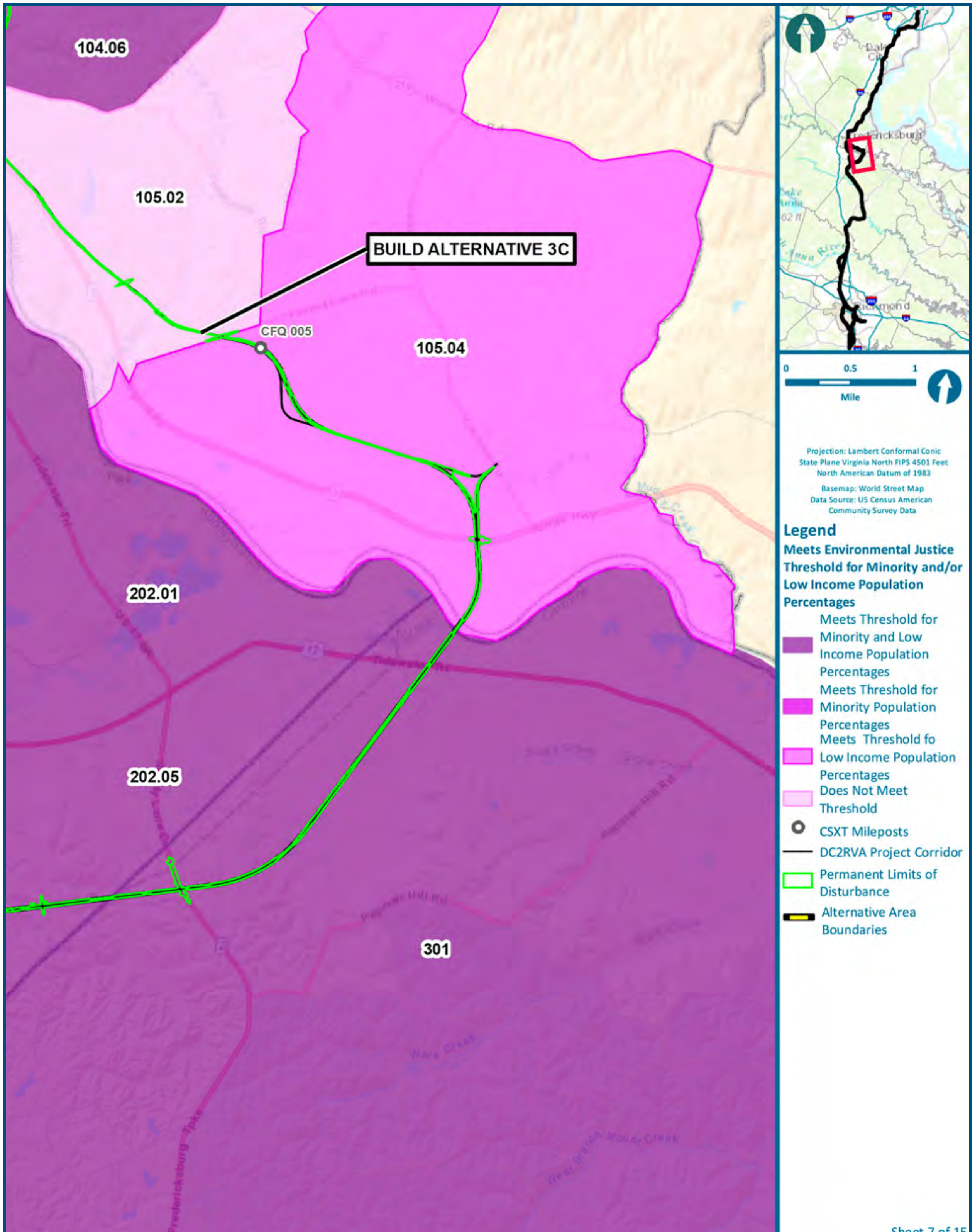


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternative 3C

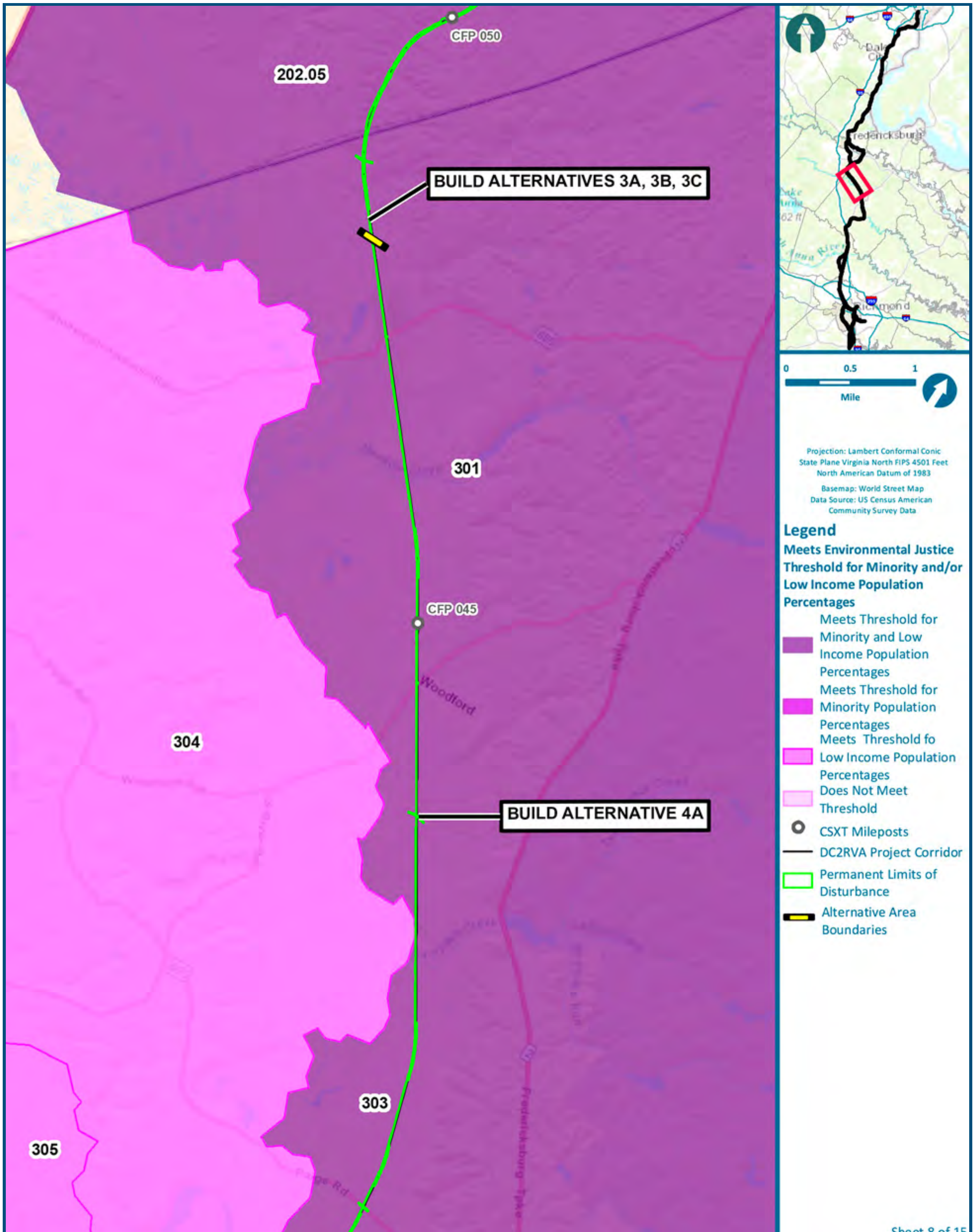


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternatives 3A, 3B, 3C, 4A

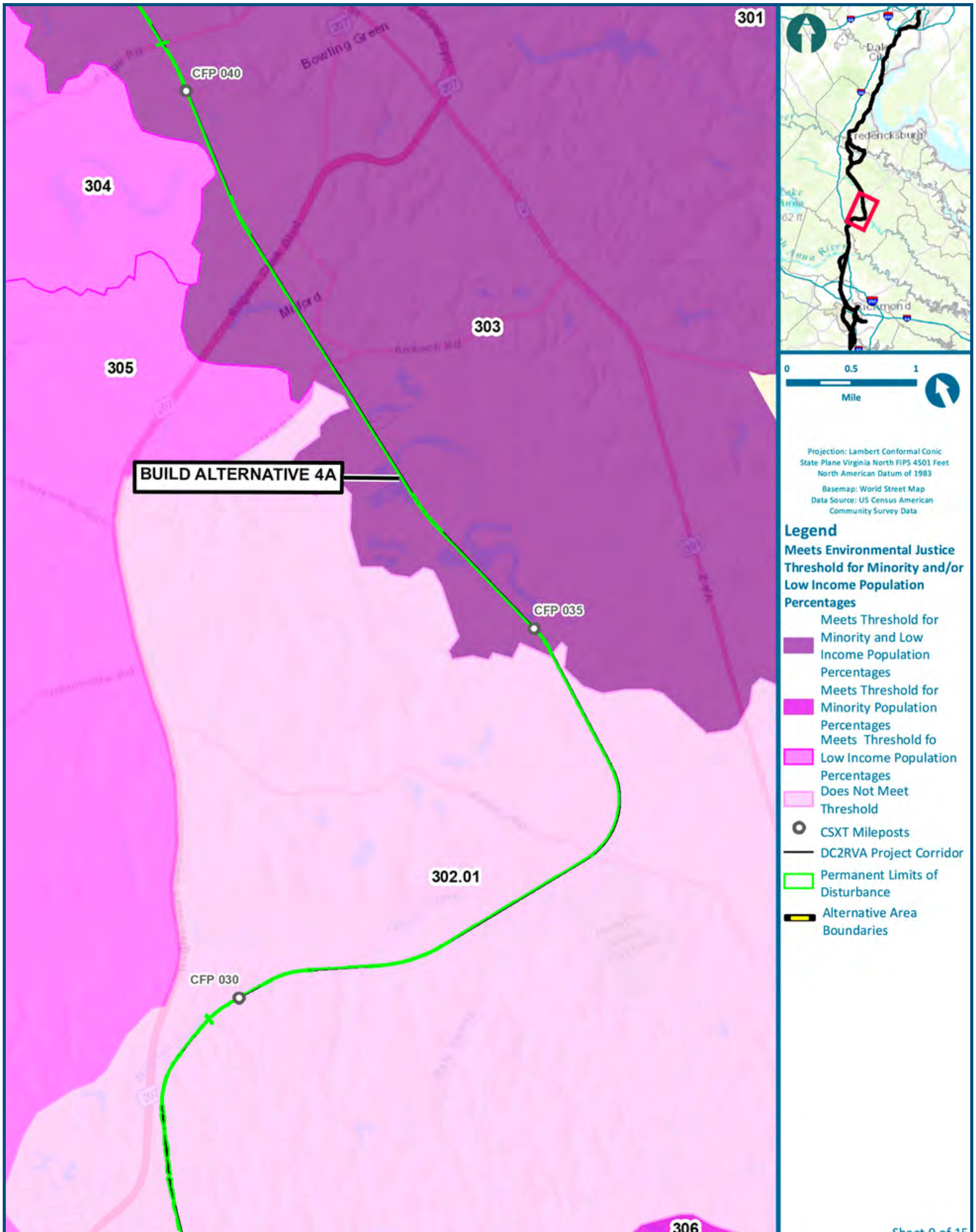


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternative 4A

DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

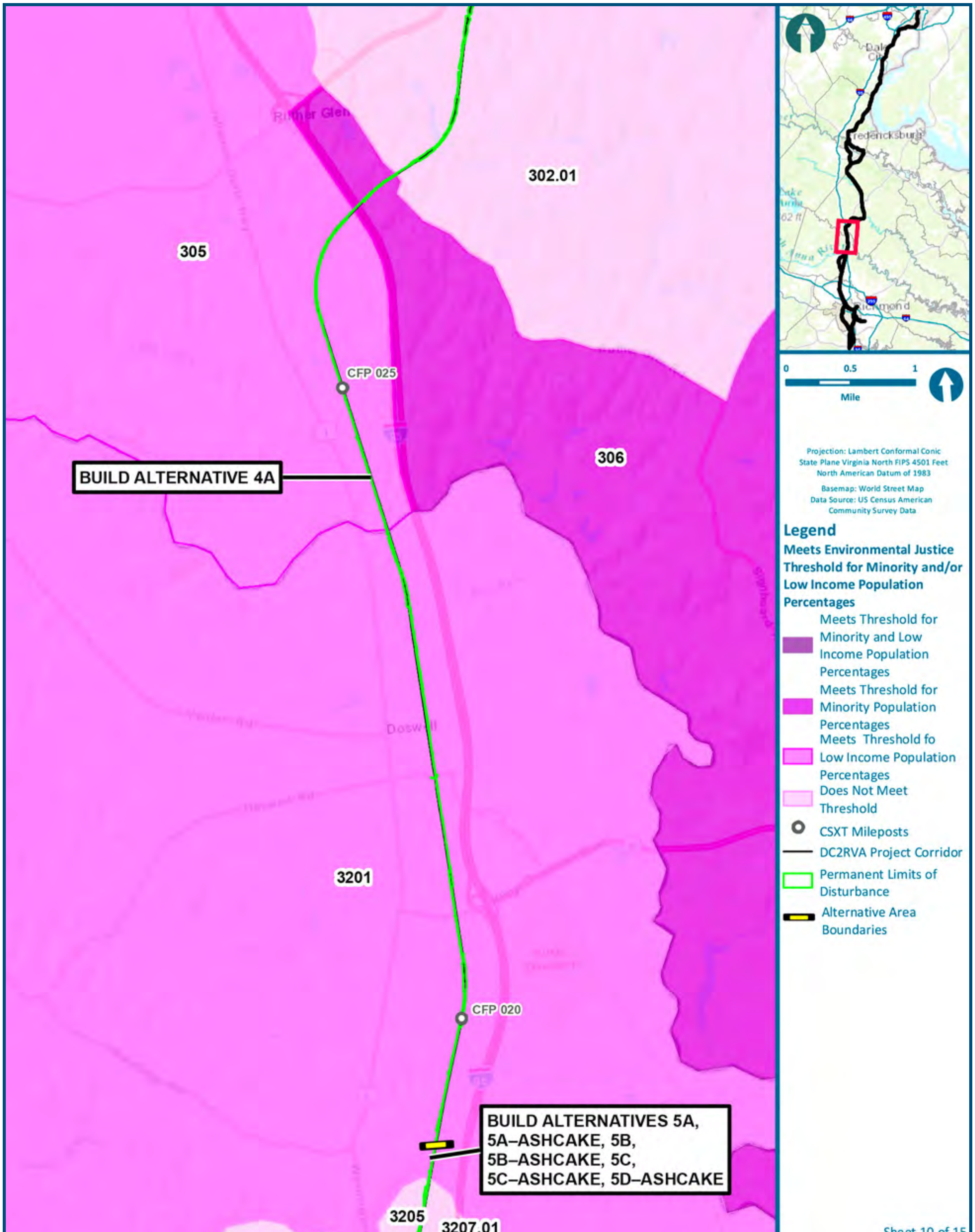


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternatives 4A, 5A, 5A–Ashcake, 5C, 5C–Ashcake, 5D–Ashcake

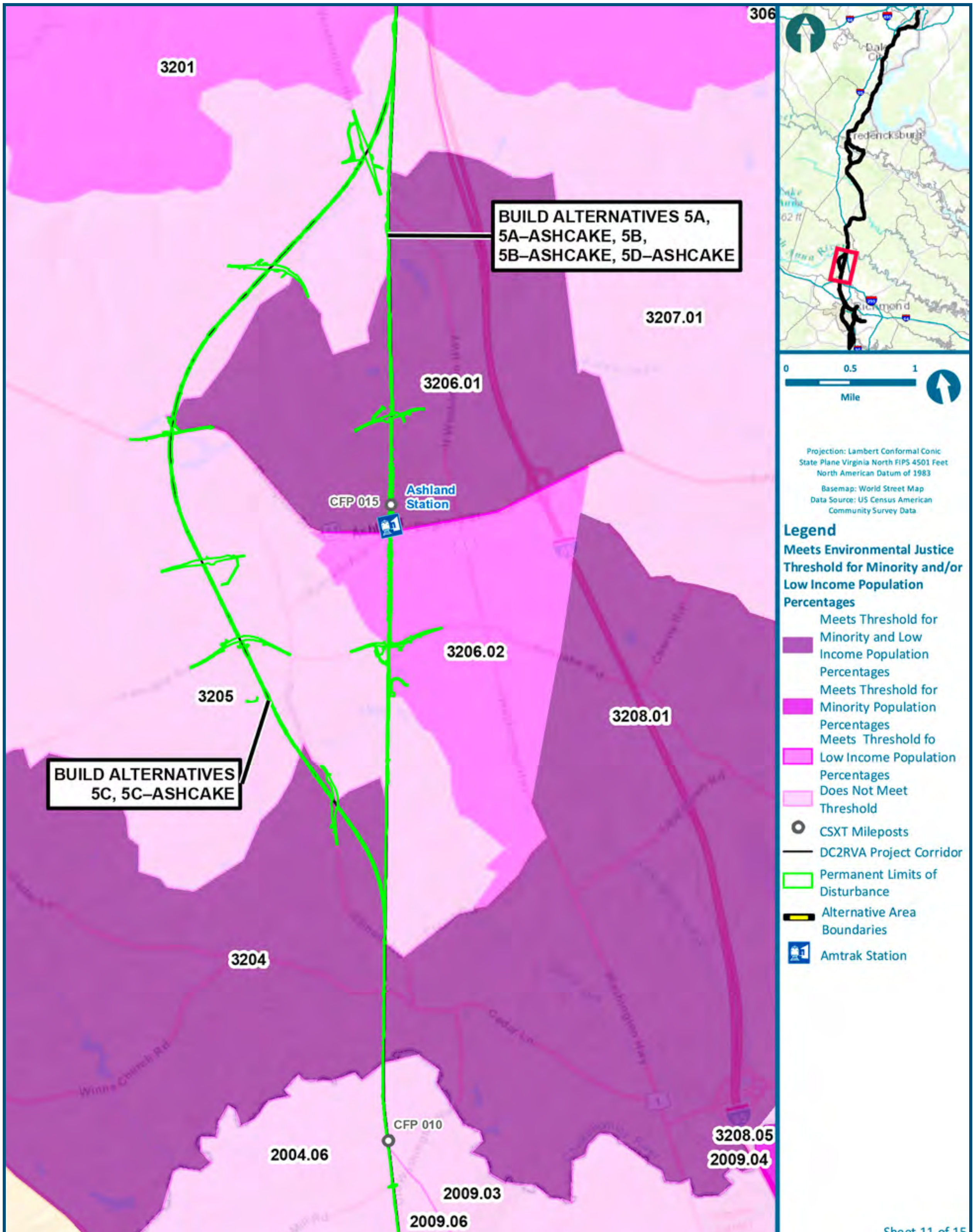


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, 5C, 5C–Ashcake, 5D–Ashcake

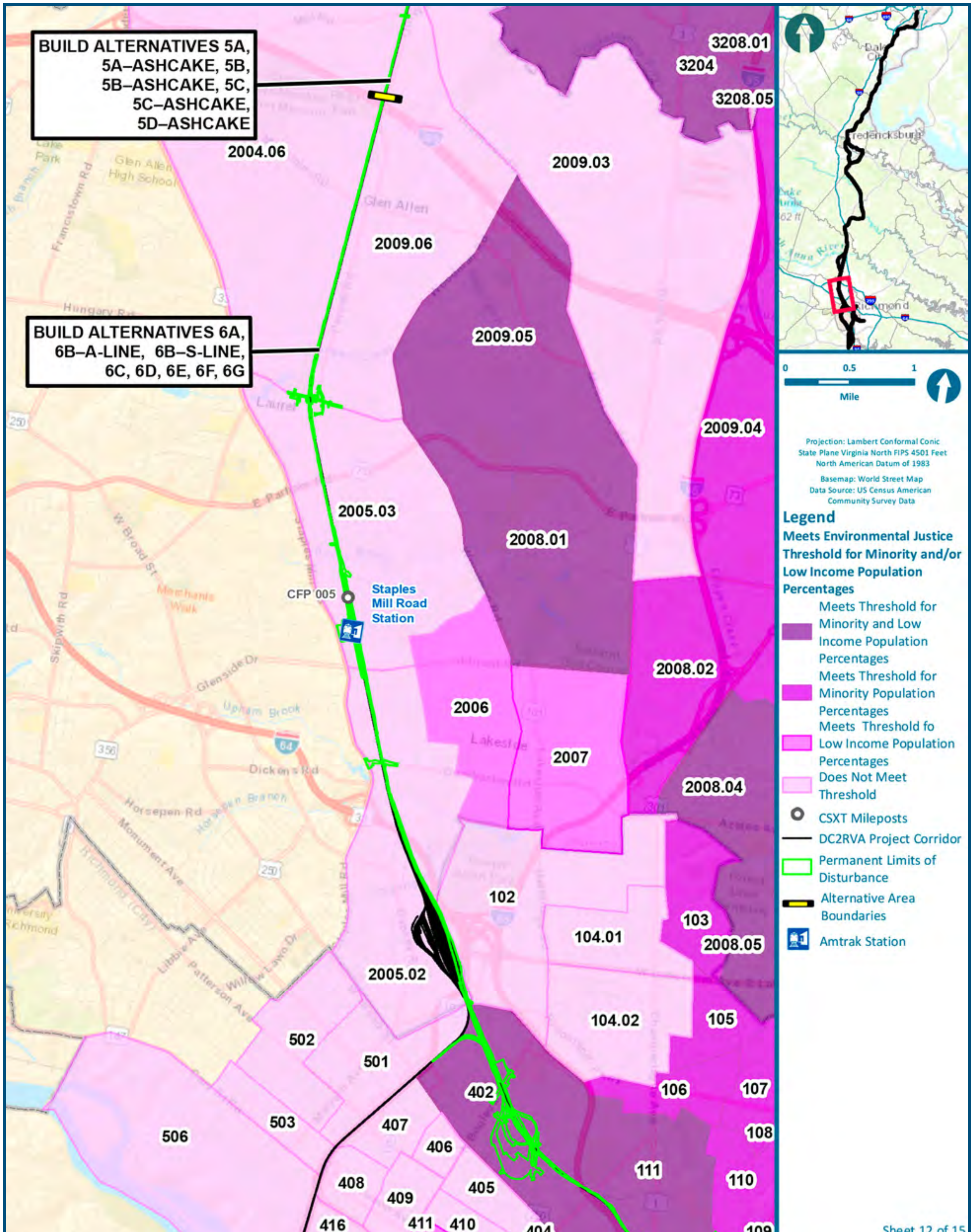


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, 5C, 5C–Ashcake, 5D–Ashcake, 6A, 6B–A-Line, 6B–S-Line, 6C, 6D, 6E, 6F, 6G

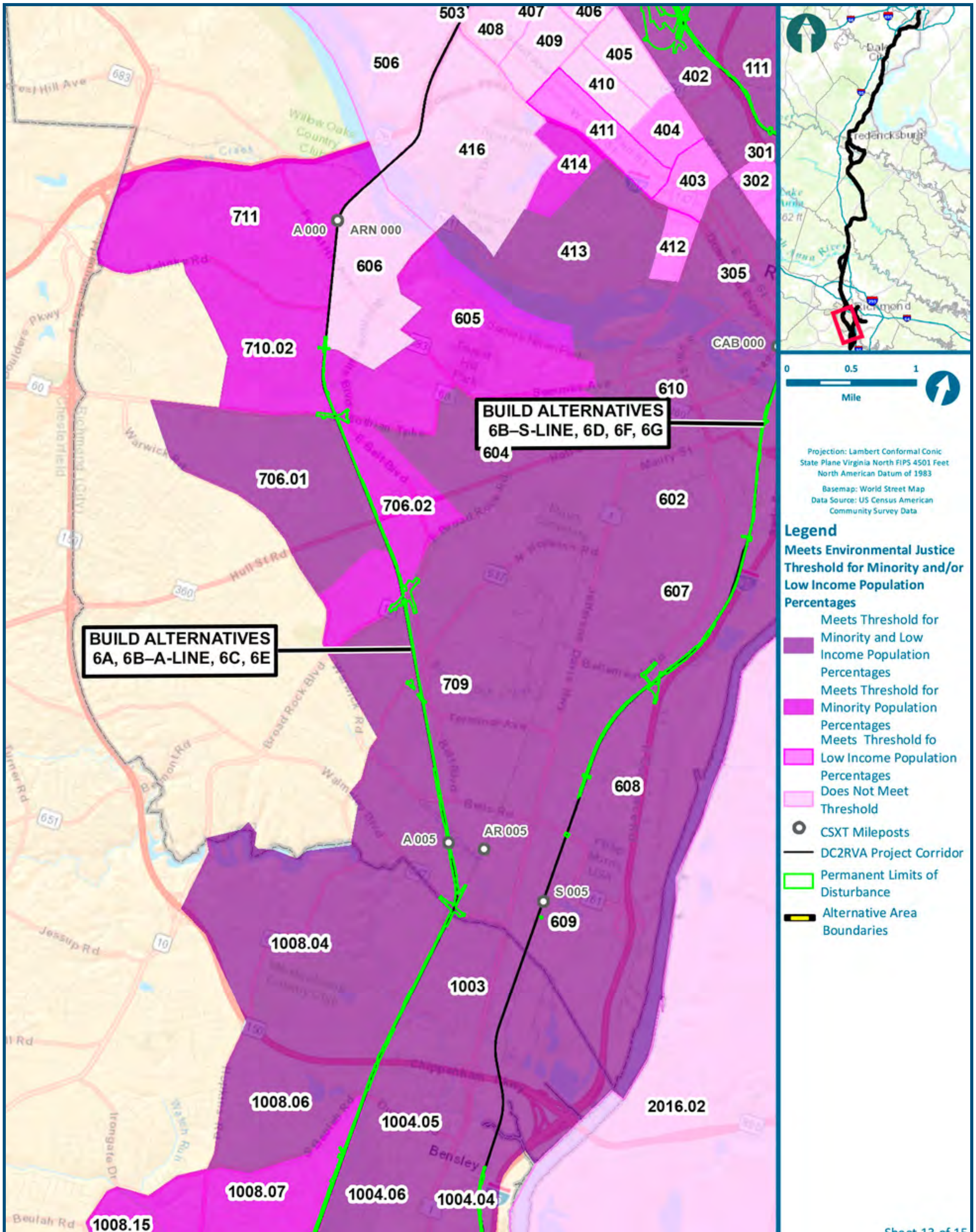


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternatives 6A, 6B–A-Line, 6B–S-Line, 6C, 6D, 6E, 6F, 6G

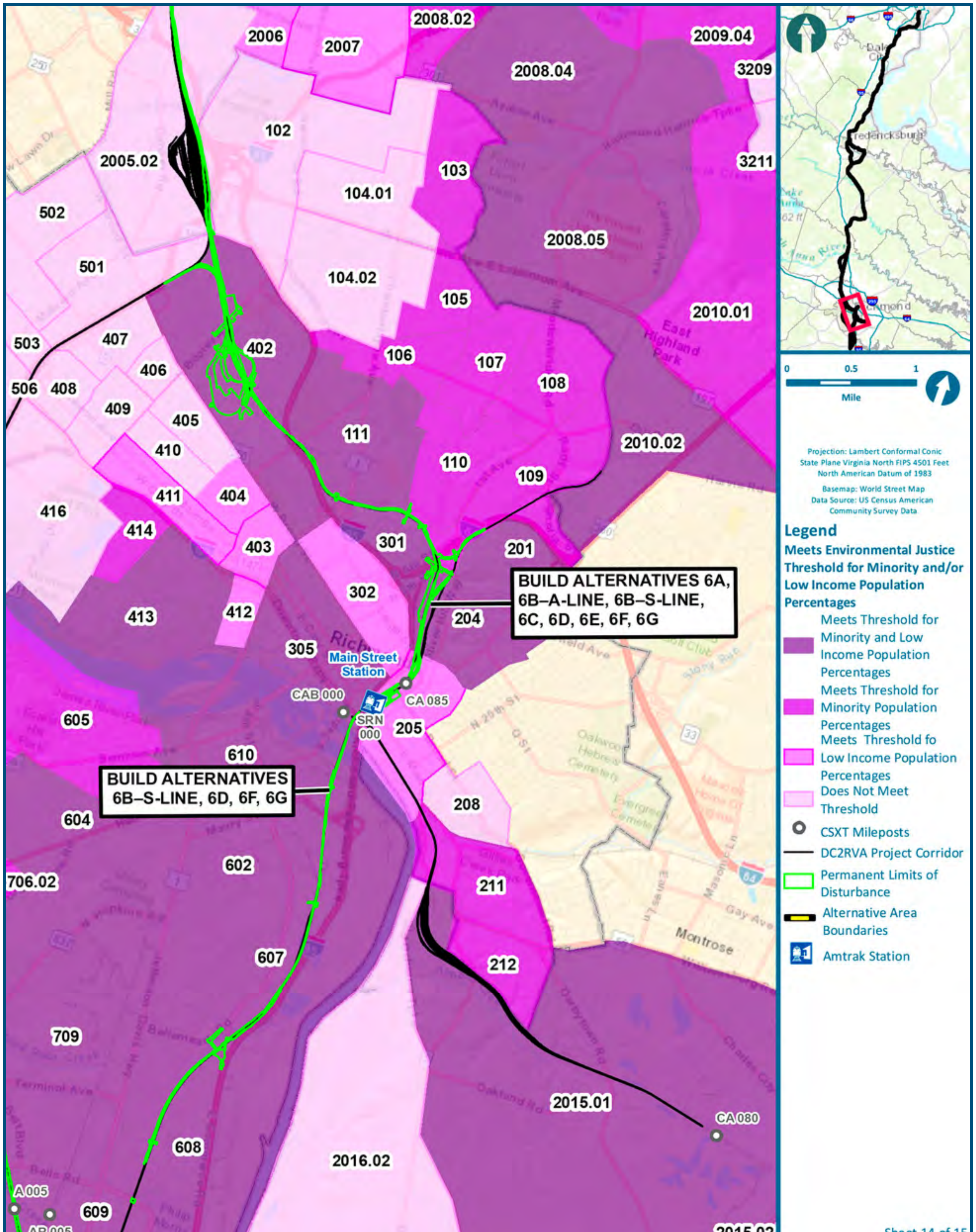


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternatives 6A, 6B–A-Line, 6B–S-Line, 6C, 6D, 6E, 6F, 6G

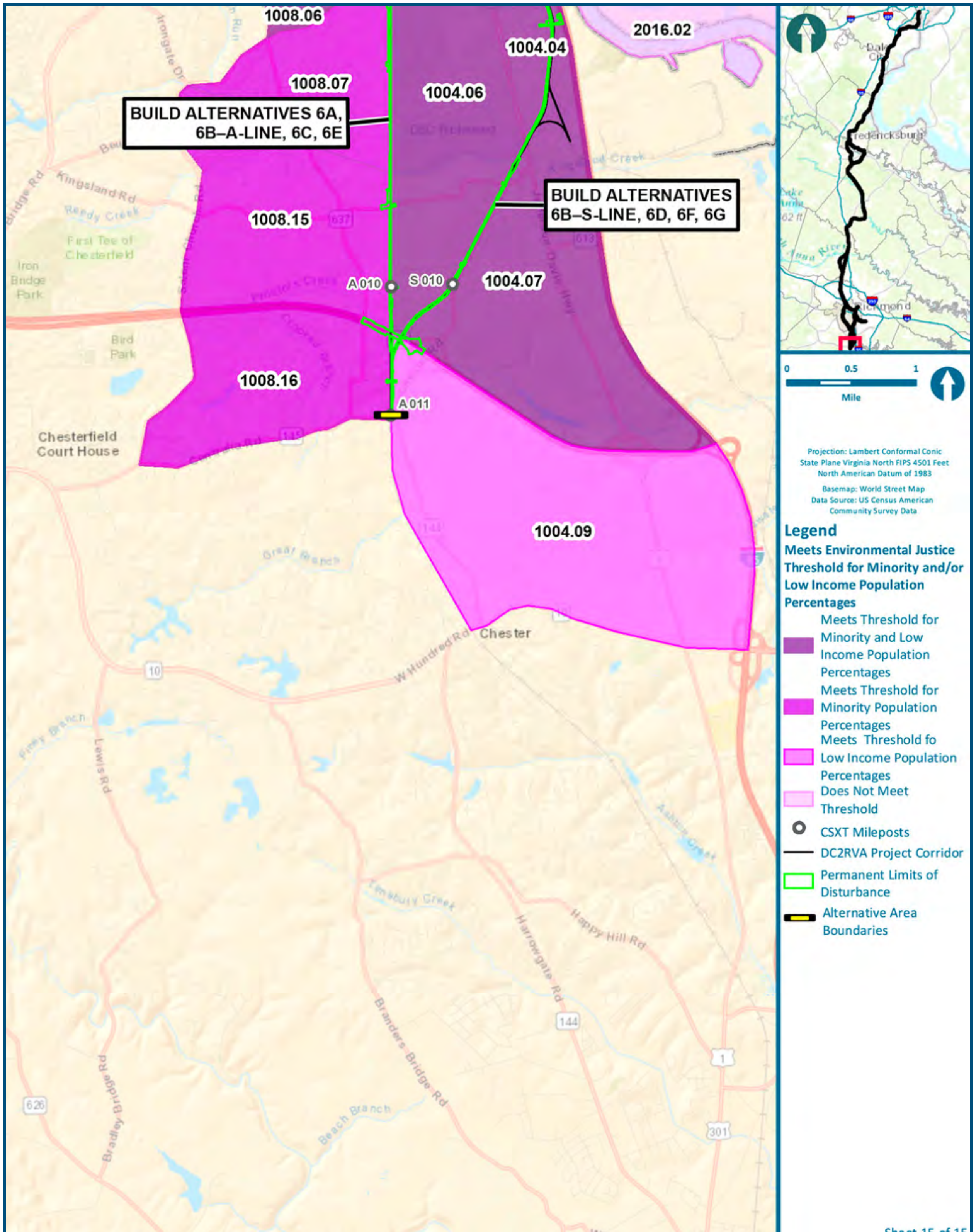


Figure 4.12-1: Environmental Justice Census Tract Impacts – Build Alternatives 6A, 6B–A-Line, 6B–S-Line, 6C, 6D, 6E, 6F, 6G

In Alternative Area 4 (Central Virginia), there are less than 100 noise receptors affected by the single Build Alternative 4A. Seventy-nine (79) percent of these occur in census tracts with a high proportion of minority and low-income populations in the communities of Claiborne, Woodford, Milford, Penola, and Doswell. This would be a disproportionately high and adverse effect on potential environmental justice populations in these communities.

In Alternative Area 5 (Ashland), there are almost 160 noise receptors affected by Build Alternatives that pass through town (Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake); however, 80 percent of these occur in census tracts with a high proportion of minority and low-income populations. These occur in the communities of downtown Ashland, Gwathmey, and Elmont. There are more than 300 noise receptors affected by the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake). Forty-six (46) percent of these occur in census tracts with a high proportion of minority and low-income populations; therefore, the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) would not have a disproportionately high and adverse impact on potential environmental justice populations. The Build Alternatives that pass through town (Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake) would have a disproportionately high and adverse effect on potential environmental justice populations in these communities.

In Alternative Area 6 (Richmond), noise receptors affected by the Build Alternatives range from approximately 310 to 440. The Build Alternatives that use the A-Line between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, 6C, and 6E) affect approximately 400 noise receptors on the A-line; 30 percent of these occur in census tracts with a high proportion of minority and low-income populations in the communities of Cedarhurst, Forest View, Belt Center, and Chimney Corner. Three of the four Build Alternatives that use the S-Line between Main Street Station and Centralia (Build Alternatives 6B–S-Line, 6D, and 6F) affect approximately 440 noise receptors on the S-line; 54 percent of these occur in census tracts with a high proportion of minority and low-income populations in the communities of Newtowne West, Chamberlayne, Gilpin, Davee Gardens, and Bellwood. The fourth Build Alternative that uses the S-Line (Build Alternative 6G) affects approximately 310 noise receptors. Thirty-five (35) percent of these occur in census tracts with a high proportion of minority and low-income populations, and they occur in the communities previously listed for both the A-Line and the S-Line. None of the Build Alternatives in Alternative Area 6 would have a disproportionately high and adverse effect on potential environmental justice populations in these communities.

Additional information on the environmental justice analysis can be found in the *Community Impact Assessment Technical Report* (Appendix Q).

4.13 ARCHAEOLOGICAL AND ABOVEGROUND CULTURAL AND HISTORIC RESOURCES

Section 106 of the *National Historic Preservation Act of 1966,* as amended (54 U.S.C. 306108) (Section 106), and implementing regulations (36 CFR Part 800) require federal agencies to consider the effects of their actions on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) an opportunity to comment if the action would result in an adverse effect on any property listed in or eligible for the NRHP. Eligibility criteria for the NRHP are summarized in Section 3.13. The Section 106 process is summarized below:

- **Initiate Section 106 process–**The responsible federal agency first determines whether it has an undertaking that is a type of activity that could affect historic properties. Historic properties are properties that are included in the NRHP or that meet the criteria for the NRHP. If so, it must identify the appropriate State Historic Preservation Officer/Tribal Historic Preservation Officer (SHPO/THPO) to consult with during the process. It should also plan to involve the public, and identify other potential consulting parties. If it determines that it has no undertaking, or that its undertaking is a type of activity that has no potential to affect historic properties, the agency has no further Section 106 obligations.

- **Identify historic properties–**If the agency's undertaking could affect historic properties, the agency determines the scope of appropriate identification efforts and then proceeds to identify historic properties in the area of potential effects. The agency reviews background information, consults with the SHPO/THPO and others, seeks information from knowledgeable parties, and conducts additional studies as necessary. Districts, sites, buildings, structures, and objects listed in the NRHP are considered; unlisted properties are evaluated against the National Park Service's published criteria, in consultation with the SHPO/THPO and any Indian tribe or Native Hawaiian organization that may attach religious or cultural importance to them.

  If questions arise about the eligibility of a given property, the agency may seek a formal determination of eligibility from the National Park Service. Section 106 review gives equal consideration to properties that have already been included in the NRHP as well as those that have not been so included, but that meet NRHP criteria.

  If the agency finds that no historic properties are present or affected, it provides documentation to the SHPO/THPO and, barring any objection, proceeds with its undertaking.

  If the agency finds that historic properties are present, it proceeds to assess possible adverse effects.

- **Assess adverse effects–**The agency, in consultation with the SHPO/THPO, makes an assessment of adverse effects on the identified historic properties based on criteria found in ACHP's regulations.

  If they agree that there will be no adverse effect, the agency proceeds with the undertaking and any agreed-upon conditions.

  If they find that there is an adverse effect, or if the parties cannot agree and ACHP determines that there is an adverse effect, the agency begins consultation to seek ways to avoid, minimize, or mitigate the adverse effects.

- **Resolve adverse effects–**The agency consults to resolve adverse effects with the SHPO/THPO and others, who may include Indian tribes and Native Hawaiian organizations, local governments, permit or license applicants, and members of the public. ACHP may participate in consultation when there are substantial impacts to important historic properties, when a case presents important questions of policy or interpretation, when there is a potential for procedural problems, or when there are issues of concern to Indian tribes or Native Hawaiian organizations.

  Consultation usually results in a Memorandum of Agreement (MOA), which outlines agreed-upon measures that the agency will take to avoid, minimize, or mitigate the adverse effects. In some cases, the consulting parties may agree that no such measures are possible, but that the adverse effects must be accepted in the public interest.

- **Implementation–**If an MOA is executed, the agency proceeds with its undertaking under the terms of the MOA.
- **Failure to resolve adverse effects–**If consultation proves unproductive, the agency or the SHPO/THPO, or ACHP itself, may terminate consultation. If a SHPO terminates consultation, the agency and ACHP may conclude an MOA without SHPO involvement. However, if a THPO terminates consultation and the undertaking is on or affecting historic properties on tribal lands, ACHP must provide its comments. The agency must submit appropriate documentation to ACHP and request ACHP's written comments. The agency head must take into account ACHP's written comments in deciding how to proceed.
- **Indian Tribes and Native Hawaiian Organizations–**The regulations also place major emphasis on consultation with Indian tribes and Native Hawaiian organizations, in keeping with the 1992 amendments to NHPA. Consultation with an Indian tribe must respect tribal sovereignty and the government-to-government relationship between the Federal Government and Indian tribes. Even if an Indian tribe has not been certified by NPS to have a Tribal Historic Preservation Officer who can act for the SHPO on its lands, it must be consulted about undertakings on or affecting its lands on the same basis and in addition to the SHPO.
- **Public Involvement–**Public involvement is a key ingredient in successful Section 106 consultation, and the views of the public should be solicited and considered throughout the process.

FRA and DRPT initiated the Section 106 process and invited consulting parties, such as the National Park Service (NPS), local historical societies, and property owners, to participate in the Fall of 2014. Table 5.7-1 in Chapter 5 lists the consulting parties for this Project, as well as those who were invited to be a consulting party but did not respond.

DRPT defined an Area of Potential Effect after the Section 106 process was initiated. The Virginia Department of Historic Resources (DHR), the SHPO for the Commonwealth of Virginia, concurred on the Area of Potential Effect in early 2015. DRPT evaluated the resources in the APE and identified 158 historic properties within the Area of Potential Effect (APE): 9 archaeological sites, 135 above ground resources, 3 resources with an above ground and below ground component, and 11 battlefields. See the *Cultural Resources Reports* (Appendix R) for technical reports and mapping related to cultural resource studies and historic properties. DHR has reviewed and commented on these technical reports. After DHR review, FRA and DRPT distributes them to the consulting parties for review and comment. Section 5.7 provides a summary of the Section 106 coordination completed for this Project.

FRA has completed a preliminary evaluation of potential effect of the Project on archaeological and historic architectural resources in accordance with Section 106. According to the criteria for Effect and Adverse Effect developed by ACHP (36 CFR Section 800.5), potential effect is determined based on the following:

- **No Effect–**There would be no effect, neither adverse nor beneficial, on historic properties.

- **No Adverse Effect–**There would be an effect, but the effect would not compromise those characteristics that qualify the property for listing on the NRHP. Archaeological sites may be "adversely affected" when they are threatened with unavoidable physical destruction or damage.
- **Adverse Effect–**There would be an effect that would compromise the physical and/or historic integrity of the resource.

4.13.1 Archaeological Resources

As described in Section 3.13, archaeological studies have been completed along all Project alternatives with the exception of the Fredericksburg and Ashland bypasses and on roadway modification areas. In accordance with 36 CFR 800.4(b)(2), a phased approach for archaeological studies such as this are allowed where alternatives under consideration consist of corridors or large land areas. DHR has agreed with this approach for this Project. Additional Phase I survey will be completed through these unsurveyed areas once a Preferred Alternative is selected. Any ensuing Phase II archaeological evaluation testing will be included as a stipulation in the PA that will be completed as part of the environmental process.

Two (2) NRHP and 10 NRHP-eligible archaeological sites are located in the APE, including 9 archaeological sites and 3 resources that have both an archaeological and an architectural component. One of these sites—Ferry Farm/George Washington's Boyhood Home (44ST0084/089-0016)—is a National Historic Landmark (NHL). FRA's preliminary determinations of effect for archaeological resources in Virginia are listed in Tables 4.13-1 and 4.13-2. Coordination of these determinations is ongoing with DHR and consulting parties. The resources are listed in the order they appear in the study area from north to south. Only the sites with a preliminary determination of an adverse effect on the resource are described below.

Site 44SP0187 comprises a set of cut stone piers that are now located under the waters of the Rappahannock River. They may be associated with earlier railroad structures or nearby mills that are no longer extant. It is eligible under Criteria A and D for its association with the development of Fredericksburg and its information potential. Construction of a new bridge across the Rappahannock River to accommodate a third track for Build Alternative 3B would impact the subsurface archaeological deposits in this area, thus diminishing the data potential of this site. FRA's preliminary determination is that Build Alternative 3B would have an adverse effect to this historic property.

Sites 44HE1098, 44HE1097, and 44HE1095 are all archaeological sites located in downtown Richmond. They are potentially eligible for the NRHP under Criteria A and D for their association with the development of Richmond and their data potential. They were recorded based on the appearance of warehouses and other urban buildings on historic maps in this area. Today, these sites are paved parking lots. Often, parking lot developers truncate once-extant buildings and leave foundations and other deposits in place, sealing them with asphalt. As such, the potential for notable archaeological deposits within these recorded sites is high. Current plans for Build Alternatives 6B–S-Line, 6D, 6F, and 6G include the installation of new piers to support expanded tracks near Main Street Station. The installation of the piers would result in subsurface disturbances within these three recorded archaeological sites. As such, FRA's preliminary determination is that Build Alternatives 6B–S-Line, 6D, 6F, and 6G would have an adverse effect on these three archaeological sites.

Table 4.13-1: Summary of Preliminary Effect Determinations on Archaeological Sites

Alternative Area	Alternative	Potential Effect (Number of Resources		
		Adverse	No Adverse	No Effect
Area 1: Arlington (Long Bridge Approach)	1A	0	0	0
	1B	0	0	0
	1C	0	0	0
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	0	0	0
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	0	0	3
	3B	1	1	1
	3C*	0	1	0
Area 4: Central Virginia (Crossroads to Doswell)	4A	0	0	0
Area 5: Ashland (Doswell to I-295)	5A	0	0	0
	5A–Ashcake	0	0	0
	5B	0	0	0
	5B–Ashcake	0	0	0
	5C*	0	0	0
	5C–Ashcake	0	0	0
	5D–Ashcake	0	0	0
Area 6: Richmond (I-295 to Centralia)	6A	0	5	4
	6B–A-Line	0	5	4
	6B–S-Line	3	4	2
	6C	0	5	4
	6D	3	4	2
	6E	0	7	2
	6F	3	4	2
	6G	3	4	2

* Partial Data; Only Phase IA reconnaissance studies were completed on the bypass options. As such, this count only includes previously recorded resources.

Table 4.13-2: Details of Project Preliminary Effect on Archaeological Sites

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
089-0016/ 44ST0084	Ferry Farm	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
44SP0187	Stone Piers; Bridge or Building	–	–	–	–	No Effect	Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
44SP0468-extension	Earthwork/ Jackson's Earthwork	–	–	–	–	No Effect	No Effect	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
44CF0680	Fort Darling/ Battlefield, Earthworks, Fort	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
44HE1098	Main Street Station Parking Lot/Railroad	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	Adverse	No Adverse	Adverse	No Adverse	Adverse	Adverse
44HE1097	Railroad, Warehouse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	Adverse	No Adverse	Adverse	No Adverse	Adverse	Adverse
44HE1092	Warehouse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
44HE1094	Warehouse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
44HE1095	Storage Facility	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	Adverse	No Adverse	Adverse	No Adverse	Adverse	Adverse
127-6245/ 44CF0724	Williams Bridge Company, Emergency Fleet Corporation Factory, 700 East 4th Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse
020-0063	Falling Creek Ironworks Archaeological Site	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse
020-0022/ 44CF0680	Centralia Earthworks	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse

4.13.2 Historical Resources

One-hundred thirty-eight (138) eligible or listed buildings, districts, structures, and objects are located within the APE of the DC2RVA Project—135 above ground resources and 3 that have an above ground and below ground component. They range from single-family rural dwellings to significant historic districts along the rail corridor. One above ground property is an NHL—Main Street Station in Richmond (127-0172). FRA's preliminary determinations of effect for historic resources in the Project APE are listed in Tables 4.13-3 and 4.13-4. Coordination of these determinations is ongoing with DHR and relevant consulting parties. The resources are listed in the order they appear in the study area from north to south. Only the buildings, districts, structures, and objects with a preliminary determination of an adverse effect on the resource are described below; these historic properties are also shown on Figure 4.13-1.

Table 4.13-3: Summary of Preliminary Effect Determinations on Buildings, Districts, Structures, and Objects

Alternative Area	Alternative	Potential Effect (Number of Resources)		
		Adverse	No Adverse	No Effect
Area 1: Arlington (Long Bridge Approach)	1A	1	2	0
	1B	1	2	0
	1C	1	2	0
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	1	10	4
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	1	0	15
	3B	4	11	1
	3C*	1	5	0
Area 4: Central Virginia (Crossroads to Doswell)	4A	3	12	4
Area 5: Ashland (Doswell to I-295)	5A	0	0	0
	5A–Ashcake	0	3	16
	5B	7	10	2
	5B–Ashcake	7	10	2
	5C*	1	4	2
	5C–Ashcake*	1	4	2
	5D–Ashcake	7	10	2
Area 6: Richmond (I-295 to Centralia)	6A	8	50	11
	6B–A-Line	16	42	11
	6B–S-Line	13	45	11
	6C	16	42	11
	6D	7	52	10
	6E	7	60	2
	6F	7	52	10
	6G	10	57	2

*Partial Data; Only Phase IA reconnaissance studies were completed on the bypass options. As such, this count only includes previously recorded resources.

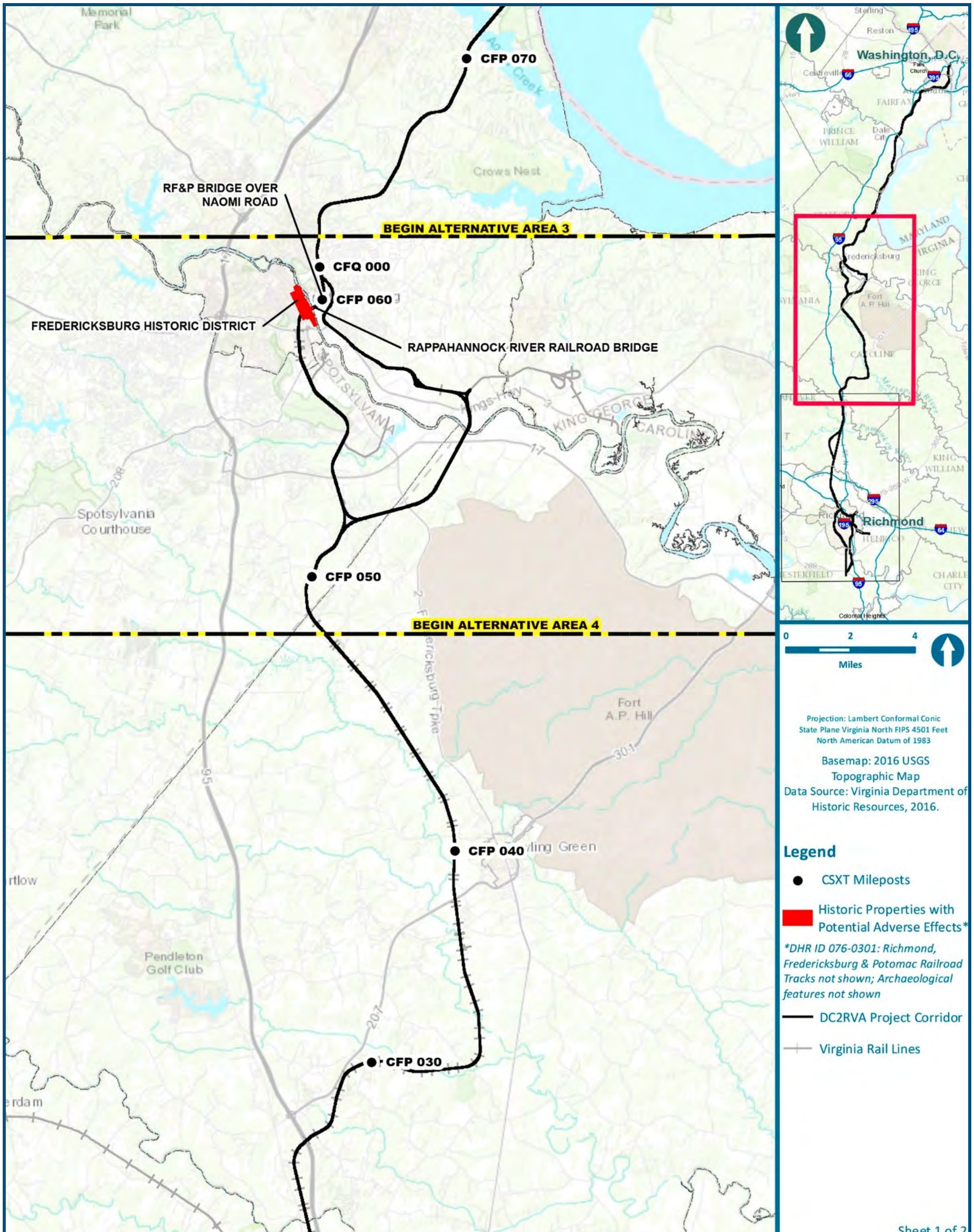


Figure 4.13-1: Historic Properties with Potential Adverse Effects

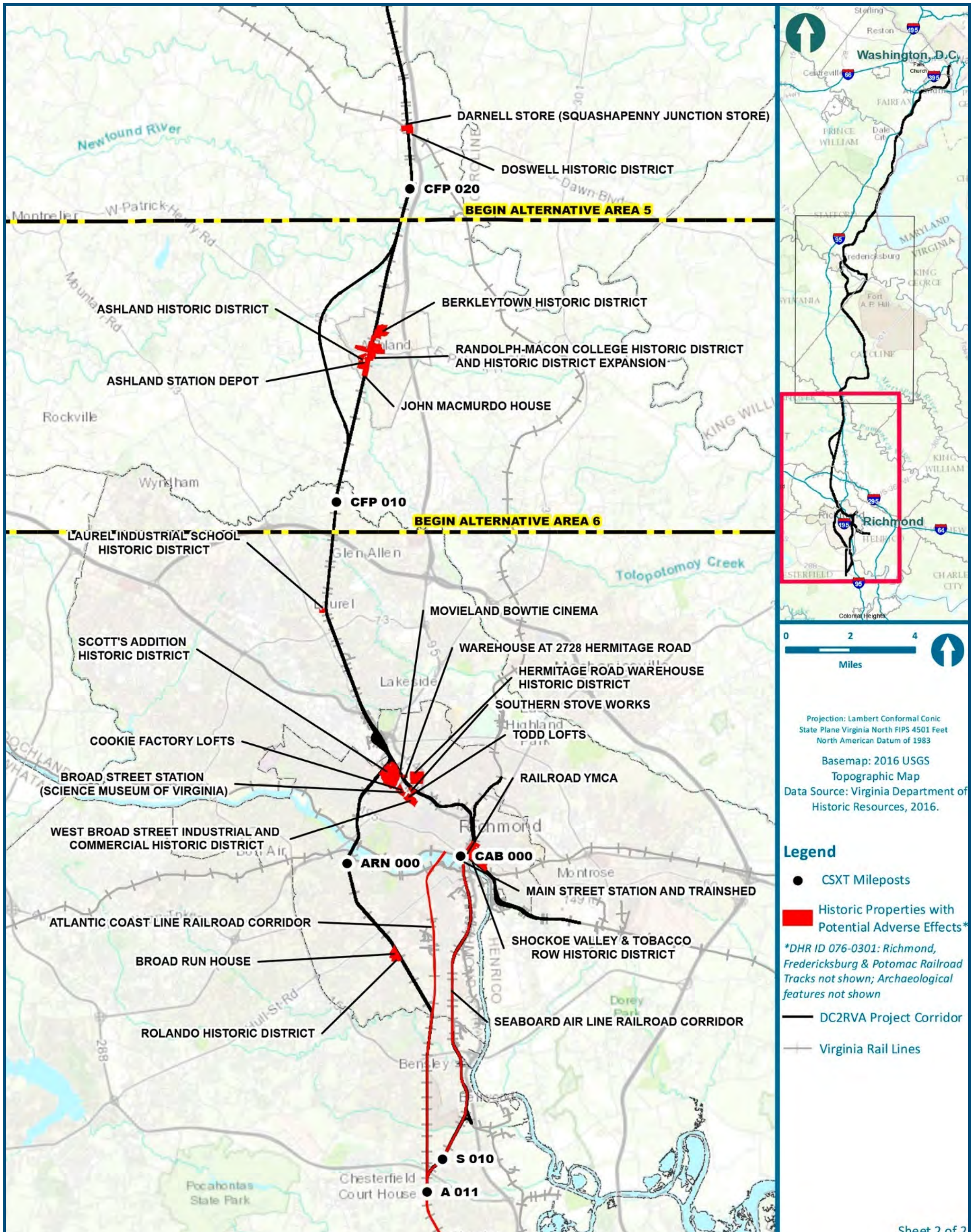


Figure 4.13-1: Historic Properties with Potential Adverse Effects

Table 4.13-4: Details of Project Preliminary Effect on Buildings, Structures, Objects, and Districts

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
029-0218	Mount Vernon Memorial Highway (8.5-mile section of the George Washington Memorial Parkway from Fairfax County to the southern boundary of Alexandria)	No Adverse	No Adverse	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
000-0045	Washington National Airport (Reagan National Airport) (1 Aviation Circle, Arlington)	No Adverse	No Adverse	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0160	George Washington Junior High School, (1005 Mt. Vernon Avenue)	–	–	–	No Effect	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0133	Parker-Gray Historic District/Uptown (northwestern quadrant of Old Town Alexandria)	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0137	Rosemont Historic District (northwest of Old Town Alexandria)	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0124	Alexandria Depot (110 Callahan Drive, Alexandria)	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0128	George Washington National Masonic Memorial (101 Callahan Drive, Alexandria)	–	–	–	No Effect	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0277	Phoenix Mill (3642 Wheeler Avenue, Alexandria)	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TBD	RF&P Bridge over Holmes Run (Cameron Run Park, Alexandria)	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
029-0953	Old Colchester Road, Potomac Path, King's Highway (Occoquan River to Route 1, Fairfax County)	–	–	–	No Effect	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
029-5741	Hannah P. Clark House/Enyedi House (10605 Furnace Road, Fairfax County)	–	–	–	No Effect	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
029-0043	Colchester Arms, Fairfax Arms (10712 Old Colchester Road, Fairfax County)	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TBD	RF&P Bridge over Occoquan River (Occoquan River at Town of Occoquan, Prince William County)	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

▶ *Continued*

Table 4.13-4: Details of Project Preliminary Effect on Buildings, Structures, Objects, and Districts

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
287-0010	Marine Corps Base Quantico, Quantico Marine Corps Base Historic District (East of town of Quantico, Prince William and Stafford counties)	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
287-5147	Town of Quantico, Town of Quantico Historic District (Southern Prince William County, east of Route 1)	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
089-0019	Richland/Richlands (945 Widewater Road, Stafford County)	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
089-0045	RF&P Bridge over Potomac Creek at Leland Road (Leland Road east of Route 1, Stafford County)	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
089-0080	RF&P Bridge over Naomi Road (Naomi Road north of Rappahannock, Stafford County)	–	–	–	–	No Effect	Adverse	—	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0147	Fredericksburg & Spotsylvania Co. Battlefields National Military Park & Cemetery (Lee Drive, Fredericksburg and Spotsylvania County)	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
089-0016/ 44ST0084	Ferry Farm (268 Kings Highway, Stafford County)	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
089-0014	Sherwood Forest (Sherwood Forest Farm Road, Stafford County)	–	–	–	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0132-00 25	Rappahannock River Railroad Bridge (Railroad at Rappahannock River north of Fredericksburg)	–	–	–	–	No Effect	Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0132-0704	Fredericksburg Train Station (200 Lafayette Boulevard, Fredericksburg)	–	–	–	–	No Effect	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0132	Fredericksburg Historic District (downtown Fredericksburg, east of Route 1)	–	–	–	–	Adverse	Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0132-0020	Purina Tower (401 Charles Street, Fredericksburg)	–	–	–	–	No Effect	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

▶ *Continued*

Table 4.13-4: Details of Project Preliminary Effect on Buildings, Structures, Objects, and Districts

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
111-0132-0522	House, 314–316 Frederick Street (314–316 Frederick Street, Fredericksburg)	–	–	–	–	No Effect	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0009-0795	Pulliam's Service Station (411 Lafayette Boulevard, Fredericksburg)	–	–	–	–	No Effect	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0009	Fredericksburg Historic District Extension (west of historic district, Fredericksburg)	–	–	–	–	No Effect	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
088-5364	Fredericksburg & Gordonsville Railroad Bed District (Virginia Central Railroad) (38 miles long; Fredericksburg to Orange)	–	–	–	–	No Effect	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0145	Fredericksburg Gun Manufactory (210 Ferdinand Street, Fredericksburg)	–	–	–	–	No Effect	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
088-0254	Slaughter Pen Farm (11232 Tidewater Trail, Spotsylvania County)	–	–	–	–	No Effect	No Effect	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
088-0039	LaVue (3232 LaVue Lane, Spotsylvania County)	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0092	Fairfield Plantation Office, Jackson Shrine (12019 Stonewall Jackson Road, Caroline County)	–	–	–	–	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0208	House (12096 Guinea Drive, Caroline County)	–	–	–	–	–	–	–	No Effect	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-5165	Excelsior Industry of Caroline County MPD (numerous properties throughout Caroline County)	–	–	–	–	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-5129	Woodford Historic District (central Caroline County)	–	–	–	–	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0223	Woodford Excelsior Company Office (Lake Farm Road, Caroline County)	–	–	–	–	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0222	Woodford Freight & Passenger Depot (Woodford Road, Caroline County)	–	–	–	–	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0224	Glenwood House (11102 Woodford Road, Caroline County)	–	–	–	–	–	–	–	No Effect	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

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Table 4.13-4: Details of Project Preliminary Effect on Buildings, Structures, Objects, and Districts

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
016-0220	Carolina Mansion (11146 Woodford Road, Caroline County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0270	Milford State Bank (15461 Antioch Road, Caroline County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-5136	Milford Historic District (east-central Caroline County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0286	Coleman's Store (22275 Penola Road/16095 Polecat Lane, Caroline County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-5448	Doswell Historic District (northern Hanover County, east of Route 1)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-0470	House/Squashapenny Store (10570 Doswell Road, Hanover County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-0469	Tri-County Bank, Doswell Branch (part of Squashapenny Antiques) (10561 Doswell Road, Hanover County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-0093	Doswell Depot and Tower (10577 Doswell Road, Hanover County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-5307	Taylorsville Road Historic District (southern Hanover County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TBD	RF&P Bridge over Little River (Little River at RF&P, Hanover County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-0836	Earthworks, Little River (south side of Little River, Hanover County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-0557	Dry Bridge (10411 Old Bridge Road, Hanover County)	–	–	–	–	–	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	No Adverse	–	–	–	–	–	–	–	–
042-0392	Montevideo (Hanover County west of Route 1, north of Ashland)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
166-5073	Berkleytown Historic District (north of Ashland, Hanover County)	–	–	–	–	–	–	–	–	–	No Effect	Adverse	Adverse	–	–	Adverse	–	–	–	–	–	–	–	–
166-5073-0010	House, Dabney Funeral Home (600 B Street, Ashland)	–	–	–	–	–	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	No Adverse	–	–	–	–	–	–	–	–
166-0001	Ashland Historic District (downtown Ashland west of I-95)	–	–	–	–	–	–	–	–	–	No Adverse	Adverse	Adverse	–	–	Adverse	–	–	–	–	–	–	–	–

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Table 4.13-4: Details of Project Preliminary Effect on Buildings, Structures, Objects, and Districts

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
166-0001-0015	Business Office, Randolph-Macon (310 N. Center Street, Ashland)	–	–	–	–	–	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	No Adverse	–	–	–	–	–	–	–	–
166-5072	Randolph-Macon College Historic District Expansion (east of original district, Ashland)	–	–	–	–	–	–	–	–	–	No Effect	Adverse	Adverse	–	–	Adverse	–	–	–	–	–	–	–	–
166-0002	Randolph-Macon College Historic District (east of RF&P, Ashland)	–	–	–	–	–	–	–	–	–	No Effect	Adverse	Adverse	–	–	Adverse	–	–	–	–	–	–	–	–
166-0001-0008	Ashland Station Depot (112 N. Railroad Avenue, Ashland)	–	–	–	–	–	–	–	–	–	No Adverse	Adverse	Adverse	–	–	Adverse	–	–	–	–	–	–	–	–
166-5041	Priddy House (107 Stebbins Street, Ashland)	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Effect	–	–	No Effect	–	–	–	–	–	–	–	–
166-0001-0055	House (704 S. Center Street, Ashland)	–	–	–	–	–	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	No Adverse	–	–	–	–	–	–	–	–
166-0001-0060	House (708 S. Center Street, Ashland)	–	–	–	–	–	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	No Adverse	–	–	–	–	–	–	–	–
166-0036	MacMurdo House (713 S. Center Street, Ashland)	–	–	–	–	–	–	–	–	–	No Effect	Adverse	Adverse	–	–	Adverse	–	–	–	–	–	–	–	–
166-0037	Hugo House (11208 Gwathmey Church Road, Ashland)	–	–	–	–	–	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	No Adverse	–	–	–	–	–	–	–	–
166-0001-0077	House (1005 S. Center Street, Ashland)	–	–	–	–	–	–	–	–	–	No Effect	No Adverse	No Adverse	–	–	No Adverse	–	–	–	–	–	–	–	–
042-5048	Elmont Historic District (southern Hanover County)	–	–	–	–	–	–	–	–	–	No Effect	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	–	–	–	–	–	–	–	–
043-0693	Mill Road Historic District (northern Henrico County)	–	–	–	–	–	–	–	–	–	No Effect	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	–	–	–	–	–	–	–	–
043-0694	Hunton Treasures (11701 Greenwood Road, Henrico County)	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	–	–	–	–	–	–	–	–
043-5646	House (11501 Old Washington Highway, Henrico County)	–	–	–	–	–	–	–	–	–	No Effect	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	–	–	–	–	–	–	–	–
043-5657	Darling Smokestack (Old Washington Highway, Henrico County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
043-0690	Lewis-McLeod House (2945 Mountain Road, Henrico County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
043-0292	Laurel Industrial School Historic District (Hungary Road, Henrico County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse

► *Continued*

Table 4.13-4: Details of Project Preliminary Effect on Buildings, Structures, Objects, and Districts

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
043-0292-0001	Main Building/Robert Stiles Building/Bluford Office Building (2900 Hungary Road, Henrico County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
043-5636	Integrated Power Sources of Virginia (2260 Dabney Road, Henrico County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6136	Scott's Addition Historic District (northwest Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Adverse	Adverse	Adverse	Adverse	No Adverse	Adverse	No Adverse	Adverse
127-6569	Central National Bank (3501 W. Broad Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Effect	No Adverse	No Effect	No Adverse	No Effect	No Adverse
127-6514	Kent Road Village (905 Kent Road, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect	No Effect
127-0742	West of Boulevard Historic District (west Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Effect	No Adverse	No Effect	No Adverse	No Effect	No Adverse
127-6756	Carillon Neighborhood Historic District (northwest Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Effect	No Adverse	No Effect	No Adverse	No Effect	No Adverse
127-0171	James River and Kanawha Canal Historic District (north of James River, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6792	Southern Railway (north of James River, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6629	Cedarhurst Neighborhood Historic District (northwest Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Effect	No Adverse	No Effect	No Adverse	No Effect	No Adverse
Temp 402	House (351 W. 49th Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Effect	No Adverse	No Effect	No Adverse	No Effect	No Adverse
127-6757	Woodstock Historic District (west Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Effect	No Adverse	No Effect	No Adverse	No Effect	No Adverse
Temp R	Rolando Historic District (southwest Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Adverse	Adverse	No Effect	Adverse	No Effect	Adverse	No Effect	Adverse
Temp 268	Broad Run House (2011 S. Kinsley Avenue, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Adverse	Adverse	No Effect	Adverse	No Effect	Adverse	No Effect	Adverse
020-5351	Richmond & Petersburg Electric Railway (along Route 1 between Richmond and Chesterfield County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse

▶ *Continued*

Table 4.13-4: Details of Project Preliminary Effect on Buildings, Structures, Objects, and Districts

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
020-5336	The Bellwood-Richmond Quartermaster Depot Historic District, United States Department of Defense Supply Center Historic District (north central Chesterfield County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6188	Movieland Bowtie Cinema (1331 North Boulevard, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	Adverse	Adverse	Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6840	Warehouse (2728 Hermitage Road, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	Adverse	Adverse	Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6730	Hermitage Road Warehouse Historic District (north central Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	Adverse	Adverse	Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6165	Cookie Factory Lofts (900 Terminal Place, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	Adverse	Adverse	Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0226	Science Museum of Virginia (2500 Broad Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	Adverse	Adverse	Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-5978	Todd Lofts (1128 Hermitage Road, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	Adverse	Adverse	Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6145	Southern Stove Works (1215 Hermitage Road, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	Adverse	Adverse	Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6570	West Broad Street Industrial and Commercial Historic District (north of Broad Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	Adverse	Adverse	Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0414	Governor's School (1000 North Lombardy Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0354	Virginia Union University Historic District (1500 North Lombardy Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0428	George W. Carver Elementary School (1110 West Leigh Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0822	Carver Residential Historic District (northeast Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6171	Richmond and Chesapeake Bay Railway Barn), Richmond-Ashland Railway Company Car Barn (northeast Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse

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Table 4.13-4: Details of Project Preliminary Effect on Buildings, Structures, Objects, and Districts

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
127-5679	Barton Heights Cemetery (1600 Lamb Avenue, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0353	Richmond Nursing Home (210 Hospital Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6166	Hebrew Cemetery (320 Hospital Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0343	Chestnut Hill/ Plateau Historic District (northwest Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Effect	No Effect	No Adverse	No Adverse	No Adverse	No Adverse
127-0344	Shockoe Valley & Tobacco Row Historic District (north of James River, downtown Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	Adverse	No Adverse	Adverse	Adverse
127-6129	Winfree Cottage (East Main Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0172	Main Street Station and Trainshed, New Union Station, Seaboard Airline & Chesapeake & Ohio Railroad Depot (Main Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Adverse	Adverse	No Adverse	Adverse	Adverse	No Adverse	Adverse	Adverse
127-0344-0123	Railroad Y.M.C.A. (1552 East Main Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	Adverse	No Adverse	Adverse	Adverse
127-0219	Shockoe Slip Historic District and Expansions (north of James River, downtown Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6793	C&O Railroad (downtown Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-5809	Bridge #1857, North 14th Street; Mayo Bridge North (14th Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-5808	Bridge #1857, South 14th Street; Mayo Bridge South (14th Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0197	Philip Morris Leaf Storage Warehouse (1717–1721 East Cary Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0282	Henrico County Courthouse (2127 Main Street East, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0192	St. John's Church Historic District (downtown Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse

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Table 4.13-4: Details of Project Preliminary Effect on Buildings, Structures, Objects, and Districts

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
127-0192-0322	Libby Hill Park and Park House (2801 East Franklin Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0854	Bridge #1850 (E. Main Street, spanning Southern Railway, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0119	John Woodward House (3017 Williamsburg Avenue, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6693	Armitage Manufacturing Company (3200 Williamsburg Avenue, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-6255	Fulton Gas Works (Williamsburg Avenue, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0257	Bridge #8067 (east of downtown Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
043-5313	James River Steam Brewery Cellars (4920 Old Main Street, Henrico County))	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
043-0439	Aviation General Supply Depot (508 Bickerstaff Road, Henrico County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
127-0457	Manchester Warehouse Historic District (south of James River, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse
127-6193	J.P. Taylor Leaf Tobacco, Southern Stove Works (516 Dinwiddie Avenue, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse
127-6245/ 44CF0724	Williams Bridge Company, Emergency Fleet Corporation Factory (700 East 4th Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse
127-6248	Pure Oil Company, Transmontaigne(1314 Commerce Street, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse
127-6213	Davee Gardens Historic District (east of Route 1, Richmond)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse
020-5474	DuPont Spruance (north Chesterfield County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse

▶ *Continued*

Table 4.13-4: Details of Project Preliminary Effect on Buildings, Structures, Objects, and Districts

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
020-0007	Bellwood, Sheffields, Auburn Chase, Building 42, Defense Supply Center Richmond (8000 Jefferson Davis Highway, Chesterfield County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse
020-0013	House (3619 Thurston Road, Chesterfield County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse
020-5378	VEPCo Power Transmission Line (west of Route 1, Chesterfield County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
020-0140	Circle Oaks (4510 Centralia Road, Chesterfield County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
020-0552	Centralia Post Office (Centralia Road, Chesterfield County)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse
076-0301	Richmond, Fredericksburg, and Potomac Railroad (rail corridor between Washington, D.C. and Main Street Station in Richmond)	Adverse	Adverse	Adverse	Adverse	No Effect	Adverse	Adverse	Adverse	–	No Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse
127-6251	Atlantic Coast Line Railroad Corridor, Richmond, and Petersburg Railroad (A-Line rail corridor between Main Street Station and Centralia)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse
127-6271	Seaboard Air Line Railroad Corridor (S-Line rail corridor between Main Street Station and Centralia)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse	Adverse

The **RF&P Bridge over Naomi Road (089-0080**) is a double-vault arched structure rumored to be the oldest documented and identified reinforced concrete bridge in the Commonwealth. It is potentially eligible for the NRHP under Criterion C for its architectural merit. It is also a contributing element to the Richmond, Fredericksburg & Potomac (RF&P) Railroad (076-0301). Construction of Build Alternative 3B would result in removal of the existing bridge and construction of a new structure. Demolition would remove all character-defining features of this resource. FRA's preliminary determination is that Build Alternative 3B would have an adverse effect on this structure.

The **Rappahannock River Railroad Bridge (111-0132-0025)** is a multiple-span, open-spandrel, concrete-arch bridge and is an excellent and rare surviving example of a reinforced-concrete arch railroad bridge within this region of Virginia. It was erected when the station and tracks were elevated for automobile traffic pass through on surface streets in downtown Fredericksburg. The bridge is both individually eligible (Criterion C for its architectural merit) and eligible as a contributing element to the Fredericksburg Historic District (111-0132) and the RF&P Railroad (076-0301). Addition of a third track to the east of the existing alignment as part of Build Alternative 3B would require construction of a new bridge adjacent to the old structure, thus diminishing its integrity of design, setting, feeling, and association and affecting its architectural character. FRA's preliminary determination is that Build Alternative 3B would have an adverse effect on this resource.

The 200-acre **Fredericksburg Historic District (111-0132)** comprises the city's downtown commercial area, adjacent industrial area, and some of the surrounding residential blocks. This part of Fredericksburg boasts a wide variety of infrastructure that ranges in date from the early eighteenth century throughout the late twentieth century. It is listed in the NRHP under Criterion C for its architectural merit. Although Build Alternative 3A does not require installation of new tracks, plans call for construction of a multi-story parking deck to the east (south) of the tracks in an existing parking lot. Installation of the third track associated with Build Alternative 3B also entails building the multi-story parking deck. This new structure would impact the viewshed of the district and its integrity of setting, feeling, and association by adding a large, non-conforming, visual element to the distinct area skyline. The new parking structure would also add a new physical element within the district boundaries. FRA's preliminary determination is that Build Alternatives 3A and 3B would have an adverse effect on this historic property.

The **Doswell Historic District (042-5448)** encompasses a rural community that was once a center of major activity along road and rail networks. Nearly a dozen historic properties are located within the district's boundaries. It is potentially eligible for the NRHP under Criteria A for its association with railroad history and C for its architectural integrity. Although the community was founded along the rail lines, Build Alternative 4A would adversely affect one contributing element to the district, the Squashapenny Junction Store (042-0470), as listed below. This includes potentially removing the main building and associated outbuildings and taking land from the parcel, thus diminishing the characteristics that render it eligible for the NRHP. FRA's preliminary determination is that because of the potential physical adverse effects to a contributing element, Build Alternative 4A would likely have an adverse effect on the district.

Located at 10570 Doswell Road, the **Squashapenny Junction Store (042-0470)** is a two-and-a-half-story, three-bay, vernacular commercial building. Located adjacent to the tracks, the store was a commercial hub for the Doswell community. It is potentially eligible for the NRHP under Criterion C for its architectural style. The building is also a contributing element to the Doswell

Historic District (042-5448). The building is located immediately east of the rail tracks. Build Alternative 4A requires acquisition of land from the parcel and would bring the tracks even closer to the dwelling, potentially requiring removal of the main building or one or more contributing outbuildings on the property, thus compromising its integrity of design, setting, materials, workmanship, feeling, and association. FRA's preliminary determination is that Build Alternative 4A would have an adverse effect on this resource.

The **Berkleytown Historic District (166-5073)** is typical of many small-town, twentieth-century, African American neighborhoods in that it was relatively isolated from the formal downtown core and is dotted by small vernacular dwellings. It is potentially eligible under Criteria A for its association with African-American history in this area and C for its architectural merit. Construction of an overpass carrying Vaughan Road over the rail tracks associated with Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would require alterations to the historic road pattern within the district and require a new bridge structure within the viewshed of the district and several contributing elements. Due to these disturbances to the setting, feeling, and design of the district, FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would have an adverse effect.

The **Ashland Historic District (166-0001)**, with its large collection of late-Victorian and Edwardian frame dwellings and its brick commercial core, all set among hundreds of trees, survives as a fine example of a railroad and streetcar suburb preserving much of its turn-of-the-century character. It is listed in the NRHP under Criteria A for its association with railroad history and C for its architectural character. Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake, expanding the existing rail corridor through town, would result in modified roadways, sidewalks, and viewsheds in the district, thus impacting character-defining features. Moreover, FRA's preliminary determination is that these alternatives would have an adverse effect to several contributing resources to the district (as described below), including the Ashland Station Depot (166-0001-0008) and the MacMurdo House (166-0036). As such, FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would have an adverse effect on the Ashland Historic District.

The **Randolph-Macon College Historic District Expansion (166-5072)** highlights a significant part of campus that developed between the early-twentieth century and the mid-1960s when a substantial building boom occurred. The expansion was determined to be eligible for the NRHP as part of the current survey. Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake, expanding the existing rail corridor through town, would result in modified roadways, sidewalks, and viewsheds in the district, thus impacting character-defining features. Thus, FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would have an adverse effect on the district.

The 85-acre **Randolph-Macon College Historic District (166-0002)** includes the college campus and all associated buildings, structures and landscape features. This is the oldest Methodist-related college in the United States still in operation. The original district was listed in the NRHP under Criteria A as one of the oldest Methodist colleges in the United States and C for its architectural merit. As with the Randolph-Macon Historic District Expansion listed above, Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would result in modifications that would diminish character-defining features of the district through roadway realignments, sidewalk modifications, and viewshed changes. Some contributing elements may also be required to be relocated. FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would have an adverse effect on this historic property.

The one-story, five-bay, brick **Ashland Station Depot (166-0001-0008)** is said to have been designed by W. P. Lee to replace a previous circa-1890 station that burned down. Although the building is no longer used as a station (with its interior turned over for other purposes), the building appears little altered and is a good example of a Colonial Revival-styled depot potentially eligible for the NRHP under Criteria A for its association with area development and C for its architectural character. The building is also a contributing element to the Ashland Historic District (166-0001) and the RF&P Railroad (076-0301). Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake require track changes and alterations to the station. Build Alternative 5D–Ashcake includes demolition of the historic station and construction of a new station. These modifications, and the potential demolition, would diminish the characteristics that render this resource eligible for the NRHP. Removal of the historic, and continued, use of these contributing elements would remove character-defining attributes of the property—namely its use as a rail stop. FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would have an adverse effect on this resource.

The **MacMurdo House (166-0036)** is a two-story, three-bay, Greek Revival, single-family dwelling. It is one of the few buildings of its style in Ashland, and it has excellent historic integrity. As such, it is potentially eligible for the NRHP under Criterion C for its architectural merit. The building is also a contributing element to the Ashland Historic District (166-0001) as it dates to the period of significance and reflects the developmental history of the district. Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake, expanding the existing rail corridor through town, would result in moving the existing sidewalks and roadways closer to the historic dwelling and onto the parcel boundaries, thus impacting the resource's integrity of design, setting, feeling, and association and modifying key visual elements of the building. FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would have an adverse effect on this property.

The **Laurel Industrial School Historic District (043-0292)** consists of a complex of buildings that was part of a school founded under the patronage of the Prison Association of Virginia, a group of private citizens who sought to reform the state's penal system by establishing a self-supporting model industrial reformatory for boys. It is listed in the NRHP under Criteria A for its association with prison reform and C for its architectural character. All Build Alternatives in Area 6 (6A through 6G) would require construction of a bridge to carry traffic on Hungary Road over the rail tracks, as well as notable associated secondary road changes. These modifications would impact the district through the introduction of a large visual element (the new overpass) and modified roadway plans. Some contributing elements may also be required to be relocated. As such, FRA's preliminary determination is that Build Alternatives 6A through 6G would have an adverse effect on this historic district.

The **Scott's Addition Historic District (127-6136)** is a 152-acre industrial and commercial district in Richmond featuring 287 contributing resources built primarily between 1900 and 1956 in the Colonial Revival, Classical Revival, Mission, Moderne, International, and Art Deco styles. The district is located immediately southeast of the intersection of the A-line and the S-line in Richmond. It is listed in the NRHP under Criteria A for its association with Richmond development and C for its architectural fabric. Construction of Build Alternatives 6A, 6B–A-Line, 6B–S-Line, 6C, 6E, and 6G would require notable changes to this area, including new tracks outside of the existing right-of-way, erecting superstructures to support rail facilities, and construction of multi-story parking facilities. These changes would diminish character-defining features of the district. FRA's preliminary determination is that Build Alternatives 6A, 6B–A-Line, 6B–S-Line, 6C, 6E, and 6G would have an adverse effect on the historic district.

Containing approximately 142 parcels, the **Rolando Historic District (Temp R)** is a post-World War II-era, suburban neighborhood. The dwellings were constructed in the Minimal Traditional style. The neighborhood and contributing dwellings have been generally unchanged since its subdivision in 1946. It is potentially eligible for the NRHP under Criterion C for its styling as a post-war neighborhood. Plans associated with Build Alternatives 6A, 6B–A-Line, 6C, 6E, and 6G include construction of a new overpass carrying Broad Rock Boulevard over the tracks and associated roadway modifications. Some of the impacted roadways are located within the footprint of the district, and the new overpass would be a notable new visual element to the viewshed of the neighborhood. These changes would diminish the district's integrity of design, setting, feeling, and association. FRA's preliminary determination is that Build Alternatives 6A, 6B–A-Line, 6C, 6E, and 6G would have an adverse effect on this district.

The two-story, Federal-style, frame **Broad Run House (Temp 268)** was constructed with a central-passage plan. It is a rare and exceptional, surviving example of a late-eighteenth century dwelling in this area of Richmond. Although it is located within the Rolando Historic District, the resource is a noncontributing element to the district as it dates outside of its period of significance. The house is located within the northeastern section of the Rolando Historic District listed above. It is potentially eligible for the NRHP under Criterion C for its architectural style and as a unique example of extant eighteenth-century architecture in this part of Richmond. The new overpass and roadway changes along Broad Rock Boulevard would have the same impacts on this individual resource. Given this, FRA's preliminary determination is that Build Alternatives 6A, 6B–A-Line, 6C, 6E, and 6G would have an adverse effect on this historic property.

The **Movieland Bowtie Cinema (127-6188)**, previously known as the Richmond Locomotive & Machine Works, the American Locomotive Company, and Richmond Works, is an industrial complex with two buildings—the brass foundry and the iron foundry—that are both steel-framed resources with masonry walls. It is listed in the NRHP under Criteria A for its association with Richmond industrial history and C for its architectural merit. Construction of Build Alternatives 6B–A-Line, 6B–S-Line, and 6C require development of new rail corridors and large-scale structures to accommodate the train movement in this part of Richmond, as well as associated road modifications and new parking structures. Some of these changes border, or are actually located on, the Movieland Bowtie Cinema parcel. Modifications would diminish the characteristics that render this resource eligible for the NRHP. As such, FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have an adverse effect on this resource.

Access to the **Warehouse at 2728 Hermitage Road (127-6840)** was not granted during the Phase I-level survey. As such, little is known about the structure; however, the changes noted above associated with the Movieland Bowtie Cinema would also result in notable changes to the viewshed and nearby roadways related to this warehouse. FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have an adverse effect on this resource.

The industrial **Hermitage Road Warehouse Historic District (127-6730)** is characterized by roughly a dozen medium- to large-scale one-story warehouse buildings set on a gridded block pattern. Most of the buildings have large footprints that occupy most of the block on which they sit. The buildings are typically one-story, clad in brick, and covered with flat roofs. It is listed in the NRHP under Criterion A for its association with twentieth-century Richmond development and Criterion C for its architectural styling. Located north of the tracks, Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would require road work along Hermitage Road, which forms the western boundary of the district, and also include construction of a rail superstructure to aid in train movement. This new superstructure would be visible from the district. Because of these modifications, FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have an adverse effect on this district.

The **Cookie Factory Lofts (127-6165)**, previously known as Southern Biscuit Company, Interbake Foods, and Famous Foods of Virginia, is a six-story, multi-bay, industrial building with a water tower on the roof that was constructed with Colonial Revival attributes. It is listed in the NRHP under Criterion A for its association with the development of this section of Richmond and Criterion C for its architectural merit. The resource is also a contributing element to the West Broad Street Industrial and Commercial Historic District (127-6570) listed below. The same aforementioned changes associated with Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would affect the setting, feeling, and association of the Cookie Factory Lofts due to construction of new rail lines and road changes in the area. FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have an adverse effect on this historic property.

The **Science Museum of Virginia (127-0226)** is a 3-story, 11-bay, monumental Neoclassical style train station that now houses the Science Museum of Virginia. This resource was designed by architect John Russell Pope and is constructed of dressed ashlar with a large, central, copper dome. It is listed on the NRHP under Criteria A for its association with transportation history and C for its architectural characteristics. The resource is also a contributing element to the West Broad Street Industrial and Commercial Historic District (127-6570) listed below. While construction of Build Alternative 6C would restore the historic usage of this property, many of the rail-related features originally part of this property were removed when the structure was converted into a museum. Work associated with Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would result in new construction to the north and east of the historic building, such as raised tracks and installation of new structures, as well as roadway modifications. This work would diminish the integrity of design, setting, materials, workmanship, feeling, and association of this historic property. As such, FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have an adverse effect on the Science Museum of Virginia.

The five-story, multi-bay **Todd Lofts (127-5978)** building was originally built as the Richmond Brewery. The E.M. Todd Company bought the building in 1919 and expanded it into a meat production facility. Until 1998, this resource housed the county's oldest meat processor in continuous business. This property is located along Hermitage Road. It is listed on the NRHP under Criterion A for its association with industrial development in this part of Richmond. Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would require road work along Hermitage Road, and Build Alternatives 6B–A-Line and 6B–S-Line include construction of a rail superstructure to aid in train movement. This new superstructure would be visible from the property. Because of these modifications, FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have an adverse effect on this resource.

The **Southern Stove Works (127-6145)** is an industrial complex of four brick buildings and a water tower built during the time of rapid industrialization in Richmond. Southern Stove Works was one of the two largest and most important stove making plants in Richmond and the South. It is listed on the NRHP under Criteria A for its association with Richmond industrialization and C for its architectural merit. This resource is located just east across Hermitage Road from Todd Lofts, listed above. The same modifications stated above are applicable to this resource, including roadway changes and construction of new rail structures. FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have an adverse effect on this historic property.

The 40-acre **West Broad Street Industrial and Commercial Historic District (127-6570)** reflects development of the industrial capabilities of Richmond, and the allied development of commercial resources, culminating in the embrace of large-scale consumer economy by the middle of the twentieth century. It is listed in the NRHP under Criteria A for its association with industrial history in this area and C for its architectural characteristics. The district is located on both sides of Broad Street and extends northeast past Marshall Street. Changes associated with the new rail system and associated roads related to Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would diminish character-defining features of this district, as well as at least two contributing resources—the Cookie Factory Lofts (127-6165) and the Science Museum of Virginia (127-0226). FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have an adverse effect on this historic district.

The **Shockoe Valley & Tobacco Row Historic District (127-0344**) encompasses the area of Richmond's earliest residential, commercial, and manufacturing activity. It is listed in the NRHP under Criteria A for its association with early Richmond developmental history and C for its architectural merit. The district is located east of the S-line corridor and north of the James River in downtown Richmond. Construction associated with Build Alternatives 6D, 6F, and 6G would include one to two multistory parking garages and the addition of long, linear platforms within the district boundaries, thus resulting in a modified building stock and the addition of large visual elements to the district. These elements have the potential to diminish the characteristics that render this resource eligible for the NRHP. FRA's preliminary determination is that Build Alternatives 6D, 6F, and 6G would have an adverse effect on this resource.

Main Street Station and Trainshed (127-0172), also known as New Union Station and Seaboard Airline & Chesapeake & Ohio Railroad Depot, symbolizes the importance of the rail terminal as an entrance gateway to Richmond and is an example of the influence of the French Ecole des Beaux Arts on American building. The building is a National Historic Landmark (NHL), listed in the NRHP under Criteria A and C, and is also a contributing element to both RF&P Railroad (076-0301) and the Seaboard Air Line Railroad (127-6271), both listed below. Three of the four Build Alternatives that use the A-Line between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, and 6C) include disuse of the current station and construction of a new station elsewhere. Removal of the historic, and continued, use of this significant rail station would remove character-defining attributes of the building—namely its use as a rail depot. This is especially notable as this property is an NHL due to its association with local, state, and national rail history. Three of the four Build Alternatives that use the S-Line between Main Street Station and Centralia (Build Alternatives 6D, 6F, and 6G) would involve the restoration of intercity passenger service on the west side of Main Street Station and would include the construction of one to two multistory parking garages within the viewshed of the main station building and also require alterations to historic platforms, thus diminishing the integrity of design, setting, materials, workmanship, feeling, and association. FRA's preliminary determination is that Build Alternatives 6A, 6B–A-Line, 6C, 6D, 6F, and 6G would have an adverse effect on this resource.

The French Renaissance Revival-styled **Railroad Y.M.C.A. (127-0344-0123)** is notable for its architectural characteristics and for its importance as a community center to provide recreational space for railroad workers and their families in the area. It is eligible for the NRHP under Criterion A for its importance to the early recreational and social history of this section of Richmond and under Criterion C for its architectural styling. Work associated with Build Alternatives 6D, 6F, and 6G involves the construction of one to two multistory parking decks and platform modifications, both of which would add a notable visual element within the viewshed of this resource. The parking garages and modified platforms have the potential to diminish the characteristics that render this resource eligible for the NRHP. FRA's preliminary determination is that Build Alternatives 6D, 6F, and 6G would have an adverse effect on this resource.

The **Richmond, Fredericksburg, & Potomac Railroad (076-0301)** opened in 1836 and eventually spanned from the Potomac River to Richmond. It is eligible for the NRHP under Criterion A for its association with rail development in northern and central Virginia. The DC2RVA corridor includes the main rail line, spurs, and associated elements such as station houses, bridges, and other structures. Construction associated with several alternatives would result in removal or large-scale modifications to several contributing elements to the railroad district, including Main Street Station listed above and several bridges. The exact roster of bridges is under consideration but, at a minimum, this includes the Naomi Road Bridge and the Rappahannock River Bridge in Fredericksburg, the North Anna Bridge near Doswell, and several bridges and other rail structures in Richmond. FRA's preliminary determination is that the Build Alternatives 1A through 1C, 2A, 3B, 3C, 4A, 5B through 5D–Ashcake, and 6A through 6G that include improvements on or expansion to the rail line, bridges, or structures between Arlington and Acca Yard in Richmond would have an adverse effect on this property.

The historic **Atlantic Coast Line Railroad Corridor (127-6251)** merged from several railroads in the early 1890s and represents the origins and growth of the railroad industry in the Richmond to Petersburg corridor., The historic predecessor of the CSXT A-Line, the line ran roughly parallel along what is today I-95, transporting rail travelers between Richmond and Florida. It is eligible for the NRHP under Criterion A for its association with area transportation history. Like the RF&P listed above, construction of any one of the Build Alternatives in the Richmond area would result in modifications or reconstruction of several contributing elements to this railroad district. The exact list is pending, but this includes the CSXT A-Line bridge over the James River and potential contributing resources in the Centralia area. FRA's preliminary determination is that portions of the CSXT A-Line improvements between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, 6C, and 6E), including the connection with the CSXT S-Line at Centralia (Build Alternatives 6B–S-Line, 6D, 6F, and 6G) would have an adverse effect on this resource.

Also representing the post-Civil War trend of merging smaller operations, the **Seaboard Air Line Railroad Corridor (127-6271)** was founded in 1900. The historic predecessor to the CSXT S-Line from Main Street Station to Centralia, it roughly paralleled what is today I-85 from Richmond to Florida. It is also eligible for the NRHP under Criterion A for its association with area transportation history. Similar to the Atlantic Coast Line Railroad, work associated with improvements to the S-Line would include modifications to contributing elements to this resource such as Main Street Staton, the S-Line bridge over the James River, and other road and rail structures south of Richmond. FRA's preliminary determination is that improvements between Main Street Station and Centralia (Build Alternatives 6B–S-Line, 6D, 6F, and 6G), including the connection with the CSXT A-Line at Centralia (Build Alternatives 6A, 6B–A-Line, 6C, and 6E) would have an adverse effect on this resource.

4.13.3 Battlefields

Due to their expansive nature and multi-resourced nature, battlefields have been pulled from the list of above ground properties as mentioned above and are outlined here in a separate narrative. The resources were defined and mapped based on the American Battlefield Protection Program (ABPP)-defined Potential National Register (PotNR) boundaries, as determined in 2009. If PotNR boundaries were not available, DHR boundaries were used. In February 2016, DHR agreed to use these boundaries in the current analysis (Appendix R).

There are 11 battlefields located in the APE. All 11 are associated with Civil War activities located in areas that were the site of numerous troop engagements during the war, notably Fredericksburg and surrounding counties, Hanover County, Henrico County, the City of Richmond, and Chesterfield County.

FRA's preliminary determinations of effect for historic resources in Virginia are listed in Tables 4.13-5 and 4.13-6.

Table 4.13-5: Summary of Preliminary Effect Determinations on Battlefields

Alternative Area	Alternative	Potential Effect (Number of Resources)		
		Adverse	No Adverse	No Effect
Area 1: Arlington (Long Bridge Approach)	1A	0	0	0
	1B	0	0	0
	1C	0	0	0
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	0	0	0
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	0	0	3
	3B	0	3	0
	3C*	0	0	0
Area 4: Central Virginia (Crossroads to Doswell)	4A	0	1	0
Area 5: Ashland (Doswell to I-295)	5A	0	0	0
	5A–Ashcake	0	0	0
	5B	0	0	0
	5B–Ashcake	0	0	0
	5C*	0	0	0
	5C–Ashcake	0	0	0
	5D–Ashcake	0	0	0
Area 6: Richmond (I-295 to Centralia)	6A	0	4	2
	6B–A-Line	0	4	2
	6B–S-Line	0	6	0
	6C	0	4	2
	6D	0	6	0
	6E	0	6	0
	6F	0	6	0
	6G	0	6	0

* Partial Data; Only Phase IA reconnaissance studies were completed on the bypass options. As such, this count only includes previously recorded resources.

Table 4.13-6: Details of Project Preliminary Effect on Battlefields

		Build Alternative																						
DHR ID	Name/Description	1A	1B	1C	2A	3A	3B		3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
111-5295	Battle of Fredericksburg I	–	–	–	–	No Effect	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
111-5296	Battle of Fredericksburg II	–	–	–	–	No Effect	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
088-5181	Salem Church Battlefield (Banks Ford Battlefield)	–	–	–	–	No Effect	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
042-0123	North Anna Battlefield	–	–	–	–	–	–	–	No Adverse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	
043-5108	Yellow Tavern Battlefield	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	
020-5320	Proctor's Creek Battlefield	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	
043-0307	Battle of Chaffin's Farm (New Market Heights Battlefield), New Market Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	
043-5071	Darbytown & New Market Roads Battlefield, Route 5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	No Adverse	
020-0147	Drewry's Bluff Battlefield (Fort Darling, Fort Drewry), Fort Darling Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse	
123-5025	Assault on Petersburg (Petersburg Battlefield II), Bermuda Hundred Road (Alt Route 697)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Effect	No Effect	No Adverse	No Effect	No Adverse	No Adverse	No Adverse	No Adverse	

Coordination of these determinations is ongoing with DHR and relevant consulting parties. Based on preliminary dialogues with DHR, the Project would have No Adverse Effect on any of the 11 battlefields within the APE. As Project plans are confirmed, the work would be evaluated to assure that character-defining features of the battlefields in general, and contributing elements specifically, are not altered or diminished during the Project. Because FRA's preliminary determination is that there would be no adverse effects to these battlefields, narratives are not presented below. See Section 3.13 for descriptions of these resources.

4.13.4 Summary and Mitigation

In summary, FRA's preliminary determination is that 33 historic properties would be adversely affected by 1 or more of the Build Alternatives (Figure 4.13-1). Figures in the *Cultural Resources Reports* (Appendix R) show the potential impacts to these historic properties. FRA's preliminary determination is that the remaining 125 historic properties in the APE would have no effect or no adverse effect resulting from any of the Build Alternatives.

Where FRA determines that the Project will have an adverse effect on historic resources, efforts will be undertaken to avoid, minimize, or mitigate the adverse effects. Efforts have been made by DRPT to identify Project alternatives that avoid adverse effects to Section 106 resources identified in this section. Where avoidance is not possible, FRA will identify measures to minimize and mitigate for impacts. Chapter 5 outlines measures to minimize harm to historic resources. Chapter 6 describes the coordination that has taken place between DRPT and state historic preservation offices, resource owners, historic societies, and other consulting parties.

A Programmatic Agreement was executed for the SEHSR project. Due to the nature of the DC2RVA Project, a Programmatic Agreement (PA) is underway to outline: (1) studies still required once a recommended Preferred Alternative has been selected (namely, additional Phase I and Phase II archaeological studies on the main corridor and road improvement areas and full cultural resource studies on the bypasses, if selected); and (2) tasks that would be undertaken to mitigate adverse effects.

4.14 PARKLANDS, RECREATIONAL AREAS, AND REFUGES

4.14.1 Effects

Effects to parklands, recreational areas, and wildlife refuges, collectively referred to as parkland resources, were determined through overlay of the parkland boundaries with the permanent and temporary limits of disturbance for the Build Alternatives. Section 3.14 in Chapter 3 identifies all the parklands, recreational areas, and wildlife refuges identified in the study area. DRPT assumed that the proposed right-of-way would match the permanent limits of disturbance, and these areas would be permanently removed from use as a park, recreational area, or wildlife refuge. Seventeen (17) parkland and trail resources could potentially be impacted by the Build Alternatives. Six of the 17 facilities would have permanent impacts while the remainder would only have temporary impacts. Table 4.14-1 identifies the permanent and temporary impacts to parkland resources by Build Alternative. Figure 4.14-1 depicts the permanent impact areas. The No Build Alternative would have no impacts to parkland resources.

Section 3.14 in Chapter 3 also identifies Section 4(f) recreational resources and Section 6(f) resources. These designations apply to some of the public parks, recreation areas, and wildlife refuges in the study area and afford additional protection to these resources. See Chapter 5 for the Section 4(f) Evaluation and discussion of Section 4(f) impacts and mitigation. Section 6(f) impacts are discussed below.

The permanent impacts associated with each of the Build Alternatives are discussed below.

In Alternative Area 1 (Arlington), Build Alternatives 1B and 1C would impact Long Bridge Park. Permanent impacts range from 0.36 to 1.45 acres. Build Alternative 1B would have the greatest impact to this resource.

In Alternative Area 2 (Northern Virginia), the single Build Alternative 2A would have a 0.04-acre permanent impact to the Dog Run Park at Carlyle.

In Alternative Area 3 (Fredericksburg), none of the alternatives through or around Fredericksburg (Build Alternatives 3A, 3B, and 3C) would have permanent impacts to parkland resources.

In Alternative Area 4 (Central Virginia), the single Build Alternative 4A would not have permanent impacts to parkland resources.

In Alternative Area 5 (Ashland), permanent impacts to parkland resources are minimal. The four alternatives that include a new intercity passenger rail station at Ashcake Road (Build Alternatives 5A–Ashcake, 5B–Ashcake, 5C–Ashcake, and 5D–Ashcake) would have a 0.01-acre permanent impact to Ashland Trolley Line. The alternatives that would add a third track, primarily on the east side of the right-of-way, through town (Build Alternatives 5B and 5B–Ashcake) would have a 0.03-acre permanent impact to Carter Park.

In Alternative Area 6 (Richmond), permanent impacts to parkland resources are minimal. Build Alternatives that use the A-Line between Acca Yard and Centralia (Build Alternatives 6A, 6B–A-Line, 6C, and 6E) would have the slightly higher permanent impact of 0.19 acre and would only impact Gates Mill Park. Build Alternatives that use the S-Line between Main Street Station and Centralia (Build Alternatives 6B–S-Line, 6D, 6F, and 6G) would have a 0.17-acre permanent impact to Walker’s Creek Retention Basin Park.

Section 6(f) directs the United States Department of Interior (DOI) to assure that replacement lands of equal value, location, and usefulness are provided as conditions to such conversions. Consequently, where conversions of Section 6(f) lands are proposed for transportation projects, replacement lands would be necessary. There are no permanent impacts to Section 6(f) lands. George Washington Memorial Parkway, Fredericksburg and Spotsylvania National Military Park, and Pierson/Slaughter Pen Farm are Section 6(f) resources but would only have temporary impacts during construction and replacement lands would not be required.

4.14.2 Mitigation

Impacts to parkland, recreational areas, and wildlife refuges were avoided and minimized to the maximum extent possible. All potential impacts consist of minor amounts of additional right-of-way required for track construction that would not impact park functions. DRPT will coordinate these impacts with the park owners. Temporary impacts were also avoided and minimized to the greatest extent feasible. DRPT will make all efforts to return temporary easements back to pre-construction conditions and to avoid impacting the essential park functions during construction.

Table 4.14-1: Permanent and Temporary Impacts to Parkland Resources by Build Alternative (acres)

Alternative Area	Alternative	Long Bridge Park	Crystal City Water Park	Old Town Greens Homeowners Association	Dog Run Park at Carlyle	George Washington Memorial Parkway	Veterans Memorial Park	Mount Vernon Trail	Pierson/Slaughter Pen Farm	Fredericksburg and Spotsylvania National Military Park	Mattaponi Wildlife Management Area	North Ashland Park	Railside Park	Carter Park	Ashland Trolley Line	Maggie Walker Governor's School Fields	Walkers Creek Retention Basin Park	Gates Mill Park
Area 1: Arlington (Long Bridge Approach)	1A	P: 0.00 T: 0.51	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	1B	P: 1.45 T: 0.88	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	1C	P: 0.36 T: 0.65	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	–	P: 0.00 T: 0.11	P: 0.00 T: 0.08	P: 0.04 T: 0.14	P: 0.00 T: 1.04	P: 0.00 T: 0.05	P: 0 feet T: 20 feet	–	–	–	–	–	–	–	–	–	–
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	–	–	–	–	–	–	–	P: 0.00 T: 0.17	P: 0.00 T: 0.02	–	–	–	–	–	–	–	–
	3B	–	–	–	–	–	–	–	P: 0.00 T: 0.17	P: 0.00 T: 0.02	–	–	–	–	–	–	–	–
	3C	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Area 4: Central Virginia (Crossroads to Doswell)	4A	–	–	–	–	–	–	–	–	P: 0.00 T: 1.09	P: 0.00 T: 2.54	–	–	–	–	–	–	–
Area 5: Ashland (Doswell to I-295)	5A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
	5A–Ashcake	–	–	–	–	–	–	–	–	–	–	—	—	—	P: 0.01 T: 0.00	–	–	–
	5B	–	–	–	–	–	–	–	–	–	–	—	—	P: 0.03 T: 0.00	—	–	–	–
	5B–Ashcake	–	–	–	–	–	–	–	–	–	–	—	—	P: 0.03 T: 0.00	P: 0.01 T: 0.00	–	–	–
	5C	–	–	–	–	–	–	–	–	–	–	–	–	–	—	–	–	–
	5C–Ashcake	–	–	–	–	–	–	–	–	–	–	–	–	–	P: 0.01 T: 0.00	–	–	–
	5D–Ashcake	–	–	–	–	–	–	–	–	–	–	–	–	–	P: 0.01 T: 0.00	–	–	–
Area 6: Richmond (I-295 to Centralia)	6A	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	P: 0.19 T: 0.22
	6B–A-Line	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	P: 0.19 T: 0.22
	6B–S-Line	–	–	–	–	–	–	–	–	–	–	–	–	–	–	P: 0.00 T: 0.01	P: 0.17 T: 0.23	–
	6C	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	P: 0.19 T: 0.22
	6D	–	–	–	–	–	–	–	–	–	–	–	–	–	–	P: 0.00 T: 0.01	P: 0.17 T: 0.23	–
	6E	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	P: 0.19 T: 0.22
	6F	–	–	–	–	–	–	–	–	–	–	–	–	–	–	P: 0.00 T: 0.01	P: 0.17 T: 0.23	–
	6G	–	–	–	–	–	–	–	–	–	–	–	–	–	–	P: 0.00 T: 0.01	P: 0.17 T: 0.23	–

P: Permanent Impacts in Acres; T: Temporary Impacts in Acres

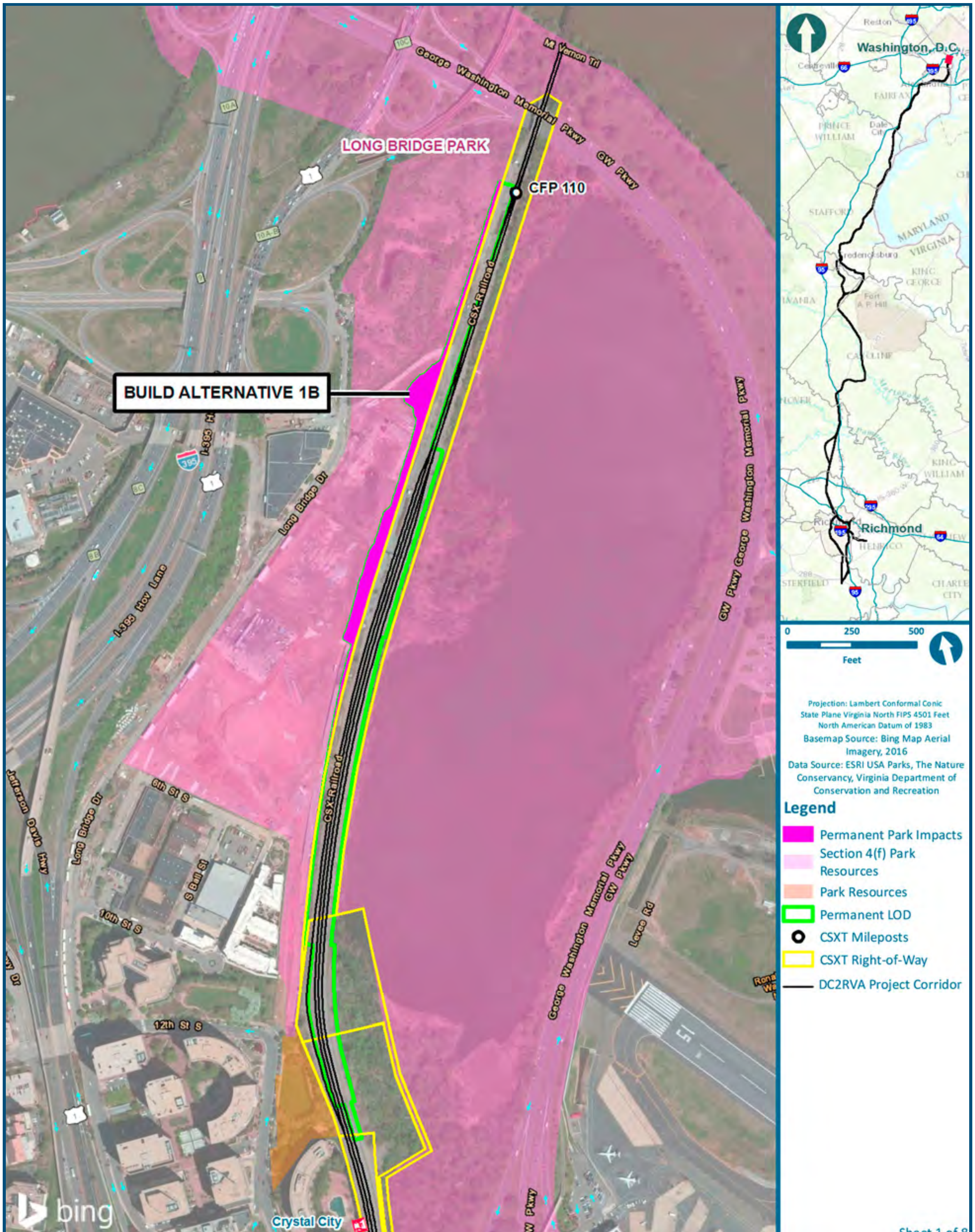

Figure 4.14-1: Permanent Park Impacts – Build Alternative 1B

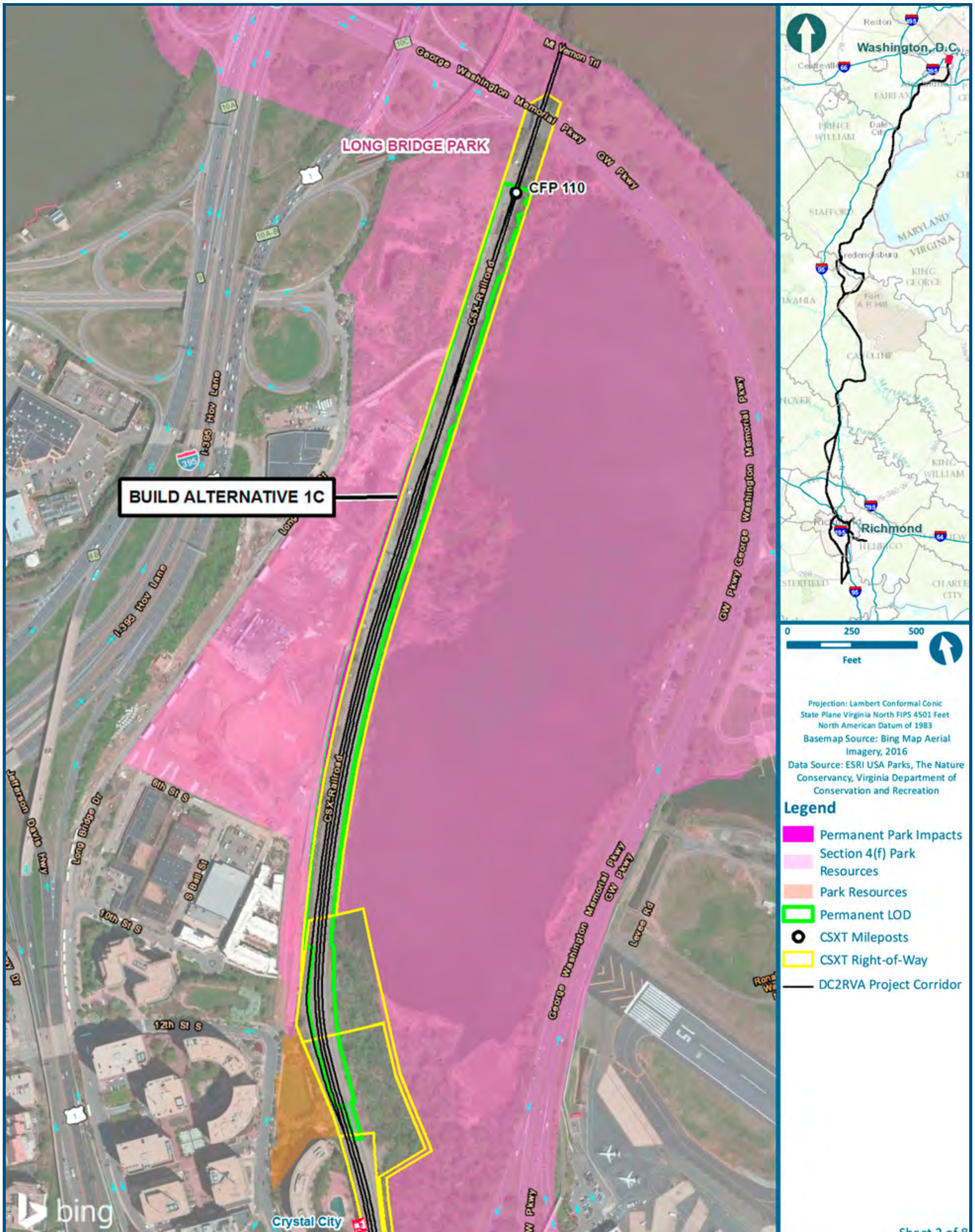

Figure 4.14-1: Permanent Park Impacts – Build Alternative 1C

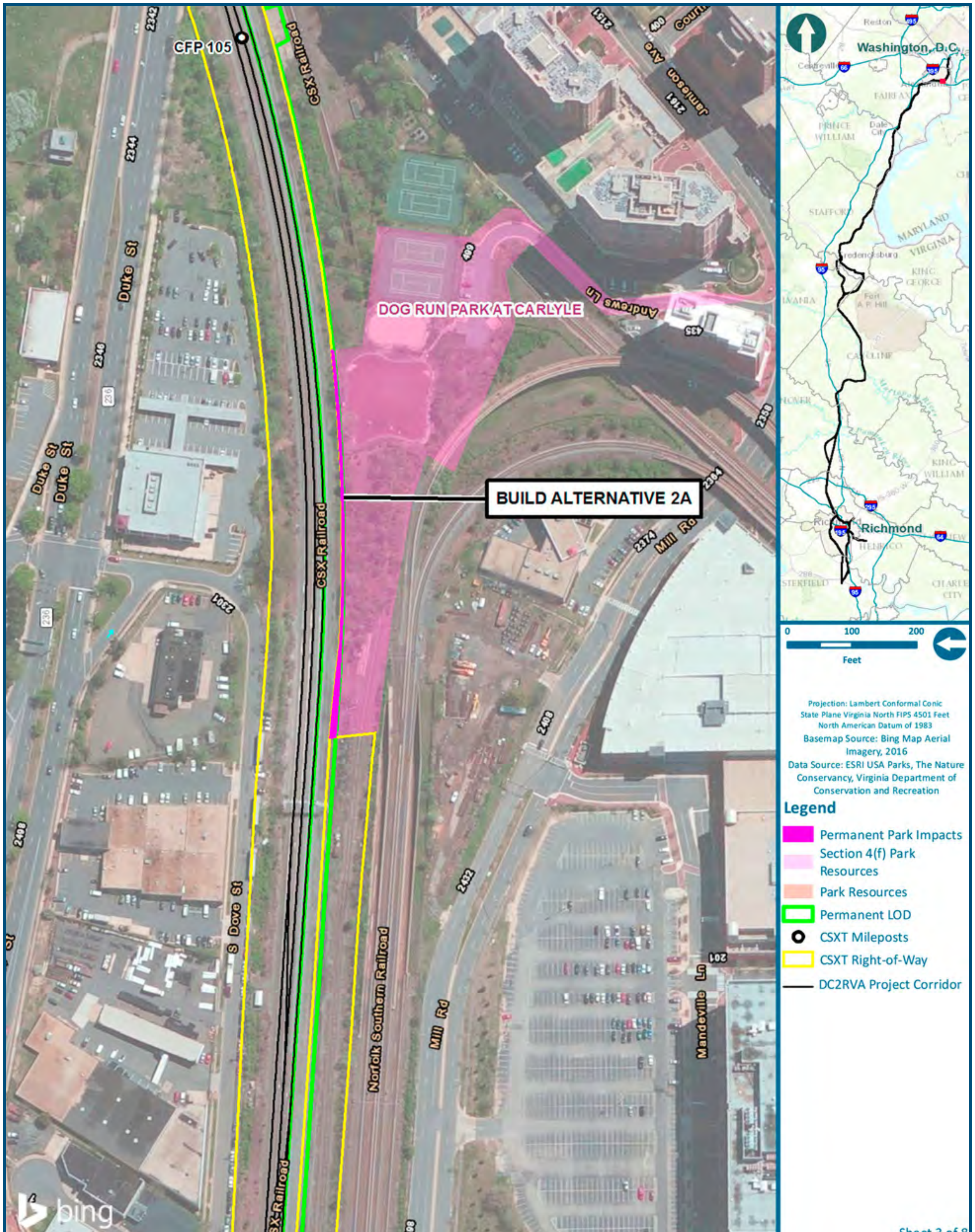

Figure 4.14-1: Permanent Park Impacts – Build Alternative 2A

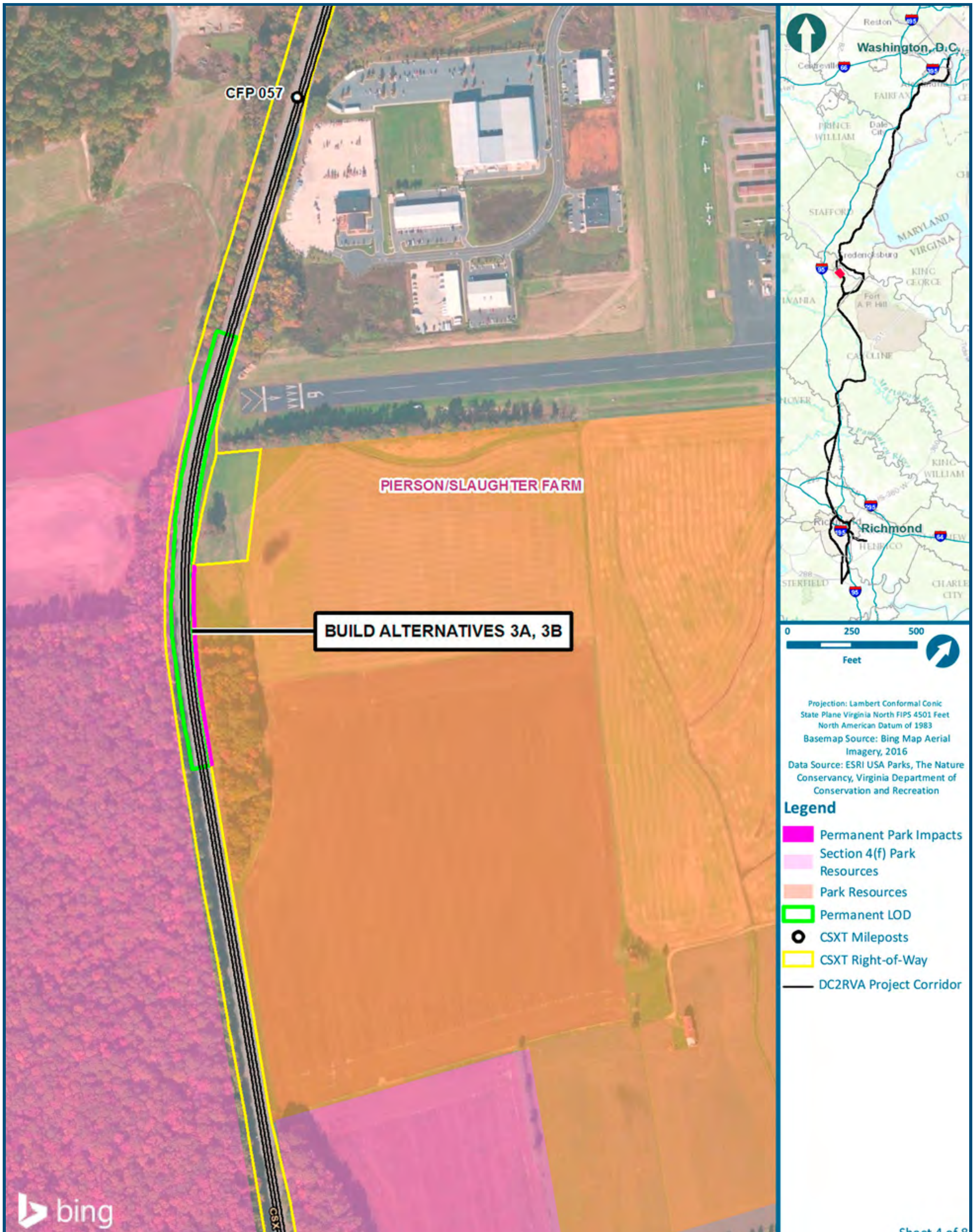

Figure 4.14-1: Permanent Park Impacts – Build Alternatives 3A, 3B

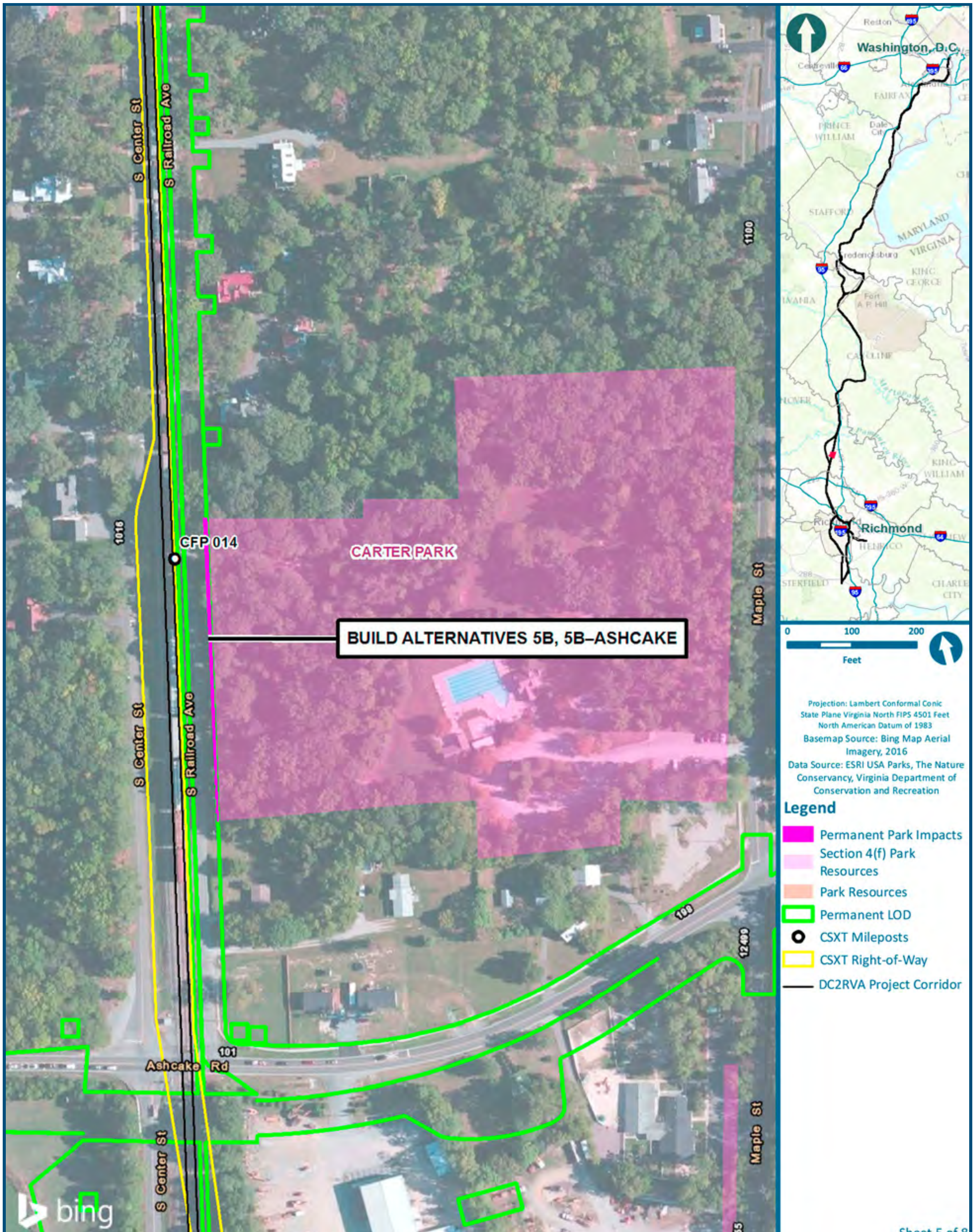

Figure 4.14-1: Permanent Park Impacts – Build Alternatives 5B, 5B–Ashcake

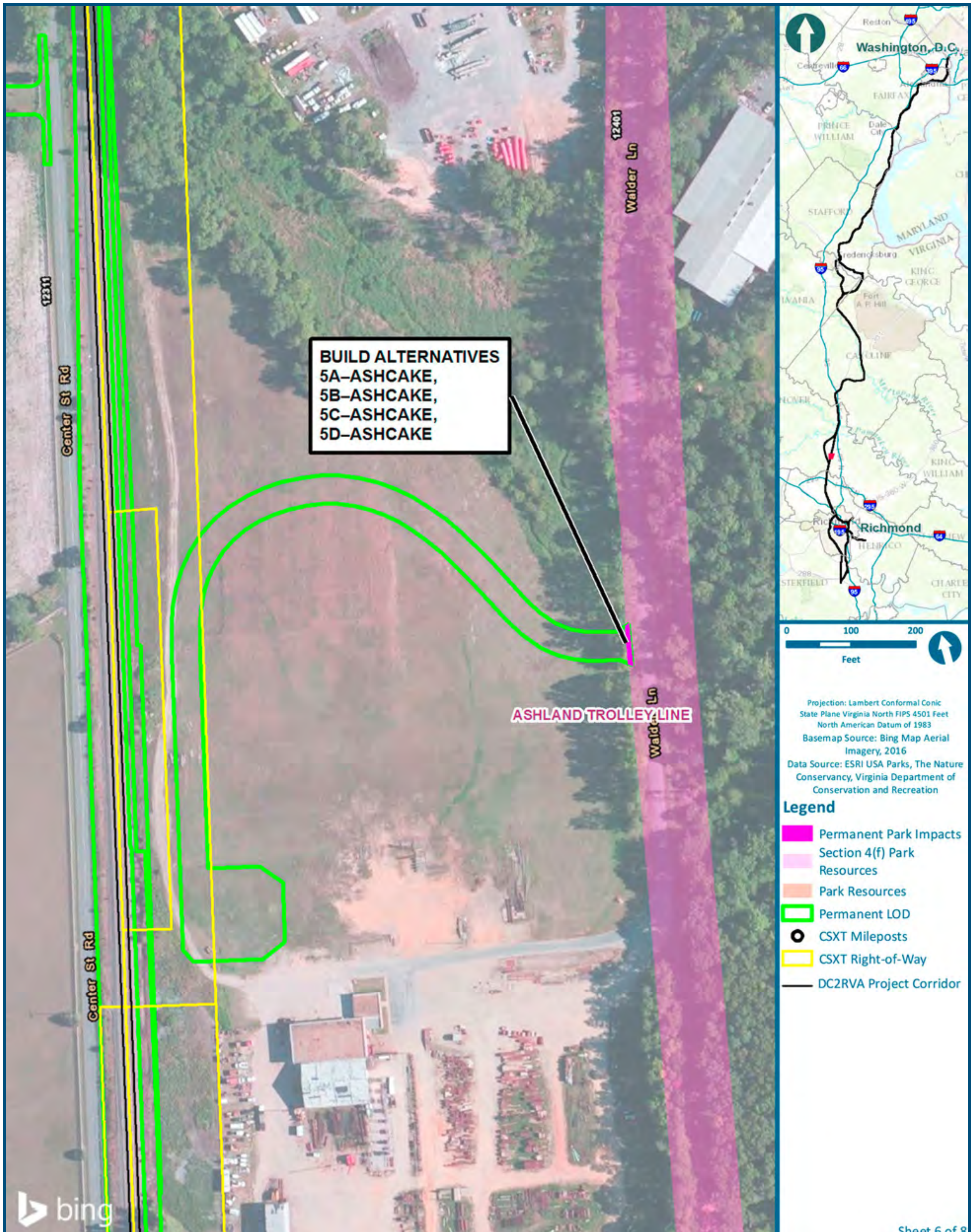

Figure 4.14-1: Permanent Park Impacts – Build Alternatives 5A–Ashcake, 5B–Ashcake, 5C–Ashcake, 5D–Ashcake

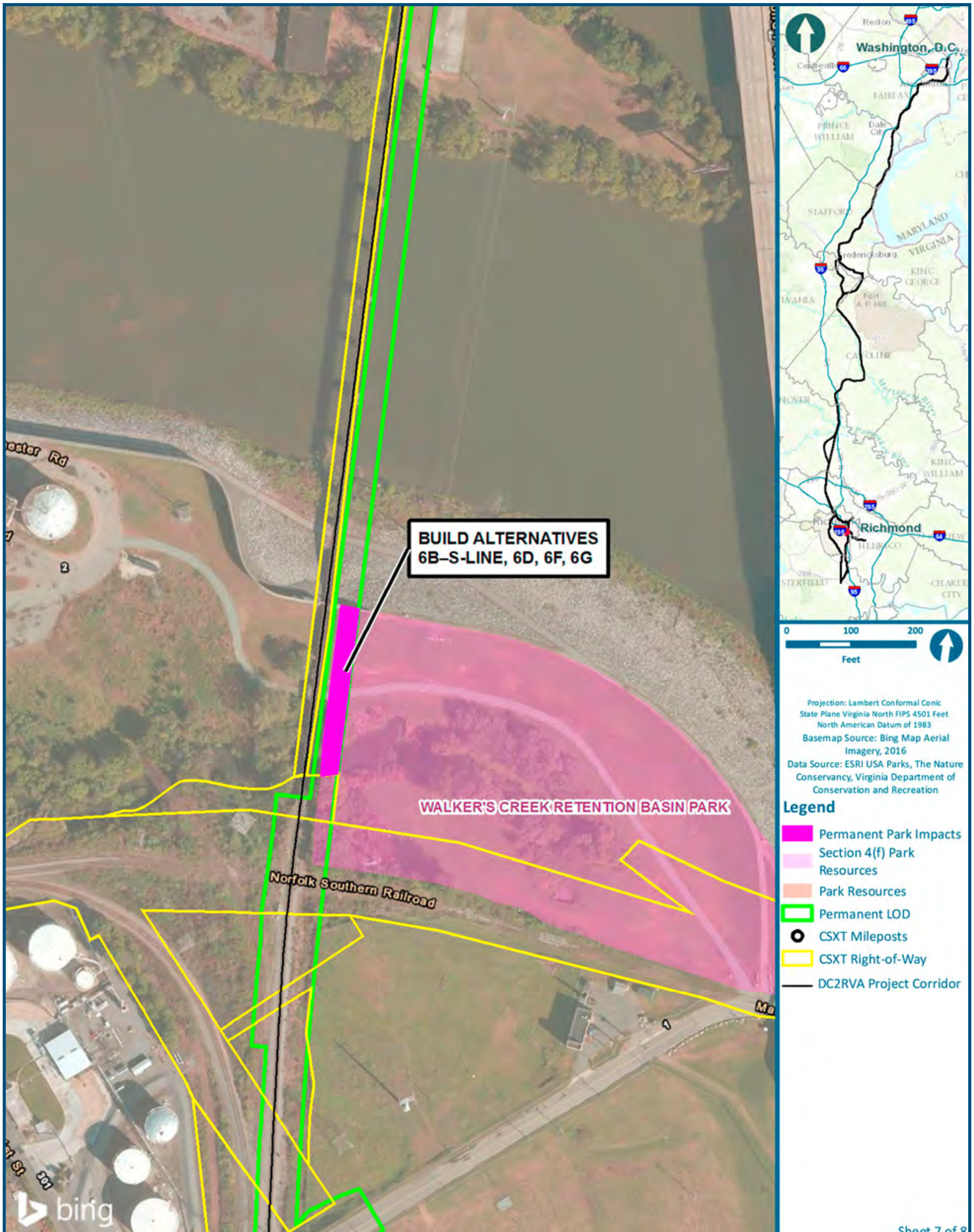

Figure 4.14-1: Permanent Park Impacts – Build Alternatives 6B–S-Line, 6D, 6F, 6G

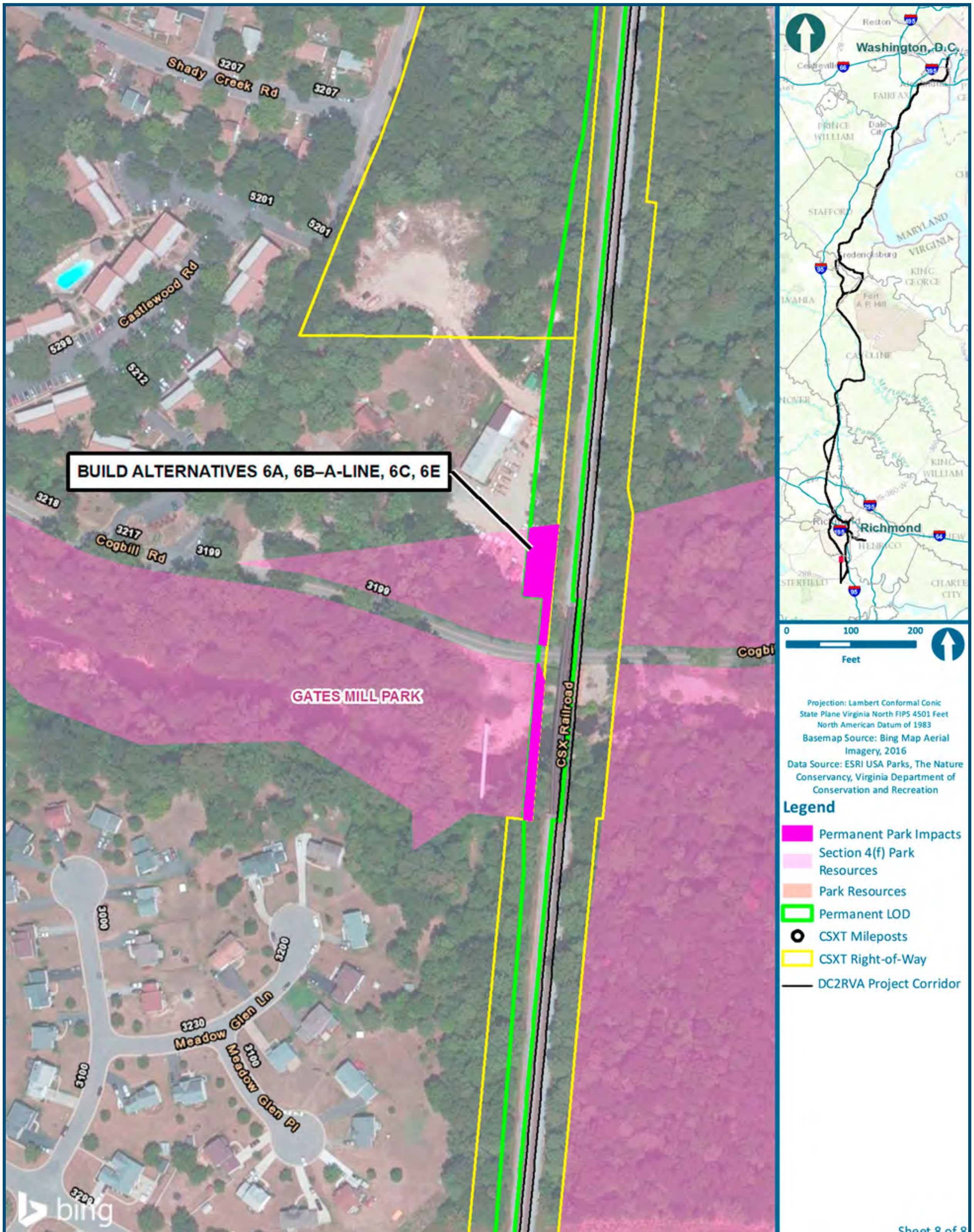

Figure 4.14-1: Permanent Park Impacts – Build Alternatives 6A, 6B–A-Line, 6C, 6E

4.15 TRANSPORTATION FACILITIES

This section summarizes the anticipated effects on the DC2RVA Project area transportation network and is presented at the same two scales as the Affected Environment Transportation Facilities section: Regional Scale and Corridor Scale.

The Regional Scale Environmental Consequences include the following (in order of presentation):

- DC2RVA train service through the corridor, including the type and number of increases in daily trips through the DC2RVA corridor, and associated ridership projections.
- Effects due to increases in DC2RVA ridership along the corridor:
  - Effects on the regional roadway network from the DC2RVA Project, including the number of vehicles anticipated to be removed from the transportation network due to DC2RVA ridership.
  - Effects on adjacent roadways to the Amtrak stations that are being served by the DC2RVA intercity passenger trains.
  - Effects on parking needs at the Amtrak stations that are being served by the DC2RVA intercity passenger trains.

The Corridor Scale Environmental Consequences include the following (in order of presentation):

- Crossing improvements that are proposed at each roadway crossing as part of the DC2RVA Project, including presentation of:
  - Descriptions of the types of crossing treatments.
  - Crossing improvements at existing public and private at-grade crossings.
  - Crossing improvements at existing grade-separated crossings.
  - Build alternative improvements to other public roadways.
  - Summary of all proposed public roadway closures and grade separations.
- Crossing improvement effects (qualitative) on connectivity and accessibility, including:
  - Effects of improvements at public at-grade crossings
  - Effects of improvements at private at-grade crossings
  - Effects of improvements at grade-separated crossings.
  - Relevance of Build Alternatives to existing quiet zones.
  - Effects on bicycle and pedestrian connectivity.
- Quantitative traffic operational analysis (changes in volumes and level of service along roadways and through the intersections) to determine the effects of the public roadway closures that are proposed as part of the DC2RVA Project.
- Quantitative analysis of the crossing improvement effects on vehicles at the public at-grade crossings (total daily vehicle delay).

It is the intent of this section to provide a high-level overview of the transportation analysis and resulting effects that were conducted to support the decisions to be made for the DC2RVA Project. The *Transportation Technical Report* (Appendix S) contains a full inventory of all methodology, data, and analyses summarized herein. In accordance with Project planning dates for physical impacts, analyses of transportation facilities are estimated for 2025; refer to Section 2.1.2 for details.

4.15.1 Regional Scale

This section presents the future year 2025 conditions of the DC2RVA train service and associated increased ridership from a regional level, and the analysis of how those improvements are anticipated to affect the greater roadway network. Year 2025 is the current best estimate of when construction of the DC2RVA infrastructure could be completed and the new DC2RVA service would be placed in operation.

4.15.1.1 DC2RVA Train Service and Ridership

Under 2025 Build conditions, intercity passenger rail ridership is projected to increase due to increased train frequency, availability, and reliability, as well as trends in general population growth. The future year increases in ridership from the DC2RVA Project could affect the regional roadway network[1] in the following ways:

- Decreases in vehicles using the roadway network (i.e., mainly I-95) between Washington, D.C. and Richmond. *Refer to Section 4.15.1.2 for this analysis.*
- Increases in vehicles using the roadway network directly adjacent to the train station(s) that provide service, as well as increases in parking needs at those stations. *Refer to Section 4.15.1.3 and 4.15.1.4 for these analyses.*

The DC2RVA Project would add nine new passenger rail round trips for 2025 Build conditions (refer to Chapter 2 for full details):

- Four new interstate corridor (NC) passenger trains, with stops at the following stations within the DC2RVA corridor:
  - Alexandria
  - Fredericksburg
  - Richmond (station location within the city varies by Build Alternative)
- Five new Northeast Regional passenger (VA) trains, with stops at the following stations within the DC2RVA corridor:
  - Alexandria
  - Woodbridge
  - Quantico
  - Fredericksburg
  - Ashland (station location within town varies by Build Alternative)
  - Richmond (station location within the city varies by Build Alternative)

Table 4.15-1 presents the annual ridership at each station, represented as a total number of boardings and alightings (i.e., a total number of train passengers getting on and off of the train) for 2015, 2025 No Build, and 2025 Build conditions, by Build Alternative. As the station alternatives in Richmond drive the differences in ridership for Build conditions throughout the DC2RVA corridor, the annual ridership is presented by the seven station alternatives in the Richmond area. Ridership is the same for Build Alternatives 6B–A-Line and 6B–S-Line, so they are presented as a single Build Alternative 6B. The table also compares each of the Build

[1] Changes in the number and operating characteristics (i.e., type, speed, and length) of trains can have a direct effect on individual at-grade highway-rail crossings in terms of delay experienced while trains are traversing the crossing. These analyses are provided on the Corridor Scale, which are included in Section 4.15.2.

Table 4.15-1: Annual DC2RVA Ridership[1] at Station in Project Area (boardings and alightings[2])

Alternative	Station									Total Corridor Stations
	Alexandria	Woodbridge	Quantico	Fredericksburg	Ashland Station	Staples Mill Road	Boulevard Road	Broad Street	Main Street	
Existing–2015	174,238	23,836	34,574	127,535	28,013	351,156	–	–	46,849	1,028,488
No Build–2025	208,496	31,191	37,945	168,627	32,694	407,119	–	–	50,846	1,248,848
Build Alternatives–2025: Annual Ridership (% Change Compared to 2025 No Build Alternative)										
6A (Staples Mill Road Station Only)	233,602 (12%)	82,694 (165%)	45,313 (19%)	305,177 (81%)	47,368 (45%)	714,795 (76%)	–	–	–	1,929,413 (54%)
6B[3] (Boulevard Station Only)	227,706 (9%)	82,304 (164%)	44,943 (18%)	311,500 (85%)	50,437 (54%)	–	700,152 (new)	–	–	1,895,121 (52%)
6C (Broad Street Station Only)	224,571 (8%)	81,140 (160%)	44,278 (17%)	311,761 (85%)	54,002 (65%)	–	–	677,667 (new)	–	1,849,827 (48%)
6D (Main Street Station Only)	228,278 (9%)	82,521 (165%)	45,118 (19%)	314,017 (86%)	55,771 (71%)	–	–	–	725,586 (1,327%)	1,910,001 (53%)
6E (Split Service, Staples Mill Road/Main Street Stations)	230,896 (11%)	82,171 (163%)	45,398 (20%)	301,810 (79%)	45,701 (40%)	588,610 (45%)	–	–	107,090 (111%)	1,879,581 (51%)
6F (Full Service, Staples Mill Road/Main Street Stations)	230,840 (11%)	83,057 (166%)	45,257 (19%)	303,303 (80%)	44,165 (35%)	417,774 (3%)	–	–	370,238 (628%)	1,951,631 (56%)
6G (Shared Service, Staples Mill Road/Main Street Stations)	233,030 (12%)	83,467 (168%)	45,527 (20%)	303,120 (80%)	44,388 (36%)	514,975 (26%)	–	–	254,728 (401%)	1,941,560 (55%)

[1] The annual ridership represents the DC2RVA Project. It excludes passengers on VRE, the Auto Train, and the long distance trains to Georgia/Florida. Ridership forecasts for the Build Alternatives only differ based on which station option is used in Richmond.

[2] Boardings and alightings represent train passengers getting on and off of the train, respectively.

[3] The DC2RVA passenger train ridership is the same for Build Alternatives 6B–A-Line and 6B–S-Line, so they are presented in this table as a single Build Alternative 6B.

conditions to the No Build, as a percentage of total ridership. The total DC2RVA ridership throughout the corridor is anticipated to increase approximately 50 percent by 2025 for all Build Alternatives (ranging from a low of 48 percent for Build Alternative 6C Broad Street Station Only, to a high of 56 percent for Build Alternative 6F, Full Service at Staples Mill and Main Street Stations).

4.15.1.2 Ridership Effects on Regional Roadways

The purpose of this analysis is to determine the effects of increased DC2RVA ridership on the number of vehicles that use the regional roadway system each day.

Future year roadway traffic volumes for the No Build condition were developed by applying a two percent growth rate (linear growth, non-compounded) to existing traffic volumes. Refer to the *Transportation Technical Report* (Appendix S) for details of the methodology of determining the growth rate, which was based on examining growth trends in historical traffic volume data, and of determining the associated future year regional roadway network Build conditions.

Table 4.15-2 summarizes the estimated traffic on the regional roadway for 2025 No Build conditions, as well as existing conditions (2015) for reference. The data indicate an overall increase of 20 percent in total VMT[2] by 2025, without the DC2RVA rail improvements. The I-95 facility represents approximately 280 directional roadway miles (including I-395) of the total regional roadway miles between Washington, D.C. and Richmond within the DC2RVA corridor. I-95 is projected to carry approximately 45.4 million vehicle miles annually by 2025, which represents almost 50 percent of the total vehicles miles in the regional area.

Table 4.15-2: Regional Roadway Network, No Build Conditions

	Directional Measure	Interstate and U.S. Routes	State Primary Route	State Secondary Route	Urban Routes	Total
2015 Total (Regional Scale)	ADT	47,856,880	14,744,998	5,748,709	1,029,843	69,380,430
	Length	895.0	530.7	422.2	70.8	1,918.7
	VMT	60,815,804	13,903,153	3,658,472	618,849	78,996,278
2025 No Build Total (Regional Scale)	ADT	57,240,582	17,636,174	6,875,907	1,231,773	82,984,436
	Length	895.0	530.7	422.2	70.8	1,918.7
	VMT	72,740,471	16,629,261	4,375,819	740,192	94,485,743

The DC2RVA improvements are expected to result in an increase of up to 854,000 annual rail passenger trips[3] (compared to No Build conditions). By shifting this travel to rail, DRPT anticipates that up to 2,050 VPD and 250,000 daily vehicle miles would be removed from the parallel roads of I-95 and U.S. Route 1 in the 123-mile Project corridor – annually, this equates to

[2] A vehicle mile is a measure of total travel on a particular roadway or within an overall area; it is calculated by multiplying the number of vehicles traveling on a particular roadway by the total length of that roadway.

[3] This value represents trips going to, from, and through the study corridor.

removing 656,000 vehicles per year and 80 million annual vehicle miles from the system[4]. This represents a reduction in vehicle miles both annually and daily of approximately 0.6 percent.

4.15.1.3 Ridership Effects on Roadway Network at Amtrak Stations

The purpose of this evaluation is to assess the effects on major roadways that are located adjacent to the Amtrak stations that are served by the DC2RVA passenger trains. To complete this assessment, the annual DC2RVA passenger train ridership (as presented in Table 4.15-1) was used to estimate daily trips by mode, and the resulting motor vehicle trips were compared to the daily volumes of the adjacent roadways[5] to determine the percent change in traffic due to increases in DC2RVA ridership. The *Transportation Technical Report* (Appendix S) includes estimates of the daily number of passengers and associated daily number of motor vehicle trips, as well as associated changes in daily traffic at every station for each Build Alternative.

A summary of the ridership effects on the station roadway network is presented in Table 4.15-3. The results indicate the following overall corridor-wide results.

- For each Build Alternative, the DC2RVA ridership equates to over 2,000 new daily motor vehicle trips at each station (for each single-station alternative) or combination of stations (for each two-station alternative).
- Most adjacent roadways to the stations will experience nominal increases in traffic[6] (under 1 percent increase in total daily traffic) for most Build conditions. In general, the adjacent roadways at the stations are multiple lane facilities with high carrying capacity that could accommodate increases in vehicular trips due to the DC2RVA Project.
- Overall, the highest increases in daily traffic on adjacent roadways due to the DC2RVA ridership are anticipated at the Fredericksburg station where traffic is projected to increase approximately 7 to 8 percent on the adjacent roadways of Princess Anne Street and Caroline Street for all Build Alternatives. These facilities carry some of the lowest existing and future daily volumes on adjacent roadways to stations for the project.
- Within Ashland, the location of the station has minimal effect on the results. Increases to traffic are nominal (less than 1 percent change in daily traffic) for both the existing station location and the station relocation to Ashcake Road.
- For the single station Build Alternatives in Richmond, the greatest increases in traffic on adjacent roadways are anticipated for the two stations that are not currently served by any passenger trains (Boulevard and Broad Street stations), which are projected to increase approximately 5 percent. Traffic increases adjacent to the Main Street Station and Staples Mill Station are projected to increase approximately 4 percent and 2 percent, respectively.

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[4] Average daily to annual equivalence based on assumed ratio of 320.

[5] Adjacent roadway(s) at stations were defined as those that vehicles (including personal motor vehicle, transit, or drop-off service such as taxis) could use to access the station. The starting adjacent roadway values were based on the DC2RVA Project not being build, i.e. the No Build.

[6] While increases in DC2RVA ridership would cause increases in traffic adjacent to DC2RVA stations, the levels of increase in ridership do not directly correlate to the same increases in traffic.

- For the two-station Build Alternatives in Richmond, the traffic increases vary by station; however, all projected traffic increases are anticipated to be under 2 percent at both Staples Mill Road and Main Street stations for all Build conditions.
- Reductions in traffic due to the DC2RVA ridership are anticipated at stations that are being served in the No Build condition but are not being served in the Build condition.

4.15.1.4 Ridership Effects on Parking Needs at Stations

DRPT used an Amtrak-approved method to determine the parking demand at each Amtrak station in the DC2RVA corridor[7]. Parking factors vary by the type and location of station. There are three types of Amtrak stations within the DC2RVA corridor: Large (fully staffed, multiple transit services and amenities, multiple tracks and platforms); Medium (lower levels of staff, supporting transit services); and Caretaker (enclosed waiting areas, limited amenities, not fully staffed). Additionally, stations were categorized as city center (high density urban) or suburban (medium density)[8]. The analysis approach takes into account the different characteristics of regional, state corridor, or long distance passenger train riders and includes average duration of trip. Refer to the *Transportation Technical Report* (Appendix S) for detailed assumptions, as well as results for each station alternative.

Alexandria Depot

[7] Amtrak recommends that parking capacities at its stations should be based on at least a twenty-year projection of ridership growth. Accordingly, DRPT determined it appropriate to conduct the DC2RVA parking analysis based on projections for the year 2045.

[8] It was assumed that a suburban station requires more parking than in a city center.

Table 4.15-3: Summary of Ridership Impacts on Station Roadways, % Change[1] in Traffic on Adjacent Roadways[2] due to DC2RVA Intercity Passenger Trains

2025 Build Alternatives	Station								
	Alexandria	Woodbridge	Quantico	Fredericksburg	Ashland Station	Staples Mill Road	Boulevard Road	Broad Street	Main Street
6A (Staples Mill Road Station Only)	0.2%	0.4%	0.8%	7.7%	0.3%	2.2%	0.0%	0.0%	-0.4%
6B[3] (Boulevard Station Only)	0.1%	0.3%	0.4%	8.1%	0.3%	-3.0%	5.2%	0.0%	-0.4%
6C (Broad Street Station Only)	0.1%	0.3%	0.4%	8.1%	0.3%	-3.0%	0.0%	5.3%	-0.4%
6D (Main Street Station Only)	0.1%	0.3%	0.4%	8.1%	0.3%	-3.0%	0.0%	0.0%	3.9%
6E (Split Service, Staples Mill Road/Main Street Stations)	0.1%	0.3%	0.8%	7.3%	0.3%	1.3%	0.0%	0.0%	0.3%
6F (Full Service, Staples Mill Road/Main Street Stations)	0.1%	0.4%	0.8%	7.3%	0.1%	0.1%	0.0%	0.0%	1.8%
6G (Shared Service, Staples Mill Road/Main Street Stations)	0.1%	0.4%	0.8%	7.3%	0.1%	0.7%	0.0%	0.0%	1.1%

[1] The % changes shown in this table compare the 2025 Build to the 2025 No Build conditions. For details of each Build Alternative, refer to the *Transportation Technical Report.* The information is presented by the Richmond area alternatives, because the ridership forecasts developed for this Project only differ based on which station option is used in Richmond.

[2] Adjacent roadway(s) at stations were defined as those that vehicles (including personal motor vehicle, transit, or drop-off service such as taxis) could use to access the station.

[3] The DC2RVA passenger train ridership is the same for Build Alternatives 6B–A-Line and 6B–S-Line, so they are presented in this table as a single Build Alternative 6B.

Note that the station(s) served within Richmond for each Build Alternatives are highlighted for ease of reference.

DRPT calculated a range of daily parking space demand (a high and low range) based on projected DC2RVA ridership. A summary of the results is provided in Table 4-15.4.

Table 4-15.4: Summary of Daily Parking Space Demand by Station

Station	Station Size / Type	Daily Parking Space Demand: Low	Daily Parking Space Demand: High
Alexandria	Medium / Suburban	140	190
Woodbridge	Caretaker / Suburban	35	47
Fredericksburg	Medium / Suburban	142	191
Ashland	Caretaker / Suburban	29	39
Boulevard Road	Large / Suburban	459	620
Broad Street	Large / Suburban	446	603
Staples Mill:			
Build Alternative 6A	Large / Suburban	467	632
Build Alternative 6E	Large / Suburban	411	556
Build Alternative 6F	Large / Suburban	301	406
Build Alternative 6G	Large / Suburban	344	465
Main Street:			
Build Alternative 6D	Large / City Center	193	261
Build Alternative 6E	Medium / Suburban	49	66
Build Alternative 6F	Large / Suburban	199	269
Build Alternative 6G	Medium / Suburban	120	163

The results indicate the following overall corridor-wide results.

- The daily parking space demand does not vary by Build Alternative for the stations with a single location (Alexandria; Woodbridge; Fredericksburg; Ashland; Boulevard Road; and Broad Street).
- At Staples Mill Road Station, sizing and type do not vary. Build Alternative 6A would require the highest daily parking space demand at 632 spaces (high demand), which is a 56 percent increase over the Build Alternative 6F which requires 406 spaces (high demand).
- At Main Street Station, the station size and type varies by Build Alternative. Build Alternatives 6D and 6E, in which it is defined as a large station, would require the most daily parking (260 to 270 spaces, high demand), while Build Alternative 6E, in which Main Street is defined as a medium station, requires the least amount of parking (66 spaces, high demand).

The conceptual layouts based on these parking needs are shown in Chapter 2. These conceptual layouts for each station were based on the physical characteristics of the station site, the DC2RVA basis of design, and the functional requirements of Amtrak. In general, the high end of the range of the daily parking space demand was used (with rounding) when developing the parking layouts; however, for the Alexandria station, the conceptual layout reflects the existing property constraints and not the calculated parking space demand.

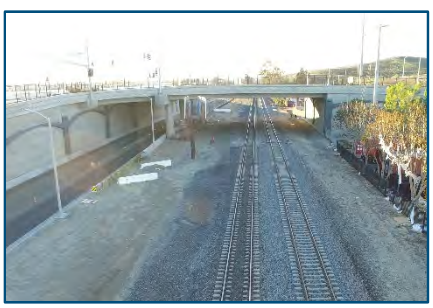
4.15.2 Corridor Scale

This section presents the potential effects of the DC2RVA Project on the highway-rail crossings and connecting roadway network. It includes descriptions of the improvements proposed at each crossing as well as analysis of the effects of those improvements on vehicles using the crossings and on connectivity to the transportation network. All analyses in this section are for the permanent Build condition; for temporary construction-related effects, refer to Section 4.19.

4.15.2.1 DC2RVA Build Alternative Crossing Improvements

Types of Crossing Treatments

The following five types of crossing treatments are included within the DC2RVA Build Alternatives; these were based on FRA guidelines, life-cycle cost efficiency, and safety needs of the geometry of parallel/intersecting crossing roadways and operating conditions within the DC2RVA corridor. Other site improvements (i.e., geometric and/or safety improvements) to improve overall roadway and/or railroad safety, as part of or in addition to these treatments, are not precluded from the design of any of these treatments. It is anticipated that changes to crossing treatments that could occur during final design would have limited effects compared to the treatment types developed and analyzed in this Draft EIS. In the unanticipated event that substantive changes are developed as part of final design efforts, the impacts of these changes would be assessed at that time.



***Grade Separation*.**

A highway-rail crossing that occurs at two different vertical levels (i.e., the roadway pavement and the railroad tracks do not intersect). Per FHWA[9], "the decision to grade separate at [an existing] highway-rail crossing is primarily a matter of economics" as a long-term investment. Benefits of grade-separated crossings (compared to at-grade crossings) include reduction in collisions, vehicle and rail delay, and maintenance costs.

***Four-Quadrant Gates*.**

A system of gates (entrance and exit gates on all roadway approaches) designed to provide full closure of the crossing when a train is approaching or occupying the crossing, thus eliminating the opportunity for vehicles to navigate around a single lowered gate. Design can include detection inside the gates to ensure that vehicles do not get "trapped" inside lowered gates.

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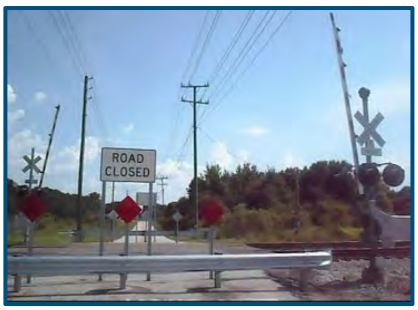
[9] Quoted from FHWA's *Railroad-Highway Grade Crossing Handbook* (Revised Second Edition August 2007)

***Median Treatment with Gates*.**

A system of physical improvements designed to impede the movement of vehicles into the opposing traffic lane and around the single lowered gate (two-quadrant gate). Treatments include barrier wall systems, wide raised medians, and mountable raised curb systems with vertical median separators. Considerations include cost-benefit (median treatments are generally less expensive to install than four-quadrant gate systems) and absence/distance of nearby intersections and driveways.



***Closure*.**

Per FHWA[10], "closure of [an existing at-grade] crossing to highway traffic should always be considered as an alternative." Benefits include reduction in collisions, vehicle and rail delay, and rail maintenance costs. Considerations include elimination of redundant crossings, convenience/travel cost of vehicles using an adjacent crossing, and effects on adjacent crossings and connecting roadway network due to diversion of vehicles.

***Locking Gate (private crossings only)*.**

This term refers to a moveable barrier gate that is engaged (i.e., closed) and only opens on demand, and would be implemented in accordance with FRA's 2009 *High Speed Passenger Rail Safety Strategy* guidelines[11]. The locking gate could be manual (requiring property owners to exit their vehicle to manually interact with the gate) or more automated (e.g., key card access to open and close the gate), the details of which would be determined during final design.

***No Action*.**

Considered at crossings where the existing crossing treatment is sufficient to accommodate the DC2RVA Project.

The example images above are representative of a typical application; they are included for illustrative purposes only.

10 Quoted from FHWA's *Railroad-Highway Grade Crossing Handbook* (Revised Second Edition August 2007)

11 FRA's 2009 High Speed Passenger Rail Safety Strategy guidance states for track speeds between 80mph and 110mph, private highway-rail grade crossings should be treated with "automated warning or locked gate with signal interlock". Other types of private gates were considered during the alternatives development process, but from a safety standpoint, the locked gate treatment was considered to be the better candidate by restricting access to the crossing to the private crossing owner and allowing access only for a specific set of conditions as opposed to being open 24 hours a day excluding train events.

Virginia state code[12] restricts the creation of new at-grade crossings; this means that any new crossings of existing roadways due to the DC2RVA Project should be grade-separated, with potential roadway realignment and/or closure. As part of any Build Alternative for the DC2RVA Project, every existing or new at-grade crossing should be grade-separated, closed, or have appropriate crossing treatment that is connected into the train detection circuitry[13] and physically impedes vehicles from accessing the tracks when a train is approaching or occupying the crossing.

Existing or future year roadway capacity improvements, other than those that are directly due to actions of this Project, are under the purview of VDOT and/or local governments and are excluded from the DC2RVA analyses. For example, if a Build Alternative of the DC2RVA Project consolidates two adjacent crossings, assessing if roadway improvements that are directly related to that traffic diversion are required is part of this Project and would be evaluated as part of the environmental consequences; however, assessing if roadway improvements are needed due to increases in overall traffic due to regional growth (i.e., No Build conditions) is outside the purview of this Project.

Crossing Improvements at Existing Public and Private At-Grade Crossings

Decisions regarding whether an existing at-grade public or private roadway crossing should be eliminated (grade-separated or closed) or improved through installation of new or additional crossing treatments depended on several factors, including FHWA crossing elimination guidance criteria for public roadways[14], as well as the identification and analysis of site-specific conditions by the DRPT team[15]:

- Traffic Data and Traffic Operations
- Train Data and Rail Operations
- Safety/Geometric Deficiencies
- Environmental Resources
- Engineering Feasibility
- Adjacent Property Uses.
- Preliminary Cost-Benefit
- Accessibility
- Connectivity to Adjacent Crossings
- Special Uses at Crossings

[12] The applicable state law can be found at: https://vacode.org/56-363/.

[13] The design and construction of crossings will comply with all applicable safety standards, including positive train control. Positive train control is a new system being designed to automatically stop a train before certain types of accidents occur. Specifically, positive train control, as mandated by Congress in the Rail Safety Improvement Act of 2008 (RSIA), is being designed to prevent train-to-train collisions; derailments caused by excessive speed; unauthorized incursions by trains onto sections of track where maintenance activities are taking place; and movement of a train through a track switch left in the wrong position.

[14] FHWA's *Railroad-Highway Grade Crossing Handbook – Revised Second Edition* provides guidance criteria and details physical and operational improvements for highway-rail at-grade crossings to enhance safety and operation of roadway and rail traffic through the crossings. Specifically, the handbook outlines analysis methodologies for consideration of traffic control devices or other measures at every public roadway-rail at-grade crossing and sets forth 11 conditions 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. FHWA Rail-Roadway Crossing Handbook can be found here: http://safety.fhwa.dot.gov/xings/com_roaduser/07010/07010.pdf.

[15] Site-specific condition evaluation was based on project site visits, aerial and/or street-view photography, and VDOT and FRA online databases. The level of detail documented for the site-specific conditions was intended to support identification of feasibility considerations for each proposed action at the crossing location.

The methodology to determine the crossing treatment at new crossings followed a similar site-specific process as described above, with an emphasis on roadway network connectivity and accessibility to adjacent crossings and land uses.

Based on the above, DRPT developed a crossing improvement recommendation for each crossing[16] for the Draft EIS, which can vary by Build Alternative. It is anticipated that, during final design, additional crossing diagnostics would be performed based on the standards of practice at that time.

Summary tables of total type of crossing improvement for each Build Alternative for public and private crossings are provided in Tables 4.15-5 and 4.15-6, respectively.

At-Grade Crossing at Vaughan Road in Ashland, VA

[16] The proposed crossing improvements that DRPT developed were based on the Build condition of adding one additional track throughout the DC2RVA corridor. It was intended that the primary proposed actions resulting from the evaluation could be altered for other Build condition scenarios based on detailed engineering analyses and design considerations. For example, for Hermitage Road (S-Line crossing), DRPT initially recommended additional median treatment; however, during the design of Build Alternative 6B–S-Line, it was determined that the potential for risk to motorists at this crossing increases significantly with passenger trains accelerating and decelerating toward the proposed Boulevard Station. Accordingly, the Hermitage Road crossing was proposed to be grade-separated as part of this build alternative.

Table 4.15-5: Public At-Grade Crossing Improvements, Summary by Build Alternative

Alternative Area	Alternative	Description	Proposed Crossing Improvements[1] Grade Separation	Crossing Closure	Four-Quadrant Gates	Median Treatment	No Action	New[2]	Total
Area 1: Arlington (Long Bridge Approach)	1A, 1B, and 1C	RO 2-Track East Alignment, RO 2-Track West Alignment, and RO 1 Track East & West	0	0	0	0	0	0	0
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A[3]	Add 1 Track East or West	0	1	2	0	1	0	4
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	No Additional Track	0	0	3	1	0	0	4
	3B	Add Main Track East of Existing	1	0	2	1	0	0	4
	3C	2-Track Bypass (East)	0	0	5	4	0	5	14
Area 4: Central Virginia (Crossroads to Doswell)	4A	Add 1 Track East or West	0	1	4	2	0	0	7
Area 5: Ashland (Doswell to I-295)	5A and 5B	No Additional Track; and Add 1 Track East	2	1	7	1	0	0	11
	5A–Ashcake, 5B–Ashcake, and 5D–Ashcake,	No Additional Track (Relocate Station); Add 1 Track East (Relocate Station); and Add Main Track and Center Existing;	2	0	8	1	0	0	11
	5C	2-Track West Bypass	0	1	9	1	0	8	19
	5C–Ashcake	2-Track West Bypass (Relocate Station)	0	0	10	1	0	8	19
Area 6: Richmond (I-295 to Centralia)	6A, 6B–A-Line, and 6E	Staples Mill Road Station Only; Boulevard Station Only (A-Line); and Split Service Main Street/Staples Mill	3	4	2	1	1	0	11
	6B–S-Line	Boulevard Station Only (S-Line)	4	5	4	3	1	0	17
	6C	Broad Street Station Only	3	4	2	2	1	2	14
	6D, 6F, and 6G	Main Street Station Only; Full Service. Main Street/Staples Mill; and Shared Service, Main Street/Staples Mill	3	5	4	4	1	0	17

[1] "Crossing Closure" can include construction of a new roadway connector to provide access. "Median Treatment" can include raised medians (new or extension of existing raised medians) or mountable raised curbs with vertical median tubes, with gates. "No action required" includes existing crossings with existing treatment that meets the DC2RVA criteria; existing crossings that are not affected by the Build Alternative (bypass alignments only); or new crossings of public roadways that do not require an action due to property acquisition (bypass alignments).

[2] "New" public crossings are provided as a summary total for reference and include crossings that would be grade-separated, closed/consolidated with adjacent crossings or due to property acquisitions; or realigned. The exception is for Build Alternative 6C (Broad Street Station), which includes two new at-grade public roadway crossings as part of the station improvements.

[3] Build Alternative 2A includes the proposed improvement of four-quadrant gates at Potomac Avenue, if not installed by others as part of the Powells Creek–Arkendale improvements.

Note that all crossings may require minor safety and/or geometric improvements related to construction of the Build Alternative (i.e., moving existing gates to accommodate the proposed track).

This table does not include potential effects to other non-crossing roadways that may be required as part of the Build Alternative.

Table 4.15-6: Private At-Grade Crossing Improvements, Summary by Build Alternative

Alternative Area	Alternative	Description	Proposed Crossing Improvement				New Private Crossings[2]	Total
			Crossing Closure	Four-Quadrant Gates	Locking Gate	No Action Required[1]		
Area 1: Arlington (Long Bridge Approach)	1A, 1B, and 1C	RO 2-Track East Alignment; RO 2-Track West Alignment; and RO 1 Track East & West	0	0	0	0	0	0
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	Add 1 Track East or West	0	3	1	1	0	5
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A and 3B	No Additional Track; and Add Main Track East of Existing	0	0	0	0	0	0
	3C	2-Track East Bypass	1	0	4	0	4	9
Area 4: Central Virginia (Crossroads to Doswell)	4A	Add 1 Track East or West	0	0	10	0	0	10
Area 5: Ashland (Doswell to I-295)	5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake	No Additional Track; Add 1 Track East of Existing; Add Main Track / Center Existing	0	0	0	0	0	0
	5C and 5C–Ashcake	2-Track West Bypass	0	0	0	0	7	7
Area 6: Richmond (I-295 to Centralia)	6A, 6B–A-Line, 6C, and 6E	Staples Mill Road Station Only; Boulevard Station Only (A-Line); Broad Street Station Only; and Split Service, Main Street/Staples Mill	0	0	0	0	0	0
	6B–S-Line, 6D, 6F, and 6G	Boulevard Station Only (S-Line); Main Street Station Only; Full Service, Main Street/Staples Mill; and Shared Service, Main Street/Staples Mill	0	2	2	0	0	4

[1] "No action required" in the above table includes existing crossings with existing treatment that meets the DC2RVA criteria; or new crossings of public roadways that do not require an action due to property acquisition or alternate access (bypass alignments).

[2] "New Private Crossings" in the above table are provided as a summary total for reference, and include crossings that would be closed/consolidated with adjacent crossings or due to property acquisitions; or realigned.

Note that all crossings may require minor safety and/or geometric improvements related to construction of the Build Alternative (i.e., moving existing gates to accommodate the proposed track).

As shown by the summary at-grade crossing improvement data:

- DRPT proposes that most of the existing at-grade public roadways remain at grade with the addition of four-quadrant gates or gates with median treatment as appropriate to provide a corridor with increased safety for the DC2RVA Project.
- DRPRT proposes that most of the existing private at-grade crossings have locking gates in all Build Alternatives, unless the property is acquired or alternate access can be provided. Four-quadrant gates are proposed at private crossing locations where site-specific safety, geometric, and/or operating conditions were determined to preclude use of locking gates. See the *Transportation Technical Report* (Appendix S) for details.
- Most new crossings occur in Build Alternative 3C (Fredericksburg Bypass) and Build Alternatives 5C and 5C–Ashcake (Ashland Bypass).
- Build Alternative 6C (Broad Street Station Only) includes two new at-grade public roadway crossings on West Leigh Street as part of the station improvement design, which would require a variance of Virginia State Code and/or coordination with VDOT.

Each proposed crossing improvement for public at-grade roadways is presented in Figures 4.15-1 through 4.15-13. Additionally, a list of each public roadway closure and grade separation is provided at the end of this section.

Full methodology of the crossing improvement evaluation process, as well as detailed lists of the crossing roadways and figures showing the proposed crossing improvements at private crossings, are provided in the *Transportation Technical Report* (Appendix S)**.**

Crossing Improvements at Existing Grade-Separated Crossings

All existing grade-separated crossings (both public and private) in the rail corridor would be maintained as part of all Build Alternative designs. The proposed crossing improvements at the existing grade-separated crossings consist of one of the following:

- No action required (i.e., the existing structure is sufficient to accommodate the DC2RVA Project)
- Extend the existing structure (i.e., widen either roadway structure for roadway overpasses or rail structure for roadway underpasses)
- Build a new structure

These three types of crossing improvements are functionally equivalent because the existing operations of the crossing roadway (i.e., the number and type of lanes) are not modified as part of the Build Alternative.

Build Alternative Improvements to other Roadways

In addition to the highway-rail crossing roadways, two public roadways that run parallel to and generally adjacent to the railroad tracks are included in the Build Alternative improvements, as follows.

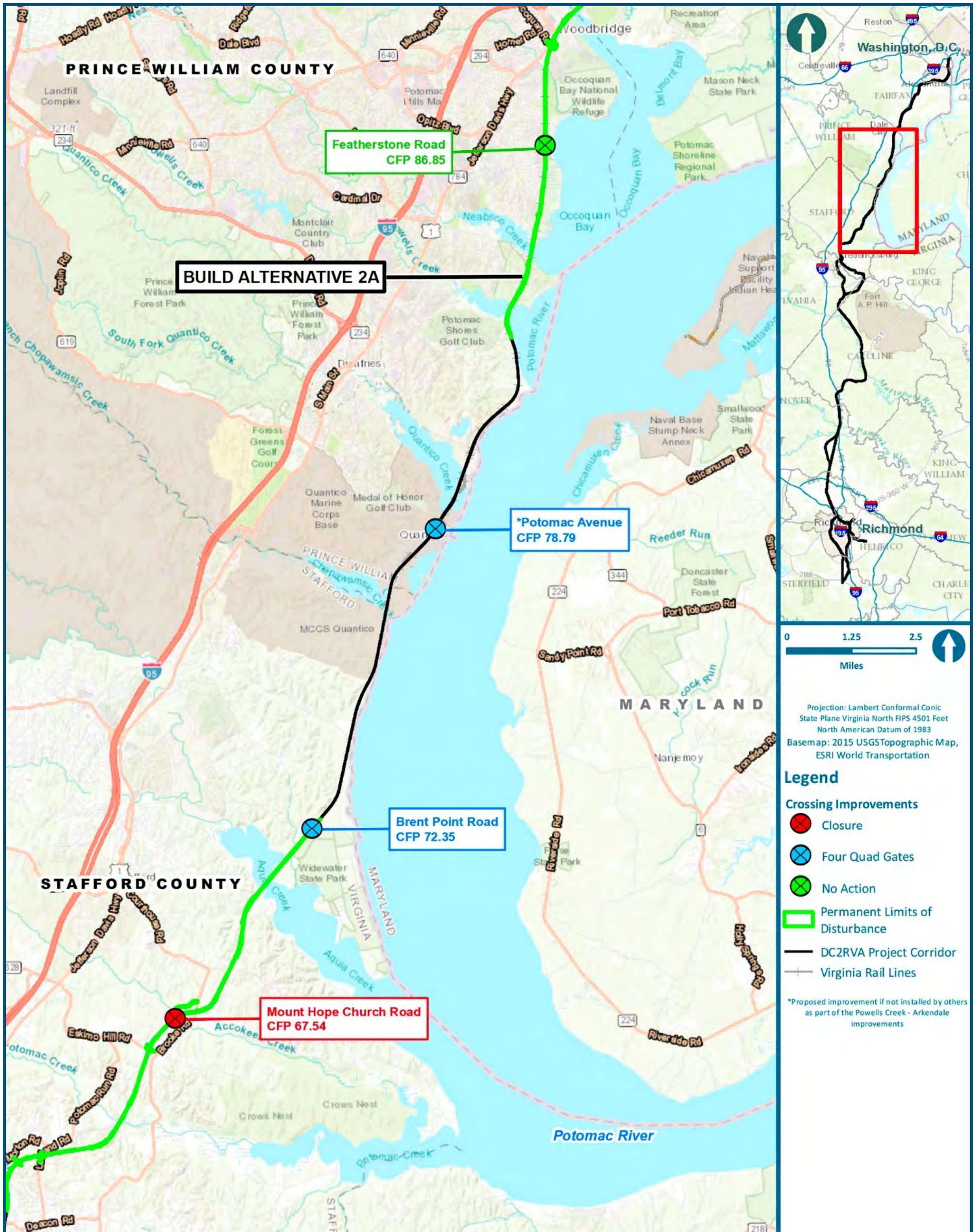


Figure 4.15-1: Public At-Grade Crossing Improvements – Build Alternative 2A

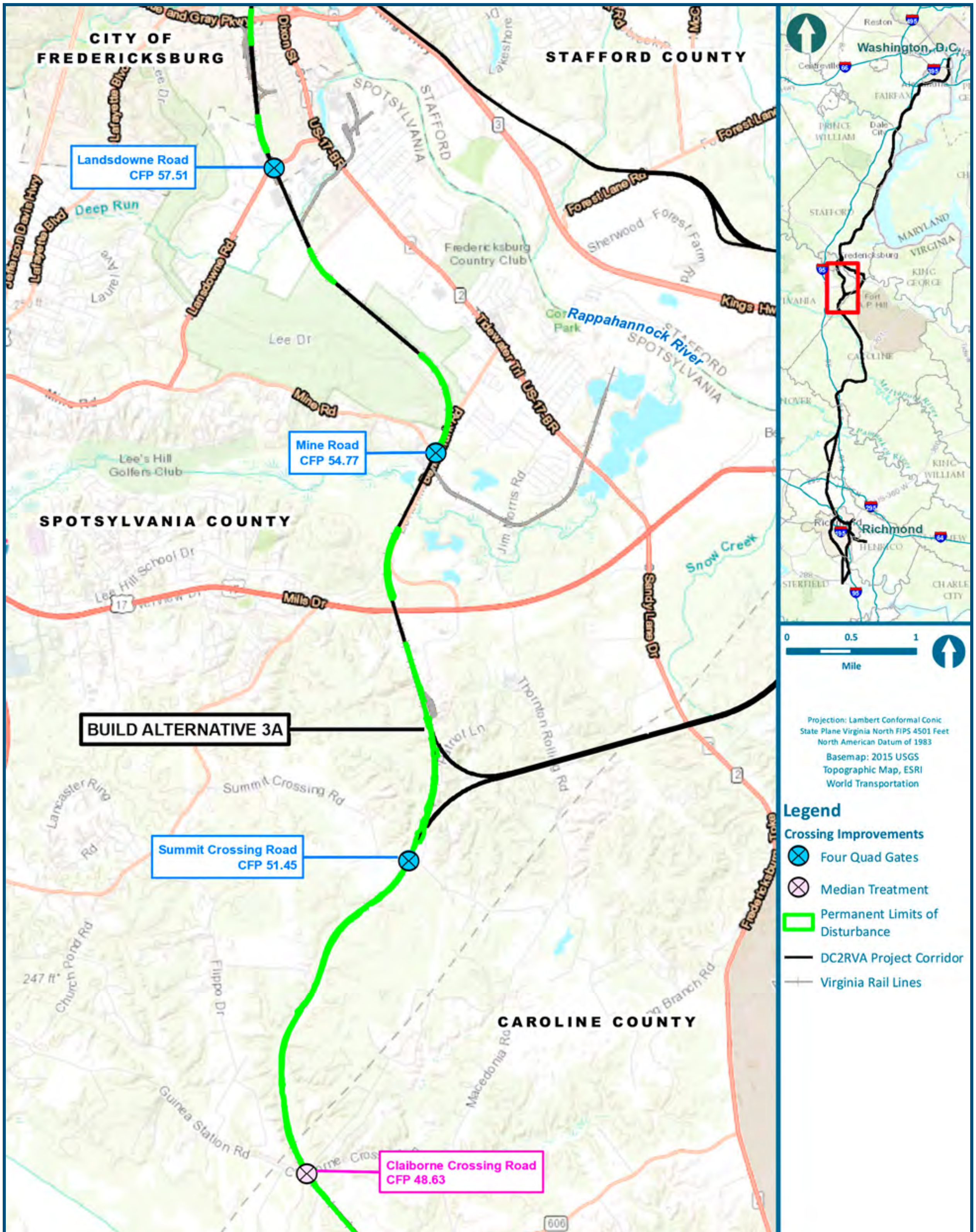


Figure 4.15-2: Public At-Grade Crossing Improvements – Build Alternative 3A

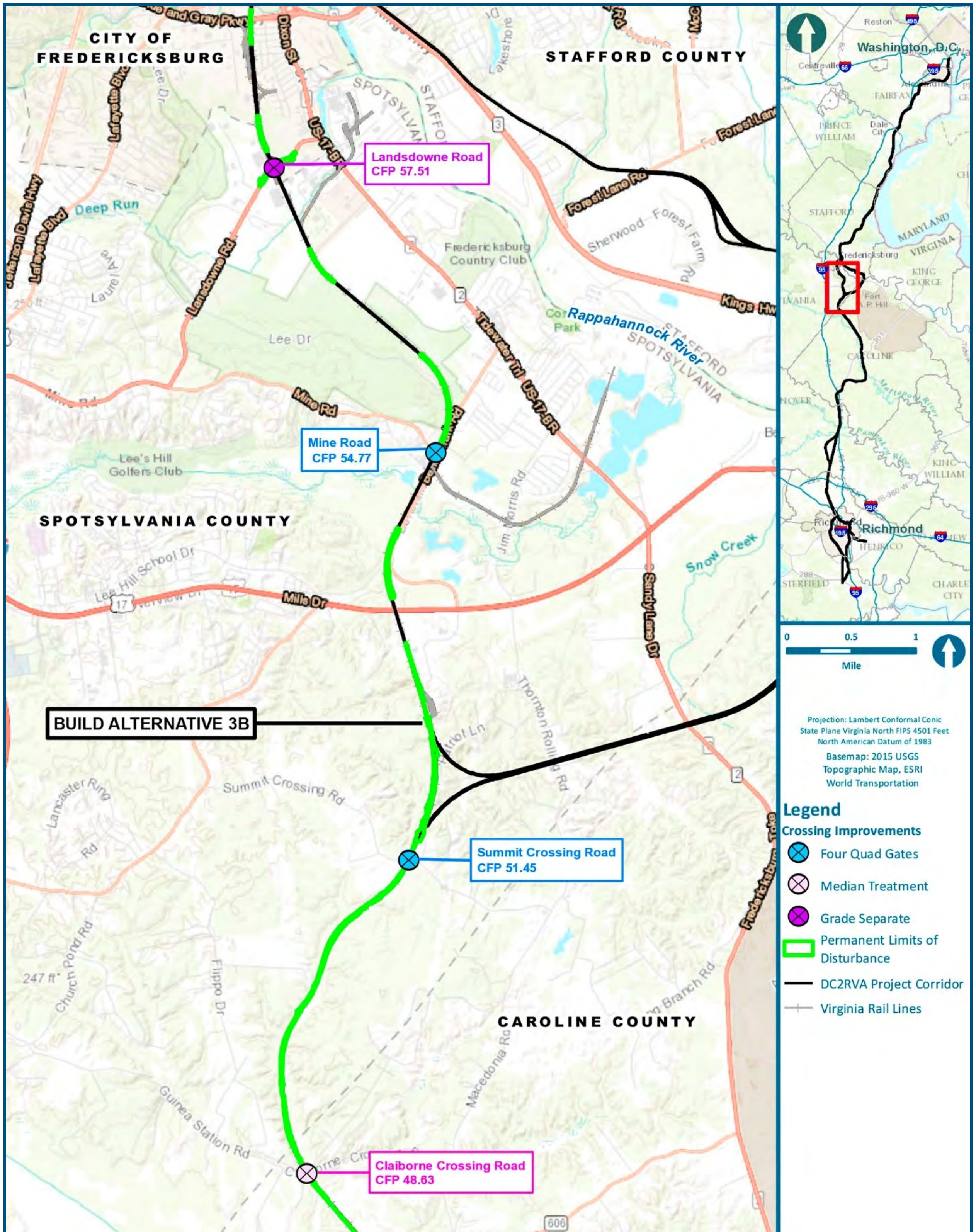


Figure 4.15-3: Public At-Grade Crossing Improvements – Build Alternative 3B

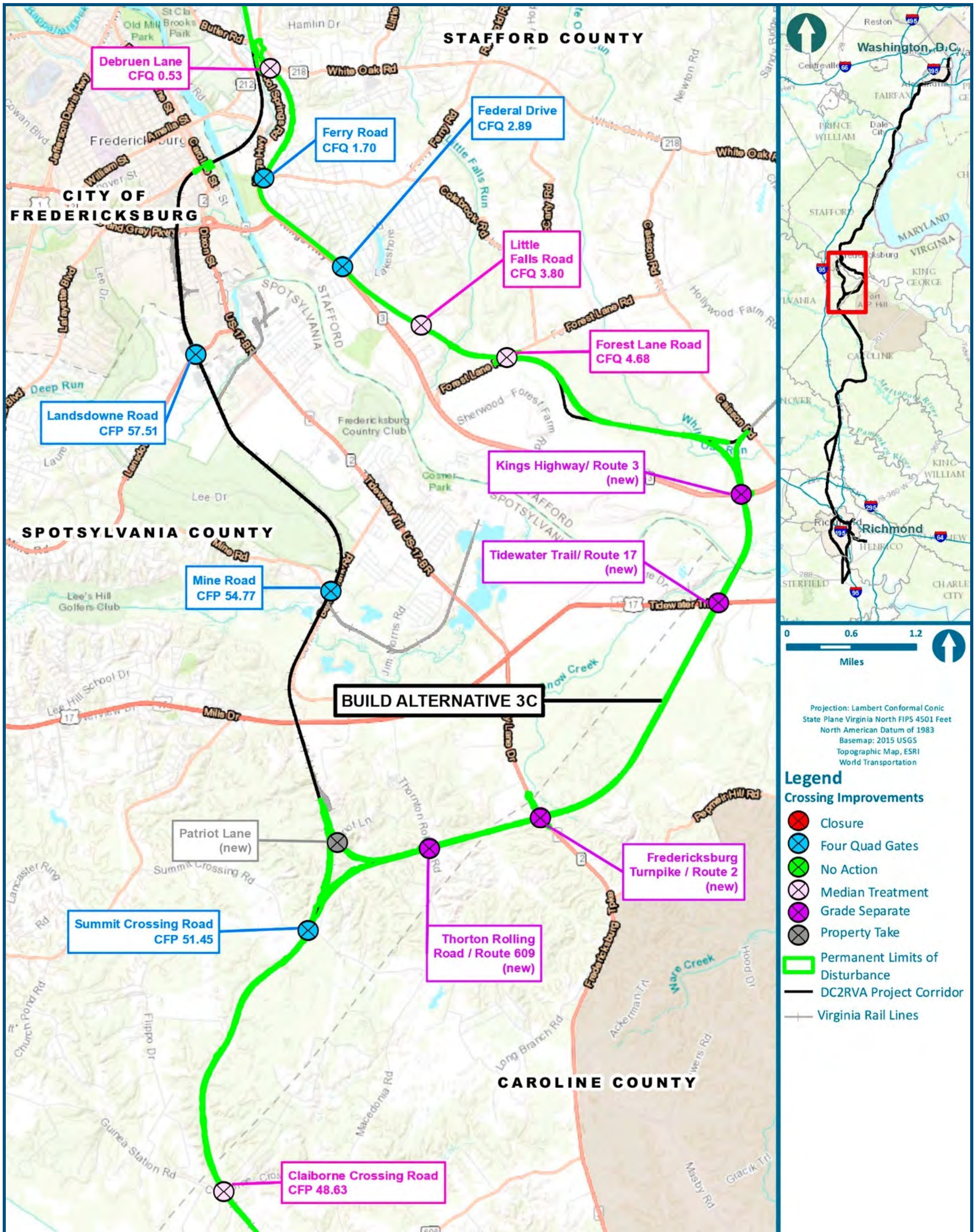


Figure 4.15-4: Public At-Grade Crossing Improvements – Build Alternative 3C

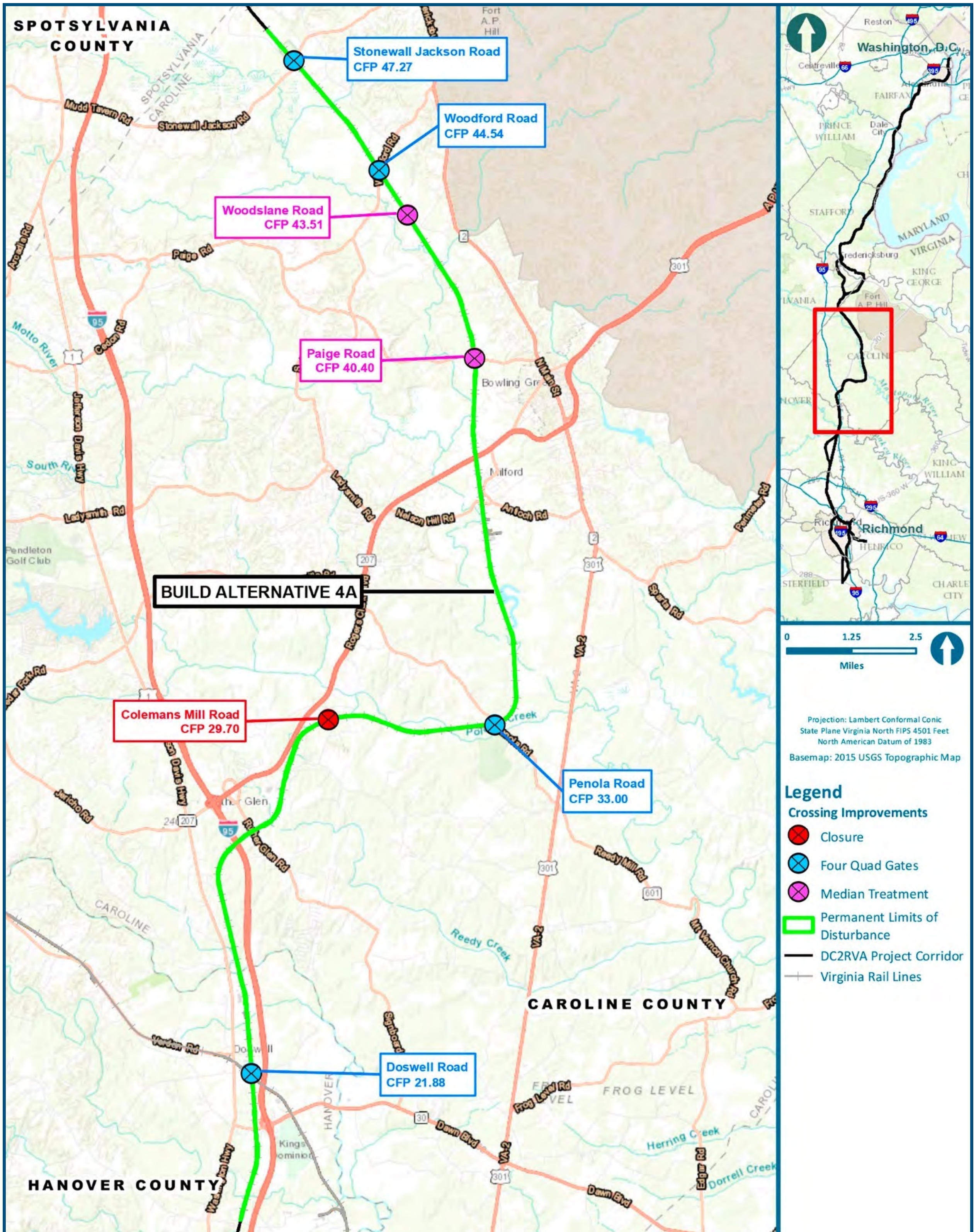


Figure 4.15-5: Public At-Grade Crossing Improvements – Build Alternative 4A

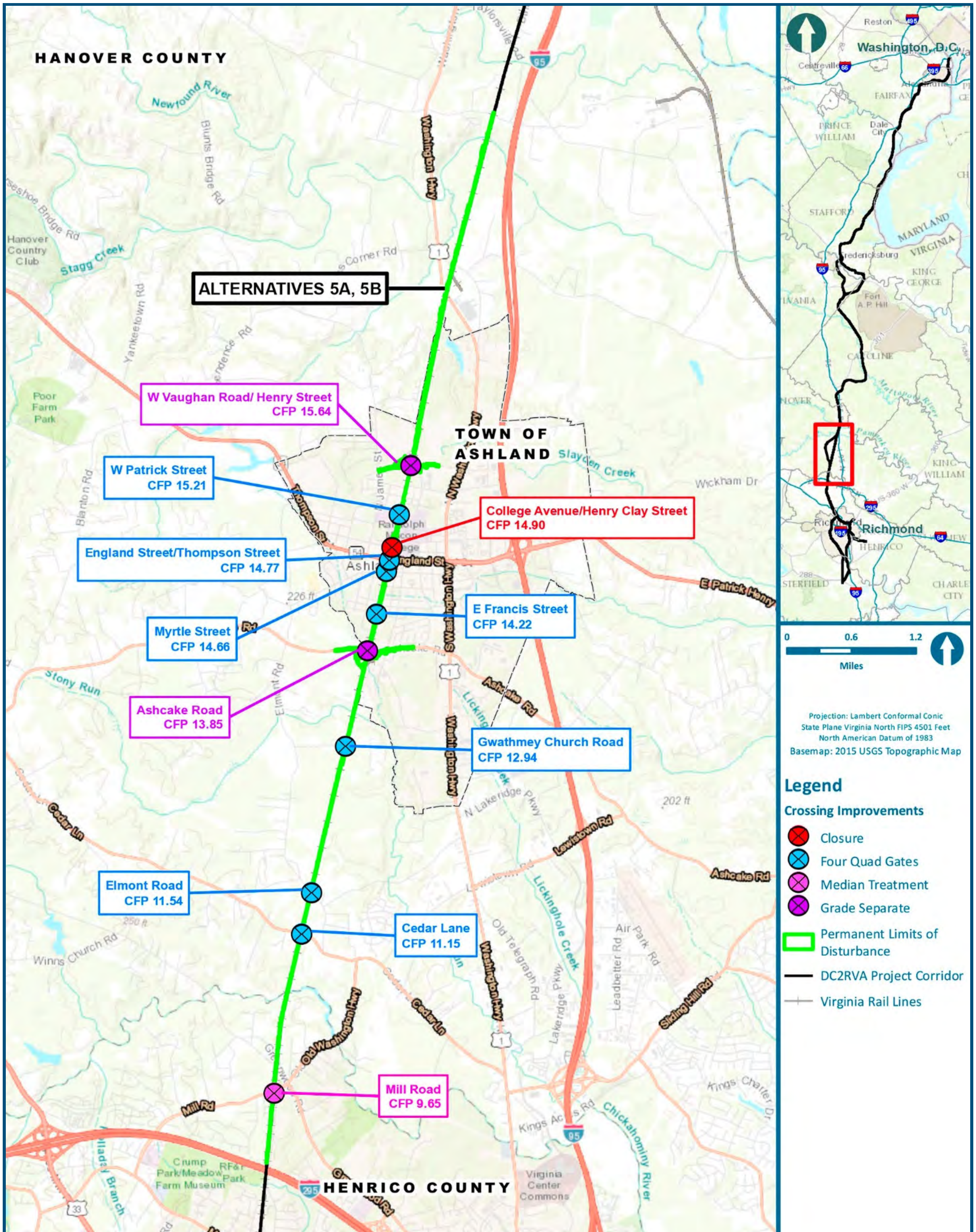


Figure 4.15-6: Public At-Grade Crossing Improvements – Build Alternative 5A, 5B

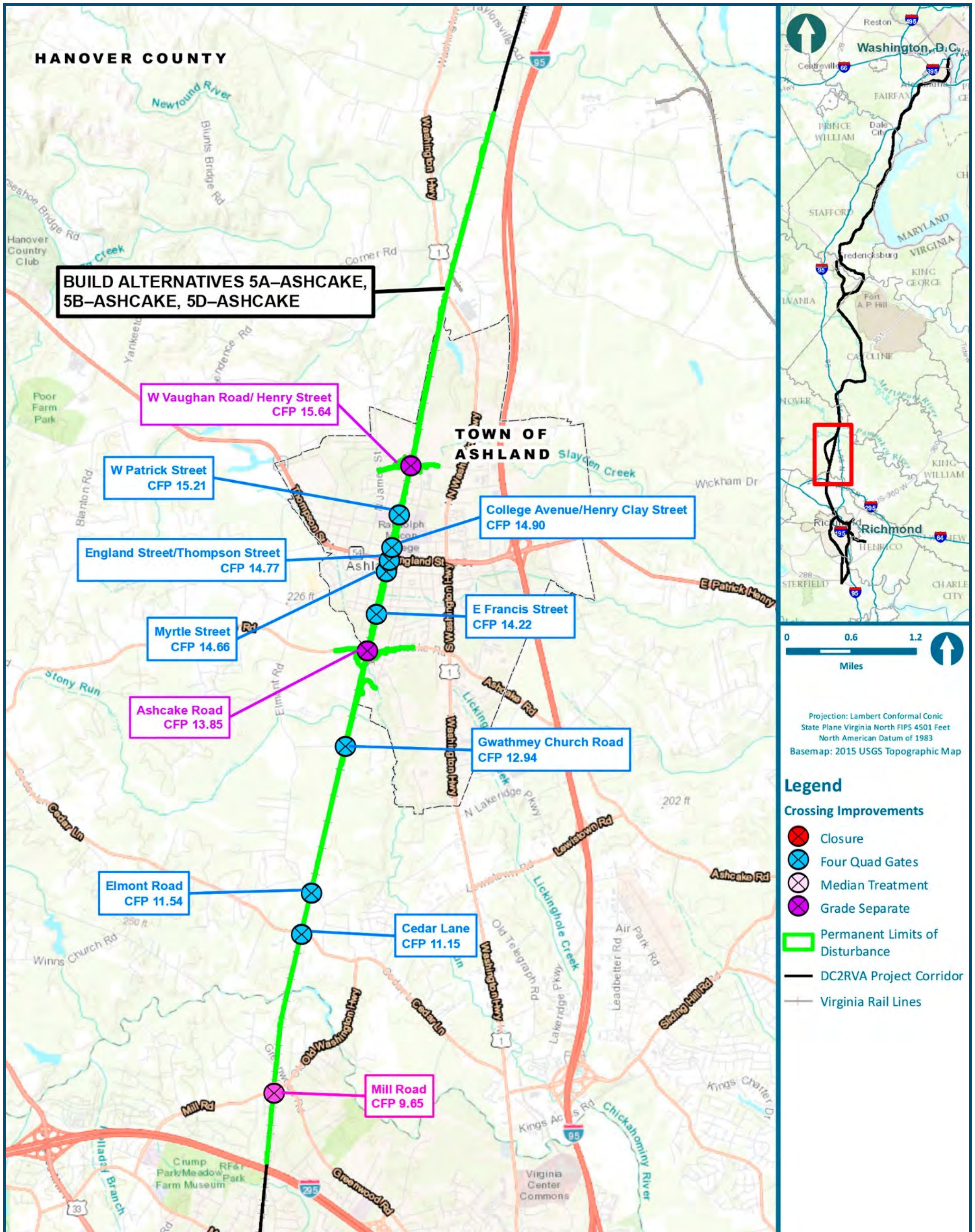


Figure 4.15-7: Public At-Grade Crossing Improvements – Build Alternatives 5A–Ashcake, 5B–Ashcake, 5D–Ashcake

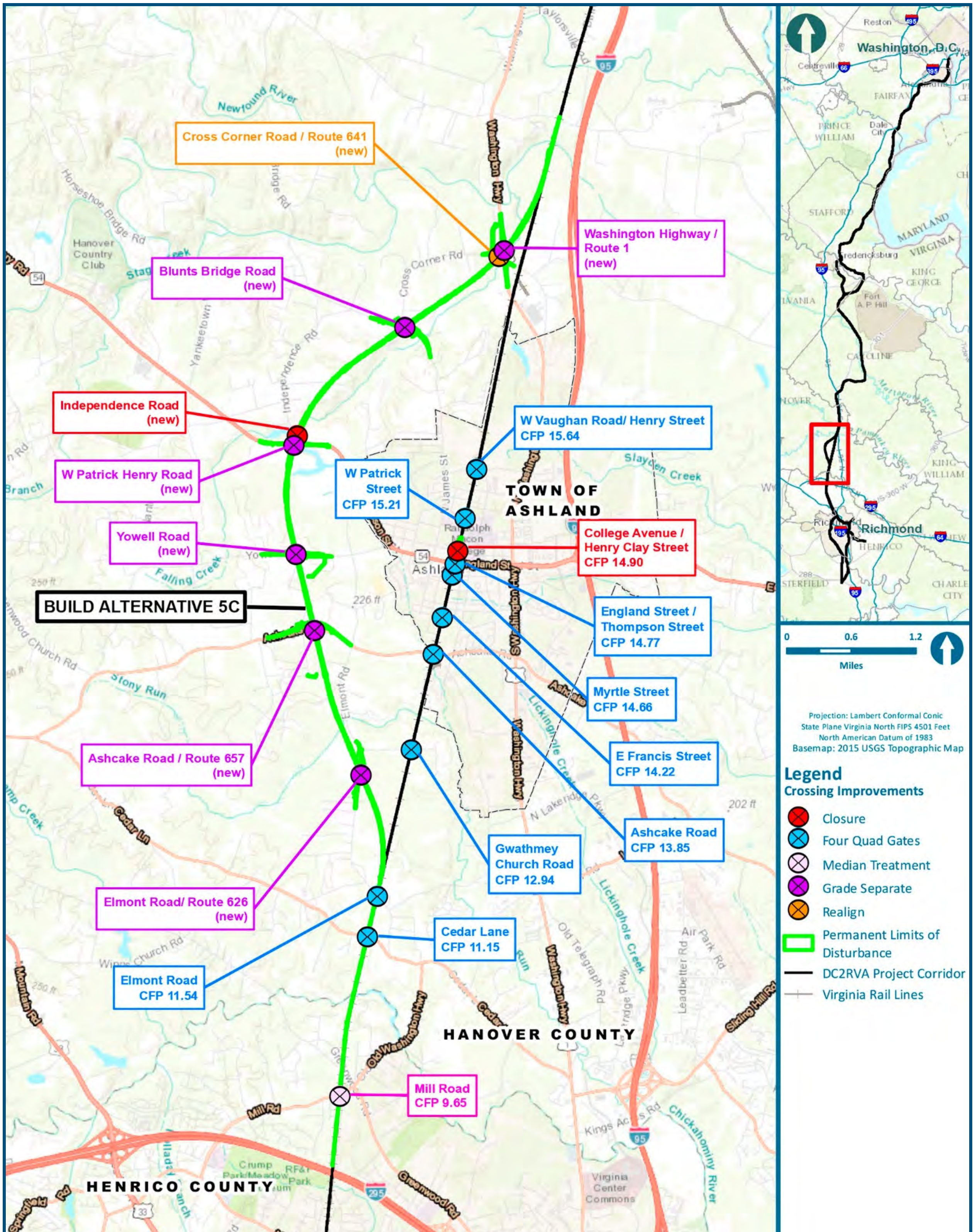


Figure 4.15-8: Public At-Grade Crossing Improvements – Build Alternative 5C

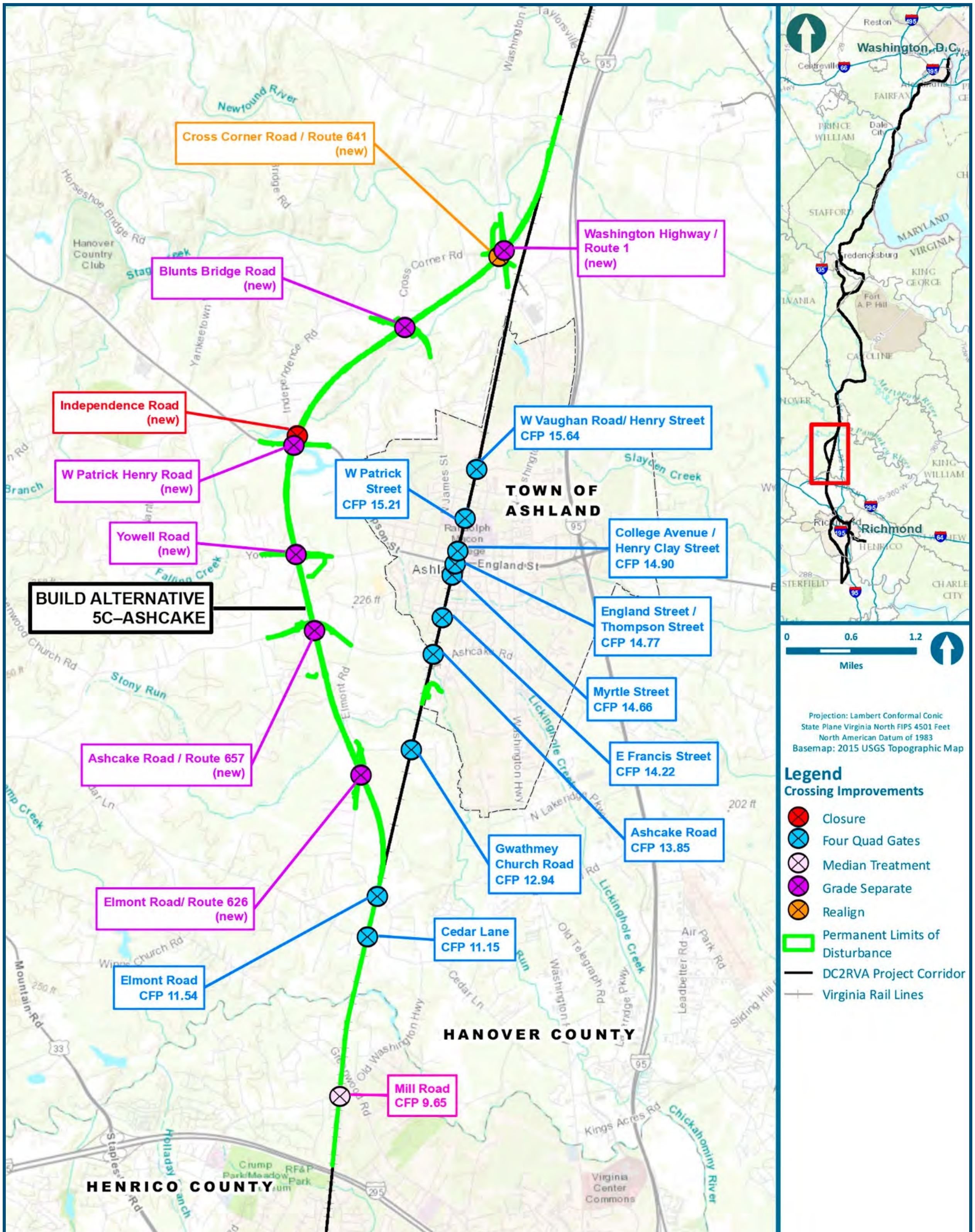


Figure 4.15-9: Public At-Grade Crossing Improvements – Build Alternative 5C–Ashcake

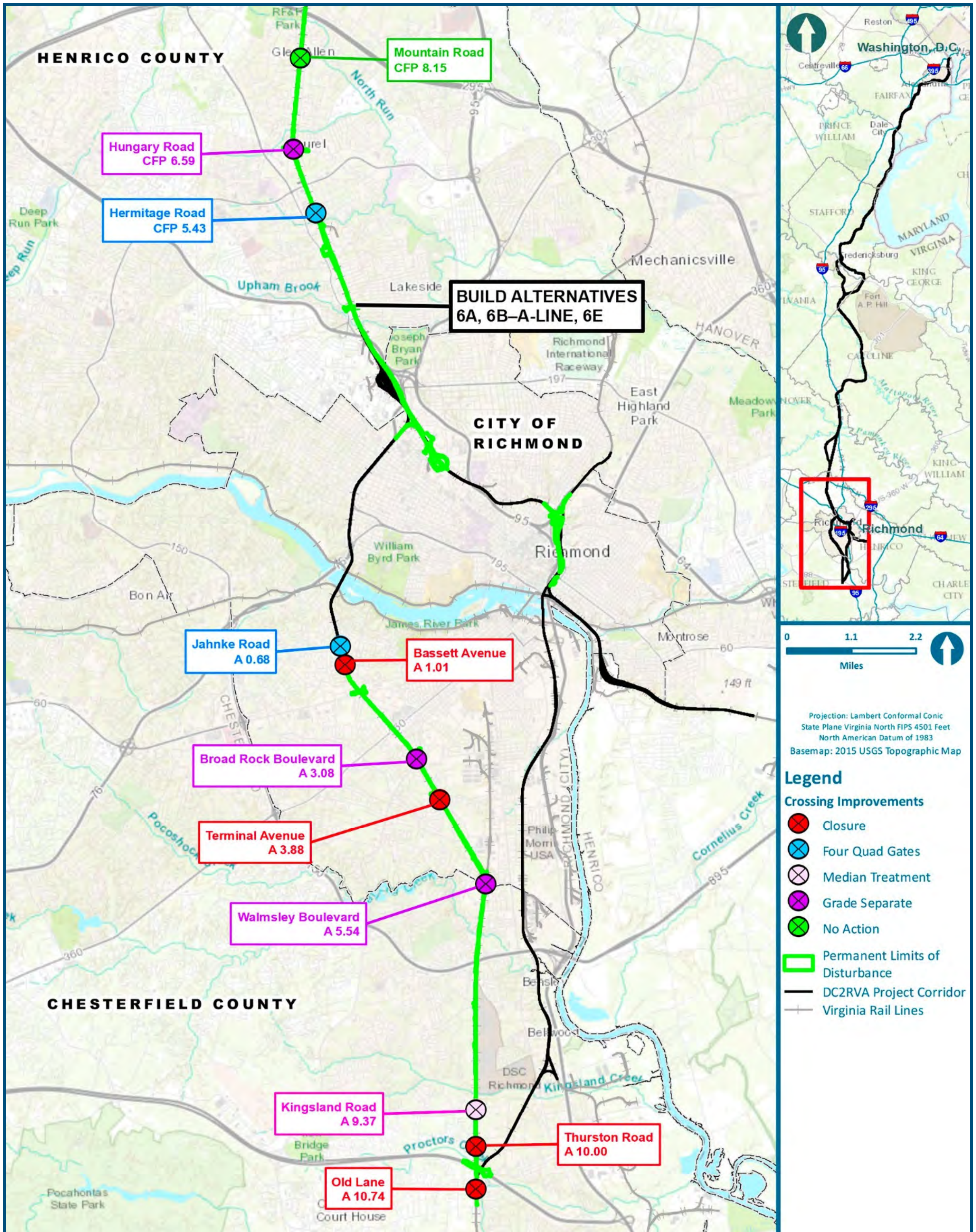


Figure 4.15-10: Public At-Grade Crossing Improvements – Build Alternatives 6A, 6B–A-Line, 6E

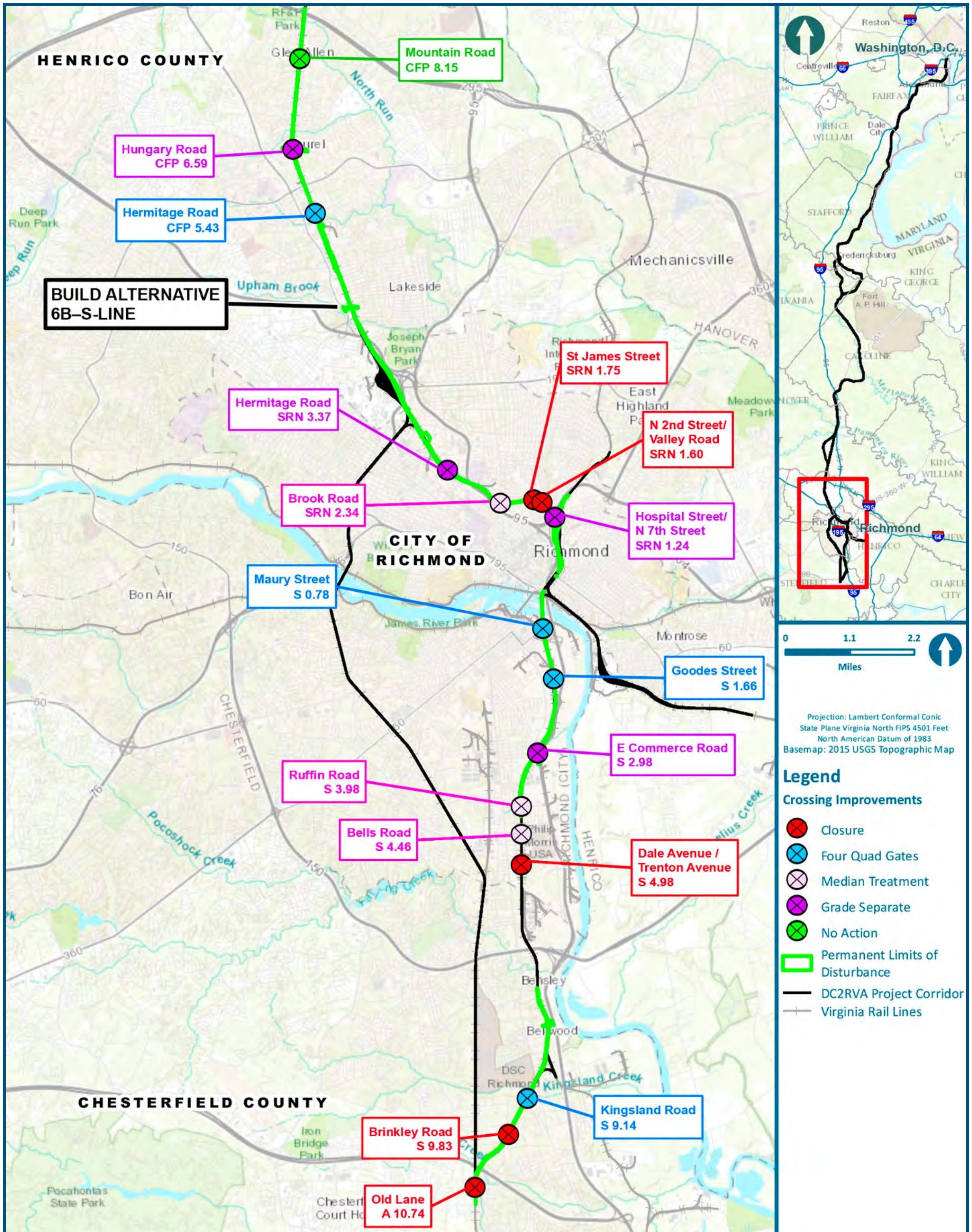


Figure 4.15-11: Public At-Grade Crossing Improvements – Build Alternative 6B–S-Line

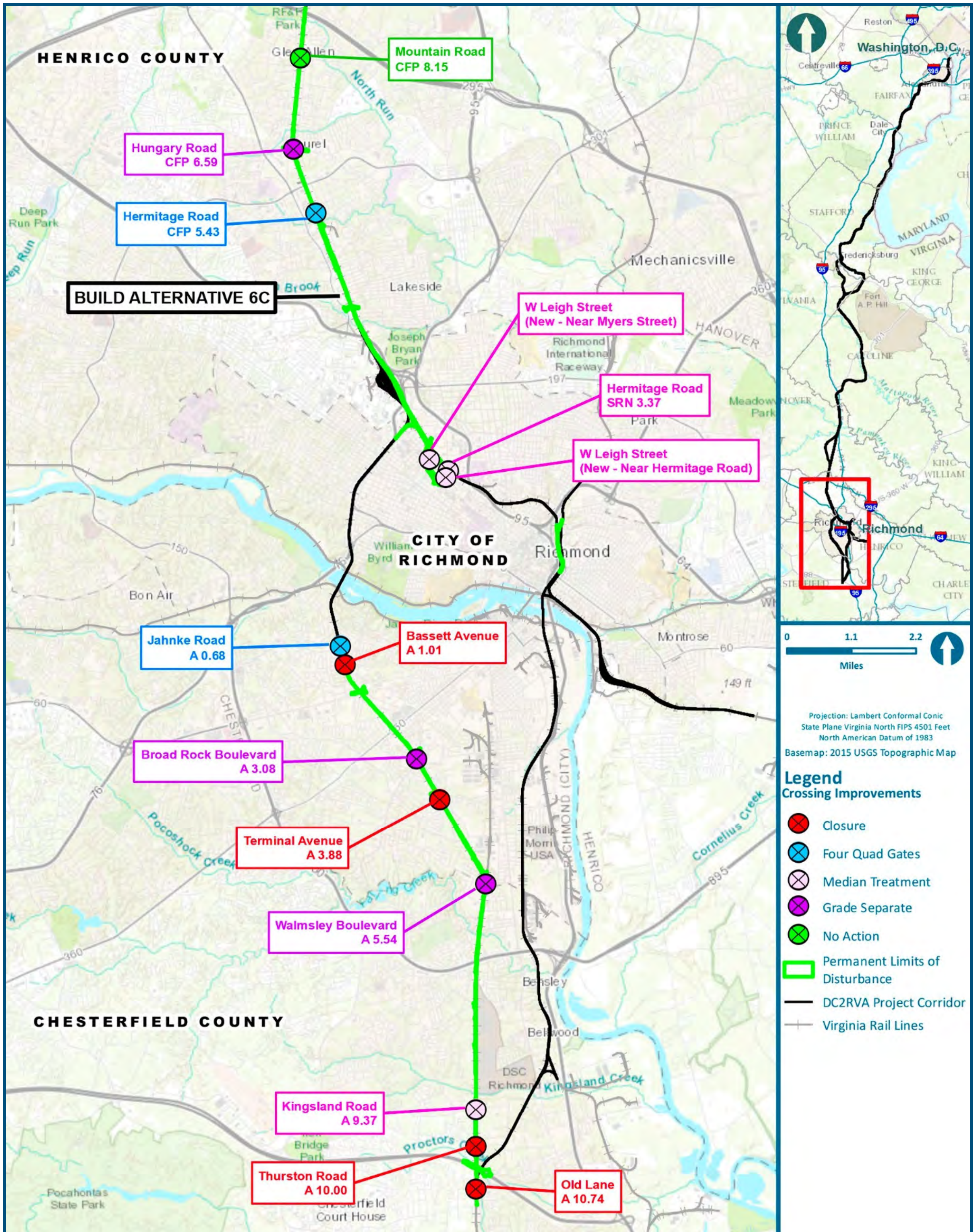


Figure 4.15-12: Public At-Grade Crossing Improvements – Build Alternative 6C

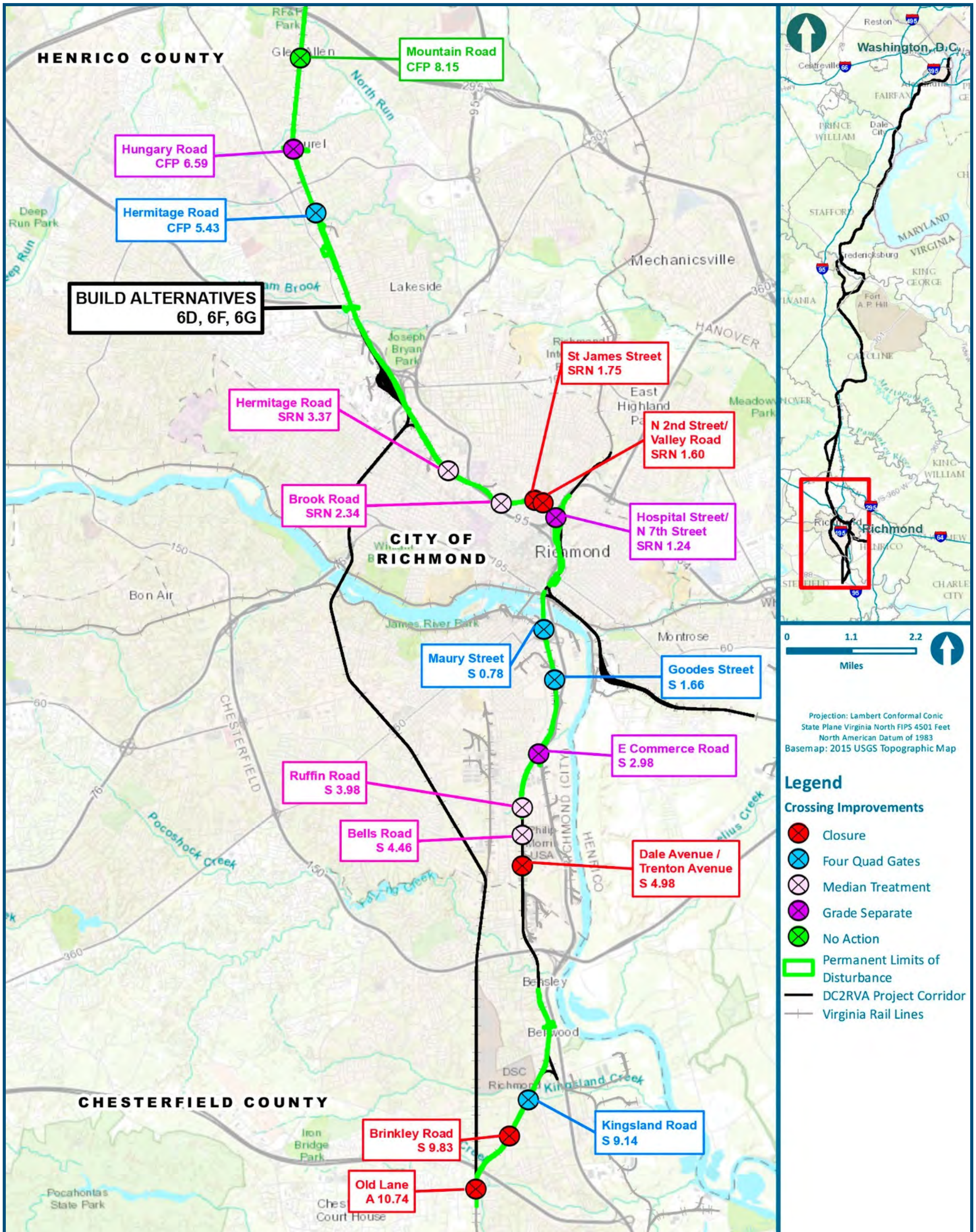


Figure 4.15-13: Public At-Grade Crossing Improvements – Build Alternatives 6D, 6F, 6G

- The Build Alternatives that include the addition of a third track through town (Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake) require the closure of the eastern section of Railroad Avenue / Center Street between England / Thompson Street and Maiden Lane. At this location Railroad Avenue / Center Street[17] runs adjacent and parallel to the railroad tracks within the Town of Ashland. The portion of Railroad Avenue / Center Street on the eastern side of the rail corridor between England / Thompson Street and Maiden Lane conflicts with the addition of the third track. All other portions of Railroad Avenue / Center Street, on either side of the rail corridor within the Town of Ashland, would be realigned, as required, to accommodate the design of the Build conditions and remain open to traffic after completion of construction.
- The proposed additional track through the Richmond Area conflicts with one public roadway that is located adjacent and parallel to the railroad tracks. Dalebrook Drive from Bellbluff Drive to southern terminus of Dalebrook Drive would be required to be realigned without change to existing operations as part of all Build Alternatives.

Summary of All Proposed Public Roadway Closures and Grade Separations

For ease of reference, a summary of the public roadway improvements that are proposed as part of each Build Alternative is provided here. Unless specified below, all other public roadway crossings would either maintain the existing at-grade condition with crossing improvements of either four-quadrant gates or median treatment with gates, or do not require any action.

Alternative Area 1 (Arlington): There are no public roadway closures or grade separations within Area 1 as part of any Build Alternative.

Alternative Area 2 (Northern Virginia): There are no grade separations proposed within the single Build Alternative 2A. One closure is proposed at Mount Hope Church Road crossing.

Alternative Area 3 (Fredericksburg): As shown in Table 4.15-7, there are no proposed public roadway closures through Fredericksburg. One grade separation is proposed at Landsdowne Road in Build Alternative 3B only. Four grade separations are proposed along the new alignment portion of the Fredericksburg Bypass (Build Alternative 3C).

Table 4.15-7: Public Roadway Closures and Grade Separations in Fredericksburg Area

Alternative Area	Alternative	Grade Separate Landsdowne Road
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	
	3B	✓
	3C	

This table only shows the proposed improvements of grade separation and closure for public roadways.

[17] Railroad Avenue / Center Street operates as two one-way roadways (one on each side of the rail line) through the Town of Ashland. Based on inventory of physical street signage, the Railroad Avenue designation is generally used closest to the center of town (near England Street) and the Center Street designation is used elsewhere. For ease of reference, these roadways will be designated as "Railroad Avenue / Center Street" with callouts to the appropriate side of the tracks, as necessary, as well as to/from limits, in place of any "N" or "S" designation in the transportation analysis for the Draft EIS.

Alternative Area 4 (Central Virginia): There are no proposed grade separations within the single Build Alternative 4A. One closure is proposed at Colemans Mill Road crossing.

Alternative Area 5 (Ashland): As shown in Table 4.15-8, each Build Alternative in Ashland contains some combination of the following closures and separations:

- All Build Alternatives except for the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) will require two grade separations as part of this project: W. Vaughan Road crossing and Ashcake Road crossing.
- All Build Alternatives that include station platform improvements at the existing station location within town require one roadway crossing closure at College Avenue crossing to accommodate the platform improvements at the existing station.
- The Build Alternatives that include the addition of a third track through town (Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake) require the closure of the eastern section of Center Street / Railroad Avenue between England / Thompson Street and Maiden Lane.
- The Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) will require one roadway closure at Independence Road and six grade separations along the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) (not listed in Table 4.15-8).

Table 4.15-8: Public Roadway Closures and Grade Separations in Ashland Area

Area	Alternative	Grade Separate West Vaughan Crossing	Grade Separate Ashcake Crossing	Close College Avenue Crossing	Close Center Street, South of England Street to Maiden Lane
Area 5: Ashland (Doswell to I-295)	5A	✓	✓	✓	
	5A–Ashcake	✓	✓		
	5B	✓	✓	✓	✓
	5B–Ashcake	✓	✓		✓
	5C			✓	
	5C–Ashcake				
	5D–Ashcake	✓	✓		✓

This table only shows the proposed improvements of grade separation and closure for public roadways.

Alternative Area 6 (Richmond): As shown in Table 4.15-9, each Build Alternative in Richmond contains some combination of the following closures and grade separations, the need for which is driven by the at-grade crossing evaluation that was completed by DRPT as part of this project:

- All Build Alternatives grade separate Hungary Road near Staples Mill Road Station and close Old Lane near the junction of the CSXT A-Line and S-Line at Centralia.
- All Build Alternatives that use the A-Line close Bassett Avenue, Terminal Avenue, and Thurston Road, and grade separate Broad Rock Boulevard and Walmsley Boulevard.
- All Build Alternatives that use the S-Line close St James Street, N 2nd Street/Valley Road, Dale/Trenton Avenue, and Brinkley Road, and grade separate Hospital Street and E Commerce Drive.
- Build Alternative 6B–S-Line grade separates the S-Line crossing of Hermitage Road, which is proposed for safety considerations due to proximity of trains decelerating and accelerating to the new Boulevard Road Station.

Table 4.15-9: Public Roadway Closures and Grade Separations in Richmond Area

Alternative	Grade Separate Hungary Road	Close Bassett Avenue	Grade Separate Broad Rock Boulevard	Close Terminal Avenue	Grade Separate Walmsley Boulevard	Close Thurston Road	Close Old Lane	Grade Separate Hermitage Road (S-Line Crossing)	Close St James Street	Close N 2nd Street/ Valley Road	Grade Separate Hospital Street	Grade Separate E Commerce Road	Close Dale / Trenton Avenue	Close Brinkley Road
6A	✓	✓	✓	✓	✓	✓	✓							
6B–A-Line	✓	✓	✓	✓	✓	✓	✓							
6B–S-Line	✓						✓	✓	✓	✓	✓	✓	✓	✓
6C	✓	✓	✓	✓	✓	✓	✓							
6D	✓						✓		✓	✓	✓	✓	✓	✓
6E	✓	✓	✓	✓	✓	✓	✓							
6F	✓						✓		✓	✓	✓	✓	✓	✓
6G	✓						✓		✓	✓	✓	✓	✓	✓

This table only shows the proposed improvements of grade separation and closure for public roadways.

4.15.2.2 DC2RVA Crossing Improvement Effects on Connectivity and Accessibility

The purpose of this analysis is to qualitatively identify locations where existing accessibility and connectivity of the roadway network may be affected by the DC2RVA Project as compared to the No Build condition. These locations will be moved forward for further quantitative analysis (refer to Section 4.15.2.4.).

Accessibility and connectivity to public roadways and private property driveways and access were considered. The identification was conducted at each highway-rail crossing; however, both the crossing roadway and adjacent connecting roadway network within the limits of disturbance were evaluated. The determination of "no effect"[18] is defined as maintaining existing capacity and connectivity to the roadway network, as follows:

- No increases or decreases to carrying capacity of public roadways.
- All existing movements on the crossing roadway are maintained.

All existing parcel access is maintained, unless the design requires a full property acquisition. The results of this process are summarized by type of crossing in the sections below. Refer to the *Transportation Technical Report* (Appendix S) for full details of the process and results of the evaluation.

[18] "No effect" does not preclude minor changes to location of any access points within the same property, if needed, to facilitate design and construction of the project. For properties with existing access to the crossing roadway, if at least one access to that property area is maintained or the parcel was a full property acquisition, the "no effect" is considered reasonable.

Effects of Improvements at Public At-Grade Crossings and Adjacent Public Roadways

Closure Effects. The crossing improvements that are anticipated to have the greatest effect on the existing accessibility and connectivity of the transportation network are related to either closures of existing public at-grade highway–rail crossings or closures of public roadways located adjacent and parallel to the railroad tracks that are required due to engineering of other improvements. Closing an existing traffic movement requires a permanent detour of vehicular traffic. This permanent detour not only affects the vehicles that are making the detour, but also the traffic operations and vehicles along the alternate route to some degree and therefore warrants further analysis.

Fourteen (14) public roadway closures within the different Build Alternatives were identified to be analyzed further (see Section 4.15.2.3); these include:

- Mount Hope Church Road crossing, Stafford County: Build Alternative 2A
- Colemans Mill Road crossing, Caroline County: Build Alternative 4A
- College Avenue/Henry Clay Road crossing, Town of Ashland: Build Alternatives 5A, 5B, and 5C
- Railroad Avenue/Center Street between England Street and Maiden Lane, Town of Ashland: Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake
- Independence Road intersection with West Patrick Henry Road, Hanover County: Build Alternatives 5C and 5C–Ashcake
- Bassett Avenue crossing, City of Richmond: Build Alternatives 6A, 6B–A-Line, 6C, and 6E
- Terminal Avenue crossing, City of Richmond: Build Alternatives 6A, 6B–A-Line, 6C, and 6E
- Thurston Road crossing, Chesterfield County: Build Alternatives 6A, 6B–A-Line, 6C, and 6E
- Brinkley Road crossing, Chesterfield County: Build Alternatives 6B–S-Line, 6D, 6F, and 6G
- Old Lane crossing, Chesterfield County: all Richmond Area Build Alternatives
- Ownby Lane intersection with Hermitage Road, City of Richmond: Build Alternative 6B–S-Line
- St James Street crossing, City of Richmond: Build Alternatives 6B–S-Line, 6D, 6F, and 6G
- N 2nd Street/Valley Road crossing, City of Richmond: Build Alternatives 6B–S-Line, 6D, 6F, and 6G
- Dale Avenue/Trenton Avenue crossing, City of Richmond: Build Alternatives 6B–S-Line, 6D, 6F, and 6G

The closure locations are included on Figures 4.15-1 through 4.15-13. Refer to Section 4.15.2.3 of this Draft EIS for details on the closure diversion analysis that was completed for each location.

Grade Separation and Median Treatment Effects. After review of all highway-rail crossings[19], the proposed crossing improvements of grade separation and crossing treatment improvements (including both median treatment with gates and four-quadrant gates) are expected to have minimal effect on existing accessibility and connectivity of the transportation network as part of any Build Alternative of the DC2RVA Project. The designs of all proposed grade separations and crossing treatment improvements of existing at-grade crossings maintain the existing functional characteristics of the crossing roadway, including number and type of roadway lanes. Improvements associated with the Build Alternatives sought to address potential adverse effects on traffic through implementation of grade separations.

Effects of Improvements at Private At-Grade Crossings

After review of all private at-grade highway-rail crossings, DRPT does not anticipate that any of the private crossing improvements included as an element of any DC2RVA Build Alternative would have an effect on the overall connectivity and accessibility of the transportation network; therefore, they do not warrant further detailed traffic operations analysis.

This outcome is supported by the fact that these crossings are all private and are, by definition, exclusive of the public roadway network. Regardless of the private classification, however, the crossing improvements at all private at-grade crossing locations were designed to maintain existing accessibility and connectivity to the private land parcels. All Build Alternatives as part of the DC2RVA Project maintain private property access, with the exception of where full property acquisitions are required by the design.

Effects of Improvements at Grade-Separated Crossings

After review of all public and private grade-separated highway-rail crossings, DRPT does not anticipate any of the proposed modifications to existing grade-separated crossings would have an effect on the overall connectivity and accessibility of the transportation network for any Build Alternative of the DC2RVA Project. The crossing modifications, if required, at existing grade-separated crossings include two types: extension of the existing crossing structure or construction of a new separate parallel grade-separated crossing structure. All modifications were designed to maintain existing functional characteristics of the crossing roadway, including number and type of roadway lanes, as part of each Build Alternative; therefore, the proposed actions of the existing grade-separated public and private crossings do not warrant further detailed traffic operations analysis.

Relevance of Build Alternatives on Quiet Zones (Public At-Grade Crossings)

As discussed in Section 3.15.2.2, a Quiet Zone is a section of rail line that contains one or more consecutive at-grade public crossings at which locomotive horns are not routinely sounded[20]. FHWA defines highway-rail Supplemental and Alternative Safety Measures (SSMs) as

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[19] The impact to the two new W. Leigh Street at-grade crossings is identified as “no effect” to the connectivity of the transportation network because all existing movements are maintained in the design. This is not intended to indicate that there would be no effects to vehicles if a new crossing is implemented; refer to Section 14.15.2.2 of this Draft EIS for the daily vehicle delay analysis.

[20] FRA’s regulatations mandate that a horn be sounded at every public at-grade crossing (i.e., horns are not required to be sounded at public crossings that re grade-separated or private crossings). See the *Transportation Technical Report* (Appendix S) for details.

engineering improvements that compensate for the absence of the train horn safety requirement at at-grade crossings. SSMs include the following:

- Closure of a highway-rail at-grade crossing. *Note that closure of an at-grade crossing indicates, in this instance, closure of the at-grade condition, which would include grade separation of the crossing or permanently closing the crossing to vehicular traffic.*
- Four-quadrant gates.
- Gates with traffic channelization arrangements (e.g., non-mountable curb or mountable curb with delineators).

In accordance with FHWA's *Railroad-Highway Grade Crossing Handbook* (Revised Second Edition August 2007), if SSMs are "employed at every highway-rail grade crossing in the quiet zone, they automatically qualify the quiet zone (subject to reporting requirements)." The DC2RVA Build Alternatives include SSMs at all public existing at-grade crossings; therefore, because the proposed actions for existing at-grade highway-rail crossings for the DC2RVA Project fully align with the definition of SSMs, the DC2RVA Project would not negatively affect the ability of local public authorities to obtain Quiet Zones within their jurisdictions. Because local jurisdictions must initiate and manage the process for implementing Quiet Zones, the noise reduction benefits that derive from removing the requirement for trains to routinely sound horns are dependent on locality actions; the DC2RVA Project would support local jurisdictions should they seek to establish Quiet Zones. FRA Office of Safety authorizes quiet zones on a site-specific basis, which are voluntary by the operating railroad.

Furthermore, DRPT does not anticipate that the DC2RVA Project will adversely affect the existing Quiet Zone designations because safety improvements that qualify as SSMs are proposed at all existing public at-grade crossings, including those with existing Quiet Zone designations that are based on the "grandfather" provision in the regulations. Refer to the *Transportation Technical Report* (Appendix S) for full assessment details.

Effects on Bicycle and Pedestrian Connectivity

All existing bicycle and pedestrian facilities would be maintained (provided in-kind) as part of all DC2RVA Build Alternatives and would be designed to current safety standards. This includes the existing at-grade pedestrian crossings through the Town of Ashland. The 11 at-grade pedestrian crossings in Ashland consist of 3-foot-wide walkways at top of rail, with steps at each end. The pedestrian crossings do not have any train warning protection (e.g., no flashing lights or gates). In addition, the current at-grade pedestrian crossings do not meet *Americans with Disabilities Act* (ADA) requirements. Most of the pedestrian crossings also lack a designated crosswalk leading across Center Street/Railroad Avenue. DC2RVA Build Alternatives that add a track through town would extend existing pedestrian crossings across the new track alignment, as necessary.

Opportunities for additional bicycle and pedestrian accessibility improvements, including updates to ADA facilities, would be incorporated during final design in coordination with FRA after the Draft EIS.

4.15.2.3 DC2RVA Crossing Closure Diversion Analysis (Traffic Operations)

Roadway closures can affect more than the closed roadway itself. Closing an existing traffic movement requires vehicles to divert to a different route. This not only affects the vehicles that are diverting, but it also affects traffic operations and vehicles along the diversion route to some degree. It is the purpose of this analysis to evaluate the effect of each closure along the diversion route. There are fourteen roadways that are anticipated to be closed by the DC2RVA Build Alternatives; these are presented in Table 4.15-10.

Table 4.15-10: Existing and 2025 No Build Data for Closure Diversion Analysis

Alternative Area[1]	Alternative	Closure Roadway Name	Existing/ New	Roadway Type	Crossing Milepost	Daily Volumes[2]	
						2015	2025 No Build
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	Mount Hope Church Road	Existing	Crossing	CFP 67.54	214	256
Area 4: Central Virginia (Crossroads to Doswell)	4A	Colemans Mill Road	Existing	Crossing	CFP 29.70	449	537
Area 5: Ashland (Doswell to I-295)[3]	5A, 5B, and 5C	College Avenue / Henry Clay Road	Existing	Crossing	CFP 14.90	1,326	1,586
	5B, 5B–Ashcake, and 5D–Ashcake	Railroad Avenue / Center Street	Existing	Adjacent	n/a	1,000	1,200
	5C and 5C–Ashcake	Independence Road	New	Crossing	New	949	1,135
Area 6: Richmond (I-295 to Centralia)	6A, 6B–A-Line, 6C, 6E	Bassett Avenue	Existing	Crossing	A 1.01	1,399	1,674
	6A, 6B–A-Line, 6C, 6E	Terminal Avenue	Existing	Crossing	A 3.88	683	817
	6A, 6B–A-Line, 6C, 6E	Thurston Road	Existing	Crossing	A 10.00	459	549
	6B–S-Line, 6D, 6F, 6G	Brinkley Road	Existing	Crossing	S 9.83	1,836	2,196
	6A through G	Old Lane	Existing	Crossing	A 10.74	4,896	5,856
	6B–S-Line	Ownby Lane	Existing	Adjacent	n/a	n/a	n/a
	6B–S-Line, 6D, 6F, 6G	St James Street	Existing	Crossing	SRN 1.75	1,000	1,196
	6B–S-Line, 6D, 6F, 6G	N 2nd Street/ Valley Road	Existing	Crossing	SRN 1.60	2,142	2,562
	6B–S-Line, 6D, 6F, 6G	Dale Avenue/ Trenton Avenue	Existing	Crossing	S 4.98	0	0

[1] No closure diversion analysis in Alternative Areas 1 or 3.

[2] The source for all traffic volumes for transportation analyses is the VDOT GIS online database for AADT with Vehicle Classification for 2014 (accessed January 2016). ADT grown to future years; refer to Section 4.15.1.2 of this Draft EIS. Note that the Dale Avenue/Trenton Avenue crossing is not open to public traffic in existing conditions.

[3] Within Ashland, Build Alternative 5A–Ashcake does not include any closures of public roadways.

The analysis was performed at a level of detail commensurate with size and varied conditions of the project's geographic scale, and with the relatively low traffic volumes on the majority of roadways that have the potential for being closed. The closure diversion analysis included two evaluations for each closure:

1. Effects on the roadway traffic along the diversion route(s), including changes in daily volumes and associated facility level of service (LOS)[21] operations.
2. Effects on intersection capacity and operations along the diversion route(s). DRPT considered three threshold criteria: under capacity, near capacity, and over capacity, where intersections may be approaching but not yet exceeding capacity. The intersection capacity analyses are intended to generally correspond to LOS as follows:
   a) Under capacity represents LOS A/B conditions
   b) Near capacity represents LOS C/D conditions
   c) Over capacity represents LOS E/F conditions

For this analysis, DRPT assumed that diverted vehicles would travel beginning at the location of the crossing and then utilize the closest adjacent crossing(s) using the shortest roadway path (determined based on roadway speeds and distances and engineering judgment). Diversions on both sides of the crossing (i.e., east and west of the tracks) were included, as well as upstream and downstream adjacent crossings, as applicable. The diversion analysis was conducted separately for each roadway closure, except within Ashland. For the Ashland alternatives, the analysis was completed for each Build Alternative to evaluate all of the proposed roadway closures together on the affected roadway network within the town[22].

Refer to the *Transportation Technical Report* (Appendix S) for full details on the process and assumptions, as well as detailed results, including maps of roadways and intersection, by closure location.

The results of the roadway and intersection diversion analysis are summarized in two tables:

- Table 4.15-11 summarizes the analysis as it was conducted: by closure location.
- Table 4.15-12 compiles the results by Build Alternative.

As shown by the results in Table 4.15-11, the majority of the roadway closures are anticipated to have minimal effect on both roadway and intersection operations. "Minimal effect" is defined as the Build condition LOS on all roadway segments and through all intersections as being equivalent to the No Build condition.

There are four closures that DRPT anticipates will have an effect on roadway and/or intersection operations, which are shaded for ease of reference in the table and described in further detail below.

[21] Level of service (LOS) is a measure of traffic operating conditions based generally on a comparison of traffic volumes to available capacity. LOS is described in terms of letter grades from A to F; LOS A represents free-flowing traffic conditions, while LOS F represents a breakdown in traffic flows, with stop-and-go conditions. Generally, LOS C is considered acceptable in rural areas, whereas LOS D is considered acceptable in urban areas.

[22] Within the Town of Ashland, a small traffic assignment model was developed to analyze the closure diversions. While the model used the same general process as the other roadway closures, the advantage of using a computerized model is to enable the consideration of a greater number of and more varied detour routes.

Table 4.15-11: Summary of Closure Diversion Analysis Results, by Closure

Alternative Area[1]	Alternative	Closure Roadway Name	# Roadway Segments / Effect on Roadway Volumes & LOS	# Intersections / Effect on Intersection Capacity
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	Mount Hope Church Road	4 / Minimal Effect	4 / Minimal Effect
Area 4: Central Virginia (Crossroads to Doswell)	4A	Colemans Mill Road	4 / Minimal Effect	7 / Minimal Effect
Area 5: Ashland[2] (Doswell to I-295)	5A and 5C	Ashland: Close College Avenue Crossing	24 / Decreased LOS one segment	24 / Decreased capacity through one intersection
	5B–Ashcake and 5D–Ashcake	Ashland: Close Center Street (South of England / Thompson Street to Maiden Lane)	24 / Minimal Effect	24 / Minimal Effect
	5B	Ashland: Close College Avenue Crossing & Close Center Street (South of England / Thompson Street to Maiden Lane)	24 / Decreased LOS on one segment	24 / Decreased capacity through one intersection
	5C and 5C–Ashcake	Independence Road	3 / Minimal Effect	3 / Minimal Effect
Area 6: Richmond (I-295 to Centralia)	6A, 6B–A-Line, 6C, 6E	Bassett Avenue	8 / Minimal Effect	10 / Minimal Effect
	6A, 6B–A-Line, 6C, 6E	Terminal Avenue	Qualitative / Minimal Effect	Qualitative / Minimal Effect
	6A, 6B–A-Line, 6C, 6E	Thurston Road	4 / Minimal Effect	6 / Minimal Effect
	6B–S-Line, 6D, 6F, 6G	Brinkley Road	4 / Decreased LOS on one segment	6 / Minimal Effect
	6A - G	Old Lane	4 / Decreased LOS on two segments	6 / Decreased capacity through one intersection
	6B–S-Line	Ownby Lane	Qualitative / Minimal Effect	Qualitative / Minimal Effect
	6B–S-Line, 6D, 6F, 6G	St James Street	4 / Minimal Effect	6 / Minimal Effect
	6B–S-Line, 6D, 6F, 6G	N 2nd Street/ Valley Road	Qualitative / Minimal Effect	Qualitative / Minimal Effect
	6B–S-Line, 6D, 6F, 6G	Dale Avenue/ Trenton Avenue	Qualitative / Minimal Effect	Qualitative / Minimal Effect

[1] No closure diversion analysis in Alternative Areas 1 or 3.

[2] Within the Town of Ashland, the closure diversion analysis was performed as a set for the concurrent closures by Build Alternative. Build Alternative 5A–Ashcake does not include any public roadway closures.

Shaded rows represent closures that are anticipated to have an effect on roadway and/or intersection operations.

Effects of Closure of College Avenue Crossing, Town of Ashland

This closure is required by the station improvements at the existing station location (i.e., the extension of the platform across College Avenue/Henry Clay Road) in Build Alternatives 5A and 5C. Diverted vehicles could use a variety of alternate routes through the grid street network in the Town of Ashland.

- **Roadway Operations.** Thompson Street, between N James Street and N Center Street, is projected to drop from operating at LOS D (with 14,600 daily vehicles) in 2025 No Build to LOS E (with 15,400 daily vehicles) 2025 Build.
- **Intersection Operations.** Thompson/England Street at Center Street, which is the primary intersection in the center of the Town of Ashland, is projected to operate near capacity (generally equivalent to LOS C/D) during Build conditions, compared to under capacity (generally equivalent to LOS A/B) during 2025 No Build conditions.

Effects of Closure of College Avenue Crossing and Closure of Center Street (South of England/Thompson Street to Maiden Lane), Town of Ashland

These concurrent closures are required due to conflicts with the station platform improvements (closure of College Avenue crossing) and conflicts with the addition of the third track (closure of Railroad Avenue/Center Street (on the east side of the tracks, between England/Thompson Street and Maiden Lane) that are part of Build Alternative 5B. Diverted vehicles could use a variety of alternate routes through the grid street network in the Town of Ashland.

Roadway Operations. Thompson Street, between N James Street and N Center Street, is projected to drop from operating at LOS D (with 14,600 daily vehicles) in 2025 No Build to LOS E (with 15,300 daily vehicles) in 2025 Build.

- **Intersection Operations.** Thompson/England Street at Center Street, which is the primary intersection in the center of the Town of Ashland, is projected to operate near capacity (generally equivalent to LOS C/D) during Build conditions, compared to under capacity (generally equivalent to LOS A/B) during 2025 No Build conditions.

Effects of Closure of Brinkley Road, Chesterfield County

The Kingsland Road crossing is located just over approximately ½ mile north of the Brinkley Road crossing. For 2025 Build conditions as part of Build Alternatives 6B–S-Line, 6D, 6F, and 6G, diverted vehicles would access this crossing by using Dorsey Road to the west of the rail corridor and Chester Road to the east.

- **Roadway Operations.** Kingsland Road, between Dorsey Road and Chester Road is projected to drop from operating at LOS A (with 2,100 daily vehicles) in the 2025 No Build conditions to LOS B (with 4,200 daily vehicles) in the 2025 Build conditions.
- **Intersection Operations.** Minimal effect.

Effects of Closure of Old Lane, Chesterfield County

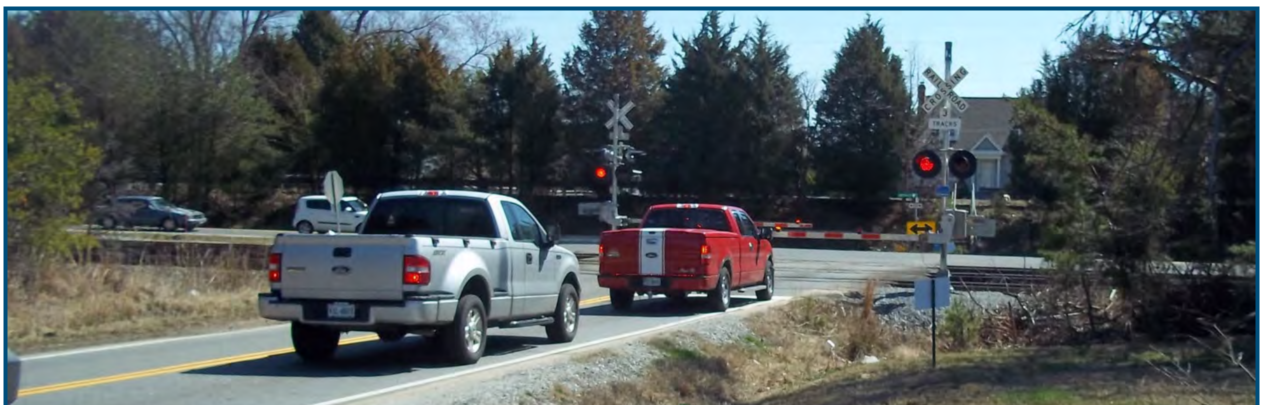
The Centralia Road crossing, which is proposed to be grade-separated as a part of the Richmond-to-Raleigh (R2R) project, is located approximately ½ mile south of the Old Lane crossing. For 2025 Build conditions in all Richmond Build Alternatives (6A through 6G), diverted vehicles would access this crossing by using Hopkins Road to the west of the rail corridor and Chester Road to the east.

- **Roadway Operations.** The following two roadway segments are affected by the closure:
  - Centralia Road, between Hopkins Road and Chester Road, is projected to drop from operating at LOS B (with 10,500 daily vehicles) in the 2025 No Build conditions to LOS E (with 16,300 daily vehicles) in the 2025 Build conditions. Centralia Road near this segment would be redesigned and reconstructed (including the grade separation) to accommodate these future volumes.
  - Hopkins Road, between Old Lane and Centralia Road, is projected to drop from operating at LOS B (with 4,100 daily vehicles) in the 2025 No Build conditions to LOS C (with 8,000 daily vehicles) in the 2025 Build conditions.
- **Intersection Operations.** Centralia Road at Chester Road is projected to operate near capacity (generally equivalent to LOS C/D) during Build conditions, compared to under capacity (generally equivalent to LOS A/B) during 2025 No Build conditions.

The results of the crossing diversion analyses compiled by Build Alternative are presented in Table 4.15-12.

4.15.2.4 DC2RVA Crossing Improvement Effects on Total Daily Vehicle Delay

The total vehicle delay per day is the amount of time that vehicles spend queuing at an at-grade crossing over the course of a day (24 hours) based on the number of trains that are expected to pass through the crossing. The purpose of the daily delay calculations as part of the DC2RVA transportation analysis is to quantify the delay experienced by vehicles due to the number and type of trains traveling through the public at-grade highway-rail crossings for existing, No Build, and Build conditions. This daily vehicle delay calculation applies only to the at-grade public crossings themselves in the DC2RVA corridor[23]. Any combination of more trains, slower trains, and more motor vehicles would result in increases in resulting daily vehicle delay. Refer to the *Transportation Technical Report* (Appendix S) for full details on the daily delay calculation and source data, as well as the results summarized below.



At-Grade Crossing at Mine Road

[23] While private vehicles may experience additional delay due to either train service improvements or crossing improvements as part of the DC2RVA Project, it is not quantified as part of this analysis.

[24] The increase of 1 hour of total daily delay for Build Alternative 3A is due to a combination of maintaining existing crossing conditions and increases in train frequency.

Table 4.15-12: Summary of Closure Diversion Analysis Results, by Build Alternative

Alternative Area[1]	Alternative	Closure Diversion Roadway(s) Analyzed	Effects on Roadway Traffic Volumes and Associated LOS	Effects on Intersection Capacity
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	Mount Hope Church Road	Minimal Effect	Minimal Effect
Area 4: Central Virginia (Crossroads to Doswell)	4A	Colemans Mill Road	Minimal Effect	Minimal Effect
Area 5: Ashland (Doswell to I-295)	5A	College Avenue/Henry Clay Road	<u>Thompson Street:</u> *14,600 vehicles / LOS D, No Build* *15,400 vehicles / LOS E, Build* All other locations minimal effect.	<u>England/Thompson Street at Center Street:</u> *Under Capacity, No Build* *Near Capacity, Build* All other locations minimal effect.
	5A–Ashcake	*No Closures for this Build Alternative*	*n/a*	*n/a*
	5B	College Avenue / Henry Clay Road; Railroad Avenue / Center Street	<u>Thompson Street:</u> *14,600 vehicles / LOS D, No Build* *15,300 vehicles / LOS E, Build* All other locations minimal effect.	<u>England/Thompson Street at Center Street:</u> *Under Capacity, No Build* *Near Capacity, Build* All other locations minimal effect.
	5B–Ashcake	*Same as 5D–Ashcake*	*Same as 5D–Ashcake*	*Same as 5D–Ashcake*
	5C	College Avenue / Henry Clay Road; Independence Road	<u>Thompson Street:</u> *14,600 vehicles / LOS D, No Build* *15,400 vehicles / LOS E, Build* All other locations minimal effect.	<u>England/Thompson Street at Center Street:</u> *Under Capacity, No Build* *Near Capacity, Build* All other locations minimal effect.
	5C–Ashcake	Independence Road	Minimal Effect	Minimal Effect
	5D–Ashcake	Railroad Avenue / Center Street	Minimal Effect	Minimal Effect

▶ *Continued (see end of table for detailed notes.)*

Table 4.15-12: Summary of Closure Diversion Analysis Results, by Build Alternative

Alternative Area[1]	Alternative	Closure Diversion Roadway(s) Analyzed	Effects on Roadway Traffic Volumes and Associated LOS	Effects on Intersection Capacity
Area 6: Richmond (I-295 to Centralia)	6A	Bassett Avenue; Terminal Avenue; Thurston Road; Old Lane	Centralia Road: *10,500 vehicles / LOS B, No Build* *16,300 vehicles / LOS E, Build* Hopkins Road: *4,100 vehicles / LOS B, No Build* *8,000 vehicles / LOS C, Build* All other locations minimal effect.	Centralia Road at Chester Road: *Under Capacity, No Build* *Near Capacity, Build* All other locations minimal effect.
	6B–A-Line	*Same as 6A*	*Same as 6A*	*Same as 6A*
	6B–S-Line	St James Street; N 2nd Street/Valley Road; Dale Avenue/Trenton Avenue; Brinkley Road; Old Lane	*Same as 6A* Kingsland Road: *2,100 vehicles / LOS A, No Build* *4,200 vehicles / LOS B, Build* All other locations minimal effect.	*Same as 6A*
	6C	*Same as 6A*	*Same as 6A*	*Same as 6A*
	6D	*Same as 6B–S-Line*	*Same as 6B–S-Line*	*Same as 6B–S-Line*
	6E	*Same as 6A*	*Same as 6A*	*Same as 6A*
	6F	*Same as 6B–S-Line*	*Same as 6B–S-Line*	*Same as 6B–S-Line*
	6G	*Same as 6B–S-Line*	*Same as 6B–S-Line*	*Same as 6B–S-Line*

[1] No closure diversion analysis locations in Alternative Areas 1 or 3.

Effects of Types of Crossing Treatments on Daily Vehicle Delay

Different crossing treatments that are proposed as part of the DC2RVA Build Alternatives would have different effects on the total daily delay. The type of crossing improvement that can have the largest effect on the daily delay calculation is crossing elimination, as it fully removes the delay condition of vehicles queueing at an at-grade crossing. Crossing elimination is defined as either grade-separation or crossing closure:

- Grade separation eliminates the vehicle delay by physically separating the train traffic from the roadway vehicles, though all vehicles use the crossing in the same travel patterns as the existing condition. This would affect the daily delay calculation by "zeroing out" the daily delay at the grade-separated crossing in the Build condition. For the DC2RVA Project, the following proposed crossing closure locations would divert vehicular traffic to adjacent crossing(s) that are grade-separated, as previously presented in Section 4.15.2.3, and therefore do not require diverted vehicles to be accounted for in the analysis of delay.

  - Mount Hope Church Road, Build Alternative 2A, Stafford County
  - Colemans Mill Road, Build Alternative 4A, Caroline County
  - Independence Road, Build Alternative 5C, Hanover County
  - Old Lane, all Richmond Build Alternatives, Chesterfield County
  - St James Street, Build Alternative 6B–S-Line, 6D, 6F, and 6G, Richmond
  - Terminal Avenue, Build Alternative 6A, 6B–A-Line, 6C, and 6E, Richmond
  - N 2nd Street/Valley Road, Build Alternative 6B–S-Line, 6D, 6F, and 6G, Richmond
  - Dale Avenue/Trenton Avenue is not considered an existing public crossing and therefore has no effect on the delay analyses.

- Crossing closure eliminates the vehicle delay by physically removing the ability of roadway vehicles to cross the rail corridor at an existing location; these vehicles would be accommodated via a permanent detour of vehicular traffic to adjacent crossing(s) as presented in Section 4.15.2.3. This would affect the daily delay in two ways in the Build conditions: (1) it would "zero out" the daily delay at the location of the crossing closure, and (2) it would increase the delay at any adjacent at-grade crossing(s) that the detoured vehicles use. If the adjacent crossing used by detoured vehicles is a grade-separated crossing(s), there is no effect on the grade-separated crossing because, as noted above, there is no interaction between motor vehicles and rail traffic. Otherwise, proposed crossing closures would require detouring vehicles to adjacent at-grade crossing(s), and therefore, would require inclusion of diverted vehicles on those adjacent crossing(s) as part of the Build condition. For the total daily delay analyses, vehicles were diverted per the closure diversion analysis methodology as presented in Section 4.15.2.3 above.

Table 4.15-13 presents the summary of the total daily delay results for the above conditions. The results indicate the following overall corridor-wide results.

Effect of the DC2RVA Project on the 40-hour FHWA Daily Delay Threshold

Daily vehicle delay is one of FHWA's 11 criteria for which grade separation of at-grade crossings should be considered; the criteria threshold set by FHWA is 40 total vehicle hours of delay per day, which is the cumulative time all vehicles are delayed at a crossing per day.

- The 40-hour FHWA threshold for total daily delay at an individual at-grade crossing is not met or exceeded under existing or No Build conditions.

- The 40-hour FHWA threshold for total daily delay at an individual at-grade crossing is not met or exceeded by the crossing conditions for any Build Alternative as part of the DC2RVA Project with the exception of one crossing. The England Street/Thompson Street crossing exceeds the 40-hour FHWA threshold in two of the build alternatives that pass through the Town of Ashland (Build Alternatives 5A and 5B with 41.85 total daily hours). The total daily delay at this crossing is 37.37 hours under No Build conditions.

Effect of the DC2RVA Project on Total Daily Vehicle Delay

The results shown in Table 4.15-13 are the sum total of all crossings within each Build Alternative. Negative values in the "% change" column represent decreases in delay in the Build condition.

- DRPT anticipates that the DC2RVA Project will reduce vehicle delay for each Build Alternative with the exception of Build Alternative 3A, which maintains existing crossing conditions[24]. This reduction in delay indicates that the overall proposed grade separations and operating conditions that reduce delay (i.e., improved train speeds) outweigh the proposed changes that would increase delay (i.e., number of daily vehicles and trains, length of train). While vehicles at crossing closures will divert to adjacent crossings, the majority of diverted vehicles would utilize adjacent grade-separated crossings (thus removing the daily delay of those vehicles) and/or are relatively not high volumes of vehicles that are detoured.
- Corridor-wide, the Build Alternatives with the greatest reductions in total vehicle delay hours are represented by the areas with the most at-grade crossing eliminations (i.e., grade separation or crossing closure) or those with service changes (i.e., the bypass alignments that reduce the daily number of trains through existing at-grade crossings or service line changes on the A- and S-Lines in Richmond).
- Within Build Alternative 2A, there is one crossing elimination at Mount Hope Church Road (of four total at-grade crossings), which represents a 1 percent reduction in daily delay compared to No Build.
- Within Fredericksburg, the only Build Alternative that includes a crossing elimination is 3B, which includes one grade separation at Landsdowne Road (of four total at-grade crossings) and has the fewest total number of at-grade crossings. 3B represents a 60 percent reduction in daily delay compared to No Build.
- Within Build Alternative 4A, there is one crossing elimination at Colemans Mill Road (of seven total at-grade crossings), which represents a 6 percent reduction in daily delay compared to No Build.
- Within Ashland, the Build Alternatives with the greatest reductions in daily delay occur for the bypass alignments (5C and 5C–Ashcake), which represent approximately 90 percent reductions in daily delay through the existing at-grade crossings in town. The bypass alignments remove freight and long-distance passenger trains from traveling through the at-grade crossings in the town. For all other Build Alternatives, which vary in the total number and location of crossing elimination, there is a reduction of approximately 25 percent in daily delay compared to No Build.
- The A-Line Build Alternatives in Richmond include seven crossing eliminations (out of eleven total at-grade crossings), which represents a 70 percent reduction in daily delay

[24] The increase of 1 hour of total daily delay for Build Alternative 3A is due to a combination of maintaining existing crossing conditions and increases in train frequency.

compared to No Build. The exception is 6C, which includes two new at-grade crossings at the Broad Street Station and therefore would experience higher total delay.

- The S-Line Build Alternatives in Richmond include seven crossing eliminations (of a total of seventeen at-grade crossings), which represents a 60 percent reduction in daily delay compared to No Build. The exception is 6B–S-Line, which includes an additional crossing elimination in proximity to the Boulevard Station. By eliminating the most at-grade crossings in the Build condition, it is projected to experience the greatest decreases in delay.
- For crossings that remain at-grade and experience increases in delay in the Build condition, the change in total daily delay is less than 8 percent for most crossings. Less than ten individual crossings that are located within Fredericksburg, Ashland, and Richmond will experience higher total daily delay. Refer to the *Transportation Technical Report* (Appendix S) for these details.

Total Daily Delay due to Types of Trains

Table 4.15-13 also shows the Intercity Passenger, VRE Passenger, and Freight percentage of total daily delay.

- The delay due to intercity passenger trains increases compared to No Build conditions for the majority of the corridor and continues to represent a relatively small fraction of the total daily vehicle delay experienced at at-grade crossings in 2025 Build conditions.
- The majority of the total delay experienced throughout all alternative areas would continue to be from freight trains, which represents almost 90 percent of the total delay corridor-wide in 2025[25].

4.16 UTILITIES

Utility impacts for the Build Alternatives vary widely throughout the length of the Project. Table 4.16-1 summarizes the estimated utility impacts and costs for the Build Alternatives. The No Build Alternative would not require any utility relocations.

4.17 SAFETY AND SECURITY

FRA's Track Safety Standards (49 CFR 213) are based on classifications of track that determine maximum operating speed limits, inspection frequencies, and standards of maintenance, among other issues. Higher track classes require more-stringent maintenance standards to support higher allowable maximum operating speed. Between Fredericksburg and Staples Mill Station in Richmond, the proposed maximum speed is 90 mph, or FRA Class 5. Outside of this area, the proposed maximum speed is 79 mph, or FRA Class 4. The proposed improvements described in Chapter 2 would bring rail infrastructure in the selected corridor into compliance with the appropriate FRA standards. FRA will require the preparation of a System Safety Plan upon the completion of the EIS and prior to authorization to implement the infrastructure and service improvements proposed under the DC2RVA Project. Refer to the *Basis of Design Technical Report* (Appendix B).

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[25] The exception to this is Build Alternative 5C and 5C-Ashcake, which shift all freight trains onto the bypass. Accordingly, the existing at-grade intersections through the Town of Ashland would therefore have reduced daily delay due to freight trains for the bypass alternatives.

Table 4.15-13: Summary of Total Daily Delay[1] Results, 2025 Build Conditions, By Build Alternative

Alternative Area[2]	Alternative	Crossings that Exceed FWHA 40-hour Daily Delay Threshold		Total Daily Vehicle Delay Results						Change in Daily Delay Build to No Build	
		No Build	Build	No Build (Hours)	At-Grade Crossings Removed[3] as part of project	Build (Hours)	Intercity Percent of Total Delay	VRE Percent of Total Delay	Freight Percent of Total Delay	Hours	% Change
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	0	0	23.28	1	23.01	13%	5%	82%	-0.26	-1%
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	0	0	16.61	0	17.61	13%	5%	81%	0.99	6%
	3B	0	0	16.61	1	6.59	13%	5%	82%	-10.03	-60%
	3C	0	0	36.37	0	32.79	9%	0%	91%	-3.58	-10%
Area 4: Central Virginia (Crossroads to Doswell)	4A	0	0	3.58	1	3.35	13%	0%	87%	-0.23	-6%
Area 5: Ashland (Doswell to I-295)	5A	0	1	73.94	3	56.28	11%	0%	89%	-17.66	-24%
	5A–Ashcake	0	0	73.94	2	56.33	11%	0%	89%	-17.61	-24%
	5B	0	1	73.94	3	55.01	11%	0%	89%	-18.93	-26%
	5B–Ashcake and 5D–Ashcake	0	0	73.94	2	55.06	11%	0%	89%	-18.88	-26%
	5C	0	0	73.94	1	9.76	42%	0%	58%	-64.18	-87%
	5C–Ashcake	0	0	73.94	0	9.77	42%	0%	58%	-64.17	-87%
Area 6: Richmond (I-295 to Centralia)	6A, 6B–A-Line, and 6E	0	0	78.70	7	26.48	12%	0%	88%	-52.22	-66%
	6B–S-Line	0	0	168.36	9	40.37	11%	0%	89%	-127.99	-76%
	6C[4]	0	0	104.90	7	64.95	24%	0%	76%	-39.95	-38%
	6D and 6F	0	0	168.36	8	68.55	10%	0%	90%	-99.81	-59%
	6G	0	0	168.36	8	67.20	8%	0%	92%	-101.17	-60%

[1] Delay represents the Total Daily Vehicle Delay for all train types. It is the cumulative delay for all at-grade crossings.

[2] Note that there are no public at-grade crossings located within Alternative Area 1 (Arlington).

[3] Removal of the At-Grade Highway-Rail Crossing Condition includes the proposed improvements of Grade Separation and Crossing Closure.

[4] Build Alternative 6C includes the delay associated with the two new at-grade crossings in all calculations excluding the No Build condition.

Table 4.16-1: Estimated Utility Relocations and Costs

Alternative Area	Alternative	Relocations (in feet, except Major Facility)							Cost $2016
		Fiber	Water	Sanitary Sewer	Electric Dist.	Electric Trans.	Gas	Major Facility	
Area 1: Arlington (Long Bridge Approach)	1A	–	–	–	–	–	–	–	$0
	1B	–	–	–	400	–	–	–	$118,800
	1C	–	–	–	400	–	–	–	$118,800
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	3,000	–	–	2,000	–	45,000	–	$34,485,000
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	1,500	–	–	–	–	3,500	–	$2,695,500
	3B	1,500	–	–	–	–	3,500	–	$2,695,500
	3C	1,500	–	–	–	–	4,000	–	$3,070,500
Area 4: Central Virginia (Crossroads to Doswell)	4A	153,000	1,160	–	1,875	–	7,275	–	$13,506,885
Area 5: Ashland (Doswell to I-295)	5A	61,776	–	–	400	–	600	–	$3,472,272
	5A–Ashcake	61,776	–	–	400	–	600	–	$3,472,272
	5B	90,288	5,000	600	2,825	–	2,800	–	$8,724,561
	5B–Ashcake	90,288	5,000	600	2,825	–	2,800	–	$8,724,561
	5C	30,096	1,667	200	942	–	933	–	$2,908,123
	5C–Ashcake	30,096	1,667	200	942	–	933	–	$2,908,123
	5D–Ashcake	90,288	5,000	600	2,825	–	2,800	–	$8,724,561
Area 6: Richmond (I-295 to Centralia)	6A	24,345	2,170	1,175	9,510	3,700	6,915	1	$28,935,430
	6B–A-Line	104,855	2,575	1,220	20,920	5,200	7,200	1	$43,945,400
	6B–S-Line	196,175	1,658	1,215	23,020	14,700	7,325	2	$96,463,578
	6C	104,900	2,665	1,220	20,920	5,700	7,200	1	$46,471,005
	6D	196,175	1,658	1,215	23,020	14,700	7,325	2	$96,463,578
	6E	91,630	2,350	1,220	11,040	3,700	7,140	2	$33,035,740
	6F	196,175	1,658	1,215	23,020	14,700	7,325	2	$96,463,578
	6G	196,175	1,658	1,215	23,705	14,700	7,475	2	$96,779,523

Note: Cost estimates do not include engineering costs or contingency. Major utility facility relocations are provided by number, not feet.

Each at-grade highway-rail crossing was analyzed to determine which safety mechanisms or treatments would be proposed as part of the Build Alternatives. These treatments include grade separation, closure/consolidation, four-quadrant gates, median treatment, other treatment, or no action. All roadways that would be retained across the Fredericksburg Bypass (Build Alternative 3C) and the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) would be grade-separated.

There would be two new at-grade crossings under the single-station alternative in Richmond at Broad Street (Build Alternative 6C). The Project would improve safety of the private at-grade crossings with either locking gates or signalized four-quadrant gates and would improve safety at the pedestrian at-grade crossings.

Safety of the existing public at-grade crossings in the DC2RVA corridor would be improved as part of the Build Alternatives (Appendix S, *Transportation Technical Report).*

4.18 PUBLIC HEALTH AND SAFETY

Most of the rail lines in the United States, including the DC2RVA corridor, are used for transportation of various freight, including hazardous materials. All Class I railroads are required to maintain a safety plan for transporting such materials. FRA and The United States Department of Homeland Security (DHS) regulate the transportation of materials on railroads.

The Transportation Security Administration (TSA) of DHS determines the routes for shipment of certain hazardous materials. For security reasons, TSA does not share this information outside specific agencies and freight rail carriers; however, freight rail carriers regularly communicate with emergency management agencies and DHS about materials of concern.

The Build Alternatives would add nine additional round trips of intercity passenger trains on the DC2RVA corridor. The Project would not add any hazardous materials trains on the DC2RVA corridor. The Build Alternatives are designed in accordance with FRA regulations, industry standards, and CSXT requirements. DRPT expects that the proposed upgrades to facilities and added rail capacity associated with the Build Alternatives will increase safety of all train traffic through the DC2RVA corridor by decreasing congestion, maintaining the rail line to current standards in locations where work is being conducted and replacing older infrastructure. The modern infrastructure and new technologies that would be applied would provide a greater level of safety for all rail traffic, including transportation of hazardous materials.

4.19 CONSTRUCTION IMPACTS

Construction impacts associated with a transportation project are those impacts that are temporary or short term and that occur only during construction. They can involve temporary changes in land use and access, air quality, noise levels, water quality, and wildlife habitat. The following provides an overview of the types and extent of potential construction impacts that may occur if a Build Alternative is advanced. BMPs and other measures that can be used as appropriate to mitigate any temporary construction impacts are also presented. Construction impacts would be similar amongst the different Build Alternatives in each alternative area, with the exception of Alternative Area 3 (Fredericksburg) and Alternative Area 5 (Ashland). In these areas, more construction would occur with the Fredericksburg Bypass (Build Alternative 3C) and the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) than the Build Alternatives that go through town (Build Alternatives 3A, 3B, 5A, 5A–Ashcake, 5B, 5B–Ashcake, and 5D–Ashcake). However, the Build Alternatives that go through town and add an additional track (Build Alternatives 3B, 5B, 5B–Ashcake, and 5D–Ashcake) would require construction through a built up urban environment where space is more confined and where construction activities are more likely to impact activities of area residents. Refer to the *Constructability Technical Report* (Appendix L) for addition information regarding the construction of each Build Alternative.

4.19.1 Impacts

4.19.1.1 Rail

Track closures and shifts can have major effects on rail operations. New stations and station alterations can also have effects on transit users. Construction of the additional track, infrastructure additions and modification to control points, station infrastructure with additional platforms, and speed increases requires a phased construction approach.

4.19.1.2 Land Use and Access

Construction activities for all Build Alternatives could result in temporary and localized detours, modifications to access, and increases in truck traffic. Access to businesses and homes could be temporarily disrupted due to temporary detours that are necessary to allow ample space for equipment staging and construction.

4.19.1.3 Air Quality

Demolition and construction activities can result in short-term increases in fugitive dust and equipment-related particulate emissions in and around the study area. The potential air quality effects would be short term, occurring only while demolition and construction work is in progress and local conditions are appropriate. The potential for fugitive dust emissions typically is associated with building demolition, ground clearing, site preparation, grading, stockpiling of materials, onsite movement of equipment, and transportation of materials. The potential is greatest during dry periods, periods of intense construction activity, and during high wind conditions.

GHG emissions would also be generated during construction; however, these emissions are likely to be relatively minor given the nature and size of the Project and the limited duration of construction activities.

4.19.1.4 Noise

Noise levels would not be substantially altered by construction, which includes noise generated by heavy equipment during construction activities. The potential for noise impacts during construction is correlated to the proximity of sensitive noise receptors to the proposed construction activity. The potential for noise impacts during construction typically increases in urban and suburban areas because of the higher population densities found in those areas; however, noise in urban areas might be less noticeable than in rural areas because ambient noise levels are higher in urban areas. Construction noise impacts are temporary and, typically, progress linearly along transportation corridor construction projects. As construction approaches an area, noise impacts to receptors in that area would begin to increase over a period of time, reach a peak, and then dissipate as construction moves past the area. Section 4.7.1.4 provides additional information regarding construction noise.

4.19.1.5 Water Resources

Construction could potentially result in short-term effects such as increased sedimentation, increase in turbidity from in-stream work, and possible spills, or non-point source pollutants entering groundwater or surface water from stormwater runoff. Construction activities that could affect stormwater runoff include excavation to widen ‘cut’ sections and to remove unsuitable (organic) material from 'fill' sections; filling and placing ballasts to support new track; relocating access roads; relocating or creating new trackside swales; and any substructure work required for bridge or culvert installation, or station improvements. Construction staging areas and haul roads, if needed, could also disturb the ground, potentially causing erosion and sedimentation. Additionally, culvert installation may require pump-around methods, resulting in a temporary cessation of flow through stream sections.

4.19.1.6 Wildlife and Habitat

Human presence during construction and the associated construction noise, such as from passing equipment, piling emplacement, and blasting of bedrock, may temporarily displace some species of wildlife. The noises associated with construction may also mask territorial vocalizations of birds, interfering temporarily with breeding. Amphibians, which breed more commonly at dusk or night, are less likely to be affected. Construction in forested areas may result in mortality of amphibians, reptiles, and small mammals within the work zone and the loss of nesting birds if construction is initiated during nesting season. The clearing of terrestrial and aquatic vegetated cover within the construction footprint would temporarily displace certain habitat areas, and the mechanical removal of cover would cause animal migration away from the disturbance, resulting in a temporary decrease in available habitat and increased competition for remaining habitat. Water quality and therefore aquatic species may be affected temporarily by runoff from construction areas and permanently through runoff from increased impervious surfaces. Anadromous fish movements could be interrupted during construction. Opportunistic or invasive plant species may have a competitive advantage in colonizing disturbed areas during early construction activities. Many of these effects can be offset through application of BMPs.

4.19.2 Mitigation

4.19.2.1 Rail

During construction, the goal will be to maintain two main tracks in operation wherever possible; however, there will be some track outages and service disruptions during construction. DRPT will prepare a Service Development Plan (SDP) for the DC2RVA Project. The SDP will define the phased implementation of improvements relative to the incremental expansion of service. Preliminary engineering and final design plans will include a construction staging plan to minimize track outages during construction. Station improvements for platform additions and pedestrian access will be constructed early to support the new track when placed in operation.

4.19.2.2 Land Use and Access

Temporary disruptions to driving patterns and access are often unavoidable but would be minimized to the extent possible by carefully planning for maintenance of traffic during the construction process. The SDP will define the phased implementation of improvements relative to the incremental expansion of service. Preliminary engineering and final design plans will include a construction staging plan to minimize roadway outages during construction. Safety concerns due to the presence of heavy construction equipment during Project construction will be mitigated using appropriate signage and fencing to separate pedestrians and vehicles from construction areas and equipment. All land use temporarily affected by construction activities would be returned to its original use after construction is complete. All temporary access for construction vehicles would be removed and returned to its original land use.

4.19.2.3 Air Quality

DRPT will identify the appropriate BMPs to minimize air quality effects during construction. The VDOT Road and Bridge Specifications include provisions on fugitive dust control. Under these provisions, dust and airborne dirt generated by construction activities will be controlled through dust control procedures or a specific dust control plan, when warranted. The contractor and DRPT will meet to review the nature and extent of dust-generating activities and will cooperatively develop specific types of control techniques appropriate to the specific situation. Techniques that may warrant consideration include measures such as minimizing track-out of soil onto nearby publicly traveled roads, reducing speed on unpaved roads, covering haul vehicles, and applying chemical dust suppressants or water to exposed surfaces, particularly those on which construction vehicles travel. With the application of appropriate measures to limit dust emissions during construction, this Project will not cause any significant, short-term particulate matter air quality impacts.

4.19.2.4 Noise

Practices to minimize the effects of construction noise would be in accordance with Section 107.14(c)(3) of VDOT's Road and Bridge Specifications.

While construction noise is unavoidable in most cases, steps can be taken to minimize the impact, such as the following:

- Keep all equipment well maintained, tuned, and properly lubricated to minimize at-source noise production;
- Use sound attenuation devices on exhaust ports;
- Substitute the use of flag persons to control construction vehicle movements, instead of using audible back-up alarms for vehicles;
- Minimize unnecessary idling of heavy equipment and machinery, especially diesel engines and generators, when not actively in use; and
- Prohibit construction during sensitive nighttime, early evening, and early morning hours.

DRPT will evaluate construction noise mitigation measures in more detail when an analysis of construction noise based on an actual construction plan can be completed and will ensure that all appropriate mitigation measures are employed by including these measures in the contractors' contracts.

4.19.2.5 Water Resources

All temporary and permanent impacts to wetlands and water resources associated with construction activities are regulated by USACE and Virginia DEQ through Sections 404 and 401 of the CWA, as well as by the Virginia Water Protection Program. DRPT will be responsible for ensuring that all Section 404 and 401 permit requirements are met by the Project contractors.

Stormwater discharges to jurisdictional wetlands and waterways, such as discharges from construction sites, are regulated through the National Pollutant Discharge Elimination System (NPDES) Stormwater program. An NPDES Construction permit would be required for any construction site that disturbs more than 1 acre (including sites that are smaller than 1 acre but are included as part of a larger project or development). Through issuance of an NPDES

Stormwater permit, the regulating agency would ensure that enough erosion and sediment control measures are specified for the activity and that impacts are further reduced by using construction BMPs.

Erosion and sedimentation control plans for highway and rail improvements, including staging areas, would be required for work that would include ground disturbance, and they would describe the measures to be employed as erosion control, sedimentation control, temporary stormwater management measures, and dust control. Erosion control plans would also address in-water work at stream crossing locations. These plans must be approved before site construction could proceed and would be developed in accordance with regulations set forth by VDCR. Implementation of the Project-specific plan would be expected to minimize impacts of erosion and sedimentation during construction. Erosion and sediment control measures would be implemented throughout the construction period to minimize water quality impacts from increased levels of sedimentation and turbidity. Control measures may include berms, dikes, sediment basins, fiber mats, straw silt barriers, netting, mulch, temporary and permanent seeding, and other methods. Construction impacts to in-stream aquatic habitats would be minimized to the extent practicable by avoiding stream relocations and by crossing streams at right angles where possible. To the extent possible, construction equipment would be restricted from fording and otherwise disrupting in-stream habitats. Staging areas for heavy equipment, material storage, and short-term field offices would be chosen carefully and situated away from sensitive areas.

4.19.2.6 Wildlife and Habitat

DRPT anticipates that construction would be monitored to adhere to a strict schedule with possible time of year restrictions to avoid disrupting the critical life cycles of both aquatic and terrestrial wildlife, in particular, threatened and endangered species. The spread of invasive plant species would be minimized during construction through cleaning of equipment and machinery between sites to reduce transport of undesirable plant species and prompt revegetation of disturbed areas. Temporary and permanent revegetation establishment, in accordance with VDOT's Road and Bridge Specifications, would minimize the extent and duration of undesirable plant growth and reduce sediment runoff. Work in streams and wetlands would also be minimized to the extent practicable, and necessary in-stream work would be done in the dry or with the use of sediment curtains and other measures to minimize impacts to aquatic species. Aquatic and terrestrial habitat would be restored in temporary construction areas as the native vegetation reestablishes over time.

4.20 INDIRECT AND CUMULATIVE EFFECTS

4.20.1 Indirect Effects

Indirect effects are those that are caused by an action and are later in time or farther removed in distance, but still are reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems (40 CFR 1508.8(a)). The analysis of indirect effects followed a seven-step process described below based on National Cooperative Highway Research Program (NCHRP) Report 466, *Desk Reference for Estimating the Indirect Effects of Proposed Transportation Projects* (TRB, 2002). This process is consistent with Council on Environmental Quality (CEQ) and FHWA regulations for implementing the *National Environmental Policy Act of 1969* (NEPA) and with applicable CEQ and FHWA guidance.

NCHRP Report 466 states that indirect effects can occur in three broad categories:

1. Encroachment-alteration impacts – Alteration of the behavior and functioning of the affected environment caused by project encroachment (physical, biological, socioeconomic) on the environment
2. Induced growth impacts – Project-influenced development effects (land use)
3. Impacts related to induced growth – effects related to Project-influenced development effects (impacts of changed land uses on the human and natural environment)

4.20.1.1 Step 1: Scoping

Scoping entails collaboration with the public, agencies, and other stakeholders to identify the significant issues that should be studied in the indirect effects analysis. The study team coordinated extensively with local, state, and federal agencies and jurisdictions and the public throughout the study. Early outreach included an agency scoping meeting, four public scoping meetings, e-mail distributions, press releases, website announcements, and letters to elected officials. Additional details on the coordination can be found in Chapter 6.

Commenters identified several resources of concern, including:

- Socioeconomics (land use, parks and recreational areas, public lands, minority and low-income populations, and right-of-way and displacements);
- Natural resources (surface waters and wetlands, floodplains, biological resources, and air quality);
- Historic properties (building sites, districts, and objects listed in or eligible for listing in the NRHP).

4.20.1.2 Step 2: Identify Study Area Direction and Goals

As described in Chapter 1, Purpose and Need, and Chapter 2, Alternatives, the proposed improvements would be largely limited to the existing rail corridor, with the exception of several local realignment options at the City of Fredericksburg and the Town of Ashland. Accordingly, the general study areas for the Project are centered on the existing rail facilities, as illustrated in Figure 1.2-1 in Chapter 1. The preceding sections of this chapter describe the direct environmental impacts of the proposed improvements along these corridors.

Indirect effects can occur in areas beyond the direct footprint of the constructed improvements. Moreover, the areas within which indirect effects may materialize vary by resource type. Therefore, each resource-specific study area includes additional lands that contain resources that are in some way connected to the area of direct effects of the Project. The following study areas have been defined for the indirect and cumulative effects analyses.

Socioeconomics

The study area for indirect and cumulative effects on socioeconomic resources encompasses an area defined by Census tracts that lie directly within or partially within the direct impacts area. Topics included under socioeconomics include land use, demographics, environmental justice, parks and recreational resources, and public lands. The Project corridor traverses parts of 153 census tracts in

Arlington County (2), the City of Alexandria (10), Fairfax County (13), Prince William County (11), Stafford County (10), the City of Fredericksburg (3), Spotsylvania County (4), Caroline County (6), Hanover County (12), Henrico County (19), the City of Richmond (52), and Chesterfield County (11). The data associated with these tracts are presented in Table 3.12-2 and Figure 3.12-1 in Chapter 3. While the census tracts encompass areas where indirect socioeconomic effects may occur, the locations where induced growth might occur is focused near the stations where access to improved intercity passenger rail services would be provided. Inducement of growth requires access to the rail services at the station locations in the same manner as highway interchanges provide access to the interstate highway system. Major passenger transport stations for intercity passenger rail work best in existing regional centers (FRA, 2011). Accordingly, station locations proposed for one or more alternatives include the following, which are all in urban or suburban areas:

- Alexandria Union Station
- Woodbridge Station
- Quantico Station
- Fredericksburg Station
- Ashland Station
- Staples Mill Road Station
- Boulevard Station
- Broad Street Station
- Main Street Station

In a station area planning reference document for high speed and intercity rail, FRA (2011) suggests defining the station area in terms of 0.25- and 0.5-mile radii of the station. Accordingly, the study area for analysis of potential induced development is defined as the areas within a 0.5-mile radius of the station locations.

Also included for the indirect effects analysis for socioeconomics is Union Station in downtown Washington, D.C. Although Washington's Union Station is beyond the limits of the Project, it serves as an existing hub for Amtrak services and an important origin and destination for potential passenger travel on the Washington, D.C. to Richmond line. Union Station is located near many government and commercial buildings and residential areas.

Natural Resources

The study area for indirect and cumulative effects to natural resources includes the seven eight-digit hydrologic unit code (HUC) watershed boundaries that encompass the Project limits. Chapter 3, Affected Environment, Section 3.1.1, provides descriptions of these watersheds, and Figure 3.1-1 in Chapter 3 shows their locations.

- Middle Potomac-Anacostia-Occoquan (HUC 02070010)
- Lower Potomac (HUC 02070011)
- Lower Rappahannock (HUC 02080104)
- Mattaponi (HUC 02080105)
- Pamunkey (HUC 02080106)
- Middle James-Willis (HUC 02080205)
- Lower James (HUC 02080206)

These watersheds represent the area within which there is potential for indirect and/or cumulative effects on waters and related resources (wetlands and floodplains) upstream and downstream of the study area. It also is a suitable area for consideration of the potential effects of habitat loss on the availability and connectivity of wildlife habitats.

Historic Properties

The study area for indirect and cumulative effects to historic properties is the same as the Section 106 APE for architectural and archaeological resources as defined in the historic properties analysis. The APE extends 500 feet on either side of the DC2RVA corridor center line in those areas where the proposed corridor would follow the existing rail line; however, in town or urban settings, the APE is reduced to one city block because dense modern development would often limit the effect of the proposed rail Project on historic resources. The APE was expanded to 1,000 feet in areas where DRPT recommends highway-rail grade separations and also expanded as needed in areas of new roadways to capture potential viewshed impacts (areas where alterations to a resource's setting and feeling could occur). This APE was approved by DHR in March 2015.

Direction and goals pertain to past trends and future expectations regarding social, economic, natural resource, and historic property conditions. Past actions regarding land use and development, including exploitation of natural resources, are reflected in the current conditions of the environment, as described in Chapter 3. Future conditions depend in part on the policies and planning activities of local and regional planners with respect to land use types and densities. Local comprehensive plans generally contain sections regarding visions or goals for desired patterns of development, as well as protection and preservation of sensitive environmental resources. Evidence indicates that transportation investments result in land use changes only in the presence of other factors. These factors include supportive local land use policies, local development incentives, availability of developable land, and a favorable investment climate (TRB, 2002). An understanding of local goals, combined with knowledge of demographic, economic, and social trends, contributes to understanding the potential for Project-influenced changes. Moreover, understanding goals permits consideration of the extent to which potential indirect effects align with those goals as a partial determinant of impact significance and an indicator of effects that merit further analysis. In Chapter 3, Section 3.11.3.2, Status of Local Planning/Development Trends, provides an overview of direction and goals.

4.20.1.3 Step 3: Inventory Notable Features in the Study Area

The objective of this step is to identify specific environmental issues within the indirect effects study areas against which the Project may be assessed. This is accomplished through conducting an inventory of notable features for each resource of concern. Notable features include specific valued, vulnerable, or unique elements of the environment. More-specific information regarding notable features for each resource is provided throughout Chapter 3, Affected Environment.

4.20.1.4 Step 4: Identify Impact-Causing Activities of the Proposed Alternatives

Step 4 identifies the impact-causing activities of the Project so that they may be compared with the goals and trends identified in Step Two and the notable features identified in Step Three to assess whether a potential for indirect effects exists (Step Five). General types of Project impact-causing activities include earthwork for track and station construction (clearing, excavation, and filling), landscaping, erosion control, remediation, changes in travel patterns, and changes in access. These activities have been considered in the analysis of direct effects for each resource in this chapter. Direct effects that may result from the Project can potentially trigger indirect effects through encroachment and alteration of the environment farther in distance or time.

In addition to indirect effects that can be triggered by Project encroachment, indirect effects can also occur as a result of induced changes in land use patterns, population density, or growth rate that would otherwise not be expected without implementation of a proposed Project. General circumstances influencing the likelihood of induced development include:

- Extent and maturity of existing transportation infrastructure
- Accessibility
- Location attractiveness
- State of the regional economy
- Land availability and value
- Availability of utilities
- Area vacancy rates
- Local political/regulatory conditions
- Land use controls

For this Project, the potential for induced growth effects is focused on station locations. The existing railway passenger stations on the DC2RVA corridor require facilities and infrastructure improvements. The site preparation for station construction may include clearing and grubbing, grading for new or expanded platforms and trackage, utility service installation and relocations, and drainage installations. Other potential impact-causing activities at station locations may include provision of intermodal connectivity for local transit, pedestrian, and bicycle travel; passenger pickup and drop offs; parking as either parking decks or paved parking areas; and ancillary retail and other amenities. The relevant station locations are as listed previously in Step 2.

4.20.1.5 Step 5: Identify Indirect Effects for Analysis

The objective of this step is to assess whether notable features identified in Step 3 would be indirectly affected by the proposed alternatives, taking into consideration the impact-causing activities and direct effects in Step 4. The following subjects were determined to potentially experience indirect effects from the Build Alternatives and were thus selected to move forward to the analysis of indirect effects in Step 6:

- Socioeconomics and land use
- Parks and recreation areas
- Historic properties
- Water resources
- Floodplains
- Wildlife and habitat

4.20.1.6 Step 6: Analyze Indirect Effects and Evaluate Analysis Results

Socioeconomics and Land Use

Under the No Build Alternative, the population along or near the rail corridor is expected to continue to grow. The Washington/Northern Virginia, Fredericksburg, and Richmond urban areas would continue to function as hubs of residential and commercial activities. In-fill development and denser development would be expected in these areas. Less-developed lands between these hubs also would be expected to continue to experience development as people seek more space that is still within reasonable commuting distance of job opportunities.

All existing rail station locations are in urban and suburban locations where considerable development already exists; however, under the Build Alternatives, further intensification of development densities could occur at these locations in response to demand for residential space and commercial services in areas convenient to the stations, generally within a 0.5-mile radius from the station. Government agencies and other entities often prepare planning documents to anticipate and guide the form and density of such development. For example, Amtrak prepared a Master Plan for Washington, D.C.'s Union Station (Amtrak, 2012). The Master Plan provides for relieving existing and future passenger rail congestion and accommodating triple the current number of passengers and double the current number of trains (including the new SEHSR trains) within the existing station footprint. This would be accomplished by improving existing facilities and constructing new facilities under and over the existing facilities, including air rights development of retail, hotel, commercial, and residential spaces. Construction would be phased over a 15- to 20-year period. Phase 4 of the Master Plan provides further expanded tracks and platforms on a lower level and creation of a new Amtrak lower-level concourse, which would accommodate increased intercity passenger rail service south to Virginia and the Southeastern United States. Aside from the facilities that would specifically be built to serve increased intercity passenger rail services, it is difficult to determine specific increments of other types of development that could be attributed to actual implementation of the services. The variety of other passenger rail services at the station (e.g., Northeast Corridor [NEC], VRE, Metrorail), as well as the dense and dynamic existing and planned residential and commercial activities, also contribute to the overall development status of the station area and surrounding lands. Similarly, the City of Richmond's Downtown Master Plan (2009) calls for Main Street Station to be a multimodal transportation hub for downtown Richmond. Recent and ongoing construction at the Main Street Station is aimed at rehabilitating the condition of the facilities, furthering the multimodal functions of the station, and promoting retail and social activities within and around the station.

Other stations in the DC2RVA corridor that would be served by the additional intercity passenger trains may also experience some increment of increased development to take advantage of the transportation benefits provided; however, such development would be consistent with the urban or suburban patterns already existing and would be consistent with local land use planning and goals. Moreover, such development would only enhance the utilization and effectiveness of the passenger rail services.

Except for the Fredericksburg Bypass (Build Alternative 3C) and Ashland Bypass (Build Alternatives 5C and 5C–Ashcake), the Project involves improvements to an existing rail facility. As such, the Project would not divide or segment existing communities or interfere with community cohesion. Existing communities adjacent to the rail corridor are accustomed to the presence of the rail facility, the train traffic on it, and the noise and visual effects associated with it. However, in sections where parallel track would be added, the rail facility would be in incrementally closer proximity to residences and businesses, which may increase noise levels and/or remove visual buffers. It is possible that some residents or businesses may leave the area because of such increased proximity effects. It is also possible, however, that some people may be attracted to communities adjacent to the rail stations because of the improved travel times and access.

The Fredericksburg Bypass (Build Alternative 3C) would bisect residential development along two local roads (Thornton Rolling Road and Patriot Lane), which would adversely affect community cohesion by separating adjacent neighbors and introducing a rail line where one does not currently exist. The introduction of a rail line and rail traffic would alter the rural setting of the area and may make nearby lands less attractive for residential use. Likewise, the Ashland Bypass (Build Alternatives 5C or 5C–Ashcake) would cross rural lands designated in Hanover County's Comprehensive Plan for agricultural and forestry uses, including the locally designated Stanley Agricultural and Forestal District. In addition to displacing homes, this alternative would adversely affect community cohesion by separating adjacent neighbors and introducing a rail line where one does not currently exist. The introduction of a rail line and rail traffic would alter the rural setting of the area. The effects on community cohesion are mitigated, to some extent, through the provision of highway-rail grade at most of the roadways that cross the bypass alignments.

The Project could contribute positively to economic activity along the DC2RVA corridor in the short term by providing jobs during Project design and construction and in the long term by reducing congestion, improving intercity travel time and reliability, and improving accessibility to employment at other location within the region by rail.

Parks and Recreation Areas

Many publicly owned parks and recreation areas exist immediately adjacent to the rail corridor. The No Build Alternative would have no induced development effects on these properties. None of these properties are at station locations where new or modified access would be provided to accommodate intercity passenger rail services. Accordingly, none of the Build Alternatives would result in induced growth effects on parks or recreation areas; however, these properties could potentially experience encroachment-alteration indirect effects under the Build Alternatives due to ongoing proximity effects over time, such as air quality, noise, and visual impacts from the railroad and trains operating on it. However, these are expected to be minor and would not differ substantially from the No Build Alternative. There would be direct effects of the Project on publicly owned parks and recreational areas by one or more of the Build Alternatives (see Section 4.14 of this chapter). Land at up to six parks would be directly used by the Project. None of these impacts would affect park activities, and the amount of right-of-way required would generally be below 0.4 acre. The exception is at Long Bridge Park, where Build Alternative 1B would impact 1.45 acres. Impacts at the other parks would be temporary and would not result in incorporation of parkland into the railroad right-of-way. Noise levels under the Build Alternatives would generally be higher than existing noise levels or No Build Alternative noise levels; however, such noise levels would not rise to a level as to render the parklands unsuitable for their designated public recreational uses.

Historic Properties

The No Build Alternative would have no induced development effects on historic properties, except to the extent that station modifications are being planned and constructed to address other needs while also accommodating future increases in intercity passenger train services. For example, the City of Richmond's Main Street Station and Trainshed (NRHP and NHL) is currently undergoing renovations that include retrofitting, upgrading, and expanding existing platforms to accommodate more trains; replacing the roof of the train shed; restoring pedestrian and bicycle travel through the train shed between Franklin Street and the farmer's market; providing 80,000 square feet of retail space; and providing facilities and amenities to promote the site as an alternative transportation hub for transit, bicycles, and other alternative vehicles (City of Richmond Department of Economic & Community Development, 2016). These improvements also would support use of the station as a multimodal transportation hub for downtown Richmond (City of Richmond, 2009). While these improvements anticipate use of the station for both the Washington-to-Richmond and Richmond-to-Raleigh sections of the SEHSR corridor, additional improvements at the station would be needed to fully implement the increased intercity train services.

Several of the Build Alternatives could have induced development effects on historic properties based on the different stations associated with the alternatives:

- Build Alternative 2A in the Northern Virginia Area includes Alexandria Union Station (NRHP). Two other NRHP-listed historic properties are near the station – the George Washington National Masonic Memorial and the Rosemont Historic District. Although the Project involves no physical changes to the station, the increased train service could incrementally enhance the attractiveness of adjacent lands for more or denser development. However, the City of Alexandria's Master Plan sets goals of encouraging quality, high-density mixed-use development near the King Street Metro Station, which is adjacent to the Alexandria Union Station. The major proposed changes involve phasing out industrial uses and replacing them with higher-density mixed-use development and moderate density office spaces. Accordingly, any increment of development induced by the Project at this location would be fully consistent with local planning for land use. Evaluation of effects on historic properties at this location pursuant to Section 106 of the NHPA is not complete. FRA's preliminary conclusion is there will be no adverse effect, but this is subject to further consultation with DHR and the Section 106 consulting parties.
- Build Alternatives 3A, 3B, and 3C in the Fredericksburg Area involve the Fredericksburg Amtrak/VRE Station. The historic station building (potentially eligible for NRHP) is not actually used for the station but is occupied by a restaurant. Passengers use the nearby platforms that have canopies to provide some protection from the weather. The station building is within the Fredericksburg Historic District (NRHP), which straddles the rail corridor. The historic station building would not be physically impacted. Instead, the platforms would be widened and lengthened, a new station building would be constructed, and a parking garage would be constructed. A tunnel would be constructed to connect the new station building with the parking garage. The increased train service could incrementally enhance the attractiveness of adjacent lands for more or denser development; however, the City of Fredericksburg's Comprehensive Plan contains provisions aimed at protecting the city's historic properties while also allowing compatible development through building rehabilitation, infill on vacant parcels, and replacement of noncontributing resources (City of Fredericksburg, 2010). Evaluation of effects on historic properties pursuant to Section 106 of the NHPA is not complete. FRA's preliminary conclusion is there will be no adverse effect on the historic train station building and an adverse effect on the Fredericksburg Historic District under Build Alternatives 3A and 3B, but this is subject to further consultation with DHR and the Section 106 consulting parties.

- Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake through the town of Ashland would involve the Ashland Station Depot. Although the building is no longer used as a station (with its interior turned over for other purposes), it is potentially eligible for NRHP. Increased train service at this station under Build Alternatives 5A, 5B, and 5D could incrementally enhance the attractiveness of adjacent lands for more or denser development. Evaluation of effects on the historic station for these alternatives pursuant to Section 106 of the NHPA is not complete. FRA's preliminary conclusion is there will be an adverse effect under Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake, but this is subject to further consultation with DHR and the Section 106 consulting parties.
- The Build Alternatives that use the S-Line between Main Street Station and Centralia (Build Alternatives 6B–S-Line, 6D, 6F, and 6G) and one of the Build Alternatives that uses the A-Line between Acca Yard and Centralia (Build Alternative 6E) would involve the Main Street Station (NRHP and NHL) in downtown Richmond. Increased train service at this station could incrementally enhance the attractiveness of adjacent lands for more or denser development; however, development around the station is relatively dense, and ongoing planning and construction at the station are taking into account more intensive utilization of the station and its environs as a multimodal transportation hub, increased commercial uses, and increased social activities. Evaluation of effects on the historic station for these alternatives pursuant to Section 106 of the NHPA is not complete. FRA's preliminary conclusion is there will be no adverse effect under Build Alternatives 6B–S-Line and 6E and an adverse effect under Build Alternatives 6D, 6F, and 6G. Build Alternatives 6A, 6B–A-Line, and 6C would involve disuse of the Main Street Station, which would be an adverse effect. This preliminary conclusion is subject to further consultation with DHR and the Section 106 consulting parties.

DRPT does not expect either the No Build Alternative or the Build Alternatives to have notable indirect encroachment-alteration effects on historic properties.

Water Resources

The No Build Alternative would have no induced development effects on water resources. The Build Alternatives may have incremental induced development effects on water resources near station areas; however, given the urban and suburban locations of these stations, land cover is relatively impervious, and the potential for increased runoff and diminished water quality is less than it would be if the induced development were to occur in more naturalized land cover types (e.g., forest).

Under the No Build Alternative, stormwater runoff from the existing rail and station facilities would continue to transport sediments and roadway contaminants to local water bodies, including impaired streams.

All the Build Alternatives involve direct loss of streams and wetlands as a result of track additions and modification, with the exception of Build Alternatives 1A, 1B, and 1C where there would be no stream impacts. Potential temporary indirect impacts of the Build Alternatives during Project construction include increased downstream sedimentation and turbidity from in-stream work, and possible spills or non-point source pollutants entering groundwater or surface water from storm runoff. Each Build Alternative would incrementally increase the amount of impervious surface, resulting in increased stormwater runoff flows from affected surfaces. If untreated, increased flows would incrementally increase the transport of sediments and roadway contaminants to streams crossed by or adjacent to the rail corridor. These pollutants can then be transported farther downstream and into wetland areas. Pollutant levels in runoff and the extent of downstream impacts are very difficult to quantify because there are many variables surrounding land use and stream dynamics. Given that a meaningful projection of the extent of pollutant loads from each alternative cannot be made without extensive analysis, the best predictor of relative degree of impacts would then be the amount of increase in impervious surfaces and the number of stream crossings for each alternative. Specific quantities of additional impervious surfaces for each Build Alternative are not yet known, but they are expected to be similar among the alternatives given the substantial overlap of the alternatives.

Floodplains

The No Build Alternative would have no induced development effects on floodplains. Likewise, the Build Alternatives would not have induced development impacts on floodplains because none of the locations where induced development might occur are in floodplains. With respect to encroachment-alteration indirect effects, the existing rail tracks displaced 100-year floodplains by placing bridges and culverts at stream crossings within the floodplains. The Build Alternatives would require new or modified bridges and extensions of culverts, which could potentially cause indirect effects with respect to changes in flood flow elevations and changes in floodplain configurations. While floodplain encroachments are likely, Project design under any of the alternatives would be consistent with federal policies and procedures for the location and hydraulic design of encroachments on floodplains. Therefore, DRPT does not expect that the Project would cause notable increases in flood levels, increase the probability of flooding, or increase the potential for property loss and hazard to life. Furthermore, the Project would not be expected to have substantial indirect effects on natural and beneficial floodplain values.

Wildlife and Habitat

The No Build Alternative would have no induced development effects on wildlife and habitat. DRPT does not expect the Build Alternatives to have notable induced development impacts on wildlife and habitat because all locations of potential induced development are in urban and suburban areas where available natural habitat is very limited. With respect to encroachment-alteration indirect effects of the Build Alternatives, wildlife habitat along the rail corridor is highly variable. In some areas, development has entirely displaced or at least fragmented forested habitat. In other areas, sizable blocks of forested habitat remain, though in many cases it is fragmented by agricultural activities. While the No Build Alternative would not result in further fragmentation of wildlife habitats due to rail construction, present and planned future development and transportation projects would continue to reduce habitat areas. Under the No Build Alternative, wildlife that occupies habitats adjacent to the rail corridor would continue to experience disturbance from noise, habitat degradation from soil erosion and sedimentation, introduction of invasive plants, and risk of collision with vehicles and trains. Stream hydrology and water quality within aquatic habitats downstream of the rail corridor are currently affected by erosive stormwater velocities and transport of sediment and roadway contaminants in stormwater runoff. The Build Alternatives may incrementally increase ongoing habitat impacts due to expansion of the rail facilities. Adjacent habitats would be further fragmented by removal of habitat for construction of the proposed improvements. Such habitat disturbances and losses could incrementally increase competition for resources in diminished habitats by displaced populations.

The indirect impacts to water quality discussed earlier would potentially affect habitat quality for aquatic species living in streams and wetlands downstream of the rail corridor. Sediments and pollutants in runoff may contribute to changes in macrobenthic community structure and composition, affecting fish and amphibian populations that rely on them as a food source, as well as birds and mammals higher on the food chain.

4.20.1.7 Step 7: Assess Consequences and Develop Mitigation

Various indirect effects for the Project are identified in Step 6. While planning judgment allows the identification of potential indirect effects, insufficient data exist to fully assess the consequences of these indirect effects. For example, while it is reasonable to predict that direct impacts to water quality may occur at stream crossings by the railroad, there is not enough information to determine how far downstream such impacts would persist. Despite the lack of detailed data, DRPT expects that the consequences of the indirect effects would be limited because:

- The proposed improvements would modify an existing rail facility within which the locations of potential induced development are limited to station areas where development already is prevalent.
- Any induced development that may occur would be largely compatible with existing development and would actually be desirable in the context of promoting more compact development patterns consistent with rail mass transit, multimodal transportation hubs, and facilitation of intercity travel that does not rely on the automobile.
- Any induced development would be consistent with local planning goals and land use plans.
- The narrow linear nature of the Project presents a limited footprint of direct impacts and, therefore, a limited potential for expansive indirect impacts attributable to encroachment and alteration.
- Impacts of the Project can be minimized and mitigated in many ways, including:
  - Implementation of temporary and permanent stormwater management features and erosion and sediment controls.
  - Compensation for unavoidable stream and wetland impacts.
  - Resolution of adverse effects on historic properties through design changes and other measures developed in consultation with DHR and other Section 106 consulting parties.

4.20.2 Cumulative Effects

Cumulative effects are defined as the impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative effects can result from individually minor but collectively significant actions taking place over a period of time. The cumulative effects analysis uses a five-part evaluation process based on FHWA guidance:

1. What is the geographic area affected by the Project?
2. What are the resources affected by the Project?
3. What are the other past, present, and reasonably foreseeable actions that have impacted these resources?
4. What were those impacts?
5. What is the overall impact on these various resources from the accumulation of the actions?

4.20.2.1 Geographic Area and Time Span

The geographic limits of the resource-specific study areas used for the cumulative effects analysis are the same as those used for the indirect effects analysis. The time span for the analysis is from the mid-1950s (when highways and automobile use were rapidly expanding and rail passenger travel was declining) to 2045, which is the design year for the Project (the horizon year for traffic analysis and Project design). Notwithstanding, a general synopsis of human activities before the mid-1950s is provided as background.

4.20.2.2 Affected Resources

The resources that would potentially experience cumulative effects are the same as those that would experience direct and/or indirect effects.

4.20.2.3 Past, Present, and Reasonably Foreseeable Actions

Past Actions

General Past Development. The current condition of the affected environment reflects the impacts of thousands of years of prehistoric occupations and four centuries of historic occupation. In the Northern Virginia, Fredericksburg, and Richmond portions of the DC2RVA corridor, many of the past actions that have broadly contributed to the baseline for this analysis occurred as part of a general development progression advancing from subsistence hunting and gathering to agricultural uses to increasingly dense urban/suburban occupations. This incremental land use intensification in portions of the DC2RVA corridor has contributed to increased benefits to society from expanding communities with growing employment and increasing standards of living, but also a decline in natural resource conditions. Other portions of the DC2RVA corridor remain largely in agricultural or rural residential uses, with a correspondingly greater portion of remaining natural resources. These stages of progressively more intensive utilization of the environment by humans encompass a multitude of past actions that cannot be reasonably enumerated; however, the cumulative impact of these actions is represented in the current state or condition of environmental resources.

Existing Rail. In 1834, RF&P was formed, connecting Richmond to Washington, D.C. via Fredericksburg. The railroad served as a bridge line between other railroads to the north and south to facilitate movement of freight and passengers. Its strategic location allowed it to connect with virtually every major northeastern and southeastern railroad. By the 1930s, the line was accommodating many passenger rail services, including extensive long-distance interstate travel between New York and Florida. During the 1960s through the 1980s, several railroads merged and consolidated, and RF&P eventually became part of CSXT. Rail passenger travel declined through the 1960s and 1970s as the interstate highway system made automobile travel more convenient, and air travel diverted most long-distance travelers. In 1971, Amtrak took over passenger services on the RF&P line. As highways became more congested, rail travel again became attractive, particularly in urban areas such as Northern Virginia. Establishment of VRE in 1992 provided a new alternative to commuting on congested highways between Fredericksburg and Washington, D.C. Amtrak trains using the line include regional services connecting to the NEC services that run from Washington to New York and Boston, as well as some long-distance service. Amtrak has expanded service in the corridor since 1992, adding Northeast Regional (Virginia) and Interstate Corridor (Carolinian) trains.

Road Development. The 1918 Virginia General Assembly approved establishment of the first state highway system, a network of 4,002 miles for which construction and maintenance would be the direct responsibility of the highway commissioner and his staff. Among the roads to be included was the Richmond-Washington Highway, the predecessor of U.S. Route 1 and I-95. A fully paved Route 1 was not completed until 1927 (VDOT, 2006).

In the *Federal Aid Highway Act of 1944,* Congress called for designation of a national system of interstate highways that was "so located as to connect by routes, as direct as practicable, the principal metropolitan areas, cities, and industrial centers, to serve the national defense, and to connect at suitable border points with routes of continental importance." However, it was not until passage of the *Federal-Aid Highway Act of 1956* that enough funding was provided for development of the system. In Virginia, early emphasis was on the I-95 corridor because it was to parallel U.S. Route 1, which by the mid-1950s had become the most heavily traveled through road in Virginia and one of the nation's busiest highways. I-95 had lower crash rates than conventional roads; reduced travel times; stimulated commercial, industrial, and residential growth; and provided broader tax bases for local governments related to the associated economic development (VDOT, 2006).

Development of an arterial network to supplement the interstate system was authorized by the 1964 Virginia General Assembly.

Present and Reasonably Foreseeable Future Actions

As described in Chapter 1, Purpose and Need, population in the DC2RVA corridor and adjacent urban regions continues to grow, increasing demand for reliable and safe travel options. With population growth comes increased development, consumption, and freight movement. Construction of homes, businesses, community facilities, and supporting infrastructure will continue into the future throughout the DC2RVA corridor; however, those developments are too numerous and unspecific to enumerate here. Illustrative of the types of infrastructure other than transportation facilities needed to support ongoing development is a 340-megawatt electrical power generating plant at Doswell approved by the State Corporation Commission (SCC) (SCC, 2016). Section 3.11.3.2 outlines expected future land use and planned growth and development as envisioned by local jurisdictions and regional planning organizations.

The following rail and transit projects have been identified within the indirect and cumulative effects study area.

- Washington Union Station Capacity upgrade
- Virginia Avenue Tunnel expansion (under construction)
- VRE 4th Track: CP Virginia – Long Bridge
- Long Bridge Project
- RF&P Franconia-Featherstone improvements (CSXT "Fast Track agreement")
- RF&P Powells Creek – Arkendale improvements
- Main Line Relocation Project at Acca Yard and Crossovers South of the James River
- Richmond-Petersburg section improvements for service expansion to Norfolk
- DC2RVA Franconia – Occoquan Improvements
- VRE Broad Run/Crossroads Yard expansion

- VRE Gainesville/Haymarket Extension
- VRE Station Platform Expansion Program
- VRE Potomac Shores Station
- GRTC Pulse Bus Rapid Transit (BRT) Implementation (The Pulse BRT)
- WMATA Silver Line Phase II Implementation (under construction)
- Crystal City BRT/Streetcar Corridor

The *Financially Constrained Long-Range Transportation Plan* for the National Capital Region contains projects to add nearly 1,200 new lane miles of roadway throughout the Washington Metropolitan Area. Notable projects in the Virginia portion of the region include the following:

- I-395 express lanes between the Capital Beltway and the Pentagon
- I-66 corridor improvements from U.S. 15 to Capital Beltway
- I-66 express lanes inside the beltway
- I-66 eastbound widening inside the Beltway
- U.S. 1, Richmond Highway BRT
- U.S. 1 widening

The *2040 Long Range Transportation Plan* for the Fredericksburg region contains 37 projects to increase roadway capacity, replace or expand aging bridges, enhance safety and operations, improve intersections, increase commuter parking options, and provide enhanced accommodations for bicyclists and pedestrians. Notable projects include:

- Extension of I-95 express lanes
- Reconstruction of I-95/Route 630 interchange at Stafford
- Replacement of Falmouth bridge on U.S. 1
- Widening of U.S. 17 in Spotsylvania and Stafford counties

The Richmond Regional Transportation Planning Organization's draft *Plan 2040* includes many highway improvement projects on I-95, I-295, I-64, US 1, US 301, and others.

4.20.2.4 Impacts

Socioeconomics and Land Use

Impact from Proposed Project. Except for the Fredericksburg Bypass (Build Alternative 3C) and the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake), the land use and relocations impacts are relatively modest compared to the length of the Project. Including the bypass alternatives, the total number of residential relocations would range from approximately 10 to 150, depending on the specific combination of alternatives within each area. Of the larger number, just over 40 would be within the 2 bypass sections. The lower number reflects the ability to contain much of the Build Alternative improvements within the existing rail corridor for large portions of its length. Acquisition of properties and relocations of families, businesses, farms, and nonprofit organizations would occur in accordance with standards of the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (as amended, 1987). Any individual displaced as a result of the acquisition of real property, in whole or in part, would be eligible to receive reimbursement for the fair market value of the property acquired, as well as moving costs. Displaced property owners would be provided relocation assistance and advisory services together with the assurance of the availability of decent, safe, and sanitary housing. Relocation resources would be made available to all relocatees without discrimination.

The Build Alternatives would reduce congestion and improve travel time and reliability within the rail corridor. These improvements to mobility would generally contribute positively to the quality of life for local communities and support the anticipated continued economic growth; however, the two sections of potential bypasses would convert lands largely in rural residential and agricultural uses to transportation use. These conversions would be inconsistent with local comprehensive plans and would result in some divisions of rural communities. Notwithstanding, the bypasses still would provide transportation benefits and would incrementally decrease some impacts along sections of the existing rail line through the City of Fredericksburg and the Town of Ashland.

The Build Alternatives could induce more or denser development at station locations as a result of the improved transportation services; however, such development generally would be desirable to enhance the effectiveness of passenger rail services. Furthermore, because the station locations are in already urbanized areas, such development would be consistent with local plans, policies, and goals.

Impacts from Past and Present Actions. Past and present actions have changed the landscape dramatically and have resulted in the conversion of forest land to agricultural lands to residential, commercial, and industrial land uses as the populations and economies of localities along the DC2RVA corridor grew. It is presumed that in prehistoric times forests once covered the entirety of the area surrounding the rail corridor. Those forests were displaced by agriculture and development long before modern times. Therefore, tree cover that exists today is due to multiple regenerations of tree growth. Agriculture, particularly tobacco farming, depleted the soil, and much of the soil that was not depleted washed away due to erosion of unprotected soil surfaces. Livestock waste contributed to water pollution. By the mid-1950s, development accelerated sharply in Northern Virginia, largely as a result of a growing federal government sector and post-World War II prosperity. Housing booms in counties bordering Washington D.C. were fed by postwar affluence and the desire of people to own their own homes and land. The *Interstate Highway Act* authorized construction of high speed roads that made living farther from work a possibility. By the time I-95 was completed between Richmond and Washington, D.C., several residential subdivisions had already been built in jurisdictions along the DC2RVA corridor. In recent times, the City of Fredericksburg and portions of the surrounding Stafford and Spotsylvania counties have become bedroom communities to the metropolitan Washington region, as well as becoming economic activity centers themselves. The City of Richmond and surrounding counties collectively have become the third largest metropolitan area in Virginia ranked by population. The urbanization of these areas has created neighborhoods, facilitated social interaction, provided business and employment opportunities, facilitated economies of scale in community services such as education and public safety, and provided connectivity through robust multimodal transportation systems.

Potential Impact on Resources from Potential Future Actions. Under the No Build Alternative, the socioeconomic and land use impacts of the Build Alternatives would not occur and would not contribute to overall cumulative impacts. The foreseeable future projects noted above may have various socioeconomic and land use impacts throughout the study area; however, there is not enough information to reasonably quantify them. The foreseeable transportation projects listed above are all along existing transportation facilities. As such, disruptive socioeconomic and land use effects could be largely limited by containing construction within existing rights-of-way to the extent possible. Furthermore, these projects also would be subject to NEPA and other regulatory processes that are designed to help avoid substantial impacts to communities. Future projects also would be guided by local comprehensive plans, which identify areas for compatible planned growth while accommodating future planned transportation improvements.

Cumulative Effect. Except for the Fredericksburg Bypass (Build Alternative 3C) and the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake), the nature and magnitude of the direct and indirect effects among the Build Alternatives are very similar. While there are some differences in the extent of impacts associated with each alternative, these differences as well as the overall impacts are small in the context of the effects of past, present, and reasonably foreseeable future actions. Build Alternatives 3C, 5C, and 5C–Ashcake would have greater socioeconomic and land use impacts than the other Build Alternatives. Nevertheless, at a corridor-wide scale, these impacts are relatively small; however, at local scales, these impacts would be felt more acutely.

Parks and Recreation Areas

Impact from Proposed Project. There would be direct effects of the Project on publicly owned parks and recreational areas by one or more of the Build Alternatives (see Section 4.14 of this chapter). Land at up to six parks would be directly used by the Project. None of these impacts would affect park activities, and the amount of right-of-way required would generally be below 0.4 acre. The exception is at Long Bridge Park, where Build Alternative 1B would impact 1.45 acres. Impacts at the other parks would be temporary and would not result in incorporation of parkland into the railroad right-of-way. Noise levels under the Build Alternatives would be higher than existing noise levels or No Build Alternative noise levels; however, such noise levels would not rise to a level as to render the parklands unsuitable for their designated public recreational uses.

Impacts from Past and Present Actions. Past actions have preserved notable acreages of land throughout the study area for conservation and recreational uses. At the same time, some past actions may have had direct physical encroachment impacts on some parks and recreation areas. Population increases and associated traffic increases may have caused higher levels of traffic noise within parks and placed greater wear and tear on park facilities due to greater use. Development adjacent to parks may have contributed to visual impacts to parks and increased volumes of stormwater flow to streams running through parks.

Potential Impact on Resources from Potential Future Actions. Under the No Build Alternative, the parks and recreation area impacts of the Build Alternatives would not occur and would not contribute to overall cumulative impacts to parks and recreation areas. Some of the foreseeable future projects noted above may have various park and recreational area impacts throughout the study area; however, there is not enough information to reasonably quantify them. Notwithstanding, the projects that would be subject to federal transportation agency approvals also would be subject to Section 4(f) provisions that require avoidance and minimization of uses of land from publicly owned public parks and recreation areas.

Cumulative Effect. The Build Alternatives would have only minor impacts to parks and recreation areas. Additionally, the legal protections afforded parks and recreation areas by Section 4(f) for federal-aid transportation projects and the plan review processes by local jurisdictions for other projects greatly limit the potential for impacts by future projects.

Accordingly, no substantial adverse cumulative impacts to parks and recreation areas by the Project are anticipated.

Historic Properties

Impact from Proposed Project. The APE encompasses 158 historic properties. A preliminary determination of effects has concluded that 33 historic properties could experience adverse effects from 1 or more of the alternatives, as outlined in Section 4.13. A formal effects determination would be coordinated with DHR once a recommended Preferred Alternative is selected. Where FRA determines that the Project will have an adverse effect on historic resources, Section 106 requires that efforts be undertaken to avoid, minimize, or mitigate the adverse effects. As part of this process, FRA and DRPT have initiated consultation with DHR and other "consulting parties," such as the National Park Service (NPS), local historical societies, and property owners. Due to the nature of the this Project, a Programmatic Agreement (PA) is underway to outline: (1) studies still required once a recommended Preferred Alternative has been selected (namely, additional Phase I and Phase II archaeological studies on the main corridor and road improvement areas and full cultural resource studies on the bypasses, if selected); and (2) tasks that would be undertaken to mitigate adverse effects.

Impacts from Past and Present Actions. Damage to or loss of historic resources was far more prevalent from past actions that occurred before the NHPA. The NHPA and the establishment of historic resource protection objectives at the local planning level have reduced the rate of impacts to historic resources.

Potential Impact on Resources from Potential Future Actions. Notwithstanding the protections now afforded, conflicts between protection of historic properties and development and transportation projects are expected to continue under the No Build Alternative, especially because non-federal actions, such as private developments, are not subject to the NHPA. Potential effects include permanent loss and proximity effects (noise and visual impacts) from present and planned future development and transportation projects.

Cumulative Effect. The Build Alternatives would adversely affect historic properties and contribute to the cumulative degradation of historic properties. However, feasible and prudent avoidance alternatives and measures to minimize harm to historic properties would be incorporated into the Project.

Water Resources

Impact from Proposed Project. The Project corridor crosses more than 350 rivers and streams, 51 of which are characterized as impaired on Virginia's Section 303(d) list (see Section 3.1.6 in Chapter 3, Affected Environment, for details). As shown in Figure 3.1-1, the following boundaries of watersheds are crossed by the Project:

- The Middle Potomac-Anacostia-Occoquan Watershed encompasses approximately 831,483 acres, with roughly 45 percent of the watershed forested.
- The Lower Potomac River Watershed encompasses approximately 1,160,160 acres, most of which is forested.
- The Pamunkey Watershed encompasses approximately 941,032 acres, most of which is forested.
- The Lower Rappahannock Watershed encompasses approximately 738,446 acres. Half of the area is forested, with the remainder consisting largely of agricultural and developed land.

- The Mattaponi Watershed encompasses approximately 582,426 acres of which approximately 70 percent is forested.
- The Middle James-Willis Watershed encompasses approximately 615,449 acres.
- The Lower James Watershed encompasses approximately 1,135,000 acres, approximately 48 percent of which is in urban and suburban uses.

Details on the impacts of the alternatives are provided in Section 4.1. Unavoidable impacts to streams and wetlands would be mitigated.

Impacts from Past and Present Actions. Past and present actions within the affected watersheds have impacted an unknown quantity of streams and wetlands; however, the water quality effects of these actions are reflected in impairment designations and establishment of TMDLs of pollutants in certain waters, including the Chesapeake Bay, into which most of the affected watersheds drain.

Potential Impact on Resources from Potential Future Actions. Under the No Build Alternative, the water resources impacts of the Build Alternatives would not occur and would not contribute to overall cumulative impacts; however, the other reasonably foreseeable projects noted earlier would have incremental effects on water resources. Before implementation, these projects would be required to undergo analysis of alternatives that avoid and minimize water resources impacts to the extent practicable, and project proponents would have to obtain any required permits. Compensatory mitigation of unavoidable impacts also would be required.

Cumulative Effect. While the impacts of the Project and the multiple other reasonably foreseeable transportation projects and other likely development would be additive, these impacts would not all be occurring simultaneously due to the phasing of construction over a period of years. Additionally, the impacts would be largely disbursed over many streams and multiple watersheds. Furthermore, the direct impact of the Project at each stream would be localized and the reach of the Project's indirect impacts is not expected to be extensive. Stormwater generated through new impervious surfaces would be treated through improved or new stormwater management facilities. Implementation of compensatory mitigation, both for the Project and other foreseeable actions would offset the adverse direct and indirect impacts. Moreover, local jurisdictions have established preservation and conservation programs that serve to improve water quality by protecting streams and controlling development. For example, Fairfax County's Environmental Quality Corridor (EQC) system protects the county's stream valleys by incorporating them into a system of connected parklands and trail systems. The EQC system provides buffer lands that separate streams from land uses and development activities that have the potential to degrade the ecological quality of streams (Fairfax County, 2013). Prince William County's Comprehensive Plan limits development within the designated "Rural Area" and includes various rural preservation goals and policies that serve to protect water quality through careful land use planning (Prince William County, 2008). Both counties also prepare watershed management plans or studies that assess, monitor, and evaluate water quality and identify priorities and BMPs for improving water quality. Other counties and cities encompassed by the watersheds have similar policies and programs in place to protect water resources.

Floodplains

Impact from Proposed Project. As noted in Section 4.1.1.2 of this chapter, none of the floodplain encroachments by the Build Alternatives would represent a significant encroachment. The Project would be designed to not encourage, induce, allow, serve, support, or otherwise facilitate incompatible base floodplain development.

Impacts from Past and Present Actions. The cumulative extent of impacts to floodplains from past and present actions is not known; however, it can be assumed that the degree of impacts was greater before federal initiatives to avoid and minimize floodplain impacts (e.g., EO 11988 in 1977). State and local initiatives also now protect floodplains and reduce floodplain encroachments by development (Virginia's *Chesapeake Bay Preservation Act* enabled localities to establish resource protection areas along streams draining to the Chesapeake Bay).

Potential Impact on Resources from Potential Future Actions. Under the No Build Alternative, the floodplain impacts of the Build Alternatives would not occur and would not contribute to overall cumulative impacts. Reasonably foreseeable future public or private actions could potentially impact floodplains; however, these actions would also be subject to federal and local floodplain protections that would minimize potential impacts.

Cumulative Effect. Because the floodplain encroachments by the Project do not represent significant encroachments, and because federal and local initiatives would continue to exert floodplain protections, adverse cumulative effects of the Project to floodplains are expected to be negligible.

Wildlife and Habitat

Impact from Proposed Project. Most of the habitat within the LOD for all Build Alternatives includes either developed lands or aquatic habitats. A limited amount of forested and other upland habitat would be disturbed by the Build Alternatives, with the exception of the Fredericksburg Bypass (Build Alternative 3C) and the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake). Disturbance or loss of these upland habitats would not result in substantial impacts to wildlife due to the widespread availability of such habitats within the study area. In general, habitats that would be impacted are directly adjacent to the existing rail line and are already altered by local activities, including operation of the railroad.

Impacts from Past and Present Actions. As outlined above under cumulative socioeconomic and land use impacts, past and present actions have changed the landscape dramatically and converted natural habitats to human uses. These changes have resulted in considerable fragmentation and loss of habitat throughout the study area.

Potential Impact on Resources from Potential Future Actions. Under the No Build Alternative, the wildlife and habitat impacts of the Build Alternative would not occur and would not contribute to overall cumulative impacts; however, the other reasonably foreseeable actions noted above would be expected to contribute to further fragmentation and losses of habitat over time.

Cumulative Effect. Adverse effects on wildlife habitats are expected to continue to accrue with anticipated population growth in the study area, even in the absence of the Project. The relative contribution of the Build Alternatives to the effects of terrestrial and aquatic habitat losses is small given the existing fragmented condition of affected habitat areas along the existing rail corridor. The contribution of the Build Alternatives to degradation of water quality within aquatic habitats is also minimal given that the proposed improvements are being made to an existing rail facility and stormwater management measures would be implemented in accordance with federal, state, and local regulations to minimize onsite and downstream water quality impacts. Project proponents would be responsible for coordination with applicable federal and state agencies.

4.20.2.5 Overall Cumulative Effects

Overall, the No Build Alternative reflects the absence of the incremental direct and indirect impacts of the Build Alternatives relative to accumulation of adverse effects; however, adverse environmental effects, though offset to some degree by mitigation and compensation measures, would continue to accumulate due to ongoing implementation of other reasonably foreseeable projects and development in general. Furthermore, cities along the rail corridor would also not benefit from the transportation improvements that would accompany the Build Alternatives.

While providing transportation benefits, the Build Alternatives would incrementally increase environmental effects. Where these effects would occur along the existing rail corridor, they are relatively small in the context of the entire corridor as well as the localized impact sites. In contrast, impacts with the Fredericksburg Bypass (Build Alternative 3C) and the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) would be correspondingly greater because of the size of new right-of-way required; therefore, on a proportionate basis, these bypass alternatives would contribute more to cumulative effects than comparable lengths of corridor on existing rail alignment.

In summary, considerable adverse impacts to sensitive and vulnerable resources have occurred over time, first due to agricultural uses of the land and then to residential, commercial, industrial, institutional, and public infrastructure development; however, current regulatory requirements and planning practices are helping avoid or minimize the contribution of present and future actions to adverse cumulative effects. With the exception of the bypass alternatives, when considered in the context of the Project setting, the magnitude and intensity of the impacts of the Build Alternatives generally would not have substantial cumulative effects, particularly considering the efforts to minimize adverse impacts of the Project and other mitigation measures to be implemented. The Fredericksburg Bypass (Build Alternative 3C) and the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) may be perceived as having a more substantial cumulative effect, at least at the local level where the impacts would be most felt.

4.21 RELATIONSHIP BETWEEN SHORT-TERM IMPACTS AND LONG-TERM BENEFITS

This section addresses in general terms the proposed Project's relationship between local short-term impacts/use of resources and the maintenance and enhancement of long-term productivity. Build alternatives were developed based on sound planning for local, regional, and statewide transportation needs within the context of present and possible future traffic requirements and land use patterns. Coupled with the environmentally sensitive design of the proposed Project and BMPs, this helps to ensure that the short-term use of resources related to construction would be outweighed by the long-term benefits of implementing the proposed Project.

The most disruptive local short-term impacts associated with the Build Alternatives would occur during land acquisition and Project construction. The short-term use of the environment and of human, socioeconomic, cultural, and natural resources contributes to the long-term productivity of the DC2RVA corridor. Most short-term, construction-related impacts would occur within or near the proposed right-of-way.

Some existing homes, farms, and businesses would be displaced under the Build Alternatives; however, adequate replacement housing, land, and space are available for homeowners, tenants, and business owners. Residential displacements would range from approximately 10 to 150 over the entire DC2RVA corridor, with the highest number of displacements associated with the

Fredericksburg Bypass (Build Alternative 3C), the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake), and the single-station alternative at Broad Street in Richmond (Build Alternative 6C). DRPT estimates that these alternatives would result in 21, 21, and 112 residential displacements, respectively. Business displacements would range from approximately 10 to 20 over the entire DC2RVA corridor and most would occur in Alternative Area 6 (Richmond). Improved access to intercity travel within the DC2RVA corridor would contribute to long-term residential and business growth.

Construction activities would create short-term air quality impacts, such as dust due to earthwork, road and rail improvements, and exhaust from construction vehicles. Short-term noise impacts would be unavoidable due to use of heavy equipment. Air and noise abatement measures, discussed in Sections 4.6 and 4.7, would be used to minimize these short-term impacts during construction. Short-term visual impacts would occur near the construction corridor. Mitigation measures, such as reducing slope cuts outside necessary road widths, reducing vegetation removal, leaving native vegetation screens in place, and minimizing the alteration of scenic viewsheds, would be used to reduce long-term visual resource impacts.

Implementation of BMPs for protection of surface waters would minimize potential water quality impacts. A short-term impact from construction would be removal of biotic communities and wildlife within the proposed right-of-way and construction staging areas Overall, the Build Alternatives would have minimal short-term impacts relative to the long-term benefits of increased intercity passenger rail service in the DC2RVA corridor, and the ultimate extension of the SEHSR corridor along the East Coast. The elimination of some of the existing at-grade rail crossings and construction of grade-separated crossings would also improve the safety of rail crossings and reduce roadway delay. Construction-related activities would be localized and temporary. Short-term gains to the local economy should be recognized as a result of hiring local firms and labor, as well as purchasing local services and supplies to construct the proposed Project. Once completed, the benefits of long-term productivity in terms of improved mobility and safety would be realized. Implementation of the Project would enhance the existing transportation network between Washington, D.C. and Richmond, VA, and provide a viable travel alternative for residents and users. This is consistent with the purpose of the proposed Project. Based on the significant contribution to the long-term objectives of regional and local plans for development, the proposed Project is consistent with the maintenance and enhancement of the long-term productivity at the local, regional, state, and national levels. Benefits of the Project are described in more detail in Chapter 1.

4.22 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Construction of one of the Build Alternatives would require certain irreversible and irretrievable commitments of natural resources, energy (which would include fossil fuels), manpower, materials, and fiscal resources. Because most of the Project would be constructed within existing railroad right-of-way, land acquisition for construction of the proposed Project would be minimized; however, there would be an irreversible conversion of land to a transportation use in areas of new alignment and in areas where the existing road network would be modified to accommodate rail crossing closures and consolidations and to avoid historic resources. If a greater need for the use of the land were to arise or if the transportation facility were no longer needed, it could be converted to another use. There is no reason to believe such a conversion would be necessary or desirable.

The acquisition of new right-of-way and new construction within the existing right-of-way may result in short-term and long-term losses and alterations to the natural resources in the area. Upland and aquatic biotic communities, as well as agricultural land, may be committed to rail service where new right-of-way is required. The most apparent impact may be loss of aquatic or terrestrial habitat productivity and connectivity; therefore, wildlife abundance may decline in the area as a result of habitat destruction. Increased noise associated with the Project may be intolerable to some wildlife species. Forested areas may be cleared in some locations, and wetlands and other surface waters may be filled to accommodate new bridges and underpasses. Riprap may be placed along stream banks at bridge crossings, reducing habitat within riparian zone. After construction, some habitat types may be restored within the construction limits, although their value to wildlife is unlikely to equate to that which was lost. If wetlands are filled for new construction, mitigation of impacts would likely involve restoration of degraded wetlands within the same watershed. In the long term, this would offset the loss of wetland habitats within the Project construction limits. The commitment of natural resources within existing and new right-of-way is a permanent loss of productive wildlife habitat.

Construction of the Fredericksburg Bypass (Build Alternative 3C) or the Ashland Bypass (Build Alternatives 5C and 5C–Ashcake) would also increase habitat fragmentation within the DC2RVA corridor. As described in Section 4.10, habitat fragmentation can increase the risk of predation or displacement of native species by invasive, exotic species. Loss of habitat, mortality due to collisions, barrier effect, and reduction in habitat quality are the main impacts of habitat fragmentation by railroads. On a local scale, trains may affect wildlife habitats through the introduction of exotic plant species (e.g., seeds), emission of toxic contaminants (e.g., heavy metals), or right-of-way management (e.g., herbicide application). Section-specific habitat fragmentation effects are discussed in Section 4.10. Fossil fuels, labor, and construction materials would be expended in the fabrication and preparation of construction materials, as well as during construction of the Project. While these materials are generally not retrievable, they are not in short supply, and their use would not have an adverse effect on the continued availability of these resources. The steel rails required for the Project could be recycled should an alternate use of the property be selected. Any construction would also require a substantial, one-time expenditure of state and federal funds, which are not retrievable and could be used instead on other projects within the local community or in other parts of the country.

Specific natural resource impacts for the Build Alternatives have been previously detailed in this chapter. When reviewed in the overall context of the Project and taken in total, they are proportionately small compared to the benefits of the Project.

4.23 SUMMARY OF IMPACTS

The following table (Table 4.23-1) provides a summary of the potential impacts of each of the Build Alternatives upon the built and natural environments. It is the intent of this table to summarize the key results that differentiate the Build Alternatives and assist in the decisions to be made. All impacts shown are permanent impacts (i.e., not temporary disturbances due to construction activities). Any "Change" shown is consistent with how that resource was evaluated in this chapter (i.e., "change" in the transportation resource compares 2025 Build Alternatives to 2025 No Build conditions; "change" in the air quality and energy resources compares 2045 Build Alternatives to 2045 No Build conditions).

As noted earlier in this chapter, DRPT uses two future planning years for analysis of the DC2RVA Project. Year 2025 is the current best estimate of when construction of the DC2RVA infrastructure could be completed and the new DC2RVA service would be placed in operation. All the physical impact analyses within this Draft EIS on human and natural resources are estimated for 2025, and compared to the No Build Alternative conditions projected for 2025. Year 2045 is used by DRPT to demonstrate that the proposed project is sufficient to deliver the proposed passenger rail benefits and an efficient and reliable multimodal rail corridor over a 20-year time horizon following the completion of the passenger project. DRPT also used the 2045 planning horizon date to estimate some of the longer term effects of the proposed service such as ridership, energy use, and effects on air quality, as well as indirect and cumulative effects.

Table 4.23-1: Summary of Impacts

Area #	Area Name and CSXT Milepost Limits	Alternative	Description	Additional ROW (Acres)	Natural Resources				Geologic Resources				Hazardous Materials				Air Quality
										Prime Farmland							
					Wetlands (Acres)	Floodplains (Acres)	Stream & River Crossings (linear feet)	Threatened & Endangered Species and Habitat	Construction-Limiting Soils	Prime Soils (Acres)	NRCS Form 106 Score (Points)	Agricultural & Forestal Districts (Acres)	Superfund / CERCLA Sites	Recorded Release & Potential Contamination Sites	HAZMAT Facilities	Petroleum Storage Tanks	CO_2 Emissions (Tons per Year) Change Compared to No Build
1	Arlington (Long Bridge Approach) CFP 110 – 109.3	1A	Add Two Tracks on the East	0.0	0.02	0.3	0	No	Unknown / Not Rated	0	0	0	0	0	0	0	n/a
		1B	Add Two Tracks on the West	1.5	0.00	0.1	0	No	Unknown / Not Rated	0	0	0	0	2	0	0	n/a
		1C	Add One Track East and One Track West	0.4	0.01	0.1	0	No	Unknown / Not Rated	0	0	0	0	2	0	0	n/a
2	Northern Virginia CFP 109.3 – 62	2A	Add One Track/Improve Existing Track	33.0	5.19	15.1	7, 198	Yes	Yes	53.56	66	0	0	12	2	1	n/a
3	Fredericksburg (Dahlgren Spur to Crossroads) CFP 62 – 48	3A	Maintain Two Tracks Through Town	2.2	5.24	7.7	1,101	Yes	Yes	26.84	80	0	1	7	0	0	n/a
		3B	Add One Track East of Existing	19.8	5.29	10.5	1,506	Yes	Yes	34.01	80	0	0	10	4	3	n/a
		3C	Add Two-Track Bypass East	140.5	23.82	8.0	4,597	Yes	Yes	69.05	118	0	0	11	1	1	n/a
4	Central Virginia (Crossroads to Doswell) CFP 48 – 19	4A	Add One Track/Improve Existing Track	2.4	8.39	17.2	3,627	Yes	Yes	99.17	93	0	1	0	0	0	n/a
5	Ashland (Doswell to I-295) CFP 19 – 9	5A	Maintain Two Tracks Through Town	21.9	0.41	5.9	6,928	Yes	Yes	27.18	51	0	0	5	0	1	n/a
		5A–Ashcake	Maintain Two Tracks Through Town (Relocate Station to Ashcake)	20.5	0.41	7.1	6,928	Yes	Yes	28.04	46	0	0	5	0	1	n/a
		5B	Add One Track East of Existing	29.4	0.41	6.5	9,114	Yes	Yes	31.2	51	0	0	5	1	3	n/a
		5B–Ashcake	Add One Track East of Existing (Relocate Station to Ashcake)	29.9	0.45	10.7	9,101	Yes	Yes	33.82	51	0	0	5	1	3	n/a
		5C	Add Two-Track West Bypass	147.8	8.44	9.2	9,005	Yes	Yes	89.83	171	73.7	0	5	0	2	n/a
		5C–Ashcake	Add Two-Track West Bypass (Relocate Station to Ashcake)	146.4	8.48	10.4	9,005	Yes	Yes	90.88	171	73.7	0	5	0	2	n/a
		5D–Ashcake	Three Tracks Centered Through Town (Add One Track, Relocate Station to Ashcake)	36.4	0.45	11.5	8,163	Yes	Yes	39.38	52	0	0	8	1	5	n/a
6	Richmond (I-295 to Centralia) CFP 9 – A 011	6A	Staples Mill Road Station Only	76.0	3.21	8.1	7,523	Yes	Yes	45.20	29	0	0	13	4	7	-6,696
		6B–A-Line	Boulevard Station Only, A-Line	101.0	2.91	11.3	9,650	Yes	Yes	49.04	23	0	0	23	4	14	-6,003
		6B–S-Line	Boulevard Station Only, S-Line	78.7	3.47	48.6	8,819	Yes	Yes	30.79	22	0	0	39	7	8	-6,003
		6C	Broad Street Station Only	128.1	2.99	16.1	10,886	Yes	Yes	49.93	22	0	0	27	6	16	-5,663
		6D	Main Street Station Only	73.7	3.47	51.9	8,819	Yes	Yes	30.93	22	0	1	40	6	6	-5,947
		6E	Split Service, Staples Mill Road/ Main Street Stations	89.1	3.31	22.2	7,952	Yes	Yes	45.20	24	0	1	17	6	7	-6,051
		6F	Full Service, Staples Mill Road/ Main Street Stations	83.0	3.52	50.7	8,869	Yes	Yes	31.78	19	0	1	38	6	5	-6,518
		6G	Shared Service, Staples Mill Road/ Main Street Stations	81.0	3.74	48.1	8,235	Yes	Yes	32.48	19	0	1	38	6	5	-6,869

Notes: All impacts shown are permanent impacts (i.e., not temporary disturbances due to construction activities). Any "Change" shown compares 2045 Build Alternatives to 2045 No Build conditions. Air Quality is analyzed corridor-wide with differences only related to the station alternatives in Richmond.

▸ *Continued*

Table 4.23-1: Summary of Impacts

Area #	Area Name and CSXT Milepost Limits	Alternative	Description	Noise							Vibration				Energy	Aesthetics & Visual Environment	Community & Environmental Justice			
				Impacted Noise Receptors							Impacted Vibration Receptors									
				Category 1 Moderate	Category 1 Severe	Category 2 Moderate	Category 2 Severe	Category 3 Moderate	Category 3 Severe	Total	Category 1	Category 2	Category 3	Total	Energy Consumption (Billions of BTUs) Change Compared to No Build	Visual Impact Rating (Low, Medium, or High)	Commercial Relocations	Residential Relocations	Compatible with Comprehensive Land Use Plans (Yes / No)	Environmental Justice Census Tracts with Residential Relocations
1	Arlington (Long Bridge Approach) CFP 110 – 109.3	1A	Add Two Tracks on the East	0	0	0	0	0	0	0	0	0	0	0	n/a	Low	0	0	Yes	0
		1B	Add Two Tracks on the West	0	0	0	0	0	0	0	0	0	0	0	n/a	Low	0	0	Yes	0
		1C	Add One Track East and One Track West	0	0	0	0	0	0	0	0	0	0	0	n/a	Low	0	0	Yes	0
2	Northern Virginia CFP 109.3 – 62	2A	Add One Track/Improve Existing Track	0	0	670	99	6	0	775	0	15	0	15	n/a	Low – Medium	0	2	Yes	0
3	Fredericksburg (Dahlgren Spur to Crossroads) CFP 62 – 48	3A	Maintain Two Tracks Through Town	0	0	66	8	1	0	75	0	0	0	0	n/a	Low	0	0	Yes	0
		3B	Add One Track East of Existing	0	0	67	8	1	0	76	0	0	0	0	n/a	High	1	0	Yes	0
		3C	Add Two-Track Bypass East	2	1	2392	1524	8	5	3932	0	43	0	43	n/a	High	1	19	No	2
4	Central Virginia (Crossroads to Doswell) CFP 48 – 19	4A	Add One Track/Improve Existing Track	0	0	51	18	1	0	70	0	2	0	2	n/a	Low	0	0	Yes	0
5	Ashland (Doswell to I-295) CFP 19 – 9	5A	Maintain Two Tracks Through Town	0	0	135	14	1	4	154	0	25	1	26	n/a	Medium	1	0	Yes	0
		5A–Ashcake	Maintain Two Tracks Through Town (Relocate Station to Ashcake)	0	0	135	14	1	4	154	0	25	1	26	n/a	Medium	1	0	Yes	0
		5B	Add One Track East of Existing	1	0	133	20	1	4	159	0	30	1	31	n/a	Medium	1	0	Yes	0
		5B–Ashcake	Add One Track East of Existing (Relocate Station to Ashcake)	1	0	133	20	1	4	159	0	30	1	31	n/a	Medium	1	0	Yes	0
		5C	Add Two-Track West Bypass	0	0	272	51	2	4	329	0	35	1	36	n/a	High	1	21	No	1
		5C–Ashcake	Add Two-Track West Bypass (Relocate Station to Ashcake)	0	0	272	51	2	4	329	0	35	1	36	n/a	High	1	21	No	1
		5D–Ashcake	Three Tracks Centered Through Town (Add One Track, Relocate Station to Ashcake)	1	0	135	18	1	4	159	0	30	1	31	n/a	Medium	1	0	Yes	0
6	Richmond (I-295 to Centralia) CFP 9 – A 011	6A	Staples Mill Road Station Only	0	0	366	8	6	0	380	0	8	0	8	-307	Low – Medium	10	12	Yes	2
		6B–A-Line	Boulevard Station Only, A-Line	0	0	386	9	6	0	401	0	8	0	8	-277	Low – High	18	12	Yes	2
		6B–S-Line	Boulevard Station Only, S-Line	1	0	416	15	7	0	439	0	8	0	8	-277	Low – High	10	7	Yes	0
		6C	Broad Street Station Only	0	0	387	9	7	0	403	0	8	0	8	-265	Low – High	15	112	Yes	3
		6D	Main Street Station Only	1	0	416	15	7	0	439	0	8	0	8	-280	Low – High	10	7	Yes	0
		6E	Split Service, Staples Mill Road/ Main Street Stations	0	0	379	9	6	0	394	0	8	0	8	-286	Low – High	10	12	Yes	2
		6F	Full Service, Staples Mill Road/ Main Street Stations	1	0	416	15	7	0	439	0	8	0	8	-293	Low – High	10	7	Yes	0
		6G	Shared Service, Staples Mill Road/ Main Street Stations	1	0	298	10	4	0	313	0	8	0	8	-299	Low – High	10	7	Yes	0

Notes: All impacts shown are permanent impacts (i.e., not temporary disturbances due to construction activities). Any "Change" shown compares 2045 Build Alternatives to 2045 No Build conditions. Noise and Vibration categories defined in Section 4.7. Energy is analyzed corridor-wide with differences only related to the station alternatives in Richmond.

▸ *Continued*

Table 4.23-1: Summary of Impacts

Area #	Area Name and CSXT Milepost Limits	Alternative	Description	Park Resources	Cultural Resources								
					Effects on Archaeological Sites			Effects on Buildings, Districts, Structures, & Objects			Effects on Battlefields		
				Number / Acres	Adverse Effect	No Adverse Effect	No Effect	Adverse Effect	No Adverse Effect	No Effect	Adverse Effect	No Adverse Effect	No Effect
1	Arlington (Long Bridge Approach) CFP 110 – 109.3	1A	Add Two Tracks on the East	0 / 0	0	0	0	1	2	0	0	0	0
		1B	Add Two Tracks on the West	1 / 1.45	0	0	0	1	2	0	0	0	0
		1C	Add One Track East and One Track West	1 / 0.36	0	0	0	1	2	0	0	0	0
2	Northern Virginia CFP 109.3 – 62	2A	Add One Track/Improve Existing Track	1 / 0.04	0	0	0	1	10	4	0	0	0
3	Fredericksburg (Dahlgren Spur to Crossroads) CFP 62 – 48	3A	Maintain Two Tracks Through Town	0 / 0	0	0	3	1	0	15	0	0	3
		3B	Add One Track East of Existing	0 / 0	1	1	1	4	11	1	0	3	0
		3C	Add Two-Track Bypass East	0 / 0	0	1	0	1	5	0	0	0	0
4	Central Virginia (Crossroads to Doswell) CFP 48 – 19	4A	Add One Track/Improve Existing Track	0 / 0	0	0	0	3	12	4	0	1	0
5	Ashland (Doswell to I-295) CFP 19 – 9	5A	Maintain Two Tracks Through Town	0 / 0	0	0	0	0	0	0	0	0	0
		5A–Ashcake	Maintain Two Tracks Through Town (Relocate Station to Ashcake)	1 / 0.01	0	0	0	0	3	16	0	0	0
		5B	Add One Track East of Existing	1 / 0.03	0	0	0	7	10	2	0	0	0
		5B–Ashcake	Add One Track East of Existing (Relocate Station to Ashcake)	2 / 0.04	0	0	0	7	10	2	0	0	0
		5C	Add Two-Track West Bypass	0 / 0	0	0	0	1	4	2	0	0	0
		5C–Ashcake	Add Two-Track West Bypass (Relocate Station to Ashcake)	1/ 0.01	0	0	0	1	4	2	0	0	0
		5D–Ashcake	Three Tracks Centered Through Town (Add One Track, Relocate Station to Ashcake)	1 / 0.01	0	0	0	7	10	2	0	0	0
6	Richmond (I-295 to Centralia) CFP 9 – A 011	6A	Staples Mill Road Station Only	1 / 0.19	0	5	4	8	50	11	0	4	2
		6B–A-Line	Boulevard Station Only, A-Line	1 / 0.19	0	5	4	16	42	11	0	4	2
		6B–S-Line	Boulevard Station Only, S-Line	1 / 0.17	3	4	2	13	45	11	0	6	0
		6C	Broad Street Station Only	1 / 0.19	0	5	4	16	42	11	0	4	2
		6D	Main Street Station Only	1 / 0.17	3	4	2	7	52	10	0	6	0
		6E	Split Service, Staples Mill Road/ Main Street Stations	1 / 0.19	0	7	2	7	60	2	0	6	0
		6F	Full Service, Staples Mill Road/ Main Street Stations	1 / 0.17	3	4	2	7	52	10	0	6	0
		6G	Shared Service, Staples Mill Road/ Main Street Stations	1 / 0.17	3	4	2	10	57	2	0	6	0

Notes: All impacts shown are permanent impacts (i.e., not temporary disturbances due to construction activities).

▶ *Continued*

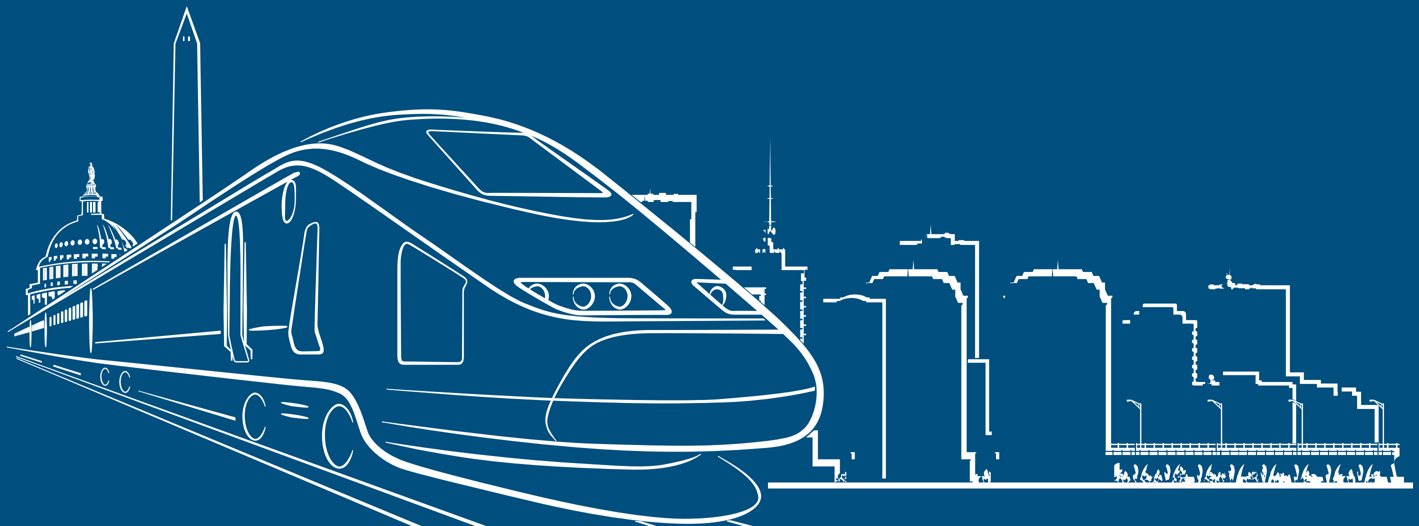
Table 4.23-1: Summary of Impacts

Area #	Area Name and CSXT Milepost Limits	Alternative	Description	Transportation: Proposed Crossing Improvements: Public At-Grade Crossings: Grade Separate	Closure	Four-Quad Gates	Median Treatment	No Action	New Public Crossings	Proposed Crossing Improvements: Private At-Grade Crossings: Closure	Four-Quad Gates	Locking Gate	No Action	New Private Crossings	Roadway Travel Patterns: % Change in Daily Traffic, Adjacent Roadways at Stations	At-Grade Crossings: Total Daily Delay, % Change
1	Arlington (Long Bridge Approach) CFP 110 – 109.3	1A	Add Two Tracks on the East	0	0	0	0	0	0	0	0	0	0	0	n/a	n/a
		1B	Add Two Tracks on the West	0	0	0	0	0	0	0	0	0	0	0	n/a	n/a
		1C	Add One Track East and One Track West	0	0	0	0	0	0	0	0	0	0	0	n/a	n/a
2	Northern Virginia CFP 109.3 – 62	2A	Add One Track/Improve Existing Track	0	1	2	0	1	0	0	3	1	1	0	<1%	-1%
3	Fredericksburg (Dahlgren Spur to Crossroads) CFP 62 – 48	3A	Maintain Two Tracks Through Town	0	0	3	1	0	0	0	0	0	0	0	7-8%	6%
		3B	Add One Track East of Existing	1	0	2	1	0	0	0	0	0	0	0		-60%
		3C	Add Two-Track Bypass East	0	0	5	4	0	5	1	0	4	0	4		-10%
4	Central Virginia (Crossroads to Doswell) CFP 48 – 19	4A	Add One Track/Improve Existing Track	0	1	4	2	0	0	0	0	10	0	0	n/a	-6%
5	Ashland (Doswell to I-295) CFP 19 – 9	5A	Maintain Two Tracks Through Town	2	1	7	1	0	0	0	0	0	0	0	<1%	-24%
		5A–Ashcake	Maintain Two Tracks Through Town (Relocate Station to Ashcake)	2	0	8	1	0	0	0	0	0	0	0		-24%
		5B	Add One Track East of Existing	2	1	7	1	0	0	0	0	0	0	0		-26%
		5B–Ashcake	Add One Track East of Existing (Relocate Station to Ashcake)	2	0	8	1	0	0	0	0	0	0	0		-26%
		5C	Add Two-Track West Bypass	0	1	9	1	0	8	0	0	0	0	7		-87%
		5C–Ashcake	Add Two-Track West Bypass (Relocate Station to Ashcake)	0	0	10	1	0	8	0	0	0	0	7		-87%
		5D–Ashcake	Three Tracks Centered Through Town (Add One Track, Relocate Station to Ashcake)	2	0	8	1	0	0	0	0	0	0	0		-26%
6	Richmond (I-295 to Centralia) CFP 9 – A 011	6A	Staples Mill Road Station Only	3	4	2	1	1	0	0	0	0	0	0	2%	-66%
		6B–A-Line	Boulevard Station Only, A-Line	3	4	2	1	1	0	0	0	0	0	0	5%	-66%
		6B–S-Line	Boulevard Station Only, S-Line	4	5	4	3	1	0	0	2	2	0	0		-76%
		6C	Broad Street Station Only	3	4	2	2	1	2	0	0	0	0	0	5%	-38%
		6D	Main Street Station Only	3	5	4	4	1	0	0	2	2	0	0	4%	-59%
		6E	Split Service, Staples Mill Road/ Main Street Stations	3	4	2	1	1	0	0	0	0	0	0	1-2%	-66%
		6F	Full Service, Staples Mill Road/ Main Street Stations	3	5	4	4	1	0	0	2	2	0	0	1-2%	-59%
		6G	Shared Service, Staples Mill Road/ Main Street Stations	3	5	4	4	1	0	0	2	2	0	0	1-2%	-60%

Notes: All impacts shown are permanent impacts (i.e., not temporary disturbances due to construction activities). Any "Change" shown compares 2025 Build Alternatives to 2025 No Build conditions.

DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

5 SECTION 4(f) EVALUATION



D.C. TO RICHMOND SOUTHEAST HIGH SPEED RAIL

5 SECTION 4(f) EVALUATION

5.1 DESCRIPTION OF THE PROPOSED ACTION

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.

5.1.1 Introduction to Section 4(f)

Section 4(f) of the *U.S. Department of Transportation (U.S. DOT) Act of 1966* (23 United States Code [U.S.C.] 138) prohibits use of land from a public park, recreation area, wildlife or waterfowl refuge, or any significant historic site unless it can be demonstrated that there are no feasible and prudent alternatives to avoid the property and that the proposed project included all possible planning to minimize effects.

- Section 4(f) applies only to publicly owned parks, recreation areas, and wildlife and waterfowl refuges. Similar resources that are privately owned yet open to the public are not considered Section 4(f) resources.
- Section 4(f) also applies to historic sites listed on or eligible for listing on the National Register of Historic Places (NRHP), regardless of whether the site is in public or private ownership.
- Section 4(f) applies to all archaeological sites listed on or eligible for inclusion on the NRHP, including those discovered during construction. The exception to this is when FRA, in consultation with the Virginia Department of Historic Resources (DHR), determines that the archaeological resource is important chiefly because of what can be learned by data recovery and has minimal value to preservation in place.
- Section 4(f) applies to protected resources when a "use" occurs. This "use" can be permanent, such as the permanent acquisition of a property, or temporary, such as the use of the property for construction staging purposes. Section 4(f) also applies when a "constructive use" occurs, such as when the noise, vibration, air quality, or visual effects of a project are so great that the use of the property is substantially impaired, even though it is not physically affected by the project.

5.1.2 Purpose and Need for the Project

The Project would 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 passenger, commuter, and freight rail traffic, thereby providing a competitive option for travelers going between Washington, D.C. and Richmond and those traveling to and from adjacent connecting corridors.

The purpose of the current DC2RVA Project described here is to fulfill the purpose of the Southeast High Speed Rail (SEHSR) Tier I Environmental Impact Statement (EIS) within this segment of the larger SEHSR corridor. The Project, by increasing rail capacity and improving travel times between Washington, D.C. and Richmond, would improve passenger train performance and reliability in the corridor, enabling intercity passenger rail to be a competitive transportation choice for travelers between Washington, D.C. and Richmond and beyond.

DRPT anticipates that the Project will 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 Virginia Railway Express (VRE) commuter rail service operations.
- Accommodating freight rail movement through the corridor, including to and from Virginia's ports.
- 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 (GHG) emissions by diverting passenger trips by automobile and movement of freight by trucks to more environmentally sustainable rail transportation.

Higher speed passenger rail service would also encourage economic development in Virginia and along the Eastern Seaboard 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 with 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.

Current conditions existing 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 Congestion.** Travel by air is increasingly at capacity, resulting in frequent delays and causing commercial carriers to reduce flights and increase fares, which limits the transportation options between Washington, D.C., Richmond, and adjacent corridors, and generates 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 to effectively and efficiently meet existing and future demands for 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 for Virginia and the 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 effects to air quality. Travel or freight movement by train provides a safe and efficient travel mode, and it uses less energy and produces fewer emissions per passenger or ton of freight moved per mile.

5.1.3 Project Description and Approach

The DC2RVA Project will include specific rail infrastructure improvements and service upgrades to deliver higher speed passenger rail, 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 door-to-door competitive travel time in a corridor shared by growing volumes of passenger, commuter, and freight rail traffic. Specific improvements to the existing rail infrastructure between Arlington, VA, and Centralia, VA, include:

- Corridor-wide improvements to train operating capacity to accommodate efficient operation of passenger, commuter, and freight rail service with increased frequency, reliability, and speed, including an additional main track along most of the corridor, additional sidings, crossovers, yard bypasses and leads, and other capacity and reliability improvements at certain locations.
- 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.

- New or replacement station, platform, and parking improvements at intercity passenger stations in the corridor to improve the efficiency of railroad operations, improve quality of service, and accommodate increased ridership.
- Safety improvements to roadway crossing treatments, to include median treatment, grade separations, and/or closure of existing at-grade crossings of the rail corridor.

5.1.4 Project Alternatives

Developing potential rail alignments was an iterative process. DRPT relied on previous studies and public scoping comment as the starting point for developing potential rail alignments. 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—to determine the Build Alternatives to be carried forward for evaluation in the Draft EIS—focused on each rail alignment's ability to reduce trip times based on increased track design speed and increase the reliability of rail operations based upon added capacity, with the least potential environmental impact and consideration of cost to construct.

As part of the Build Alternatives, DRPT evaluated both existing and potential new passenger rail stations in the DC2RVA corridor. DRPT plans to incorporate the DC2RVA SEHSR passenger train service into Amtrak's regional and long distance intercity passenger rail network; along the DC2RVA corridor, these existing stations include: Alexandria, Woodbridge, Quantico, Fredericksburg, Ashland, and Staples Mill Road and Main Street in Richmond. Additionally, in Richmond, DRPT is considering two proposed new locations under some Build Alternatives: Boulevard Station and Broad Street Station. However, not all proposed trains would necessarily serve all existing or proposed stations.

For evaluation in the Tier II Draft EIS, DRPT combined and categorized the Build Alternatives into six alternative areas along the corridor (Figure 5.1-1):

- Alternative Area 1: Arlington (Long Bridge Approach): 1-mile section that includes approach alignments to the Long Bridge, which crosses the Potomac River between Washington, D.C. and Virginia.
- Alternative Area 2: Northern Virginia (Long Bridge to Dahlgren Spur): 47-mile section that includes additional track within existing railroad right-of-way.
- Alternative Area 3: Fredericksburg (Dahlgren Spur to Crossroads): 14-mile section that includes alignments through or around the city.
- Alternative Area 4: Central Virginia (Crossroads to Doswell): 29-mile section that includes additional track primarily within the existing railroad right-of-way.
- Alternative Area 5: Ashland (Doswell to I-295): 10-mile section including alignments through or around the town.
- Alternative Area 6: Richmond (I-295 to Centralia): 23-mile section including different station locations and routing options along the A-Line and/or S-Line.

Project Build Alternatives were developed separately, specific to the existing conditions, constraints, and/or needs of each of the six areas, and will be linked to form a single DRPT recommended Preferred Alternative for the corridor, to be confirmed in the Final EIS and Record of Decision (ROD).

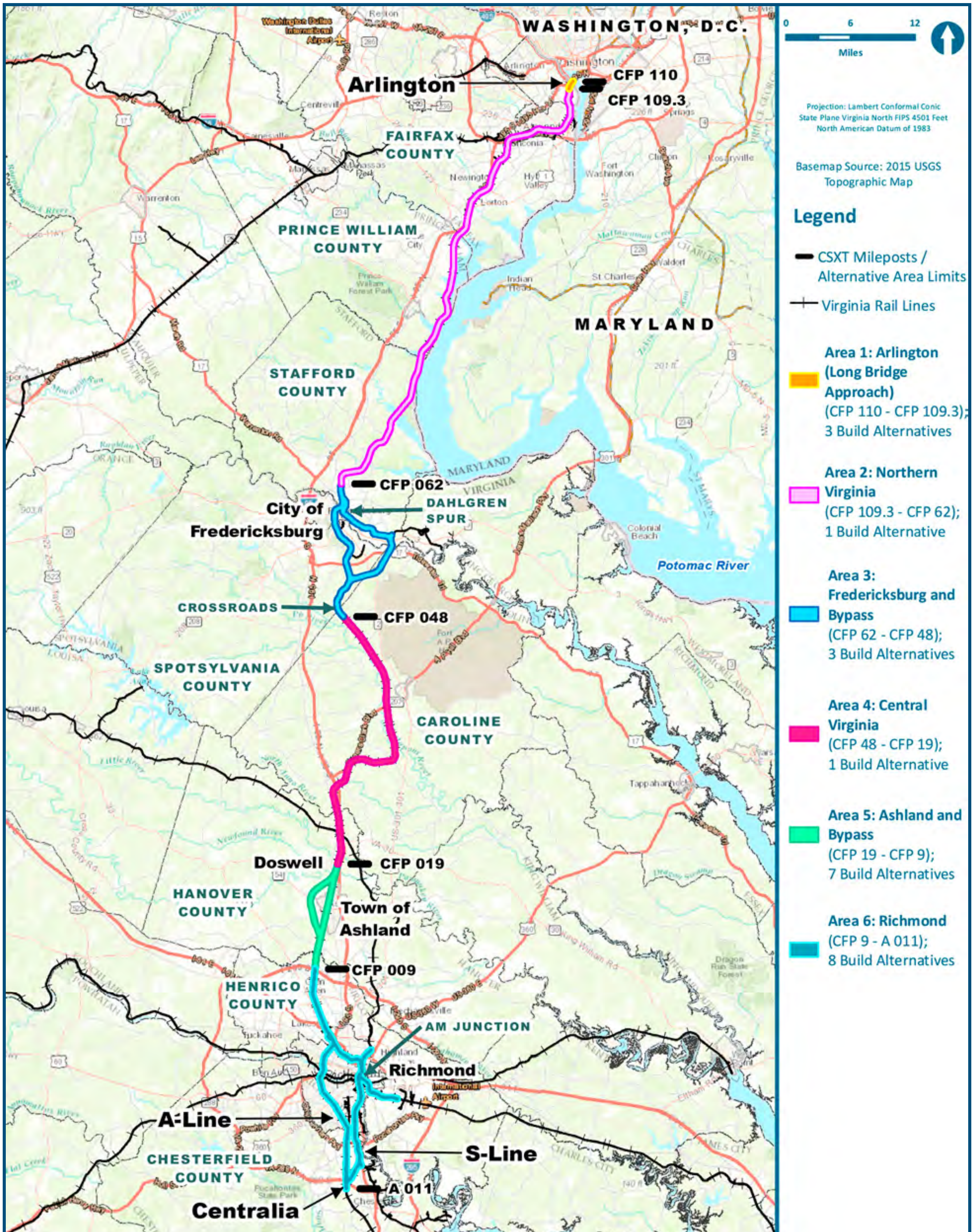


Figure 5.1-1: Alternative Areas

Refer to Chapter 2 of the Draft EIS for a full summary of the alternatives development process and description of Build Alternatives, and Chapter 7 of the Draft EIS for description of the DRPT recommended Preferred Alternative.

In general, the DC2RVA Project proposes to increase capacity by adding one additional main track. In most areas, the Project will add a new third track in addition to two existing tracks. The determination of the location of the new track on the east or west of existing trackage varies by location within the corridor based on physical constraints and minimization of impacts. For each alternative, DRPT also evaluated the potential to realign the tracks to improve speeds. The proposed Build Alternatives vary within the City of Fredericksburg and the Town of Ashland, where alignments outside of the existing right-of-way were considered (i.e., bypass alignments around the downtown areas); the typical section of the new bypass alignments consists of two tracks.

From a wide range of options that were considered during the alternatives development process, 23 Build Alternatives, which vary within each alternative area, were included for evaluation in the Draft EIS (Table 5.1-1). Each includes build-alternative-specific improvements to features such as stations and at-grade roadway crossings, as applicable. The following sections provide details of each of these Build Alternatives, as well as the No Build Alternative.

5.1.4.1 No Build Alternative

The No Build Alternative defines the future infrastructure and service levels that will result from planned investments in the Washington, D.C. to Richmond rail corridor, independent of the improvements planned by the DC2RVA Project. Information about planned physical improvements and rail service additions in the corridor was gathered from fiscally-constrained Metropolitan Planning Organization (MPO) planning documents, Commonwealth multiyear improvement programs, and from transit agency planning documents. If a project was under construction, fully-funded, or was the focus of advanced collaborative planning (evidenced by partial funding, board-level commitments, or interagency agreements), DRPT assumed it to be complete by 2025 for the purposes of the Draft EIS evaluation. Chapter 2 of the Draft EIS provides a full description of elements included in the No Build Alternative.

The purpose of the No Build Alternative is to serve as a baseline for comparison of potential effects and impacts of the DC2RVA Build Alternatives. The No Build Alternative was fully evaluated and dismissed by FRA in the 2002 SEHSR Tier I ROD because it does not meet the SEHSR Purpose and Need. Although previously dismissed as not a viable alternative, it is fully considered as part of the Tier II Draft EIS for the DC2RVA Project because the baseline is required by the National Environmental Policy Act (NEPA).

5.1.4.1 Build Alternatives

The 23 Build Alternatives are summarized below. Figures 5.1-2 through 5.1-22 show the proposed improvements by alternative. Figures 5.1-23 through 5.1-39 show the proposed station improvements. All of these figures are provided at the end of this section.

Chapter 2 of the Draft EIS provides full information, including lists of specific track and station improvements, for each Build Alternative.

Table 5.1-1: Build Alternatives

Alternative Area	Alternative	Description
Area 1: Arlington (Long Bridge Approach)	1A	Add Two Tracks on the East
	1B	Add Two Tracks on the West
	1C	Add One Track East and One Track West
Area 2: Northern Virginia (Long Bridge to Dahlgren Spur)	2A	Add One Track/Improve Existing Track
Area 3: Fredericksburg (Dahlgren Spur to Crossroads)	3A	Maintain Two Tracks Through Town
	3B	Add One Track Through Town East of Existing
	3C	Add Two-Track Bypass East
Area 4: Central Virginia (Crossroads to Doswell)	4A	Add One Track/Improve Existing Track
Area 5: Ashland (Doswell to I-295)	5A	Maintain Two Tracks Through Town
	5A–Ashcake	Maintain Two Tracks Through Town (Relocate Station to Ashcake)
	5B	Add One Track Through Town East of Existing
	5B–Ashcake	Add One Track Through Town East of Existing (Relocate Station to Ashcake)
	5C	Add Two-Track West Bypass
	5C–Ashcake	Add Two-Track West Bypass (Relocate Station to Ashcake)
	5D–Ashcake	Three Tracks Centered Through Town (Add One Track, Relocate Station to Ashcake)
Area 6: Richmond (I-295 to Centralia)	6A	Staples Mill Road Station Only
	6B–A-Line	Boulevard Station Only, A-Line
	6B–S-Line	Boulevard Station Only, S-Line
	6C	Broad Street Station Only
	6D	Main Street Station Only
	6E	Split Service, Staples Mill Road/Main Street Stations
	6F	Full Service, Staples Mill Road/Main Street Stations
	6G	Shared Service, Staples Mill Road/Main Street Stations

Recommended Preferred Alternative (see Chapter 7)

Build Alternatives in Alternative Area 1: Arlington (Long Bridge Approach)

There are three Build Alternatives in Alternative Area 1, which are described in Table 5.1-2. Build Alternative 1A, 1B, and 1C are shown in Figure 5.1-2.

Table 5.1-2: Arlington Build Alternatives: 1A, 1B, and 1C

TRACK
All three Build Alternatives would: ▪ Equally support expanded intercity passenger service (all types), expanded VRE commuter service, and expanded CSXT freight service ▪ Add two main tracks, with minor shifts to improve speed ▪ Be constructed within existing railroad right-of-way The difference between the alternatives is on which side(s) of the existing track the new track is added (as indicated in Build Alternative names): two tracks on the east (1A); two tracks on the west (1B); one track east and one track west (1C) Final decision deferred to the completion of the Long Bridge Study (separate study by the District of Columbia Department of Transportation) Track maximum authorized speed: ≤ 45 mph
STATIONS
No stations within area
CROSSINGS
No changes to existing public roadway crossings

Build Alternatives in Alternative Area 2: Northern Virginia

There is one Build Alternative in Alternative Area 2, which is described in Table 5.1-3. Build Alternative 2A is shown in Figure 5.1-3.

Table 5.1-3: Northern Virginia Build Alternative 2A

TRACK
One main track would be added, with realignment of some curves to improve speed, to create: ▪ Fourth track from Alexandria to Crystal City ▪ Third track from Spotsylvania to Alexandria Improvements are generally within existing right-of-way Track maximum authorized speed: ≤ 79 mph
STATIONS
Station improvements are mainly platform improvements and to be performed by VRE Proposed new DC2RVA service includes: ▪ Alexandria: Northeast Regional (SEHSR) and Interstate Corridor (SEHSR) (Figure 5.1-23) ▪ Woodbridge: Northeast Regional (SEHSR) (Figure 5.1-24) ▪ Quantico: Northeast Regional (SEHSR) *(no figure)* ▪ All other stations: VRE service only *(no figure)* No changes to the locations of Amtrak Long Distance, Interstate Corridor (Carolinian), and Northeast Regional (Virginia) or VRE commuter stations served
CROSSINGS
Close one existing public roadway crossing (Mount Hope Church Road), with alternate access provided; no grade separations of at-grade crossings All other public roadway crossings would remain at-grade, with safety improvements Major water crossings at Occoquan River, Neabsco Creek, and Aquia Creek

Alexandria Union Station

Build Alternatives in Alternative Area 3: Fredericksburg

There are three Build Alternatives in Alternative Area 3, which are described in Table 5.1-4, Table 5.1-5, and Table 5.1-6. Build Alternative 3A, 3B, and 3C are shown in Figure 5.1-4, Figure 5.1-5, and Figure 5.1-6, respectively. All three Build Alternatives would support expanded intercity passenger (all types), VRE commuter, and CSXT freight service, without change to stations served by existing Amtrak (Interstate Corridor (Carolinian), Northeast Regional (Virginia), Long Distance, and Auto Train) passenger service or VRE commuter service. Due to constraints of the geography through this location, the maximum authorized speed in this section is designed for 79 mph where feasible. Build Alternative 3B is consistent with the City of Fredericksburg Comprehensive Plan (2015).

Table 5.1-4: Fredericksburg Build Alternative 3A

TRACK
No construction of new track / no additional rail capacity within Fredericksburg ▪ Existing two main tracks would be maintained, which are used by freight, passenger, and commuter trains, similar to existing conditions ▪ Tracks would be shifted in some areas to improve speed Construction of one additional track, with some track shifts to improve speed, north and south of the city All improvements are within existing right-of-way Track maximum authorized speed: ≤ 79 mph
STATIONS
Improvements to Fredericksburg Station would include a new station building, side platform improvements, and a new parking structure (Figure 5.1-25) Proposed new DC2RVA service at Fredericksburg Station: ▪ Northeast Regional (SEHSR) and Interstate Corridor (SEHSR) The other station in Alternative Area 3 is located in Spotsylvania County and provides VRE service only.
CROSSINGS
All public roadway crossings would remain at-grade, with safety improvements (no roadway crossing closures or grade separations of public at-grade crossings) Improvements to major rail bridges over the Rappahannock River

Table 5.1-5: Fredericksburg Build Alternative 3B

TRACK
One main track would be added in most areas, with track shifts to improve speed ▪ Within Fredericksburg, the additional track would be added east of the existing two tracks ▪ A third track already exists between Fredericksburg and Spotsylvania stations; therefore, no improvements are required in this section Improvements are generally within existing right-of-way Track maximum authorized speed: ≤ 79 mph
STATIONS
Improvements to Fredericksburg Station would include a new station building, a new elevated railway, side and center platform improvements, and a new parking structure (Figure 5.1-26) Proposed new DC2RVA service at Fredericksburg Station: Northeast Regional (SEHSR) and Interstate Corridor (SEHSR) The other station in Alternative Area 3 is located in Spotsylvania County and provides VRE service only.
CROSSINGS
No public roadway crossing closures; grade separation of one at-grade roadway crossing (Landsdowne Road) Improvements to major rail bridges over the Rappahannock River

Table 5.1-6: Fredericksburg Build Alternative 3C

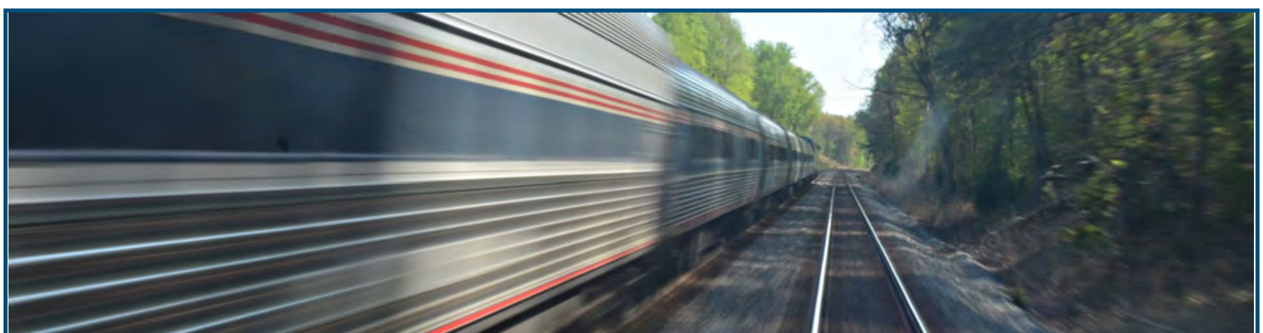
TRACK
Existing two-track corridor through the city would be maintained, with some track shifts to improve speed New two-track bypass would be constructed east of the city ▪ Would serve all freight rail as well as some or all of Interstate Corridor (SEHSR) and Amtrak Interstate Corridor (Carolinian), Long Distance, and Auto Train passenger trains ▪ Would require new right-of-way Construction of one additional track, with some track shifts to improve speed, north and south of the bypass Track maximum authorized speed: ≤ 79 mph
STATIONS
Improvements to Fredericksburg station would include a new station building, side platform improvements, and a new parking structure (Figure 5.1-25)
Proposed new DC2RVA service at Fredericksburg Station: Northeast Regional (SEHSR) and Interstate Corridor (SEHSR)
The other station in Alternative Area 3 is located in Spotsylvania County and provides VRE service only.
CROSSINGS
Public roadway crossings along existing Dahlgren Spur would remain at-grade, with safety improvements All new public roadway crossings on the bypass would be grade-separated All other public roadway crossings would remain at-grade, with safety improvements Improvements to major rail bridge over the Rappahannock River

Build Alternatives in Alternative Area 4: Central Virginia

There is one Build Alternative in Alternative Area 4, which is described in Table 5.1-7. Build Alternative 4A is shown in Figure 5.1-7. Based on geography throughout this area, this section is most suitable for higher speed passenger rail service and therefore provides the greatest contiguous section along the DC2RVA corridor with a maximum authorized speed up to 90 mph.

Table 5.1-7: Central Virginia Build Alternative: 4A

TRACK
One main track would be added, with track shifts to improve speed Improvements are generally within existing right-of-way Supports expanded intercity passenger service (all types) and CSXT freight service Track maximum authorized speed: ≤ 90 mph
STATIONS
No stations within the area Would not preclude the development of a proposed future station at Carmel Church (not included as part of this study)
CROSSINGS
Close one existing public roadway crossing (Colemans Mill Road); no grade separations of at-grade crossings All other public roadway crossings would remain at-grade, with safety improvements Multiple crossings of small waterways and wetlands



Corridor in rural Caroline County

Build Alternatives in Alternative Area 5: Ashland

There are seven Build Alternatives in Alternative Area 5, which are described in Table 5.1-8 through Table 5.1-11 below. Build Alternative 5A, 5A–Ashcake, 5B, 5B–Ashcake, 5C, 5C–Ashcake, and 5D–Ashcake are shown in Figure 5.1-8, Figure 5.1-9, Figure 5.1-10, Figure 5.1-11, Figure 5.1-12, Figure 5.1-13, and Figure 5.1-14, respectively.

The Ashland Build Alternatives may include different station locations: either maintaining the station at the existing downtown station with improvements (Build Alternatives 5A, 5B, and 5C) or relocating the station to south of Ashcake Road (all Build Alternatives with "–Ashcake" in their name). The Build Alternatives with the same letter, with and without the "–Ashcake" designation, are otherwise identical in terms of alignment. For ease of comparison, they are presented together in the tables below.

Due to constraints of the geography through this location, the maximum authorized speed in this section is designed for 79 mph where feasible, with an existing 35 mph municipal slow order through the Town of Ashland.

Table 5.1-8: Ashland Build Alternatives: 5A and 5A–Ashcake

TRACK
Both alternatives would maintain two existing tracks (no construction of new track/no additional rail capacity) within Ashland Both alternatives would construct one additional track, with some track shifts to improve speed, north and south of the town All rail improvements are generally within existing right-of-way
STATIONS
Both alternatives would provide Northeast Regional (SEHSR and Virginia) service at different station locations: ▪ 5A: Would maintain existing station location with improvements, including 850-foot platforms, which would require closure of the existing roadway crossing at College Avenue; use of shorter, 350-foot platforms is an option to minimize impacts (Figure 5.1-27) ▪ 5A–Ashcake: Would close the existing station and relocate service to a new station south of Ashcake Road (Figure 5.1-28)
CROSSINGS
Both alternatives include the grade separation of two existing at-grade roadway crossings in Ashland: West Vaughan Road and Ashcake Road All other existing public roadway crossings would remain at-grade, with safety improvements

Table 5.1-9: Ashland Build Alternatives: 5B and 5B–Ashcake

TRACK
Both alternatives would maintain two existing tracks and construct one additional track east of the existing tracks within Ashland ▪ The addition of a third track through town would require closure of a short portion of Railroad Avenue/Center Street ▪ New right-of-way would be required for rail improvements within the town Both alternatives would construct one additional track, with some track shifts to improve speed, north and south of the town ▪ Rail improvements north and south of the town are generally within existing right-of-way
STATIONS
Both alternatives would provide Northeast Regional (SEHSR and Virginia) with different station locations: ▪ 5B: Would maintain existing station location with improvements, including 850-foot platforms, which requires closure of the existing roadway crossing at College Avenue; use of shorter, 350-foot platforms is an option to minimize impacts (Figure 5.1-29) ▪ 5B–Ashcake: Would close the existing station and relocate service to a new station south of Ashcake Road (Figure 5.1-28)
CROSSINGS
Both alternatives include the grade separation of two existing at-grade roadway crossings in Ashland: West Vaughan Road and Ashcake Road All other existing public roadway crossings would remain at-grade, with safety improvements

Table 5.1-10: Ashland Build Alternatives: 5C and 5C–Ashcake

TRACK
Both alternatives would construct a two-track bypass, west of Ashland, to serve all freight rail as well as all Interstate Corridor (SEHSR) and Amtrak Interstate Corridor (Carolinian), Long Distance, and Auto Train passenger trains ▪ New right-of-way would be required on bypass alignment Both alternatives would maintain the existing two-track corridor through town ▪ No additional right-of-way needed in town Both alternatives would construct one additional track, with some track shifts to improve speed, north and south of the town ▪ Rail improvements north and south of the town are generally within existing right-of-way
STATIONS
Both alternatives would provide Northeast Regional (SEHSR and Virginia) service at different station locations: ▪ 5C: Would maintain existing station location with improvements, including 850-foot platforms, which requires closure of the existing roadway crossing at College Avenue; use of shorter, 350-foot platforms is an option to minimize impacts (Figure 5.1-27) ▪ 5C–Ashcake: Would close the existing station and relocate service to a new station south of Ashcake Road (Figure 5.1-28)
CROSSINGS
All new roadway crossings on the bypass would be grade-separated All existing public roadway crossings within town would remain at-grade, with safety improvements

Table 5.1-11: Ashland Build Alternatives: 5D–Ashcake

TRACK
One additional main line track, with centering of all main line tracks on the existing alignment, would be constructed through the entire area, which generally requires additional railroad right-of-way, especially within the town of Ashland ▪ The addition of a third track through town would require closure of a short portion of Railroad Avenue/Center Street
STATIONS
This rail alignment would require removal of the existing station building and platforms, resulting in the relocation of service to a new station south of Ashcake Road to provide Northeast Regional (SEHSR and Virginia) service (Figure 5.1-28).
CROSSINGS
Includes the grade separation of two existing at-grade roadway crossings in Ashland: West Vaughan Road and Ashcake Road All other existing public roadway crossings within town would remain at-grade, with safety improvements

Corridor in downtown Ashland

DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

Build Alternatives in Alternative Area 6: Richmond

There are eight Build Alternatives in Alternative Area 6. All Build Alternatives generally add one main track (though they vary whether they use the A-Line or S-Line through the city), and they vary in whether they consolidate passenger train service to a single station (including two potential new stations at Boulevard Station or Broad Street Station) or provide combinations of service at two stations. There are no changes to CSXT freight service routes due to proposed changes to passenger train routes as part of the DC2RVA Project. The Amtrak Auto Train does not stop in Richmond.

Five of the Richmond area alternatives are single-station alternatives, which are presented in Table 5.1-12 through Table 5.1-16. The single station alternatives are Build Alternative 6A, 6B–A-Line, 6B–S-Line, 6C, and 6D, which are shown in Figure 5.1-15, Figure 5.1-16, Figure 5.1-17, Figure 5.1-18, and Figure 5.1-19, respectively. All single-station alternatives consolidate Northeast Regional (SEHSR) and Interstate Corridor (SEHSR) service, as well as all Amtrak Long Distance, Interstate Corridor (Carolinian), and Northeast Regional (Virginia) service, to one station.

Three of the Richmond area alternatives are two-station alternatives, which are presented in Table 5.1-17 through Table 5.1-19. All dual station alternatives use the existing Staples Mill Road and Main Street Stations. The dual station Build Alternatives are Build Alternatives 6E, 6F, and 6G, which are shown in Figure 5.1-20, Figure 5.1-21, and Figure 5.1-22, respectively. All two-station alternatives provide Northeast Regional (SEHSR) and Interstate Corridor (SEHSR) service to at least one station, as well as associated service of Amtrak Long Distance, Interstate Corridor (Carolinian), and Northeast Regional (Virginia) to one or both stations.

Main Street Station

Table 5.1-12: Richmond Single Station Build Alternative: 6A (Staples Mill Road Station Only)

TRACK
One main track would be added along portions of RF&P (north of Richmond) and A-Line (through Richmond), with track shifts to improve speed
STATIONS
Existing Main Street Station would be closed to passenger rail service, and all service consolidated at Staples Mill Road Station
Staples Mill Road Station would be improved and becomes the one passenger rail station to serve Richmond (Figure 5.1-30) ▪ Does not meet FRA requirement for CBD location ▪ Would be served by all passenger trains, including new proposed Interstate Corridor (SEHSR) and Northeast Regional (SEHSR) service
Freight and passenger rail service operating together on the A-Line, CSXT's principal freight corridor, would increase rail congestion/delay
CROSSINGS
Close four existing public roadway crossings; grade separate three at-grade roadway crossings
All other public roadway crossings would remain at-grade, with safety improvements
Major waterway crossing of James River

Table 5.1-13: Richmond Single Station Build Alternative: 6B–A-Line (Boulevard Station Only)

TRACK
One of two Boulevard Station-Only alternatives in Alternative Area 6
One main track would be added along portions of existing RF&P (north of Richmond) and A-Line (through Richmond), with track shifts to improve speed
Elevated loop track at new station
STATIONS
Main Street and Staples Mill Road stations would be closed to passenger rail service and all service relocated and consolidated to a new station at Boulevard
New Boulevard Road Station would be the one passenger rail station to serve Richmond (Figure 5.1-31) ▪ May not meet FRA requirement for CBD location ▪ Would be served by all passenger trains, including new proposed Interstate Corridor (SEHSR) and Northeast Regional (SEHSR) service
Freight and passenger rail service operating together on the A-Line, CSXT's principal freight corridor, would increase rail congestion/delay
CROSSINGS
Close four existing public roadway crossings; grade separate three at-grade roadway crossings
All other public roadway crossings would remain at-grade, with safety improvements
Major waterway crossing of James River

Table 5.1-14: Richmond Single Station Build Alternative: 6B–S-Line (Boulevard Station Only)

TRACK
Second of two Boulevard Station-Only alternatives in Alternative Area 6
One main track would be added along portions of existing RF&P (north of Richmond) and S-Line (through Richmond), with track shifts to improve speed
STATIONS
Existing Main Street and Staples Mill Road stations would be closed to passenger rail service and all service relocated and consolidated to a new station at Boulevard
New Boulevard Road Station would be the one passenger rail station to serve Richmond (Figure 5.1-31) ▪ May not meet FRA requirement for CBD location ▪ Would be served by all passenger trains, including new proposed Interstate Corridor (SEHSR) and Northeast Regional (SEHSR) service
Locating all passenger train service (except Auto Train, which does not stop in Richmond) to S-Line, separate from CSXT's principal freight corridor through Richmond (the A-Line), would reduce rail congestion/delay
CROSSINGS
Close five existing public roadway crossings; grade separate four at-grade roadway crossings
All other public roadway crossings would remain at-grade, with safety improvements
Major waterway crossing of James River

Table 5.1-15: Richmond Single Station Build Alternative: 6C (Broad Street Station Only)

TRACK
One main track would be added along portions of existing RF&P (north Richmond) and A-Line (through Richmond), with track shifts to improve speed At-grade loop track at new station
STATIONS
Existing Main Street and Staples Mill Road stations would be closed to passenger rail service and all service relocated and consolidated to a new station at Broad Street New Broad Street Station would be the one passenger rail station to serve Richmond (Figure 5.1-32) ▪ May not meet FRA requirement for CBD location ▪ Would be served by all passenger trains, including new proposed Interstate Corridor (SEHSR) and Northeast Regional (SEHSR) service Freight and passenger rail service operating together on the A-Line, CSXT's principal freight corridor, would increase rail congestion/delay
CROSSINGS
Station location would require two new at-grade crossings on West Leigh Street adjacent to proposed station, which would require a variance from state code and/or coordination with VDOT Close four existing public roadway crossings; grade separate three at-grade roadway crossings All other public roadway crossings would remain at-grade, with safety improvements Major waterway crossing of James River

Table 5.1-16: Richmond Single Station Build Alternative: 6D (Main Street Station Only)

TRACK
One main track would be added along portions of existing RF&P (north of Richmond) and S-Line (through Richmond), with track shifts to improve speed
STATIONS
Existing Staples Mill Road Station would be closed to passenger rail service and all service consolidated at Main Street Station Main Street Station would be improved and be the one passenger rail station to serve Richmond (Figure 5.1-33) ▪ Meets FRA requirement for CBD location ▪ Would be served by all passenger trains, including new proposed Interstate Corridor (SEHSR) and Northeast Regional (SEHSR) service ▪ Potential increases in passenger and freight delay may occur as proximity to I-95 prevents adding sufficient station platforms/track on the west side of the station Locating all passenger train service (except Auto Train, which does not stop in Richmond) to S-Line, separate from CSXT's principal freight corridor through Richmond (the A-Line), would reduce rail congestion/delay
CROSSINGS
Close five existing public roadway crossings; grade separate three at-grade crossings All other public roadway crossings would remain at-grade, with safety improvements Major waterway crossing of James River

James River Bridge

Table 5.1-17: Richmond Two Station Build Alternative: 6E (Split Service)

TRACK
One main track would be added along portions of existing RF&P (north of Richmond) and A-Line (through Richmond), with track shifts to improve speed
STATIONS
Both existing stations would remain operational. All passenger trains would serve Staples Mill Road Stations; trains to and from Newport News would additionally serve Main Street Station. ▪ Staples Mill Road Station would be expanded and would be served by all passenger trains that stop in Richmond, including new proposed Northeast Regional (SEHSR) to Norfolk and Interstate Corridor (SEHSR) trains (Figure 5.1-34) ▪ Main Street Station would have platform and parking improvements and would be served by all Northeast Regional (SEHSR and Virginia) passenger trains to Newport News (Figure 5.1-35) Freight and passenger rail service operating together on the A-Line, CSXT's principal freight corridor, would increase rail congestion/delay
CROSSINGS
Close four existing public roadway crossings; grade separate three at-grade roadway crossings All other public roadway crossings would remain at-grade, with safety improvements Major waterway crossing of James River

Table 5.1-18: Richmond Two Station Build Alternative: 6F (Full Service)

TRACK
One main track would be added along portions of existing RF&P (north of Richmond) and S-Line (through Richmond), with track shifts to improve speed
STATIONS
Both existing stations would remain operational, with all passenger trains serving both stations ▪ Both stations would be improved, including new/modified station buildings, platforms, and parking (Figure 5.1-36 and Figure 5.1-37) ▪ Both stations would be served by all passenger trains that stop in Richmond, including new proposed Northeast Regional (SEHSR) and Interstate Corridor (SEHSR) service Locating all passenger train service (except Auto Train, which does not stop in Richmond) to S-Line, separate from CSXT's principal freight corridor through Richmond (the A-Line), would reduce rail congestion/delay
CROSSINGS
Close five existing public roadway crossings; grade separate three at-grade roadway crossings All other public roadway crossings would remain at-grade, with safety improvements Major waterway crossing of James River

Table 5.1-19: Richmond Two Station Build Alternative: 6G (Shared Service)

TRACK
One main track would be added along portions of existing RF&P (north of Richmond) and the S-Line (through Richmond), with track shifts to improve speed ▪ The A-Line is used for service but does not require proposed track
STATIONS
Both existing stations would remain operational, with both stations being served by all new proposed SEHSR service and other Amtrak passenger train services to either one or both stations ▪ Both stations would be improved, including new/modified station buildings, platforms, and parking (Figure 5.1-38 and Figure 5.1-39) ▪ Both stations would be served by all Interstate Corridor (SEHSR) and Northeast Regional (SEHSR and Virginia) trains ▪ Long Distance (Amtrak) and Interstate Corridor (Carolinian) would serve Staples Mill Station only Freight and passenger rail service operating together on the A-Line, CSXT's principal freight corridor, would increase rail congestion/delay
CROSSINGS
Close five existing public roadway crossings; grade separate three at-grade roadway crossings All other public roadway crossings would remain at-grade, with safety improvements Major waterway crossing of James River

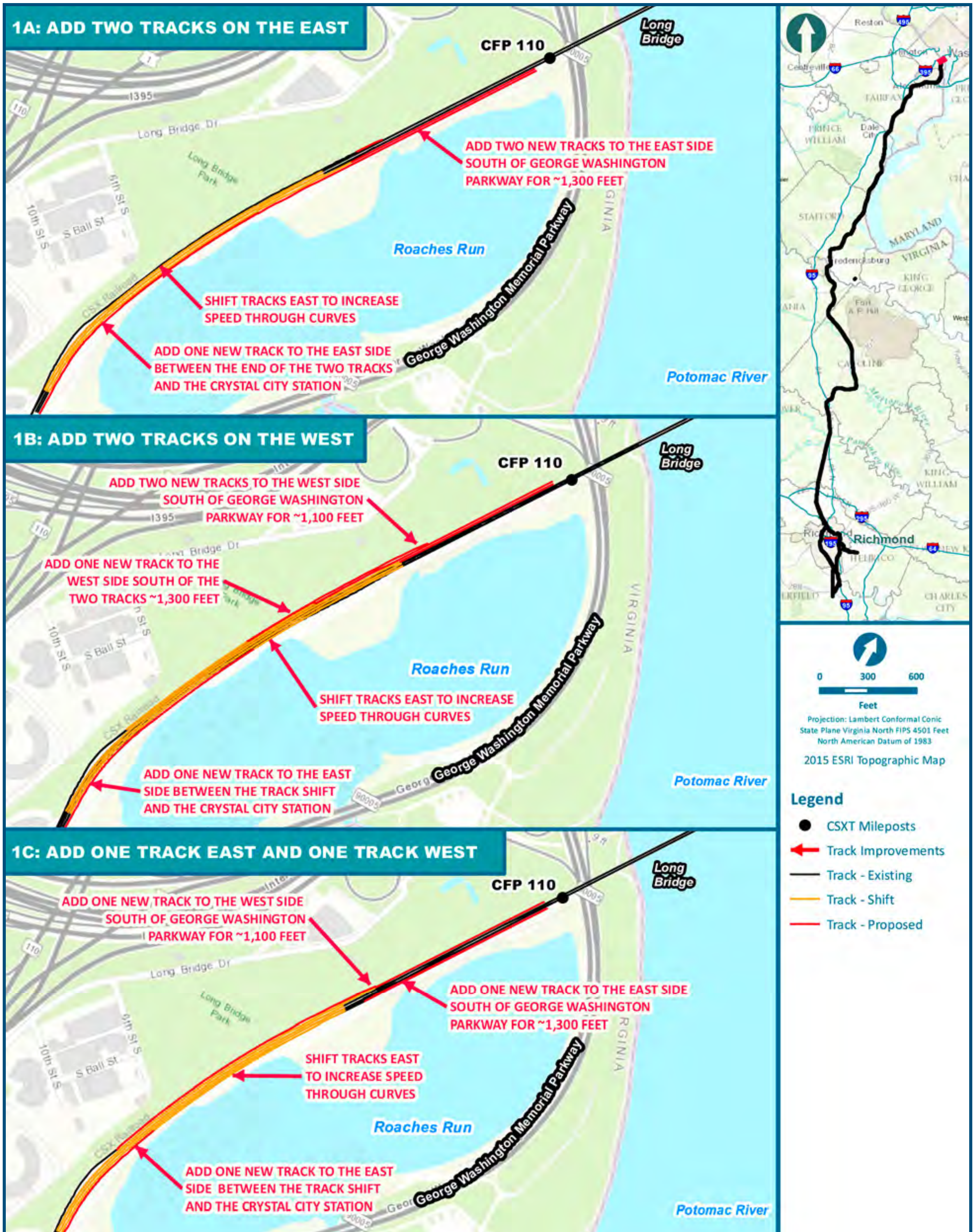


Figure 5.1-2: Build Alternatives 1A, 1B, 1C

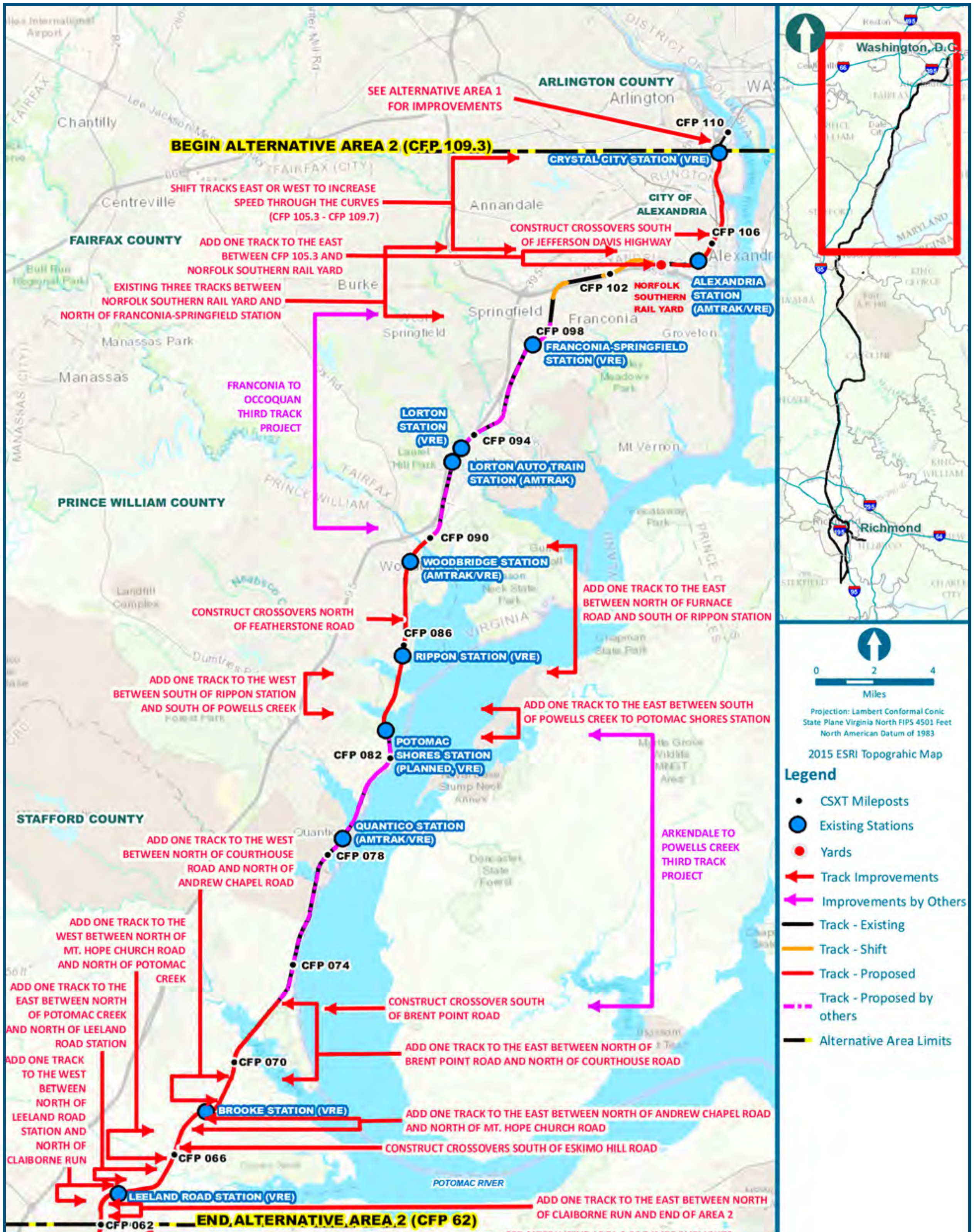


Figure 5.1-3: Build Alternative 2A – Add One Track/Improve Existing Track

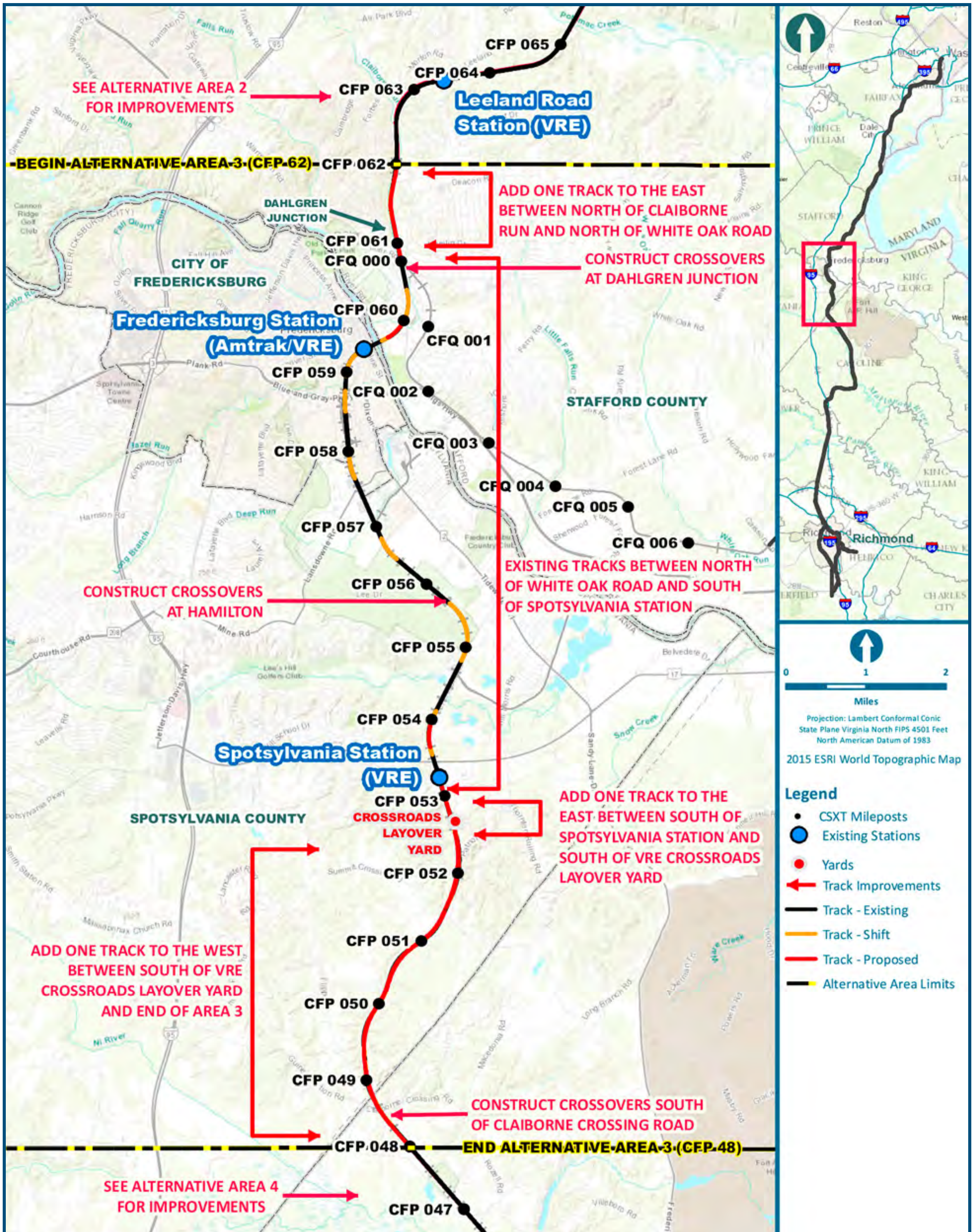


Figure 5.1-4: Build Alternative 3A – Maintain Two Tracks Through Town

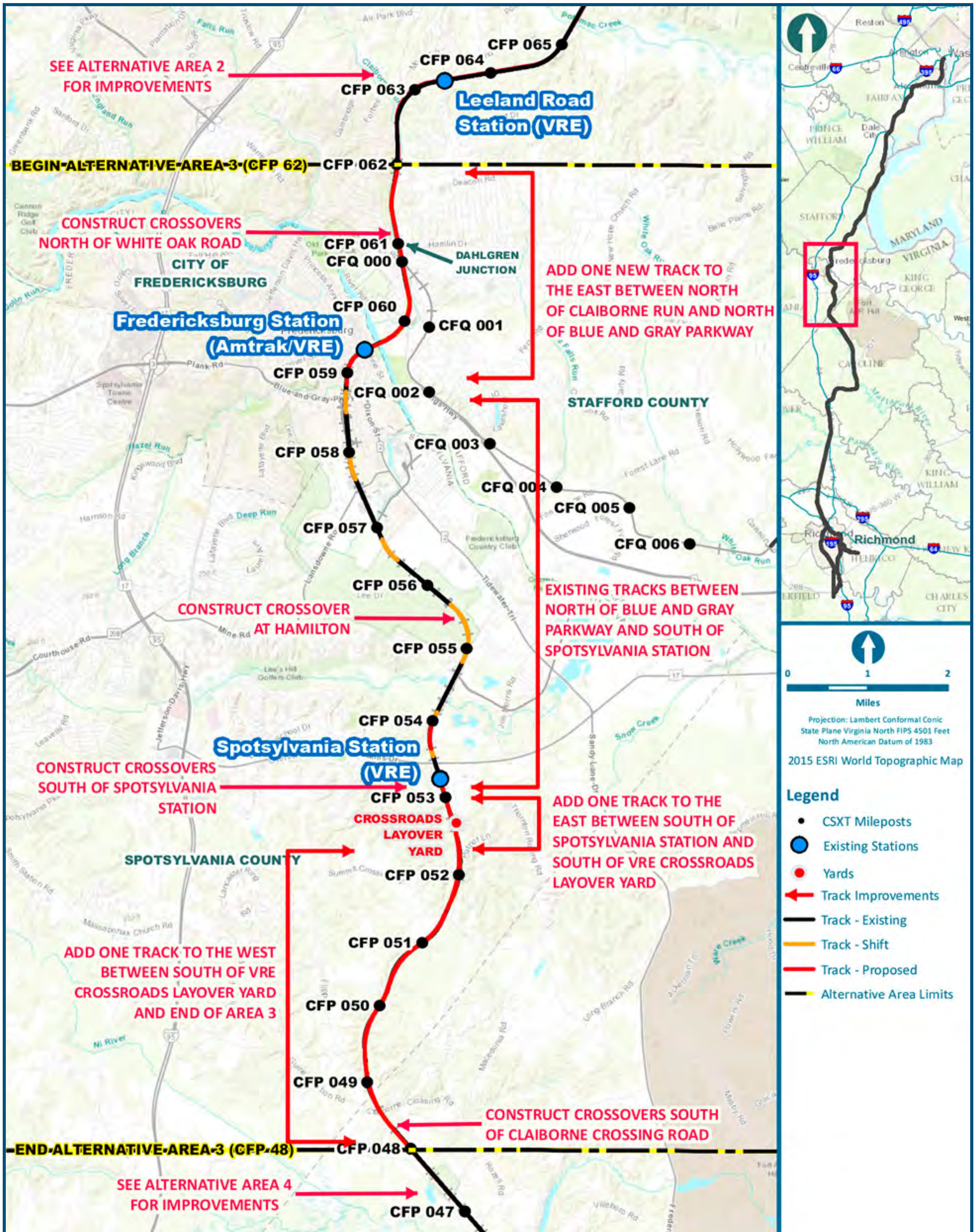


Figure 5.1-5: Build Alternative 3B – Add One Track Through Town East of Existing

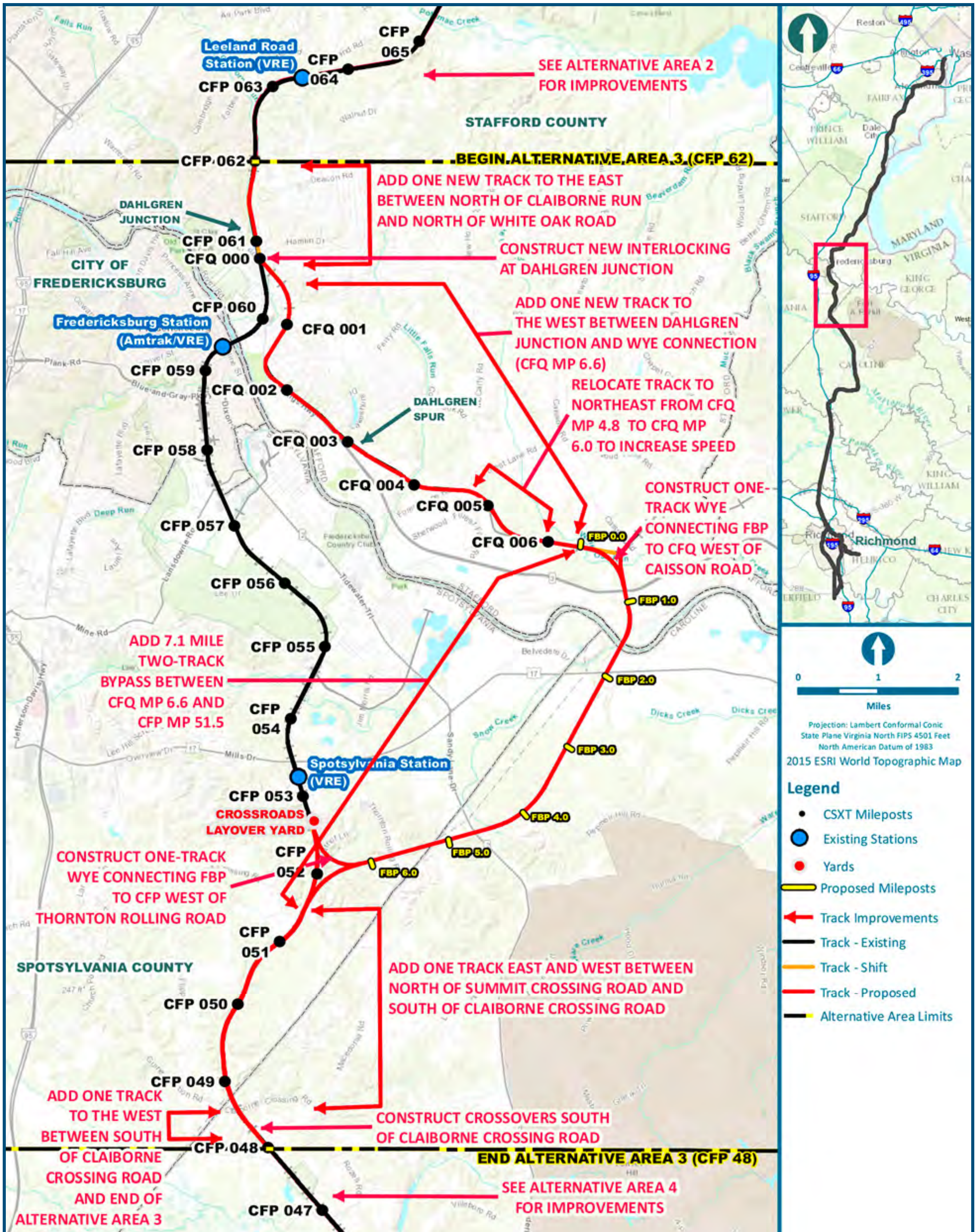


Figure 5.1-6: Build Alternative 3C – Add Two-Track Bypass East

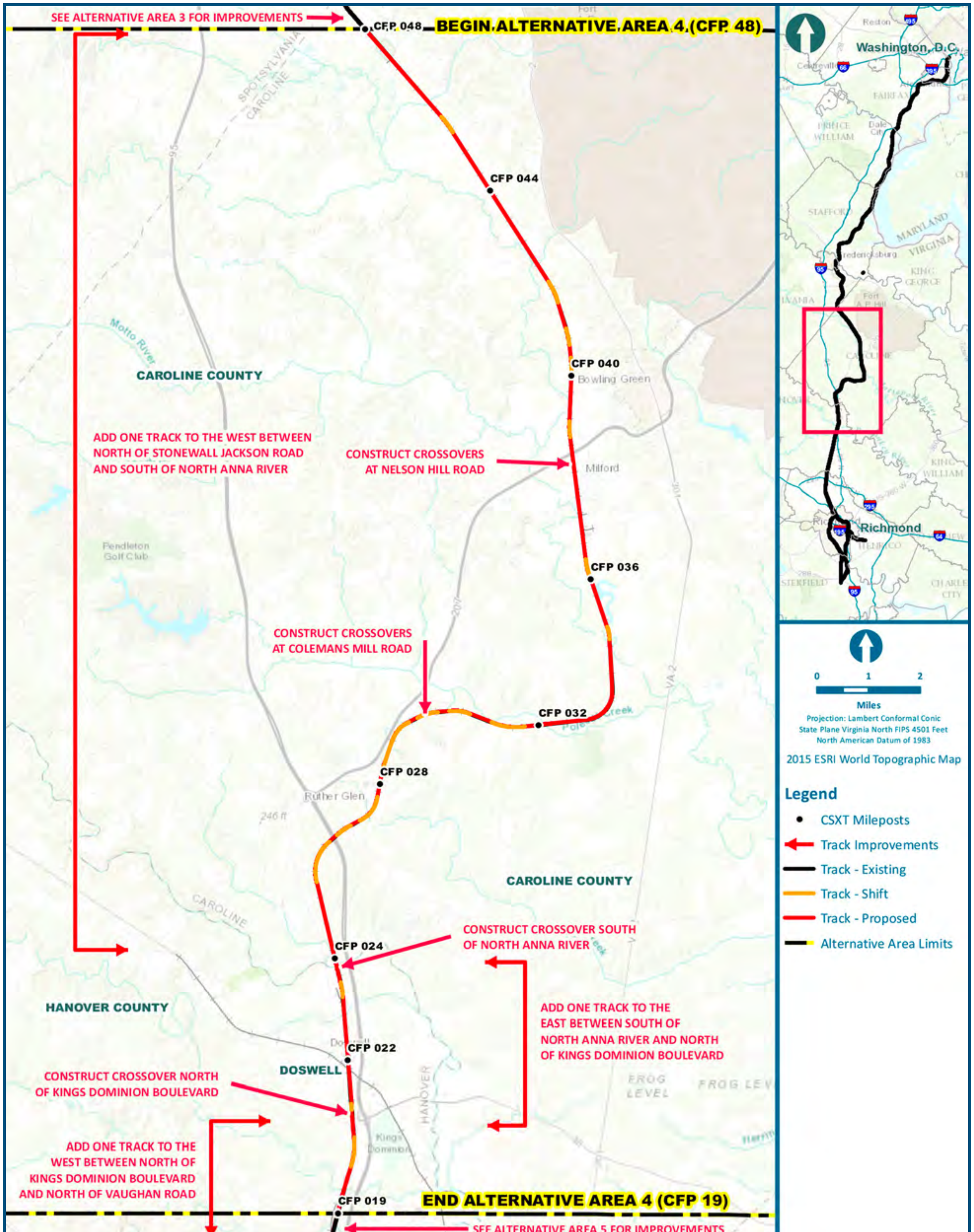


Figure 5.1-7: Build Alternative 4A – Add One Track/Improve Existing Track

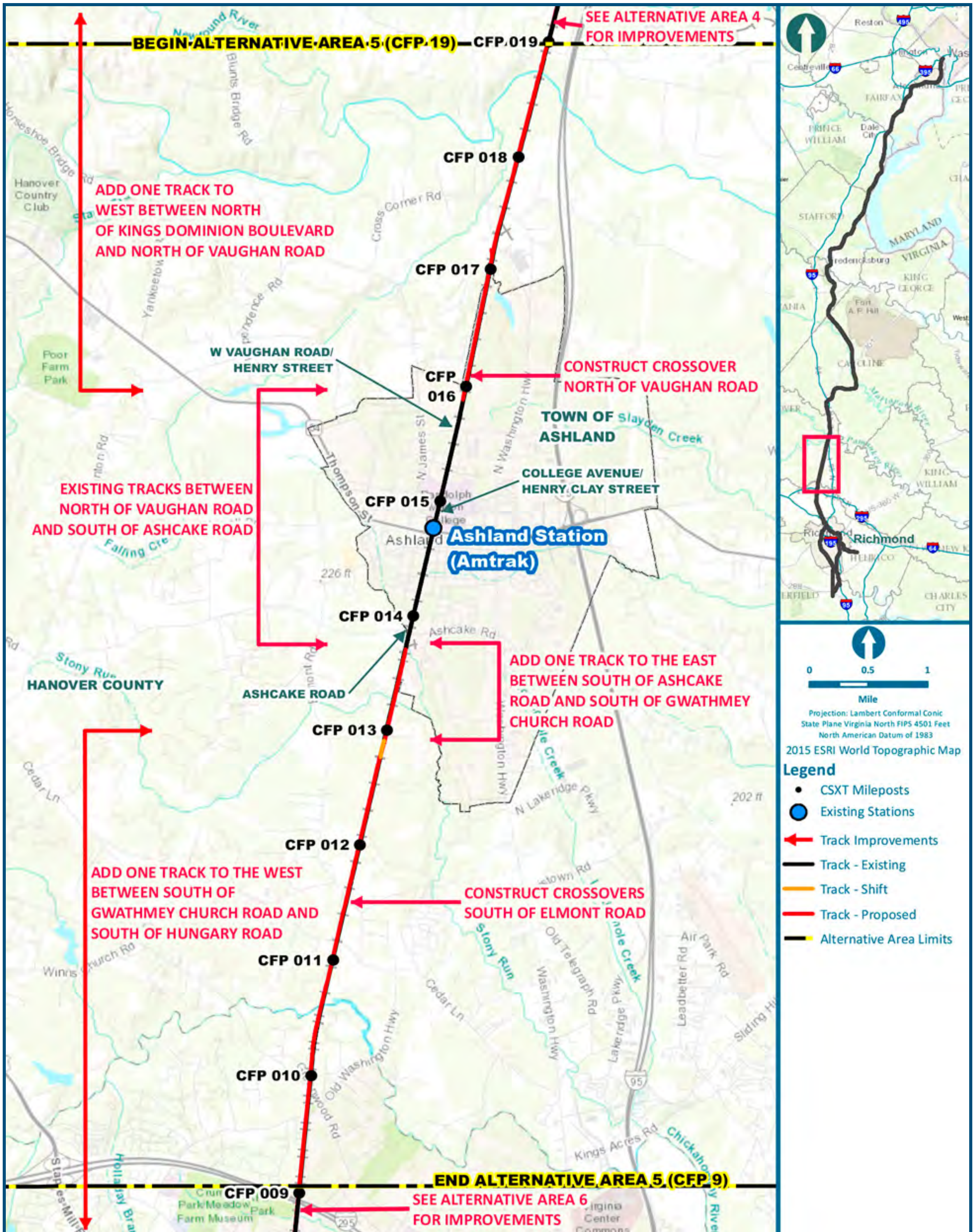


Figure 5.1-8: Build Alternative 5A – Maintain Two Track Through Town

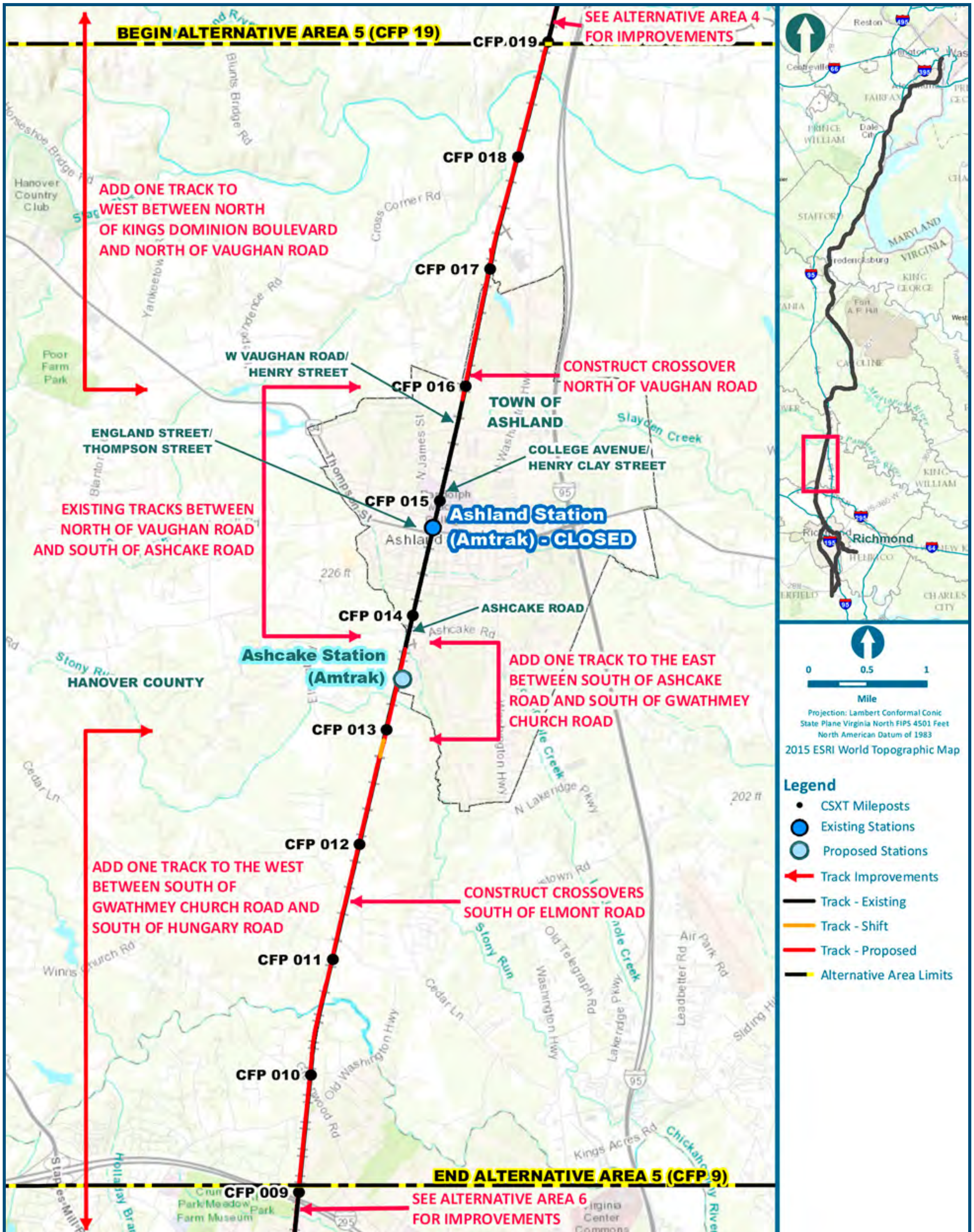


Figure 5.1-9: Build Alternative 5A–Ashcake – Maintain Two Track Through Town (Relocate Station to Ashcake)

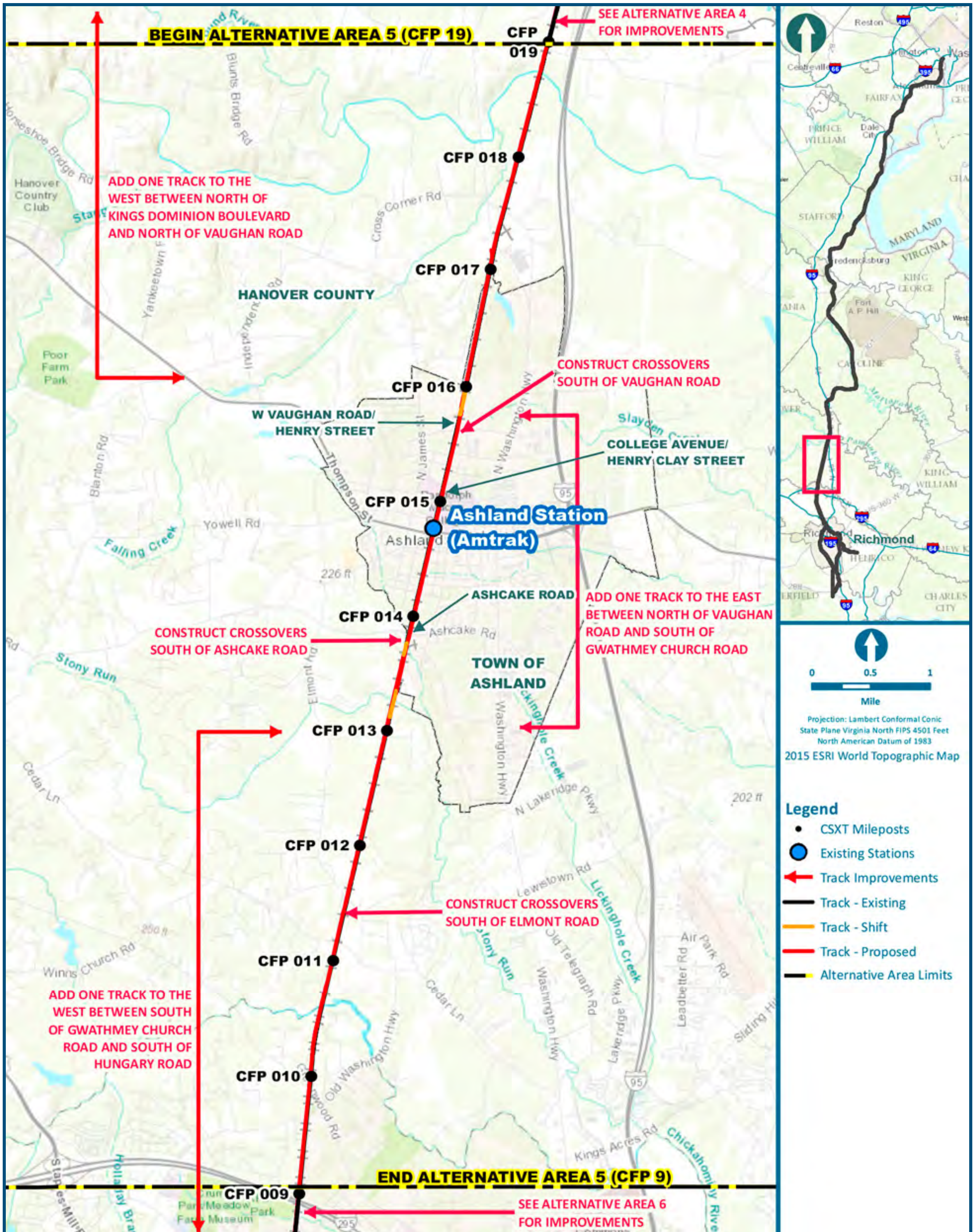


Figure 5.1-10: Build Alternative 5B – Add One Track Through Town East of Existing

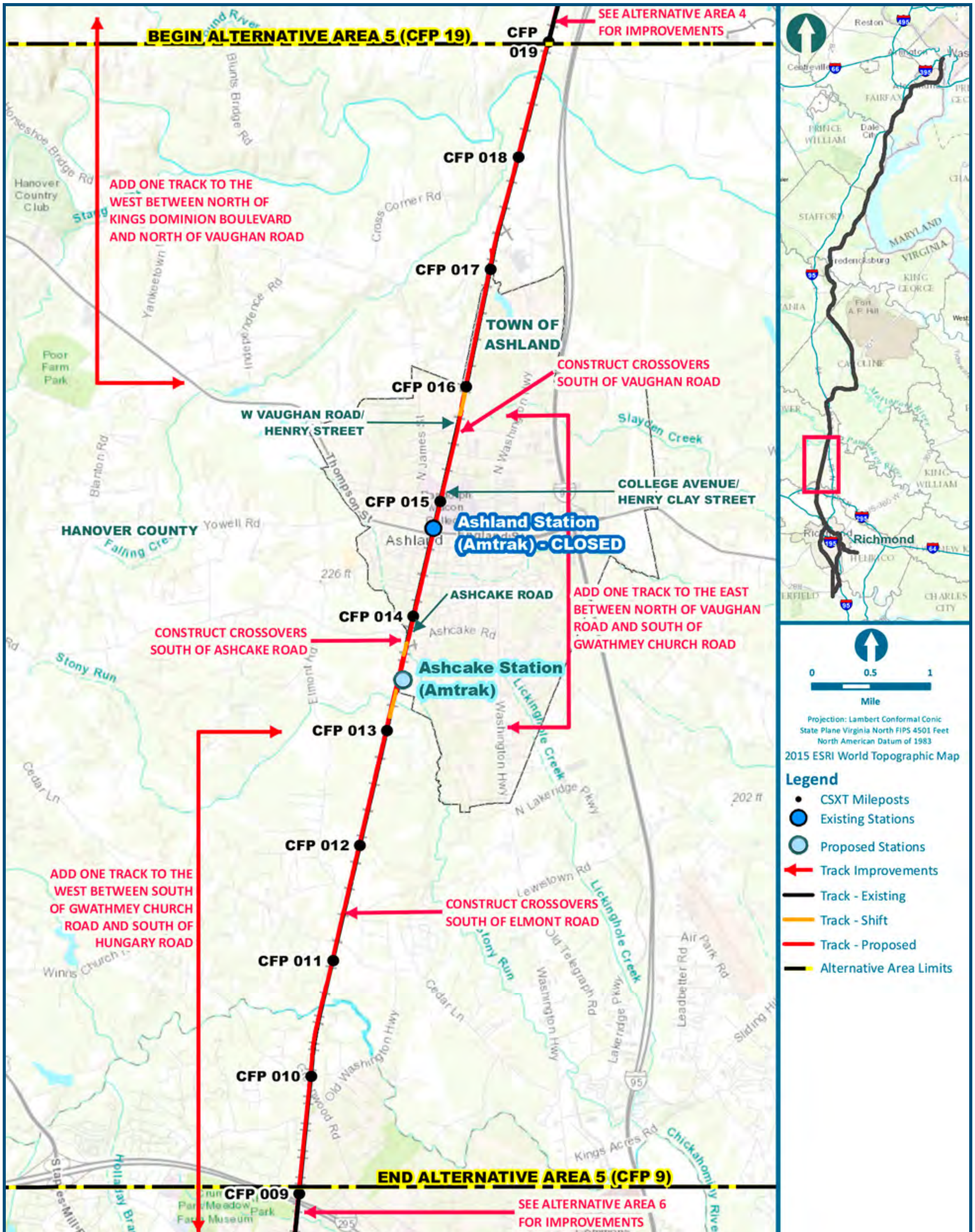


Figure 5.1-11: Build Alternative 5B–Ashcake – Add One Track Through Town East of Existing (Relocate Station to Ashcake)

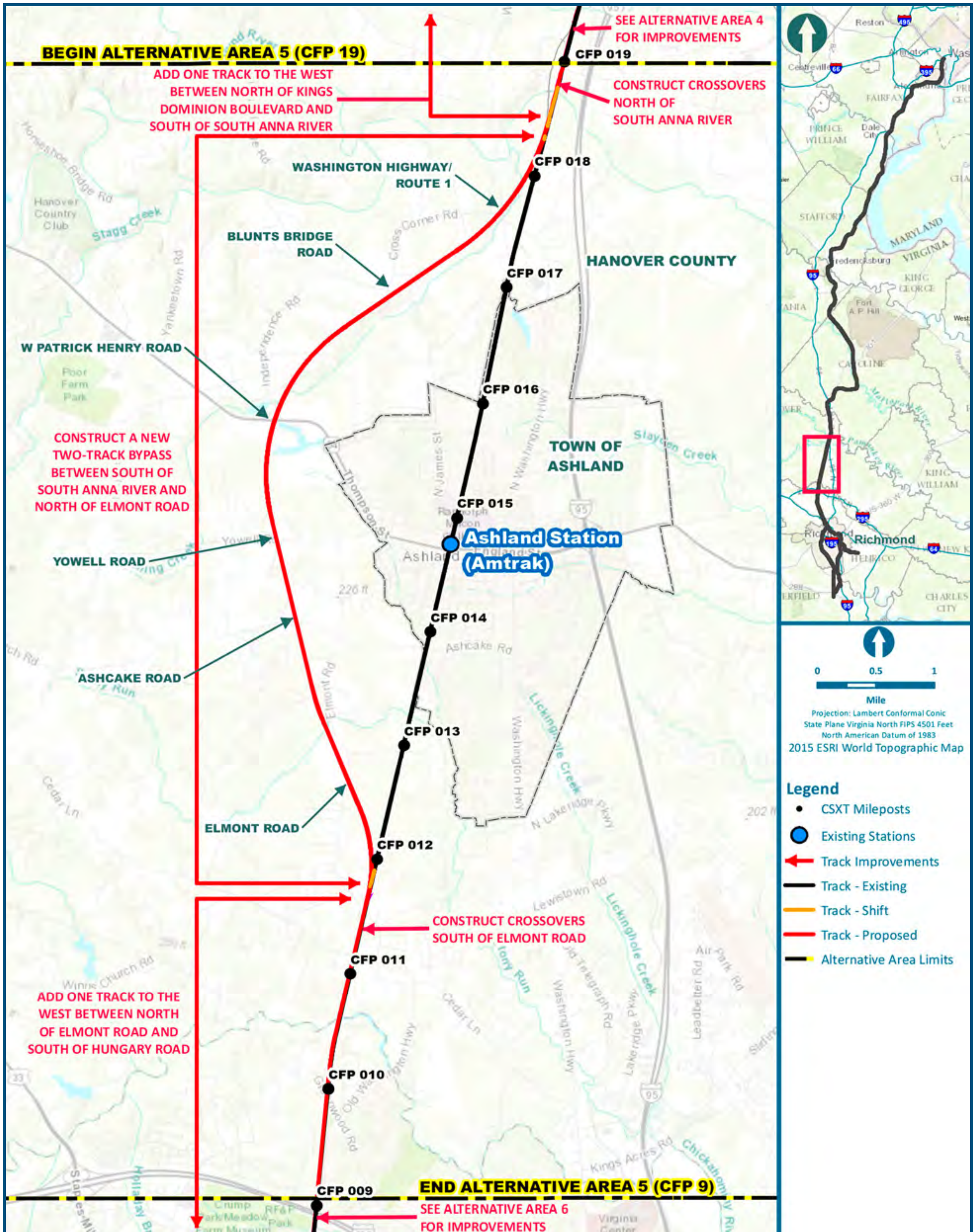


Figure 5.1-12: Build Alternative 5C – Add Two-Track West Bypass

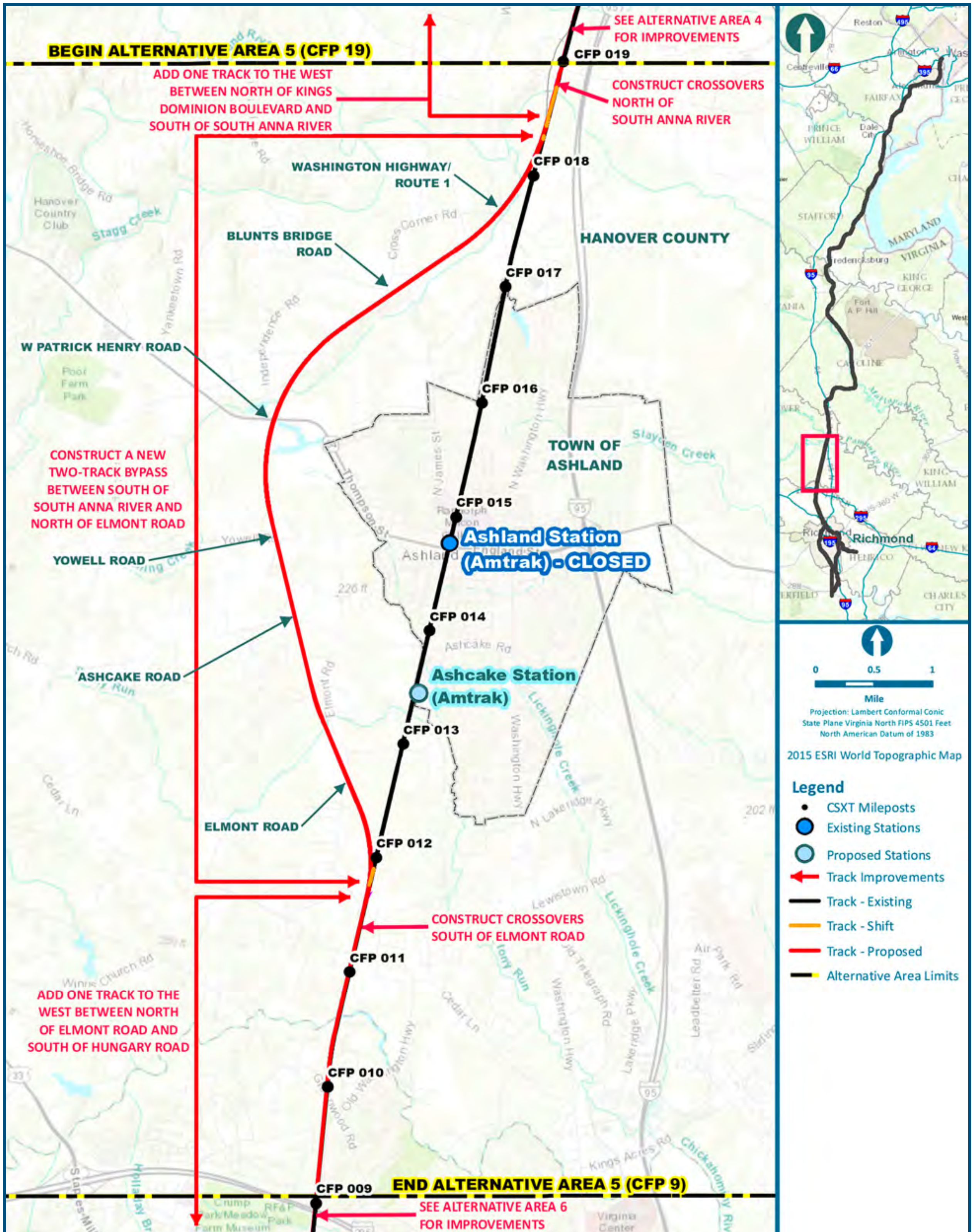


Figure 5.1-13: Build Alternative 5C–Ashcake – Add Two-Track West Bypass (Relocate Station to Ashcake)

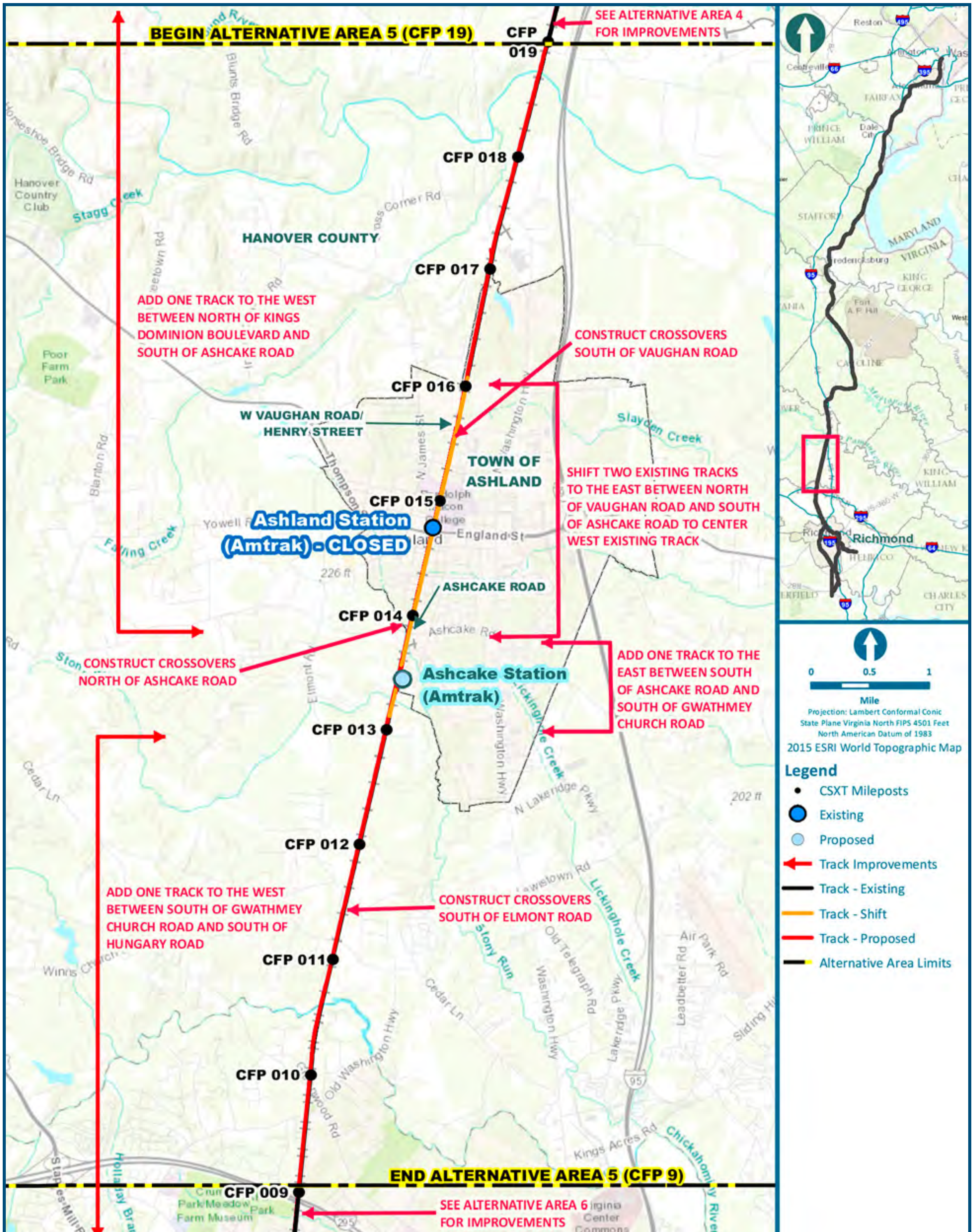


Figure 5.1-14: Build Alternative 5D–Ashcake – Three Tracks Centered Through Town (Add Single Track, Relocate Station to Ashcake)

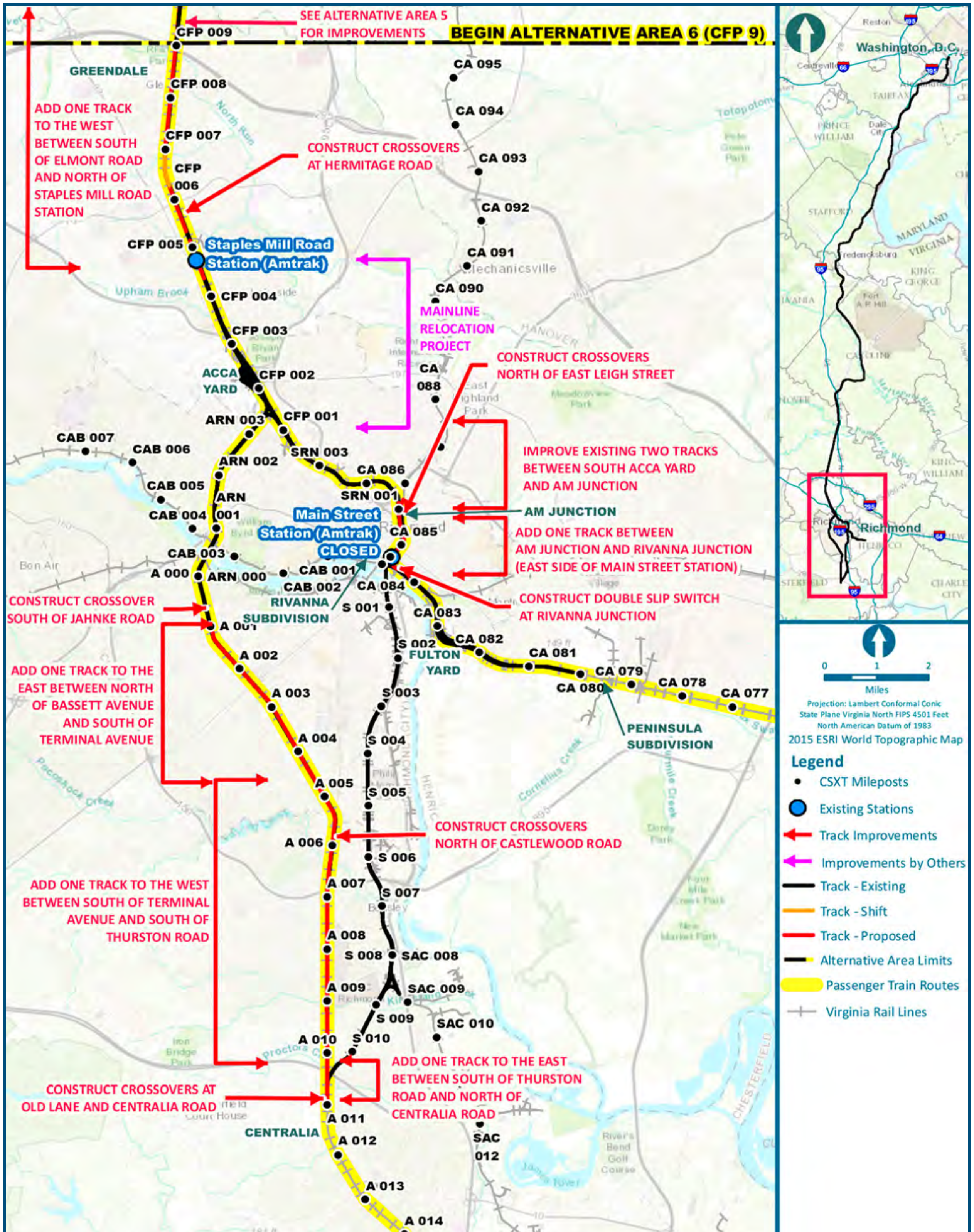


Figure 5.1-15: Build Alternative 6A – Staples Mill Road Station Only

DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

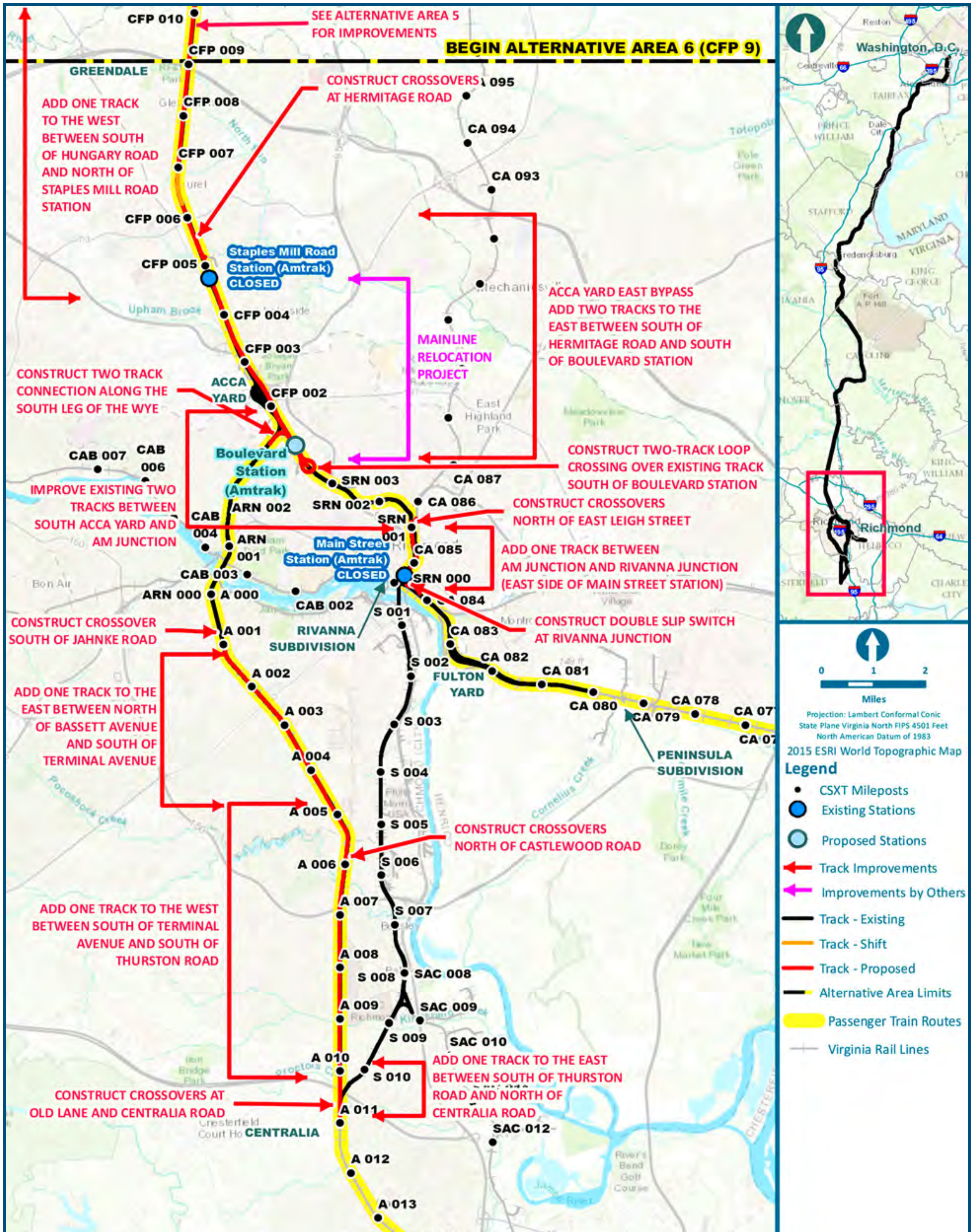


Figure 5.1-16: Build Alternative 6B–A-Line – Boulevard Station Only, A-Line

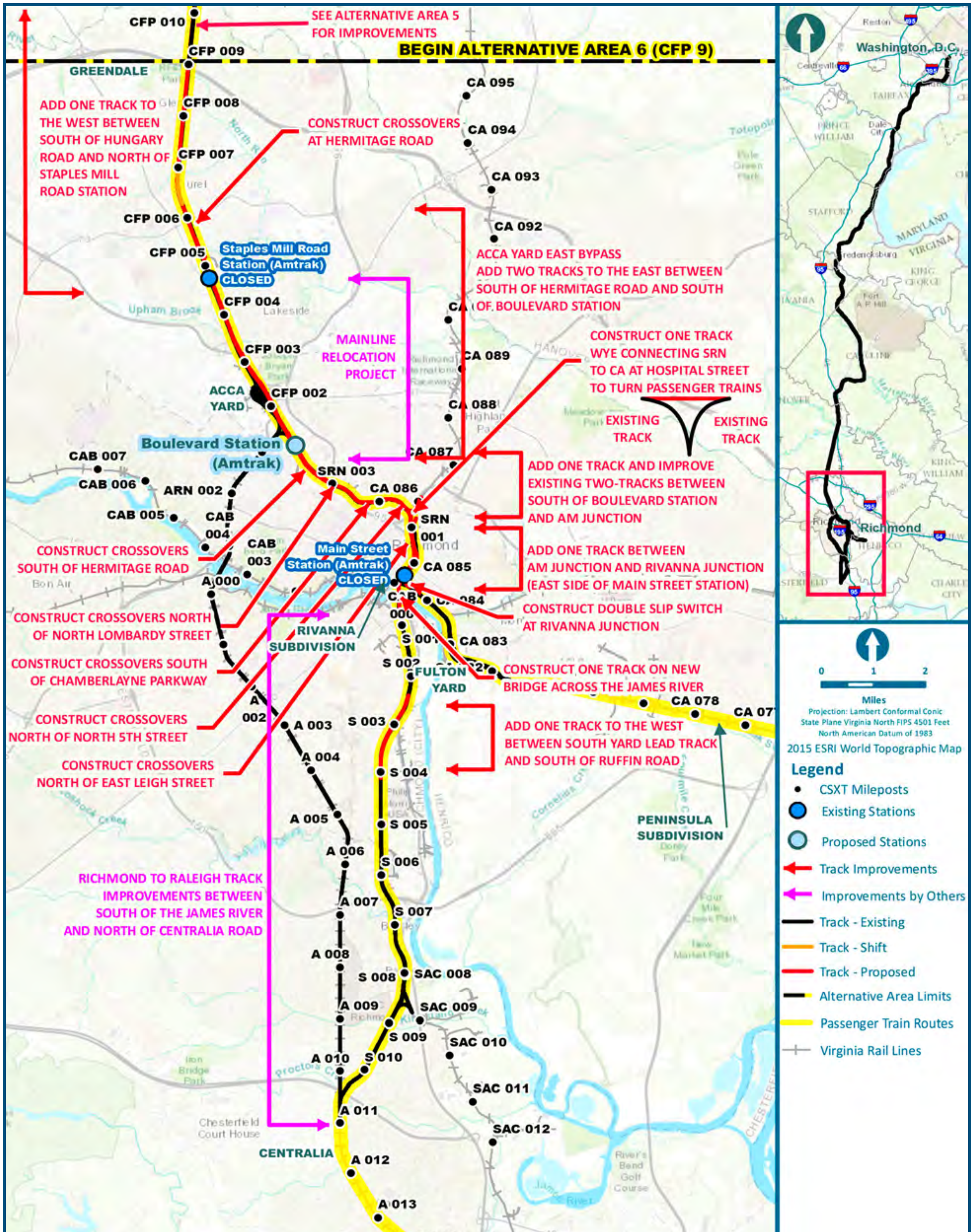


Figure 5.1-17: Build Alternative 6B–S-Line – Boulevard Station Only, S-Line

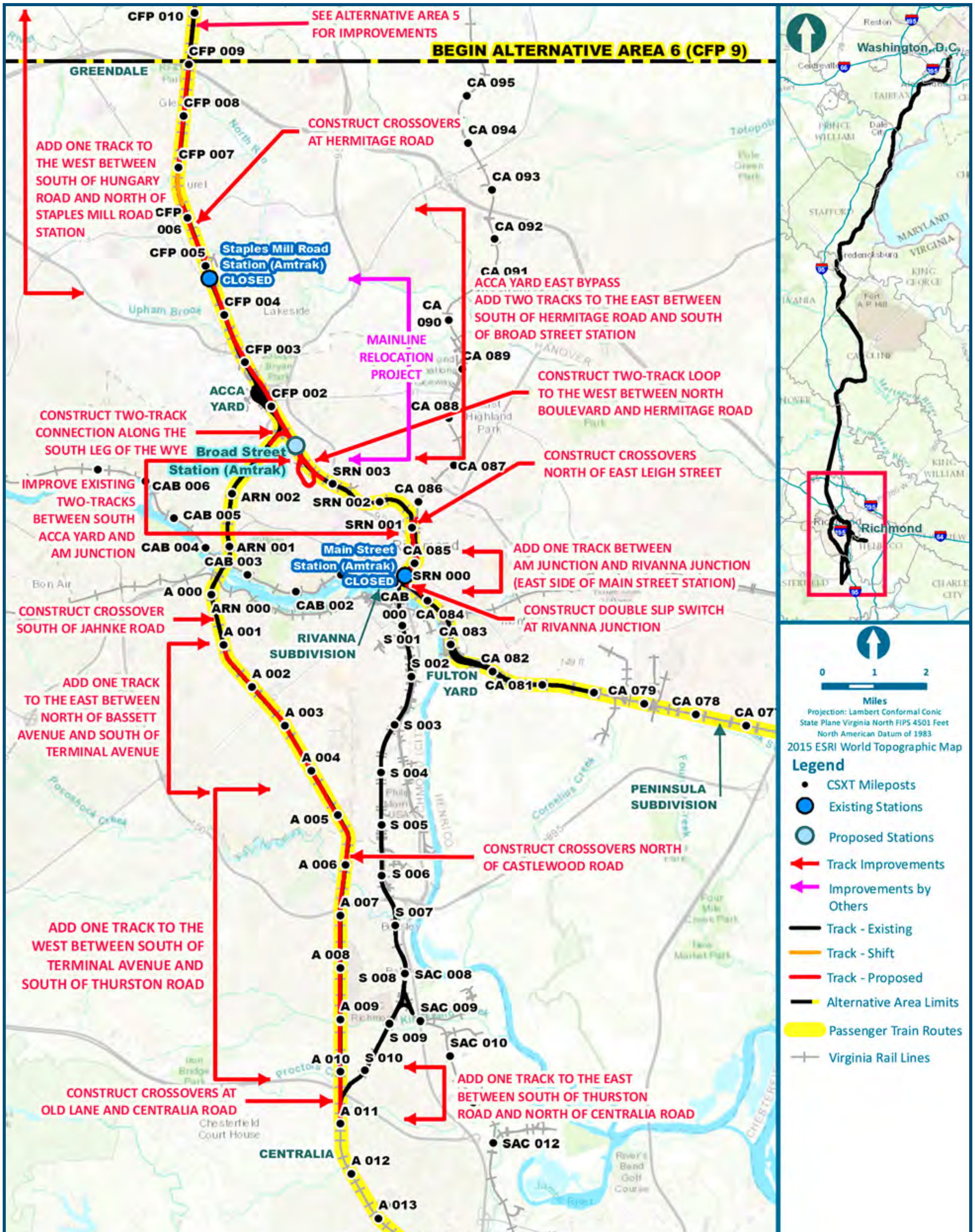


Figure 5.1-18: Build Alternative 6C – Broad Street Station Only

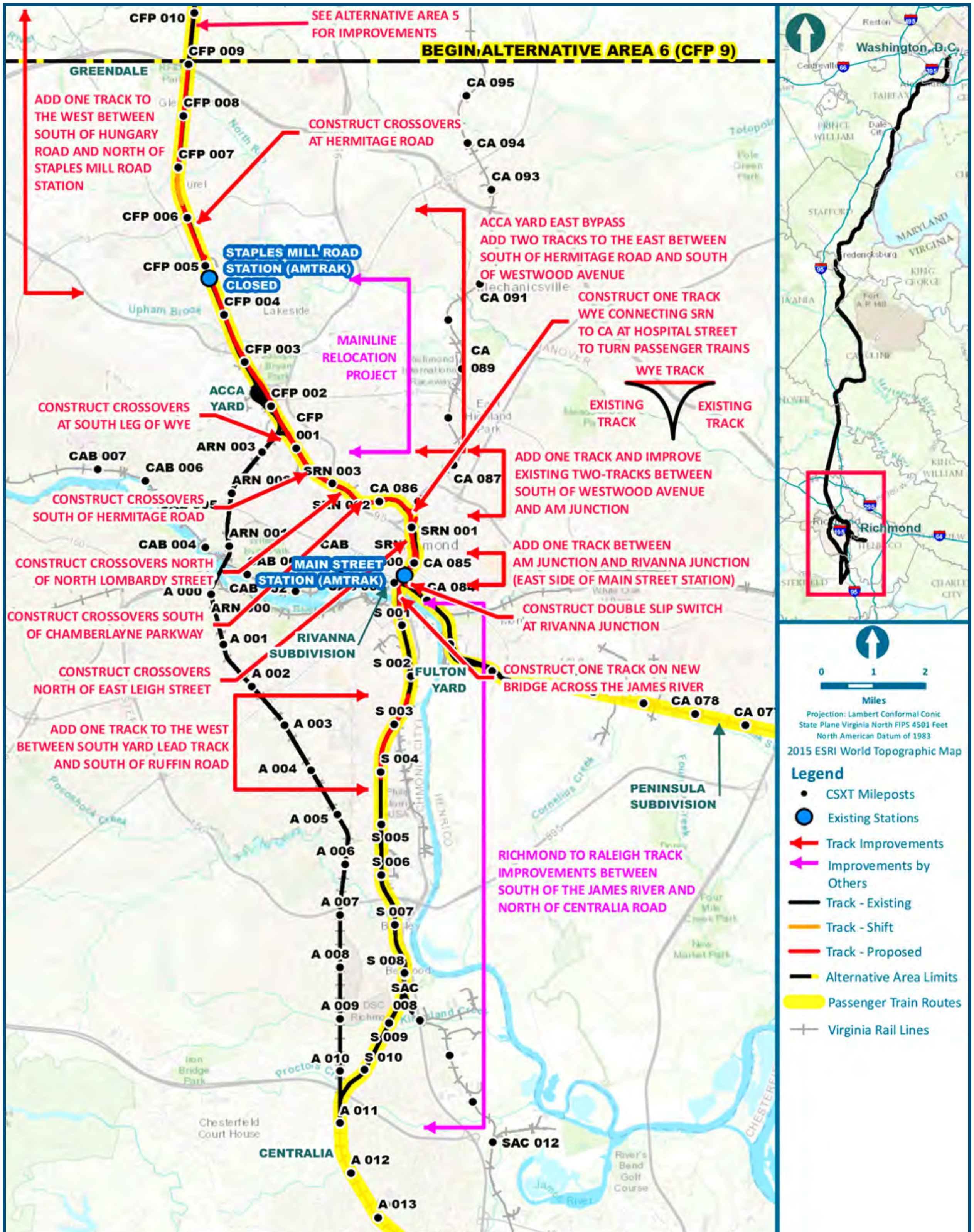


Figure 5.1-19: Build Alternative 6D – Main Street Station Only

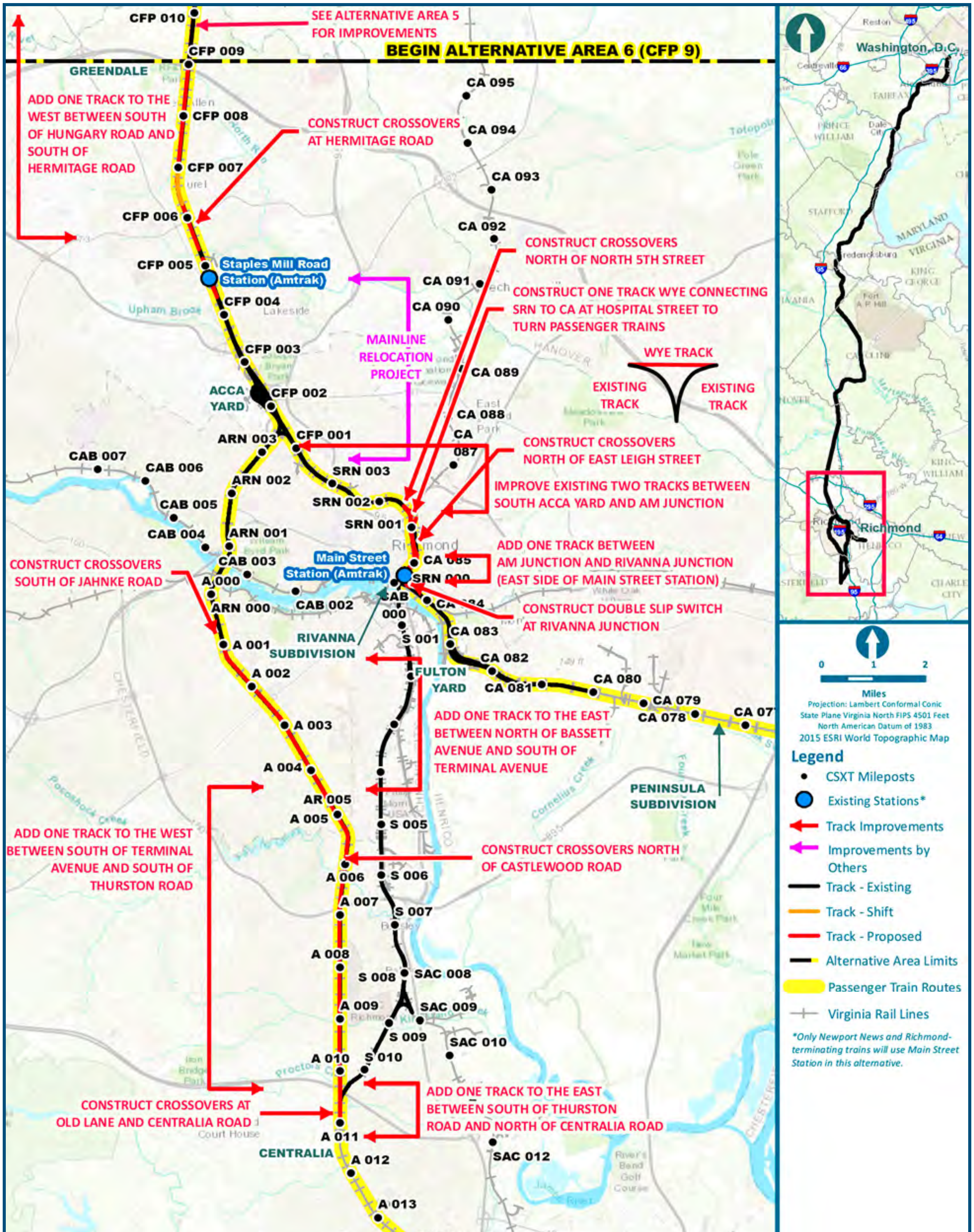


Figure 5.1-20: Build Alternative 6E – Split Service, Staples Mill Road/Main Street Stations

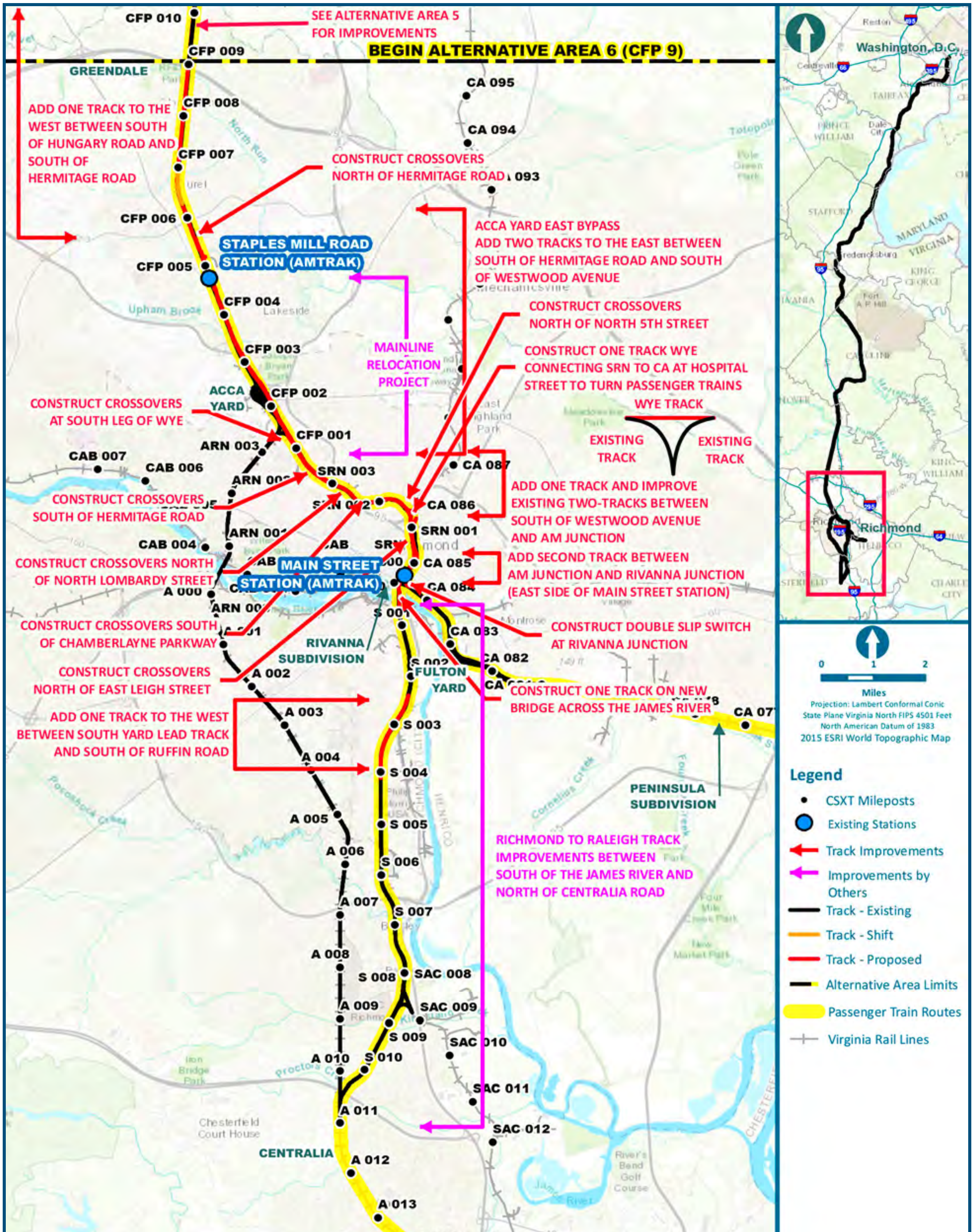


Figure 5.1-21: Build Alternative 6F – Full Service, Staples Mill Road/Main Street Stations

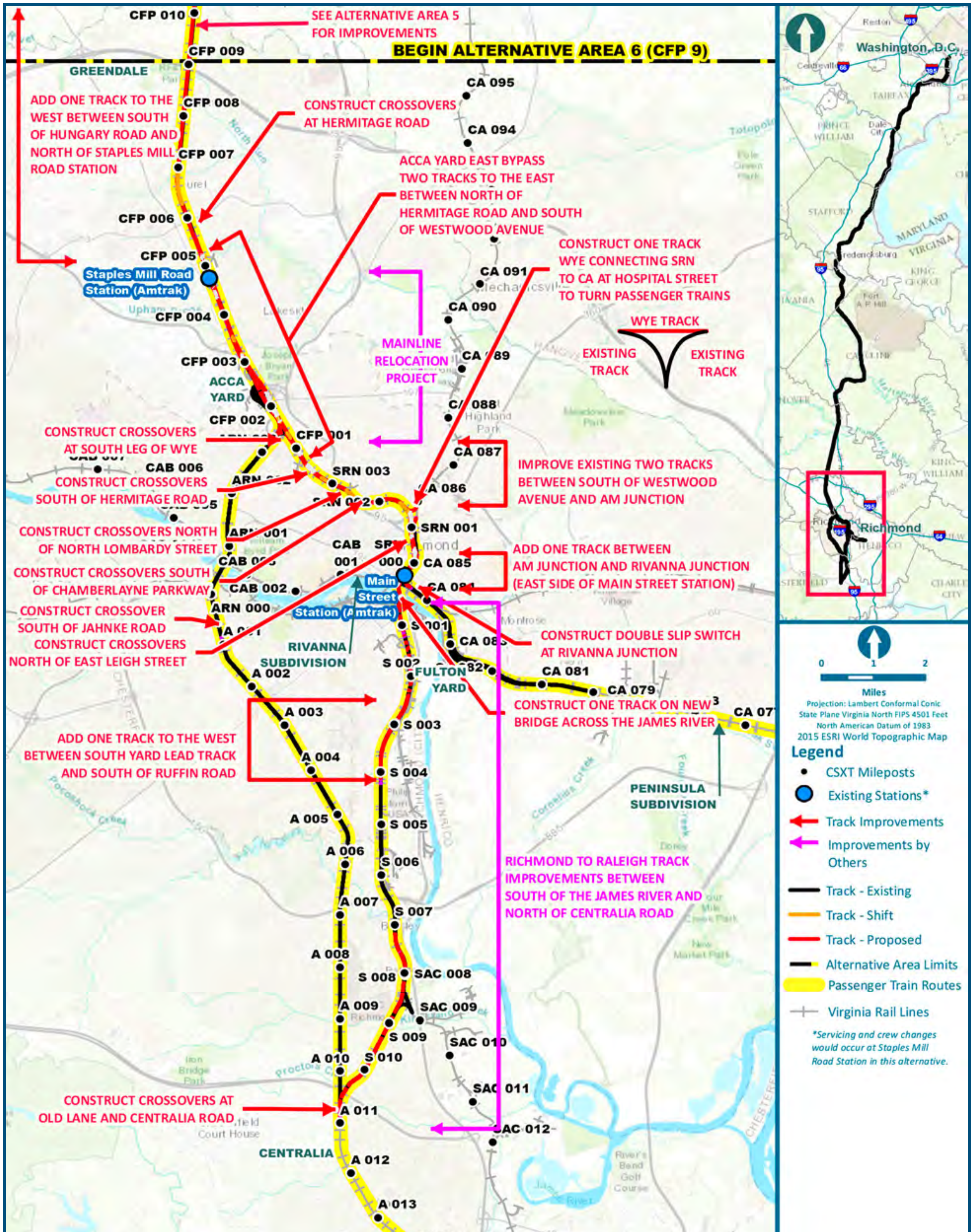


Figure 5.1-22: Build Alternative 6G – Shared Service, Staples Mill Road/Main Street Stations

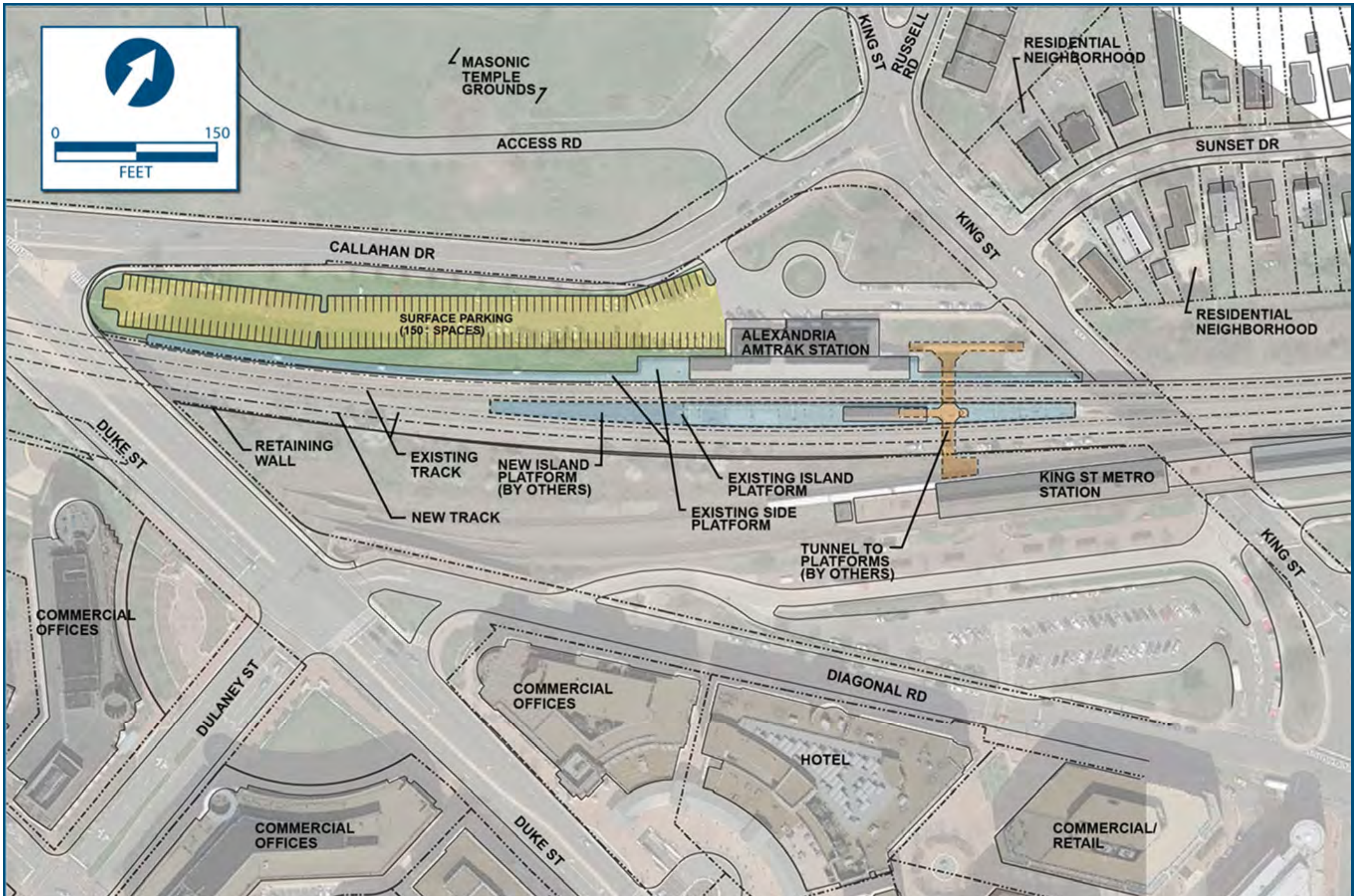


Figure 5.1-23: Alexandria Station Improvements for Build Alternative 2A

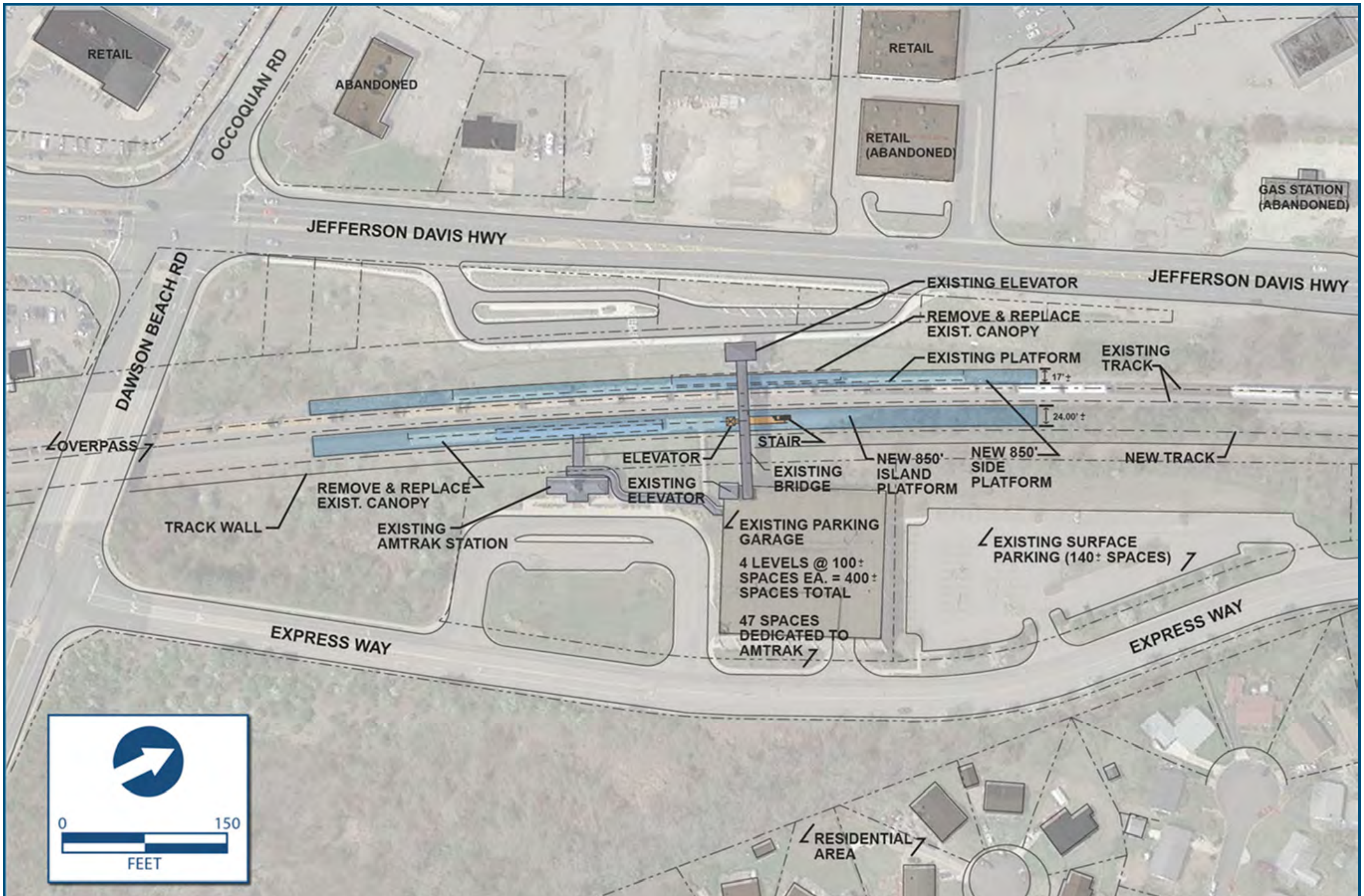


Figure 5.1-24: Woodbridge Station Improvements for Build Alternative 2A

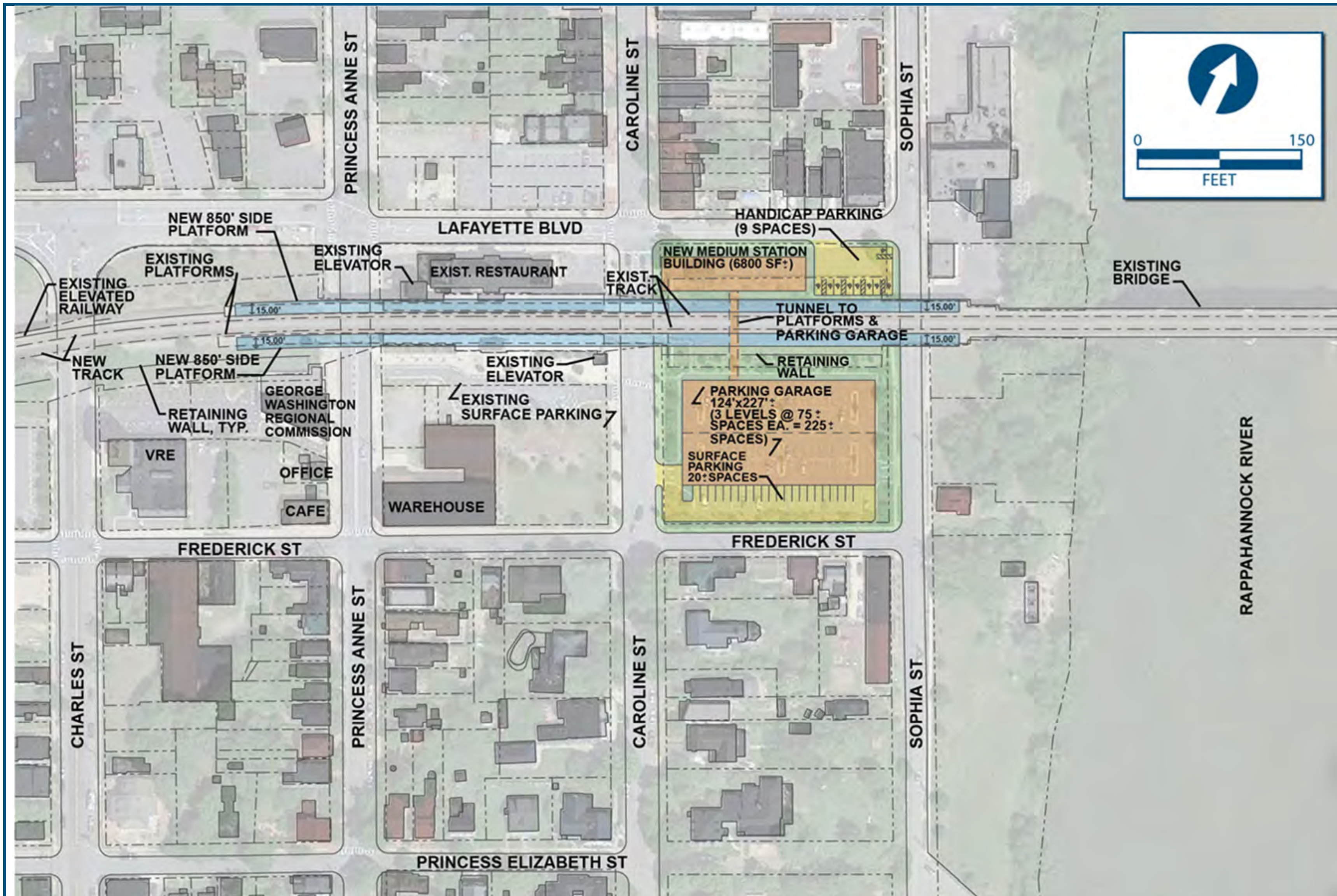


Figure 5.1-25: Fredericksburg Station Improvements for Build Alternatives 3A and 3C

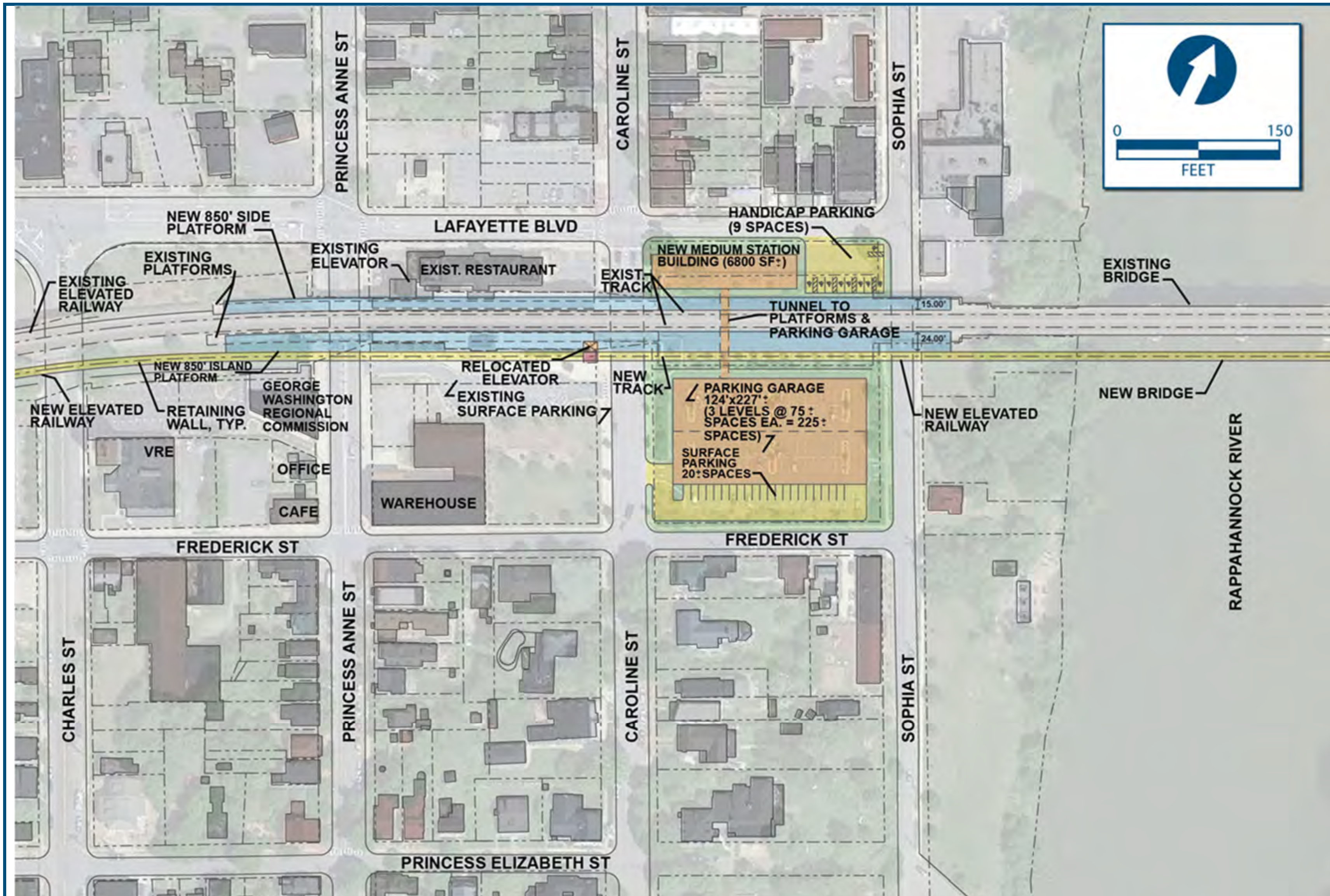


Figure 5.1-26: Fredericksburg Station Improvements for Build Alternative 3B

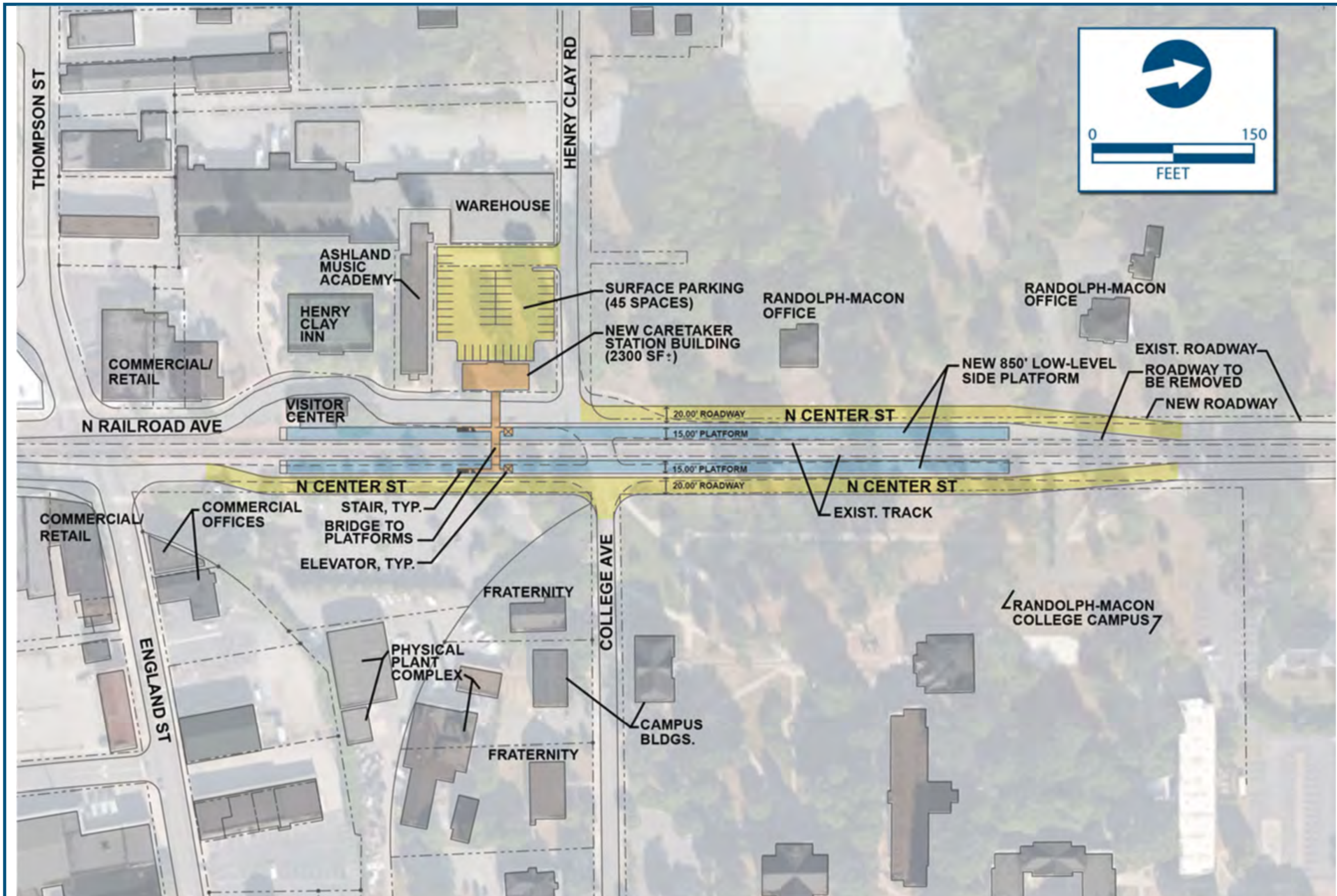


Figure 5.1-27A: Ashland Station Improvements for Build Alternatives 5A and 5C (Two-Track/850-Foot Platforms)

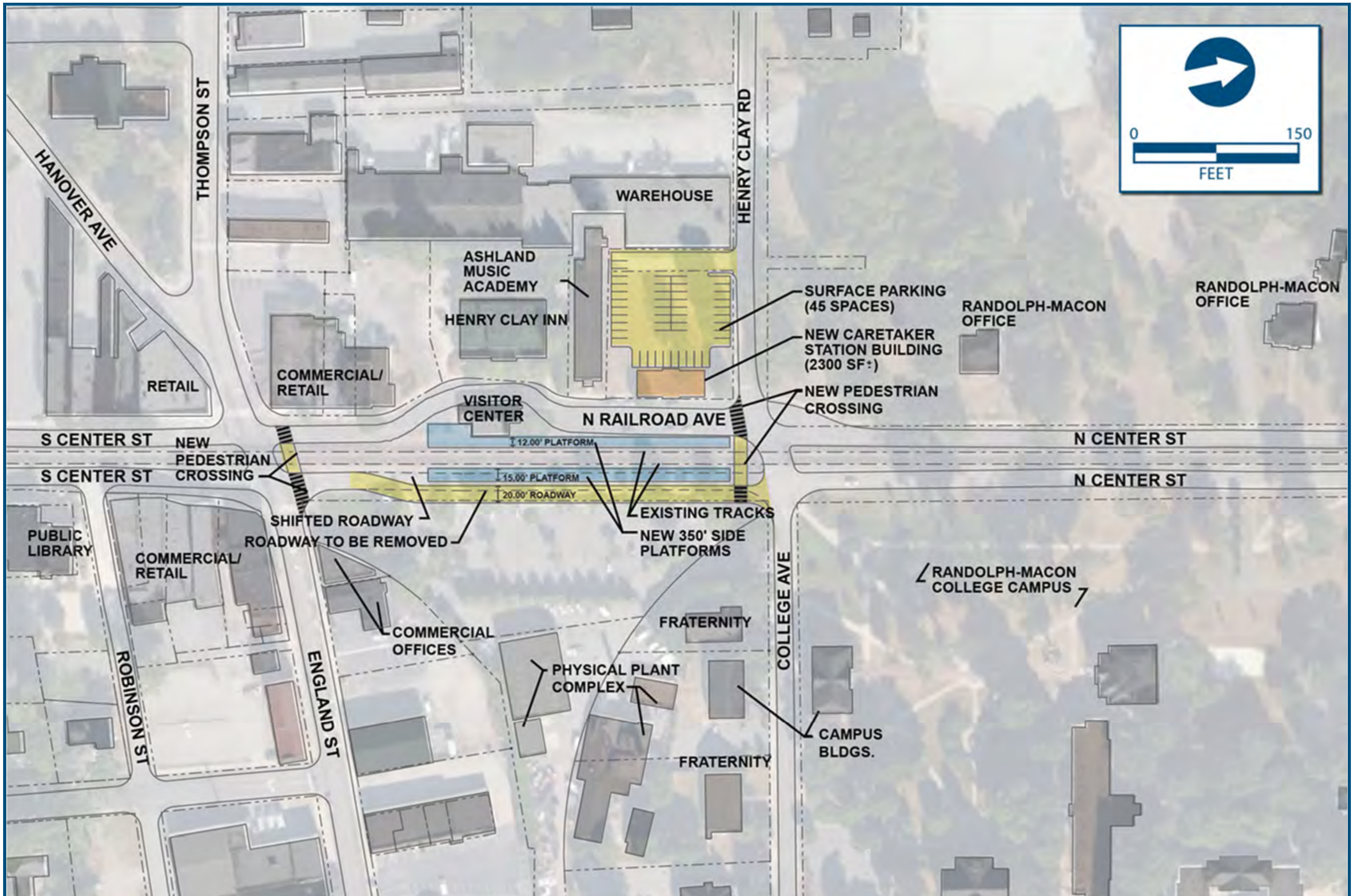


Figure 5.1-27B: Ashland Station Improvements for Build Alternatives 5A and 5C (Two-Track/350-Foot Platforms)

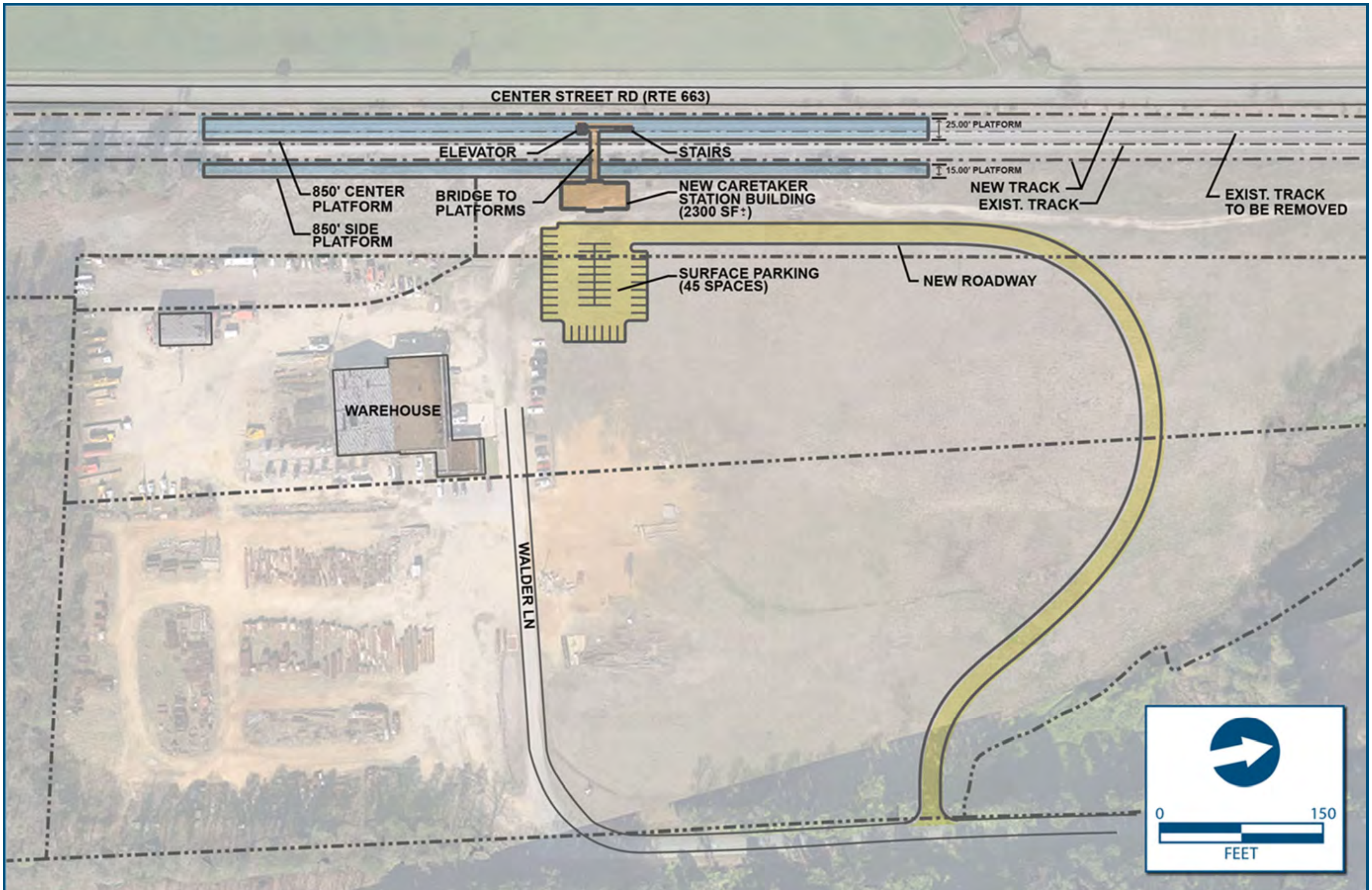


Figure 5.1-28: Ashcake Station Improvements for Build Alternatives 5A–Ashcake, 5B–Ashcake, 5C–Ashcake, and 5D–Ashcake

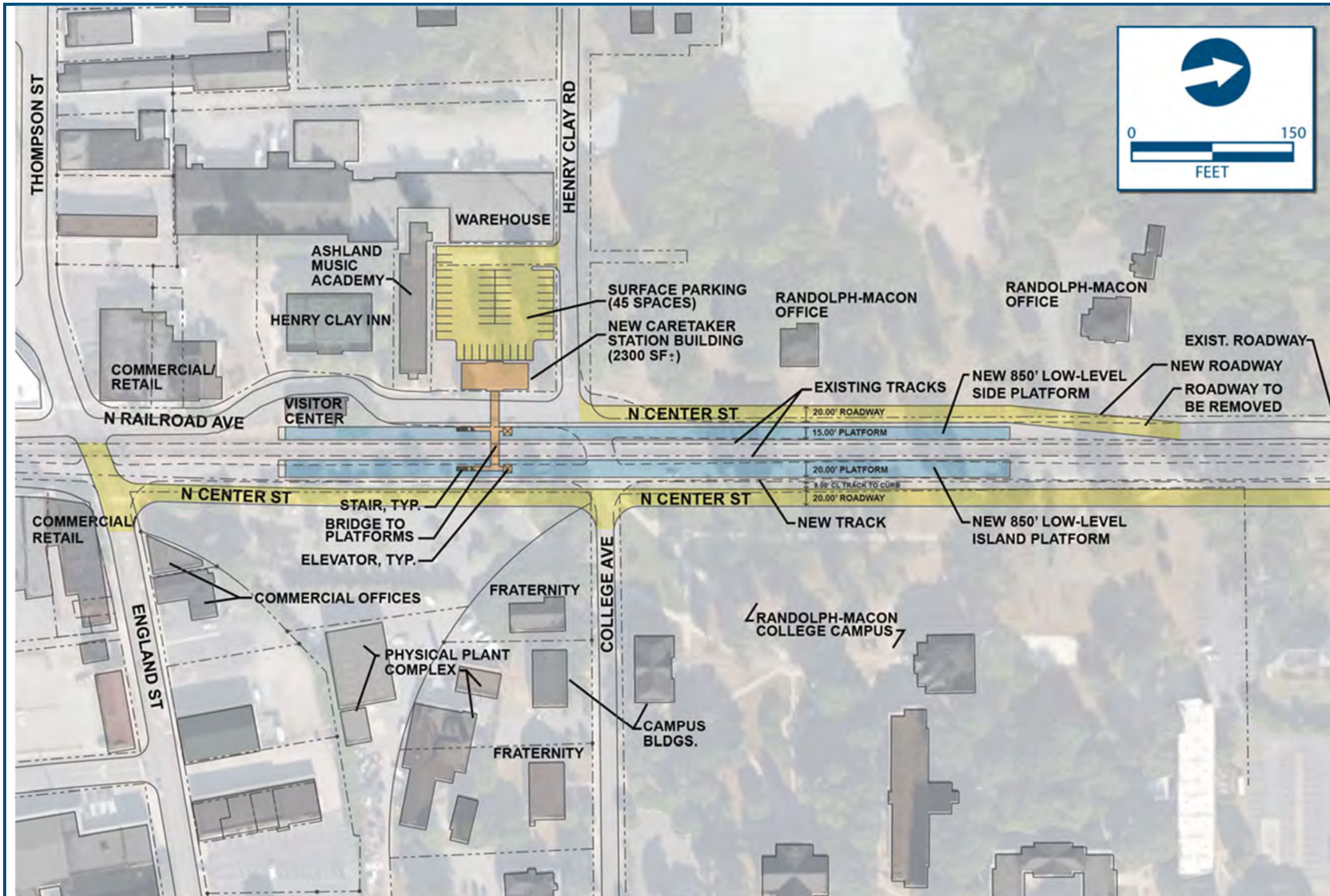


Figure 5.1-29A: Ashland Station Improvements for Build Alternative 5B (Three-Track/850-Foot Platforms)

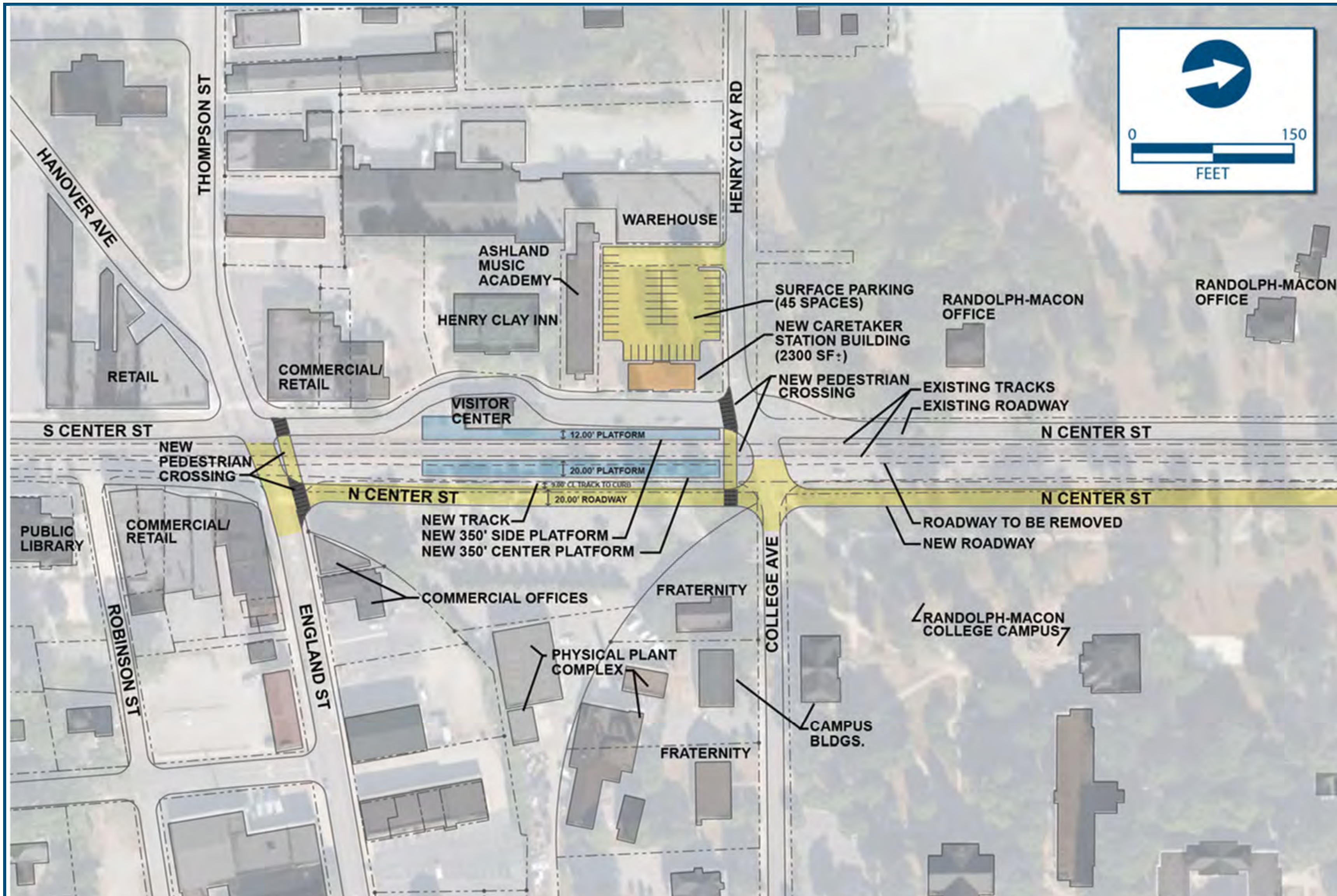


Figure 5.1-29B: Ashland Station Improvements for Build Alternative 5B (Three-Track/350-Foot Platforms)

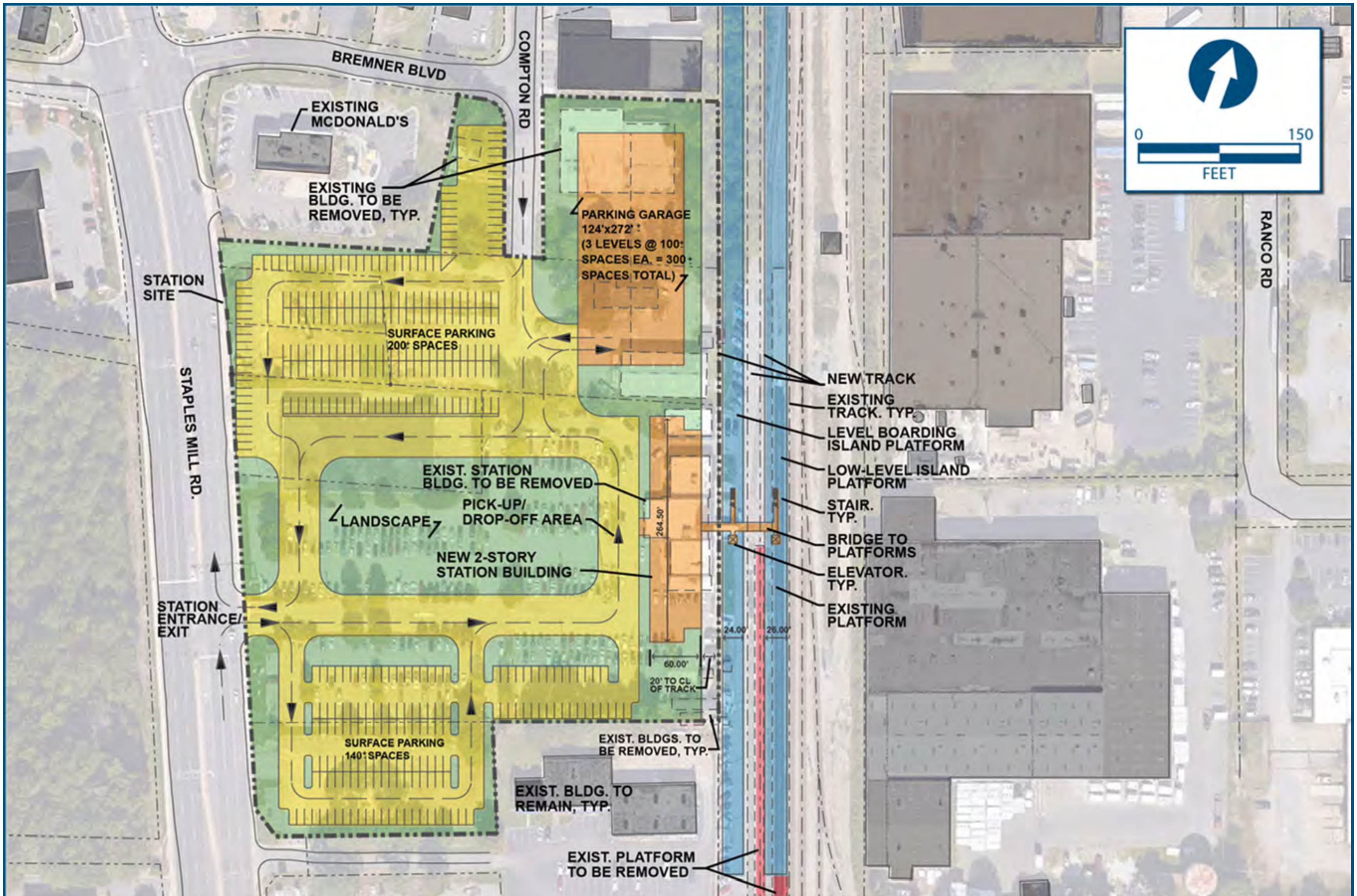


Figure 5.1-30: Staples Mill Road Station Improvements for Build Alternative 6A

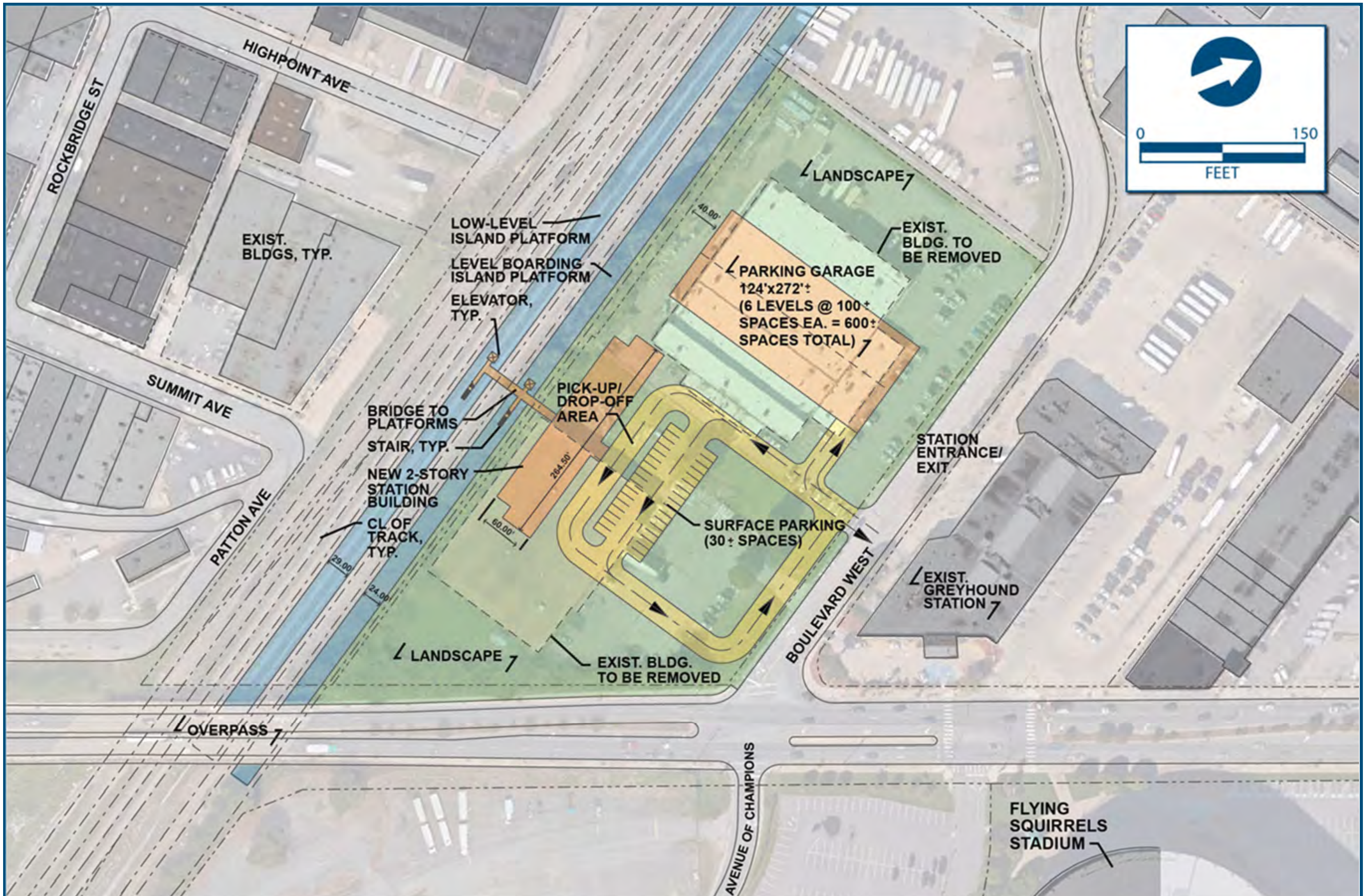


Figure 5.1-31: Boulevard Station Improvements for Build Alternatives 6B–A-Line and 6B–S-Line

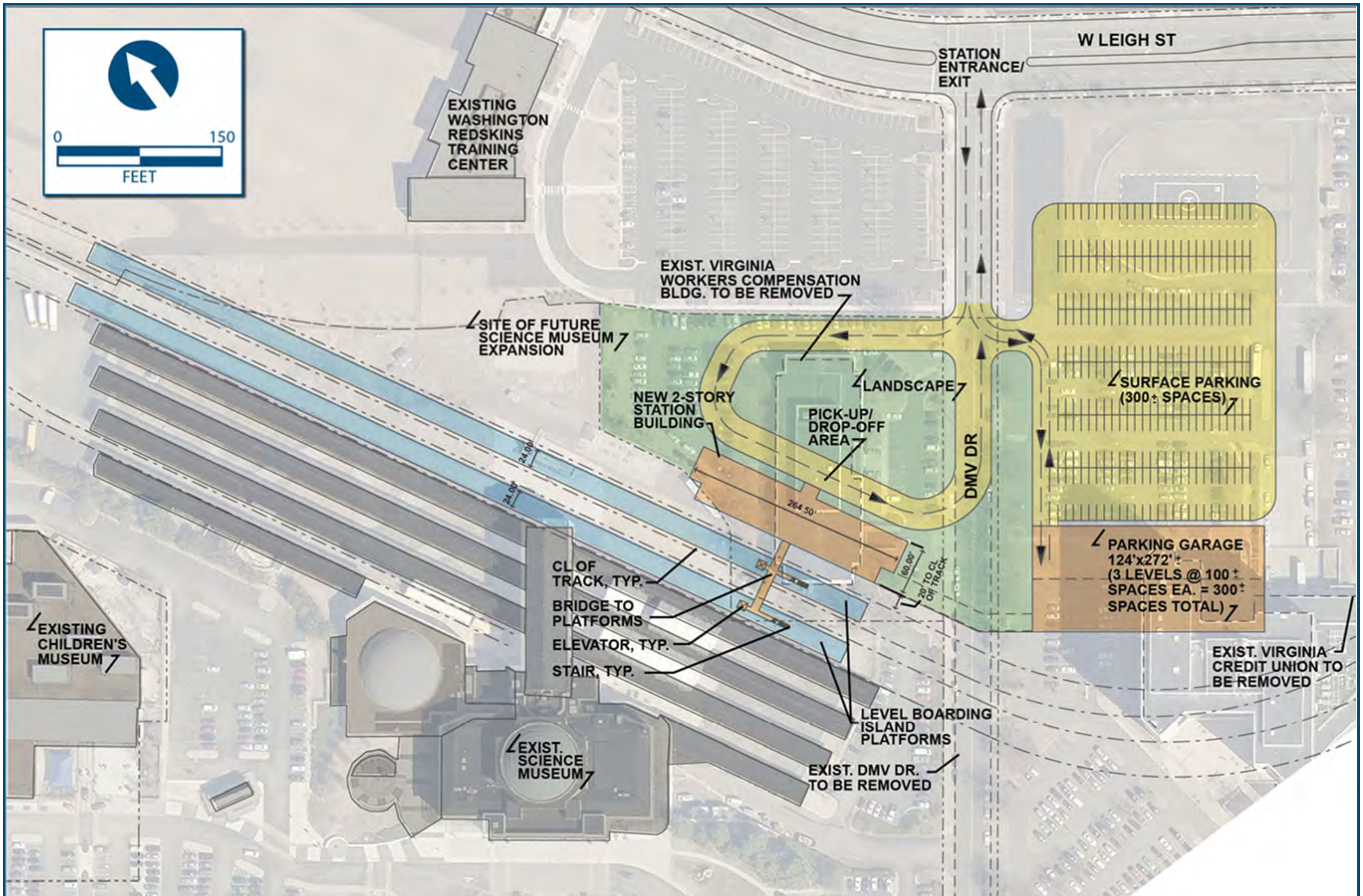


Figure 5.1-32: Broad Street Station Improvements for Build Alternative 6C

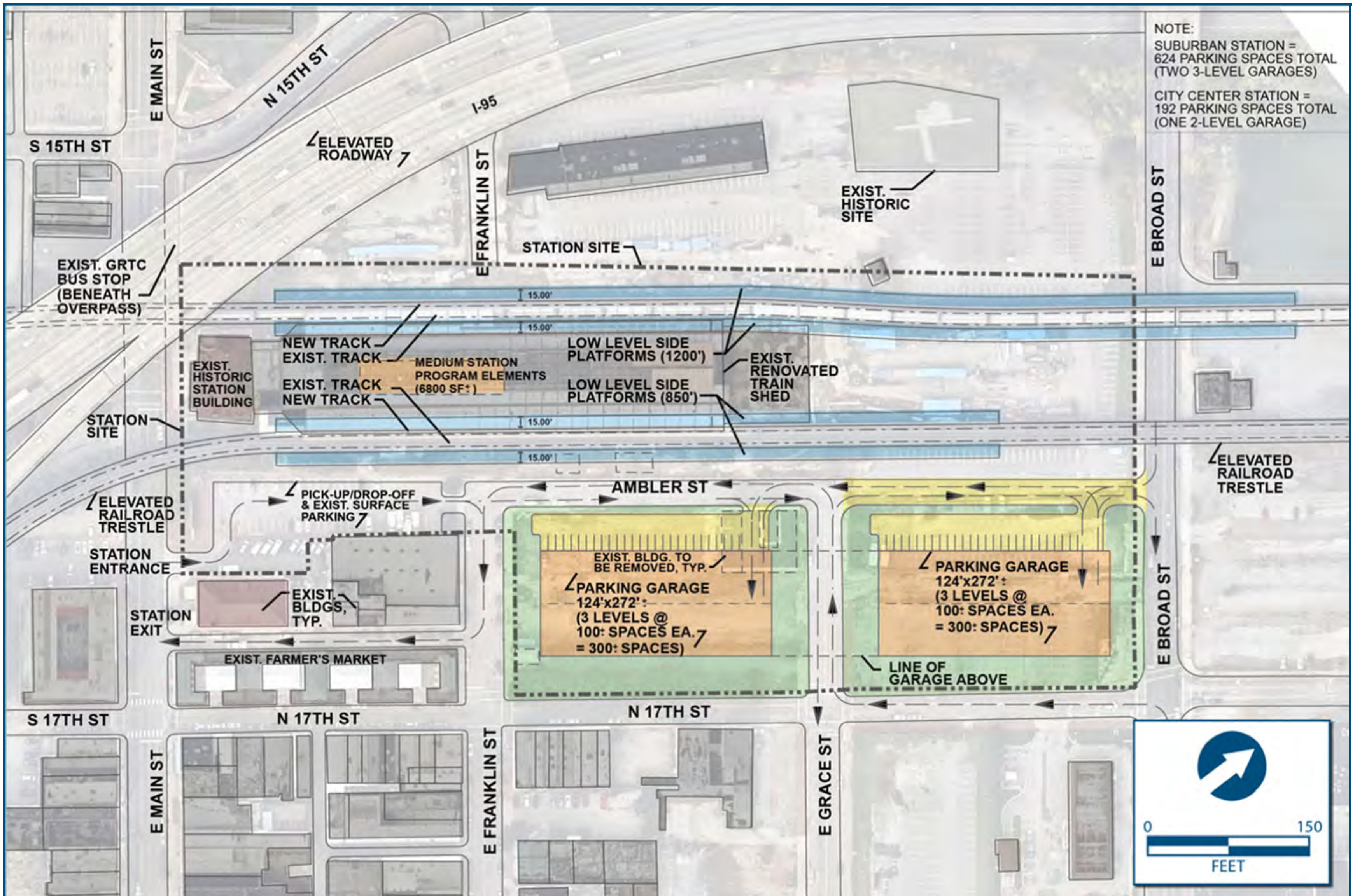


Figure 5.1-33: Main Street Station Improvements for Build Alternative 6D

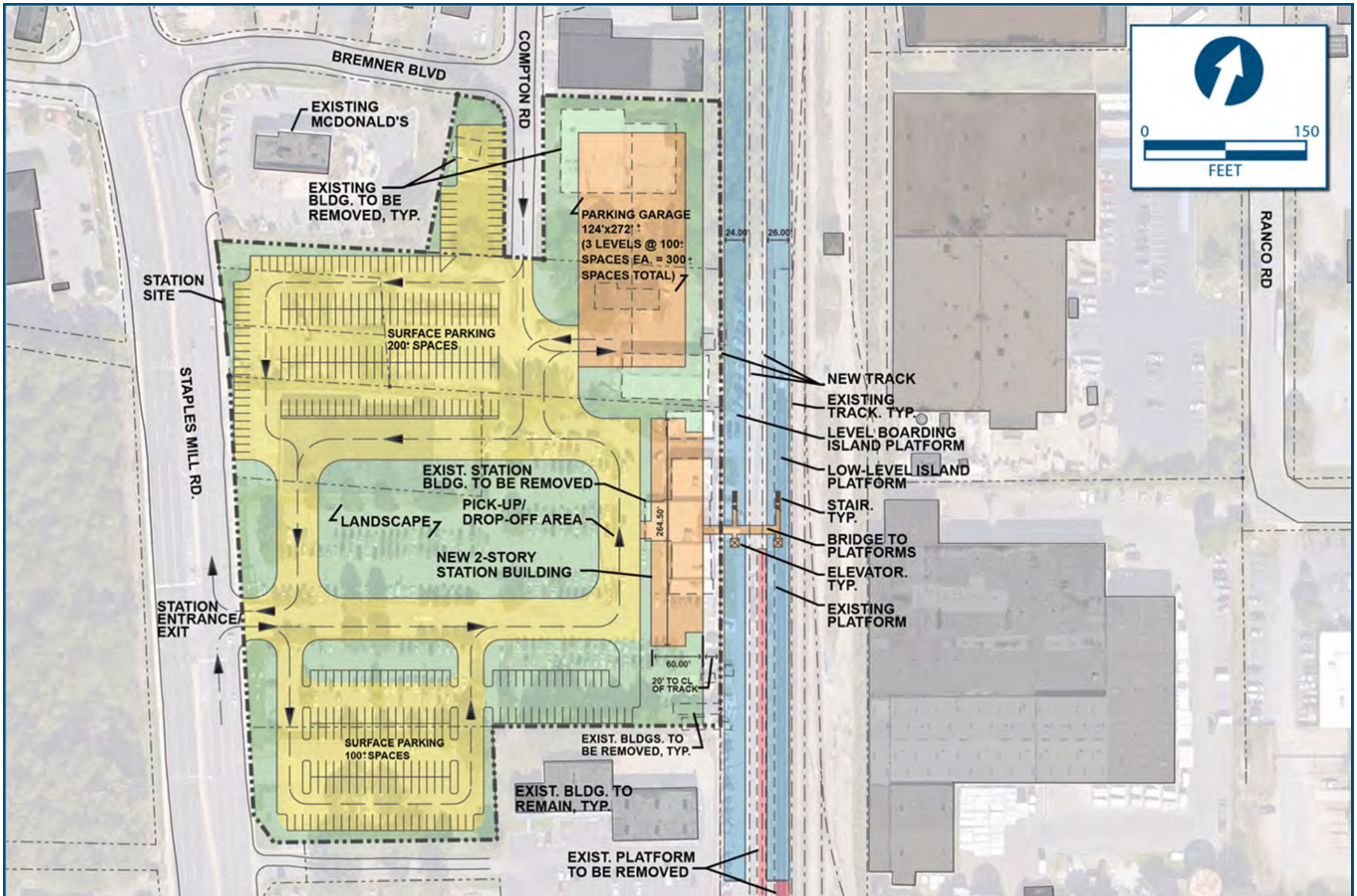


Figure 5.1-34: Staples Mill Road Station Improvements for Build Alternative 6E

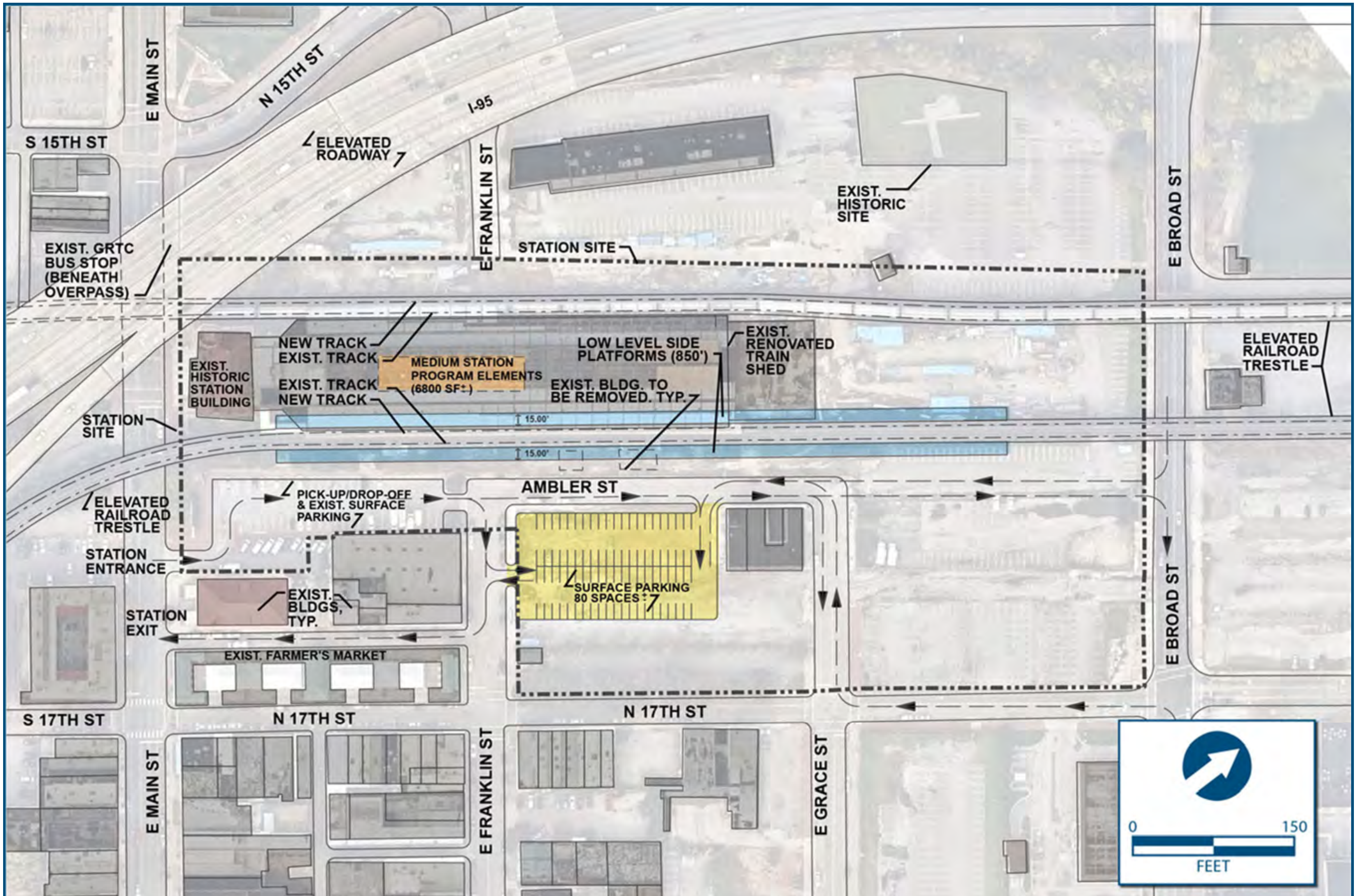


Figure 5.1-35: Main Street Station Improvements for Build Alternative 6E

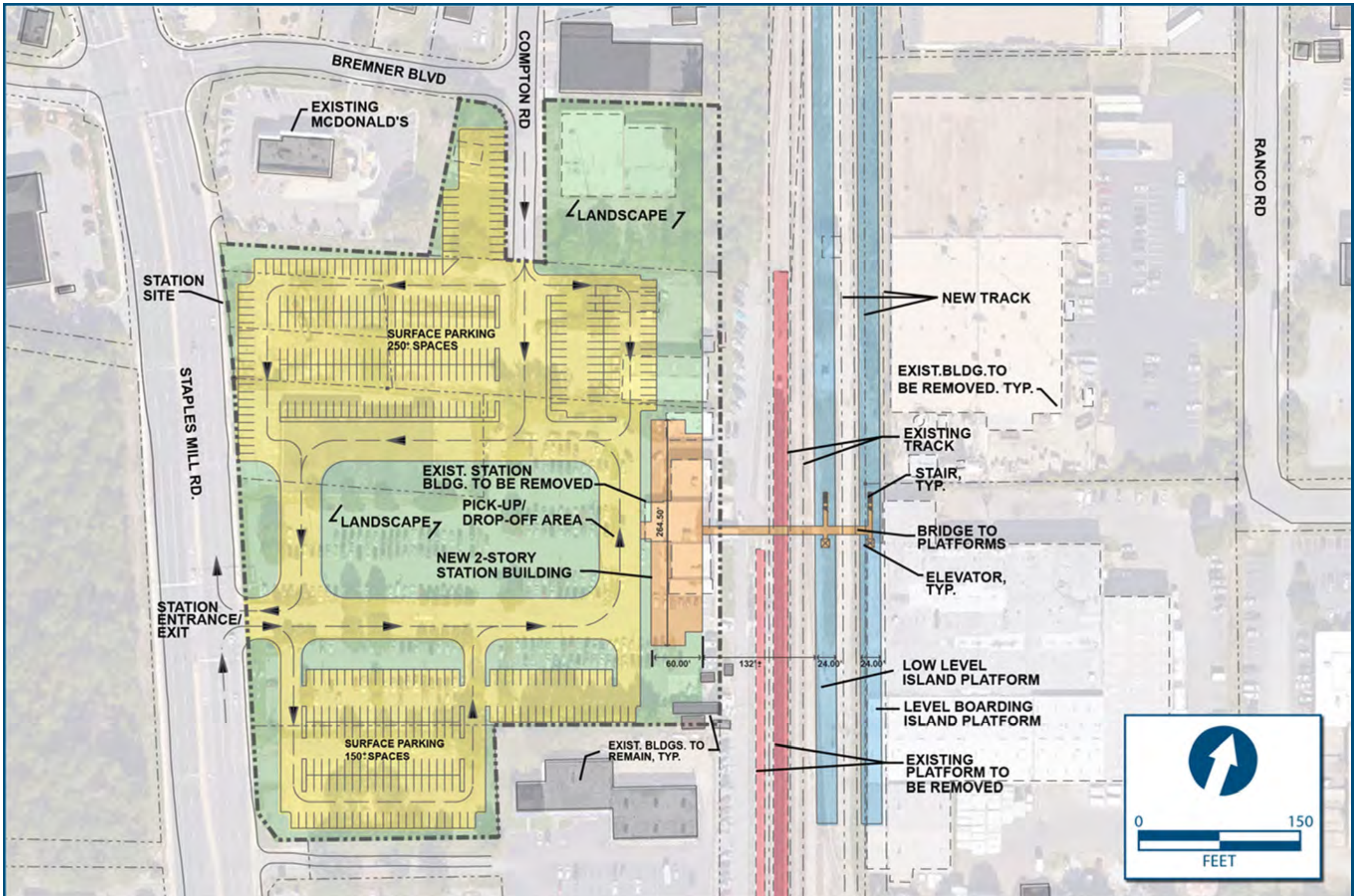


Figure 5.1-36: Staples Mill Road Station Improvements for Build Alternative 6F

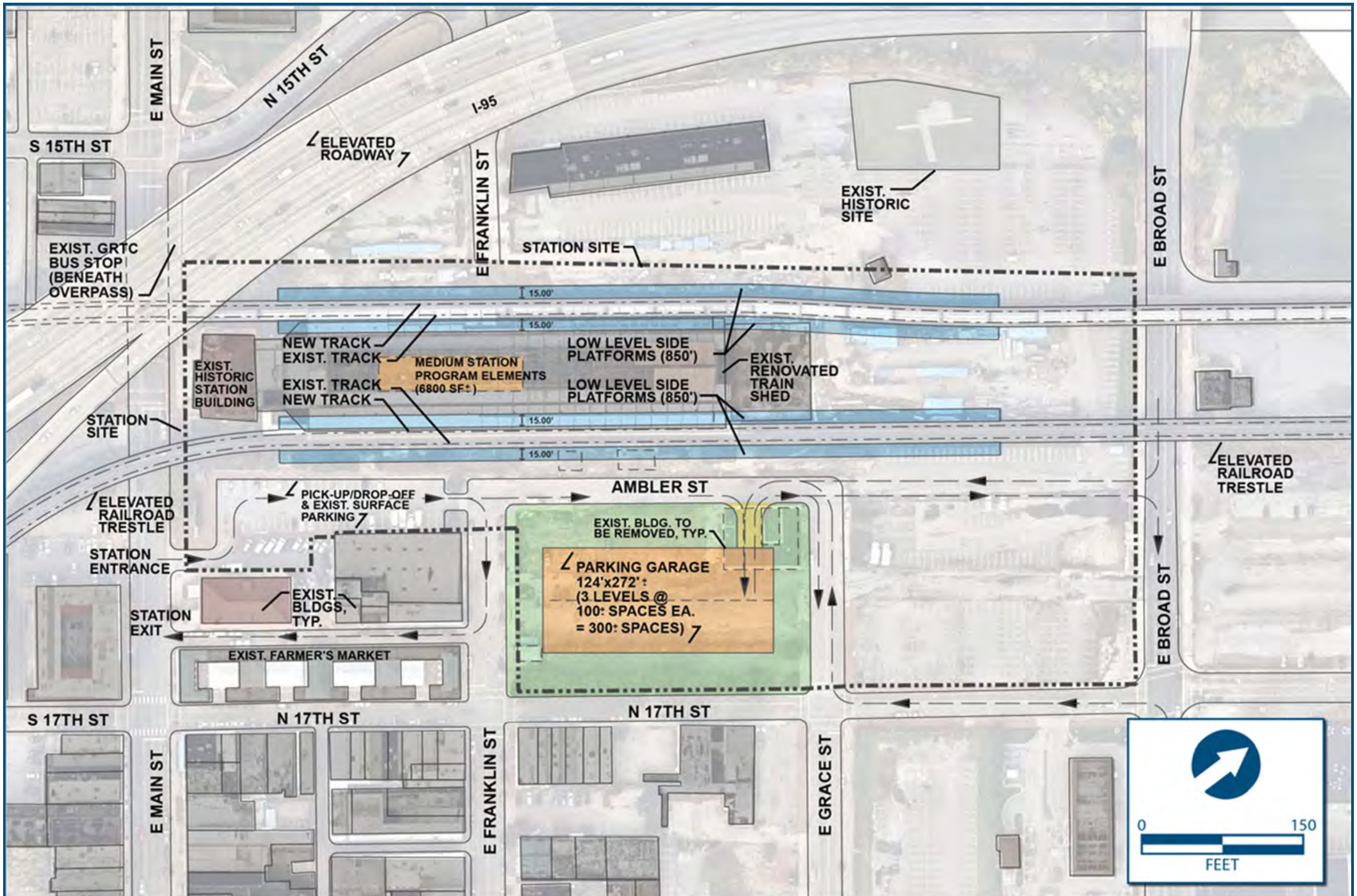


Figure 5.1-37: Main Street Station Improvements for Build Alternative 6F

DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

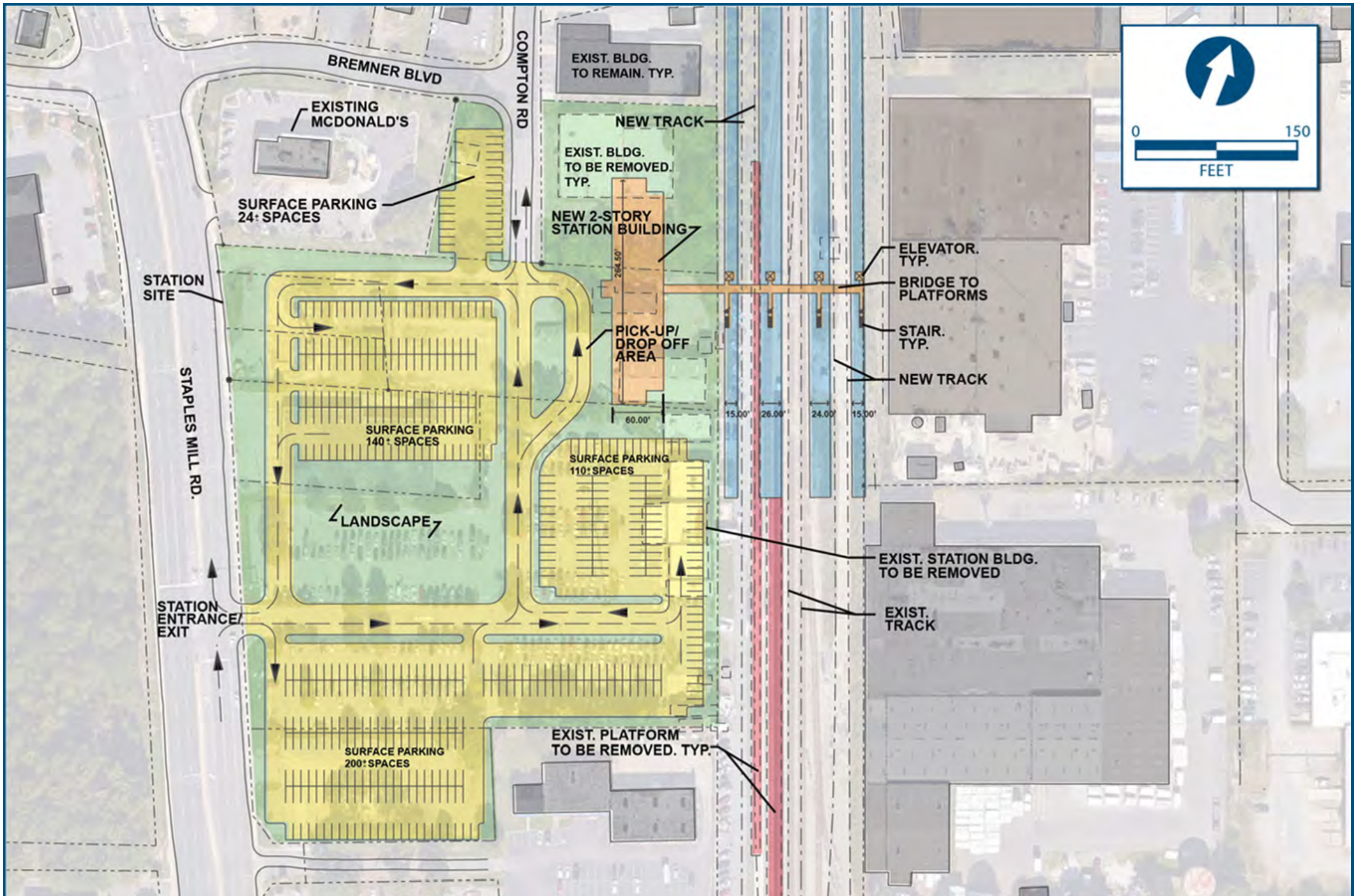


Figure 5.1-38: Staples Mill Road Station Improvements for Build Alternative 6G

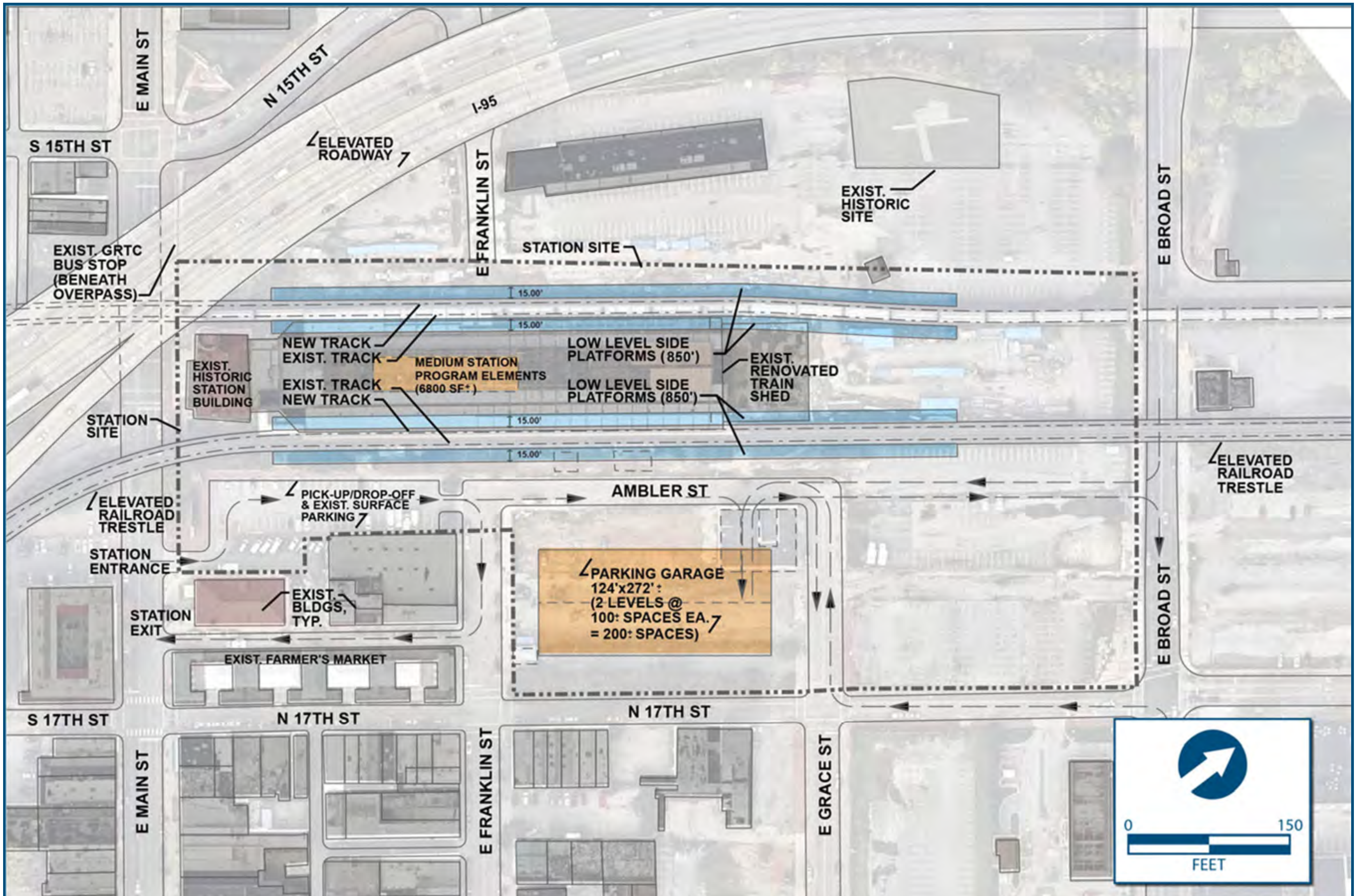


Figure 5.1-39: Main Street Station Improvements for Build Alternative 6G

5.2 TYPES OF SECTION 4(f) USE

Under Section 4(f) of the *U.S. DOT Act of 1966* (49 U.S.C. 303[c]), as amended by Section 6009 of the Safe, Accountable, Flexible, Efficient, Transportation Equity Act: a Legacy for Users (SAFETEA-LU), U.S. DOT may approve a transportation project requiring the use of a publicly owned park, recreation area, wildlife and waterfowl refuge, or a historic site only if: (1) there is no prudent and feasible alternative to using that land; and (2) the project includes all possible planning to minimize harm to the Section 4(f) resource resulting from the use, unless the criteria for *de minimis* Section 4(f) involvement can be met. Historic sites protected under Section 4(f) include publicly or privately owned properties listed or eligible for listing on the NRHP. For those historic sites, the Section 106 process helps inform the Section 4(f) process, but the two processes are distinct. Section 4.13 of the Draft EIS includes a description of the Section 106 process. Projects funded by U.S. DOT must comply with the requirements of Section 4(f). Section 4(f) has mandatory requirements for avoidance alternatives, minimization measures, and possible mitigation of any use of the above types of resources.

There are three different types of Section 4(f) use:

- Permanent Use
- Temporary Use
- Constructive Use

A Section 4(f) Permanent Use occurs if a property meeting the requirements of Section 4(f) is permanently acquired (as fee simple or as permanent easement) such that the use of that acquired Section 4(f) property is incorporated in the transportation facility changing its original use to "transportation use" and the acquisition does not meet the *de minimis* criteria.

Temporary Use occurs when the Section 4(f) property or a portion of the Section 4(f) property is impacted or used only during a portion of the construction of the project such that the Section 4(f) property is not permanently incorporated into the transportation facility or transportation use. For temporary use, the Section 4(f) property must be restored to its original condition (e.g. regrading or revegetating the area). For temporary use the following conditions must be met:

- The land use is of short duration (defined as less than the time needed for the construction of the project)
- There is no change in ownership of the land
- The scope of the work must be minor
- There are no temporary or permanent adverse changes to the activities, features, or attributes of the property
- The land must be fully restored to a condition at least as good as prior to the project
- There must be documented agreement from the official(s) with jurisdiction over the property with the above conditions

Constructive Use occurs when there is an indirect impact to the Section 4(f) property of such magnitude as to effectively act as a permanent incorporation. Here, the project does not physically incorporate the resource but is close enough to it to severely impact important features, activities, or attributes associated with it and to substantially impair it. Examples of impacts that may be considered constructive use include noise, vibration, air quality, and visual impacts. "Constructive use" is rare; however, if it is determined that there is a "constructive use", the requirements are the same as a regular Section 4(f) use.

A *de minimis* impact involves the use of a Section 4(f) property that is generally minor in nature. For a *de minimis* use of a non-historic site:

- The transportation use of the Section 4(f) resource, together with any impact avoidance, minimization, and mitigation or enhancement measures incorporated into the project, does not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f);
- The public has been afforded an opportunity to review and comment on the effects of the project on the protected activities, features, and attributes of the Section 4(f) resource; and
- The official(s) with jurisdiction over the property is informed of U.S. DOT's intent to make the *de minimis* impact finding based on their written concurrence that the project will not adversely affect the activities, features, and attributes that qualify the property for protection under Section 4(f).

A determination of *de minimis* impact on a historic site may be made when all three of the following criteria are satisfied:

- The process required by Section 106 of the National Historic Preservation Act (NHPA) results in the determination of "no adverse effect" or "no historic properties affected" with the concurrence of the State Historic Preservation Officer (SHPO) and/or Tribal Historic Preservation Officer (THPO), and Advisory Council on Historic Preservation (ACHP), if the ACHP is participating in the Section 106 consultation;
- The SHPO and/or THPO, and ACHP, if the ACHP is participating in the Section 106 consultation, is informed of U.S. DOT's intent to make a *de minimis* impact determination based on their written concurrence in the Section 106 determination; and
- U.S. DOT has considered the views of any consulting parties participating in the Section 106 consultation.

Additional details on historic properties and the Section 106 evaluation process can be found in Section 4.13.

5.3 DESCRIPTION OF THE 4(f) RESOURCES

Chapter 3 of this Draft EIS discusses the screening process that was completed to identify Section 4(f) resources that would potentially be affected by Project alternatives. The following sections describe these resources.

5.3.1 Parks and Recreation Areas

The parks discussed in this section are located within the temporary and/or permanent rights-of-way of the proposed Build Alternatives. Potential impacts to these park properties are described in Section 5.4.

- **Long Bridge Park**—Long Bridge Park is a 29-acre local park constructed in 2011 that is owned and operated by Arlington County. The park is located between Long Bridge Drive and the western edge of the rail alignment and includes additional land east of the rail alignment adjacent to Roaches Run Waterfowl Sanctuary. This park includes multi-sport, lighted, athletic fields, as well as walkways, greenspace, and playgrounds. The park facilities are located west of the rail alignment.

- **Dog Run Park at Carlyle—**This 3-acre facility consists of a fenced dog exercise area and tennis courts. The park is owned by the City of Alexandria.
- **George Washington Memorial Parkway—**The Parkway encompasses 1,105 acres and is operated by the National Park Service (NPS). The facility is utilized for transportation and recreational driving, but it also includes several walking/biking trails. The Parkway runs parallel to the DC2RVA corridor throughout much of Arlington.
- **Veterans Memorial Park—**This 110-acre park includes a recreation center and several outdoor athletic fields, pavilions, a skate park, horseshoe pits, and walking trails.
- **Fredericksburg and Spotsylvania National Military Park—**This park is operated by NPS. The park is 8,374 acres in size and is comprised of several different sections. The park encompasses four major Civil War battlefields and also preserves four historic buildings associated with them. The Stonewall Jackson Shrine is contained within this park in the section located near Guinea, VA.
- **North Ashland Park—**This small 0.2-acre park is owned by the Town of Ashland and currently consists of open greenspace and a picnic shelter, but it is under development and is likely to expand in size. The park is part of a much larger 29-acre parcel owned by the Town that includes a sewage treatment facility and maintenance/storage areas.
- **Railside Park—**This 1.0-acre park is owned by the Town of Ashland and is located at the northern end of North Center Street. The park connects to Vaughan Road by a 1/3-mile-long path along the rail tracks. The site remains largely open space with one picnic table and some park benches for viewing passing trains.
- **Carter Park—**This park is around 13.5 acres and is located between South Center Street and Maple Street Extended. Most of the park is heavily wooded. Carter Park is the centerpiece of the Ashland park system. It contains a junior Olympic size swimming pool, one-half basketball court, a picnic shelter and picnic area, playground, and gravel walking trails through the wooded areas.
- **Ashland Trolley Line—**This park is approximately 0.5 mile in length and totals 6.7 acres. It is part of the historic Ashland-Richmond Trolley Line. The majority of the walkway and park is owned by Hanover County and is maintained as a natural surface trail. The northern portion of the park also includes Walder Lane and is owned by the Town of Ashland.
- **Maggie Walker Governor's School Fields—**The Maggie Walker Governor's School is located adjacent to the railroad tracks to the west on North Lombardy Street in Richmond. This resource includes approximately 4.9 acres of outdoor athletic fields. The parcel is owned by the Maggie L. Walker Governor's School Regional School Board.
- **Walker's Creek Retention Basin Park—**This 6.4-acre park is owned by the City of Richmond Public Works. The park provides access to the walk along the floodwall south of the James River.
- **Gates Mill Park—**This park is 11.4 acres and is located west of the railroad right-of-way. The park is owned by Chesterfield County and includes some trails for passive recreation.

- **Mount Vernon Trail**—The trail is an 18-mile-long trail that connects Theodore Roosevelt Island Park with George Washington's Estate at Mount Vernon. It is a very popular trail in the Washington, D.C. area with heavy use by bikers and pedestrians. Most of the trail is paved with some portions on boardwalk. This trail also connects with several other local and regional trails, including the Woodrow Wilson Bridge Trail, the Four Mile Run Trail, and the Custis Trail. The trail crosses the DC2RVA corridor near Long Bridge Park.

5.3.2 Wildlife Refuges

There is only one wildlife refuge potentially affected by the Build Alternatives.

- **Mattaponi State Wildlife Management Area**—This state wildlife management area is 2,652 acres in size and is owned and operated by the Virginia Department of Game and Inland Fisheries (VDGIF).

Roaches Run Waterfowl Sanctuary is located in close proximity to Build Alternatives 1A, 1B, and 1C, but there would be no permanent or temporary impacts to the Wildlife Sanctuary land.

5.3.3 Historic Properties

Chapter 3 of the Draft EIS describes the historic architecture resources within the Area of Potential Effect (APE) of the Project that were determined to be eligible for listing or are listed on the NRHP. DRPT determined that these resources meet one or more of the following NRHP eligibility criteria:

- Criterion A—Associated with events that have made a significant contribution to the broad patterns of our history
- Criterion B—Associated with the lives of persons significant in our past
- Criterion C—Embodies the distinctive characteristics of a type, period, or method of construction, or that represents the work of a master, or that possesses high artistic values, or that represents a significant and distinguishable entity whose components may lack individual distinction
- Criterion D—Has yielded or may be likely to yield information important in prehistory or history. Although resources considered eligible for the NRHP under Criterion D alone are evaluated for project effect, a resource must be eligible for one other criterion in addition to D (wherein preservation in place in warranted) to be considered a Section 4(f) resource.

The 158 historic properties (buildings, districts, objects, structures, and sites) that are included in this Section 4(f) analysis are listed in Table 5.3-1 (see Chapter 3 for additional details). The resources are listed in the order they appear in the DC2RVA corridor from north to south.

Table 5.3-1: Summary of Historic Properties in the Area of Potential Effect

Alternative Area	DHR ID	Name/Description	Date/Time Period	NRHP Eligibility
Area 1: Arlington	029-0218	Mount Vernon Memorial Highway (portion of George Washington Memorial Parkway)	Ca. 1929	Listed under Criteria A and C
Area 1: Arlington	000-0045	Washington National Airport (Reagan National Airport)	1941	Listed under Criteria A and C

▶ *Continued.*

Table 5.3-1: Summary of Historic Properties in the Area of Potential Effect

Alternative Area	DHR ID	Name/Description	Date/Time Period	NRHP Eligibility
Area 2: Northern Virginia	100-0160	George Washington Junior High School, 1005 Mt. Vernon Avenue	1935	Potentially Eligible under Criterion C
Area 2: Northern Virginia	100-0133	Parker-Gray Historic District/Uptown	Ca. 1810	Listed under Criteria A and C
Area 2: Northern Virginia	100-0137	Rosemont Historic District	Ca. 1900	Listed under Criteria A and C
Area 2: Northern Virginia	100-0124	Alexandria Depot 110 Callahan Drive	1905	Listed under Criteria A and C
Area 2: Northern Virginia	100-0128	George Washington National Masonic Memorial	Ca. 1922	Listed Criterion C and Criterion Consideration F
Area 2: Northern Virginia	TBD	RF&P Bridge over Holmes Run in Cameron Run Park	1946	Potentially Eligible under Criterion C
Area 2: Northern Virginia	100-0277	Phoenix Mill 3642 Wheeler Avenue	ca. 1776	Potentially Eligible under Criteria A and C
Area 2: Northern Virginia	029-0953	Old Colchester Road, Potomac Path, King's Highway	ca. 1664	Eligible under Criterion A
Area 2: Northern Virginia	029-5741	Hannah P. Clark House/Enyedi House, 10605 Furnace Road	ca. 1876	Potentially Eligible under Criterion B and Criteria Consideration B and G
Area 2: Northern Virginia	029-0043	Colchester Arms, Fairfax Arms, 10712 Old Colchester Road	ca. 1756	Listed under Criteria A and C
Area 2: Northern Virginia	TBD	RF&P Bridge over Occoquan River	1915	Potentially Eligible under Criterion C
Area 2: Northern Virginia	287-0010	Marine Corps Base Quantico (Current), Quantico Marine Corps Base Historic District (NRHP Listing)	post-1918	Listed NRHP and VLR under Criteria A and C
Area 2: Northern Virginia	287-5147	Town of Quantico (Historic/Current), Town of Quantico Historic District (Current)	post-1918	Eligible under Criterion A
Area 2: Northern Virginia	089-0019	Richland/Richlands, 945 Widewater Road	ca. 1790	Eligible for the NRHP under Criteria B and C
Area 3: Fredericksburg	089-0045	RF&P Bridge over Potomac Creek at Leland Road	1872	Potentially Eligible under Criteria A and B
Area 3: Fredericksburg	089-0080	RF&P Bridge over Naomi Road	1931	Potentially Eligible under Criterion C
Area 3: Fredericksburg	111-0147	Fredericksburg & Spotsylvania Co. Battlefields National Military Park & Cemetery, Lee Drive	1862	Listed under Criteria A and D
Area 3: Fredericksburg	089-0016/ 44ST0084	Ferry Farm	1738	Listed National Historic Landmark (NHL), NRHP, and Virginia Landmarks Registry (VLR) under Criteria A, B, and D
Area 3: Fredericksburg	089-0014	Sherwood Forest (Historic)	1810	Eligible under Criterion C
Area 3: Fredericksburg	111-0132-0025	Rappahannock River Railroad Bridge	1927	Potentially Eligible under Criterion C
Area 3: Fredericksburg	44SP0187	Stone Piers; Bridge or Building	19th Century	Potentially Eligible under Criteria C and D
Area 3: Fredericksburg	111-0132-0704	Fredericksburg Train Station 200 Lafayette Boulevard	1910	Potentially Eligible under Criteria A and C
Area 3: Fredericksburg	111-0132	Fredericksburg Historic District	Post 1727	Listed under Criterion C

► *Continued.*

Table 5.3-1: Summary of Historic Properties in the Area of Potential Effect

Alternative Area	DHR ID	Name/Description	Date/Time Period	NRHP Eligibility
Area 3: Fredericksburg	111-0132-0020	Purina Tower	1916	Potentially Eligible under Criteria A and C
Area 3: Fredericksburg	111-0132-0522	House 314–316 Frederick Street	1851	Potentially Eligible under Criteria A and C
Area 3: Fredericksburg	111-0009-0795	Pulliam's Service Station 411 Lafayette Boulevard	ca. 1935	Potentially Eligible under Criterion C
Area 3: Fredericksburg	111-0009	Fredericksburg Historic District Extension	post 1775	Potentially Eligible under Criteria A and C
Area 3: Fredericksburg	111-5295	Battle of Fredericksburg I	1862	Eligible/Potentially Eligible under Criterion A
Area 3: Fredericksburg	111-5296	Battle of Fredericksburg II	1863	Eligible/Potentially Eligible under Criterion A
Area 3: Fredericksburg	088-5181	Salem Church Battlefield (Banks Ford Battlefield)	1863	Eligible under Criterion A
Area 3: Fredericksburg	088-5364	Fredericksburg & Gordonsville Railroad Bed District (Virginia Central Railroad)	1853	Eligible under Criterion A
Area 3: Fredericksburg	111-0145	Fredericksburg Gun Manufactory	ca. 1775	Listed under Criteria A and D
Area 3: Fredericksburg	088-0254	Slaughter Pen Farm 11232 Tidewater Trail (Wayside Farm or Pierson Farm)	ca. 1898	Potentially Eligible under Criterion A
Area 3: Fredericksburg	44SP0468-extension	Earthwork/ Jackson's Earthwork	1861	Eligible/Potentially Eligible under Criteria A, C, and D
Area 3: Fredericksburg	088-0039	LaVue 3232 LaVue Lane (Prospect View)	ca. 1848	Listed under Criterion C
Area 4: Central Virginia	016-0092	Fairfield Plantation Office Jackson Shrine 12019 Stonewall Jackson Road	ca. 1820	Potentially Eligible under Criteria A, B, and C
Area 4: Central Virginia	016-0208	House 12096 Guinea Drive	ca. 1900	Potentially Eligible under Criterion C
Area 4: Central Virginia	016-5165	Excelsior Industry of Caroline County MPD	ca. 1896-ca. 1950	Potentially Eligible under Criteria A and C
Area 4: Central Virginia	016-5129	Woodford Historic District	ca. 1890-1969	Potentially Eligible under Criteria A and C
Area 4: Central Virginia	016-0223	Woodford Excelsior Company Office, Lake Farm Road	ca. 1896	Potentially Eligible under Criterion A
Area 4: Central Virginia	016-0222	Woodford Freight & Passenger Depot, Woodford Road	ca. 1900	Potentially Eligible under Criterion C
Area 4: Central Virginia	016-0224	Glenwood House 11102 Woodford Road	ca. 1925	Potentially Eligible under Criterion C
Area 4: Central Virginia	016-0220	Carolina Mansion 11146 Woodford Road	ca. 1900	Potentially Eligible under Criterion C
Area 4: Central Virginia	016-0270	Milford State Bank 15461 Antioch Road	ca. 1910	Potentially Eligible under Criterion C
Area 4: Central Virginia	016-5136	Milford Historic District	ca. 1880-1960	Potentially Eligible under Criteria A and C
Area 4: Central Virginia	016-0286	Coleman's Store 22275 Penola Road Penola 16095 Polecat Lane	ca. 1900	Potentially Eligible under Criterion C

▶ *Continued.*

Table 5.3-1: Summary of Historic Properties in the Area of Potential Effect

Alternative Area	DHR ID	Name/Description	Date/Time Period	NRHP Eligibility
Area 4: Central Virginia	042-0123	North Anna Battlefield	1864	Eligible under Criterion A
Area 4: Central Virginia	042-5448	Doswell Historic District	ca. 1840-1950	Potentially Eligible under Criteria A and C
Area 4: Central Virginia	042-0470	House 10570 Doswell Road	ca. 1898	Potentially Eligible under Criteria B and C
Area 4: Central Virginia	042-0469	Tri-County Bank, Doswell Branch (part of Squashapenny Antiques) 10561 Doswell Road	ca. 1920	Potentially Eligible under Criterion C
Area 4: Central Virginia	042-0093	Doswell Depot and Tower 10577 Doswell Road	ca. 1928	Potentially Eligible under Criterion C
Area 4: Central Virginia	042-5307	Taylorsville Road Historic District	ca. 1900-1935	Potentially Eligible under Criteria A and C
Area 4: Central Virginia	TBD	RF&P Bridge over Little River	1923	Potentially Eligible under Criterion C
Area 4: Central Virginia	042-0836	Earthworks, Little River	1862	Eligible under Criteria A and C
Area 5: Ashland	042-0557	Dry Bridge 10411 Old Bridge Road	ca. 1850	Potentially Eligible under Criteria A and C
Area 5: Ashland	042-0392	Montevideo	1790	Eligible under Criteria A and C
Area 5: Ashland	166-5073	Berkleytown Historic District	ca. 1900-1965	Potentially Eligible under Criteria A and C
Area 5: Ashland	166-5073-0010	House, Dabney Funeral Home 600 B Street	1955	Potentially Eligible under Criteria A and C
Area 5: Ashland	166-0001	Ashland Historic District	1850-1950	Listed under Criteria A and C
Area 5: Ashland	166-0001-0015	Business Office, Randolph-Macon, 310 N. Center Street	ca. 1895	Potentially Eligible under Criterion C
Area 5: Ashland	166-5072	Randolph-Macon College Historic District Expansion	ca. 1900-1960	Potentially Eligible under Criteria A and C
Area 5: Ashland	166-0002	Randolph-Macon College Historic District	1872-1950	Listed VLR and NRHP under Criteria A and C
Area 5: Ashland	166-0001-0008	Ashland Station Depot 112 N. Railroad Avenue	1910	Potentially Eligible under Criteria A and C
Area 5: Ashland	166-5041	Priddy House 107 Stebbins Street	ca. 1926	Potentially Eligible under Criterion C
Area 5: Ashland	166-0001-0055	House 704 S. Center Street	ca. 1850	Potentially Eligible under Criterion C
Area 5: Ashland	166-0001-0060	House 708 S. Center Street	ca. 1894	Potentially Eligible under Criterion C
Area 5: Ashland	166-0036	MacMurdo House 713 S. Center Street	ca. 1858	Potentially Eligible under Criterion C
Area 5: Ashland	166-0037	Hugo House, 11208 Gwathmey Church Road	ca. 1886	Potentially Eligible under Criterion C
Area 5: Ashland	166-0001-0077	House 1005 S. Center Street	ca. 1890	Potentially Eligible under Criterion C
Area 5: Ashland	042-5048	Elmont Historic District	ca. 1870-1950	Potentially Eligible under Criterion C
Area 5: Ashland	043-0693	Mill Road Historic District	ca. 1870-1950	Potentially Eligible under Criterion C

▶ *Continued.*

Table 5.3-1: Summary of Historic Properties in the Area of Potential Effect

Alternative Area	DHR ID	Name/Description	Date/Time Period	NRHP Eligibility
Area 5: Ashland	043-0694	Hunton Treasures 11701 Greenwood Road	ca. 1930	Potentially Eligible under Criterion C
Area 5: Ashland	043-5646	House 11501 Old Washington Highway	ca. 1937	Potentially Eligible under Criterion C
Area 6: Richmond	043-5108	Yellow Tavern Battlefield	1864	Eligible/Potentially Eligible under Criterion A
Area 6: Richmond	043-5657	Darling Smokestack Old Washington Highway	ca. 1910	Potentially Eligible under Criterion C
Area 6: Richmond	043-0690	Lewis-McLeod House 2945 Mountain Road	ca. 1921	Potentially Eligible under Criterion C
Area 6: Richmond	043-0292	Laurel Industrial School Historic District, Hungary Road	1892	Listed under Criteria A and C
Area 6: Richmond	043-0292-0001	Main Building/Robert Stiles Building/ Bluford Office Building, 2900 Hungary Road	1895	Potentially Eligible under Criteria A and C
Area 6: Richmond	043-5636	Integrated Power Sources of Virginia 2260 Dabney Road	ca. 1940	Potentially Eligible under Criterion A
Area 6: Richmond	127-6136	Scott's Addition Historic District	Post-1900	Listed under Criteria A and C
Area 6: Richmond	127-6569	Central National Bank 3501 W. Broad Street	1956	Potentially Eligible under Criterion C
Area 6: Richmond	127-6514	Kent Road Village 905 Kent Road	1942	Listed on the NRHP and VLR under Criterion C
Area 6: Richmond	127-0742	West of Boulevard Historic District	ca. 1895	Listed under Criteria A and C
Area 6: Richmond	127-6756	Carillon Neighborhood Historic District	1859	Potentially Eligible under Criteria A and C
Area 6: Richmond	127-0171	James River and Kanawha Canal Historic District	1795	Listed NRHP and VLR under Criteria A and C
Area 6: Richmond	127-6792	Southern Railway	ca. 1850	Potentially Eligible under Criterion A
Area 6: Richmond	127-6629	Cedarhurst Neighborhood Historic District	post-1941	Eligible under Criteria A and C
Area 6: Richmond	Temp 402	House 351 W. 49th Street	ca. 1958	Not accessible; Further Survey Required
Area 6: Richmond	127-6757	Woodstock Historic District	ca. 1950-1960	Potentially Eligible under Criterion C
Area 6: Richmond	Temp R	Rolando Historic District	ca. 1946-1950	Potentially Eligible under Criterion C
Area 6: Richmond	Temp 268	Broad Run House 2011 S. Kinsley Avenue	ca. 1770	Potentially Eligible under Criterion C
Area 6: Richmond	020-5351	Richmond & Petersburg Electric Railway	1902	Eligible under Criterion A
Area 6: Richmond	020-5336	The Bellwood-Richmond Quartermaster Depot Historic District, United States Department of Defense Supply Center Historic District	post-1942	Eligible under Criteria A, B, C, and D
Area 6: Richmond	44CF0680	Fort Darling/Battlefield, Earthworks, Fort	1861-1865	Eligible under Criteria A, C, and D
Area 6: Richmond	020-5320	Proctor's Creek Battlefield	1864	Eligible/Potentially Eligible under Criterion A

► *Continued.*

Table 5.3-1: Summary of Historic Properties in the Area of Potential Effect

Alternative Area	DHR ID	Name/Description	Date/Time Period	NRHP Eligibility
Area 6: Richmond	127-6188	Movieland Bowtie Cinema 1331 North Boulevard	1887	Listed under Criteria A and C
Area 6: Richmond	127-6840	Warehouse 2728 Hermitage Road	ca. 1955	Indeterminate; Could not Access; Phase II Needed
Area 6: Richmond	127-6730	Hermitage Road Warehouse Historic District	1930-1958	Listed under Criteria A and C
Area 6: Richmond	127-6165	Cookie Factory Lofts 900 Terminal Place	1927	Listed under Criteria A and C
Area 6: Richmond	127-0226	Science Museum of Virginia 2500 Broad Street, West	1919	Listed under Criteria A and C
Area 6: Richmond	127-5978	Todd Lofts 1128 Hermitage Road	1892	Listed under Criterion A
Area 6: Richmond	127-6145	Southern Stove Works 1215 Hermitage Road	1905	Listed under Criteria A and C
Area 6: Richmond	127-6570	West Broad Street Industrial and Commercial Historic District	1890-1960	Listed under Criteria A and C
Area 6: Richmond	127-0414	Governor's School 1000 North Lombardy Street	1938	Listed under Criteria A and C
Area 6: Richmond	127-0354	Virginia Union University Historic District 1500 North Lombardy Street	1899	Listed under Criteria A and C
Area 6: Richmond	127-0428	George W. Carver Elementary School 1110 West Leigh Street	1887	Eligible under Criterion C
Area 6: Richmond	127-0822	Carver Residential Historic District	Pre-1958	Listed under Criterion C
Area 6: Richmond	127-6171	Richmond and Chesapeake Bay Railway Barn), Richmond-Ashland Railway Company Car Barn	1907	Listed NRHP and VLR under Criteria A and C
Area 6: Richmond	127-5679	Barton Heights Cemetery 1600 Lamb Avenue	1814	Listed under Criteria A and B and Criterion Consideration D
Area 6: Richmond	127-0353	Richmond Nursing Home 210 Hospital Street	1860	Listed under Criterion C
Area 6: Richmond	127-6166	Hebrew Cemetery 320 Hospital Street	1816	Listed under Criteria A and C
Area 6: Richmond	127-0343	Chestnut Hill/ Plateau Historic District	1889-1950	Listed under Criteria A and C
Area 6: Richmond	127-0344	Shockoe Valley & Tobacco Row Historic District	post 1737	Listed NRHP and VLR under Criteria A and C
Area 6: Richmond	44HE1098	Main Street Station Parking Lot/Railroad	19th Century	Potentially Eligible under Criteria A and D; under Parking Lot
Area 6: Richmond	127-6129	Winfree Cottage East Main Street	ca. 1866	Potentially Eligible under Criteria A and C
Area 6: Richmond	44HE1097	Railroad, Warehouse	19th Century	Potentially Eligible under Criteria A and D; under Parking Lot
Area 6: Richmond	127-0172	Main Street Station and Trainshed, New Union Station, Seaboard Airline & Chesapeake & Ohio Railroad Depot	1901	Listed NHL, NRHP, and VLR under Criteria A and C
Area 6: Richmond	127-0344-0123	Railroad Y.M.C.A. 1552 East Main Street	1907	Potentially Eligible under Criteria A and C

▶ *Continued.*

Table 5.3-1: Summary of Historic Properties in the Area of Potential Effect

Alternative Area	DHR ID	Name/Description	Date/Time Period	NRHP Eligibility
Area 6: Richmond	127-0219	Shockoe Slip Historic District and Expansions	1780	Listed NRHP and VLR under Criteria A and C
Area 6: Richmond	44HE1092	Warehouse	19th Century	Potentially Eligible under Criteria A and D; under Parking Lot
Area 6: Richmond	44HE1094	Warehouse	19th Century	Potentially Eligible under Criteria A and D; under Parking Lot
Area 6: Richmond	127-6793	C&O Railroad	Pre-1851	Potentially Eligible under Criterion A
Area 6: Richmond	127-5809	Bridge #1857, North 14th Street; Mayo Bridge North	1911	Potentially Eligible under Criteria A and C
Area 6: Richmond	127-5808	Bridge #1857, South 14th Street; Mayo Bridge South	1911	Potentially Eligible under Criteria A and C
Area 6: Richmond	127-0197	Philip Morris Leaf Storage Warehouse 1717-1721 East Cary Street	1914	Potentially Eligible under Criterion C
Area 6: Richmond	44HE1095	Storage Facility	19th Century	Potentially Eligible under Criteria A and D; under Parking Lot
Area 6: Richmond	127-0282	Henrico County Courthouse 2127 Main Street East	1896	Potentially Eligible under Criteria A and C
Area 6: Richmond	127-0192	St. John's Church Historic District	18th Century to 1940	Listed under Criterion C
Area 6: Richmond	127-0192-0322	Libby Hill Park and Park House 2801 East Franklin Street	ca. 1873	Potentially Eligible under Criteria A and C
Area 6: Richmond	127-0854	Bridge #1850, E. Main Street spanning Southern Railway	ca. 1913	Eligible under Criteria A and C
Area 6: Richmond	127-0119	John Woodward House 3017 Williamsburg Avenue	pre-1782	Listed on the NRHP and VLR under Criteria A and C
Area 6: Richmond	127-6693	Armitage Manufacturing Company 3200 Williamsburg Avenue	1900	Listed on the NRHP and VLR under Criteria A and C
Area 6: Richmond	127-6255	Fulton Gas Works Williamsburg Avenue	ca. 1925	Eligible under Criterion A
Area 6: Richmond	127-0257	Bridge #8067	1938	Potentially Eligible under Criterion C
Area 6: Richmond	043-5313	James River Steam Brewery Cellars 4920 Old Main Street	1866	Listed on the NRHP and VLR under Criteria A and C
Area 6: Richmond	043-0439	Aviation General Supply Depot 508 Bickerstaff Road	1917	Eligible under Criterion A
Area 6: Richmond	043-0307	Battle of Chaffin's Farm (New Market Heights Battlefield) New Market Road	1862	Eligible/Potentially Eligible under Criterion A
Area 6: Richmond	043-5071	Darbytown & New Market Roads Battlefield, Route 5	1864	Eligible/Potentially Eligible under Criterion A
Area 6: Richmond	127-0457	Manchester Warehouse Historic District	1880-1960	Listed under Criteria A and C
Area 6: Richmond	127-6193	J.P. Taylor Leaf Tobacco Southern Stove Works 516 Dinwiddie Avenue	1920	Listed under Criteria A and C

► *Continued.*

Table 5.3-1: Summary of Historic Properties in the Area of Potential Effect

Alternative Area	DHR ID	Name/Description	Date/Time Period	NRHP Eligibility
Area 6: Richmond	127-6245/ 44CF0724	Williams Bridge Company, Emergency Fleet Corporation Factory 700 East 4th Street	1919	Eligible under Criteria A, C, and D
Area 6: Richmond	127-6248	Pure Oil Company, 1314 Commerce Street Transmontaigne	1936	Eligible under Criteria A and C
Area 6: Richmond	127-6213	Davee Gardens Historic District	1947	Eligible under Criteria A and C
Area 6: Richmond	020-5474	DuPont Spruance	1929	Eligible under Criteria A and C
Area 6: Richmond	020-0063	Falling Creek Ironworks Archaeological Site	1619	Listed NRHP and VLR under Criterion D
Area 6: Richmond	020-0147	Drewry's Bluff Battlefield (Fort Darling, Fort Drewry) Fort Darling Road	1862	Eligible/Potentially Eligible under Criterion A
Area 6: Richmond	123-5025	Assault on Petersburg (Petersburg Battlefield II) Bermuda Hundred Road (Alt Route 697)	1865	Eligible/Potentially Eligible under Criterion A
Area 6: Richmond	020-0007	Bellwood, Sheffields, Auburn Chase Building 42, Defense Supply Center Richmond 8000 Jefferson Davis Highway	1804	Listed NRHP and VLR under Criteria A, C, and D
Area 6: Richmond	020-0013	House 3619 Thurston Road	1913	Eligible under Criterion C
Area 6: Richmond	020-0022/ 44CF0680	Centralia Earthworks	1861	Eligible under Criteria A and C
Area 6: Richmond	020-5378	VEPCo Power Transmission Line	ca. 1910	Eligible under Criteria A and C
Area 6: Richmond	020-0140	Circle Oaks 4510 Centralia Road	1840	Eligible under Criterion C
Area 6: Richmond	020-0552	Centralia Post Office	1905	Eligible under Criterion A
Area 6: Richmond	127-6251	Atlantic Coast Line Railroad (ACL) Corridor Richmond and Petersburg Railroad	post 1833	Eligible under Criterion A
Area 6: Richmond	127-6271	Seaboard Air Line Railroad (SAL) Corridor	1900	Eligible under Criterion A
All	076-0301	RF&P Railroad	1836	Eligible under Criterion A

5.4 SECTION 4(f) PROPERTY IMPACTS

5.4.1 Parks and Recreation Areas

This section describes the potential impacts by alternative to parks and recreational areas protected under Section 4(f). Table 5.4-1 provides a summary of the temporary and permanent use of lands associated with these Section 4(f) resources. Figure 5.4-1 depicts the areas of permanent use. Based on the criteria discussed in Section 5.2, FRA anticipates all permanent impacts to parks and recreation areas will be *de minimis* and all temporary impacts to parks and recreation areas will not result in a Section 4(f) use. DRPT sent initial coordination letters regarding Section 4(f) impacts to resource owners in June 2017 (Appendix U). FRA and DRPT will continue this coordination after publication of the Draft EIS and will discuss potential impacts with all affected resource owners prior to issuance of the Final EIS.

- **Long Bridge Park—**Build Alternatives 1A, 1B, and 1C would have temporary impacts to this facility. Build Alternatives 1B and 1C would also have permanent impacts.

  Build Alternative 1A would expand the railroad infrastructure on the east side of the right-of-way approaching Long Bridge from the south, which would have 0.51 acre of temporary impacts during construction associated with access, erosion control, and material placement to this 29-acre park; this is less than two percent of the parkland at this facility. The temporary impacts would affect a narrow strip of land less than 10 feet in width along the east side of the railroad; however, this area is segregated from the active parkland by a retaining wall and fence on the west side of the active railroad corridor and is inaccessible for public use. The Long Bridge Park activities such as trails and sport fields are located along the west side of the railroad. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, and the activities of the park would not be affected during the timeframe of the temporary impacts.

  Build Alternative 1B would expand the railroad infrastructure on the west side of the right-of-way approaching Long Bridge from the south, which would require 1.45 acres of permanent right-of-way and 0.88 acre of temporary impacts for a combined permanent and temporary impact of eight percent of the 29-acre facility. The permanent impacts would affect a long narrow width of additional right-of-way of generally less than 50 feet expanding to around 100 feet in one area on the west side of the existing railroad. Temporary impacts, from area needed for construction access, erosion control, and material placement, extend approximately another 15 feet in width. The permanent impacts avoid the park activity areas such as walking trails and sport fields. The areas impacted consist of landscaping or natural vegetation. Impacted landscaped elements will be replaced in nearby locations in the remaining parkland. Temporary impacts may affect the area adjacent to the soccer field but will not affect the field itself, and disruptions to the activity will be avoided. FRA believes the permanent impacts to be minor in nature and will recommend that the use is *de minimis*. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, and the activities of the park would not be affected during the timeframe of the temporary impacts.

  Build Alternative 1C would expand the railroad infrastructure on both the east and west sides of the right-of-way approaching Long Bridge from the south, which would require 0.36 acre of additional permanent right-of-way and 0.65 acre of temporary impacts totaling three percent of the 29-acre facility. These impacts would affect a narrow strip of land along the west side of the existing railroad, generally less than 25 feet in width (approximately 15-foot width of permanent impacts and 10-foot width of temporary impacts). The areas impacted consist of landscaping and natural vegetation. Temporary impacts are associated with access, erosion control, and material placement for construction. Trails and sport fields are not impacted. Impacted landscaped elements will be replaced in nearby locations in the remaining parkland. FRA believes the impacts to be minor in nature and will recommend that the use is *de minimis*. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, and the activities of the park would not be affected during the timeframe of the temporary impacts.

- **Mount Vernon Trail**—Build Alternative 2A would have temporary impacts to 20 feet of this trail facility for access and erosion control during construction. Trail connectivity would be maintained during construction. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, trail connectivity would be maintained, and the land would be restored to its prior condition. The activities of the park would not be affected during the timeframe of the temporary impacts.
- **Dog Run Park at Carlyle**—Build Alternative 2A would require 0.04 acre of permanent right-of-way from this park facility and 0.14 acre of temporary impacts totaling six percent of this 3-acre dog park. The permanent impacts are primarily located at the west side of the park in an area of natural vegetation that is not utilized for park activities. There is also a very narrow strip of permanent impacts along the length of the park, approximately 3 feet in width. Temporary impacts, from area needed for access, erosion control, and material placement during construction, are located in an area of natural vegetation comprising a narrow strip and extending an additional 10 feet from the additional permanent right-of-way. The adjacent dog run area and tennis courts would not be impacted. FRA believes the impacts to be minor in nature and will recommend that the use is *de minimis*. The transportation use of this additional right-of-way does not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f). FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition. The activities of the park would not be affected during the timeframe of the temporary impacts.
- **George Washington Memorial Parkway**—Build Alternative 2A would have temporary impacts to this facility. These impacts consist of an approximately 10-foot-wide strip of vacant forested land on the east side of the existing railroad totaling 1.04 acres or less than 0.1 percent of the 1,105-acre facility. Temporary impacts would be from area needed for access, erosion control, and material placement during construction. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, and the activities of the park would not be affected during the timeframe of the temporary impacts.
- **Veterans Memorial Park**—Build Alternative 2A would have temporary impacts of 0.05 acre of this 110-acre facility or 0.5 percent of the total parkland acreage. The impacted area is a narrow strip of land, less than 5 feet in width. Temporary impacts would be needed from area needed for access, erosion control, and material placement during construction. The area consists of natural vegetation. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, and the activities of the park would not be affected during the timeframe of the temporary impacts.
- **Fredericksburg and Spotsylvania National Military Park**—Build Alternatives 3A, 3B, and 4A would have temporary impacts to this facility. Build Alternatives 3A and 3B, which follow the existing CSXT right-of-way through Fredericksburg, share a common alignment in this area and would have temporary impacts of 0.02 acre, less than 0.001 percent of the 8,374-acre National Military Park. The temporarily impacted area is a small rectangular-shaped piec of land that is vacant. Temporary impacts would be from area needed for access, erosion control, and material placement during construction. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion

of construction, the land would be restored to its prior condition and the activities of the park would not be affected during the timeframe of the temporary impacts.

Build Alternative 4A, which follows the existing CSXT right-of-way south of Fredericksburg, would have temporary impacts of 1.09 acres, or 0.01 percent of the National Military Park. The temporary impacts consist of an approximately 20-foot-wide strip that consists of forest and agricultural lands. Temporary impacts would be from area needed for access, erosion control, and material placement during construction. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, and the activities of the park would not be affected during the timeframe of the temporary impacts.

- **North Ashland Park—**Build Alternative 5D–Ashcake, which adds a third track through and constructs a new station south of Ashland, would have temporary impacts to this facility. The temporary impacts would be 0.02 acre in size or 10 percent of the 0.2-acre park. The temporary impacts would be to an open grassed area that is approximately 10 feet wide along the existing right-of-way. Temporary impacts would be from area needed for access and erosion control during construction. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, and the activities of the park would not be affected during the timeframe of the temporary impacts.
- **Railside Park—**Build Alternative 5D–Ashcake, which adds a third track through and constructs a new station south of Ashland, would have temporary impacts to this facility. The temporary impacts would be 0.01 acre in size or one percent of the 1.-acre park. The temporary impacts would be to an approximately 6-foot-wide strip of vacant land along the existing right-of-way. Temporary impacts would be from area needed for access and erosion control during construction. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, and the activities of the park would not be affected during the timeframe of the temporary impacts.
- **Carter Park—**Build Alternatives 5B and 5B–Ashcake, which add a third track through Ashland (Build Alternative 5B–Ashcake also constructs a new station south of Ashland), share a common alignment in this area and would require 0.03 acre of permanent right-of-way, 0.2 percent of this 13.5-acre park facility. This impact consists of a very narrow strip of forested land, less than 5 feet in width, on the east side of the existing right-of-way. Park activities would not be affected. FRA believes the impacts to be minor in nature and will recommend that the use is *de minimis*. The transportation use of this additional right-of-way does not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f).
- **Ashland Trolley Line—**Build Alternatives 5A–Ashcake, 5B–Ashcake, 5C–Ashcake, and 5D–Ashcake, each of which constructs a new station south of Ashland, share a common alignment at this location and would require 0.01 acre of permanent right-of-way, 0.1 percent of this 6.7-acre park facility. The additional right-of-way is required for access purposes to connect to Walder Lane which is located within the park boundaries in the area owned by the Town of Ashland. FRA believes the impacts to be minor in nature and will recommend that the use is *de minimis*. The permanent impacts consist of a small area of additional right-of-way. The transportation use of this additional right-of-way does not

adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f).

- **Maggie Walker Governor's School Fields**—Build Alternatives 6B–S-Line, 6D, 6F, and 6G, which expand intercity passenger rail service on the S-Line through and south of downtown Richmond, share a common alignment in this area and would have temporary impacts of 0.01 acre, 0.2 percent of this 4.9-acre facility. The area temporarily impacted consists of small slivers of land less than 5 feet in width. These areas are not actively used by the school and consist of natural vegetation. Temporary impacts would be from area needed for access and erosion control during construction. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, and the activities of the park would not be affected during the timeframe of the temporary impacts.
- **Walker's Creek Retention Basin Park**—Build Alternatives 6B–S-Line, 6D, 6F, and 6G, which expand intercity passenger rail service on the S-Line through and south of downtown Richmond, share a common alignment in this area and would require permanent right-of-way from and temporary impacts to this park facility. Permanent impacts would be 0.17 acre, and temporary impacts would be 0.23 acre for a total affected percentage of six percent of the 6.4-acre park. The affected area is a vacant grassed area with a multi-use trail that currently crosses under the existing tracks. Trail connectivity would be maintained during and after construction. The impacted width ranges up to 70 feet for temporary and permanent impacts combined. FRA believes the impacts to be minor in nature and will recommend that the use is *de minimis*. The transportation use of this additional right-of-way does not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f). Temporary impacts would be from area needed for access, erosion control, and material placement during construction. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, trail connectivity would be maintained, and the other activities of the park would not be affected during the timeframe of the temporary impacts.
- **Gates Mill Park**—Build Alternatives 6A, 6B–A-Line, 6C, and 6E, which expand intercity passenger rail service on the A-Line through and south of Richmond (none of which are identified as the recommended Preferred Alternative as described in Chapter 7 of this Draft EIS), share a common alignment in this area and would require permanent right-of-way from and temporary impacts to this park facility. Permanent impacts would be 0.19 acre, and temporary impacts would be 0.22 acre for a total affected percentage of four percent of the 11-acre park. The affected area includes parking for an adjacent business and vacant forested land. The land is not actively used for park activities. FRA believes the impacts to be minor in nature and will recommend that the use is *de minimis*. The transportation use of this additional right-of-way does not adversely affect the activities, features, and attributes that qualify the resource for protection under Section 4(f). Temporary impacts would be from area needed for access, erosion control, and material placement during construction. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, and there would be no changes to areas of park activity.

5.4.2 Wildlife Refuges

There are no permanent impacts to wildlife refuges (see Table 5.4-2). Build Alternative 4A would have temporary impacts of 2.54 acres or 0.1 percent of the 2,652-acre Mattaponi Wildlife Management Area. The impacted area consists of forest in a narrow strip of land, approximately 15 feet wide on the west side of the existing right-of-way. Temporary impacts would be from area needed for access, erosion control, and material placement during construction. FRA does not anticipate the temporary impacts will result in a Section 4(f) use because upon completion of construction, the land would be restored to its prior condition, and the other activities of the park would not be affected during the timeframe of the temporary impacts. Roaches Run Waterfowl Sanctuary is located near the DC2RVA corridor but will not have temporary or permanent impacts associated with any of the Build Alternatives.

Mattaponi Wildlife Management Area

Table 5.4-1: Permanent and Temporary Impacts to Park Resources by Build Alternative (Acres)

Resource	Build Alternative																						
	1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
Long Bridge Park	0.00 (0.51)	1.45 (0.88)	0.36 (0.65)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Mount Vernon Trail	–	–	–	0 ft (20 ft)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Dog Run Park at Carlyle	–	–	–	0.04 (0.14)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
George Washington Memorial Parkway	–	–	–	0.00 (1.04)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Veterans Memorial Park	–	–	–	0.00 (0.05)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Fredericksburg and Spotsylvania National Military Park	–	–	–	–	0.00 (0.02)	0.00 (0.02)	–	0.00 (1.09)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
North Ashland Park	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.00 (0.02)	–	–	–	–	–	–	–	–
Railside Park	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.00 (0.01)	–	–	–	–	–	–	–	–
Carter Park	–	–	–	–	–	–	–	–	–	–	0.03 (0.00)	0.03 (0.00)	–	–	–	–	–	–	–	–	–	–	–
Ashland Trolley Line	–	–	–	–	–	–	–	–	–	0.01 (0.00)	–	0.01 (0.00)	–	0.01 (0.00)	0.01 (0.00)	–	–	–	–	–	–	–	–

▶ *Continued*; Key: Permanent Impacts / (Temporary Impacts); Recommended Preferred Alternative (see Chapter 7)

Table 5.4-1: Permanent and Temporary Impacts to Park Resources by Build Alternative (Acres)

Resource	Build Alternative																					
	1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
Maggie Walker Governor's School Fields	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.00 (0.01)	–	0.00 (0.01)	–	0.00 (0.01)	0.00 (0.01)
Walker's Creek Retention Basin Park	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.17 (0.23)	–	0.17 (0.23)	–	0.17 (0.23)	0.17 (0.23)
Gates Mill Park	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.19 (0.22)	0.19 (0.22)	–	0.19 (0.22)	–	0.19 (0.22)	–	–

Key: Permanent Impacts / (Temporary Impacts); Recommended Preferred Alternative (see Chapter 7)

Table 5.4-2: Permanent and Temporary Impacts to Wildlife Refuges by Build Alternative (Acres)

Resource	Build Alternative																					
	1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
Mattaponi Wildlife Management Area	–	–	–	–	–	–	–	0.00 (2.54)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Key: Permanent Impacts / (Temporary Impacts); Recommended Preferred Alternative (see Chapter 7)

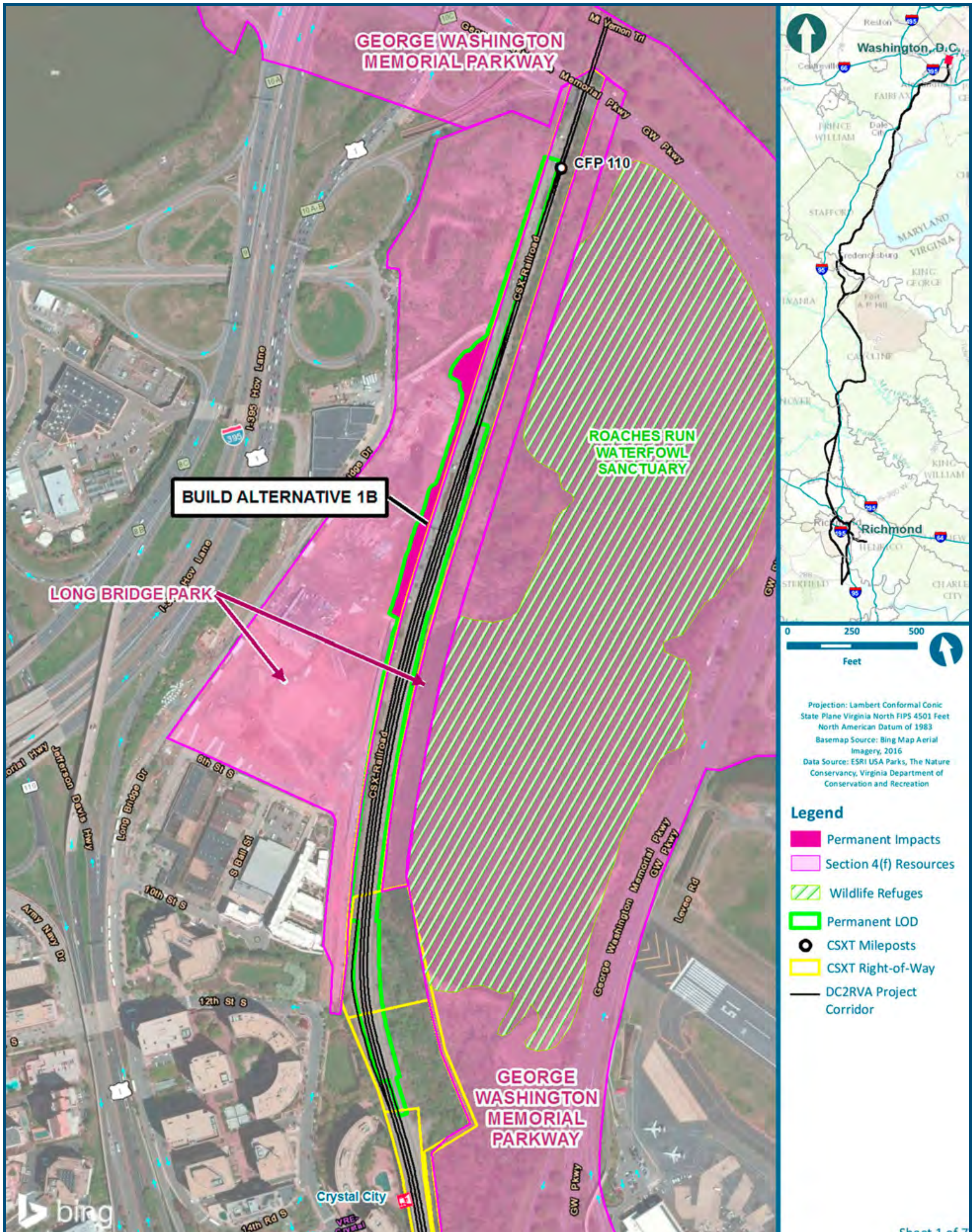


Figure 5.4-1: Permanent Park Impacts – Build Alternative 1B

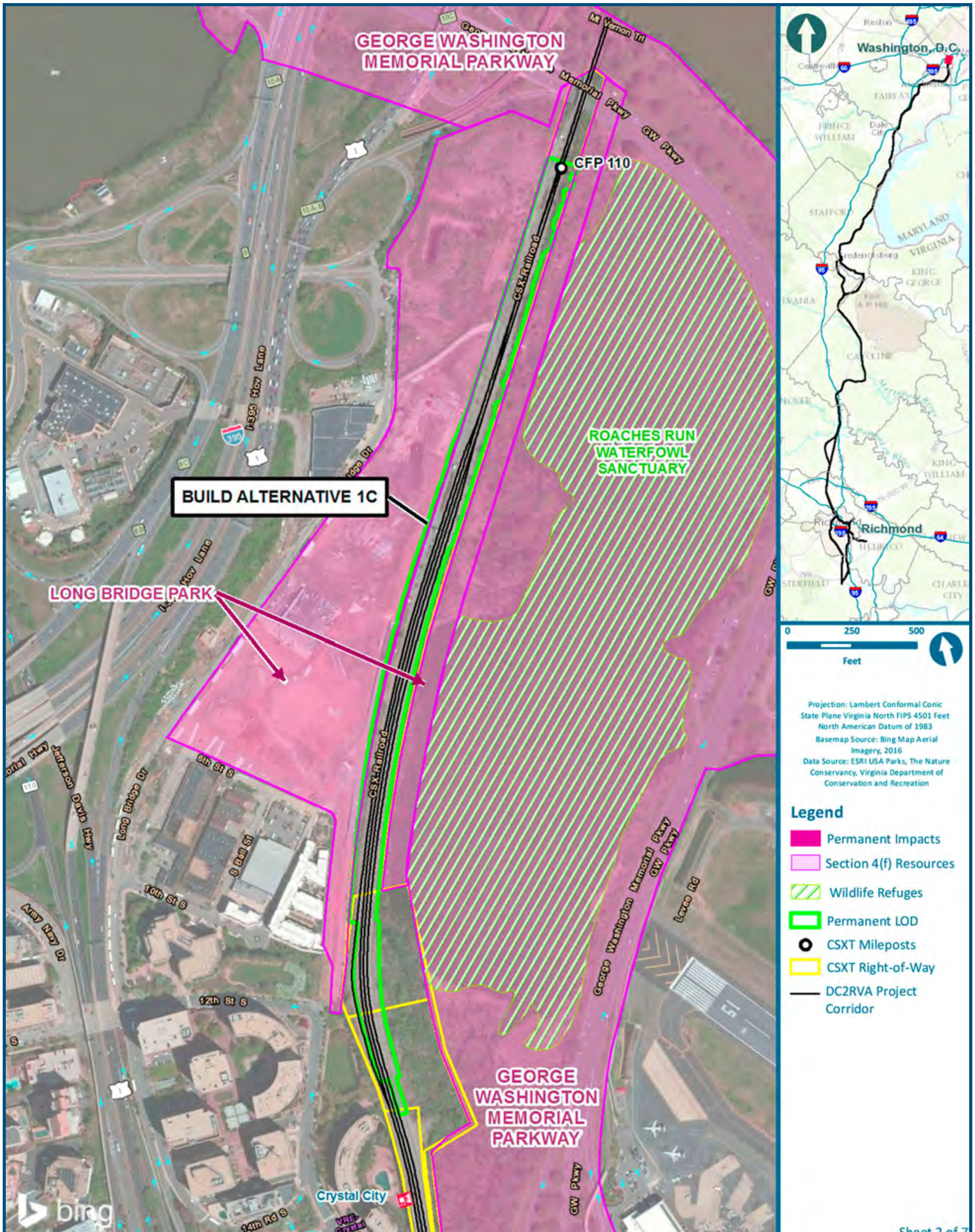


Figure 5.4-1: Permanent Park Impacts – Build Alternative 1C

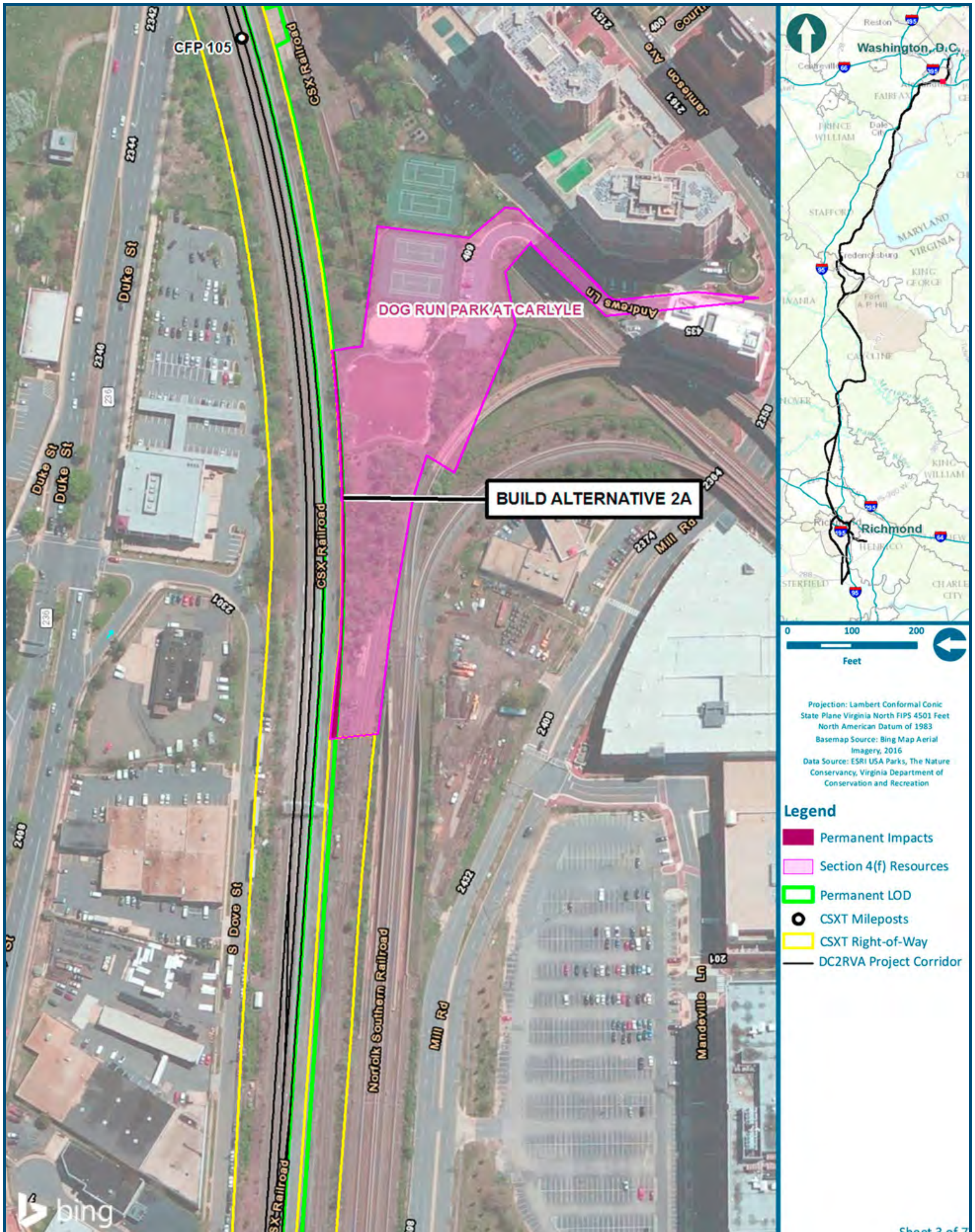


Figure 5.4-1: Permanent Park Impacts – Build Alternative 2A

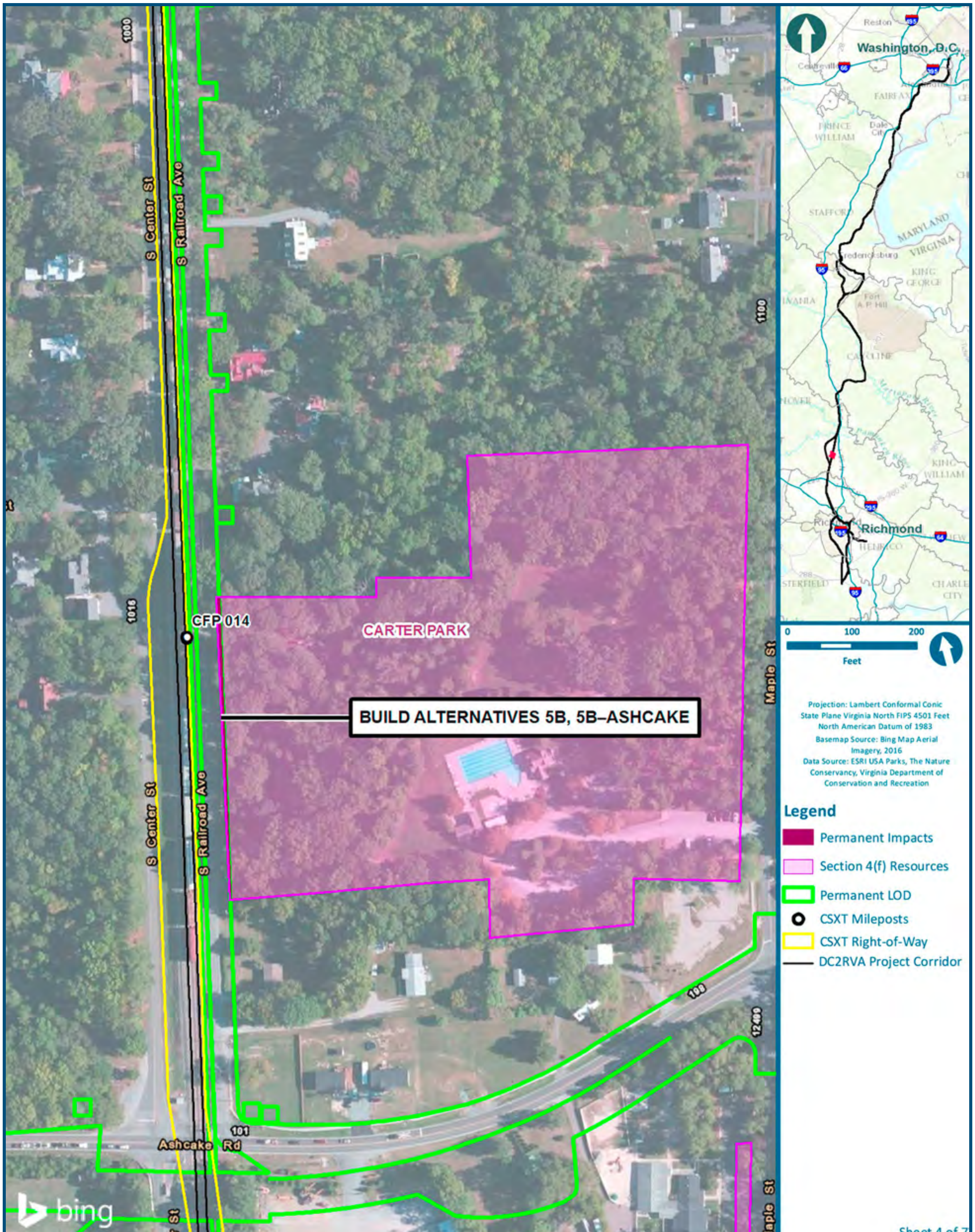


Figure 5.4-1: Permanent Park Impacts – Build Alternatives 5B, 5B–Ashcake

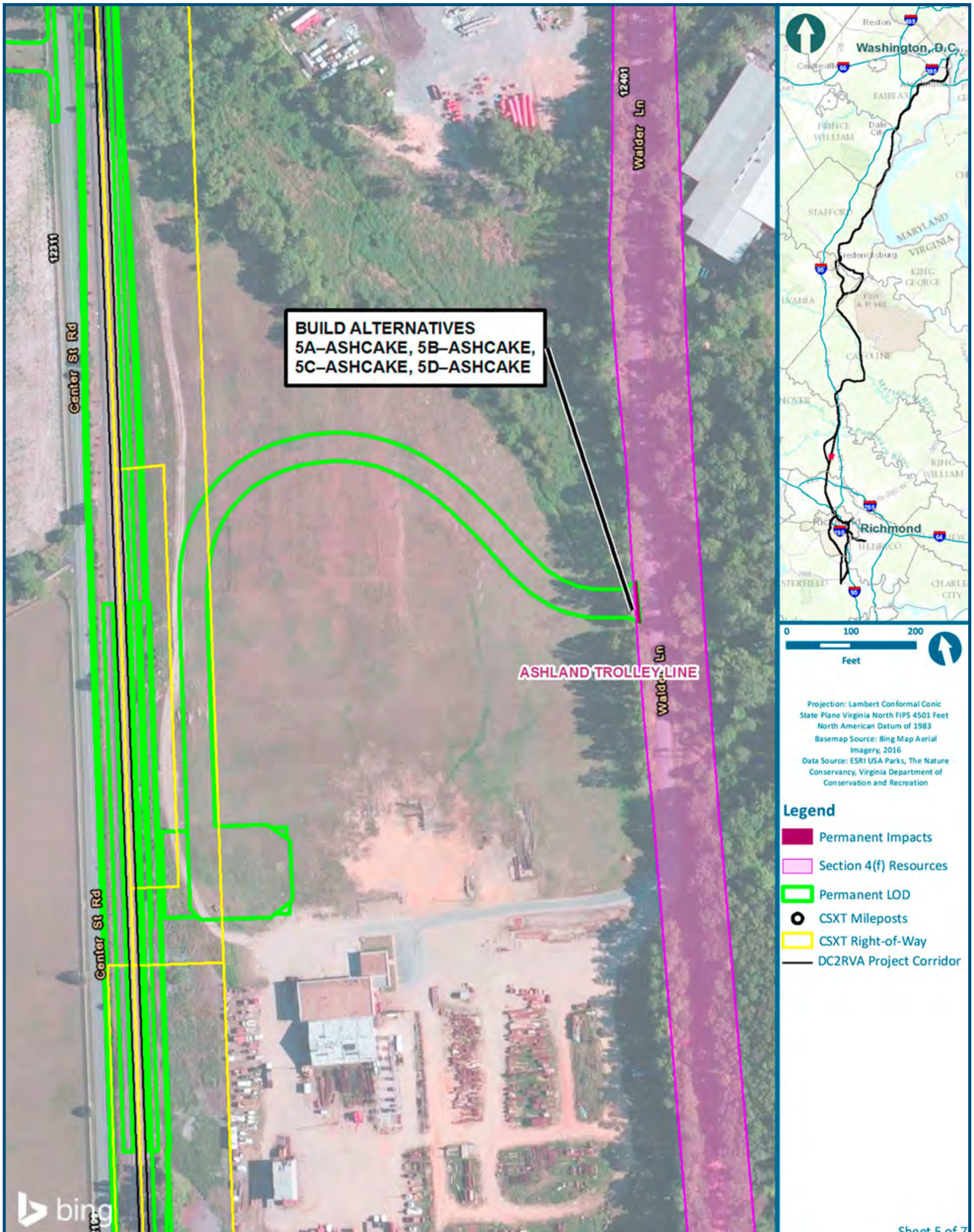


Figure 5.4-1: Permanent Park Impacts – Build Alternatives 5A–Ashcake, 5B–Ashcake, 5C–Ashcake, 5D–Ashcake

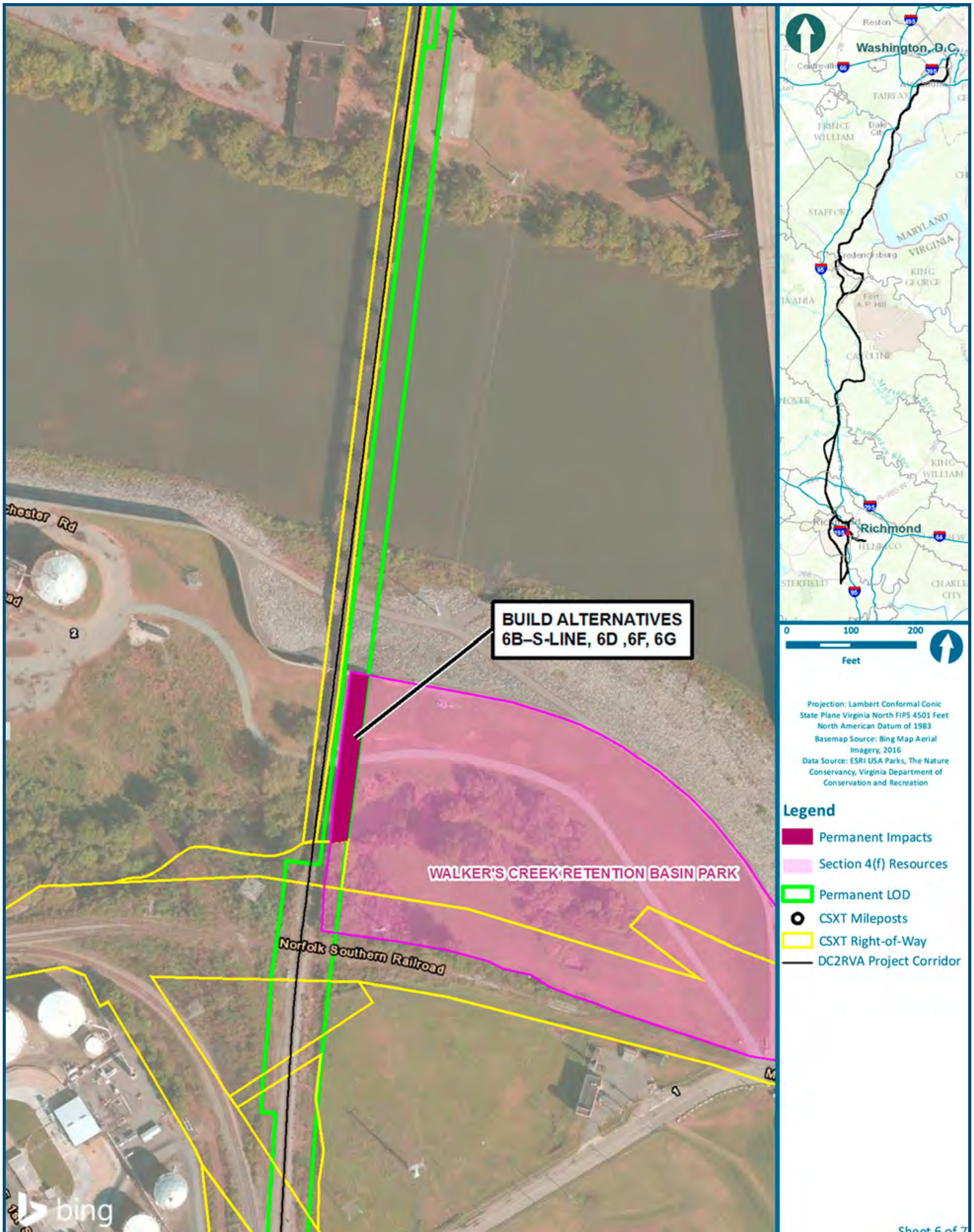


Figure 5.4-1: Permanent Park Impacts – Build Alternatives 6B–S-Line, 6D, 6F, 6G

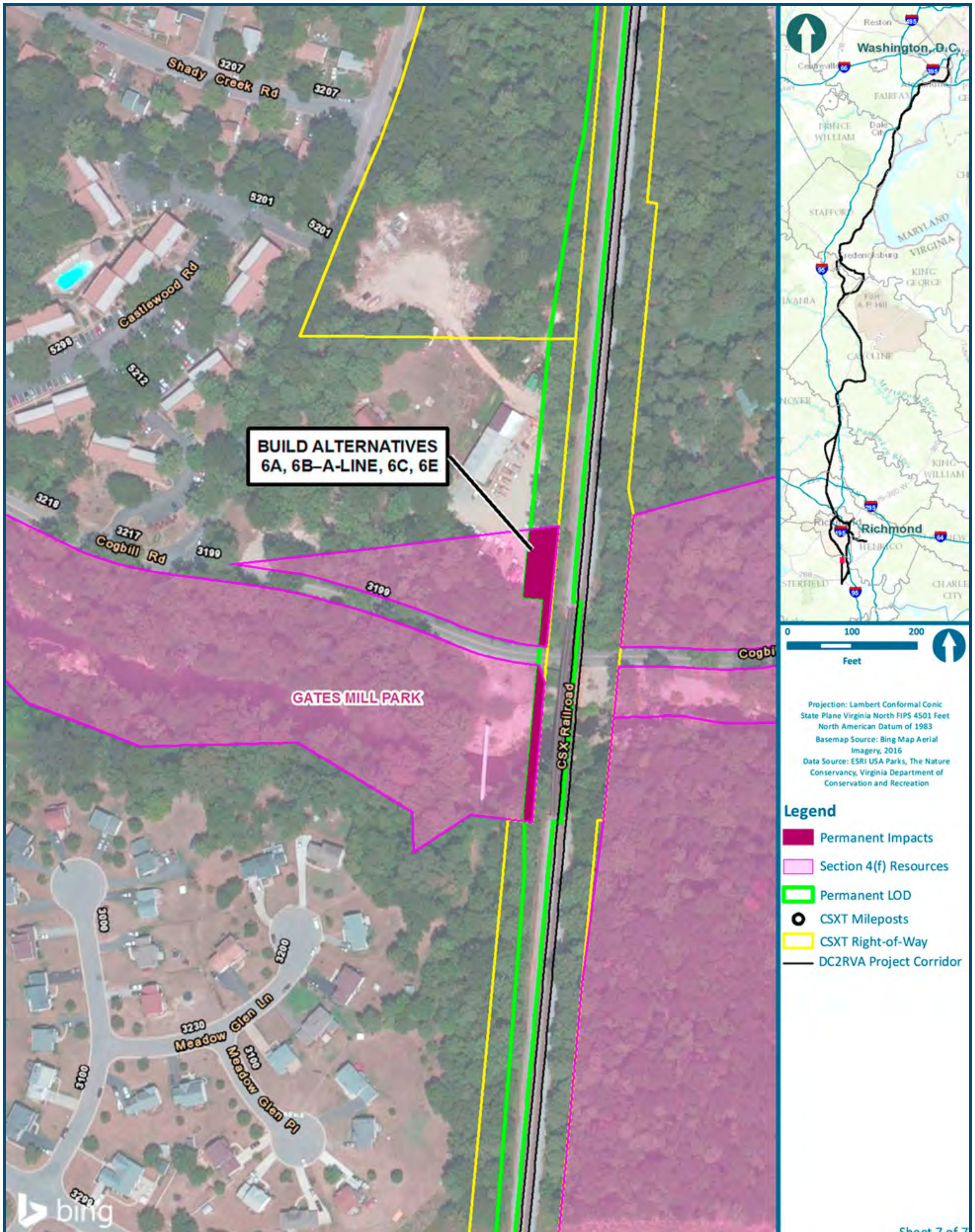


Figure 5.4-1: Permanent Park Impacts – Build Alternative 6A, 6B–A-Line, 6C, 6E

5.4.3 Historic Properties

There are 158 historic properties within the APE: 9 archaeological sites, 135 aboveground resources, 3 resources with an aboveground and belowground component, and 11 battlefields. FRA anticipates that the Project could potentially result in a Section 4(f) use of up to 14 of the 158 historic properties from one or more of the Build Alternatives (Tables 5.4-3 and 5.4-4 and Figure 5.4-2). Therefore, FRA anticipates the Project will result in either no use or *de minimis* use of the remaining 144 properties. If FRA determines there is no use of these properties, no further action is required, and these results will be presented to the DHR to inform DHR of FRA's *de minimis* determinations. More-detailed figures showing impacts to historic properties and DHR eligibility determinations (including individual eligibility and contributions to historic districts) are provided in the *Cultural Resources Reports* (Appendix R).

Preliminary dialogues with the DHR on effect and Section 4(f) use took place on August 10, 2016, and the ensuing preliminary determinations are represented here. Where FRA anticipates that one or more of the Build Alternatives will potentially result in a use of a historic property, details are provided below regarding each alternative's impact on the resource. If the DHR determined that the project will have an adverse effect on a resource but FRA determined that the project will have a *de minimis* use or no use, these resources are discussed below to provide contextual data for the *de minimis*/no use determination. FRA and DRPT will continue consultations with DHR and consulting parties, and the Final EIS will detail final determinations of effect and Section 4(f) uses.

Table 5.4-3: Summary of Preliminary Section 4(f) Recommendations for All Historic Properties

Alternative Area	Alternative	Section 4(f) Recommendation		
		Use	*de minimis*	No Use
Area 1: Arlington	1A	1	1	1
	1B	1	1	1
	1C	1	1	1
Area 2: Northern Virginia	2A	1	6	8
Area 3: Fredericksburg	3A	0	0	21
	3B	3	10	8
	3C[1]	1	3	2
Area 4: Central Virginia	4A	3	10	7
Area 5: Ashland	5A	0	0	0
	5A–Ashcake	0	4	15
	5B	3	11	5
	5B–Ashcake	3	11	5
	5C[1]	1	3	3
	5C–Ashcake[1]	1	3	3
	5D–Ashcake	3	11	5
Area 6: Richmond	6A	4	36	43
	6B–A-Line	5	25	53
	6B–S-Line	8	30	45
	6C	5	28	50
	6D	7	36	40
	6E	3	47	33
	6F	7	35	41
	6G	7	43	33

Note: 1. Partial Data; Only Phase IA reconnaissance studies were completed on the bypass alternatives. As such, this count only includes previously recorded resources; Recommended Preferred Alternative (see Chapter 7)

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
029-0218	Mount Vernon Memorial Highway (portion of George Washington Memorial Parkway)	*de minimis*	*de minimis*	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
000-0045	Washington National Airport (Reagan National Airport)	No Use	No Use	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0160	George Washington Junior High School 1005 Mt. Vernon Avenue	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0133	Parker-Gray Historic District/Uptown	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0137	Rosemont Historic District	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0124	Alexandria Depot 110 Callahan Drive	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0128	George Washington National Masonic Memorial	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
100-0277	Phoenix Mill 3642 Wheeler Avenue	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TBD	RF&P Bridge over Holmes Run in Cameron Run Park	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
029-0953	Old Colchester Road, Potomac Path, King's Highway	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
029-5741	Hannah P. Clark House/Enyedi House 10605 Furnace Road	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
029-0043	Colchester Arms Fairfax Arms 10712 Old Colchester Road	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TBD	RF&P Bridge over Occoquan River	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

▸ *Continued*; Recommended Preferred Alternative (see Chapter 7)

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
287-0010	Marine Corps Base Quantico (Current), Quantico Marine Corps Base Historic District (NRHP Listing)	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
287-5147	Town of Quantico (Historic/ Current), Town of Quantico Historic District (Current)	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
089-0019	Richland/Richlands 945 Widewater Road	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
089-0045	RF&P Bridge over Potomac Creek at Leland Road	–	–	–	–	No Use	*de minimis*	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
089-0080	RF&P Bridge over Naomi Road	–	–	–	–	No Use	Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0147	Fredericksburg & Spotsylvania Co. Battlefields National Military Park & Cemetery, Lee Drive	–	–	–	–	No Use	*de minimis*	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
089-0016/ 44ST0084	Ferry Farm	–	–	–	–	No Use	No Use	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
089-0014	Sherwood Forest (Historic)	–	–	–	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0132-0025	Rappahannock River Railroad Bridge	–	–	–	–	No Use	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
44SP0187	Stone Piers; Bridge or Building	–	–	–	–	No Use	Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0132-0704	Fredericksburg Train Station 200 Lafayette Boulevard	–	–	–	–	No Use	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0132	Fredericksburg Historic District	–	–	–	–	No Use	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0132-0020	Purina Tower	–	–	–	–	No Use	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

► *Continued;* Recommended Preferred Alternative (see Chapter 7)

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
111-0132-0522	House 314–316 Frederick Street	–	–	–	–	No Use	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0009-0795	Pulliam's Service Station 411 Lafayette Boulevard	–	–	–	–	No Use	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0009	Fredericksburg Historic District Extension	–	–	–	–	No Use	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-5295	Battle of Fredericksburg I	–	–	–	–	No Use	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-5296	Battle of Fredericksburg II	–	–	–	–	No Use	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
088-5181	Salem Church Battlefield (Banks Ford Battlefield)	–	–	–	–	No Use	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
088-5364	Fredericksburg & Gordonsville Railroad Bed District (Virginia Central Railroad)	–	–	–	–	No Use	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
111-0145	Fredericksburg Gun Manufactory	–	–	–	–	No Use	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
088-0254	Slaughter Pen Farm 11232 Tidewater Trail (Wayside Farm or Pierson Farm)	–	–	–	–	No Use	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
44SP0468-extension	Earthwork/ Jackson's Earthwork	–	–	–	–	No Use	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
088-0039	La Vue 3232 LaVue Lane (Prospect View)	–	–	–	–	No Use	*de minimis*	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0092	Fairfield Plantation Office Jackson Shrine 12019 Stonewall Jackson Road	–	–	–	–	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0208	House 12096 Guinea Drive	–	–	–	–	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

▸ *Continued*; Recommended Preferred Alternative (see Chapter 7)

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
016-5165	Excelsior Industry of Caroline County MPD	–	–	–	–	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-5129	Woodford Historic District	–	–	–	–	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0223	Woodford Excelsior Company Office, Lake Farm Road	–	–	–	–	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0222	Woodford Freight & Passenger Depot, Woodford Road	–	–	–	–	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0224	Glenwood House, 11102 Woodford Road	–	–	–	–	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0220	Carolina Mansion 11146 Woodford Road	–	–	–	–	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0270	Milford State Bank 15461 Antioch Road	–	–	–	–	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-5136	Milford Historic District	–	–	–	–	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
016-0286	Coleman's Store, 22275 Penola Road Penola, 16095 Polecat Lane	–	–	–	–	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-0123	North Anna Battlefield	–	–	–	–	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-5448	Doswell Historic District	–	–	–	–	–	–	–	Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-0470	Squashapenny Junction Store; House 10570 Doswell Road	–	–	–	–	–	–	–	Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-0469	Tri-County Bank, Doswell Branch (part of Squashapenny Antiques) 10561 Doswell Road	–	–	–	–	–	–	–	No Use	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-0093	Doswell Depot and Tower 10577 Doswell Road	–	–	–	–	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

► *Continued;* Recommended Preferred Alternative (see Chapter 7)

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
042-5307	Taylorsville Road Historic District	–	–	–	–	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
TBD	RF&P Bridge over Little River	–	–	–	–	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-0836	Earthworks, Little River	–	–	–	–	–	–	–	*de minimis*	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
042-0557	Dry Bridge 10411 Old Bridge Road	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	–	–	–	–	–	–	–	–
042-0392	Montevideo	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	–	–	–	–	–	–	–	–	–
166-5073	Berkleytown Historic District	–	–	–	–	–	–	–	–	–	No Use	*de minimis*	*de minimis*	–	–	*de minimis*	–	–	–	–	–	–	–	–
166-5073-0010	House, Dabney Funeral Home, 600 B Street	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	–	–	No Use	–	–	–	–	–	–	–	–
166-0001	Ashland Historic District	–	–	–	–	–	–	–	–	–	*de minimis*	Use	Use	–	–	Use	–	–	–	–	–	–	–	–
166-0001-0015	Business Office, Randolph-Macon College 310 N. Center Street	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	–	–	No Use	–	–	–	–	–	–	–	–
166-5072	Randolph-Macon College Historic District Expansion	–	–	–	–	–	–	–	–	–	No Use	*de minimis*	*de minimis*	–	–	*de minimis*	–	–	–	–	–	–	–	–
166-0002	Randolph-Macon College Historic District	–	–	–	–	–	–	–	–	–	No Use	*de minimis*	*de minimis*	–	–	*de minimis*	–	–	–	–	–	–	–	–
166-0001-0008	Ashland Station Depot 112 N. Railroad Avenue	–	–	–	–	–	–	–	–	–	*de minimis*	Use	Use	–	–	Use	–	–	–	–	–	–	–	–
166-5041	Priddy House 107 Stebbins Street	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	–	–	No Use	–	–	–	–	–	–	–	–
166-0001-0055	House 704 S. Center Street	–	–	–	–	–	–	–	–	–	No Use	*de minimis*	*de minimis*	–	–	*de minimis*	–	–	–	–	–	–	–	–
166-0001-0060	House 708 S. Center Street	–	–	–	–	–	–	–	–	–	No Use	*de minimis*	*de minimis*	–	–	*de minimis*	–	–	–	–	–	–	–	–
166-0036	MacMurdo House 713 S. Center Street	–	–	–	–	–	–	–	–	–	No Use	*de minimis*	*de minimis*	–	–	*de minimis*	–	–	–	–	–	–	–	–

▶ *Continued;* Recommended Preferred Alternative (see Chapter 7)

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
166-0037	Hugo House 11208 Gwathmey Church Road	–	–	–	–	–	–	–	–	–	No Use	*de minimis*	*de minimis*	–	–	*de minimis*	–	–	–	–	–	–	–	–
166-0001-0077	House 1005 S. Center Street	–	–	–	–	–	–	–	–	–	No Use	*de minimis*	*de minimis*	–	–	*de minimis*	–	–	–	–	–	–	–	–
042-5048	Elmont Historic District	–	–	–	–	–	–	–	–	–	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	–	–	–	–	–	–	–	–
043-0693	Mill Road Historic District	–	–	–	–	–	–	–	–	–	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	–	–	–	–	–	–	–	–
043-0694	Hunton Treasures 11701 Greenwood Road	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	–	–	–	–	–	–	–	–
043-5646	House 11501 Old Washington Highway	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	–	–	–	–	–	–	–	–
043-5657	Darling Smokestack Old Washington Highway	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
043-5108	Yellow Tavern Battlefield	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
043-0690	Lewis-McLeod House 2945 Mountain Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
043-0292	Laurel Industrial School Historic District, Hungary Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
043-0292-0001	Main Building/Robert Stiles Building/Bluford Office Building, 2900 Hungary Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
043-5636	Integrated Power Sources of Virginia, 2260 Dabney Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-6136	Scott's Addition Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-6569	Central National Bank 3501 W Broad Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	No Use	*de minimis*

▶ *Continued*; Recommended Preferred Alternative (see Chapter 7)

DC TO RICHMOND SOUTHEAST HIGH SPEED RAIL

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

		Build Alternative																					
DHR ID	Name/Description	1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
127-6514	Kent Road Village 905 Kent Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-0742	West of Boulevard Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	No Use	*de minimis*
127-6756	Carillon Neighborhood Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	No Use	*de minimis*
127-0171	James River and Kanawha Canal Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-6792	Southern Railway	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-6629	Cedarhurst Neighborhood Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	No Use	*de minimis*
Temp 402	House 351 W. 49th Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	No Use	*de minimis*
127-6757	Woodstock Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	No Use	*de minimis*
Temp R	Rolando Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	No Use	*de minimis*
Temp 268	Broad Run House 2011 S. Kinsley Avenue	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	No Use	*de minimis*
020-5351	Richmond & Petersburg Electric Railway	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
020-5336	The Bellwood-Richmond Quartermaster Depot Historic District, US Department of Defense Supply Center Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
44CF0680	Fort Darling/Battlefield, Earthworks, Fort	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
020-5320	Proctor's Creek Battlefield	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-6188	Movieland Bowtie Cinema 1331 North Boulevard	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*

▶ *Continued;* Recommended Preferred Alternative (see Chapter 7)

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
127-6840	Warehouse 2728 Hermitage Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-6730	Hermitage Road Warehouse Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-6165	Cookie Factory Lofts, 900 Terminal Place	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-0226	Science Museum of Virginia 2500 Broad Street, West	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	Use	Use	Use	No Use	No Use	No Use	No Use
127-5978	Todd Lofts 1128 Hermitage Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-6145	Southern Stove Works 1215 Hermitage Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-6570	West Broad Street Industrial and Commercial Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	*de minimis*	No Use	No Use	No Use	No Use
127-0414	Governor's School 1000 North Lombardy St.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	No Use	No Use	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-0354	Virginia Union University Historic District, 1500 North Lombardy St.	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-0428	George W. Carver Elementary School 1110 West Leigh Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-0822	Carver Residential Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-6171	Richmond and Chesapeake Bay Railway Barn), Richmond-Ashland Railway Company Car Barn	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-5679	Barton Heights Cemetery 1600 Lamb Avenue	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-0353	Richmond Nursing Home 210 Hospital Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use

▶ *Continued*; Recommended Preferred Alternative (see Chapter 7)

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

DHR ID	Name/Description	Build Alternative																					
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
127-6166	Hebrew Cemetery 320 Hospital Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	No Use	No Use	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-0343	Chestnut Hill/ Plateau Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-0344	Shockoe Valley & Tobacco Row Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	No Use	No Use	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
44HE1098	Main Street Station Parking Lot/Railroad	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	No Use	Use	No Use	Use	*de minimis*	Use	Use
127-6129	Winfree Cottage East Main Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
44HE1097	Railroad, Warehouse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	No Use	Use	No Use	Use	*de minimis*	Use	Use
127-0172	Main Street Station and Trainshed, New Union Station, Seaboard Airline & Chesapeake & Ohio Railroad Depot	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Use	Use	Use	Use	Use	*de minimis*	Use	Use
127-0344-0123	Railroad Y.M.C.A. 1552 East Main Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-0219	Shockoe Slip Historic District and Expansions	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
44HE1092	Warehouse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
44HE1094	Warehouse	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-6793	C&O Railroad	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-5809	Bridge #1857, North 14th Street; Mayo Bridge North	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-5808	Bridge #1857, South 14th Street; Mayo Bridge South	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-0197	Philip Morris Leaf Storage Warehouse 1717–1721 East Cary Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use

► *Continued;* Recommended Preferred Alternative (see Chapter 7)

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

DHR ID	Name/Description	Build Alternative																					
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
44HE1095	Storage Facility	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	No Use	Use	No Use	Use	*de minimis*	Use	Use
127-0282	Henrico County Courthouse 2127 Main Street East	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-0192	St. John's Church Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-0192-0322	Libby Hill Park and Park House, 2801 East Franklin Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-0854	Bridge #1850, E. Main Street, spanning Southern Railway	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-0119	John Woodward House 3017 Williamsburg Avenue	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-6693	Armitage Manufacturing Company 3200 Williamsburg Avenue	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-6255	Fulton Gas Works Williamsburg Avenue	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-0257	Bridge #8067	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
043-5313	James River Steam Brewery Cellars 4920 Old Main Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
043-0439	Aviation General Supply Depot 508 Bickerstaff Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
043-0307	Battle of Chaffin's Farm (New Market Heights Battlefield) New Market Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
043-5071	Darbytown & New Market Roads Battlefield, Route 5	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*

▶ *Continued;* Recommended Preferred Alternative (see Chapter 7)

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
127-0457	Manchester Warehouse Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-6193	J.P. Taylor Leaf Tobacco Southern Stove Works 516 Dinwiddie Avenue	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
127-6245/ 44CF0724	Williams Bridge Company, Emergency Fleet Corporation Factory 700 East 4th Street	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-6248	Pure Oil Company 1314 Commerce Street Transmontaigne	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
127-6213	Davee Gardens Historic District	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
020-5474	DuPont Spruance	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
020-0063	Falling Creek Ironworks Archaeological Site	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
020-0147	Drewry's Bluff Battlefield (Fort Darling, Fort Drewry), Fort Darling Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
123-5025	Assault on Petersburg (Petersburg Battlefield II), Bermuda Hundred Road (Alt Route 697)	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
020-0007	Bellwood, Sheffields, Auburn Chase, Building 42, Defense Supply Center Richmond, 8000 Jefferson Davis Highway	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	*de minimis*	No Use	*de minimis*	*de minimis*	*de minimis*	*de minimis*
020-0013	House 3619 Thurston Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	No Use	No Use	No Use	No Use	No Use	No Use	No Use	No Use
020-0022/ 44CF0680	Centralia Earthworks	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*

▶ *Continued*; Recommended Preferred Alternative (see Chapter 7)

Table 5.4-4: Details of Recommended Preliminary Section 4(f) Use Determinations of Historic Properties

DHR ID	Name/Description	Build Alternative																						
		1A	1B	1C	2A	3A	3B	3C	4A	5A	5A–Ashcake	5B	5B–Ashcake	5C	5C–Ashcake	5D–Ashcake	6A	6B–A-Line	6B–S-Line	6C	6D	6E	6F	6G
020-5378	VEPCo Power Transmission Line	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
020-0140	Circle Oaks` 4510 Centralia Road	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
020-0552	Centralia Post Office	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*	*de minimis*
076-0301	RF&P Railroad	Use	Use	Use	Use	No Use	Use	Use	Use	–	*de minimis*	Use	Use	Use	Use	Use	Use	Use	Use	Use	Use	Use	Use	Use
127-6251	Atlantic Coast Line Railroad (ACL) Corridor, Richmond and Petersburg Railroad	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Use	Use	Use	Use	Use	Use	Use	Use
127-6271	Seaboard Air Line Railroad (SAL) Corridor	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	Use	Use	Use	Use	Use	Use	Use	Use

Recommended Preferred Alternative (see Chapter 7)

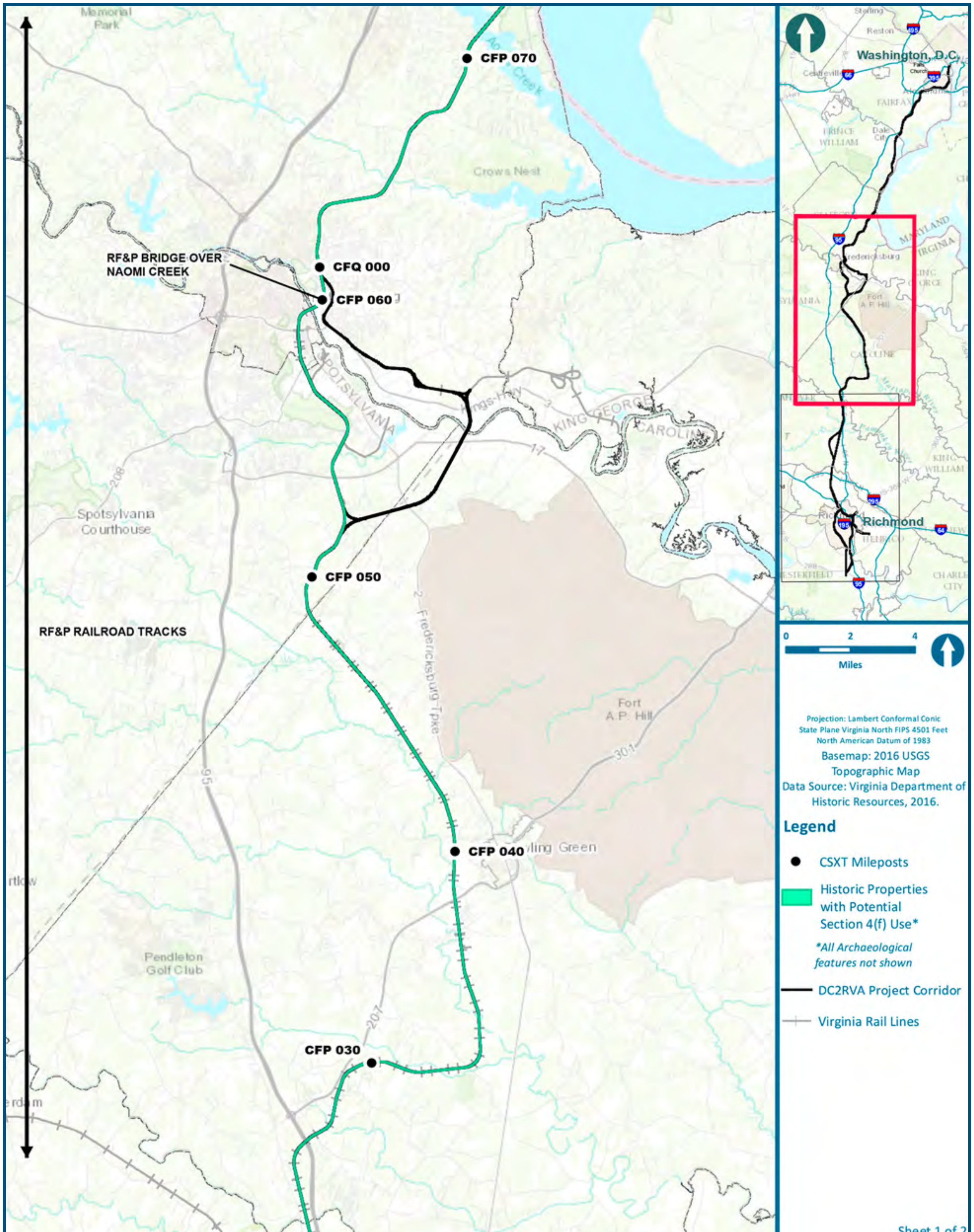


Figure 5.4-2: Historical Properties with Potential Section 4(f) Use

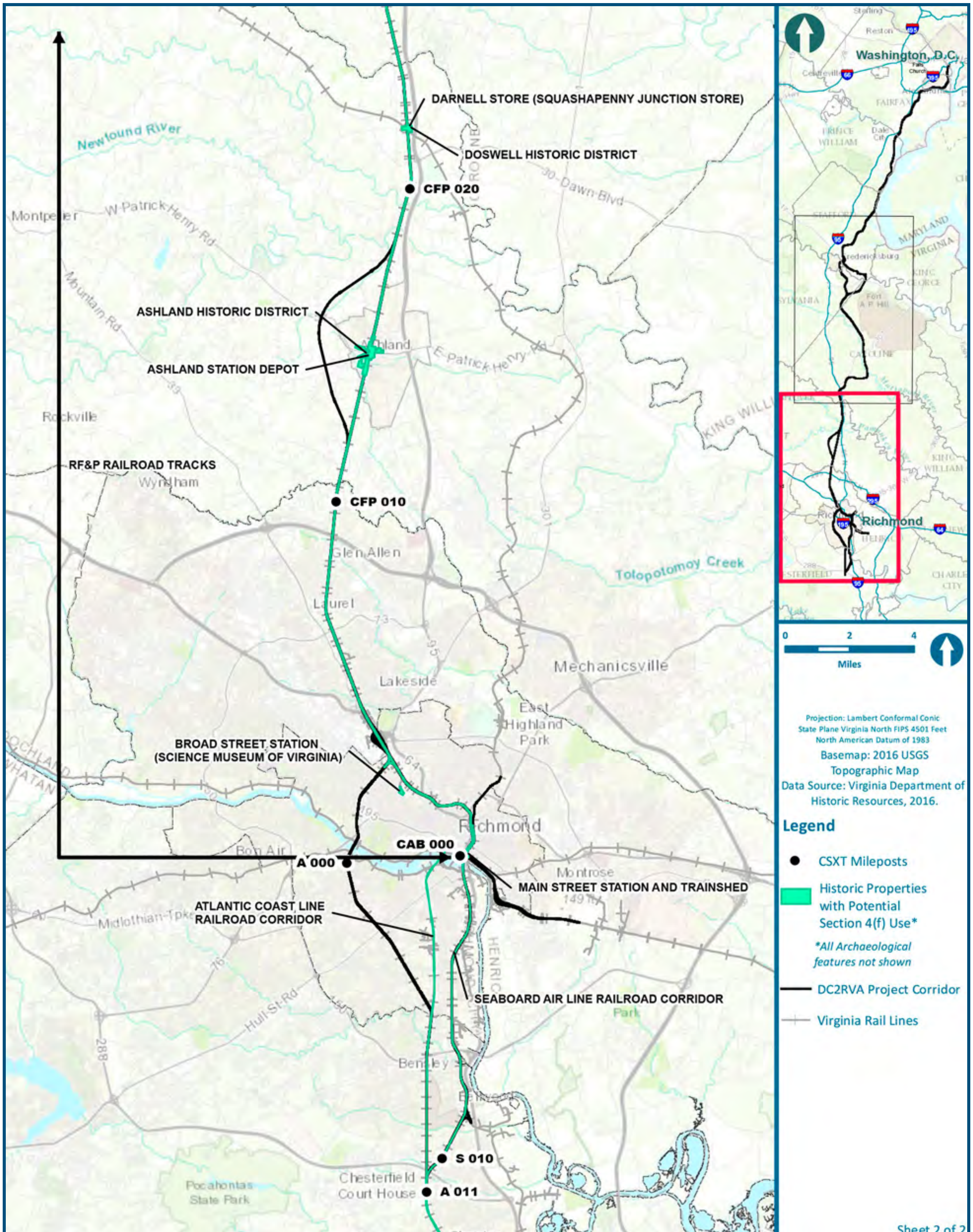


Figure 5.4-2: Historical Properties with Potential Section 4(f) Use

RF&P Bridge over Naomi Road (089-0080): The bridge is a double-vault arched structure rumored to be the oldest documented and identified reinforced concrete bridge in the Commonwealth. It is potentially eligible for the NRHP under Criterion C for its architectural merit. Construction of Build Alternative 3B, which follows the existing CSXT right-of-way through Fredericksburg, would result in the removal of the existing bridge and construction of a new structure. Based on effect dialogues with DHR, FRA believes that demolition would remove all character-defining features of this resource. FRA's initial determination is that Build Alternative 3B, which is identified as the recommended Preferred Alternative in Alternative Area 3 as described in Chapter 7 of this Draft EIS, would have a Section 106 adverse effect on this structure and would result in a Section 4(f) use of this resource.

Rappahannock River Railroad Bridge (111-0132-0025): This multiple-span, open-spandrel, concrete-arch bridge is an excellent and rare surviving example of a reinforced-concrete arch railroad bridge within this region of Virginia. The bridge is both individually eligible (Criterion C for its architectural merit) and eligible as a contributing element to the Fredericksburg Historic District (111-0132) and the RF&P Railroad (076-0301). Addition of a third track to the east of the existing alignment as part of Build Alternative 3B, which follows the existing CSXT right-of-way through Fredericksburg, would require construction of a new bridge adjacent to the old structure. Although the new bridge would somewhat diminish its integrity of design, setting, feeling, and association, and affect the architectural character of the Rappahannock Railroad Bridge, FRA does not believe these indirect impacts are so severe as to substantially impair the bridge.[1] FRA's initial determination is that Build Alternative 3B, which is identified as the recommended Preferred Alternative in Alternative Area 3 as described in Chapter 7 of this Draft EIS, would have a Section 106 adverse effect on this resource but would not result in a Section 4(f) use of the bridge.

Site 44SP0187: This site includes a series of stone piers along the river, likely associated with a railroad structure or a mill once located in this area. It is eligible under Criteria A and D for its association with the development of Fredericksburg and its information potential. Construction of a new bridge across the Rappahannock River to accommodate a third track for Build Alternative 3B, which follows the existing CSXT right-of-way through Fredericksburg, would physically impact the subsurface archaeological deposits in this area, thus diminishing the data potential of this site. FRA's initial determination is that Build Alternative 3B, which is identified as the recommended Preferred Alternative in Alternative Area 3 as described in Chapter 7 of this Draft EIS, would have a Section 106 adverse effect to this historic property and would result in a Section 4(f) use of this site.

Fredericksburg Historic District (111-0132): The district is a 200-acre area that comprises the city's downtown commercial area, adjacent industrial area, and some of the surrounding residential blocks. It is listed in the NRHP under Criterion C for its architectural merit. Although no new tracks are part of Build Alternative 3A and installation of the third track associated with Build Alternative 3B, which follows the existing CSXT right-of-way through Fredericksburg, would be constructed within the existing rail right-of-way, work associated with both alternatives would entail building a multi-story parking deck to the east (south) of the tracks in an existing parking lot. This new structure would impact the viewshed of the district and its integrity of setting, feeling, and association by adding a large, non-conforming, visual element to the distinct area skyline. The new parking structure would also add a new physical element within the district boundaries. These impacts are all, however, indirect, and FRA does not believe that they are severe enough to

[1] Per 23 CFR 774.15(a), "substantial impairment occurs only when the protected activities, features, or attributes of the property are substantially diminished."

substantially impair the district. FRA's initial determination is, therefore, that Build Alternatives 3A and 3B, of which Build Alternative 3B is identified as the recommended Preferred Alternative in Alternative Area 3 as described in Chapter 7 of this Draft EIS, would have a Section 106 adverse effect on this historic property but would not result in a Section 4(f) use of the district.

Doswell Historic District (042-5448): Doswell Historic District encompasses a rural community that was once a center of major activity along road and rail networks. It is potentially eligible for the NRHP under Criteria A for its association with railroad history and C for its architectural integrity. Although the community was founded along the rail lines, Build Alternative 4A would adversely affect one contributing element to the district, the Squashapenny Junction Store (042-0470), as listed below. This includes potentially removing the main dwelling and/or associated outbuildings and taking land from the parcel, thus diminishing the characteristics that render it eligible for the NRHP. Because of the potential physical adverse effects to a contributing element, Build Alternative 4A, which is identified as the recommended Preferred Alternative in Alternative Area 4 as described in Chapter 7 of this Draft EIS, would likely have a Section 106 adverse effect on the district, and FRA's initial determination is that this alternative would result in a Section 4(f) use.

Squashapenny Junction Store/House, 10570 Doswell Road (042-0470): The store was a commercial hub for the Doswell community and is an excellent example of railroad-town commercial architecture. It is potentially eligible for the NRHP under Criterion C for its architectural style. The building, also a contributing element to the Doswell Historic District (042-5448), is located immediately east of the rail tracks. At a minimum, Build Alternative 4A requires the acquisition of approximately 10 feet of land from the parcel and would bring the tracks closer to the dwelling, potentially requiring the physical removal of one or more contributing buildings on the property and compromising its integrity of design, setting, materials, workmanship, feeling, and association. Depending on final design, the main building itself may be an acquisition, thus resulting in additional physical impacts. As such, FRA's initial determination is that Build Alternative 4A, which is identified as the recommended Preferred Alternative in Alternative Area 4 as described in Chapter 7 of this Draft EIS, would have a Section 106 adverse effect on this resource and would result in a Section 4(f) use. However, this determination may be altered pending future design plans that minimize the project footprint in this area.

Berkleytown Historic District (166-5073): The district is typical of many small-town, twentieth-century, African-American neighborhoods, dotted by small vernacular dwellings. It is potentially eligible under Criteria A for its association with African-American history in this area and C for its architectural merit. Construction of an overpass carrying Vaughan Road over the rail tracks associated with Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would require alterations to the historic road pattern within the district and require a new bridge structure within the viewshed of the district and several contributing elements, although FRA does not believe these indirect impacts will result in substantial impairment of the district. Due to these disturbances to the setting, feeling, and design of the district, FRA's initial determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would have a Section 106 adverse effect but would not result in a Section 4(f) use of the district.

Ashland Historic District (166-0001): The Ashland Historic District survives as a fine example of a railroad and streetcar suburb, preserving much of its turn-of-the-century character. It is listed in the NRHP under Criteria A for its association with railroad history and C for its architectural character. Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake, expanding the existing rail corridor through town, would result in physically modified roadways, sidewalks, secondary resources, and viewsheds in the district, some of which are contributing elements to the district. Character-defining features may be impacted. Moreover, FRA believes these alternatives would have an adverse effect to several contributing resources to the district through physical modifications or additions to their viewshed. As such, FRA's initial determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would have a Section 106 adverse effect on the Ashland Historic District and would result in a Section 4(f) use of this district.

Randolph-Macon College Historic District (166-0002) and Randolph-Macon College Historic District Expansion (166-5072): The districts include the 85-acre college campus and all associated buildings, structures, and landscape features. The original district was listed in the NRHP under Criteria A as one of the oldest Methodist colleges in the United States and C for its architectural merit. The expansion was determined to be eligible for the NRHP as part of the current survey. Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would result in modifications that would physically and visually diminish character-defining features of the districts through roadway realignments, sidewalk modifications, and viewshed changes, although FRA does not believe these indirect impacts will result in substantial impairment of the districts. FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would have a Section 106 adverse effect on these historic properties but would not result in a Section 4(f) use of these historic properties.

Ashland Station Depot (166-0001-0008): The building is a good example of a Colonial Revival-styled depot, potentially eligible for the NRHP under Criteria A for its association with area development and C for its architectural character. It is also a contributing element to the Ashland Historic District (166-0001) and the RF&P Railroad (076-0301). Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake require track changes, platform modifications, and alterations to the NRHP-eligible station. Some design proposals associated with these alternatives include demolition of the historic station and construction of a new station. FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would have a Section 106 adverse effect on this resource and would result in a Section 4(f) use of the property.

MacMurdo House (166-0036): This two-story, three-bay, Greek Revival, single-family dwelling is one of the few buildings of its style in Ashland. As such, it is potentially eligible for the NRHP under Criterion C for its architectural merit. The building is a contributing element to the Ashland Historic District (166-0001) as it dates to the period of significance and reflects the developmental history of the district. Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake, expanding the existing rail corridor through town, would result in moving the existing sidewalks and roadways closer to the historic dwelling and onto the parcel boundaries, thus physically impacting the resource's integrity of design, setting, feeling, and association and modifying key visual elements of the building, although FRA does not believe these indirect impacts will result in substantial impairment of the house. FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake would have a Section 106 adverse effect on this property but would not result in a Section 4(f) use of the resource.

Laurel Industrial School Historic District (043-0292): The district consists of a complex of buildings that were part of a school founded under the patronage of the Prison Association of Virginia. It is listed in the NRHP under Criteria A for its association with prison reform and C for its architectural character. All Build Alternatives in Area 6 (6A–6G) would require construction of a bridge to carry traffic on Hungary Road over the rail tracks, as well as notable associated secondary road changes. These modifications would impact the district through introduction of a large visual element (the new overpass) and physically modified roadway plans. Some additional landscape elements may also be required to be relocated. As such, FRA's preliminary determination is that Build Alternatives 6A through 6G, of which Build Alternative 6F is identified as the recommended Preferred Alternative in Alternative Area 6 as described in Chapter 7 of this Draft EIS, would have a Section 106 adverse effect on this historic district; however, the modifications do not rise to the level of substantial impairment. Therefore, the Project would not result in a Section 4(f) use of the district.

Scott's Addition Historic District (127-6136): This area is a 152-acre industrial and commercial district in Richmond featuring 287 contributing resources built primarily between 1900 and 1956. It is listed in the NRHP under Criteria A for its association with Richmond development and C for its architectural fabric. Construction of Build Alternatives 6A, 6B–A-Line, 6B–S-Line, 6C, 6E, and 6G would require notable visual and physical changes to this area, including new tracks outside of the existing right-of-way, erecting superstructures to support rail facilities, and construction of multi-story parking facilities. These changes would diminish character-defining features of the district, although FRA does not believe these indirect impacts will result in substantial impairment of the district. FRA's preliminary determination is that Build Alternatives 6A, 6B–A-Line, 6B–S-Line, 6C, 6E, and 6G would have a Section 106 adverse effect on the historic district but would not result in a Section 4(f) use of the district; however, none of these Build Alternatives are identified as the recommended Preferred Alternative for Alternative Area 6 in this Project.

Rolando Historic District (Temp R): The district is a post-World War II-era, suburban neighborhood containing approximately 142 parcels. It is potentially eligible for the NRHP under Criterion C for its styling as a post-war neighborhood. Plans associated with Build Alternatives 6A, 6B–A-Line, 6C, 6E, and 6G include construction of a new overpass carrying Broad Rock Boulevard over the tracks and associated roadway modifications, which are required to expand intercity passenger rail service on the A-Line through and south of downtown Richmond. Some of the impacted roadways are located within the footprint of the district, and the new overpass would be a notable new visual element to the viewshed of the neighborhood. These changes would diminish the district's integrity of design, setting, feeling, and association, although FRA does not believe these indirect impacts will result in substantial impairment of the district. FRA's preliminary determination is that Build Alternatives 6A, 6B–A-Line, 6C, 6E, and 6G would have a Section 106 adverse effect on this district but would not result in a Section 4(f) use of the resource; however, none of these Build Alternatives are identified as the recommended Preferred Alternative for Alternative Area 6 in this Project.

Broad Run House (Temp 268): This two-story, Federal-style, frame dwelling was constructed around 1770 with a central-passage plan. It is potentially eligible for the NRHP under Criterion C for its architectural style and as a unique example of extant eighteenth-century architecture in this part of Richmond. Plans associated with Build Alternatives 6A, 6B–A-Line, 6C, 6E, and 6G include construction of a new overpass carrying Broad Rock Boulevard over the tracks and associated roadway modifications, which are required to expand intercity passenger rail service on the A-Line through and south of downtown Richmond. Some of the impacted roadways are located within the viewshed of this resource, and the new overpass would be a notable new visual element to the property. These changes would diminish the district's integrity of design, setting, feeling, and association, although FRA does not believe these indirect impacts will result in substantial impairment of the house. FRA's preliminary determination is that Build Alternatives 6A, 6B–A-Line, 6C, 6E, and 6G would have a Section 106 adverse effect on this property but would not result in a Section 4(f) use of the resource; however, none of these Build Alternatives are identified as the recommended Preferred Alternative for Alternative Area 6 in this Project.

Movieland Bowtie Cinema (127-6188): This is an industrial complex with two buildings, the brass foundry and the iron foundry, that are both steel-framed resources with masonry walls. It is listed in the NRHP under Criteria A for its association with Richmond industrial history and C for its architectural merit. Construction of Build Alternatives 6B–A-Line and 6C require development of new rail corridors and large-scale structures to accommodate train movement in this part of Richmond to serve new stations on either Boulevard or Broad Street, as well as associated road modifications and new parking structures. Construction of 6B–S-Line also requires modifications to the rail system and new structures in this area. Some of these changes border, or are located on, the Movieland Bowtie Cinema parcel. Modifications would physically and visually diminish the characteristics that render this resource eligible for the NRHP, although FRA does not believe these indirect impacts will result in substantial impairment of the property. As such, FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have a Section 106 adverse effect on this resource but would not result in a Section 4(f) use of the historic property; however, none of these Build Alternatives are identified as the recommended Preferred Alternative for Alternative Area 6 in this Project.

Warehouse (127-6840): This circa 1955 warehouse could not be accessed during the reconnaissance survey; eligibility for this resource is assumed. As with the Movieland Bowtie Cinema, Build Alternatives 6B–A-Line, 6B–S-Line, and 6C all require notable modifications to the landscape, road system, rail lines, and extant resources in this area to serve new stations on either Boulevard or Broad Street. These changes would introduce large-scale new visual elements to the viewshed of this resource, although FRA does not believe these indirect impacts will result in substantial impairment of the warehouse. FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have a Section 106 adverse effect on this resource but would not result in a Section 4(f) use of the historic property; however, none of these Build Alternatives are identified as the recommended Preferred Alternative for Alternative Area 6 in this Project.

Hermitage Road Warehouse Historic District (127-6730): This industrial district is characterized by roughly a dozen medium- to large-scale one-story warehouse buildings constructed in the second quarter of the twentieth century and set on a gridded block pattern. It is listed in the NRHP under Criterion A for its association with twentieth-century Richmond development and Criterion C for its architectural styling. Construction of Build Alternatives 6B–A-Line and 6C require development of new rail corridors and large-scale structures to accommodate train movement to serve new stations on either Boulevard or Broad Street, as well as road modifications and new parking structures. Construction of Build Alternative 6B–S-Line also requires modifications to the rail system and new structures in this area. These changes would physically and visually diminish the characteristics that render this resource eligible for the NRHP, although FRA does not believe these indirect impacts will result in substantial impairment of the district. As such, FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have a Section 106 adverse effect on this resource but would not result in a Section 4(f) use of the historic property; however, none of these Build Alternatives are identified as the recommended Preferred Alternative for Alternative Area 6 in this Project.

Cookie Factory Lofts (127-6165): The building is a six-story, multi-bay industrial building constructed in 1927 with Colonial Revival attributes. It is listed in the NRHP under Criterion A for its association with the development of this section of Richmond and Criterion C for its architectural merit. The resource is also a contributing element to the West Broad Street Industrial and Commercial Historic District (127-6570) listed below. As with nearby properties listed above, Build Alternatives 6B–A-Line, 6B–S-Line, and 6C all require notable modifications to the landscape, road system, rail lines, and extant resources in this area to serve new stations on either Boulevard or Broad Street. These changes would introduce large-scale new visual elements to the viewshed of this resource, although FRA does not believe these impacts will result in substantial impairment of the building. FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have a Section 106 adverse effect on this resource but would not result in a Section 4(f) use of the historic property; however, none of these Build Alternatives are identified as the recommended Preferred Alternative for Alternative Area 6 in this Project.

Science Museum of Virginia (127-0226): This building is a 3-story, 11-bay, monumental Neoclassical style train station that now houses the Science Museum of Virginia. It is listed on the NRHP under Criteria A for its association with transportation history and C for its architectural characteristics. The resource is also a contributing element to the West Broad Street Industrial and Commercial Historic District (127-6570) listed below. While construction of Build Alternative 6C would partially restore the historic usage of this property as a passenger station, many of the rail-related features originally part of this property were removed when the structure was converted into a museum. Work associated with Build Alternative 6C, as well as that required to serve a new station on Boulevard in Build Alternatives 6B–A-Line and 6B–S-Line, would result in new construction, such as raised tracks and the installation of new structures, as well as roadway modifications, to the north and east of the historic building. This work would physically and visually diminish the integrity of design, setting, materials, workmanship, feeling, and association of this historic property. FRA's preliminary determination is that Build Alternatives 6B-A-Line, 6B–S-Line, and 6C would have a Section 106 adverse effect on the Science Museum of Virginia and, because of the physical alteration to the museum and demolition of contributing elements to this resource, would result in a Section 4(f) use of this property; however, none of these Build Alternatives are identified as the recommended Preferred Alternative for Alternative Area 6 in this Project.

Todd Lofts (127-5978): The structure is a five-story, multi-bay commercial building originally used as a brewery. It is listed on the NRHP under Criterion A for its association with industrial development in this part of Richmond. Build Alternative 6C would require road work along Hermitage Road and includes construction of a rail superstructure to aid in train movement to a new station on Broad Street. This new superstructure would be visible from the property and directly impact the property but not touch the building. Similar nearby large-scale modifications would be part of Build Alternatives 6B–A-Line and 6B–S-Line to serve a new station on Boulevard. FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have a Section 106 adverse effect on this resource, but because no changes will be made to the building itself, it would not result in a Section 4(f) use of this resource. None of these Build Alternatives are identified as the recommended Preferred Alternative for Alternative Area 6 in this Project.

Southern Stove Works (127-6145): This resource is an industrial complex of four brick buildings and a water tower built during the time of rapid industrialization in Richmond. It is listed on the NRHP under Criteria A for its association with Richmond industrialization and C for its architectural merit. This resource is located just east across Hermitage Road from Todd Lofts, listed above. The same modifications stated for Todd Lofts are applicable to this resource, including roadway changes and construction of new rail structures required to serve a new station on Boulevard in Build Alternatives 6B–A-Line and 6B–S-Line, or a new station on Broad Street in Build Alternative 6C, although FRA does not believe these indirect impacts will result in substantial impairment of the building. FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have a Section 106 adverse effect on this historic property but would not result in a Section 4(f) use of the property; however, none of these Build Alternatives are identified as the recommended Preferred Alternative for Alternative Area 6 in this Project.

West Broad Street Industrial and Commercial Historic District (127-6570): The district comprises an area of approximately 40 acres; it reflects the development of the industrial capabilities of Richmond. It is listed in the NRHP under Criteria A for its association with industrial history in this area and C for its architectural characteristics. The district is located on both sides of Broad Street and extends northeast past Marshall Street. Changes associated with the Project and associated roads required to serve a new station on Boulevard in Build Alternatives 6B–A-Line and 6B–S-Line, or a new station on Broad Street in Build Alternative 6C would physically and visually diminish character-defining features of this district, as well as at least two contributing resources: the Science Museum of Virginia (127-0226) and Cookie Factory Lofts (127-6165), although FRA does not believe these indirect impacts will result in substantial impairment of the district. FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C would have a Section 106 adverse effect on this historic district but would not result in a Section 4(f) use of this district; however, none of these Build Alternatives are identified as the recommended Preferred Alternative for Alternative Area 6 in this Project.

Shockoe Valley & Tobacco Row Historic District (127-0344): This district encompasses the area of Richmond's earliest residential, commercial, and manufacturing activity. It is listed in the NRHP under Criteria A for its association with early Richmond developmental history and C for its architectural merit. The district is located east of the S-line corridor and north of the James River in downtown Richmond. Construction associated with the expansion of intercity passenger rail service to Main Street Station on the S-Line in Build Alternatives 6D, 6F, and 6G would include one to two multistory parking garages and the addition of long, linear platforms within the district boundaries. These elements have the potential to visually diminish the characteristics that render this resource eligible for the NRHP, although FRA does not believe these indirect impacts will result in substantial impairment of the district. FRA's preliminary determination is that Build Alternatives 6D, 6F, and 6G would have a Section 106 adverse effect on this resource but would not result in a Section 4(f) use of this district, of which Build Alternative 6F is the recommended Preferred Alternative in Alternative Area 6 as described in Chapter 7 of this Draft EIS.

Sites 44HE1098, 44HE1097, and 44HE1095: These three sites represent warehouses once located in this part of Richmond. They are potentially eligible for the NRHP under Criteria A and D for their association with the development of Richmond and their data potential. Current plans for Build Alternatives 6B–S-Line, 6D, 6F, and 6G, which expand intercity passenger rail service on the S-Line through and south of downtown Richmond, include installation of new piers to support expanded tracks near Main Street Station. Installation of the piers would result in physical subsurface disturbances within these three recorded archaeological sites. As such, FRA's preliminary determination is that Build Alternatives 6B–S-Line, 6D, 6F, and 6G would have a Section 106 adverse effect on these three archaeological sites and would result in a Section 4(f) use of these three sites. Build Alternative 6F is the recommended Preferred Alternative in Alternative Area 6 as described in Chapter 7 of this Draft EIS.

Main Street Station and Trainshed (127-0172): This multi-story, multi-bay monumental structure symbolizes the importance of the rail terminal as an entrance gateway to Richmond. The building is a National Historic Landmark (NHL), listed in the NRHP under Criteria A and C, and is also a contributing element to both RF&P Railroad (076-0301) and the Seaboard Air Line Railroad (127-6271), both listed below. Based on parameters set forth in 800.5(2)(iv) and DHR's evaluation of effect, FRA's preliminary determination is that Build Alternatives 6A, 6B–A-Line, 6B–S-Line, and 6C could have a Section 106 adverse effect on this resource based on the disuse of the current station and thus removal of the historic, and continued, use of this rail station. In addition, construction of Build Alternatives 6D, 6F, and 6G, which expand intercity passenger rail service on the S-Line through and south of downtown Richmond, would alter physical elements of the property, and FRA's preliminary determination is that this impact would constitute a Section 106 adverse effect on this resource. FRA's preliminary determination is that Build Alternatives 6A, 6B–A-Line, 6B–S-Line, and 6C could and 6D, 6F, and 6G would result in a Section 4(f) use of this property. Build Alternative 6F is the recommended Preferred Alternative in Alternative Area 6 as described in Chapter 7 of this Draft EIS.

Railroad Y.M.C.A (127-0344-0123): The resource is a three-story, three-bay, rectangular, French Renaissance Revival-style commercial building constructed in 1907. It is eligible for the NRHP under Criterion A for its importance to the early recreational and social history of this segment of Richmond and under Criterion C for its architectural styling. Build Alternatives 6D, 6F, and 6G, which expand intercity passenger rail service on the S-Line through and south of downtown Richmond, all involve the construction of large parking decks to the north of this resource within the viewshed. The decks will diminish the integrity of setting, feeling, and association of this resource, although FRA does not believe these indirect impacts will result in substantial impairment of the building. FRA's preliminary determination is that Build Alternatives 6D, 6F, and 6G would have a Section 106 adverse effect on this property but would not result in a Section 4(f) use of this resource. Build Alternative 6F is the recommended Preferred Alternative in Alternative Area 6 as described in Chapter 7 of this Draft EIS.

Richmond, Fredericksburg, & Potomac Railroad (076-0301): The RF&P opened in 1836 and eventually spanned from the Potomac River to Richmond. It is eligible for the NRHP under Criterion A for its association with rail development in northern and central Virginia. Construction associated with several alternatives would result in removal or large-scale physical modifications to several contributing elements to the railroad district, including the Ashland Depot and several bridges. Determinations on the structures to be modified as part of the Project are ongoing and will be reflected in the final designs. However, based on preliminary data, FRA's preliminary determination is that Build Alternatives 1A, 1B, 1C, 2A, 3B, 3C, 4A, 5B, 5B–Ashcake, 5C, 5C–Ashcake, 5D–Ashcake, and 6A through 6G would have a Section 106 adverse effect on this property and, because of the physical alterations to contributing elements, could result in a Section 4(f) use of the property.[2] Among these Build Alternatives, one of the Build Alternatives in Alternative Area 1 (Build Alternative 1A, 1B, or 1C) will be required to deliver the service proposed in this Draft EIS, and Build Alternatives 2A, 3B, 4A, and 6F are the recommended Preferred Alternatives in respective Alternative Areas 2, 3, 4, and 6 as described in Chapter 7 of this Draft EIS.

[2] Section 11502 (23 U.S.C. 138(f)/49 U.S.C. 303(h)) exempts from Section 4(f) review the use of railroad and rail transit lines, or elements thereof, that are in use or that were historically used for the transportation of goods or passengers. The exemption applies regardless of whether the railroad or rail transit line, or element thereof, is listed on or is eligible for listing on the National Register of Historic Places. The exemption has two important exceptions: 1) the exemption does not apply to rail stations or transit stations; and 2) the exemption does not apply to bridges or tunnels located on a rail line that has been abandoned under the process described in 49 U.S.C. 10903 or a transit line that is not in use.

Atlantic Coast Line Railroad (ACL) Corridor (127-6251): This is a historic railroad corridor that represents the origins and growth of the railroad industry in the Richmond to Petersburg corridor. It is eligible for the NRHP under Criterion A for its association with area transportation history. Like the RF&P listed above, construction of the Build Alternatives would result in physical modifications or reconstruction of several contributing elements to this railroad district. The exact list is pending, but this includes the A-line bridge over the James River and potential contributing resources in the Centralia area. Determinations on the structures to be modified as part of the Project are ongoing and will be reflected in the final designs. However, based on preliminary data, FRA's preliminary determination is that all Richmond area alternatives (Build Alternatives 6A through 6G) would have a Section 106 adverse effect on this resource and, because of the physical alterations to contributing elements, could result in a Section 4(f) use of the resource. Build Alternative 6F is the recommended Preferred Alternative in Alternative Area 6 as described in Chapter 7 of this Draft EIS.

Seaboard Air Line Railroad (SAL) Corridor (127-6271): This historic railroad corridor represents a competing rail enterprise to the ACL above. It is also eligible for the NRHP under Criterion A for its association with area transportation history. Similar to the ACL, work associated with improvements to the S-Line would include modifications to contributing elements to this resource, such as Main Street Station, the S-Line bridge over the James River, and other road and rail structures south of Richmond. Determinations on the structures to be modified as part of the undertaking are ongoing and will be reflected in the final designs. However, based on preliminary data, FRA's preliminary determination is that Build Alternatives 6A through 6G would have a Section 106 adverse effect on this resource and, because of the physical alterations to contributing elements, could result in a Section 4(f) use of the historic property. Build Alternative 6F is the recommended Preferred Alternative in Alternative Area 6 as described in Chapter 7 of this Draft EIS.

5.5 AVOIDANCE ALTERNATIVES

A feasible and prudent avoidance alternative avoids using Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweigh the importance of protecting the Section 4(f) property. In assessing the importance of protecting the Section 4(f) property, it is appropriate to consider the relative value of the resource to the preservation purpose of the statute. An alternative is not feasible if it cannot be built as a matter of sound engineering judgment. An alternative is not prudent if:

- It compromises the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need;
- It results in unacceptable safety or operational problems;
- After reasonable mitigation, it still causes:
  - Severe social, economic, or environmental impacts;
  - Severe disruption to established communities;
  - Severe disproportionate impacts to minority or low income populations; or
  - Severe impacts to environmental resources protected under other Federal statutes;
- It results in additional construction, maintenance, or operational costs of an extraordinary magnitude;

- It causes other unique problems or unusual factors; or
- It involves multiple factors that, while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

If FRA concludes that there is no feasible and prudent alternative to the use of Section 4(f) property, then it may approve only the alternative that causes the least overall harm in light of the statute's preservation purpose. The least overall harm is determined by balancing the following factors:

- The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property);
- The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection;
- The relative significance of each Section 4(f) property;
- The views of the official(s) with jurisdiction over each Section 4(f) property;
- The degree to which each alternative meets the purpose and need for the project;
- After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f); and
- Substantial differences in costs among the alternatives.

An avoidance alternative for an individual Section 4(f) resource used by the Project must be evaluated within the area of the Project where the resource is located. An avoidance alternative must not impact other Section 4(f) resources. The recommended Preferred Alternative will be comprised of a recommended Preferred Alternative option within each alternative area.

Avoidance alternatives are not required when a finding of *de minimis* use is made for Section 4(f) resources because Section 4(f) is satisfied once *de minimis* applies.

The following sections discuss the resources for which FRA recommends there is Section 4(f) use with one or more of the proposed Build Alternatives. The resources are discussed by the overall corridor first and then by Build Alternatives in alternative areas 1 through 6.

5.5.1 Summary of Preliminary Section 4(f) Use Determinations

FRA's preliminary determination is that there are up to 14 historic resources for which one or more of the Build Alternatives would result in a Section 4(f) use. None of these Section 4(f) resources is along Build Alternatives 1A, 1B, 1C, or 2A. There are two historic resources along Build Alternative 3B (Fredericksburg) with a potential Section 4(f) use. There are no feasible and prudent avoidance alternatives in Alternative Area 3. Depending on the resource, Build Alternatives 3A and 3C would be avoidance alternatives; however, Build Alternative 3A does not meet the Project Purpose and Need and Build Alternative 3C is not prudent and feasible due to extensive impacts and substantial costs. There are two historic resources with a potential Section 4(f) use along Build Alternative 4A. No avoidance alternatives were identified with Build Alternative 4A; therefore, the No Build Alternative would be the avoidance alternative. The No Build Alternative does not meet the Project Purpose and Need. Two resources along Build Alternatives 5B, 5B–Ashcake, and 5D-Ashcake have a potential Section 4(f) use. Build Alternatives 5A, 5A–Ashcake, 5C, and 5C–Ashcake would not result in a Section 4(f) use and, as such, would be the avoidance alternatives within this area. There are seven resources in Alternative Area 6 with a potential Section 4(f) use along one or more of the Build Alternatives. Due to extensive resources in Alternative Area 6 (Richmond), there is no avoidance alternative that would avoid all potential Section 4(f) use other than the No Build Alternative. The No Build Alternative does not meet the Project Purpose and Need. The RF&P Railroad extends through all six alternative areas. There is no avoidance alternative for this resource other than the No Build Alternative, which does not meet the Project Purpose and Need.

Chapter 7 of this Draft EIS identifies Build Alternatives 2A, 3B, 4A, and 6F as the recommended Preferred Alternatives in their respective alternative areas along the Project corridor. This Draft EIS does not identify a recommended Preferred Alternative in Alternative Areas 1 and 5. With the identification of recommended Preferred Alternatives in Areas 2, 3, 4 and 6, while remaining undetermined in Areas 1 and 5, FRA's preliminary determination is that there are up to 14 historic resources for which one or more Build Alternatives would result in a Section 4(f) use upon publication of this Draft EIS.

5.5.2 Entire DC2RVA Corridor

Richmond, Fredericksburg, & Potomac Railroad (076-0301): Given that the historic RF&P Railroad corridor extends between the Potomac River on the north and Main Street Station on the south, FRA's preliminary determination is that there is a permanent Section 4(f) use with all Build Alternatives in all six of the alternative areas with the exception of Build Alternatives 3A and 5A. Build Alternatives 3A and 5A do not add additional track or modify any structures within the existing rail corridor, but they do not comprise a complete alternative; therefore, they would not meet the Purpose and Need of the Project.

A total avoidance alternative is the only alternative that would avoid all Section 4(f) uses within the corridor. The only total avoidance alternative would be to not use the existing rail line, and this would not be feasible and prudent due to cost and extensive impacts to the human and natural environment.

5.5.3 Build Alternatives 1A, 1B, and 1C

FRA's preliminary determination is that Build Alternatives 1A, 1B, and 1C would not result in a Section 4(f) use, other than *de minimis*, for any resources other than the RF&P Railroad (076-0301) discussed in Section 5.5.2.

5.5.4 Build Alternative 2A

FRA's preliminary determination is that Build Alternative 2A would not result in a Section 4(f) use, other than *de minimis*, for any resources other than the RF&P Railroad (076-0301) discussed in Section 5.5.2. Chapter 7 of this Draft EIS identifies Build Alternative 2A as the recommended Preferred Alternative for Alternative Area 2 of the Project corridor.

5.5.5 Build Alternatives 3A, 3B, and 3C

FRA's preliminary determination is that Build Alternative 3A would not result in a Section 4(f) use. Build Alternative 3B would result in a Section 4(f) use from two historic resources. Build Alternative 3B is the recommended Preferred Alternative in Alternative Area 3 as described in

Chapter 7 of this Draft EIS. Build Alternative 3C does not result in any Section 4(f) uses and, as such, would be the avoidance alternative within Area 3; however, Build Alternative 3C is not a feasible and prudent alternative because it results in extensive impacts to wetlands, residential and commercial properties, and substantially higher costs and the cultural resource study only provided preliminary data. In addition to these historic resources, FRA's preliminary determination is that the Build Alternatives 3B and 3C also include certain *de minimis* uses of Section 4(f) resources, and Build Alternatives 3A, 3B, and 3C include use of the RF&P Railroad (076-0301) discussed in Section 5.5.2.

RF&P Bridge over Naomi Road (089-0080): This is the existing railroad bridge over Naomi Road. FRA's preliminary determination is that Build Alternative 3B would result in a Section 4(f) use of this resource. Avoidance alternatives must not modify the existing structure at all (including not adding an abutting structure) or not add an additional track. Build Alternatives 3A and 3C are avoidance alternatives for this resource. Build Alternative 3A is not a prudent and feasible alternative as it does not meet the Purpose and Need of the Project. Build Alternative 3C is not a feasible and prudent alternative because it results in extensive impacts to wetlands, residential and commercial properties, and substantially higher costs. Build Alternative 3B is the recommended Preferred Alternative for Alternative Area 3 as described in Chapter 7 of this Draft EIS and would result in a use of this resource.

Site 44SP0187: This archaeological site is located under the existing bridge and FRA's preliminary determination is that Build Alternative 3B would result in a Section 4(f) use due to construction of a new bridge. There are no other avoidance alternatives other than utilizing a new alignment, not modifying the existing structure at all (including not adding an abutting structure), or not adding an additional track. The avoidance alternatives are Build Alternatives 3A and 3C as discussed above. Build Alternative 3A is not a prudent and feasible alternative as it does not meet the Purpose and Need of the Project. Build Alternative 3C is not a feasible and prudent alternative because it results in extensive impacts to wetlands, residential and commercial properties, and has substantially higher costs. Build Alternative 3B is the recommended Preferred Alternative for Alternative Area 3 as described in Chapter 7 of this Draft EIS and would result in a use of this resource.

5.5.6 Build Alternative 4A

FRA's preliminary determination is that Build Alternative 4A would result in a Section 4(f) use of two historic resources along the existing tracks. In addition to these historic resources, FRA's preliminary determination is that Build Alternatives 4A also includes certain *de minimis* uses of Section 4(f) resources, as well as use of the RF&P Railroad (076-0301) discussed in Section 5.5.2. Build Alternative 4A is the recommended Preferred Alternative for Alternative Area 4 as described in Chapter 7 of this Draft EIS and would result in a use of these resources.

Doswell Historic District (042-5448): Because the district is located on both sides of the existing tracks, there is no avoidance alternative other than the No Build Alternative. The No Build Alternative is not a prudent and feasible alternative because it does not meet the Purpose and Need of the Project.

Squashapenny Junction Store (042-0470): This resource is located within the Doswell Historic District. Impacts to individually eligible historic resources within the district were minimized to the greatest extent feasible. Any shifts to avoid this resource would result in impacts to other resources. Similar to the Doswell Historic District, there is no feasible and prudent avoidance alternative.

5.5.7 Build Alternatives 5A, 5A–Ashcake, 5B, 5B–Ashcake, 5C, 5C–Ashcake, and 5D–Ashcake

FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake which add a third track through Ashland, would result in a Section 4(f) use of two historic resources along the existing tracks. Build Alternatives 5A, 5A–Ashcake, 5C, and 5C–Ashcake, which do not add a third track through Ashland, would not result in a Section 4(f) use of these resources and, as such, would be the avoidance alternatives within this segment. In addition to these historic resources, FRA's preliminary determination is that the Build Alternatives in Alternative Area 5, with the exception of Build Alternative 5A, also include certain *de minimis* uses of Section 4(f) resources, as well as use, or *de minimis* use, of the RF&P Railroad (076-0301) discussed in Section 5.5.2. This Draft EIS does not identify a recommended Preferred Alternative for Alternative Area 5; therefore, FRA will defer determination of use of the resources in this area to the Final EIS.

Ashland Historic District (166-0001): FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake, which add a third track through Ashland, would result in a Section 4(f) use of this historic district. The historic district is located on both sides of the existing tracks. Build Alternatives 5A and 5A–Ashcake, which do not add additional track, and Build Alternatives 5C and 5C–Ashcake, which are a bypass on new alignment, would be the avoidance alternatives.

Ashland Station Depot (166-0001-0008): FRA's preliminary determination is that Build Alternatives 5B, 5B–Ashcake, and 5D–Ashcake, which add a third track through Ashland, would result in a Section 4(f) use of this resource. Build Alternatives 5A and 5A–Ashcake, which do not add additional track, and Build Alternatives 5C and 5C–Ashcake, which are a bypass on new alignment, would be the avoidance alternatives.

5.5.8 Build Alternatives 6A, 6B–A-Line, 6B–S-Line, 6C, 6D, 6E, 6F, and 6G

FRA's preliminary determination is that Build Alternative 6A would result in a Section 4(f) use of three historic resources; Build Alternatives 6B–A-Line and 6C would result in a Section 4(f) use of four historic resources; Build Alternative 6B–S-Line would result in the highest number of Section 4(f) uses of seven historic resources; Build Alternatives, 6D, 6F, and 6G would result in a Section 4(f) use of six historic resources; and Build Alternative 6E would result in a Section 4(f) use of two historic resources.

Due to the extensive resources in Alternative Area 6, there is no avoidance alternative that would avoid all Section 4(f) use other than the No Build Alternative. The No Build Alternative does not meet the Project Purpose and Need and, therefore, is neither feasible nor prudent. Chapter 7 of this Draft EIS identifies Build Alternative 6F as the recommended Preferred Alternative for Alternative Area 6, which includes certain use, or *de minimis* use, of Section 4(f) resources described below, as well as use of the RF&P Railroad (076-0301) discussed in Section 5.5.2.

Science Museum of Virginia (127-0226): FRA's preliminary determination is that Build Alternatives 6B–A-Line, 6B–S-Line, and 6C, which serve new stations on either Boulevard or Broad Street, would result in a Section 4(f) use of this resource due to the new Broad Street station or installation of new structures with accompanying new road patterns. All other Build Alternatives would result in no use. Chapter 7 of this Draft EIS identifies Build Alternative 6F as the recommended Preferred Alternative for Alternative Area 6; therefore, use of this resource would be avoided.

Main Street Station and Trainshed (127-0172): FRA's preliminary determination is that Build Alternatives 6A, 6B–A-Line, 6B–S-Line, and 6C could result in a Section 4(f) use to this resource due to the discontinuation of passenger rail service at the station. Build Alternatives 6D, 6F, and 6G would result in a Section 4(f) use to this resource due to physical alterations of the station. Build Alternative 6E would result in *de minimis* impacts. There is no prudent and feasible avoidance alternative for this resource. Chapter 7 of this Draft EIS identifies Build Alternative 6F as the recommended Preferred Alternative for Alternative Area 6, which will result in a use of this resource.

Sites 44HE1098, 44HE1097, and 44HE1095: These sites would be impacted due to piers for new Main Street Station platforms. FRA's preliminary determination is that Build Alternatives 6B–S-Line, 6D, 6F, and 6G, which expand intercity passenger rail service at Main Street Station, would result in a Section 4(f) use to these three resources. All other Build Alternatives would result in no use or *de minimis* impacts. There is no prudent and feasible avoidance alternative for these resources. Chapter 7 of this Draft EIS identifies Build Alternative 6F as the recommended Preferred Alternative for Alternative Area 6, which will result in a use of this resource.

Atlantic Coast Line (ACL) Railroad Corridor (127-6251): FRA's preliminary determination is that all Build Alternatives would result in a Section 4(f) use of this resource. There is no avoidance alternative. Although use of the S-Line would minimize impacts to the A-Line, impacts to the A-Line cannot be avoided. Chapter 7 of this Draft EIS identifies Build Alternative 6F as the recommended Preferred Alternative for Alternative Area 6, which will result in a use of this resource.

Seaboard Air Line (SAL) Railroad Corridor (127-6271): FRA's preliminary determination is that all Build Alternatives would result in a Section 4(f) use of this resource. There is no avoidance alternative. Although use of the A-Line would minimize impacts to the S-Line, impacts to the S-Line cannot be avoided. Chapter 7 of this Draft EIS identifies Build Alternative 6F as the recommended Preferred Alternative for Alternative Area 6, which will result in a use of this resource.

5.6 MEASURES TO MINIMIZE HARM

Section 4(f), as applied by FRA and in this document, requires a description of the measures undertaken to minimize harm where the preferred alternatives would result in a Section 4(f) use. Minimization measures are not required when a finding of *de minimis* use is made for Section 4(f) resources because Section 4(f) is satisfied once *de minimis* applies.

FRA's preliminary determination is that all impacts to parklands, recreational areas, and wildlife refuges will result in *de minimis* impacts; therefore, no further minimization measures are required.

Eleven historic resources located along the recommended Preferred Alternative wherein a Section 4(f) use would occur were evaluated to minimize harm by the Project (presented below in north to south order). The minimization measures presented here only comprise efforts to date and do not represent the full suite of measures that will ultimately be undertaken by the Project during final design. They represent consultation to date based on coordination with FRA, DHR, cooperating agencies, and consulting parties.

5.6.1 RF&P Bridge over Naomi Road (089-0080)

This is the existing railroad bridge over Naomi Road, located within the APE for Build Alternative 3B. The current bridge is a double-vault arched structure constructed in 1931. Designs associated with the recommended Preferred Alternative require the replacement of this structure, resulting in a Section 4(f) use. Project engineers explored numerous options to incorporate the existing structure into the Project design, including reinforcing the current structure, widening the structure, and encasing the structure within a new bridge system; none of these options met engineering standards and safety protocols required by the Project design. Mitigation for the use of this structure, inclusive of all comments received from cooperating agencies and consulting parties, will be included in the Project Memorandum of Agreement (MOA). The mitigation stipulations will outline steps to minimize harm.

5.6.2 Site 44SP0187 (Stone Piers)

Site 44SP0187 comprises a set of stone piers located within and directly adjacent to the Rappahannock River, just east of the rail trestle, in Fredericksburg. The piers may represent a mill once located in this area or be associated with the pre-1927 rail bridge, but additional research is needed to determine their exact use. The footprint of the site overlaps with the construction footprint for the new Rappahannock River rail bridge required as part of Build Alternative 3B. Construction of the bridge, and more specifically the approach to the structure, would physically impact significant archaeological deposits. Project engineers inspected alternatives to the currently designed bridge and approach to minimize harm to this archaeological site; however, other approaches caused greater disturbances to nearby historic properties. The footprint of the impact was lessened to the greatest extent possible to minimize impacts on the site. Mitigation of the impacts will be included in the MOA, likely to include additional archival research and a data recovery excavation.

5.6.3 Doswell Historic District (042-5448)

The Doswell Historic District is located at the intersection of the main rail corridor (historic RF&P) and the Buckingham Branch Railroad as part of Build Alternative 4A. The community developed around the two railroads, including a store, a bank, an inn, and numerous dwellings. The current rail station and associated track house were built in 1929. The district straddles the extant rail line and, as such, the Project runs through the center of the district. Project engineers have worked closely in this area to refine Project plans to minimize impacts to the district. Original design concepts ranged from a rail bridge spanning the historic district to enlarging the intersection to accommodate additional rail traffic. The engineering team conducted charrettes on the design of the rail in this location attended by DRPT. The resulting plans are greatly reduced and minimize the footprint in this area to the maximum extent practicable. Plans for utilities were also minimized to limit impacts.

Despite these efforts, the rail would be widened on the east side of the railroad right-of-way in the vicinity of Squashapenny Junction Store—the original general store for the Doswell community. The store was purposefully built directly adjacent to the tracks to facilitate the movement of goods to and from the rail cars that stopped at the nearby station. Widening of the rails may require removal of the store or an associated outbuilding, which is a contributing element to the historic district. DRPT held meetings with the public to discuss the current design on June 1-3, 2015, and December 8-10, 2015. In addition, Hanover County is a consulting party to the Project, and their comments have been solicited for the cultural resource studies. Their comments, as well as those of all other consulting parties and cooperating agencies, will be included in the development of the Project MOA. The stipulations outlined to mitigate adverse effects will highlight efforts to minimize harm.

5.6.4 Squashapenny Junction Store (042-0470)

Squashapenny Junction Store, as mentioned above, is located in the Doswell Historic District as part of Build Alternative 4A. It is immediately east of the extant rail tracks and north of Doswell Road. The store property was designed to abut the rail tracks and face onto the main road through town to maximize exposure and accessibility for rail passengers and goods arriving by the rail system. Although DRPT has thoroughly revisited the design schematics for this area to minimize impacts, the limits of disturbance still extend onto the Squashapenny property, and relocation of the store is possible. A new utility line may also be installed under a contributing outbuilding and through the western edge of the property. Original plans for the Project included removal of the outbuilding for utility installation, but avoidance plans are now underway to minimize the impacts to the built environment.

As with the larger Doswell Historic District, discussions are ongoing with the public and consulting parties regarding additional ways to minimize harm to this resource. The historic property will be included in the Project MOA, and stipulations to mitigate any adverse effects will be clearly outlined.

5.6.5 Site 44HE1098 (Main Street Station Parking) and Site 44HE1097 (Railroad, Warehouse)

Both of these resources are archaeological sites located within and adjacent to the west side of Main Street Station. They are currently covered in pavement and used as parking lots. The exact details of the subsurface integrity of the sites, as well as their temporal associations, are not known; additional research is needed. These two sites will be impacted by construction associated with Build Alternative 6F, the recommended Preferred Alternative identified in Chapter 7 of this Draft EIS, which requires new structural supports for an expanded rail platform. Construction of the supports will require subsurface disturbances within the mapped boundary of each site, thus removing significant archaeological data. Project engineers have worked to minimize the footprint of each structural support and place the supports as close to the existing structural system as possible. These actions have minimized the footprint of the Project impacts on these sites, but disturbances are still anticipated. Mitigation of the impacts will be included in the MOA, likely to include additional archival research and a data recovery excavation.

5.6.6 Main Street Station Trainshed (127-0172)

Main Street Station was built in 1901 as the main terminal for the SAL, a competitor to the ACL. Both lines ran from Richmond to Florida during the first half of the twentieth century, capitalizing on America's desire for travel during this period. The property includes the Beaux Arts-style station as well as the associated trainshed, platform, and other landscape elements. Build Alternative 6F, the recommended Preferred Alternative identified in Chapter 7 of this Draft EIS, has the potential to diminish the characteristics that render this property eligible for the NRHP due to modifications to the building, platform, trainshed, and other contributing elements.

The area around Main Street Station was the subject of numerous meetings between the Project team, the City of Richmond, other cooperating agencies, consulting parties, and the public. Build Alternative 6F would minimize harm to this historic property as it will have the least amount of impacts to this resource. In addition, Project engineers worked to minimize the extent of the changes to the resource and its contributing elements by making the footprint of the changes as minimal as possible, reducing the size of the new platforms as they could, and committing to include specific design criteria in the final designs to minimize harm to this resource. Stipulations related to this resource will be included in the Project MOA, including mitigating effects to the resource and criteria to ensure a sympathetic design to any new construction associated with this resource.

5.6.7 Site 44HE1095 (Storage Facility)

Site 44HE1095 is located south of Main Street Station. The site represents a possible warehouse/storage facility dating to the nineteenth century. Additional research is needed to determine its exact use and temporal association. The site will be impacted by construction associated with Build Alternative 6F, the recommended Preferred Alternative identified in Chapter 7 of this Draft EIS, which requires new structural supports for an expanded rail platform. Construction of the supports will require subsurface disturbances within the mapped boundary of the site, thus disturbing significant archaeological deposits. Project engineers have worked to minimize the footprint of each structural support. While these actions have minimized the footprint of the Project impacts on the site, disturbances to significant archaeological deposits are still anticipated. Mitigation of the impacts will be included in the MOA, likely to include additional archival research and a data recovery excavation.

5.6.8 Richmond, Fredericksburg, and Potomac Railroad (076-0301)

The recommended Preferred Alternative is parallel to, and in some instances encapsulates, the historic RF&P Railroad corridor between the Potomac River on the north and Main Street Station on the south. The design team has minimized impacts on the extant rail corridor to the maximum extent practicable through retention of the general alignment, maintenance of existing tracks, and minimizing the limits of disturbance (LOD) outside of the current right-of-way. Project impacts come through replacement of several contributing bridges and culverts—replacements that are required to bring the alignment in compliance with current safety standards and operational protocols. Steps to mitigate the adverse impacts will be stated in the Section 106 MOA.

5.6.9 Atlantic Coast Line Railroad (ACL) Corridor (127-6251)

The ACL Corridor includes the linear railroad footprint from what was Broad Street Station (now the Science Museum of Virginia) to the south to cross the James River. It merged with the main line in Centralia and continued to Florida. Today, this is referred to as the “A-Line.” The ACL and SAL (see below) merged in 1967. Like the RF&P, the rail corridor as a historic property includes the rail alignment itself, as well as numerous bridges, culverts, track houses, rail stations, and more. DRPT has sought out engineering solutions to avoid or minimize impacts to contributing elements to the rail district; however, due to the nature of the current Project—parallel to this historic rail alignment—some impacts will be unavoidable. In order to meet modern safety standards and proposed operational functions, all of the alternatives will require removal or replacement of some elements, most notably bridges and culverts, that contribute to the significance of this resource. FRA’s preliminary determination is that improvements associated with Build Alternatives 6A through 6G will result in a use of the ACL Corridor. Chapter 7 of this Draft EIS identifies Build Alternative 6F as the recommended Preferred Alternative for Alternative Area 6, which will result in a use of this resource. Minimization of the adverse effects will be outlined in the Project MOA.

5.6.10 Seaboard Air Line Railroad (SAL) Corridor (127-6271)

The SAL was a competing company to the ACL. This operation also ran between Richmond and Florida, commencing at Main Street Station and crossing the James River, then running parallel to the ACL before veering west in Petersburg. When the ACL and SAL merged in 1967, trains for the new company operated out of both Broad Street Station and Main Street Station and shared the same tracks. Known today as the “S-Line,” this historic property is composed of the rail itself, stations, track houses, and structures. As with the RF&P and the ACL, DRPT vigorously sought to minimize harm by narrowing the LOD where possible, maintaining historic bridges, and reusing the extant corridor. Despite these efforts, several structures—and Main Street Station itself—require modifications to meet ridership needs and safety features. As such, avoidance of all contributing elements is not possible. FRA’s preliminary determination is that improvements associated with Build Alternatives 6A through 6G will result in a use of the SAL Corridor. Chapter 7 of this Draft EIS identifies Build Alternative 6F as the recommended Preferred Alternative for Alternative Area 6, which will result in a use of this resource. Due to the adverse effect/use of the property, the Project MOA will contain stipulations to mitigate the harm.

5.7 COORDINATION

DRPT coordinated with numerous property owners and officials with jurisdiction over resources protected under Section 4(f) and further coordination will take place as necessary. Additional coordination with owners and officials with jurisdiction over impacted parkland and recreational areas will take place after issuance of the Draft EIS. If FRA determines that the Project will result in a Section 4(f) use and there are no feasible and prudent alternatives, FRA will provide individual Section 4(f) evaluations to the U.S. Department of Interior (DOI) Office of Environmental Compliance and Policy for review and concurrence with the Final EIS.

5.7.1 Consulting Parties

While FRA continued to be the primary point of contact for all federally recognized tribes, FRA delegated state agency and consulting party coordination to DRPT in 2014. As such, DRPT sent invitation letters to agencies, local governments, and other stakeholders in the Section 106 consultation process. FRA sent a letter to the one federally recognized tribe along the DC2RVA corridor—Pamunkey Indian Tribe. Table 5.7-1 provides information on the 39 distributed consulting party invitations. Of these, 14 have elected to participate in the process; Table 5.7-1 lists these groups, along with their response dates. For an additional six, DRPT assumed that they would want to participate and has treated them as consulting parties. Although a formal response was not received from these six groups, they have requested participation on similar projects and have shown a noted interest in the current undertaking through telephone calls or attendance at associated meetings. These six are noted by “assumed yes” in the table on the next page.

Table 5.7-1: List of Invited Consulting Parties

Stakeholder	Invite Letter Date	Response (Date)
American Battlefield Protection Program (ABPP)	January 6, 2015	Assumed Yes
NPS–Fredericksburg	January 6, 2015	Assumed Yes
NPS–National Capital Region	January 6, 2015	Assumed Yes
Quantico Marine Corps Base	January 6, 2015	Assumed Yes
NPS–Washington-Rochambeau NHT	January 22, 2015	Assumed Yes
Pamunkey Indian Tribe[1]	April 17, 2017	Assumed Yes
City of Fredericksburg	January 6, 2015	Yes (January 12, 2015)
NPS–Richmond	January 6, 2015	Yes (January 14, 2015)
Arlington County	January 6, 2015	Yes (January 14, 2015)
City of Richmond	January 6, 2015	Yes (January 16, 2015)
Alexandria Archaeology	January 6, 2015	Yes (January 21, 2015)
Ashland Museum	January 6, 2015	Yes (January 21, 2015)
NPS–Captain John Smith Chesapeake NHT	January 6, 2015	Yes (January 22, 2015)
Central Virginia Battlefields Trust	January 6, 2015	Yes (January 22, 2015)
Historic Fredericksburg Foundation, Inc.	January 6, 2015	Yes (January 9, 2015)
Civil War Trust	January 6, 2015	Yes (February 11, 2015)
Prince William County	January 6, 2015	Yes (February 13, 2015)
Caroline County	January 6, 2015	Yes (February 3, 2015)
Hanover County	January 6, 2015	Yes (February 3, 2015)
NPS–Potomac Heritage National Scenic Trail	January 22, 2015	Yes (March 4, 2015)
City of Alexandria	January 6, 2015	No reply received
Fairfax County	January 6, 2015	No reply received
Henrico County	January 6, 2015	No reply received
Spotsylvania County	January 6, 2015	No reply received
Stafford County	January 6, 2015	No reply received
ACL & SAL Railroad Historical Society	January 6, 2015	No reply received
Center for Neighborhood Revitalization	January 6, 2015	No reply received
Arlington Historical Society	January 6, 2015	No reply received
Caroline Historical Society	January 6, 2015	No reply received
Chesterfield Historical Society	January 6, 2015	No reply received
Hanover County Historical Society, Inc.	January 6, 2015	No reply received
Henrico County Historical Society	January 6, 2015	No reply received
Historic Alexandria Foundation	January 6, 2015	No reply received
Historic Prince William, Inc.	January 6, 2015	No reply received
Historic Richmond Foundation	January 6, 2015	Yes (December 2016)
Historical Society of Fairfax County, Virginia, Inc.	January 6, 2015	No reply received
National Trust for Historic Preservation	January 6, 2015	Yes (December 22, 2016)
Stafford County Historical Society	January 6, 2015	No reply received
Catawba Indian Tribe	January 6, 2015	No reply received

Note: 1. The letter to the Pamunkey Indian Tribe was sent by FRA. The Pamunkey were not a federally recognized tribe at the time the initial letters were disseminated. They were recognized at a later date, at which time the FRA invited them to participate.

5.7.2 Meetings

DRPT has held several in-person and telephone-based meetings with DHR, ACHP, and other consulting parties. They included a Section 106 kick- off and several follow-up meetings to update participating agencies and parties on the Project initiation; determination of APE; cultural resource methodology for the reconnaissance predictive model, identification surveys, and evaluation studies; survey results; Project effect on historic properties; stipulations to mitigate adverse effects; and crafting the Project MOA. Table 5.7-2 highlights the meetings held with these groups.

Table 5.7-2: Section 106 and Section 4(f) Meetings

Date	Attendees	Topics
November 7, 2014	DHR, DRPT	Kick-off meeting; discussions on APE, methodology, reporting
March 19, 2015	VDOT, DRPT	Roadway bridges and Section 106 coordination
February 18, 2016	DHR	Update on corridor and status of studies
June 14, 2016	Civil War Trust	General discussion on results to date; Richmond to Raleigh Memorandum of Agreement
August 10, 2016	DHR	Preliminary dialogue on historic properties and project effect
TBD	FRA, DRPT, DHR	Project PA; mitigation of adverse effects
TBD	FRA, DRPT, Consulting Parties, DHR, ACHP	Review of studies and discussion of historic properties and Project effect

5.7.3 Correspondence

Since the Project's initiation, repeated correspondence has occurred between DRPT and the cultural resource agencies, localities, and consulting parties to keep them informed on the progress of the studies, resource eligibility, and the Project's potential effects on historic properties, and DRPT will continue to hold meetings at milestones or as necessary throughout the Project. In particular, meetings and e-mail exchanges with DHR have occurred regularly to provide information on Project plans. Data on the study results in specific Project areas were also sent to corresponding consulting parties to garner comments on the Project results. The architectural reports were posted on the Project's webpage for general public comment as well. The archaeological reports were only distributed to the agencies, localities, and consulting parties as requested due to the sensitivity of site location mapping. Table 5.7-3 includes correspondence conducted to date and lists the additional anticipated correspondence that will occur at Project milestones as required. Copies of relevant correspondence are included in Appendix R, *Cultural Resources Reports* and Appendix U, *Section 106 and 4(f) Coordination Documents*.

Table 5.7-3: Project Correspondence

Date	Medium	Recipient	Topic
September 25-October 15, 2014	E-mail; Letter	DHR, FRA, DRPT	Initiation of Section 106 Process
January 5-February 2, 2015	E-mail, Letter	DHR, FRA, DRPT	Defining Project APE
June 8, 2015	E-mail	VDOT	VDOT/DHR PA on Historic Bridges
June 22, 2015	Letter	Civil War Trust, DRPT	Receipt of comments on Project screening review

▶ *Continued*

Table 5.7-3: Project Correspondence

Date	Medium	Recipient	Topic
July 30, 2015	E-mail	Consulting Parties, DRPT	Distribution of Archaeological Predictive Model report for review
July 17, 2015; August 28, 2015	Letter, E-mail	DHR	Submittal of Archaeological Predictive Model Report; DHR Reply
August 3-September 4, 2015	E-mail	Arlington County, City of Alexandria, Prince William County, City of Fredericksburg, DRPT	Receipt of comments on Archaeological IA Predictive model
August 28, 2015	E-mail	Consulting Parties, DRPT	Reminder to submit comments on Predictive Model Report
October 20, 2015; December 18, 2015	Letters	NPS (FSNMP)	*Archaeological Resources Protection Act* (ARPA) permit to dig on federal land (Segment 7)
December 9, 2015; February 5,2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segment 7); DHR Reply
December 15, 2015	Letter	DHR	Application to conduct archaeology on state lands (Segment 11)
March 18-31, 2016	E-mail; Memo	DHR	Discussion of alternative methodology for architecture in Segment 18
April 13-April 26, 2016	E-mail	David Hamilton (Consulting Party), DHR, DRPT, FRA	Mr. Hamilton is a private property owner along the Ashland Bypass. Numerous emails were exchanged with Mr. Hamilton regarding his concerns, his position as a consulting party, and distributing Project data
May 20, 2016; June 8, 2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segment 6); DHR Reply
May 31, 2016; June 22, 2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segment 3); DHR Reply
May 31, 2016; June 22, 2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segment 4); DHR Reply
June 21, 2016; June 28, 2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segments 8-9); DHR Reply
July 6, 2016; July 22, 2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segment 1); DHR Reply
July 6, 2016; July 15, 2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segment 2); DHR Reply
July 25, 2016; August 15, 2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segments 10-12); DHR Reply
December 21, 2016; February 21, 2017	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segment 13); DHR Reply
August 3, 2016; August 22, 2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segment 14); DHR Reply
October 21, 2016; November 30, 2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segments 15, 16, 20); DHR Reply
November 14, 2016; December 22, 2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segments 17, 19); DHR Reply
October 21, 2016; November 3, 2016	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Segment 18); DHR Reply
January 20, 2017; March 1, 2017	Letter, E-mail	DHR	Submittal of Architectural Phase I Report (Structures); DHR Reply
February 24, 2017; TBD	E-mail	Consulting Parties	Distribution of Architectural Reports for Review; Consulting Party Comments

▶ *Continued*

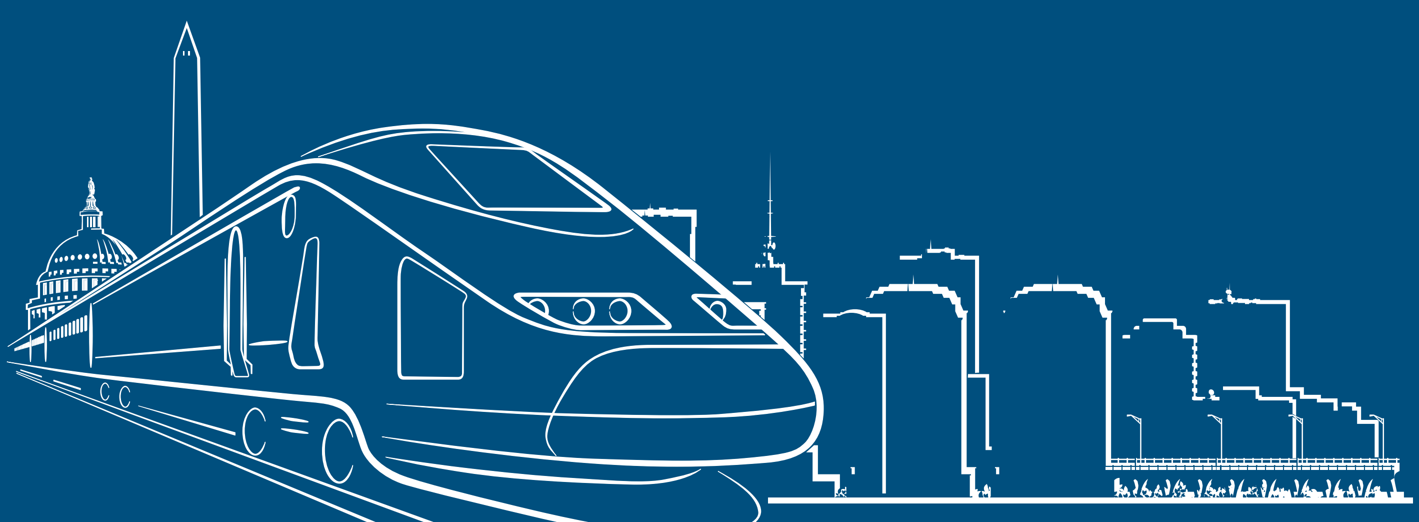
Table 5.7-3: Project Correspondence

Date	Medium	Recipient	Topic
April 14, 2017; TBD	Letter	Consulting Parties	Distribution of All Phase IA and IB Reports for Review; Consulting Party Comments
September 6, 2016; October 11, 2016	Letter, E-mail	DHR	Submittal of Archaeological Phase I Report (Segments 1-20); DHR Reply
January 20, 2017; February 3, 2017	Letter, E-mail	DHR	Submittal of Phase IA Fredericksburg Bypass Report; DHR Reply
January 6, 2017; February 3, 2017	Letter, E-mail	DHR	Submittal of Phase IA Ashland Bypass Report; DHR Reply
TBD	Letter, E-mail	DHR	Submittal of LOD Expansion Areas Report; DHR Reply
TBD	E-mail	Consulting Parties	Distribution of LOD Expansion Areas Report for Review; Consulting Party Comments
TBD	Letter, E-mail	DHR	Submittal of Architectural Phase II Report; DHR Reply
TBD	E-mail	Consulting Parties	Distribution of Architectural Phase II Report for Review; Consulting Party Comments
TBD	Letter, E-mail	DHR	Submittal of Project Effects Letter; DHR Reply
TBD	E-mail	Consulting Parties	Distribution of Project Effects Letter for Review; Consulting Party Comments
TBD	Letter, E-mail	DHR	Submittal of Draft MOA for Review
TBD	E-mail	Consulting Parties	Distribution of Draft MOA for Review; Consulting Party Comments

5.8 FINAL SECTION 4(f) EVALUATION

The Final Section 4(f) Evaluation will be completed for the Final EIS for the Project. Included will be an analysis to determine the Preferred Alternative in each of the six alternative areas of the Project that has the least overall harm on Section 4(f) resources. All possible planning measures to minimize harm to Section 4(f) resources will be undertaken and documented in this evaluation.

6 PUBLIC INVOLVEMENT AND AGENCY COORDINATION



D.C. TO RICHMOND SOUTHEAST HIGH SPEED RAIL

6 PUBLIC INVOLVEMENT AND AGENCY COORDINATION

This chapter presents the public involvement and agency coordination activities for the Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA) Tier II Draft Environmental Impact Statement (EIS). The Virginia Department of Rail and Public Transportation (DRPT) and the Federal Railroad Administration (FRA) employed many forms of outreach to engage diverse audiences, inform them of the Draft EIS, and offer a variety of ways to contribute their input. Coordination began early and continued throughout the development and publication of the Draft EIS. The first major public involvement and agency outreach event was the Project scoping, which occurred in fall 2014. The Scoping Summary Report in Appendix V contains more information on the scoping outreach process and input received during the Project scoping. The public involvement and agency coordination efforts that followed the initial scoping activities are described in detail in the following sections.

6.1 PUBLIC INVOLVEMENT

Based on the geographic extent of the Project, DRPT implemented an extensive public involvement process to keep the public informed with the latest Project information and to provide the public with opportunities to ask questions, comment, and inform the Draft EIS. The Scoping Summary Report in Appendix V includes examples of the public outreach materials distributed during the Project.

The public involvement was based on several key Project milestones, including:

- Scoping
- Alternatives Development
- Alternatives Review
- Draft EIS

6.1.1 Project Launch

On October 6, 2014, 30 days in advance of the first public scoping meeting, DRPT initiated the Project's public outreach to alert the public, agencies, and media of the Project's inception. Public outreach announcements for the launch were developed in addition to public outreach announcements for Scoping. This section describes the Project launch outreach. Project Scoping outreach and education efforts included more print and electronic outreach to diverse groups and is described in the sections that follow.

An initial group of web "splash" pages, launched on October 6, 2014, announced the kick-off of the Project, promoted the website as a way to stay informed about the Project, offered a brief description of the Project, provided a way to join the mailing list, encouraged visitors to take a brief initial survey, and provided details of the upcoming public scoping meetings.

DRPT developed an electronic survey to obtain initial information from respondents, including sources of their news and information, most convenient times for public meetings, their current usage of rail, and how they perceive the benefits of rail. Demographic information was also collected as part of the survey. The survey was available via a link on the Project website splash page from October 6 to October 20, 2014.

Social media accounts were established and became live for posting on October 6, 2014 to coincide with the Project's public outreach launch.

A database for the Project was compiled at the initiation of the study to track landowner and stakeholder contacts, comments, and meetings. DRPT distributed an email message on October 6, 2014 to 983 contacts in the Project database—including Title VI advocacy groups, ethnic groups, social service groups, and community groups—to announce the Project kick-off, to promote the Project website, and to direct the recipients to the Project splash page.

DRPT also distributed an initial press release to key local and regional print and electronic media—including a Spanish version to limited English proficiency media outlets—to announce the Project kick-off and to begin to familiarize the public and the media with the study process. The releases yielded 20 known news stories that ran in print and broadcast media informing the public of the Project kick off. DRPT shared emails and press releases with regional public information officers, Metropolitan Planning Organizations (MPOs), and social service/Title VI advocacy groups requesting they share the information with their groups.

In addition to electronic media and the press releases, a Project brochure was produced and distributed to regional libraries, faith groups, transportation agencies, chambers of commerce, and elected officials encouraging them to share this important information with their communities and customers.

All materials from these meetings, as well as the Scoping Summary Report, were posted on the Project website. The report summarized the scoping process, meetings, Project launch, and input received from the public and agencies during the scoping period (Appendix V).

The Project launch included formal publication by FRA of a Notice of Intent (NOI) for the Project in the *Federal Register* on October 23, 2014.

6.1.2 Newspaper and Online Advertising

DRPT placed multiple advertisements in local and regional newspapers and specialty newspapers along the Project corridor prior to each round of public meetings as indicated in Table 6.1-1. Ads placed in Hispanic newspapers were translated to Spanish. Electronic, interactive ads were placed in conjunction with the print ads on the Free-Lance Star and Richmond Times Dispatch websites and also through the Washington Post Digital advertising to reach people through news sites and other partner websites in the Project area.

Table 6.1-1: Newspaper Advertising

Phase	Region	Newspaper	Date
Scoping	Northern Virginia	Virginia Press Association (31 newspapers with approximately 300,000 circulation)	10/26/2014
Scoping	Richmond and Fredericksburg	Nuevas Raices (Hispanic)	10/28/2014
Scoping	Richmond	Richmond Times Dispatch	10/28/2014
Scoping	Northern Virginia/ Washington, D.C.	Washington Post Express (Commuter Edition)	10/28/2014
Scoping	Richmond	Richmond Free Press (African American)	10/30/2014
Scoping	Northern Virginia/ Washington, D.C.	El Tiempo (Hispanic)	10/31/2014
Scoping	Fredericksburg	Free Lance-Star	10/31/2014
Scoping	Richmond	Richmond Times Dispatch	11/3/2014
Scoping	Fredericksburg	Free Lance-Star	11/7/2014
Alternatives Development	Northern Virginia	Virginia Press Association	5/31/15 - 6/6/15
Alternatives Development	Fredericksburg	Free Lance-Star	5/22/2015
Alternatives Development	Fredericksburg	Free Lance-Star—online	5/22/2015
Alternatives Development	Richmond and Fredericksburg	Nuevas Raices	5/26/2015
Alternatives Development	Richmond	Richmond Times Dispatch	5/26/2015
Alternatives Development	Richmond	Richmond Times Dispatch—online	5/26/2015
Alternatives Development	Northern Virginia/ Washington, D.C.	Washington Post Express	5/26/2015
Alternatives Development	Richmond	Richmond Free Press	5/28/2015
Alternatives Development	Northern Virginia/ Washington, D.C.	El Tiempo	5/29/2015
Alternatives Development	Fredericksburg	Free Lance-Star	5/29/2015
Alternatives Development	Fredericksburg	Free Lance-Star—online	5/29/2015
Alternatives Development	Richmond	Richmond Times Dispatch	5/31/2015
Alternatives Development	Richmond	Richmond Times Dispatch—online	5/31/2015
Alternatives Review	Fredericksburg	Free Lance-Star	11/23/2015
Alternatives Review	Fredericksburg	Free Lance-Star—online	11/23/2015
Alternatives Review	Richmond	Richmond Times Dispatch	11/23/2015
Alternatives Review	Richmond	Richmond Times Dispatch—online	11/23/2015

▶ *Continued.*

Table 6.1-1: Newspaper Advertising

Phase	Region	Newspaper	Date
Alternatives Review	Northern Virginia/ Washington, D.C.	El Tiempo	11/27/2015
Alternatives Review	Northern Virginia/ Washington, D.C.	Washington Post Express	11/30/2015
Alternatives Review	Richmond and Fredericksburg	Nuevas Raices	12/1/2015
Alternatives Review	Richmond	Richmond Free Press	12/3/2015
Alternatives Review	Fredericksburg	Free Lance-Star	12/6/2015
Alternatives Review	Fredericksburg	Free Lance-Star—online	12/6/2015
Alternatives Review	Richmond	Richmond Times Dispatch	12/6/2015
Alternatives Review	Richmond	Richmond Times Dispatch—online	12/6/2015
Alternatives Review	Northern Virginia/ Washington, D.C.	Washington Post Express	12/7/2015
Alternatives Review	Northern Virginia/ Washington, D.C.	Virginia Press Association	11/29/15–12/5/15
Alternatives Review	Northern Virginia/ Washington, D.C.	Washington Post Digital/Web-based	11/20/15–12/10/15

6.1.3 Targeted Title VI outreach

At the beginning of the Project, DRPT researched Title VI audiences to identify groups for targeted Title VI outreach over the course of the Project. These groups included human service organization and faith leaders, Hispanic organizations, the National Association for the Advancement of Colored People (NAACP), transit organizations, public information officers, librarians, and social service organizations. In addition, DRPT contacted all MPOs within the 123-mile corridor to augment the Project information distribution process through their own Title VI outreach lists and committees. DRPT also notified elected officials and provided them with Project information to share with their constituents. As the Project advanced, the Title VI list was further enhanced to incorporate information gathered on Environmental Justice areas as the alternatives were refined. Email notifications to Title VI groups and organizations were sent, and outreach materials were distributed at transit agencies, community centers, libraries, and Hispanic and faith-based organizations in areas with higher populations of low income residents and areas with higher populations with limited English proficiency (LEP).

6.1.4 Scoping

In November 2014, DRPT conducted Project scoping activities pursuant to the Council on Environmental Quality (CEQ)'s regulations implementing the *National Environmental Policy Act of 1969* (NEPA). CEQ regulations direct federal agencies that have made a decision to prepare an EIS to engage in a public scoping process. The purpose of this process is to provide an early and open forum for identifying public concerns and clearly defining the environmental issues and alternatives to be examined in the EIS.

DRPT and FRA held public scoping meetings for the Project on November 5, 6, 12, and 13, 2014 (Table 6.1-2). Open house style meetings were held from 5:00 to 7:30 p.m., with a formal presentation given by a DRPT staff member using PowerPoint slides as visuals at 6:00 p.m. The public was invited to ask questions and receive responses from DRPT after the presentation. The PowerPoint meeting presentation was made available on the Project website (see details below).

During the open house portion of the meeting, attendees were invited to review information boards and discuss the Project details with team members. A meeting handout was provided in English and Spanish with details about the Project.

The intent of the scoping meetings was to:

- Introduce the Project
- Explain the study process
- Refine the Project Purpose and Need
- Begin to identify alternatives for consideration through public input

Table 6.1-2 provides the meeting date, location, and number of attendees for each public scoping meeting.

Table 6.1-2: Public Scoping Meetings

Meeting Date	Meeting Type/ Area Targeted	Meeting Location	Meeting Attendance[1]
November 5, 2014 5–7:30 p.m.	Public Scoping Meeting— Ashland/Hanover Co./Richmond	Hanover Arts and Activities Center 500 South Center Street Ashland, VA	58
November 6, 2014 5–7:30 p.m.	Public Scoping Meeting— Richmond/Ashland/Hanover Co.	Department of Motor Vehicles 2300 W. Broad Street Richmond, VA	74
November 12, 2014 5–7:30 p.m.	Public Scoping Meeting— Greater Fredericksburg	National Museum of the Marine Corps – Quantico 18900 Jefferson Davis Highway Triangle, VA	39
November 13, 2014 5–7:30 p.m.	Public Scoping Meeting— Northern Virginia	Westin Crystal City 1800 Jefferson Davis Highway Arlington, VA	66
Self-guided Online Meeting	Online Public Scoping Meeting— Entire Corridor	http://dc2rvarail.com/archive-online-meeting-phase-1/	348

Note: 1. Attendance numbers based on DC2RVA sign-in sheets.

In addition to the Project launch announcements discussed in Section 6.1.1 above, DRPT used the following methods to publicize the public scoping meetings:

- Project website information and details.
- Newspaper and online advertising (English/Spanish), as described in Section 6.1.2.
- Email notifications to the Project contact database, including Title VI advocacy groups. A series of three email messages was sent: one 30 days out, one a week out, and one just before the end of the comment period.
- Press releases and media advisories (English/Spanish).
- One-on-one media pitching to generate news stories.
- Social media messaging.
- Cable channel calendars of events slides.

- Large static display poster at libraries and Virginia Railway Express (VRE).
- Flyers, rack cards, and bookmarks at key locations, including libraries, community centers, faith organizations, social service organizations, ethnic businesses, and transit agencies (English/Spanish).
- Collaboration with county/city public information officers, transportation agencies, and jurisdiction communications managers (English/Spanish).
- Informational webinars for jurisdictional, transportation, and MPO public information officers and chambers of commerce directors.

The public were invited to provide comments about the Project during and after each meeting through various formats. To offer stakeholders—agencies and the general public—ample opportunity to provide scoping input on the DC2RVA Project, comment forms in English and Spanish were made available and collected in several locations. Comments were submitted by:

- Submitting a hardcopy comment form to any Project team member at any of the in-person meetings.
- Mailing the hardcopy comment form to the DRPT main office.
- Submission via the comment form on the website.
- Submission via the online meeting.
- Emailing the Project email address.
- Calling the toll-free Project hotline.

To encourage participation and commenting from LEP communities, additional scoping meeting handouts were distributed to public libraries after the last public scoping meeting and before the end of the comment period.

DRPT received 1,625 scoping comments. The formal comment period lasted 30 days, from October 27, 2014 to December 5, 2014. All comments received were fully considered. DRPT reviewed each comment, categorized them by topic and appropriately grouped them for response, and prepared summary responses that were published in the Scoping Summary Report (Appendix V). Public comments ranged from general support or opposition to very specific remarks on particular locations and resources. They also included several logistical comments and questions related to the scoping meetings and comment process, such as requests for meeting accommodations for sign language, comments on website function, and information requests.

Table 6.1-3 and Figure 6.1-1 provide a summary of comment trends, indicating the number of times a particular topic was mentioned by commenters.

After the meetings, DRPT prepared a Scoping Summary Report that documented public outreach efforts during the scoping period, described the format and content of the public scoping meetings, and summarized comments received from agencies, organizations, and the general public (Appendix V).

Table 6.1-3: Scoping Comments

Topic	Number of Mentions	Topic	Number of Mentions
Alternatives	202	Cultural Resources	11
Pedestrian/Bicycle	184	Wetlands	11
Parks/Recreation/Public Lands	168	Real Estate	10
Land Use	158	General Opposition	9
Traffic/Safety	130	Mobility	9
Stations	108	EIS Process	8
Economics	87	Wild and Scenic Rivers	8
Air Quality	77	Wildlife	7
Service	61	Cumulative Impacts	6
Aesthetics	60	Agency Coordination	5
Parking	56	Threatened and Endangered Species	5
General Support	38	Coastal Zone Impacts	4
Mailing List Request	36	Flooding/Floodplains	4
Operations/Maintenance	28	Social Impacts	4
Cost	24	Sustainability	4
Displacements	21	Rail Technology/Electrification	3
Right-of-Way	21	Soil/Topography	3
Compatibility with Other Projects/Plans	20	Construction	2
Ridership	20	Energy	2
Schedule	19	Environmental Justice	2
Public Involvement	17	Purpose and Need	2
Biological Resources	16	Utilities	2
Information Request	16	ADA Accommodations	1
Noise/Vibration	14	Ownership/Trackage Rights	1
Study Area/Termini	12	Revenue	1
Water Quality/Resources	12	Special Waste	1
Conservation/Mitigation	11	–	–

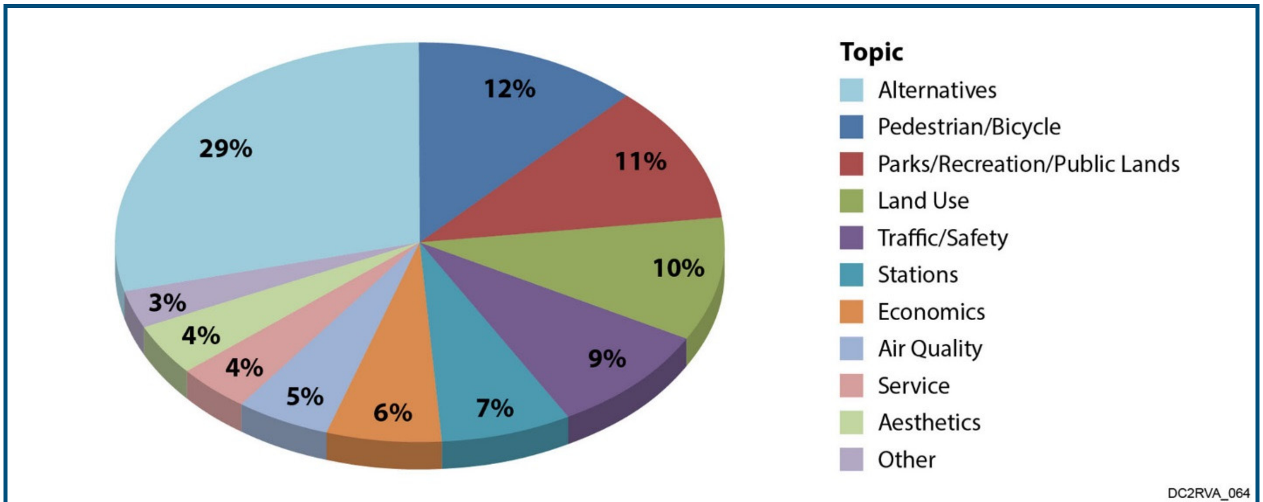


Figure 6.1-1: Top Ten Scoping Comment Topics

DC2RVA Public Scoping Meeting

6.1.5 Public Meetings

Following the formal public scoping process, DRPT held two additional sets of public information meetings to update the public on the Project's progress at key milestones.

DRPT held Preliminary Alternative Development meetings on June 1, 2, and 3, 2015. The topics covered at this set of meetings included:

- Draft Purpose and Need Statement
- Alternatives development process
- Preliminary rail alignment options

DRPT held another round of public information meetings on December 8, 9, and 10, 2015. The topics covered at these meetings included:

- Review of alternatives
- Preliminary information and methodology for rail operations, modeling, engineering, and environmental analyses

Each round of public meetings included a companion online public meeting Powerpoint presentation available for the duration of the comment period. The online public presentation offered the same display information as an in-person meeting, but allowed users to view the information when it was most convenient for them. All public meeting materials were available on the Project website.

Each set of meetings had an informal open house format. Upon arrival, attendees were asked to sign in and were given a public meeting handout providing background on the study and a comment form (materials were produced in English and Spanish). Meeting attendees were encouraged to provide written comments at the meeting, mail comment forms to DRPT, or comment electronically. A presentation by DRPT and Project team members, followed by a question and answer session, was held at the first and third set of meetings to complement the open house format. Project staff was present at each meeting to answer questions.

Table 6.1-4 provides the meeting date, location, and number of attendees for each set of public information meetings.

Table 6.1-4: Public Information Meetings

Meeting Date	Meeting Type	Meeting Location	Meeting Attendance[1]
June 1, 2015	Public Information Meeting	Hilton Alexandria Old Town 1767 King Street Alexandria, VA	52
June 2, 2015	Public Information Meeting	Dorothy Hart Community Center 408 Canal Street Fredericksburg, VA	37
June 3, 2015	Public Information Meeting	Department of Motor Vehicles 2300 W. Broad Street Richmond, VA	95
Self-guided Online Meeting	Online Public Information Meeting	http://dc2rvarail.com/archive-online-meeting-phase-2/	963
December 8, 2015	Public Information Meeting	Dorothy Hart Community Center 408 Canal Street Fredericksburg, VA	57
December 9, 2015	Public Information Meeting	Hilton Springfield 6550 Loisdale Road Springfield, VA	56
December 10, 2015	Public Information Meeting	Department of Motor Vehicles 2300 W. Broad Street Richmond, VA	98
Self-guided Online Meeting	Online Public Information Meeting	http://dc2rvarail.com/online-meeting/	1,653

Note: 1. Attendance numbers based on DC2RVA sign-in sheets.

The methods of outreach notifications for the public information meetings are summarized below:

- Project website information and details.
- Newspaper and online advertising (English/Spanish), as described in Section 6.1.2.
- Email notifications to the Project contact database, including Title VI advocacy groups. A series of three email messages was sent: one 30 days out, one a week out, and one just before the end of the comment period.
- Property owner letters.
- Postcards to property owners (Alternatives Review meeting only).
- Press releases and media advisories (English/Spanish).
- One-on-one media pitching to generate news stories.

- E-newsletters.
- Social media messaging.
- Cable channel calendars of events slides.
- Large static display poster at libraries and Virginia Railway Express (VRE).
- Flyers, rack cards, and bookmarks at key locations, including libraries, community centers, faith organizations, social service organizations, ethnic businesses, and transit agencies (English/Spanish).
- Collaboration with county/city public information officers, transportation agencies, and jurisdiction communications managers (English/Spanish).
- Informational webinars for jurisdictional, transportation, and MPO public information officers and chambers of commerce directors.

DRPT translated all broad outreach media—such as meeting handouts and comment forms, newspaper ads, flyers, and press releases—to Spanish. Any remaining handouts, including the Spanish versions, were distributed after each meeting to area libraries areas with higher concentrations of Hispanic populations to encourage their understanding and participation.

Outreach materials included reference to several methods by which people could submit comments and questions regarding the Project. These methods included:

- Submission of comment form at in-person meetings
- Submission via the electronic comment form on the Project website
- Emailing the Project email address, info@dc2rvarail.com
- Calling the toll-free Project hotline (information in English and Spanish)
- Mailing a hardcopy comment form to the Project office

All comments received during these public meetings were reviewed, documented, and included in the Project's administrative record. Comments received during specific comment periods informed decision making tied to the specified milestone. Comments submitted outside of these comment periods informed DRPT's understanding of public sentiment regarding the Project and, in some cases, provided unique information, like property and historic resource details, that helped guide alternatives development efforts. DRPT responded to comments that included information requests (*e.g.*, specific landowner concerns or general Project information questions) by email, unless otherwise requested. DRPT also hosted meetings, made phone calls, and provided information by mail as needed.

By advance request (72 hours), DRPT provided Spanish language translators and Sign Language interpreters onsite for all public meetings. On several occasions, sign language interpreters were requested and provided in Northern Virginia area. Materials were written in English and Spanish at the public information meetings and public hearings, and closed captioning was added to video presentations. All meeting locations were *Americans with Disabilities Act* (ADA) accessible, and telecommunication device for the deaf (TDD)/teletypewriter (TTY) numbers were included in materials. Meetings were held in transit-accessible locations to the extent possible, and transit information was provided in outreach materials.

6.1.5.1 Public Meetings Hosted by Outside Organizations

In addition to the public meetings hosted by DRPT, the department was asked to present at three public meetings held by outside organizations. These meetings were requested by local jurisdictions, citizens, and non-governmental organizations (NGOs) to discuss proposed alternatives in their areas. Table 6.1-5 provides the meeting host, date, location, and number of attendees for each set of meetings. During these meetings, DRPT gave a brief Project update presentation and answered questions from the audience. Topics raised during the question and answer sessions included the study process, property impacts, passenger and freight rail service, Project cost, rail within the I-95 corridor, noise and vibration, eliminated alternatives, safety, economics, purpose and need, Project outreach, and train speeds. Comment forms were available at these meetings, collected, reviewed, and logged. Additionally, DRPT collected sign-in sheets and added attendees to the Project notification database. All comments received by participants were logged in the database and noted by issue type.

Table 6.1-5: Outside Organization Hosted Meetings

Meeting Host	Meeting Date	Meeting Location	Meeting Attendance[1]
Virginians for High Speed Rail; Town of Ashland	February 4, 2016 (6:30 – 8:30 p.m.)	Ashland Town Hall 101 Thompson Street Ashland, VA 23005	17
Hanover County	April 4, 2016 (6:30 – 8:30 p.m.)	Patrick Henry High School 12449 W Patrick Henry Road Ashland, VA 23005	402
Spotsylvania County	July 11, 2016 (6:30 – 8:30 p.m.)	Fredericksburg Christian High School 9400 Thornton Rolling Road Fredericksburg, VA 22408	233

Note: 1. Attendance numbers based on DC2RVA sign-in sheets.

6.1.6 Project Contact Mailing List

DRPT created a Project mailing list for stakeholder groups and members of the public who desired to be kept informed of the Project. Requests to be added to the mailing list could be made at any time, including through the Project website and at all public meetings. DRPT delivered Project updates, newsletters, and public meeting invitations to those on the mailing list via email. Table 6.1-6 provides a list of the distributed emails.

In addition to emails, the Project mailing list was used to generate distribution lists for printed and mailed materials for individuals not readily reachable by email. Printed materials in the form of poster displays, flyers, bookmarks, postcards, and meeting handouts were produced and distributed through Title VI advocates—including faith leaders, MPOs, social services, and elected officials—to be shared in libraries, transit authorities, community centers, businesses and faith groups. All flyers, bookmarks, meeting handouts, and emails were also translated to Spanish. The public information officers from the jurisdictions within the Project area were included in the information and materials distribution to further the communication to Title VI, faith, and civic leaders in their areas. DRPT contacted many Title VI leaders directly by phone and/or through in-person meetings early in the effort to begin the formation of a relationship and to include these groups in outreach. These initial communications included the Virginia Department for the Deaf and Hard of Hearing, Virginia Department for the Blind and Vision Impaired, and Virginia Association of Area Agencies on Aging, among others. Property owners in the study area received postcard (direct mail) announcements of the alternatives review public meetings.

Table 6.1-6: Electronic Notifications and Project Updates

Title of Email	Distribution Date	Number of Recipients
Notification of Project Launch and Available Resources	October 7, 2014	959
Public Scoping Meeting Notification	October 27, 2014	959
Public Scoping Meeting Notification to Hispanic Organizations	October 27, 2014	20
Public Scoping Meeting Reminder	November 3, 2014	956
Scoping Comment Period Reminder to Faith Based Organizations	November 21, 2014	113
Scoping Comment Period Reminder	December 1, 2014	1,417
Alternatives Development Public Meeting Notification	May 4, 2015	2,903
Alternatives Development Public Meeting Notification to Hispanic Organizations	May 20, 2015	32
Alternatives Development Public Meeting Reminder	May 27, 2015	2,875
Alternatives Development Comment Period Reminder	June 15, 2015	2,743
Alternatives Development Comment Period Reminder to Hispanic Organizations	June 15, 2015	30
Amtrak Contest Solicitation for Submissions	October 7, 2015	2,749
Alternatives Review Public Meeting Notification	November 9, 2015	2,735
Alternatives Review Public Meeting Notification to Hispanic Organizations	November 9, 2015	29
Alternatives Review Public Meeting Reminder	December 1, 2015	2,767
Alternatives Review Comment Period Reminder	January 4, 2016	2,889
Alternatives Review Comment Period Reminder to Hispanic Organizations	January 4, 2016	29
Corridor-Wide Project Update	May 10, 2016	3,629

6.1.7 Property Owner Notifications

In accordance with Section 33.2-1011 of the *Code of Virginia,* DRPT mailed property owner notification letters to allow field personnel access to properties for Project review and field surveys. Notifications were mailed no less than 15 days prior to the date of first entry. DRPT distributed these letters in batches to correspond with the field review schedule, which was conducted in segments. In addition to the property access notification letter, an informational flyer was included in these Project mailings that described the Project and schedule, explained the types of field surveys and work being conducted, and provided contact information for questions and comments (see Appendix V for sample letters and informational flyer). In total, DRPT mailed 9,448 property notification letters. As of February 2017, these mailings resulted in 173 calls, comments, and emails received. The majority of the responses to property owner notifications related to coordinating times the survey crews could access the properties and the manner in which access would be permitted. Some property owners also expressed concerns related to the Project's impact on property access, noise, and property values.

In advance of the Preliminary Alternative Development public meetings in June 2015, DRPT sent property owners who had been identified at that point of the Project a postcard direct mail advising them of public meetings and the formal comment period.

As a way to communicate information specific to the sub-areas within the Project area, printed fact sheets were developed and distributed to the public through libraries and community centers. Additionally, web pages were developed to specifically address areas on the corridor and property owner needs.

6.1.8 E-Newsletters

DRPT distributed E-newsletters at key milestones throughout the Project to highlight details and outcomes of public meetings, explain the study process, provide updates on alternatives and recommendations, remind readers how and where to comment, and provide other timely insight. Table 6.1-7 provides the newsletter distribution dates and number of people reached. Project e-newsletters were also available on the Project website.

Spanish-speaking audiences were encouraged to request assistance if needed as follows:

En Español? Si necesita servicios de traducción para participar, por favor envíe un email a: espanol@DC2RVArail.com. También puede llamar a la línea directa del proyecto para dejar comentarios: 888-832-0900.

No requests from Spanish-speaking audiences were received.

Table 6.1-7: E-Newsletters

Title	Distribution Date	Registered to Receive Newsletter
DC2RVA Rail Mail: First Edition	April 22, 2015	2,967
DC2RVA Rail Mail: Second Edition	September 11, 2015	2,768
DC2RVA Rail Mail: Third Edition	March 10, 2016	3,243
DC2RVA Rail Mail: Fourth Edition	June 29, 2016	3,639
DC2RVA Rail Mail: Fifth Edition	January 11, 2017	4,191

6.1.9 Project Website

DRPT launched the Project website on October 6, 2014, which can be found at http://www.DC2RVArail.com. It serves as key reference for all public information. DRPT continually updates the website throughout the life of the Project with current and relevant information. The site offers information pertaining to the Project process and background, public meeting notices, study schedule, Project mapping, and pages with information specific to key areas of interest along the Project corridor, as well as access to all public meeting materials, including online meetings, boards, presentations, and handouts, and an electronic comment form. The website includes translation and font enlargement features.

All meeting materials and meeting summary reports were posted on the Project website.

Included on the Project website is a page dedicated to other projects and studies related to or impacted by DC2RVA. This page (http://dc2rvarail.com/resources/ongoing-projects/) includes links and updates for:

- Acca Yard/Main Line Relocation
- Virginia Avenue Tunnel
- Arkendale to Powells Creek Third Track Project
- Crossroads to Hamilton Third Track and New Spotsylvania Station
- Richmond to Raleigh Southeast High Speed Rail Project
- Washington Union Station Expansion Project
- Richmond to Hampton Roads Southeast High Speed Rail Project

- Long Bridge Phase II Study EIS
- Potomac Yard Metrorail Station EIS
- Tri-Cities Multimodal Passenger Rail Station Study
- Atlantic Gateway Program

In addition, DRPT added a brief Project overview and related links on its main website and provided the same information to Amtrak for its Northeast Corridor Future website (http://necfuture.com) and to NCDOT for its Southeast High Speed Rail website (https://www.ncdot.gov/projects/sehsr).

6.1.10 Project Press Releases

DRPT issued press releases during Project kick-off and prior to public meetings, and also made them available on the Project website. DRPT also issued media advisories prior to the public meetings to invite the media to attend and provide meeting coverage. To garner more media attention, the outreach team contacted key media outlets to follow up on releases and offered to provide other information to inform news stories. These efforts resulted in 188 (as of 5/9/2017) news stories published regarding the Project.

Table 6.1-8 lists the dates and content of these notifications.

Table 6.1-8: Press Releases and Media Advisories

Date	Information	Format
October 6, 2014	Project Launch–Kick-Off/Survey/Splash Page	Notification–Press Release
October 22, 2014	Public Scoping Meeting Information and Dates, Times, Locations	Notification–Press Release (English/Spanish)
November 4, 2014	Meeting reminder/invitation for media to attend	Media Advisory
May 19, 2015	Preliminary Alternatives Development Information and Dates, Times, Locations	Notification–Press Release (English/Spanish)
May 28, 2015	Meeting reminder/invitation for media to attend	Media Advisory
November 24, 2015	Alternatives Review Public Meeting Information and Dates, Times, Locations	Notification–Press Release (English/Spanish)
December 3, 2015	Meeting reminder/invitation for media to attend	Media Advisory

6.1.11 Small Group Informational Meetings

DRPT conducted more than 20 small group informational meetings with interested organizations throughout the corridor, in many cases at the request of the organizations themselves. All meetings were open to the public and included agencies, civic groups, and members of the public. Feedback received at these meetings focused on ways that DRPT could collaborate to improve communication with their groups and customers about the Project.

Table 6.1-9 lists these meetings and the topic of discussion.

Table 6.1-9: Small Group Informational Meetings

Meeting Date	Meeting	Topics
November 3, 2014	Richmond Regional Planning District Commission, GWRideConnect, Arlington Transit, Dinwiddie County, Federal Railroad Administration	▪ Public Information Officer Update Regarding Upcoming Public Meetings
March 12, 2015	Virginia Hispanic Chamber of Commerce	▪ Project Activities and Schedule ▪ Hispanic Community Outreach Strategy
March 12, 2015	Ridefinders	▪ Project Activities and Schedule ▪ Public Outreach Strategy
March 12, 2015	AAA Seniors	▪ Project Activities and Schedule ▪ Senior Citizens Outreach Strategy
March 15, 2015	Historic Fredericksburg Foundation Inc.	▪ Project Overview ▪ Project Engagement Opportunities
March 19, 2015	East Coast Greenway Alliance, Virginia Bicycling Federation	▪ Project Purpose and Need ▪ Barriers to Greenway within Private Freight Right-of-Way
March 19, 2015	Mayfield Civic Association	▪ Project Overview ▪ Project Activities and Schedule ▪ Field Studies ▪ Public Engagement Opportunities
May 13, 2015	Caroline County, City of Alexandria, Marine Corps Base (MCB) Quantico	▪ Public Information Officer Update Regarding Upcoming Public Meetings
May 22, 2015	Hampton Roads Regional Council	▪ Project Overview ▪ Project Activities and Schedule
July 15, 2015	DuPont	▪ Project Overview ▪ Project Activities and Schedule
September 9, 2015	Neabsco Beach Way Homeowners Association	▪ Project Overview ▪ Neabsco Creek Bridge
October 15, 2015	City of Richmond Public Information Office, Greater Richmond Transit Company	▪ Project Overview ▪ December 2015 Public Meeting Outreach Strategy
November 10, 2015	City of Richmond Office of Diversity	▪ Title VI Outreach Strategy
November 10, 2015	City of Richmond Social Services Department	▪ Title VI Outreach Strategy
November 10, 2015	Virginia Department for the Deaf and Hard of Hearing	▪ Title VI Outreach Strategy
November 12, 2015	Fairfax County Public Information Office	▪ Project Overview ▪ December Public Meetings
November 13, 2015	Fairfax County Department of Transportation Public Information Office	▪ Project Overview ▪ December Public Meetings
November 17, 2015	City of Richmond, City of Fredericksburg, Springfield Chamber of Commerce	▪ Business Groups/Chambers of Commerce Update Regarding Upcoming Public Meetings

▸ *Continued.*

Table 6.1-9: Small Group Informational Meetings

Meeting Date	Meeting	Topics
February 3, 2016	Transportation Association of Greater Springfield	▪ Project Overview ▪ Project Activities and Schedule
June 9, 2016	Randolph-Macon College, Town of Ashland, Hanover County	▪ Project Overview ▪ Ashland Area Alternatives ▪ Potential Impacts to College
June 14, 2016	Civil War Trust	▪ Cultural Resources
July 27, 2016	Randolph-Macon College	▪ Ashland Area Alternatives ▪ Potential Impacts to College
August 22, 2016	Virginia Association of Counties	▪ Project Overview
September 15, 2016	ACEC – Virginia Transportation Business Opportunities Networking Luncheon	▪ Project Overview ▪ Project Activities and Schedule
September 19, 2016	Arlington/Alexandria Phase II Meeting	▪ Project Overview ▪ Project Activities and Schedule
October 27, 2016	Hap Conners Fredericksburg Area Meeting	▪ Project Overview ▪ Project Activities and Schedule
November 3, 2016	Northern Virginia Transportation Commission	▪ Project Overview ▪ Project Activities and Schedule
November 3, 2016	Potomac and Rappahannock Transportation Commission	▪ Project Overview ▪ Project Activities and Schedule
November 16, 2016	Crystal City Civic Association	▪ Project Overview ▪ Project Activities and Schedule
November 17, 2016	Northern Virginia Transportation Authority	▪ Project Overview ▪ Project Activities and Schedule
December 5, 2016	Richmond Area Locality Workshop: City of Richmond, Henrico County, Chesterfield County, Richmond Regional Planning District Commission, and Federal Railroad Administration	▪ Richmond Recommendations ▪ Project Activities and Schedule

6.1.12 Project Brochure

DRPT prepared two Project brochures—one at the onset of the Project and an updated version in fall 2016 as part of the Project launch. Hardcopies of the brochure were printed (1,250 each, total 2,500). DRPT mailed the first brochure to 553 elected officials, libraries, faith groups, and chambers of commerce. Libraries were asked to display stacks of brochures for their customers. DRPT disseminated the second brochure at key stakeholder and public meetings. Electronic versions of the brochure are available on the Project website. Information in the brochures included a Project overview; description of the current passenger rail service; description of the Project corridor and other relevant projects; purpose of the Project, EIS steps; preliminary engineering; service development plan and schedule. The second brochure included a description of the alternatives being carried forward in the Draft EIS.

6.1.13 Social Media

The purpose of the Project's social media efforts is to broaden outreach, increase awareness of the Project, and provide engagement opportunities to stakeholders who might not otherwise participate.

Although social media posts are not included in the administrative record, the conversation that occurs online is important to the process. DRPT summarized the content of comments to check for the most discussed topics and potential new issues not identified through traditional means; these monthly social media reports are provided in Appendix V. DRPT used social media to perform real-time evaluation of Project information and locate geographic areas with higher or lower levels of stakeholder participation.

As of December 8, 2016, Social Media profiles are as follows:

- Twitter: @dc2rvarail
  Followers: 436
- Facebook: dc2rvarail
  Followers: 404

6.2 AGENCY COORDINATION

DRPT and FRA conducted extensive agency coordination throughout the course of the Draft EIS. More than 35 agencies were invited to be cooperating or participating agencies. Cooperating Agencies include those agencies that have jurisdiction by law or special expertise and typically:

- Participate in scoping
- Provide staff support
- Assist with analyses, field reviews, and public meetings
- Review documentation

The Draft EIS is meant to assist Cooperating Agencies in fulfilling their jurisdictional and NEPA responsibilities.

The following agencies agreed to be Cooperating Agencies for the DC2RVA Project[1]:

- Federal Highway Administration (FHWA)
- Federal Transit Administration (FTA)
- United States Army Corps of Engineers (USACE), Norfolk District
- United States Coast Guard (USCG)
- United States Environmental Protection Agency (EPA)
- Virginia Department of Transportation (VDOT)

[1] USFWS was also invited to be a cooperating agency but did not respond. Although USFWS is not a cooperating agency, they did participate in a phone conference with the cooperating agencies on August 31, 2015. USFWS requested information regarding proposed Project alignments. DRPT worked with USFWS to provide this information and respond to other USFWS comments.

Participating Agencies also have an interest and remain involved throughout the Project, but they typically do not have as active a role as Cooperating Agencies. The following are Participating Agencies for the DC2RVA Project:

- Advisory Council on Historic Preservation (ACHP)
- Amtrak
- Arlington County
- Caroline County
- Chesterfield County
- City of Alexandria
- City of Colonial Heights
- City of Fairfax
- City of Fredericksburg
- City of Richmond
- Crater Planning District Commission/Tri-Cities Metropolitan Planning Organization (MPO)
- Dinwiddie County
- District of Columbia Department of Transportation (DDOT)
- Fairfax County
- Fredericksburg Area Metropolitan Planning Organization (FAMPO)
- George Washington Regional Commission (GWRC)
- Hanover County
- Henrico County
- Marine Corps Base (MCB) Quantico
- Metropolitan Washington Council of Governments (MWCOG)/National Capital Region Transportation Planning Board
- Northern Virginia Regional Commission (NVRC)
- Northern Virginia Regional Park Authority (NVRPA)
- Northern Virginia Transportation Commission (NVTC)
- Potomac and Rappahannock Transportation Commission (PRTC)
- Prince William County
- Richmond Regional Planning District Commission/Richmond Regional Transportation Planning Organization (RRTPO)
- Spotsylvania County
- Stafford County
- Town of Ashland
- Town of Dumfries
- Town of Quantico
- Virginia Department of Historic Resources
- Virginia Port Authority
- Virginia Railway Express (VRE)
- Washington Metropolitan Area Transit Authority (WMATA)

6.2.1 Agency Meetings

Early agency coordination provides support for Project development. The first agency meeting was the agency scoping meeting for federal, state, and local agencies conducted on November 3, 2014. The intent of the meeting was to introduce the Project; explain the study process; refine Purpose and Need; review concerns and comments; and begin to identify alternatives for consideration. Comments and input from the agencies attending were welcomed. DRPT also held Cooperating Agency meetings on June 25, 2015, and March 31, 2016, to update the cooperating and participating agencies on Project activities and receive feedback. Table 6.2-1 provides a summary of the cooperating agency meetings to date.

Table 6.2-1: Cooperating Agency Meetings

Meeting Location	Meeting Date	Meeting Attendance	Topics
Virginia Housing Center 4224 Cox Road Glen Allen, VA	November 3, 2014	16 attendees, representing FRA, USACE, U.S. Department of Housing and Urban Development (HUD), VDOT, MWCOG, RRTPO, Stafford County, Spotsylvania County, Henrico County, Chesterfield County, and the City of Richmond	▪ Served as Agency Scoping Meeting ▪ Project Introduction ▪ Study Process Explanation ▪ Purpose and Need Refinement ▪ Identify Alternatives for Consideration ▪ Concerns and Comments on the Project from Attendees
DC2RVA Project Office 801 E. Main Street Richmond, VA	June 25, 2015	20 attendees, representing FRA, USACE, EPA, FHWA, and VDOT	▪ Project Overview ▪ Update on Project Activities to Date ▪ Ongoing and Upcoming Project Deliverables ▪ Concerns and Comments on the Project from Attendees
DC2RVA Project Office 801 E. Main Street Richmond, VA	March 31, 2016	24 attendees, representing FRA, USACE, EPA, Amtrak, VDOT, VRE, WMATA, MWCOG, RRTPO, Stafford County, Hanover County, Chesterfield County, City of Fredericksburg, and MCB Quantico	▪ Update on Project Activities to Date ▪ Ongoing and Upcoming Project Deliverables ▪ Concerns and Comments on the Project from Attendees

In addition to the larger agency meetings, DRPT scheduled smaller agency-specific meetings as needed to discuss certain resources and topics in greater detail. Table 6.2-2 lists these agency-specific meetings and includes a brief summary of the discussion topics.

Table 6.2-2: Agency-Specific Coordination Meetings

Meeting Date	Attendees	Location	Topics
September 3, 2015	USACE–Norfolk District, Virginia Department of Environmental Quality (DEQ)	Dovetail Office 300 Central Road Fredericksburg, VA	▪ Wetlands Methodology ▪ Permit Requirements
September 16, 2015	EPA	EPA Region III Office 1650 Arch Street Philadelphia, PA	▪ Project Overview ▪ Climate Change and Resiliency ▪ Wetlands ▪ Environmental Justice, Relocations, and Public Outreach ▪ Air Quality ▪ Secondary and Cumulative Impacts ▪ Stormwater
November 30, 2015	USACE–Norfolk District, DEQ	Project Corridor	▪ Streams and Wetlands Field Review Meeting–Segments 6, 7, and 8[1]
December 16, 2015	USACE–Norfolk District, DEQ	Project Corridor	▪ Streams and Wetlands Field Review Meeting–Segments 10 and 11[1]
February 3, 2016	USACE–Norfolk District, DEQ	Project Corridor	▪ Streams and Wetland Field Review Meeting–Segments 11 and 12[1]
May 19, 2016	United States Fish and Wildlife Service (USFWS)	Conference Call	▪ Project Overview ▪ Threatened and Endangered Species Inventories and Survey
July 21, 2016	USACE–Norfolk District, DEQ	Project Corridor	▪ Streams and Wetland Field Review–Segment 21[1]

Note: 1. See Section 2.2 of this Draft EIS for a description of DC2RVA corridor segments.

6.2.2 Task Force Meetings

Because the Project involves rail infrastructure owned by CSX Transportation (CSXT) and utilized by multiple operators, DRPT formed a task force of the transportation providers in the corridor to ensure effective coordination between these groups and the Project team. DRPT hosted task force meetings quarterly, or as needed at Project milestones, beginning in August 2014. Participants at the task force meetings typically included FRA, DRPT, VDOT, CSXT, Amtrak, VRE, Virginia's Office of the Attorney General (OAG), DDOT, and the DC2RVA consultant team. The task force meetings began with an initial kick-off meeting followed by a series of updates on the Project activities and the schedule. The meetings served as an important tool for coordination amongst the primary Project stakeholders. The main objectives of the task force are:

- To serve as the "Core Project Team"
- To be briefed on major Project milestones and to keep appropriate staff informed of the Project progress
- To serve as advisors to the lead agency for the Tier II EIS
- To provide technical review and input to complete certain parts of the study

Table 6.2-3 provides a summary of the task force meetings to date.

Table 6.2-3: Task Force Meetings

Meeting Date	Attendees	Location	Topics
August 18, 2014	FRA, DRPT, VDOT, CSXT, VRE	VDOT District Office 87 Deacon Road Fredericksburg, VA	▪ Project Introduction ▪ Early Project Concerns
January 8, 2015	FRA, DRPT, VDOT, CSXT, Amtrak, VRE, OAG	DC2RVA Project Office 801 East Main Street Richmond, VA	▪ General Update of Project Activities ▪ FRA Agreement with DRPT ▪ Freight Growth and Modeling ▪ Freight and Passenger Rail Capacity ▪ VRE Station Planning and Development ▪ Long Bridge ▪ Basis of Design
April 8, 2015	FRA, DRPT, VDOT, CSXT, Amtrak, VRE, OAG	Embassy Suites Alexandria Old Town 1900 Diagonal Road Alexandria, VA	▪ Purpose and Need ▪ Service Goals ▪ Alternatives Development ▪ Public Involvement
May 19, 2015	FRA, DRPT, VDOT, CSXT, Amtrak, VRE	DC2RVA Project Office 801 East Main Street Richmond, VA	▪ Purpose of June Public Meetings ▪ Materials to be Presented at June Public Meetings ▪ Issues that arose during Locality Meetings ▪ Key Provisions of Basis of Design
June 29, 2015	FRA, DRPT, VDOT, CSXT, Amtrak, VRE, OAG	Embassy Suites Alexandria Old Town 1900 Diagonal Road Alexandria, VA	▪ Project Update and Schedule ▪ Service Goals ▪ Engineering Options Overview
September 30, 2015	FRA, DRPT, VDOT, CSXT, Amtrak, VRE, OAG	Embassy Suites Alexandria Old Town 1900 Diagonal Road Alexandria, VA	▪ Project Update and Schedule ▪ Alternatives Development ▪ Screening Results: Potomac to Staples Mill ▪ Screening Status: Richmond ▪ Ridership Model Development ▪ Preliminary Service Plan ▪ Streamlining Projects
November 18, 2015	FRA, DRPT, CSXT, OAG	DC2RVA Project Office 801 East Main Street Richmond, VA	▪ Review Purpose of December Public Meetings ▪ Preview Materials to be Presented at December Public Meetings ▪ Discuss Issues that arose during Locality Meetings
January 27, 2016	FRA, DRPT, VDOT, CSXT, Amtrak, VRE, DDOT, OAG	National School Boards Association 1680 Duke Street Alexandria, VA	▪ Project Update and Schedule ▪ Operations Modeling Methodology ▪ Alternatives Review ▪ Draft EIS Content
May 11, 2016	FRA, DRPT, VDOT, CSXT, Amtrak, VRE, DDOT, OAG	National School Boards Association 1680 Duke Street Alexandria, VA	▪ Project Update and Schedule ▪ Locality Update ▪ Build Alternatives and No Build Alternative ▪ Ridership Forecasting ▪ FASTLANE Grant Application
August 16, 2016	FRA, DRPT, VDOT, CSXT, Amtrak, VRE, OAG	Embassy Suites Alexandria Old Town 1900 Diagonal Road Alexandria, VA	▪ Project Update and Schedule ▪ Build Alternatives and No Build Alternative ▪ Preliminary Ridership Estimates

▶ *Continued.*

Table 6.2-3: Task Force Meetings

Meeting Date	Attendees	Location	Topics
November 2, 2016	FRA, DRPT, VDOT, CSXT, Amtrak, VRE	National School Boards Association 1680 Duke Street Alexandria, VA	▪ Project Update and Schedule ▪ Alternatives Review ▪ Community Outreach ▪ Ridership Modeling Update ▪ Atlantic Gateway
February 2, 2017	FRA, DRPT, VDOT, CSXT, Amtrak, VRE, DDOT	Embassy Suites Alexandria Old Town 1900 Diagonal Road Alexandria, VA	▪ Project Update and Schedule ▪ Alternatives Review ▪ Ridership Modeling Update ▪ Preliminary Engineering Update ▪ Atlantic Gateway ▪ Long Bridge

6.2.3 Local Officials Coordination

Beyond agency coordination with departments within localities, DRPT also specifically engaged local officials during the Project's development. In total, DRPT conducted 44 meetings with local officials to provide Project briefings and updates, gather feedback on alternatives, and answer questions. The organizations and meeting dates are listed in Table 6.2-4.

Table 6.2-4: Local Official Meetings

Meeting Date	Attendees	Topics
December 3, 2014	City of Richmond Mayor's Staff, DRPT	▪ Project Activities and Schedule ▪ Richmond Station Locations ▪ Relation to Bus Rapid Transit (BRT)
November 19, 2014	Delegate Manoli Loupassi, DRPT	▪ Project Activities and Schedule ▪ Richmond Station Locations
March 12, 2015	Fredericksburg Area Metropolitan Planning Organization (FAMPO)	▪ Project Activities and Schedule ▪ Fredericksburg Region Outreach Strategy
March 12, 2015	RRPDC, DRPT	▪ Project Activities and Schedule ▪ Title VI Outreach Strategy
April 29, 2015	Hanover County, Town of Ashland, RRPDC, DRPT	▪ Service Goals ▪ Alternatives Development
May 1, 2015	City of Fredericksburg, FAMPO, GWRC, Stafford County, DRPT	▪ Service Goals ▪ Alternatives Development
May 1, 2015	MWCOG Transportation Planning Board, DRPT	▪ Project Activities and Schedule
May 4, 2015	Chesterfield County, City of Richmond, Henrico County, RRPDC, DRPT	▪ Service Goals ▪ Alternatives Development
May 7, 2015	PRTC, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
May 7, 2015	RRPDC, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
May 8, 2015	NVTC, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
May 14, 2015	Northern Virginia Transportation Authority (NVTA), DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
May 18, 2015	GWRC, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening

▶ *Continued.*

Table 6.2-4: Local Official Meetings

Meeting Date	Attendees	Topics
May 20, 2015	MWCOG Policy Board, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
September 24, 2015	RRPDC, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
November 9, 2015	Caroline County, City of Fredericksburg, FAMPO, GWRC, Stafford County, Spotsylvania County, VDOT, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
November 9, 2015	FAMPO Technical Committee, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
November 10, 2015	Chesterfield County, City of Richmond, Henrico County, RRPDC, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
November 12, 2015	Hanover County, Town of Ashland, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
November 13, 2015	NVTC, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
November 15, 2015	PRTC, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
November 16, 2015	FAMPO Policy Committee, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
November 19, 2015	NVTA, DRPT	▪ Project Activities and Schedule ▪ Alternative Development and Screening
December 1, 2015	Chesterfield County, City of Richmond, Henrico County, RRPDC, FRA, DRPT	▪ Project Activities and Schedule ▪ Richmond Area Rail Conditions and Alternatives Development
March 2, 2016	Hanover County, DRPT	▪ Project Activities and Schedule ▪ Hanover County Field Studies ▪ Ashland Area Alternatives
March 9, 2016	Chesterfield County, City of Richmond, Henrico County, RRPDC, DRPT, FRA	▪ Richmond Area Station Site Planning
March 22, 2016	City of Richmond, DRPT	▪ Richmond Station Facilities
March 22, 2016	Henrico County, DRPT	▪ Henrico Station Facilities
April 4, 2016	Stafford County, DRPT	▪ Project Activities and Schedule
April 7, 2016	Spotsylvania County, FAMPO, DRPT	▪ Project Activities and Schedule
April 14, 2016	Caroline County, DRPT	▪ Project Activities and Schedule
April 28, 2016	Hanover County, Town of Ashland, RRPDC, DRPT	▪ Project Activities and Schedule ▪ Ashland Area Alternatives ▪ Randolph-Macon College
May 2, 2016	City of Fredericksburg, DRPT	▪ Project Activities and Schedule
May 23, 2016	Arlington County, City of Alexandria	▪ Project Activities and Schedule
May 24, 2016	Speaker William Howell, DRPT	▪ Project Activities and Schedule
May 27, 2016	House of Delegates Transportation Chair Ron Villanueva, DRPT	▪ Project Activities and Schedule
July 28, 2016	CTB	▪ Project Overview
September 21, 2016	CTB	▪ Project Briefing
October 11, 2016	Caroline County Board of Supervisors, DRPT	▪ Project Overview ▪ Project Activities and Schedule
October 18, 2016	CTB, DRPT	▪ Project Activities and Schedule

▶ *Continued.*

Table 6.2-4: Local Official Meetings

Meeting Date	Attendees	Topics
October 25, 2016	MWCOG Regional Transportation Subcommittee, DRPT	▪ Project Activities and Schedule
November 1, 2016	CTB, Town of Ashland, Hanover County, Randolph Macon College, DRPT	▪ Project Tour of Ashland Area
November 3, 2016	PRTC, DRPT	▪ Project Activities and Schedule
November 3, 2016	NVTC, DRPT	▪ Project Activities and Schedule
November 17, 2016	NVTA, DRPT	▪ Project Activities and Schedule
November 28, 2016	VDOT, DRPT	▪ Environmental Justice and ADA Compliance
November 28, 2016	Governor McAuliffe	▪ Project Briefing
December 1, 2016	RRTPO, DRPT	▪ Project Activities and Schedule
December 6, 2016	CTB, DRPT	▪ Project Activities and Schedule ▪ Project Alternatives
December 14, 2016	Henrico County Board of Supervisors, DRPT	▪ Project Activities and Schedule
January 9, 2017	FAMPO Technical Committee, DRPT	▪ Project Activities and Schedule
January 11, 2017	FAMPO Transportation Advisory Group, DRPT	▪ Project Activities and Schedule
January 18, 2017	Alexandria Transportation Commission, DRPT	▪ Project Activities and Schedule
January 23, 2017	FAMPO Policy Committee, DRPT	▪ Project Activities and Schedule

In addition to the meetings with local officials listed in Table 6.2-4, DRPT and the DC2RVA consultant team also met with members of Virginia's Congressional delegation on May 19, 2016, in Cannon House Office Building, Room Cannon 5C. Representatives from the offices of Senator Tim Kaine, Senator Mark R. Warner, Representative Don Beyer, Representative Gerald Connolly, Representative Robert J. Wittman, Representative Dave Brat, and Representative Robert C. Scott all participated in the meeting. Attendees discussed the various area-specific options along the corridor, as well as FASTLANE funding.[2]

DRPT provided additional outreach to elected officials during key Project milestones, as shown in Table 6.2-5. More than 300 elected officials were contacted and included on the Project's email database to receive newsletters and other Project updates. See the Scoping Summary Report in Appendix V for the list of elected officials contacted.

Table 6.2-5: Elected Official Targeted Outreach

Date	Format	Content
October 22, 2014	Direct Mailing #1	Project notification provided notice that FRA and DRPT were initiating preparation of a Tier II EIS for the Washington, D.C. to Richmond, VA, rail corridor.
May 18, 2015	Direct Mailing #2	Project update provided schedule information on public meetings to take place in early June. The update also shared that the Project's purpose and need statement was completed, preliminary rail alignment options had been developed, and alternative screening criteria had been identified.
November 10, 2015	Email #1	Project update that early stages of the alternatives screening process were completed and input from the June 2015 public meetings was incorporated to develop a range of viable alternative improvements for detailed evaluation.

[2] The Atlantic Gateway is a $1.4 billion partnership that focuses on the I-95 corridor between Washington, D.C. and Fredericksburg, VA. Partially funded by a federal FASTLANE grant, the program utilizes an innovative public/private partnership to leverage a suite of multi-modal improvements along one of the nation's busiest corridors.

6.2.4 Ashland Community Advisory Committee

Through the alternatives development process and related community meetings, DRPT recognized the unique nature of the Town of Ashland and Hanover County, and that many of the alternatives for greater rail capacity in this area generated community concerns in that area. As a result, DRPT implemented a community-based effort to supplement the corridor-wise DC2RVA public involvement activities described above and to help inform DRPT's recommendation for a Preferred Alternative that provides the required rail capacity through the Ashland/Hanover area. As part of this community-based effort, DRPT established a Community Advisory Committee (CAC) to take a more intensive look at all previous options, identify any potential new options to meet the Purpose and Need of the DC2RVA Project, and suggest mitigation strategies to address Project impacts. The first meeting of the CAC was held in May 2017.

6.3 SECTION 106 COORDINATION AND CONSULTATION

The DC2RVA consultant team coordinated with numerous property owners and officials with jurisdiction over resources protected under Section 106 of the National Historic Preservation Act (NHPA), with particular focus on resources where the Project alternatives would likely result in an adverse effect to cultural or historic properties. Agencies involved in this dialogue included ACHP, Virginia Department of Historic Resources (DHR), USACE, American Battlefield Protection Program (ABPP), and United States DOI. The consulting party invitations, meetings, and additional correspondence are discussed in the following sections.

6.3.1 Consulting Parties

While FRA continued to be the primary point of contact for all federally recognized tribes, they delegated state agency and consulting party coordination to DRPT in 2014. As such, DRPT sent invitation letters to agencies, local governments, Native American tribes, and other stakeholders in the Section 106 consultation process. Table 6.3-1 provides information on the 39 distributed consulting party invitations. Of these, 14 have elected to participate in the process; Table 6.3-1 lists these groups along with their response date. An additional six are assumed to request participation. Although a formal response was not received from these six groups, they have requested participation on similar projects and have shown a noted interest in the current undertaking through telephone calls or attendance at associated meetings. These six are noted by "assumed yes" in the table below.

Table 6.3-1: Consulting Parties

Stakeholder	Invite Letter Date	Response (Date)
American Battlefield Protection Program	January 6, 2015	Assumed Yes
National Park Service (NPS)–Fredericksburg	January 6, 2015	Assumed Yes
NPS–National Capital Region	January 6, 2015	Assumed Yes
Marine Corps Base Quantico	January 6, 2015	Assumed Yes
NPS–Washington-Rochambeau NHT	January 22, 2015	Assumed Yes
Pamunkey Indian Tribe[1]	April 27, 2017	Assumed Yes
City of Fredericksburg	January 6, 2015	Yes (January 12, 2015)

Continued.

Table 6.3-1: Consulting Parties

Stakeholder	Invite Letter Date	Response (Date)
NPS–Richmond	January 6, 2015	Yes (January 14, 2015)
Arlington County	January 6, 2015	Yes (January 14, 2015)
City of Richmond	January 6, 2015	Yes (January 16, 2015)
Alexandria Archaeology	January 6, 2015	Yes (January 21, 2015)
Ashland Museum	January 6, 2015	Yes (January 21, 2015)
NPS–Captain John Smith Chesapeake NHT	January 6, 2015	Yes (January 22, 2015)
Central Virginia Battlefields Trust	January 6, 2015	Yes (January 22, 2015)
Historic Fredericksburg Foundation, Inc.	January 6, 2015	Yes (January 9, 2015)
Civil War Trust	January 6, 2015	Yes (February 11, 2015)
Prince William County	January 6, 2015	Yes (February 13, 2015)
Caroline County	January 6, 2015	Yes (February 3, 2015)
Hanover County	January 6, 2015	Yes (February 3, 2015)
NPS–Potomac Heritage National Scenic Trail	January 22, 2015	Yes (March 4, 2015)
City of Alexandria	January 6, 2015	No reply received
Fairfax County	January 6, 2015	No reply received
Henrico County	January 6, 2015	No reply received
Spotsylvania County	January 6, 2015	No reply received
Stafford County	January 6, 2015	No reply received
Atlantic Coast Line & Seaboard Air Line (ACL & SAL) Railroads Historical Society	January 6, 2015	No reply received
Center for Neighborhood Revitalization	January 6, 2015	No reply received
Arlington Historical Society	January 6, 2015	No reply received
Caroline Historical Society	January 6, 2015	No reply received
Chesterfield Historical Society	January 6, 2015	No reply received
Hanover County Historical Society, Inc.	January 6, 2015	No reply received
Henrico County Historical Society	January 6, 2015	No reply received
Historic Alexandria Foundation	January 6, 2015	No reply received
Historic Prince William, Inc.	January 6, 2015	No reply received
Historic Richmond Foundation	January 6, 2015	Yes (December 2016)
Historical Society of Fairfax County, Virginia, Inc.	January 6, 2015	No reply received
National Trust for Historic Preservation	January 6, 2015	Yes (December 22, 2016)
Stafford County Historical Society	January 6, 2015	No reply received
Catawba Indian Tribe	January 6, 2015	No reply received

Note: 1. Letters to Tribes were sent by FRA.

6.3.2 Meetings

DRPT and its DC2RVA consultant team held numerous in-person and telephone-based meetings with DHR, ACHP, and other consulting parties. They included a Section 106 kick-off and several follow-up meetings to update participating agencies and parties on the Project initiation; determination of Area of Potential Effects (APE); cultural resource methodology for the reconnaissance predictive model, identification surveys and evaluation studies; survey results;

Project effect on historic properties; stipulations to mitigate adverse effects; and crafting the Project Programmatic Agreement (PA). Table 6.3-2 highlights the meetings held with these groups.

Table 6.3-2: Section 106 Meetings

Date	Attendees	Topics	Comments
November 7, 2014	DHR, DRPT, Consultant Team	Kick-off meeting; Discussions on APE, Methodology, Reporting	Discussed Project in relation to Richmond to Raleigh segment and determined that we should follow the same general parameters in terms of APE and methodology. DHR agreed that the Project area could be divided into several reports for submittal.
March 19, 2015	VDOT, DRPT, Consultant Team	Roadway Bridges and Section 106 Coordination	Discussed existing agreement documents and how they can facilitate cultural resource studies; Determined that bridges that fall under VDOT purview would not be revisited during this study.
February 18, 2016	DHR, Consultant Team	Update on Corridor and Status of Studies	Discussed status of Project; determined that IA reconnaissance studies would be sufficient for Fredericksburg and Ashland bypasses.
June 14, 2016	Civil War Trust, Consultant Team	General Discussion of Results to Date	Specific talk about Richmond to Raleigh Memorandum of Agreement (MOA).
August 10, 2016	DHR, Consultant Team	Historic Properties and Project Effect	Preliminary dialogue on Project effect for all historic properties (as defined as of this date). Made preliminary determinations of effect to be formally coordinated once all technical studies have been completed.

6.3.3 Correspondence

Since the Project's initiation, repeated correspondence has occurred between DRPT and the Section 106 agencies, localities, and consulting parties to keep them informed on the progress of the Section 106 studies, resource eligibility, and Project effect on historic properties, and this will continue at milestones throughout the Project. In particular, meetings and email exchanges with DHR have occurred regularly to provide information on Project plans. In addition, data on the study results in specific Project areas were sent to corresponding consulting parties to garner comments on the Project results. The Architectural Reconnaissance Survey–Phase I reports were posted on the Project's webpage for general public comment as well. The Archaeological Phase I reports were only distributed to the agencies, localities, and consulting parties as requested due to the sensitivity of site location mapping. Table 6.3-3 includes correspondence conducted to date. Copies of relevant correspondence are included in Appendix R.

Table 6.3-3: Section 106 Correspondence

Date	Medium	Recipient	Topic[1]
September 25–October 15, 2014	Email; Letter	DHR, FRA, DRPT	Initiation of Section 106 Process
January 5–February 2, 2015	Email, Letter	DHR, FRA, DRPT	Defining Project APE; APE approved on February 2, 2015
June 8, 2015	Email	VDOT	VDOT/DHR PA on Historic Bridges
June 22, 2015	Letter	Civil War Trust, DRPT	Receipt of comments on Project screening review
July 30, 2015	Email	Consulting Parties, DRPT	Distribution of Archaeological Predictive Model report for review
July 17, 2015; August 28, 2015	Letter, Email	DHR	Submittal of Archaeological Predictive Model Report; DHR Reply
August 3–September 4, 2015	Email	Arlington County, City of Alexandria, Prince William County, City of Fredericksburg, DRPT	Receipt of comments on Archaeological IA Predictive model
August 28, 2015	Email	Consulting Parties, DRPT	Reminder to submit comments on Predictive Model Report
October 20, 2015; December 18, 2015	Letters	NPS (FSNMP)	*Archaeological Resources Protection Act* (ARPA) permit to dig on federal land (Segment 7)
December 9, 2015; February 5, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segment 7); DHR Reply
December 15, 2015	Letter	DHR	Application to conduct archaeology on state lands (Segment 11)
March 18–31, 2016	Email; Memo	DHR	Discussion of alternative methodology for architecture in Segment 18
April 13–April 26, 2016	Email	David Hamilton (Consulting Party), DHR, DRPT, FRA	Mr. Hamilton is a private property owner along the Ashland Bypass. Numerous emails were exchanged with Mr. Hamilton regarding his concerns, his position as a consulting party, and distributing Project data
May 20, 2016; June 8, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segment 6); DHR Reply
May 31, 2016; June 22, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segment 3); DHR Reply
May 31, 2016; June 22, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segment 4); DHR Reply
June 21, 2016; June 28, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segments 8-9); DHR Reply
July 6, 2016; July 22, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segment 1); DHR Reply
July 6, 2016; July 15, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segment 2); DHR Reply
July 25, 2016; August 15, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segments 10-12); DHR Reply
December 21, 2016; TBD	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segment 13); DHR Reply
August 3, 2016; August 22, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segment 14); DHR Reply
October 21, 2016; November 30, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segments 15, 16, 20); DHR Reply
November 14, 2016; December 22, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segments 17, 19); DHR Reply
October 21, 2016; November 3, 2016	Letter, Email	DHR	Submittal of Architectural Phase I Report (Segment 18); DHR Reply

▶ *Continued.*

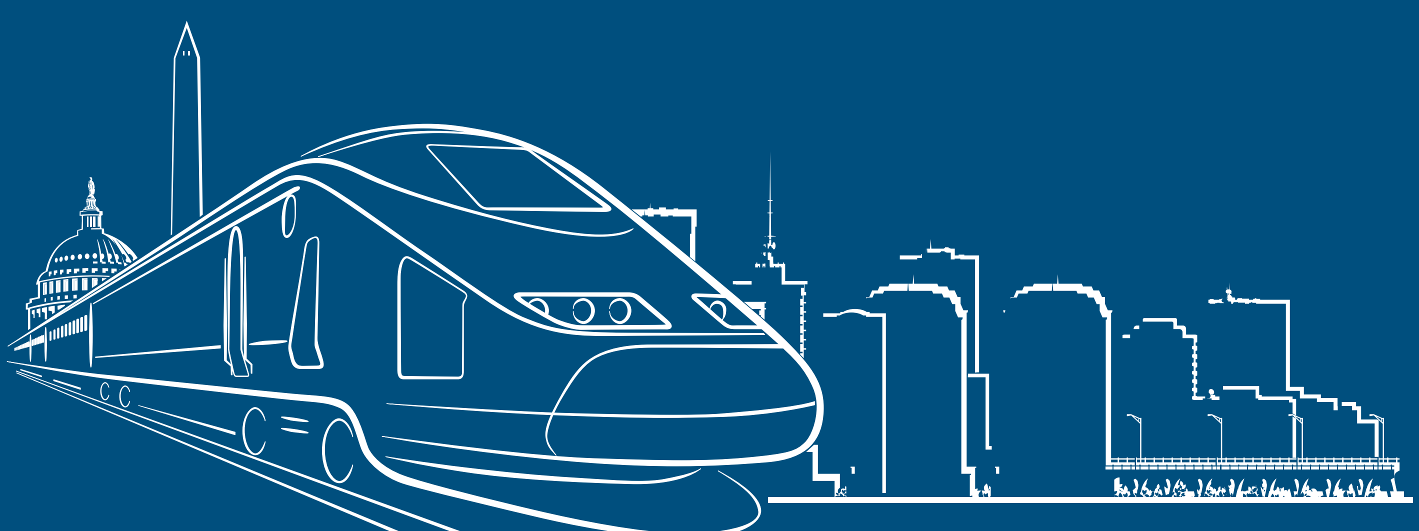
Table 6.3-3: Section 106 Correspondence

Date	Medium	Recipient	Topic[1]
January 20, 2017; TBD	Letter, Email	DHR	Submittal of Architectural Phase I Report (Structures); DHR Reply
TBD	Email	Consulting Parties	Distribution of Architectural Reports for Review; Consulting Party Comments
September 6, 2016; October 11, 2016	Letter, Email	DHR	Submittal of Archaeological Phase I Report (Segments 1-20); DHR Reply
TBD	Email	Consulting Parties	Distribution of Archaeological Phase I Report (Segments 1-20) for Review; Consulting Party Replies
January 20, 2017; TBD	Letter, Email	DHR	Submittal of Phase IA Fredericksburg Bypass Report; DHR Reply
January 6, 2017; February 3, 2017	Letter, Email	DHR	Submittal of Phase IA Ashland Bypass Report; DHR Reply

Note: 1. See Section 2.2 of this Draft EIS for a description of DC2RVA corridor segments.

DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

7 RECOMMENDED PREFERRED ALTERNATIVE



7 DRPT RECOMMENDED PREFERRED ALTERNATIVE

In this Draft Environmental Impact Statement (Draft EIS), the Virginia Department of Rail and Public Transportation (DRPT) has identified its Recommended Preferred Alternative for improvements within four of six alternative areas along the DC2RVA corridor based on the Purpose and Need for the Project and with consideration for potential environmental impacts within the respective areas. DRPT's Recommended Preferred Alternative is non-binding and is made available for public review and comment in this Draft EIS. FRA will fully consider comments received on DRPT's Recommended Preferred Alternative from the Draft EIS, or any subsequent additional analysis if required, and will confirm a selected Preferred Alternative for the full DC2RVA corridor in the Final EIS and Record of Decision (ROD).

DRPT fully considered the Project's Purpose and Need and all of the information and analysis contained in this Draft EIS in determining its Recommended Preferred Alternative. DRPT also evaluated impacts to the natural and human environment and assessed information on intercity passenger rail ridership, rail operations, cost, and constructability for each alternative. Finally, DRPT's Recommended Preferred Alternative was informed by extensive outreach and communications undertaken with the public, stakeholders, and elected officials in the DC2RVA corridor, plus prior corridor studies, including the 2002 Southeast High Speed Rail (SEHSR) Tier I EIS and Record of Decision.

DRPT's Recommended Preferred Alternative includes a service plan that would add nine additional daily intercity passenger round trips (18 trains per day). Five of these new round trips would provide regional service from Norfolk and Newport News through Richmond to Amtrak's Northeast Corridor, with one round trip originating at Richmond's Main Street Station. Four of these new round trips would provide interstate service from North Carolina through Virginia and continuing on to Amtrak's Northeast Corridor. From Washington D.C., all of these new trains would continue on to Philadelphia, New York, and Boston. The new service would be incorporated into Amtrak's intercity passenger rail network. DRPT's service plan also proposes a maximum authorized speed for the corridor of 90 mph (where practicable), and improved reliability of the intercity passenger train service.

As described in Chapter 2, DRPT evaluated rail alignment Build Alternatives in six alternative areas along the DC2RVA corridor, as well as the No Build Alternative, which was determined during the SESHR Tier 1 EIS to not meet Purpose and Need. Each alternative area contains one or more Build Alternatives that include rail alignment and associated roadway and station work. The Recommended Preferred Alternative is a combination of one Build Alternative from each of the six alternative areas to form a contiguous "best-fit" alternative for the DC2RVA corridor, with the exception of two areas where further consideration is required: Area 1 (Arlington) and Area 5 (Ashland).

Figure 7.0-1 presents the DRPT Recommended Preferred Alternative and includes a brief summary for each alternative area. A more detailed discussion of DRPT's Recommended Preferred Alternative for each alternative area is provided in the following sections.

AREA 1: ARLINGTON (LONG BRIDGE APPROACH)
Location: CFP 110 - CFP 109.3
Recommendation: Retain Alternative 1A, 1B and 1C to support a deferred selection until after completion of Long Bridge Study
Approximate Length: 1 Mile
Approximate Cost Range: $36-47 Million (2025)
All alternatives have similar impacts (within existing ROW) and equally support expanded rail service. Deferring decision maximizes flexibility of Long Bridge Study solutions.

AREA 2: NORTHERN VIRGINIA
Location: CFP 109.3 - CFP 062
Recommendation: Alternative 2A - Third or Fourth Track
Approximate Length: 47.3 Miles
Approximate Cost: $1.7 Billion (2025)
Avoids impacts to extent practicable (generally within existing ROW) while providing additional required rail capacity. Includes unavoidable impacts associated with several new bridge crossings.

AREA 3: FREDERICKSBURG
Location: CFP 062 - CFP 048
Recommendation: Alternative 3B Additional Third Main Track through City
Approximate Length: 14 Miles
Approximate Cost: $507 Million (2025)
Maximizes ability to add train service and improve reliability, while minimizing overall cost and impacts (fewer relocations/wetlands impacts). Includes unavoidable impacts associated with historic properties and crossing of Rappahannock River.

AREA 4: CENTRAL VIRGINIA
Location: CFP 048 - CFP 019
Recommendation: Alternative 4A Additional Third Track
Approximate Length: 29 Miles
Approximate Cost: $643 Million (2025)
Avoids impacts to extent practicable (generally within existing ROW) while providing additional required rail capacity. Includes some unavoidable impacts associated with the location of the additional track on either the east or west side of existing alignment.

AREA 5: ASHLAND
Location: CFP 019 - CFP 009
Recommendation: Additional study of rail capacity improvements
Approximate Length: 10-11 Miles
Defer selection of a Recommended Preferred Alternative until the Final EIS. To provide greater opportunity for community and stakeholder input into the Preferred Alternative, DRPT has created the Town of Ashland / Hanover County Community Advisory Committee (CAC). The CAC will look at the alternatives developed in this Draft EIS as well as any new alternatives generated by the additional study.

AREA 6: RICHMOND
Location: CFP 009 - A011 Centralia
Recommendation: Alternative 6F - Main Street Station and Staples Mill Road Station Full Service with S-Line Improvements
Approximate Length: 23 Miles
Approximate Cost: $1.5 Billion (2025)
The only Richmond Build Alternative that fully meets the Purpose and Need. Provides most flexible service options. Reduces conflicts of passenger operations with freight and makes stations most accessible to riders.

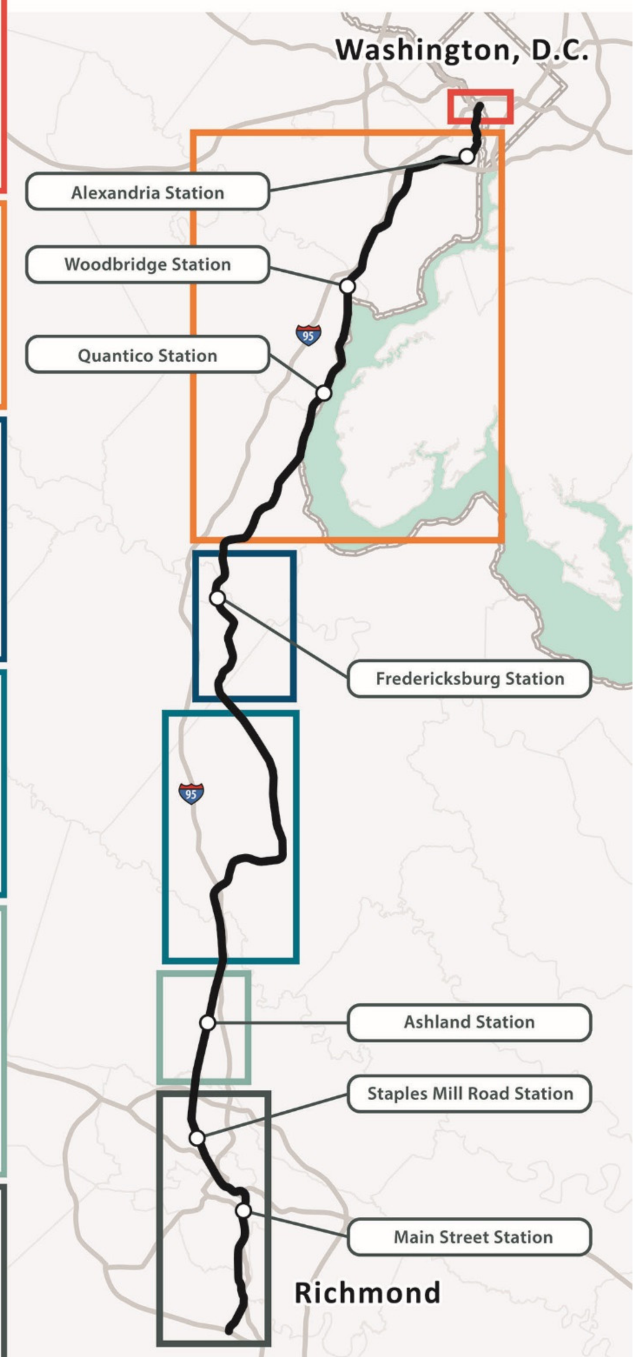


Figure 7.0-1: DRPT Recommended Build Alternative

7.1 ALTERNATIVE AREA 1: ARLINGTON LONG BRIDGE APPROACH—CFP 110 TO CFP 109.3

This less than one-mile-long section of the DC2RVA corridor provides the transition between the DC2RVA corridor and the approach to the Long Bridge across the Potomac River. DRPT is working with the District of Columbia Department of Transportation (DDOT) and FRA to evaluate possible alternatives for increasing the rail corridor's capacity across the Potomac River via the Long Bridge as part of a separate EIS (Long Bridge Rail Capacity Study, anticipated to be completed in 2019). The DC2RVA Project assumes that expanded capacity across the Potomac River will be required to accommodate both the future year No Build and Build service plans expanded service south of Washington, D.C.

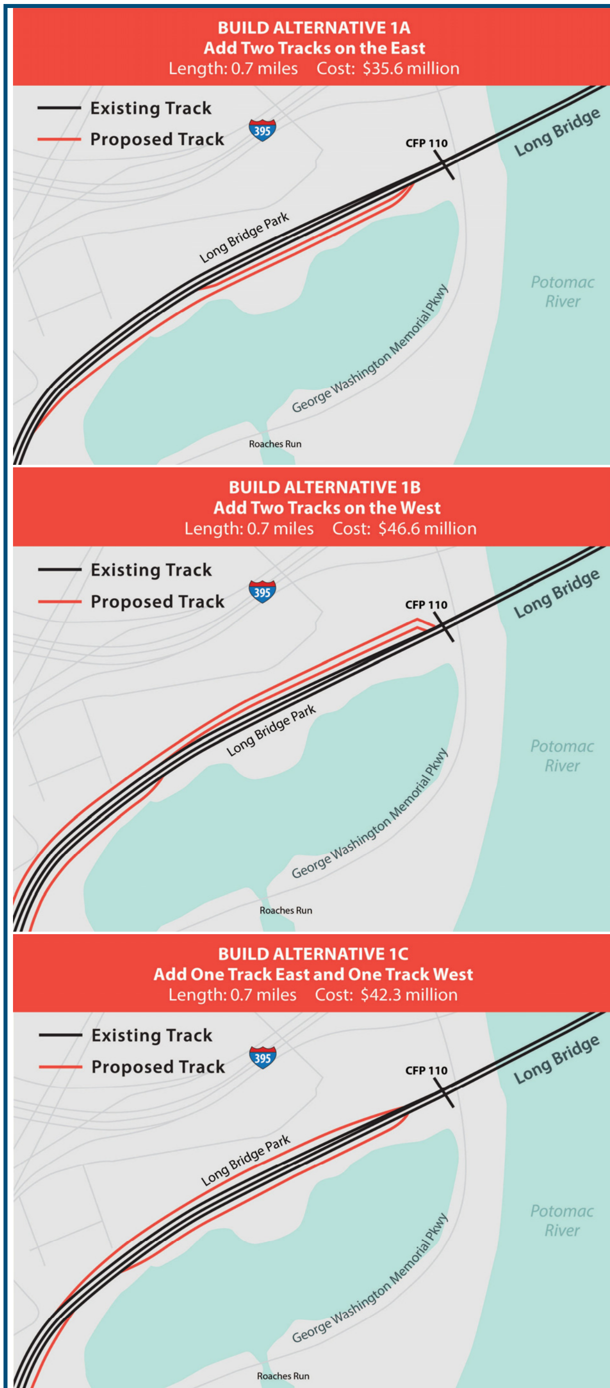


Figure 7.1-1: DRPT Recommended Preferred Alternative (Arlington Area)

In this Draft EIS, DRPT is evaluating three different configurations for the short section of track south of the Potomac River, which will become the connection between the Long Bridge preferred alternative and the DC2RVA corridor. The maximum authorized speed in this section is designed for 45 mph. DRPT considered the environmental, social, and economic impacts of each of the three Build Alternatives, in addition to each alternative's ability to meet the Project Purpose and Need. DRPT determined that each of the three Build Alternatives (1A, 1B, and 1C, as shown in Figure 7.1-1) are very similar in their impacts, and there are no overriding issues that would drive DRPT to select one over the other. Therefore, to avoid unnecessarily limiting the options that could be considered as part of the separate DDOT Long Bridge study, DRPT determined that any of the three Build Alternatives would be acceptable and recommends retaining all three Build Alternatives in order to support a deferred selection of a preferred alternative to physically align with the preferred alignment of the Long Bridge EIS study. DRPT is participating as a cooperating agency in the Long Bridge Study and will more fully discuss the selection of a preferred alternative for Area 1 in the DC2RVA Final EIS.

7.2 ALTERNATIVE AREA 2: NORTHERN VIRGINIA CFP 109.3 TO CFP 62

DRPT determined that additional rail capacity is required in the Northern Virginia area to increase train service and improve reliability. This Draft EIS evaluates the impacts of a single alternative (**Build Alternative 2A: Add One Track/Improve Existing Track**, as shown in Figure 7.2-1): constructing one additional main line track adjacent to the existing tracks in some sections and no additional track in some sections to create a corridor with four interoperable main tracks north of Alexandria and three interoperable main tracks from Alexandria to Fredericksburg. Due to constraints of the geography through this location, the maximum authorized speed in this section is designed for 79 mph.

DRPT determined that because this alternative would generally be located within the existing CSXT right-of-way, it avoids impacts to the natural and human resources to the extent practicable. This alternative does have some unavoidable impacts, including those associated with several new bridge crossings of major waterways. Table 7.2-1 summarizes the performance of Build Alternative 2A against the Purpose and Need evaluation criteria and its impact on the human and natural environment.

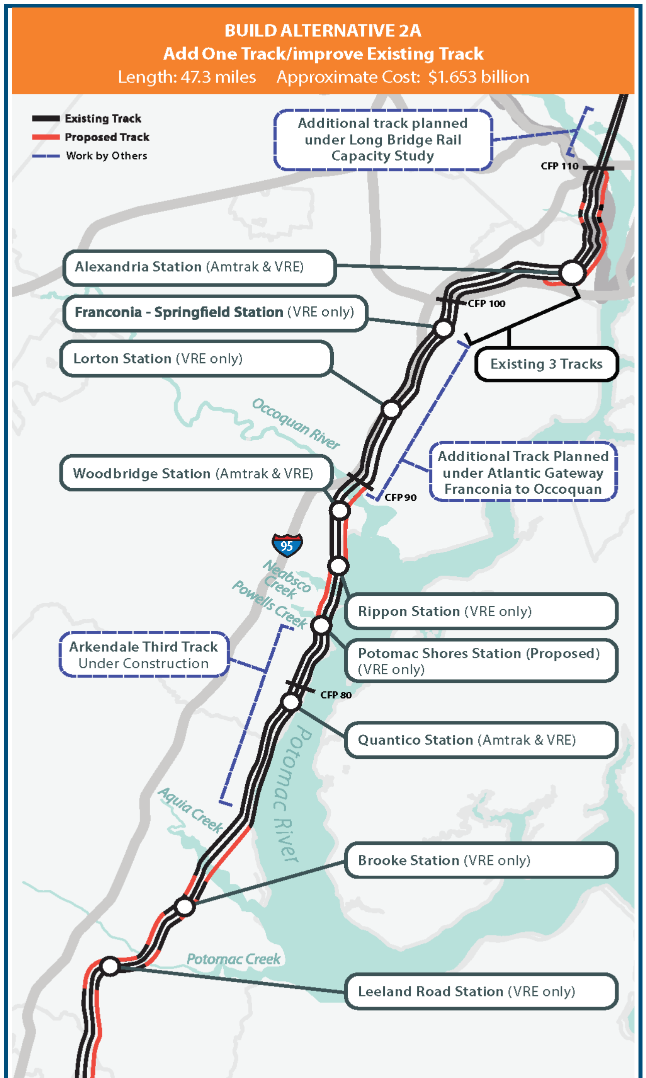


Figure 7.2-1: DRPT Recommended Preferred Alternative (Northern Virginia Area)

Occoquan River Bridge

Table 7.2-1: Evaluation of Northern Virginia Area Alternative Against the Purpose and Need and Its Impact on the Human and Natural Environment

Purpose and Need Elements & Summary of Factors Considered[1]	2A. Add One Track/Improve Existing Track
Provide an efficient and reliable multimodal rail corridor	
Impacts to human and natural resources (detailed list of impacts is in Chapter 4):	
Wetland impacts	5.19 acres
Section 4(f) park impacts	0.04 acres
Historic properties impacts	1 property affected
Right-of-way acquisition	33 acres
Residential relocations	2 residences relocated
Commercial relocations	0
Optimizes cost:	
Construction costs (2025)[2]	$1,652.6 million
Increase the capacity of the multimodal rail system through infrastructure improvements	
Increases multimodal rail capacity	Yes
Improve the frequency of passenger rail operations *(Refer to Area 6 Richmond for values)*	
Supports ridership demand within the corridor and beyond	Yes
Increases passenger train frequency by up to 9 round trips per day	Yes
Improve the reliability of passenger rail operations *(Refer to Area 6 Richmond for values)*	
Passenger Train On-Time Performance (2045 OTP)	Supports the DC2RVA proposed service plan for on-time performance
Improve the travel time of passenger rail operations *(Refer to Area 6 Richmond for values)*	
Travel time DC-Richmond	Supports the DC2RVA proposed service plan for reduced travel time
Accommodate VRE commuter rail service operations	
Accommodates VRE commuter rail service operations	Incorporates VRE planned infrastructure improvements at VRE stations and integrates VRE schedules.
Accommodate freight rail service operations	
Freight time delay (2045)	Does not increase impacts to freight time delay
Accommodates rail freight future growth, yard operations, access to local customers, and sidings for crew changes and layovers	Yes
Improve modal connectivity with other public transportation systems	
Aligns with FRA and Amtrak guidelines for station facilities, and state and local plans	Yes
At-grade crossing total daily delay (% change from No Build)	1% decrease
Changes in roadway travel patterns (% change in traffic, adjacent roadways at stations)	<1%
Improve multimodal rail operations safety	
Grade-separation of public at-grade crossings	0
Closure of public at-grade crossings	1
Safety improvements of public at-grade crossings (four quadrant gates and/or median treatment)	2
New public crossings	0
Provides platform and station improvements	Yes
Provides upgrades to signals and communication systems	Yes
Improve Air Quality & Reduce Greenhouse Gas Emissions *(Refer to Area 6 Richmond for values)*	
Supports reduction of CO2 emissions	Yes
Supports decreases in energy consumption	Yes

Notes: 1) Refer to Chapter 2 and Chapter 4 of the Draft EIS for complete list of factors evaluated and the evaluation results for each Build Alternative. 2) Does not include rolling stock.

7.3 ALTERNATIVE AREA 3: FREDERICKSBURG DAHLGREN SPUR TO CROSSROADS—CFP 62 TO CFP 48

DRPT evaluated three Build Alternatives in the Fredericksburg area. The Recommended Preferred Alternative (**Build Alternative 3B: Add One Track East of Existing**, as shown in Figure 7.3-1) would add a new third main line adjacent to the existing tracks on the east, which would provide the capacity needed to increase train service and improve reliability. Due to constraints of the geography through this location, the maximum authorized speed in this section is designed for 79 mph where feasible.

Build Alternative 3A would maintain the existing two tracks through Fredericksburg. DRPT concludes that Build Alternative 3A would not provide the capacity needed to meet the DC2RVA service plan objectives. Build Alternative 3C would construct a two-track bypass to the east of Fredericksburg. While a new bypass would provide the capacity required to meet the DC2RVA service plan objectives, DRPT concludes that, compared with adding a new third main line through Fredericksburg, the bypass alternative would have greater cost and greater impacts to natural and human resources and would result in more residential relocations.

BUILD ALTERNATIVE 3B
Add One Track East of Existing
Length: 14 miles Cost: $506.9 million

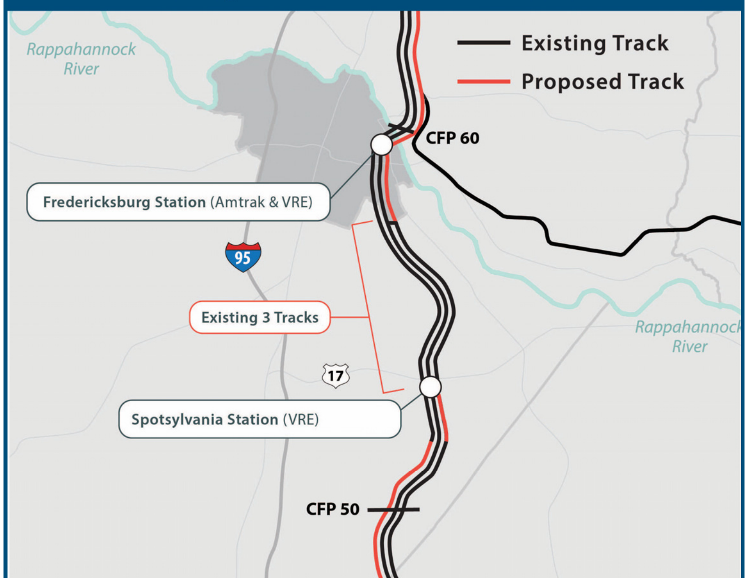


Figure 7.3-1: DRPT Recommended Preferred Alternative (Fredericksburg Area)

While the Recommended Preferred Alternative's impacts to historic resources would be greater than those of the two other Fredericksburg area Build Alternatives, it remains primarily within the existing CSXT right-of-way, and its impacts to wetlands and residential and commercial properties would be substantially lower than the bypass alternative (3C). Both Build Alternatives with additional track include new bridge crossings of the Rappahannock River, a parallel single-track bridge for Build Alternative 3B, and a new double-track bridge for Build Alternative 3C. The construction costs for Build Alternative 3B would be less than the bypass, and Build Alternative 3B is included in the *Fredericksburg Comprehensive Plan*. In summary, DRPT prefers Build Alternative 3B, adding one track in the existing alignment through the city, because it remains primarily within the existing CSXT right-of-way and minimizes overall impacts and costs while still providing improved operations for the DC2RVA corridor. Table 7.3-1 summarizes the performance of the Fredericksburg area Build Alternatives against the Purpose and Need evaluation criteria and their impact on the human and natural environment.

Table 7.3-1: Evaluation of Fredericksburg Area Alternatives Against the Purpose and Need and their Impact on the Human and Natural Environment

Purpose and Need Elements & Summary of Factors Considered[1]	Build Alternatives		
	3A. Maintain Two Tracks Through Town	3B. Add One Track East of Existing	3C. Add Two-Track Bypass East
Provide an efficient and reliable multimodal rail corridor			
Impacts to human and natural resources (detailed list of impacts is in Chapter 4):			
Wetland impacts	5.24 acres	5.29 acres	23.82 acres
Section 4(f) park impacts	0	0	0
Historic properties impacts (parks and historic properties)	1 property	5 properties	1 property
Right-of-way acquisition	2.2 acres	19.8 acres	140.5 acres
Residential relocations	0	0	19 residential relocations
Commercial relocations	0	1 commercial relocation	1 commercial relocation
Optimizes cost:			
Construction costs (2025 $) (millions)[1]	$240.2	$506.9	$977.5
Increase the capacity of the multimodal rail system through infrastructure improvements			
Increases multimodal rail capacity	No	Yes	Yes
Improve the frequency of passenger rail operations *(Refer to Area 6 Richmond for values)*			
Supports ridership demand within the corridor and beyond	Would not support the DC2RVA proposed service plan of 9 additional round trips	Supports the DC2RVA proposed service plan of 9 additional round trips	Supports the DC2RVA proposed service plan of 9 additional round trips
Increases passenger train frequency by up to 9 round trips per day	Yes	Yes	Yes
Improve the reliability of passenger rail operations *(Refer to Area 6 Richmond for values)*			
Passenger Train On-Time Performance (2045 OTP)	Does not meet DC2RVA service plan objectives for OTP	Supports the DC2RVA proposed service plan for on-time performance	Supports the DC2RVA proposed service plan for on-time performance)
Improve the travel time of passenger rail operations *(Refer to Area 6 Richmond for values)*			
Travel time DC-Richmond	Would not support DC2RVA service plan objectives for improved travel time	Supports the DC2RVA proposed service plan objectives for improved travel time	Supports the DC2RVA proposed service plan objectives for improved travel time
Accommodate VRE commuter rail service operations			
Accommodates VRE commuter rail service operations	No	Yes	Yes
Accommodate freight rail service operations			
Freight time delay (2045)	Increases freight delay	Meets DC2RVA objectives for freight impacts	Increases freight traffic travel time and distance
Accommodates rail freight future growth, yard operations, access to local customers, and sidings for crew changes and layovers	No	Yes	Yes
Improve modal connectivity with other public transportation systems			
Aligns with FRA and Amtrak guidelines for station facilities, and state and local plans	Yes	Yes	Yes
At-grade crossing total daily delay (% change from No Build)	6% increase	60% decrease	10% decrease

▶ *Continued – see end of table for notes.*

Table 7.3-1: Evaluation of Fredericksburg Area Alternatives Against the Purpose and Need and their Impact on the Human and Natural Environment

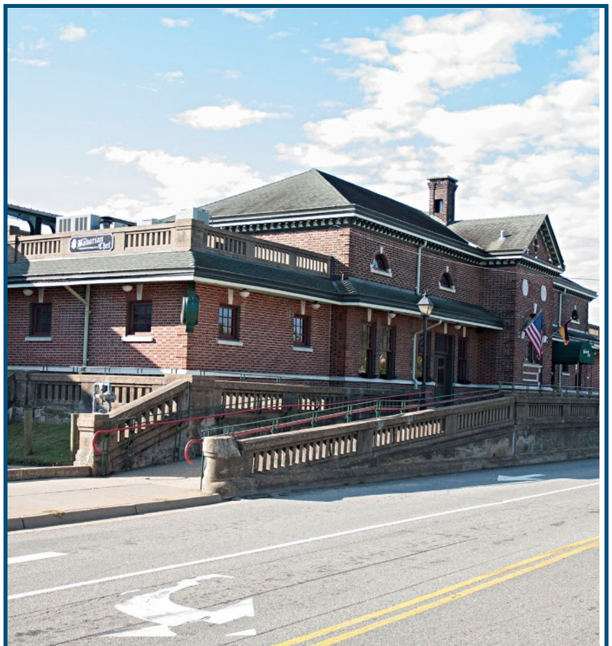
Purpose and Need Elements & Summary of Factors Considered[1]	Build Alternatives		
	3A. Maintain Two Tracks Through Town	3B. Add One Track East of Existing	3C. Add Two-Track Bypass East
Changes in roadway travel patterns (% change in traffic, adjacent roadways at stations)	7-8%	7-8%	7-8%
Improve multimodal rail operations safety			
Grade-separation of public at-grade crossings	0	1	0
Closure of public at-grade crossings	0	0	0
Safety improvements of public at-grade crossings (four quadrant gates and/or median treatment)	4	3	9
New grade-separated public crossings	0	0	5
Provides platform and station improvements	Yes	Yes	Yes
Provides upgrades to signals and communication systems	Yes	Yes	Yes
Improve Air Quality & Reduce Greenhouse Gas Emissions *(Refer to Area 6 Richmond for values)*			
Supports reduction of CO_2 emissions	Yes	Yes	Yes
Supports decreases in energy consumption	Yes	Yes	Yes

Notes: 1. Refer to Chapter 2 and Chapter 4 of the Draft EIS for complete list of factors evaluated and the evaluation results for each Build Alternative. 2. Does not include rolling stock.

Existing Rappahannock River Railroad Bridge

7.4 ALTERNATIVE AREA 4: CENTRAL VIRGINIA CROSSROADS TO DOSWELL—CFP 48 TO CFP 19

DRPT determined that additional rail capacity is required in the Central Virginia area to increase train service and improve reliability. This Draft EIS evaluates the impacts of constructing one additional main line track adjacent to the existing tracks, identified as **Build Alternative 4A: Add One Track/Improve Existing Track** (as shown in Figure 7.4-1). DRPT prefers this alternative because it would generally be located within the existing CSXT right-of-way, avoids impacts to natural and human resources to the extent practicable, and provides the greatest contiguous section along the DC2RVA corridor with a maximum authorized speed up to 90 mph. Table 7.4-1 summarizes the performance of Build Alternative 4A against the Purpose and Need evaluation criteria and its impact on the human and natural environment.



Original Fredericksburg Station

BUILD ALTERNATIVE 4A
Add One Track / Improve Existing Track
Length: 29 miles Cost: $643.2 million

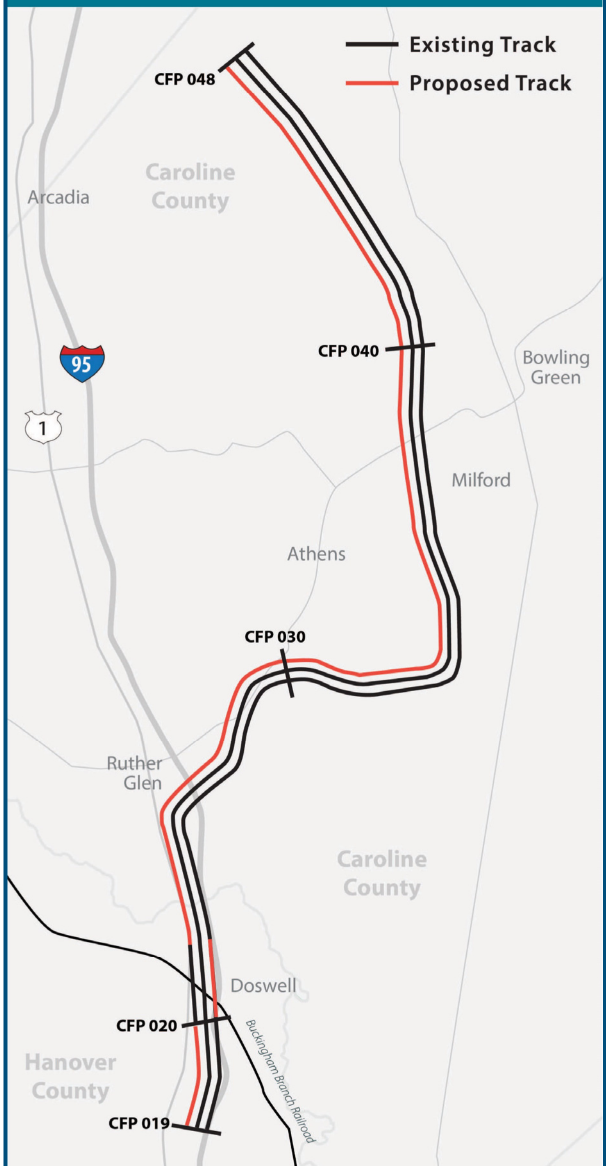


Figure 7.4-1: DRPT Recommended Preferred Alternative (Central Virginia Area)

Table 7.4-1: Evaluation of the Central Virginia Area Alternative against the Purpose and Need and Its Impact on the Human and Natural Environment

Purpose and Need Elements & Summary of Factors Considered[1]	4A. Add One Track/Improve Existing Track
Provide an efficient and reliable multimodal rail corridor	
Impacts to human and natural resources (detailed list of impacts is in Chapter 4):	
Wetland impacts	8.39 acres
Section 4(f) park impacts	0 acres
Historic properties impacts (parks and historic properties)	3 properties
Right-of-way acquisition	2.4 acres
Residential relocations	0
Commercial relocations	0
Optimizes cost:	
Construction costs (2025 $, millions)[1]	$643.2 million
Increase the capacity of the multimodal rail system through infrastructure improvements	
Increases multimodal rail capacity	Yes
Improve the frequency of passenger rail operations *(Refer to Area 6 Richmond for values)*	
Supports ridership demand within the corridor and beyond	Supports the DC2RVA proposed service plan of 9 additional round trips
Increases passenger train frequency by up to 9 round trips per day	Yes
Improve the reliability of passenger rail operations *(Refer to Area 6 Richmond for values)*	
Passenger Train On-Time Performance (2045 OTP)	Supports the DC2RVA proposed service plan for on-time performance
Improve the travel time of passenger rail operations *(Refer to Area 6 Richmond for values)*	
Travel time DC-Richmond	Supports the DC2RVA proposed service plan objectives for improved travel time
Accommodate VRE commuter rail service operations	
Accommodates VRE commuter rail service operations	No VRE stations present
Accommodate freight rail service operations	
Freight time delay (2045)	Does not increase impacts to freight time delay
Accommodates rail freight future growth, yard operations, access to local customers, and sidings for crew changes and layovers	Yes
Improve modal connectivity with other public transportation systems	
Aligns with FRA and Amtrak guidelines for station facilities, and state and local plans	No stations in the Central Virginia area
At-grade crossing total daily delay (% change from No Build)	6% decrease
Changes in roadway travel patterns (% change in traffic, adjacent roadways at stations)	n/a
Improve multimodal rail operations safety	
Grade-separation of public at-grade crossings	0
Closure of public at-grade crossings	1
Safety improvements of public at-grade crossings (four quadrant gates and/or median treatment)	6
New public crossings	0
Provides platform and station improvements	No stations in the Central Virginia area
Provides upgrades to signals and communication systems	Yes
Improve Air Quality & Reduce Greenhouse Gas Emissions *(Refer to Area 6 Richmond for values)*	
Supports reduction of CO_2 emissions	Yes
Supports decreases in energy consumption	Yes

Notes: 1) Refer to Chapter 2 and Chapter 4 of the Draft EIS for complete list of factors evaluated and the evaluation results for each Build Alternative. 2) Does not include rolling stock.

7.5 ALTERNATIVE AREA 5: ASHLAND DOSWELL TO I-295—CFP 19 TO CFP 9

DRPT considered more than 26 different options and alternatives for adding rail capacity in Ashland and evaluated 7 Build Alternatives in this Draft EIS. During the course of preparing this Draft EIS, DRPT met with the Town of Ashland, Hanover County, the public, and other stakeholders, and conducted a tour of the Ashland area with the Commonwealth Transportation Board (CTB). In addition, DRPT received numerous comments and input from stakeholders in the Town of Ashland and Hanover County communities, as well as Randolph-Macon College.

Based on analysis to-date, DRPT has concluded the following:

- The existing railroad ROW through Ashland is limited and any alternative which adds a new track or new infrastructure will require additional ROW.
- The Town of Ashland, Hanover County, and other community stakeholders have requested additional opportunities to be engaged in evaluating alternatives and developing possible mitigation strategies for the Ashland / Hanover County area.
- All seven Build Alternatives evaluated in the Draft EIS (Section 2.5.2.5) provide a reasonable range of alternatives that meet the Purpose and Need of the Project.
- Additional stakeholder input would benefit DRPT's analysis and inform their Recommended Preferred Alternative meeting the DC2RVA Purpose and Need through the Ashland Area.
- DRPT's Recommended Preferred Alternative for the Central Virginia and Richmond Areas are neither contingent on nor do they limit any one specific alternative for the Ashland Area.

DRPT has not identified a Recommended Preferred Alternative for the Ashland area of the DC2RVA corridor in this Draft EIS. DRPT recognizes that each of the proposed Build Alternatives would have adverse consequences on the citizens and resources of the Town of Ashland or Hanover County, and there is no local consensus or preference for a Build Alternative. DRPT has determined that expanded community involvement would inform decision-making.

Based on these conclusions, DRPT has deferred the selection of a Recommended Preferred Alternative in the Ashland area until the Final EIS for the DC2RVA Project. To provide the community and stakeholders a greater opportunity for input into the recommendation for a Preferred Alternative DRPT has established the Town of Ashland/Hanover County Community Advisory Committee (CAC). The CAC will take a fresh look at alternatives on the rail corridor through Ashland, including review of all previously considered alternatives and any new alternatives identified by the CAC. To provide transparency, DRPT will make the CAC meetings open to the public and will document the CAC results and all meeting minutes and other decision-documents as part of the public record for the Final EIS. At the conclusion of the CAC process, DRPT will recommend a Preferred Alternative for the Ashland area in the Final EIS.

Downtown Ashland

7.6 ALTERNATIVE AREA 6: RICHMOND I-295 TO CENTRALIA—CFP 9 TO A011

DRPT evaluated two primary route alignment alternatives for the Richmond area, with one passing west of downtown on the CSXT A-Line and another passing through downtown via the CSXT S-Line, to determine which route was best capable of providing the capacity required to support the DC2RVA Purpose and Need. In addition to the routing options, DRPT evaluated four unique station locations with eight different station service alternatives in the Richmond area serving multiple route and station combinations. The eight station service alternatives included four single-station alternatives that would consolidate passenger service to one station, and three two-station alternatives that offer combinations of services and rail line routes using Main Street Station and Staples Mill Road Station:

- Single Station Build Alternatives:
  - 6A: Staples Mill Road Station Only
  - 6B–A-Line: Boulevard Station Only, A-Line
  - 6B–S-Line: Boulevard Station Only, S-Line
  - 6C: Broad Street Station Only
  - 6D Main Street Station Only
- Two Station Build Alternatives:
  - 6E: Split Service, Staples Mill Road/Main Street Stations
  - 6F: Full Service, Staples Mill Road/Main Street Stations
  - 6G: Shared Service, Staples Mill Road/Main Street Station

To develop the most viable alternatives, DRPT engaged in discussions with CSXT, the City of Richmond, Henrico County, and Chesterfield County, as well as the Richmond Transportation Planning Organization. In addition, DRPT held three public meetings in Richmond.

DRPT recognizes that a major advantage of passenger rail is the capability to provide the traveling public with a connection to Richmond's downtown. Both FRA and Amtrak also recognize the importance of a connection to the urban core. FRA's Corridor Planning Guidance Manual states that "(each) city should have a station located in or near the central business district." DRPT is committed to maximizing the value of intercity passenger rail by connecting the DC2RVA corridor to the governmental, commercial, and residential population in downtown Richmond. However, DRPT also recognizes that Richmond's Staples Mill Road Station currently has the highest ridership volumes of any passenger rail station in Virginia, in part due to the higher level of train service at the station. Based on the cost estimates, level of impacts, and ridership projections, DRPT determined that having both a downtown station and a suburban station would provide the Commonwealth and the Richmond region with a service that provides the most convenient travel options for passengers, a high level of performance reliability, and the ability to accommodate all of the service increases proposed by the Project.

DRPT determined that **Build Alternative 6F: Full Service, Staples Mill Road/Main Street Stations** provides the most optimal solution for providing downtown Richmond rail service at Main Street Station and convenient connections to Richmond's transit system, including multiple bus routes and the new Bus Rapid Transit (BRT) system under construction along Broad Street. This two-station Richmond alternative will allow for concentration of baggage, crew change and layover activities at the Staples Mill Road location, reducing the track and platform dwell time for trains serving Main Street Station. By nature of the respective environments of each location, Main Street Station would provide expanded multimodal connectivity, while Staples Mills Road Station could continue to accommodate the parking needs of regional rail passengers who are not located in the downtown Richmond area (see Figure 7.6-1).

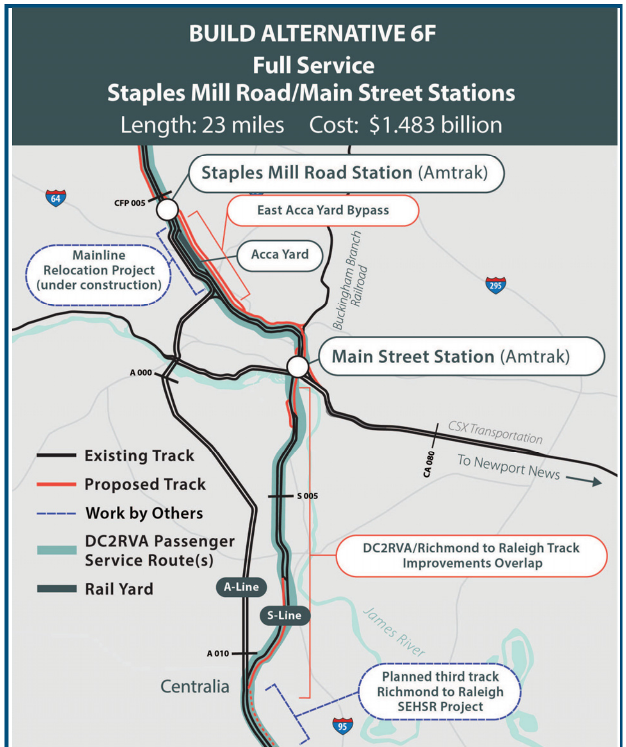
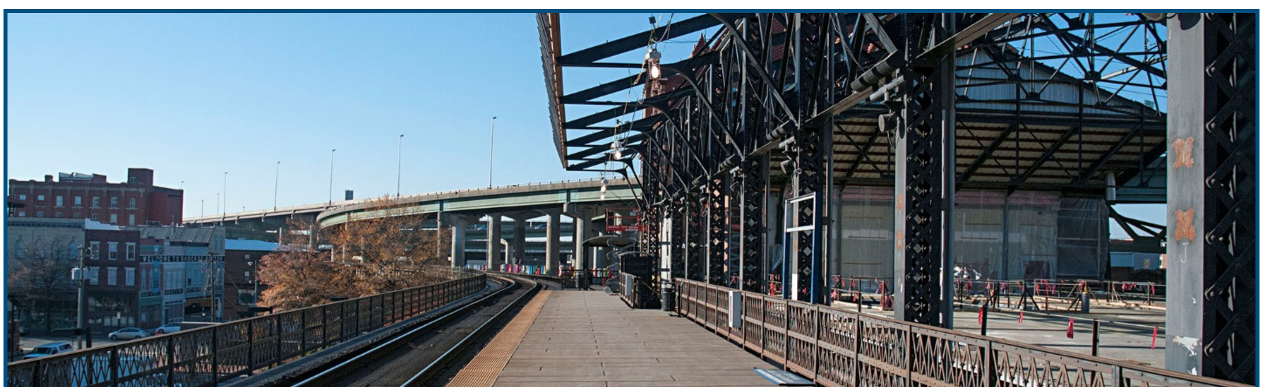


Figure 7.6-1: DRPT Recommended Preferred Alternative (Richmond Area)

In this alternative, all Long-Distance, Interstate Corridor, and Northeast Regional 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. The Northeast Regional service to Newport News would continue to use the east side of Main Street Station on the Peninsula Subdivision line. This alternative includes improvements between Greendale and Centralia along the S-Line and includes station and service improvements at Main Street Station, an additional bridge crossing of the James River, an east bypass of Acca Yard, and station and service improvements at Staples Mill Road Station. With all intercity passenger trains (with the exception of Amtrak's Auto Train) serving Downtown Richmond via the CSX S-Line, the CSX A-Line will become a primarily freight route bypassing downtown and reducing delays for both services. Therefore, DRPT has determined that Build Alternative 6F is the Recommended Preferred Alternative for the Richmond area.

Table 7.6-1 summarizes the performance of the Richmond area Build Alternatives against the Purpose and Need evaluation criteria and their impact on the human and natural environment.



Main Street Station Platform

Table 7.6-1: Evaluation of Richmond Area Alternatives Against the Purpose and Need and Their Impact on the Human and Natural Environment

Purpose and Need Elements & Summary of Factors Considered[1]	Build Alternatives							
	Richmond Single-Station Options					Richmond Two-Station Options		
	6A. Staples Mill Road Station Only	6B–A-Line. Boulevard Station Only A-Line	6B–S-Line. Boulevard Station Only S-Line	6C. Broad Street Station Only A-Line	6D. Main Street Station Only S-Line	6E. Split Service–Staples Mill Road/Main Street Stations	6F. Full Service–Staples Mill Road/ Main Street Stations	6G. Shared Service–Staples Mill Road/ Main Street Stations
Provide an efficient and reliable multimodal rail corridor								
Impacts to human and natural resources (detailed list of impacts is in Chapter 4):								
Wetland impacts	3.21 acres	2.91 acres	3.47 acres	2.99 acres	3.47 acres	3.31 acres	3.52 acres	3.74 acres
Section 4(f) park impacts	0.19 acres	0.19 acres	0.17 acres	0.19 acres	0.17 acres	0.19 acres	0.17 acres	0.17 acres
Historic properties impacts	8 properties	16 properties	16 properties	16 properties	10 properties	7 properties	10 properties	13 properties
Right-of-way acquisition	76.0 acres	101.0 acres	78.7 acres	128.1 acres	73.7 acres	89.1 acres	83.0 acres	81.0 acres
Residential relocations	12 residential relocations	12 residential relocations	7 residential relocations	112 residential relocations	7 residential relocations	12 residential relocations	7 residential relocations	7 residential relocations
Commercial relocations	10 Commercial relocations	18 Commercial relocations	10 Commercial relocations	15 Commercial relocations	10 Commercial relocations	10 Commercial relocations	10 Commercial relocations	10 Commercial relocations
Optimizes cost:								
Construction costs (2025)[2] (millions)	$1,087.7	$1,524.1	$1,451.2	$1,488.7	$1,323.5	$1,266.5	$1,482.9	$1,599.1
Increase the capacity of the multimodal rail system through infrastructure improvements								
Increases multimodal rail capacity	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Improve the frequency of passenger rail operations								
Annual Ridership, DC-Richmond (2025) (millions)	2.579	2.509	2.509	2.474	2.521	2.519	2.553	2.556
Annual Ridership, DC-Richmond (2045) (millions)	3.295	3.203	3.203	3.160	3.213	3.218	3.258	3.261

► *Continued – see end of table for notes.*

Table 7.6-1: Evaluation of Richmond Area Alternatives Against the Purpose and Need and Their Impact on the Human and Natural Environment

Purpose and Need Elements & Summary of Factors Considered[1]	Build Alternatives							
	Richmond Single-Station Options					Richmond Two-Station Options		
	6A. Staples Mill Road Station Only	6B–A-Line. Boulevard Station Only A-Line	6B–S-Line. Boulevard Station Only S-Line	6C. Broad Street Station Only A-Line	6D. Main Street Station Only S-Line	6E. Split Service–Staples Mill Road/Main Street Stations	6F. Full Service–Staples Mill Road/ Main Street Stations	6G. Shared Service–Staples Mill Road/ Main Street Stations
Increases passenger train frequency by up to 9 round trips per day	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Supports ridership demand within the corridor and beyond	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Improve the reliability of passenger rail operations								
Passenger Train On-Time Performance (2045 OTP) [3,4]: Meets DC2RVA proposed service plan for on-time performance.	No	No	Yes	No	No	No	Yes	No
Improve the travel time of passenger rail operations								
Travel time DC–Richmond (hour:minute)[5]	1:50	1:56	1:56	2:01	2:06	1:50	2:15	2:15
Reduces current passenger train trip time DC-Richmond?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Accommodate VRE commuter rail service operations by incorporating planned infrastructure and operational improvements								
Accommodates VRE commuter rail service operations	N/A (No VRE Stations Present in Richmond Area 6)							

▶ *Continued – see end of table for notes.*

Table 7.6-1: Evaluation of Richmond Area Alternatives Against the Purpose and Need and Their Impact on the Human and Natural Environment

Purpose and Need Elements & Summary of Factors Considered[1]	Build Alternatives							
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	6A. Staples Mill Road Station Only	6B–A-Line. Boulevard Station Only A-Line	6B–S-Line. Boulevard Station Only S-Line	6C. Broad Street Station Only A-Line	6D. Main Street Station Only S-Line	6E. Split Service—Staples Mill Road/Main Street Stations	6F. Full Service—Staples Mill Road/ Main Street Stations	6G. Shared Service—Staples Mill Road/ Main Street Stations
Accommodate freight rail service operations								
Freight time delay (2045) (minutes of delay per 100 train-miles) [2,3]	11.5	12	9	12	11	12	9	12
Accommodates rail freight future growth, yard operations, access to local customers, and sidings for crew changes and layovers	No	No	Yes	No	Yes	No	Yes	No
Improve modal connectivity with other public transportation systems								
Aligns with FRA and Amtrak guidelines for station facilities, and state and local plans	No. Does not meet FRA downtown station guidelines	No. Does not meet FRA downtown station guidelines	No. Does not meet FRA downtown station guidelines	No. Does not meet FRA downtown station guidelines	Yes	Yes	Yes	Yes
At-grade crossing total daily delay (% change from No Build)	66% decrease	66% decrease	76% decrease	38% decrease	59% decrease	66% decrease	59% decrease	60% decrease
Changes in roadway travel patterns (% change in traffic, adjacent roadways at stations)	2%	5%	5%	5%	4%	1 to 2%	1 to 2%	1 to 2%
Improve multimodal rail operations safety								
Grade-separation of public at-grade crossings	3	3	4	3	3	3	3	3

► *Continued – see end of table for notes.*

Table 7.6-1: Evaluation of Richmond Area Alternatives Against the Purpose and Need and Their Impact on the Human and Natural Environment

Purpose and Need Elements & Summary of Factors Considered[1]	Build Alternatives							
	Richmond Single-Station Options					Richmond Two-Station Options		
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Closure of public at-grade crossings	4	4	5	4	5	4	5	5
Safety improvements of public at-grade crossings (four quadrant gates and/or median treatment)	3	3	7	4	8	3	8	8
New public at-grade crossings[6]	0	0	0	2	0	0	0	0
Provides platform and station improvements	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Provides upgrades to signals and communication systems	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Improve Air Quality & Reduce Greenhouse Gas Emissions								
CO_2 Emissions, Change Compared to No Build (tons per year, 2025)	-6,696	-6,003	-6,003	-5,663	-5,947	-6,051	-6,518	-6,869
Energy Consumption, Change Compared to No Build (Billions of BTUs, 2025)	-307	-277	-277	-265	-280	-286	-293	-299

Notes: 1. Refer to Chapter 2 and Chapter 4 of the Draft EIS for complete list of factors evaluated and the evaluation results for each Build Alternative. 2. Does not include rolling stock. 3. Fredericksburg and Ashland operations data assumes use of Richmond Alternative 6F. 4. Richmond operations data assumes construction of the recommended alternatives for each of the sections and additional third main track capacity through Ashland. 5. Travel times are for limited stop southbound Interstate Corridor (SEHSR) trains only from Washington Union Station to the station closest to downtown Richmond. Northbound Interstate Corridor trains are about 2 minutes longer. Regional trains, which make more stops, operate 6 to 8 minutes longer. 6. New at-grade crossings would require a variance of Virginia State Code and/or coordination with VDOT.

DRPT developed operating and maintenance costs (see Chapter 2) and estimates of revenue (see Appendix J), but neither were differentiators between the Build Alternatives and were therefore not used by DRPT in selecting the Recommended Preferred Alternative.

7.7 FINAL PREFERRED ALTERNATIVE

DRPT invites the public, elected officials, and agencies to provide comments on the Draft EIS and DRPT's Recommended Preferred Alternative. After reviewing all of the comments received on the Draft EIS and DRPT's Recommended Preferred Alternative, DRPT will finalize the Preferred Alternative. In addition, DRPT will provide the CTB with a full summary of the comments received. DRPT anticipates that the CTB will formally identify the Commonwealth of Virginia's Preferred Alternative as a recommendation for FRA to consider and confirm in the Final EIS and ROD for the DC2RVA Project.

8 DISTRIBUTION OF DRAFT EIS

8 DISTRIBUTION OF DRAFT EIS

The Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA) Draft Environmental Impact Statement (EIS) is being distributed to the following federal, regional, state, and local agencies, elected officials, and other interested parties for their review and comments. The document also is available for public viewing at public libraries and government centers along the corridor, as well as on the Project website (www.DC2RVArail.com).

8.1 FEDERAL AGENCIES

- Advisory Council on Historic Preservation
- Council on Environmental Quality
- National Oceanic and Atmospheric Administration
- National Marine Fisheries Service
- United States Department of Agriculture
  - Natural Resources Conservation Service
  - Wildlife Services
- United States Department of Commerce, Ecology and Environmental Conservation Office
- United States Department of Defense
  - United States Army Corps of Engineers
    - Norfolk District
    - Baltimore District
  - Fort A.P. Hill
  - Fort Belvoir
  - Marine Corps Base Quantico
- United States Department of Health and Human Services, Region 3
- United States Department of Homeland Security
  - Federal Emergency Management Agency, Region III
  - United States Coast Guard, 5th Coast Guard District
- United States Department of Housing and Urban Development
- United States Department of the Interior
  - Bureau of Indian Affairs
  - National Park Service
    - American Battlefield Protection Program

        - Fredericksburg & Spotsylvania Battlefield
        - National Capital Region
        - Richmond National Battlefield
    - Office of Environmental Policy & Compliance
    - United States Fish and Wildlife Service
        - Chesapeake Bay Field Office
        - Virginia Field Office

- United States Department of Transportation
    - Federal Aviation Administration
    - Federal Highway Administration, Virginia Division
    - Federal Transit Administration, Region 3

- United States Environmental Protection Agency
    - Office of Federal Activities
    - National Environmental Policy Act Program Office, Region 3
    - National Environmental Policy Act Program Office, Region 4

8.2 COMMONWEALTH OF VIRGINIA AGENCIES

- Commonwealth Transportation Board
- Virginia Department of Agriculture and Consumer Services
- Virginia Department of Conservation and Recreation
    - Division of Natural Heritage Resources
    - Division of Planning and Recreation Resources
- Virginia Department of Environmental Quality
    - Air Division
    - Chesapeake Bay Program
    - Division of Water Quality, Office of Wetlands and Stream Protection
    - Erosion and Sediment Control
    - Northern Regional Office
    - Office of Environmental Impact Review
    - Piedmont Regional Office
    - Virginia Stormwater Management Program
    - Waste Division
- Virginia Department of Forestry
- Virginia Department of Game and Inland Fisheries
- Virginia Department of Health
- Virginia Department of Historic Resources
- Virginia Department of Transportation
- Virginia Marine Resources Commission
- Virginia Outdoors Foundation
- Virginia Port Authority

8.3 OTHER STATE AGENCIES

- North Carolina Department of Transportation
- District of Columbia Department of Transportation

8.4 REGIONAL AGENCIES AND ORGANIZATIONS

- Crater Planning District Commission/Tri-Cities Metropolitan Planning Organization
- George Washington Regional Commission/Fredericksburg Area Metropolitan Planning Organization
- Hampton Roads Transportation Planning Organization
- Metropolitan Washington Council of Governments/National Capital Region Transportation Planning Board
- National Capital Planning Commission
- Northern Virginia Regional Commission
- Northern Virginia Regional Park Authority
- Northern Virginia Transportation Authority
- Northern Virginia Transportation Commission
- Potomac and Rappahannock Transportation Commission
- Richmond Regional Planning District Commission/Richmond Regional Transportation Planning Organization

8.5 LOCAL GOVERNMENT, AGENCIES, AND ORGANIZATIONS

- Arlington County
- Caroline County
- Chesterfield County
- Dinwiddie County
- Fairfax County
- Hanover County
- Henrico County
- Prince William County
- Spotsylvania County
- Stafford County
- City of Alexandria
- City of Colonial Heights
- City of Fairfax

- City of Fredericksburg
- City of Richmond
- Town of Ashland
- Town of Bowling Green
- Town of Dumfries
- Town of Quantico
- Randolph-Macon College

8.6 RAIL AND TRANSIT OPERATORS

- Buckingham Branch Railroad Company
- CSX Transportation
- Fredericksburg Regional Transit
- Greater Richmond Transit Company Transit System
- National Railroad Passenger Corporation (Amtrak)
- Norfolk Southern
- Virginia Railway Express
- Washington Metropolitan Area Transit Authority

8.7 ELECTED OFFICIALS

8.7.1 Federal Elected Officials

United States Senator Tim Kaine

United States Senator Mark. R. Warner

United States Representative Robert J. Wittman, 1st Congressional District

United States Representative Robert C. Scott, 3rd Congressional District

United States Representative Donald A. McEachin, 4th Congressional District

United States Representative Dave Brat, 7th Congressional District

United States Representative Don Beyer, 8th Congressional District

United States Representative Barbara Comstock, 10th Congressional District

United States Representative Gerald E. Connolly, 11th Congressional District

8.7.2 Commonwealth of Virginia Elected Officials

Governor Terry McAuliffe

Senator Ryan T. McDougle, 4th Senate District

Senator Jennifer L. McClellan, 9th Senate District

Senator Glen H. Sturtevant, Jr., 10th Senate District

Senator Siobhan S. Dunnavant, 12th Senate District

Senator Rosalyn R. Dance, 16th Senate District

Senator Bryce E. Reeves, 17th Senate District

Senator Richard H. Stuart, 28th Senate District

Senator Adam P. Ebbin, 30th Senate District

Senator Barbara A. Favola, 31st Senate District

Senator Richard L. Saslaw, 35th Senate District

Senator Scott A. Surovell, 36th Senate District

Senator George L. Barker, 39th Senate District

Delegate L. Mark Dudenhefer, 2nd House District

Delegate William J. Howell, 28th House District

Delegate L. Scott Lingamfelter, 31st House District

Delegate Vivian E. Watts, 39th House District

Delegate David B. Albo, 42nd House District

Delegate Mark D. Sickles, 43rd House District

Delegate Paul E. Krizek, 44th House District

Delegate Mark H. Levine, 45th House District

Delegate Charniele L. Herring, 46th House District

Delegate Luke Torian, 52nd House District

Delegate Robert D. Orrock, Sr., 54th House District

Delegate Hyland F. Fowler, Jr., 55th House District

Delegate Riley E. Ingram, 62nd House District

Delegate Betsy B. Carr, 69th House District

Delegate Delores L. McQuinn, 70th House District

Delegate Jeffrey M. Bourne, 71st House District

Delegate James P. Massie III, 72nd House District

Delegate John M. O'Bannon III, 73rd House District

Delegate Margaret B. Ransone, 99th House District

8.7.3 Local Elected Officials

Libby Garvey, Chairman, Arlington County Board of Supervisors

Jeffery M. Sili, Chairman, Caroline County Board of Supervisors

Steve A. Elswick, Chairman, Chesterfield County Board of Supervisors

Sharon Bulova, Chairman, Fairfax County Board of Supervisors

Aubrey M. Stanley, Chairman, Hanover County Board of Supervisors

Tyrone E. Nelson, Chairman, Henrico County Board of Supervisors

Corey A. Stewart, Chairman, Prince William County Board of Supervisors

Timothy J. McLaughlin, Chairman, Spotsylvania County Board of Supervisors

Robert Thomas, Chairman, Stafford County Board of Supervisors

Mayor Allison Silberberg, City of Alexandria

Mayor Mary Katherine Greenlaw, City of Fredericksburg

Mayor Levar m. Stoney, City of Richmond

Mayor James Foley, Town of Ashland

Mayor Jason Satterwhite, Town of Bowling Green

Mayor Kevin P. Brown, Town of Quantico

8.8 POTENTIALLY IMPACTED SECTION 4(f) RESOURCE PROPERTY OWNERS

- Arlington County Department of Parks and Recreation (Long Bridge Park and Mount Vernon Trail)
- Chesterfield County Parks and Recreation (Gates Mill Park)
- City of Alexandria Department of Recreation, Parks, and Cultural Activities (Dog Run Park at Carlyle)
- City of Richmond Department of Public Works (Walker's Creek Retention Basin Park)
- Hanover County Department of Parks and Recreation (Ashland Trolley Line)
- Maggie L. Walker Governor's School (School Fields)
- National Park Service (George Washington Memorial Parkway)
- National Park Service (Fredericksburg and Spotsylvania National Military Park)
- Prince William County Parks and Recreation (Veterans Memorial Park)
- Town of Ashland (North Ashland Park, Railside Park, and Carter Park)
- Virginia Department of Game and Inland Fisheries (Mattaponi Wildlife Management Area and Roaches Run Wildlife Sanctuary)

8.9 PUBLIC REVIEW LOCATIONS

DRPT will make the Draft EIS available to the public and other interested parties for their review and comment at various public locations distributed evenly and equitably along the entire DC2RVA corridor. Document viewing locations are listed in the following sections.

8.9.1 Libraries

Alexandria Library – Kate Waller Barrett Branch
717 Queen Street
Alexandria 22314

Alexandria Library – James M. Duncan Branch
2501 Commonwealth Avenue
Alexandria, VA 22301

Alexandria Central Library/Charles E. Beatley, Jr. Central Library
5005 Duke Street
Alexandria, VA 22304

Arlington Central Library
1015 North Quincy Street
Arlington, VA 22201

Arlington Public Library – Aurora Hills Branch
7351 18th Street South
Arlington, VA 22202

Arlington Public Library – Columbia Pike Branch
816 South Walter Reed Drive
Arlington, VA 22204

Ashland Branch/Richard S. Gillis Jr. Library
201 South Railroad Avenue
Ashland, VA 23005

Bull Run Regional Library
8501 Ashton Avenue
Manassas, VA 20109

Caroline Library, Inc.
17202 Richmond Turnpike
Milford, VA 22514

Central Rappahannock Regional Library
1201 Caroline Street
Fredericksburg, VA 22401

Central Rappahannock Regional Library— John Musante Porter Branch
2001 Parkway Boulevard
Stafford, VA 22554

Central Rappahannock Regional Library – C. Melvin Snow Memorial Branch
8740 Courthouse Road
Spotsylvania, VA 22553

Central Rappahannock Regional Library – Salem Church Branch
2607 Salem Church Road
Fredericksburg, VA 22407

Chesterfield County Central Library
9501 Lori Road
Chesterfield, VA 23832

Chesterfield County – Chester Branch Library
11800 Centre Street
Chester, VA 23831

Chesterfield County – Ettrick-Matoaca Branch Library
4501 River Road
South Chesterfield, VA 23803-1732

Chesterfield County – Meadowdale Branch Library
4301 Meadowdale Boulevard
North Chesterfield, VA 23234

Chesterfield County – LaPrade Branch Library
9000 Hull Street Road
North Chesterfield, VA 23236

Chinn Park Regional Library
13065 Chinn Park Drive
Prince William, VA 22192

City of Fairfax Regional Library
10360 North Street
Fairfax, VA 22030

Colonial Heights Public Library
1000 Yacht Basin Drive
Colonial Heights, VA 23834

Fairfield Area Branch Library
1001 North Laburnum Avenue
Henrico, VA 23223

Fairfax County – John Marshall Library
6209 Rose Hill Drive
Alexandria, VA 22310

Fairfax County – Kingstowne Commons
6500 Landsdowne Centre
Alexandria, VA 22315

Hanover Branch Library
7527 Library Drive
Hanover, VA 23069

Henrico County Public Library – Glen Allen Branch Library
10501 Staples Mill Road
Henrico, VA 23060

Henrico County Public Library – North Park
8508 Franconia Road
Henrico, VA 23227

Henrico County Public Library – Libby Mill
2100 Libbie Lake East Street
Henrico, VA 23230

Lorton Library
9520 Richmond Highway
Lorton, VA 22079

Prince William Public Library – Dumfries Neighborhood Library
18007 Dumfries Shopping Plaza
Dumfries, VA 22026

Prince William Public Library – Lake Ridge Neighborhood Library
2239 Old Bridge Road
Woodbridge, VA 22192

Prince William Public Library – Potomac Community Library
2201 Opitz Boulevard
Woodbridge, VA 22191

Quantico Base Library
2040 Broadway Street
Quantico, VA 22134

Springfield – Richard Byrd Library
7250 Commerce Street
Springfield, VA 22150

Richmond Public Library – Broad Rock Library
4820 Old Warwick Road
Richmond, VA 23224

Richmond Public Library – East End Library
1200 North 25th Street
Richmond, VA 23223

Richmond Public Library – Ginter Park Library
1200 Westbrook Avenue
Richmond, VA 23227

Richmond Public Library – Hull Street Library
1400 Hull Street
Richmond, VA 23224

Richmond Public Library – Main Library
101 East Franklin Street
Richmond, VA 23219

Richmond Public Library – North Avenue Library
2901 North Avenue
Richmond, VA 23222

Richmond Public Library – Westover Hills Library
1408 Westover Hills Boulevard
Richmond, VA 23225

Virginia Department for the Blind and Vision Impaired
397 Azalea Avenue
Richmond, VA 23227

Virginia Rehabilitation Center for the Blind and Vision Impaired
401 Azalea Avenue
Richmond, VA 23227

8.9.2 Department of Rail and Public Transportation Offices

Richmond Office Headquarters
600 East Main Street, Suite 2102
Richmond, VA 23219

Northern Virginia Office
4975 Alliance Drive
Fairfax, VA 22030

Dulles Corridor Metrorail Project Office
198 Van Buren Street, Suite 300
Herndon, VA 22170

8.9.3 Government Centers

Arlington County Courthouse Plaza
2100 Clarendon Boulevard
Arlington, VA 22201

Caroline County Administration Building
212 North Main Street
Bowling Green, VA 22427

Chesterfield County Government Offices
9901 Lori Road
Chesterfield, VA 23832

City of Alexandria – City Hall
301 King Street
Alexandria, VA 22314

City of Fredericksburg – City Hall
715 Princess Anne Street
Fredericksburg, VA 22401

City of Richmond – City Hall
900 East Broad Street
Richmond, VA 23219

Crater Planning District Commission
1964 Wakefield Street
Petersburg, VA 23805

Dinwiddie County Planning Department
14016 Boydton Plank Road
Dinwiddie, VA 23841

Fairfax County Government Center
12000 Government Center Parkway
Fairfax, VA 22035

Fredericksburg Area Metropolitan Planning Organization
406 Princess Anne Street
Fredericksburg, VA 22401

Hanover County Administration Building
7516 County Complex Road
Hanover, VA 23069

Henrico County Eastern Government Center
3820 Nine Mile Road
Henrico, VA 23223

Henrico County Western Government Center
4301 East Parham Road
Henrico, VA 23228

Metropolitan Washington Council of Governments
777 North Capital Street, NE
Suite 300
Washington, DC 20002

Northern Virginia Transportation Authority
3040 Williams Drive, Suite 200
Fairfax, VA 22031

Prince William County – Sudley North Government Center
7987 Ashton Avenue
Manassas, VA 20109

Richmond Regional Planning District Commission
9211 Forest Hill Avenue
Richmond, VA 23235

Spotsylvania County – Marshall Center
8800 Courthouse Road
Spotsylvania, VA 22553

Stafford County Government Center
1300 Courthouse Road
Stafford, VA 22554

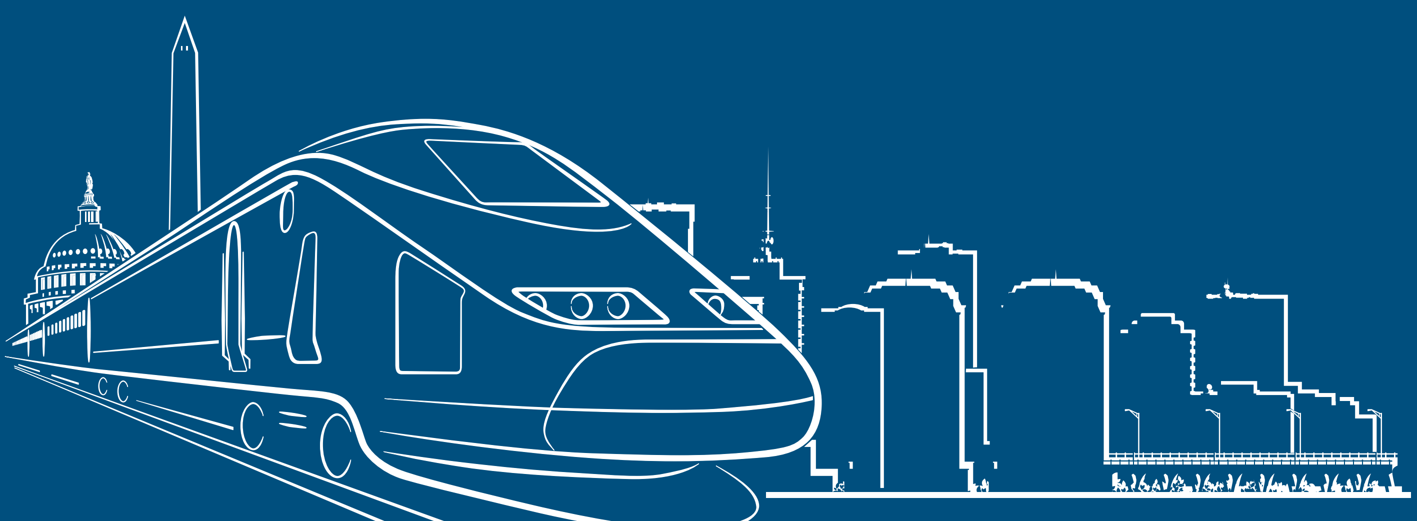
Town of Ashland – Town Hall
101 Thompson Street
Ashland, VA 23005

Town of Dumfries – Town Hall
17755 Main Street
Dumfries, VA 22026

Town of Quantico Municipal Office
337 5th Avenue
Quantico, VA 22134

DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

9 LIST OF PREPARERS



9 LIST OF PREPARERS

This Tier II Draft Environmental Impact Statement (EIS) was prepared by the Virginia Department of Rail and Public Transportation (DRPT) in close coordination with the Federal Railroad Administration (FRA) and the Virginia Department of Transportation (VDOT). Personnel from these agencies who were instrumental in the management and preparation of this document and related technical studies are listed below.

Federal Railroad Administration (FRA)

Name	Qualifications	Primary Responsibility
Randy Brown	Southeast High Speed Rail Project Manager	FRA oversight, project guidance
John Winkle, J.D.	Transportation Industry Analyst / Environmental Protection Specialist	FRA oversight, project guidance
Jessie Fernandez-Gatti	Community Planner	FRA oversight, project guidance

Virginia Department of Rail and Public Transportation (DRPT)

Name	Qualifications	Primary Responsibility
Jennifer L. Mitchell, AICP	Master of Regional Planning Bachelor of Urban Planning 20 years experience	Director
Peter Burrus	M.A Business B.A. English 25 years experience	Chief of Rail
Emily Stock, AICP	Master of Planning B.S. Geology 18 years experience	Manager of Rail Planning; DC2RVA Project Manager
Randy Selleck, AICP	M.S. Urban and Regional Planning B.S. Geography 16 years experience	Rail Planning Project Manager; DC2RVA Deputy Project Manager – Planning
Nick Ruiz	Master of Urban and Regional Planning 2 years of experience	DC2RVA Rail Planner

Virginia Department of Transportation (VDOT)

Name	Qualifications	Primary Responsibility
Elizabeth Jordan, PhD	Ph.D. Anthropology/Historical Archaeology M.A. Anthropology/Historical Archaeology B.A. Anthropology 10 years (VDOT) experience	NEPA Review
Heather Williams	M.S. Environmental Studies B.S. Environmental Science 17 years experience	NEPA Review
Ryan Crisp	Certified General 9 years experience	Right-of-Way/Relocation/Acquisition
Michael Heflin	Business Management/Marketing 28 years (VDOT) experience	Right-of-Way/Relocation/Acquisition
Caron Smith	Certified Residential Real Estate Appraiser 28 years (appraisal) experience	Right-of-Way/Relocation/Acquisition
Richie Stuart	B.S. Chemical Engineering 4 years (VDOT ROW) experience	Right-of-Way/Relocation/Acquisition
Mark Comer	B.S. Civil Engineering 25 years (VDOT) experience	Utility Relocations
Shane Lupo	Associates of Science and Surveying 3 years (VDOT) experience 10 years with Telecommunications	Utility Relocations

The following consultants were involved in the preparation of this Tier II Draft EIS, related technical reports, and conceptual engineering designs. A brief resume for each key consultant and his/her primary responsibility in the study are listed below. The names and titles of key staff are shown in **bold**.

HDR

Name	Qualifications	Primary Responsibility
John Morton, PE	M.S. Engineering Management B.S. Civil Environmental Engineering 43 years experience	**Project Manager** National Director of Rail Environmental Programs
Carey Burch, AICP	M.S. Urban and Regional Planning B.S. Forest and Wildlife Resource Management 40 years experience	**Deputy Project Manager,** **Corridor Planning Lead**, Purpose & Need Statement, Alternatives Analysis, Public Outreach
Megan (Eley) Hunter	M.A. Publishing B.A. English/Creative Writing 11 years experience	**Strategic Communications Manager** **Public Involvement Manager**
Megan O'Reilly	M.A. Global Communications B.A. Public Relations 9 years experience	**Public Involvement Manager**
Karen Harrington, PE	B.S. Biological Systems Engineering 18 years experience	**Geographic Information Systems (GIS)/Mapping Manager**

HDR

Name	Qualifications	Primary Responsibility
Bridget Ward	Master of GIS and Cartography B.A. Environmental Studies and Geography 7 years experience	GIS Analyst
Andrew Zimba	B.S. Industrial and Systems Engineering 20 years experience	GIS Analyst
Laura (Meadows) Mausolf	M.A. Museum Studies B.A. History 4 years experience	GIS Analyst
Benjamin Camras	Master of Urban and Regional Planning, GIS B.A. Geography & Sociology 8 years experience	GIS Analyst
Mark Hemphill	M.A. History B.A. History 23 years experience	Operations Analysis, Simulation, and Service Design Lead
Matt Van Hattem	B.A. English Language and Literature 17 years experience	Rail Operations Planning and Analysis
Kevin Johns, EIT	M.E. Civil Engineering B.E. Computer Engineering 11 years experience	Operations Modeling
Rick Degman	B.S. Transportation 36 years experience	Operations Modeling
Leandra Cleveland	B.S. Environmental Science/Planning 18 years experience	Alternatives Development and Analysis
Tim Casey, INCE	B.S. Biological and Life Sciences A.S. General Science 31 years experience	Noise and Vibration Analysis
Elliott Dick, INCE	B.S. Noise and Vibration Control 23 years experience	Noise and Vibration Analysis
Jennifer Brown	M.S. Environmental Project Management B.A. Environmental Policy 11 years experience	Natural Resource Analysis
Carey Wilson, PE	B.S. Civil Engineering 19 years experience	Northern Virginia Area – Engineering Lead
Robert Cone, PE	B.S. Civil Engineering 44 years experience	Alternatives Development and Screening Engineering Quality Control (QC)
Chad Chandler, PE	M.S. Transportation Systems and Management Civil Engineering B.S. Civil Engineering 15 years experience	Alternatives Development and Screening Engineering, Station Analysis
Suzanne Baumgardt	Bachelor of Architecture 23 years experience	Station Conceptual Design and Site Layout
Penley Chiang	Master of Architecture Bachelor of Arts 14 years experience	Station Conceptual Design and Site Layout

HDR

Name	Qualifications	Primary Responsibility
Chris Riviere, PE	B.S. Civil Engineering 29 years experience	Northern Virginia Area – Track Design
Kevin LaGreca, PE	B.S. Civil/Construction Engineering A.S. Civil/Construction Engineering 18 years experience	Northern Virginia Area – Track Design
Claudia Walsh, PE	B.S. Civil Engineering 21 years experience	Northern Virginia Area – Roadway Lead
Daniel Baum, PE	B.S. Civil Engineering 18 years experience	Northern Virginia Area – Roadway
Pieter Dahmen, PE	M.S. Agricultural Engineering B.S. Civil Engineering 40 years experience	Northern Virginia Area – Drainage/ Stormwater Management Lead
Julie Hicks	B.S. Civil Engineering 18 years experience	Northern Virginia Area – Drainage/ Stormwater Management
Tim Kearney, PE	B.S. Civil Engineering 24 years experience	Northern Virginia Area–Utilities Lead
Kathleen Staskin, PE	B.S. Civil Engineering 22 years experience	Northern Virginia Area – Utilities
Adeel Mysorewala, PE, LEED AP	B.S. Civil Engineering, Structures 14 years experience	Northern Virginia Area – Structures and Bridges (Rail) Lead
Kennedy Kyei-Mensah, PE	B.S. Civil Engineering 8 years experience	Northern Virginia Area – Structures and Bridges (Rail)
Michael Mo, PE	M.S. Civil Engineering B.S. Civil Engineering 27 years experience	Northern Virginia Area – Structures and Bridges (Highway) Lead
Aaron Zdinak	M.S. Geotechnical Engineering B.S. Civil/Structural Engineering 24 years experience	Geotechnical Lead
Ryan Tinsley, PG	M.S. Engineering Geology B.S. Geology, Engineering Geosciences 17 years experience	Geotechnical
Anthony DiGirolamo, PE	B.S. Civil Engineering, Transportation 24 years experience	Northern Virginia Area – Track Quality Control (QC)
Steve Carroll, EIT	B.S. Civil Engineering 40 years experience	Capital Costs
Steve Lorek, PE	B.S. Civil Engineering 20 years experience	CSXT Liaison–Corridor Lead
Kevin Keller, PG	M.S. Hydrogeology B.S. Geology 35 years experience	CSXT Liaison

Moffatt & Nichol

Name	Qualifications	Primary Responsibility
Michael Knott, PE	M.S. Civil Engineering B.S. Civil Engineering 41 years experience	**Engineering Lead – Conceptual Engineering**
C. Wayne Hyatt, Jr., PE, PLS	33 years experience	**Engineering Lead – Preliminary Engineering**
Pierce Homer	Master of Public Affairs B.A. Philosophy 36 years experience	Intergovernmental Relations
C. Eric Burke, PE	M.S. Civil Engineering B.S. Civil Engineering 24 years experience	Richmond Area – Conceptual & Preliminary Engineering
Jose Avendano, PE	B.S. Civil Engineering 27 years experience	Richmond Area – Conceptual & Preliminary Engineering
Don Darity	B.S. Civil Engineering 30 years experience	Richmond Area – Traffic Engineering
Will Garner, PE	B.S. Civil Engineering 46 years experience	Richmond Area – Traffic Engineering Studies and Design
Andrew Hayes	M.E. Civil Engineering B.S. Civil Engineering 5 years experience	Richmond Area – Traffic Engineering
Terry Coker, PE	M.S. Civil Engineering B.S. Civil Engineering 34 years experience	Richmond Area – Structures Design
Jean Paul Martucci	B.S. Civil Engineering 4 years experience	Richmond Area – Track Design
Gray Modlin, PE	B.S. Civil Engineering 11 years experience	Richmond Area – Track Design
James Todd, PE	B.S. Civil Engineering 16 years experience	Richmond Area – Track Design
Jeremy Kraft, PE	B.S. Civil Engineering 16 years experience	Richmond Area – Civil/Roadway Design
Jeff Reck, PE	M.S. Hydrology and Water Resource Science B.S. Civil Engineering 24 years experience	Richmond Area – Hydraulics/Hydrology and Drainage
Leah Young, PE	B.S. Civil Engineering 14 years experience	Richmond Area – Hydraulics/Hydrology and Drainage
Trent Huffman, PE	B.S. Civil Engineering 24 years experience	Richmond Area – Utilities
Jason Field, PE	B.S. Civil Engineering 23 years experience	Richmond Area – Grade Crossings, Safety

Parsons

Name	Qualifications	Primary Responsibility
Monica Barrow	Master of Business Administration B.S. Public Policy & Management/English 31 years experience	**Service Development Planning Lead**
Stephen Walter, CEP	M.S. Environmental Studies B.S. Environmental Conservation 39 years experience	**Environmental Lead**
Elizabeth Hynes, AICP CTP, LEED AP	Master of Regional Planning – Land Use and Environmental Planning B.A. Art History 17 years experience	**Deputy Environmental Lead; Document Manager**
Faisal Hameed, PhD, PE	Ph.D. Civil Engineering M.S. Civil & Environmental Engineering M.S. Technical Management B.S. Chemical Engineering 16 years experience	Technical Reviews
Margaret Moore	M.A. Public Administration M.S. Environmental Science B.A. History 14 years experience	Community Impact Assessment; Land Use, Agricultural Lands, Section 4(f), Section 6(f), and Parks
Michelle Fall, AICP	M.S. Environmental Engineering B.S. Biology 23 years experience	Section 4(f) Resources, Parks, Visual, Construction Impacts
Susan Bupp, RPA	M.A. Anthropology B.A. Anthropology 41 years experience	Cultural Resources
Rachael Mangum, RPA	M.A. Anthropology B.A. Anthropology 17 years experience	Cultural Resources
Anthony Pakeltis, AICP	Master of Urban Planning and Policy Bachelor of Urban Planning B.S. Environmental Design 27 years experience	Air Quality, Energy, Indirect and Cumulative Effects
Luke Eggering, PWS	M.S. Biology B.S. Fish and Wildlife Management 28 years experience	Natural Resources, Wetlands, and Threatened and Endangered Species Lead
Joel Budnik, PMC	M.S. Fisheries and Wildlife Sciences B.S. Fisheries and Wildlife Management 20 years experience	Natural Resources, Wetlands, Threatened and Endangered Species
Rebecca Chojnacki	B.S. Biotechnology & Biology 12 years experience	Natural Resources, Hazardous Materials
Katherine Astroth	M.S. Biology B.S. Biology 8 years experience	Wetlands
Rebecca Porath	M.S. Zoology B.S. Fish and Wildlife Management 20 years experience	Wetlands

Parsons

Name	Qualifications	Primary Responsibility
Lindsey Postaski	M.S. Biology B.S. Environmental Science 7 years experience	Wetlands
Margaret Rockwell	B.S. Environmental Science 6 years experience	Wetlands
William Heming, Capt. USCG (Retired)	B.S. General Engineering Postgraduate Training, Nuclear Technology NSS SAVANNAH 46 years experience	Agency Coordination
J. Stuart Tyler, PE	M.S. Civil Engineering B.A. Environmental Science 36 years experience	Indirect and Cumulative Effects
Joseph Steindam	Master of City and Regional Planning B.A. Political Science 3 years experience	Document Support
Joseph Springer, AICP	Master Degree Studies, Urban Planning B.A. English and Art History 25 years experience	Traffic and Transportation Analysis
Jennifer Wiley Kleinman, EIT	B.S. Civil and Environmental Engineering 12 years experience	Traffic and Transportation Analysis
Patrick Porzillo, PE	B.S. Civil Engineering 31 years experience	Central Virginia Area – Engineering Lead
Dan Sengupta, PE, SE	M.S. Civil Engineering B.S. Civil Engineering 24 years experience	Central Virginia Area – Structures Design
Frank Blachly, PE	B.S., Civil Engineering, Transportation Emphasis 40 years experience	Central Virginia Area – Rail Design
David Pell, PE	B.S. Civil Engineering 9 years experience	Central Virginia Area – Track Design
Clifford Roberts, PE	Bachelor of Engineering 33 years experience	Central Virginia Area – Roadway & Civil Engineering Lead
Zachery Fitzwater, EIT	B.S. Civil Engineering, Construction and Highway Design 4 years experience	Central Virginia Area – Grade Crossing Analysis and Alignments
Brian C. Smith, PE	B.S. Civil Engineering 18 years experience	Central Virginia Area – Drainage/Stormwater Management Design
Bhup Adhikari, PE	B.S. Civil Engineering 18 years experience	Central Virginia Area – Stormwater Management
Byron Williams	B.S. Civil Engineering Technology, Utility, Transportation, and Structural Design 5 years experience	Central Virginia Area – Utilities

Parsons

Name	Qualifications	Primary Responsibility
Kwong Tse, PE	M.E. Civil Engineering B.S. Civil Engineering 36 years experience	Central Virginia Area – Bridges
Randy Walker, PE	B.S. Civil Engineering 37 years experience	Constructability
Andrew Metz	Master of Urban Planning and Policy B.A. Geography 8 years experience	Station Operating and Maintenance Costs
Elizabeth Koos	19 years experience	EIS Technical Editor

Dovetail Cultural Resources Group

Name	Qualifications	Primary Responsibility
Kerri Barile, Ph.D., RPA	Ph.D. Anthropology & Architectural History M.A. Anthropology Masters Certificate in Museum Management B.A. Historic Preservation 25 years experience	Cultural Resources Lead
Emily Calhoun, RPA	M.A. Anthropology B.S. Biological Sciences 10 years experience	Cultural Resources
Heather Dollins Staton	Master of Historic Preservation Masters Certificate in Transportation Systems Management B.A. Historic Preservation 10 years experience	Cultural Resources

Cordell & Crumley Inc.

Name	Qualifications	Primary Responsibility
Deborah Cordell	B.S. Communication Arts A.A. Arts 29 years experience	Public Involvement Manager
Janette Crumley	B.S. Accounting 29 years experience	Public Involvement Manager
Deborah DeMarco	Master of Tourism Administration B.S. Secondary Education and Marketing Education 28 years experience	Public Involvement Specialist

Mary Peters Consulting

Name	Qualifications	Primary Responsibility
Mary Peters	B.A. Management 31 years experience	Executive Advisor

Novak Transportation Planning Services, LLC.

Name	Qualifications	Primary Responsibility
William J. Novak	M.A. Geography B.A. Geography 44 years experience	QC / Technical Review

Rice Associates

Name	Qualifications	Primary Responsibility
Charlie Rice	B.A. Economics and Business Management 31 years experience	Surveying

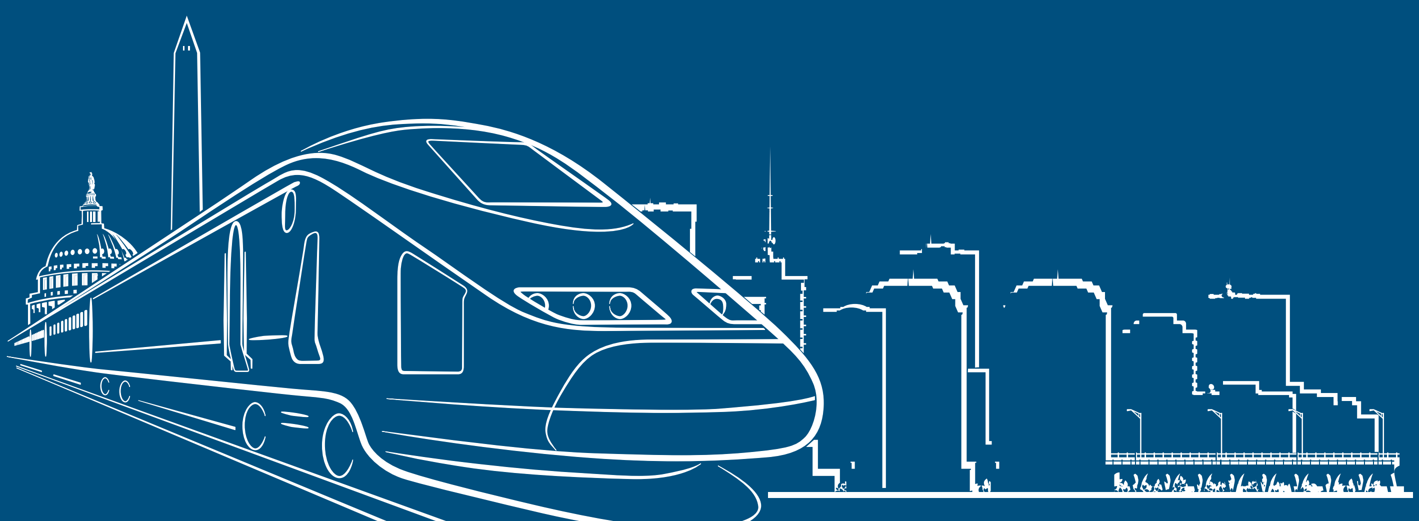
RSG

Name	Qualifications	Primary Responsibility
William Woodford	M.S. Civil Engineering B.S. Civil Engineering 36 years experience	Ridership Forecasting

Transportation Analytic Services

Name	Qualifications	Primary Responsibility
Jack Fuller	Master of Business Administration, Transportation and Computer Science B.S. Mathematics 36 years experience	Operations Modeling and Analysis

10 ABBREVIATIONS AND ACRONYMS



D.C. TO RICHMOND SOUTHEAST HIGH SPEED RAIL

10 ABBREVIATIONS AND ACRONYMS

AADT	Annual Average Daily Traffic
AAR	Association of American Railroads
AASHTO	American Association of State Highway and Transportation Officials
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
APE	Area of Potential Effect
APTA	American Public Transportation Association
AQI	Air Quality Index
AREMA	American Railway Engineers and Maintenance of Way Association
ARPA	Archaeological Resources Protection Act
ARRA	American Recovery and Reinvestment Act of 2009
ATC	Automatic Train Control
ATR	Above Top of Rail
BBR	Buckingham Branch Railroad
BMP	Best Management Practices
BOD	Basis of Design
BOD	Biological Oxygen Demand
BRT	Bus Rapid Transit
BTU	British Thermal Units
CAA	Clean Air Act of 1970
CAAA	Clean Air Act Amendments
CBD	Central Business District
CBPA	Chesapeake Bay Preservation Act
CD	Collector-Distributor

CEDAR	Comprehensive Environmental Data and Reporting System
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CFS	Cubic Feet per Second
CFR	Code of Federal Regulations
CH_4	Methane
CLOMR	Conditional Letter of Map Revision
CLRP	Constrained Long Range Plan
CNE	Common Noise Environment
CO	Carbon Monoxide
CO_2	Carbon Dioxide
COI	Compounds of Interest
COG	Council of Governments
CP	Control Point
CRMP	Virginia Coast Resources Management Program
CSS	Cab Signal System
CSXT	CSX Transportation (Railroad Company)
CTC	Centralized Traffic Control
CTB	Commonwealth Transportation Board
CTP	Comprehensive Transportation Plan
CU	Cataloging Unit
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Plan
dB	Decibel
dBA	Decibels (A-weighted scale)
DC2RVA	Washington, D.C. to Richmond High Speed Rail Project
DDOT	District of Columbia Department of Transportation
DHR	Virginia Department of Historic Resources
DPU	City of Richmond Department of Public Utilities
DRPT	Virginia Department of Rail and Public Transportation

EA	Environmental Assessment
ECG	East Coast Greenway
EDR	Environmental Data Resources
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMS	Emergency Medical Service
EO	Executive Order
EPA	United States Environmental Protection Agency
ERNS	Emergency Response Notification System
ES	Engineering Stationing
ESA	Endangered Species Act
ESC	Erosion and Sediment Control
ESRI	Environmental Science Research Institute
FAA	Federal Aviation Administration
FAMPO	Fredericksburg Metropolitan Planning Organization
FAQ	Frequently Asked Question
FAST	Fixing America's Surface Transportation Act
FCPA	Fairfax County Park Authority
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIFRA	Federal Insecticide, Fungicide, & Rodenticide Act
FINDS	Facility Index System/Facility Identification Initiative Program Summary Report
FIRM	Flood Insurance Rate Maps
FONSI	Finding of No Significant Impact
FPPA	Farmland Protection Policy Act
FRA	Federal Railroad Administration
FSC	Federal Species of Concern
FTA	Federal Transit Administration
FUDS	Formerly Used Defense Sites
GHG	Greenhouse Gas
GIS	Geographic Information System
GPH	Gallons per Hour

GPS	Global Positioning Satellites
GRTC	Greater Richmond Transit Company
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HC	Hydrocarbons
HCM	Highway Capacity Manual
HEC-RAS	Hydrologic Engineering Center – River Analysis System
HFC	Hydrofluorocarbons
HHS	U.S. Department of Health and Human Services
HMIRS	Hazardous Materials Information Reporting System
HP	Horsepower
HPT	Horsepower per Ton
HSDS	Hazardous Substance Disposal Site
HSGT	High Speed Ground Transportation
HSR	High Speed Rail
HSRSP	High Speed Rail Strategic Plan
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
HU	Hydrologic Unit
ISTEA	Intermodal Surface Transportation Efficiency Act
ITS	Intelligent Transportation System
JPA	Joint Permit Application
Ldn	Day-Night Average Sound Level
LEDPA	Least Environmentally Damaging Practicable Alternative
LEP	Limited English Proficiency
Leq	Equivalent Sound Level
Leq(h)	Equivalent Sound Level for a 1-Hour Period
LID	Low Impact Development
LOD	Limits of Disturbance
LOS	Level of Service
LOV	Low Occupancy Vehicle
LRT	Light Rail Transit
LRTP	Long Range Transportation Plan

LUST	Leaking Underground Storage Tank
LWCF	Land and Water Conservation Fund
MAS	Maximum Authorized Speed
MBTA	Migratory Bird Treaty Act
MCBQ	Marine Corps Base Quantico
Mg/m^3	Milligrams per Meter Cubed
MINES	Mines Master Index File
MLTS	Material Licensing Tracking System
MOA	Memorandum of Agreement
MOU	Memorandum of Understanding
MOVES	Motor Vehicle Emission Simulator
MP	Mile Post
MPH	Miles per Hour
MPO	Metropolitan Planning Organization
MRDS	Mineral Resources Data System
MSA	Metropolitan Statistical Area
MSAT	Mobile Source Air Toxics
MSL	Mean Sea Level
MUTCD	Manual on Uniform Traffic Control
MWCOG	Metropolitan Washington Council of Governments
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NCDC	National Clean Diesel Campaign
NEC	Northeast Corridor
NECIP	Northeast Corridor Improvement Project
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NHR	Natural Heritage Resources
NHTS	National Highway Traffic Safety Administration
NOAA	U.S. National Oceanic and Atmospheric Administration

NOI	Notice of Intent
NO_x	Nitrogen Oxides
NMFS	National Marine Fisheries Service
NPL	National Priorities List (Superfund)
NPS	National Park Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NRHP	National Register of Historic Places
NRI	Nationwide Rivers Inventory
NS	Norfolk Southern Railroad
NVRC	Northern Virginia Regional Commission
NVRPA	Northern Virginia Regional Park Authority
NVTA	Northern Virginia Transportation Authority
NVTC	Northern Virginia Transportation Commission
NWI	National Wetlands Inventory
O_3	Ozone
O&M	Operating and Maintenance
O/D	Origin/Destination
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
Pb	Lead
PCB	Polychlorinated Biphenyls
PDC	Planning District Commission
PM	Particulate Matter
PM_{10}	Particulate Matter Less Than 10 μm in Diameter
$PM_{2.5}$	Particulate Matter Less Than 2.5 μm in Diameter
PMT	Passenger Miles of Travel
ppm	Parts per Million
PPV	Peak Particle Velocity
PRIIA	Passenger Rail Investment and Improvement Act of 2008
PRTC	Potomac and Rappahannock Transportation Commission
PTC	Positive Train Control
R2HR	Richmond to Hampton Roads Passenger Rail Project

R2R	Richmond to Raleigh High Speed Rail Project
RATPO	Richmond Area Transportation Planning Organization
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
RF&P	Richmond, Fredericksburg & Potomac (Railroad Company)
RMA	Resource Management Area
RMS	Root Mean Square
ROD	Record of Decision
ROW	Right-of-Way
RPA	Resource Protection Area
RPO	Rural Planning Organization
RRPDC	Richmond Regional Planning District Commission
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Act: A Legacy for Users
SCC	Virginia State Corporation Commission – Division of Utility and Railroad Safety
SDP	Service Development Plan
SDWA	Safe Drinking Water Act
SEHSR	Southeast High Speed Rail
SEL	Sound Exposure Level
SF	Square Feet
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SOP	Standard Operating Procedure
SOV	Single Occupant Vehicle
SO_X	Sulfur Oxides
STB	U.S. Surface Transportation Board
STIP	Statewide Transportation Improvement Program
SWM	Stormwater Management
SWPPP	Stormwater Pollution Prevention Plan
TAZ	Transportation Analysis Zone
TDM	Transportation Demand Management
TEA-21	Transportation Efficiency Act for the 21st Century
TIGER	Transportation Investment Generating Economic Recovery

TIP	Transportation Improvement Plan
TMDL	Total Maximum Daily Load
TNM	FHWA Traffic Noise Model
TOD	Transit Oriented Development
TPC	Train Performance Calculator
TRB	Transportation Planning Board
TSM	Transportation System Management
TRIS	Toxic Release Inventory System
TSCA	Toxic Substances Control Act
USACE	United States Army Corps of Engineers
USCG	United States Coast Guard
USDA	United States Department of Agriculture
USDOI	United States Department of the Interior
USDOJ	United States Department of Justice
U.S. DOT	United States Department of Transportation
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
USM	Unified Stream Methodology
UST	Underground Storage Tank
UXO	Universal Crossover
VARTF	Virginia Aquatic Resources Trust Fund
VAU	Visual Assessment Unit
V/C	Volume to Capacity Ratio
VDA	Virginia Department of Agriculture and Consumer Services
VdB	Vibration Decibel
VDCR	Virginia Department of Conservation and Recreation
Virginia DEQ	Virginia Department of Environmental Quality
VDF	Virginia Department of Forestry
VDGIF	Virginia Department of Game and Inland Fisheries
VDOT	Virginia Department of Transportation
VEC	Virginia Employment Commission
VIMS	Virginia Institute of Marine Science
VLR	Virginia Landmarks Registry

VMRC	Virginia Marine Resources Commission
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds
VOF	Virginia Outdoors Foundation
VPD	Vehicles per Day
VRE	Virginia Railway Express
VSMP	Virginia Stormwater Management Program
VSTP	Virginia 2035 Surface Transportation Plan
VWPP	Virginia Water Protection Permit
WMATA	Washington Metropolitan Area Transit Authority
W&OD	Washington & Old Dominion
WOUS	Waters of the United States
WQS	Water Quality Standards
$\mu g/m^3$	Micrograms per Cubic Meter
2MT	2 Main Track
3MT	3 Main Track
4MT	4 Main Track

11 GLOSSARY OF COMMONLY USED TERMS

11 GLOSSARY OF COMMONLY USED TERMS

A

Abatement: Reduction; often used to describe noise mitigation.

Accessibility: The ease with which a site or facility may be reached by passengers and others necessary to the facility's intended function. Also, the extent to which a facility is usable by persons with disabilities, including wheelchair users.

Adverse: Negative or detrimental.

Affected Environment: The physical, biological, social, and economic setting potentially affected by one or more of the alternatives under consideration.

Air Pollution: A general term that refers to one or more chemical substances that degrade the quality of the atmosphere.

Alignment: The horizontal and vertical route of a transportation corridor or path.

Alluvial Communities: Habitat of variable vegetation type that has developed in an area with a stream and a well-developed floodplain. The terms "alluvial" and "riparian" are synonymous and imply overbank flooding events.

Alluvium: A term applied to sediments deposited in a streambed, on a floodplain, a delta, or at the base of a mountain during comparatively recent geologic time.

Americans with Disabilities Act of 1990 (ADA): Federal regulation establishing legal requirements for accessibility for those with disabilities.

Amplitude: The magnitude of a periodic wave; also describes the strength or intensity of a signal that travels in wave form, such as a radio signal.

Aquifer: Subsurface geologic unit (rock or sediment) that contains and transmits groundwater.

Area of Potential Effect (APE): The area along the project right-of-way potentially affected by construction and operation of the Project; for archaeological properties, considered to be the area of ground proposed to be disturbed during construction of the undertaking, including grading, cut-and-fill, easements, staging areas, utility relocation, borrow pits, and biological mitigation areas; for historic architecture, considered to be the proposed construction footprint and properties near the undertaking where the undertaking would result in a substantial change from the historic use, access, or noise and vibration levels that were present 50 years ago, or during the period of significance of a property, if different; and for paleontological resources, considered to be a zone 250 feet on both sides of the right-of-way for a given alternative and within 0.5 mile of any potential facilities, including potential stations.

Artifacts: Objects made by people, including tools such as projectile points, scrapers, and grinding implements, waste products from making flaked stone tools (debitage), and non-utilitarian artifacts (beads, ornaments, ceremonial items, and rock art).

At-Grade: At ground surface level; used to describe roadways, river crossings, and track alignments.

Attainment: A condition where a pollutant conforms to or shows levels at or below one or more of the National Ambient Air Quality Standards (NAAQS).

A-Weighted Sound Level: A measure of sound intensity that is weighted to approximate the response of the human ear so it describes the way sound will affect people in the vicinity of a noise source.

B

Ballasted Track: Railways installed over a specific type of crushed rock that is graded to support heavily loaded rolling stock.

Ballastless Track: Railways installed on concrete slabs for support.

Barrier Offset Distance: The lateral distance from the centerline of the track to the face of the barrier, trackside, or other roadside feature.

Barrier: A device intended to contain or redirect an errant vehicle by providing a physical limitation through which a vehicle would not typically pass.

Benthic: Located on the bottom of a body of water or in the bottom sediments, or pertaining to bottom-dwelling organisms.

Best Management Practices (BMPs): Methods designed to minimize adverse effects to the environment. Examples of BMPs include practices for erosion and sedimentation controls, watering for dust control, perimeter silt fences, rice straw bales, and sediment basins.

Biochemical Oxygen Demand (BOD): The quantity of oxygen used by a mixed population of microorganisms in the oxidation of organic matter.

Biodiversity: The variety and abundance of species, their genetic composition, and the communities, ecosystems, and landscapes in which they occur.

Biological Resources: Plant and wildlife species, terrestrial and aquatic habitats (including jurisdictional waters), and habitats of concern (including sensitive plant communities, critical habitat, core recovery areas, mitigation banks, and wildlife corridors).

Biotic Integrity: Condition of the living things in the natural community.

British Thermal Unit: See BTU.

BTU: British thermal unit, equal to the amount of heat required to raise 1 pound of water 1 degree Fahrenheit at 1 atmosphere of pressure.

Buttressing: An action or structure that provides support or stability.

C

Capacity: (1) The maximum number of trains that can be moved in each direction over a specified section of track in a 24-hour period. (2) The maximum rate of flow at which persons or vehicles can be reasonably expected to traverse a point or uniform segment of a lane or roadway during a specified time period under prevailing roadway, traffic, and control conditions. Expressed as vehicles per hour or persons per hour.

Carbon Dioxide (CO_2): A colorless, odorless gas that occurs naturally in the atmosphere; fossil fuel combustion emits significant quantities of CO_2.

Carbon Monoxide (CO): A colorless, odorless, poisonous gas that is formed as a product of the incomplete combustion of carbon and is emitted directly by automobiles and trucks.

Catenary Wire: A suspended (overhead) wire system that supplies power from a central power source to an electric vehicle such as a train.

Choice Passenger: A traveler that has more than one modal option and is making an informed choice to use the passenger rail service.

Clean Air Act of 1970 (CAA): The law that defines the United States Environmental Protection Agency's (EPA) responsibilities for protecting and improving the nation's air quality and the stratospheric ozone (O_3) layer. The CAA protects the general public from exposure to airborne contaminants that are known to be hazardous to human health.

Clean Water Act of 1972 (CWA): The primary federal law protecting the quality of the nation's surface waters, including wetlands. The CWA regulates discharges and spills of pollutants, including hazardous materials, to surface waters and groundwater.

Code of Federal Regulations (CFR): A compilation of the general and permanent rules of the executive departments and agencies of the federal government as published in the *Federal Register*. The code is divided into 50 titles that represent broad areas subject to federal regulation.

Cofferdam: Watertight enclosure from which water is pumped to expose the bottom of a body of water and allow construction.

Community Cohesion: The degree to which residents have a sense of belonging to their neighborhood, a level of commitment to the community, or an association with neighbors, groups, and institutions, usually as a result of continued association over time.

Concourse: Area for accommodating patrons at a high-speed rail station.

Congestion Management Plan: A planning document that addresses strategies for reducing traffic congestion.

Connectivity: The degree of "connectedness" of a transportation system, such as a transit network, and the ease with which passengers can move from one point to another within the network or points outside the network.

Conservation Easement: An easement that transfers property development rights to another entity, such as the local jurisdiction or an agricultural protection organization; the land remains in private ownership and may be farmed, but it may not be developed with urban uses. See also Easement.

Construction: Any activity that directly alters the environment, excluding surveying or mapping.

Cooperating Agency: Any agency invited by the lead federal agency that has agreed to participate in the *National Environmental Policy Act of 1969* (NEPA) process and has legal jurisdiction over, or technical expertise regarding, environmental impacts associated with a proposed action.

Corridor: A broad geographical band that follows a general directional flow connecting major sources of trips that may contain several streets, highways, railroads, and transit route alignments.

Cowardin Classification System: A comprehensive classification system of wetlands and deepwater habitats developed for the United States Fish and Wildlife Service (USFWS) in 1979. Under this system, wetlands are of two basic types: coastal (also known as tidal or estuarine wetlands) and inland (also known as non-tidal, freshwater, or palustrine wetlands).

Criteria Pollutants: Pollutants for which federal and state air quality standards have been established: CO, sulfur oxides (SO_X), nitrogen oxides (NO_X), O_3, particulate matter with a diameter of 10 microns or less (PM_{10}), particulate matter with a diameter of 2.5 microns or less ($PM_{2.5}$), and lead (Pb).

Critical Habitat: Designated areas that provide suitable habitat for federally listed threatened or endangered species, and in which are the geographical locations and physical features essential to conservation of a particular species

Crossover: Two turnouts with track between, connecting two nearby and usually parallel tracks, allowing a train on one track to cross over to the other.

Cultural Resources: Resources related to the tangible and intangible aspects of cultural systems, living and dead, that are valued by a given culture or contain information about the culture. Cultural resources include, but are not limited to, sites, structures, buildings, districts, and objects associated with or representative of people, cultures, and human activities and events.

Cumulative Effects: The incremental consequences of a proposed action in addition to other past and reasonably foreseeable future actions that affect the same resources. Other actions in the project area include other highway projects and residential, commercial, and institutional development.

Cumulative Impact: An impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions.

Cut and Fill: Construction technique involving excavation or grading followed by placement and compaction of fill material.

Cut Slope: A slope that is shaped by excavation or grading. See also Fill Slope.

D

Datum: A reference from which measurements are made for establishing horizontal and vertical control.

Decibel (dB): A logarithmic measurement of noise intensity.

Detention Pond: A pond designed to temporarily store and slowly release the runoff that it receives.

Dewatering: The process of removing water from an area or substance, such as fill material.

Digital Terrain Model: A three-dimensional model of digital surfaces of topographic features.

Disturbance: A discrete natural or human-induced event that causes a change in the condition of an ecological system.

Dry Utility: A wire, cable, pipeline, and support facility used to convey electricity, natural gas, gaseous chemicals, telecommunications, cable television, or other non-liquid products.

E

Easement: An interest in land owned by another individual or organization that entitles its holder to a specific limited use.

Ecosystem: An interconnected network of living organisms, including people, and their local physical environment; often viewed as an ecological unit.

Effect: A change in the condition or function of an environmental resource or environmental value as a result of human activity.

Emergent: (1) Arising naturally; (2) Vegetation rooted in periodically or continuously inundated substrate but with a portion of the plant extending above the water.

Eminent Domain: A jurisdiction or agency's legal right to take private property for public use in exchange for fair compensation.

Emissions Budget: The part of the State Implementation Plan (SIP) that identifies the allowable emissions levels, mandated by the NAAQS, for certain pollutants emitted from mobile, stationary, and area sources. The emissions levels are used for meeting emission reduction milestones, attainment, or maintenance demonstrations.

Endangered Species: Any species listed under the federal *Endangered Species Act of 1973* (ESA) as being in danger of or threatened with extinction throughout all or most of its range.

Environmental Impact Statement (EIS): Documentation required by NEPA for certain actions "significantly affecting the quality of the human environment." An EIS is a decision-making tool that presents detailed analysis of a proposed action and alternatives to the proposed action. The EIS presents the project's potential effects—both beneficial and adverse—and any mitigation measures to reduce adverse effects.

Environmental Justice: Presidential Executive Order (EO) 12898 requires federal agencies to ensure that their actions (or actions they oversee) do not disproportionately discriminate against (impact) minority populations and low-income populations.

Erosion: Process by which earth materials are worn down by the action of flowing water, ice, or wind.

Ethnicity: A grouping or categorization of people based on shared cultural traits such as ancestral origin, language, custom, or social attitude.

Eutrophication: The process by which lakes gradually age and become more productive. It normally takes thousands of years to progress; however, humans, through their various cultural activities, have greatly accelerated this process in many lakes. Cultural or anthropogenic "eutrophication" is water pollution caused by excessive plant nutrients.

F

Farmland of Local Importance: Farmlands important to the local agricultural community, as determined by each county's board of supervisors and local advisory committee. See also Farmland of Statewide Importance and Prime Farmland.

Farmland of Statewide Importance: Farmlands that are similar to prime farmlands but are less valuable because they have steeper slopes, less ability to retain moisture in the soil, or other characteristics that limit their use. To qualify as Farmland of Statewide Importance, a property must have been used for production of irrigated crops at some time during the previous 4 years.

Fauna: Animals characteristic of a region, period, or special environment.

Feasible: Capable of being implemented.

Fecundity: Fertility; the potential to be fruitful in offspring or vegetation.

Federal Endangered Species Act of 1973 (Federal ESA): The federal ESA and subsequent amendments (Sections 7, 9, and 10) provide guidance for conserving federally listed species and the ecosystems upon which they depend.

Federal Railroad Administration (FRA): An agency within the United States Department of Transportation (U.S. DOT) that administers financial assistance programs and regulates the operation and safety of freight and passenger rail throughout the United States.

Feeder Route: Branch routes that feed into main (arterial) routes.

Fill Slope: A slope shaped by the placement and compaction of loose fill material, which may be reused from elsewhere on the construction site or imported.

Fiscally or Financially Constrained Plans: Plans that are limited by the foreseen availability of project funding in a region.

Floodplain: The portion of a river or stream valley, adjacent to the channel, which is covered with water when the river or stream overflows its banks at flood stage.

Floodway: A large-capacity channel constructed to divert floodwaters safely through or around population areas.

Flyover: A bridge that carries one road or rail alignment aerially over another.

Footprint: The area covered by a facility or affected by construction activities.

Full Parcel Acquisition: A permanent taking of a parcel of land as part of land acquisition for a project.

G

General Conformity Rule: Federal, state, tribal, and local governments work in air quality nonattainment or maintenance areas to ensure that federal actions conform to the initiatives established in the applicable SIP or tribal implementation plan.

Geographic Information System (GIS): An information management system designed to store and analyze data referenced by spatial or geographic coordinates.

Grade Crossing: The intersection of a railroad and a highway at the same elevation (grade); an intersection of two or more highways; an intersection of two railroads.

Grade, Gradient: Slope changes in elevation, defined in percentage, as feet of rise in 100 feet.

Grade-Separated: At different elevations; on separate levels.

Greenhouse Gases (GHG): A class of air pollutants believed to contribute to the greenhouse global warming effect, including nitrogen oxides (NO_X), hydrocarbons (HC), and carbon dioxide (CO_2).

Groundwater: Naturally occurring water that moves through the ground and underlying rock at a depth of several feet to several hundred feet.

Growth Inducement: Contribution to the rate or extent of development in an area.

Guideway: A track or riding surface that supports and physically guides transit vehicles specially designed to travel exclusively on it.

H

Habitat: An environment where plants or animals naturally occur; an ecological setting used by animals for a particular purpose (e.g., roosting habitat or breeding habitat).

Hazardous Materials: Any material that, because of quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety, or the environment, if released.

Hazardous Waste: A hazardous material that is no longer of use and will be disposed of. Hazardous waste is regulated by EPA under the *Resource Conservation and Recovery Act of 1976.*

Headway: The time between buses, trains, or other transit vehicles at a given point. For example, a 15-minute headway means that one bus arrives every 15 minutes.

Herbaceous: Plants that have little or no woody tissue. Herbaceous plants typically survive for only a single growing season.

Heritage Resources: An alternate term for cultural resources used in some planning documents. See Cultural Resources.

High-Occupancy Toll Lanes (HOT): Designated travel lanes that are utilized by high-occupancy vehicles (HOVs), buses, and tolled vehicles carrying less than noted high-occupancy levels.

High-Occupancy Vehicle Lanes (HOV): Designated travel lanes that require two or more occupants per vehicle. Future regional plans anticipate occupancy requirement to be three (HOV-3+).

Hydrocarbons: Various organic compounds, including methane, emitted principally from the storage, handling, and combustion of fossil fuels.

I

Impact: A change in the condition or function of an environmental resource or environmental value as a result of human activity.

Impervious Surface: Surface covered by impenetrable materials, such as parking lots and buildings, which increases the potential for water runoff and reduces the potential for groundwater recharge.

Independent Utility: A project is said to have independent utility if it will provide functional improvements that can stand alone and serve a major purpose, even if no other improvements are made in the region.

Indigenous Species: A native species; any plant or animal species that occurs naturally in a wilderness area.

Indirect Effects: Impacts on the environment resulting from the primary impact of the proposed action but occurring later in time or farther removed in distance, although still reasonably foreseeable.

Infrastructure: The facilities required for a societal function or service (e.g., transportation and utility infrastructure).

Insertion Loss: The actual noise-level reduction at a specific receiver due to construction of a noise barrier or some other intervention between the noise source (e.g., traffic) and the receiver.

In-situ: In the original or natural position.

Intelligent Transportation System (ITS): The application of advanced technologies to improve the efficiency and safety of transportation systems.

Intermittent Stream: A stream that flows only during part of the year.

Intermodal Relationships: Relationships between transportation modes. An example of a mode is bus mass transit.

Intermodal Station: A transit station for more than one mode of transportation.

Intermodal: Transportation that involves more than one mode (e.g., walk, bike, auto, transit, taxi, train, bus, and air) during a single journey.

Invasive Species: A plant, animal, or other organism (1) that is non-native (or alien) to the ecosystem under consideration and (2) whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

Inversion: A region where atmospheric temperature increases rather than decreases with height, suppressing atmospheric mixing and tending to trap pollutants near the ground surface where their effects on health and materials are greater.

Investment-Grade Ridership Forecast: Ridership forecast that is sufficiently detailed and reliable to permit responsible decision making about capital expenditures.

Isolated Wetlands: Non-jurisdictional wetlands. Wetlands that are not subject to CWA regulation.

J

Jurisdictional Determination: A written statement issued by the United States Army Corps of Engineers (USACE) that identifies areas within a discrete project area that are subject to CWA regulation.

Jurisdictional Wetlands: Wetlands that are subject to CWA regulation.

K

Key Viewpoints: Viewpoints that represent the range of visual character and visual quality in the project viewshed, which is the portion of the surrounding landscape within which a project is potentially visible.

Kilovolt: A unit of potential equal to a thousand volts.

Kiss-and-Ride: Facility for private vehicles to drop off or pick up rail patrons.

L

Lead (Pb): A stable element that can have toxic effects and that persists and accumulates in the environment, humans, or animals.

Lead Agency: The public agency that has the principal responsibility for carrying out or approving a project or action and is responsible for preparing environmental review documents in compliance with NEPA.

L_{eq}: The equivalent sound level, containing the same amount of sound energy as the varying sound level measured over a specified time period.

$L_{eq}(h)$, dBA: Equivalent or average noise level for the noisiest hour, expressed in A-weighted decibels.

Level of Service (LOS): Operating conditions within a stream of traffic describing safety, traffic interruptions, speed, freedom to maneuver, comfort, and convenience. Six levels of service are defined, designated A through F, with A representing the best conditions and F the worst.

Link: Traffic term referring to one portion of a longer trip in the transportation system.

Lithic: Pertaining to or describing a stone tool or artifact.

Logarithmic Scale: A measurement in which the ratio of successive intervals is not equal to 1 (which is typical for linear scales) but is some common factor larger than the previous interval (a typical ratio is 10, so that the marks on the scale read: 1, 10, 100, 1,000, 10,000, etc). Logarithmic scales are useful for graphing values that have a very large range.

Logical Termini: Rational endpoints for consideration of transportation improvements and for review of environmental impacts.

Long Range Transportation Plan (LRTP): A document resulting from regional or statewide collaboration and consensus on a region or state's transportation system, and serving as the defining vision for the region's or state's transportation systems and services. In metropolitan areas, the plan indicates all of the transportation improvements scheduled for funding over the next 20 years.

Longitudinal: A facility located parallel to and within highway or railway right-of-way.

Low-Income Population: A low-income household is one where the median household income is below the United States Department of Health and Human Services (HHS) poverty guidelines.

M

Maintenance-of-Way: A repair and maintenance activity for a railway right-of-way and track, including tracks, roadways, buildings, signals, and communication and power facilities.

Maintenance Siding: A dead-end track dedicated to park maintenance trains and connected to a passing track, never to the main line.

Maintenance: An air basin that was formerly in nonattainment but now meets the established standards for that pollutant. See also Attainment and Nonattainment.

Maintenance-of-Way Facility: A facility co-located with the heavy-maintenance facility with offices for inspection and maintenance staff and storage areas for essential equipment and materials, such as rail ballast, ties, sections of rail, overhead catenary system poles, and diesel-powered maintenance trains.

Master Plan: A comprehensive planning document intended to guide the long-range growth and development of a community or region, or the long-term management and use of a parkland.

Mean High-Water Mark: The elevation reached by the water surface at the mean (average) high water level (average high tide elevation or average flood elevation), often indicated by physical characteristics such as erosion, lines of vegetation, or changes in type of vegetation.

Mesoscale: Describes regional air quality analysis.

Metropolitan Planning Organization (MPO): An agency created and designated to carry out the transportation planning process on behalf of localities in urbanized areas with populations over 50,000, comprising elected and appointed officials with an interest in or responsibility for transportation planning and programming in the metropolitan planning area. An MPO is responsible for the development of a Long Range Transportation Plan (LRTP), the Transportation Improvement Program (TIP), and other planning documents required to obtain federal funding for transportation projects within its metropolitan planning area.

Microscale: Describes local air quality analysis.

Minority Individuals: Members of the following population groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black (not of Hispanic origin), and Hispanic.

Mitigation Bank: A large block of land that is preserved, restored, and enhanced for the purpose of mitigating for projects that take (disturb, injure, or kill) special-status species, wetlands, or otherwise vegetated biological communities.

Mitigation: Action or measure undertaken to minimize, reduce, eliminate, or rectify the adverse impacts of a project, practice, action, or activity.

Mixed-Use Development: Development that incorporates residential and nonresidential uses.

Mobile Source: (1) The mobile source-related pollutants are CO, HC, NO_X, and particulate matter (PM_{10} and $PM_{2.5}$). (2) Mobile sources include motor vehicles, aircraft, seagoing vessels, and other transportation modes. The mobile source related pollutants are CO, HC or volatile organic compounds (VOCs), NO_X, and small particulate matter (PM_{10}).

Modal: A transportation system defined on the basis of specific rights-of-way, technologies, and operational features.

Monitoring: The collection of information to determine the effects of resource management and to identify changing resource conditions or needs.

Monoculture: The cultivation of a single product to the exclusion of other uses of land.

N

National Ambient Air Quality Standards of 1990 (NAAQS): Federal standards that set allowable concentrations and exposure limits for various pollutants. EPA developed the standards in response to a requirement of the CAA. Air quality standards have been established for the following six criteria pollutants: O_3 (or smog), CO, particulate matter, nitrogen dioxide (NO_2), Pb, and sulfur dioxide (SO_2).

National Environmental Policy Act of 1969 (NEPA): Federal legislation that establishes national policies and goals for the protection of the environment and requires federal agencies to consider the environmental impacts of major federal projects or decisions, to share information with the public, to identify and assess reasonable alternatives, to identify appropriate measures to mitigate potential impacts, and to coordinate efforts with other planning and environmental reviews taking place. Codified at: 42 United States Code (U.S.C.) § 4331 *et seq.*

National Priorities List (NPL): Also known as EPA's Superfund program. The NPL is a comprehensive list of the sites/facilities that have been evaluated using the Hazard Ranking System and have been found to pose a sufficient threat to human health and/or the environment to warrant cleanup under the *Comprehensive Environmental Response, Compensation, and Liability Act of 1980* (CERCLA). EPA is responsible for updating and maintaining the NPL.

Nitrogen Oxides (NO_X): A class of pollutant compounds that include NO_2 and nitric oxide (NO), both of which are emitted by motor vehicles. See Criteria Pollutants.

Noise Abatement Criteria (NAC): In accordance with Section 772 of the Federal Aid Policy Guide, the Federal Highway Administration (FHWA) has established noise standards. These standards include NAC, which are noise levels that represent a balancing of desired levels of noise with achievable levels.

Nonattainment: A condition where one or more of the NAAQS for a pollutant have been violated.

Nonpoint Source Pollution: Pollution that collects from a wide area and cannot be traced to a single source. Examples include pesticides or fertilizers that wash into rivers or percolate through the soil into groundwater.

Notice of Intent (NOI): The Council on Environmental Quality (CEQ) regulations and Title 23, CFR, Part 771, Environmental Impact and Related Procedures, require the sponsoring agency to publish an NOI in the *Federal Register* as soon as practicable after the decision is made to prepare an EIS and before the scoping process for a proposed action.

Noxious Weed: A plant that has been defined as a pest by law or regulation.

NPL/Superfund List: A federal list of sites that have been identified as posing an immediate public health hazard and where an immediate response is necessary.

O

Ordinary High-Water Mark: The line on the shore of a body of water established by the fluctuation of water levels.

Ozone (O_3): Unstable blue gas with a pungent odor, formed principally in secondary reactions involving VOCs, nitrogen oxides, and sunlight.

P

Palustrine Emergent Wetlands (PEM): Wetlands characterized by erect, herbaceous vegetation present for most of the growing season (e.g., marshes, wet meadows, fens, sloughs, or potholes).

Palustrine Forested Wetlands (PFO): Wetlands characterized by woody vegetation greater than 6 meters (20 feet) in height (e.g., swamps or bottomlands).

Palustrine Scrub-Shrub Wetlands (PSS): Wetlands characterized by the dominance of small trees, saplings, and shrubs. These wetlands generally have higher value than emergent systems, but not as much as forested systems.

Parcel: A distinct, continuous portion or tract of land.

Park-and-Ride: Facility where rail patrons can leave personal vehicles.

Partial Parcel Acquisition: A temporary taking of a parcel of land close to construction areas that requires that the occupants be moved during the construction period.

Particulate Matter: Liquid and solid particles of a wide range of sizes and compositions; of particular concern for air quality are PM_{10} and $PM_{2.5}$. PM_{10} is particulate matter 10 micrometers or less in diameter; $PM_{2.5}$ is particulate matter 2.5 micrometers or less in diameter.

Particulate Pollution: Air pollution, such as dust, soot, and smoke, that is irritating but usually not poisonous. Particulate pollution also can include bits of highly toxic solid or liquid substances. Of particular concern are PM_{10} or $PM_{2.5}$.

Passenger Rail Investment and Improvement Act of 2008 (PRIIA): Federal act that reauthorizes the National Railroad Passenger Corporation, better known as Amtrak, and strengthens the United States passenger rail network by tasking Amtrak, U.S. DOT, FRA, states, and other stakeholders in improving service, operations, and facilities. PRIIA focuses on intercity passenger rail, including Amtrak's long-distance routes and the Northeast Corridor (NEC), state-sponsored corridors throughout the Nation, and development of high-speed rail corridors.

Passing Track: A track connected to the main line on both ends that allows a train to stop for commercial reasons (e.g., in a station) or operating purposes (e.g., to deal with a delayed train or a train with technical issues) and that allows other trains to pass.

Perennial Stream: A stream that flows continually throughout the year.

Pesticide: Any substance intended to prevent the presence of, destroy, repel, or mitigate any pest. The term pesticide applies to insecticides and various other substances used to control pests, including herbicides.

Photogrammetry: The art, science, and technology of obtaining reliable information about physical objects and the environment through the process of recording, measuring, and interpreting images and patterns of electromagnetic radiant energy and other phenomena.

Physiographic Province: A region that is generally consistent in geologic structure and climate and that has had a unified geomorphic history.

Plat: A plan or map of a plot of ground.

Platform: Station area adjacent to tracks where trains stop to allow passengers to board and alight.

Point Source Pollution: Pollution that can be traced to a single source (e.g., a smokestack at a factory).

Polychlorinated Biphenyls (PCBs): Chemicals used in electrical transformers, hydraulic equipment, capacitors, and similar equipment.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Preferred Alternative: The alternative identified as preferred by the lead agencies.

Prime Farmland: Rural land that has the best combination of physical and soil chemistry characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses.

Program-Level/Programmatic: Refers to a NEPA environmental review that covers the broad spectrum of a large, complex, regionally extensive effort comprised of many smaller, regionally focused projects or phases.

***Project Corridor**:* An undefined width of land uses along the rail alignments used to define the general features and context of the area.

Project-Level: Refers to more detailed site-specific environmental analysis focusing on a single project that is part of a larger program.

Purpose and Need: The reason(s) why a project or action is undertaken, and the need(s) it is intended to meet or fulfill.

R

Rail Guideway: A track that supports and physically guides high-speed trains.

Relocations: The removal, rearrangement, reinstallation, or adjustment of a utility facility required by a transportation improvement project.

Resource Management Areas: As designated by Counties, these areas include floodplains, highly erodible soils, steep slopes, highly permeable soils, and non-tidal wetlands not designated in Resource Protection Area (RPA) zones.

Resource Protection Areas (RPAs): Lands at or near the shoreline that have intrinsic water quality value for ecological and biological processes, or are sensitive to significant water quality degradation impacts. The RPA designation includes tidal wetlands, tidal shores, non-tidal wetlands connected by surface flow and contiguous to tidal wetlands or tributary streams, and a minimum 100-foot (30.5-meter) buffer landward along both sides of any tributary stream and all other components of RPAs.

Retention Pond: A pond designed to hold and infiltrate most or all of the runoff that it receives.

Ridership: The number of people who ride a transportation system.

Right-of-Way: A legal right of passage over a defined area of real property. In transit usage, the corridor along a roadway or railway that is controlled by a transit or transportation agency/authority.

Riparian: Pertaining to anything connected with or immediately adjacent to the banks of a stream.

Riparian: Relating to, living, or located on the bank of a natural water course, lake, or tidewater.

Riprap: Randomly placed rock or concrete used to strengthen an embankment or protect it from erosion.

Rolling Stock: Wheeled railway vehicles.

Ruderal: Weedy vegetation, commonly including or dominated by introduced species, characteristic of areas where native vegetation has been disturbed or removed.

S

Scale: A graduated line representing a proportionate size.

Scenic Corridor: A corridor with landscapes and vistas of high scenic quality.

Scoping: A process used under NEPA to determine the scope of issues to be addressed and for identifying the significant issues related to the proposed action or project to be addressed in an EIS.

Scour: Erosion caused by fast-flowing water.

Screenline: An imaginary line across parallel roadways that defines a zone of analysis.

Section 4(f): Provisions originally enacted as Section 4(f) of the *U.S. DOT Act of 1966* codified in 49 U.S.C., Subtitle I, Section 303(c). Section 4(f) addresses the potential for conflicts between transportation needs and the protection of land for recreational use and resource conservation by providing protection for publicly owned parkland, recreation areas, and historic sites from use. Specifically, the provisions prohibit the Secretary of Transportation from approving any program or project that would require the use of any publicly owned land from a public park, recreation area, wildlife or waterfowl refuge, or land of an historic site of national significance as determined by the officials having jurisdiction over these lands unless there are no feasible and prudent alternatives to the use of these lands. In addition, a proposed program or project must include all possible planning to minimize harm resulting from the proposed use.

Section 6(f): Section 6(f) of the *Land and Water Conservation Fund (LWCF) Act of 1964* prohibits the conversion of property acquired or developed with funds granted through the act to a non-recreational purpose without approval of the National Park Service (NPS). Section 6(f) directs the United States Department of the Interior (DOI) to ensure that replacement lands of equal value (monetary), location, and usefulness are provided as conditions to such conversions. State and local governments often obtain grants to acquire or make improvements to parks and recreation areas (16 U.S.C. § 460-4 through 460-11, September 3, 1964, as amended 1965, 1968, 1970, 1972–1974, 1976–1981, 1983, 1986, 1987, 1990, 1991, 1993–1996). Consequently, where such conversions of Section 6(f) lands are proposed, replacement land must be provided.

Sediments: Fragments of material originating either from the physical or chemical weathering of rocks and minerals, from decomposition of organic matter, and from atmospheric fallout. Clay, mud, and sand are all types of sediment.

Sensitive Receiver: Noise-sensitive locations where increased annoyance can occur, such as residences, schools, hotels/motels, medical facilities, or other vibration-sensitive receivers.

Sensitive Receptors: Locations considered more sensitive to adverse effects from air pollution (e.g., residences; preschools and kindergarten through grade 12 schools; daycare centers; health-care facilities such as hospitals, retirement homes, and nursing homes; and parks and/or playgrounds).

Shared Use Corridor: Rail corridors or rights-of-way where conventional passenger and freight railroads operate.

State Implementation Plan (SIP): A plan mandated by the CAA and produced by the state environmental agency that contains procedures to monitor, control, maintain, and enforce compliance with the NAAQS. Must be taken into account in the transportation planning process.

Statewide Transportation Improvement Program (STIP): A multi-year capital improvement program of transportation projects on and off the state highway system, funded with revenues from the State Accounts and other funding sources.

Station: Area that would provide intermodal connectivity, drop-off facilities, an entry plaza, a station house area for ticketing and support services, a station box where passengers wait and access the train, and parking facilities.

Stormwater Pollution Prevention Plan (SWPPP): A plan that specifies site management activities to be implemented during site development, including construction stormwater BMPs, erosion and sedimentation controls, dewatering (nuisance water removal), runoff controls, and construction equipment maintenance

Straddle Bents: A pier structure that spans the functional/operational right-of-way limit of a roadway, highway, or railway.

Strata: Geologic units composed of sedimentary rocks usually thought of as overlying one another in layer-cake fashion.

Stub End: A track that terminates at one end.

Study Area*:* A defined area or distance that is established to determine potential area of effects associated with the proposed project. Study areas vary in size and distance depending on the type of effects being considered.

Subsidence: Sinking or lowering of the ground surface.

Sulfur Oxides (SO_X): Sulfur-oxygen compounds that include the important criteria pollutants SO_2 and sulfur trioxide (SO_3).

Superelevation: The difference in elevation between the outside rail of the curve and the inside rail of the curve measured between the highest point on each rail head.

Switch Frog: The point in the switch where two rails cross. The frog is designed to ensure the wheel crosses the gap in the rail without dropping into the gap; the wheel and rail profile ensures that the wheel is always supported by at least one rail.

Switch: A mechanical installation enabling trains to be guided from one track to another at a railway junction.

Switching Station: A station that would work with the paralleling station to balance the electrical load between tracks and to switch power off or on to either track in an emergency.

T

Tiering: Refers to the practice of addressing general issues in broader environmental impact reports or statements, such as Program-Level documents, and providing more detailed site-specific analyses in subsequent (typically Project) documents that incorporate the initial broad analysis by reference.

Topographic Map: A map of the surface features of the earth.

Trackway: The route of a train.

Traction Power Supply Station (TPSS): An electrical substation that supplies power to the rail system.

Transportation Demand Management (TDM): The operation and coordination of various transportation system policies and programs to manage travel demand to make the most efficient and effective use of existing transportation services and facilities.

Transportation Improvement Program (TIP): A document prepared by a metropolitan planning organization (MPO) that lists projects to be funded with FHWA/Federal Transit Administration (FTA) funds for the next 1- to 3-year period.

Transportation Investment Generating Economic Recovery (TIGER): A U.S. DOT-wide discretionary grant program investing in critical road, rail, transit, and port projects across the nation, managed by the U.S. DOT's Office of the Secretary. FRA administers several of these grants that are rail-specific.

Transportation System Management (TSM): Actions that improve the operation and coordination of transportation services and facilities to realize the most efficient use of the existing transportation system.

Transverse: A facility passing from one side of the right-of-way to the other side of the right-of-way.

Travel Demand Forecast: A forecast for travel demand on future or modified transportation system alternatives using existing or projected land use, socioeconomic, and transportation services data.

Travel Time: The time spent traveling from a place of origin to a place of destination. Total travel time includes the time required to reach a station or an airport, time spent waiting for the next scheduled train or flight, time spent getting to the boarding area, time spent checking and retrieving luggage, time spent getting a rental car or taxi, and time spent to reach the final destination.

Tributary Watercourse: A stream feeding a larger stream or lake.

U

Unavoidable: An impact that cannot be entirely avoided, reduced, or compensated for.

Unique Farmland: Farmland with soils of lower quality than either Prime Farmland or Farmland of Statewide Importance, but still used for the production of crops.

V

Volume–to-Capacity Ratio (V/C): Describes the relationship between the amount of traffic a roadway was designed to carry and the amount of traffic it actually carries. Related to the LOS the roadway can provide.

Viewshed: The total area visible from a single observer position, or the total area visible from multiple observer positions. Viewsheds include scenes from highways, trails, campgrounds, towns, cities, or other viewer locations. Viewshed types include corridor, feature, or basin viewsheds.

Visual Quality: The character or inherent features of a viewshed.

Visual Resources: The natural and artificial features of a landscape that characterize its form, line, texture, and color.

W

Waters of the United States: The federal CWA defines waters of the United States as (1) all waters that are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters subject to the ebb and flow of the tide; (2) all interstate waters including interstate wetlands; and (3) all other waters, such as intrastate lakes, rivers, streams (including intermittent streams), mudflats, sandflats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds, the use, degradation, or destruction of which could affect interstate or foreign commerce (33 CFR 328.3[a]).

Watershed: A specific geographic area drained by a major stream or river.

Weir: A small dam that restricts flow in a stream to raise the water level or diverts flow into a desired course.

Wet Utility: A pipeline that conveys liquid through gravity or pressured systems for public purposes (i.e., water and wastewater).

Wetland: An area of land with soil that is saturated with moisture, either permanently or seasonally. According to the USACE Wetland Delineation Manual, three criteria must be satisfied to classify an area as a jurisdictional wetland: (1) a predominance of plant life that is adapted to life in wet conditions (hydrophytic vegetation), (2) soils that saturate, flood, or pond long enough during the growing season to develop anaerobic conditions in the upper part (hydric soils), and (3) permanent or periodic inundation or soils saturation, at least seasonally (wetland hydrology).

Wildlife Corridor: A belt of habitat that is essentially free of physical barriers such as fences, walls, and development and connects two or more larger areas of habitat, allowing wildlife to move between physically separate areas.

Wingwall: A wall at the abutment of a bridge that extends beyond the bridge to retain the earth behind the abutment.

Wye Connection: A railway that connects different sections of track. The transition to a wye requires splitting two guideways into four guideways crossing over one another before the wye legs diverge in opposite directions to allow bidirectional travel.

Y

Yard Track: Dead-end track dedicated to operation needs and connected to a passing track, never to the main railway.

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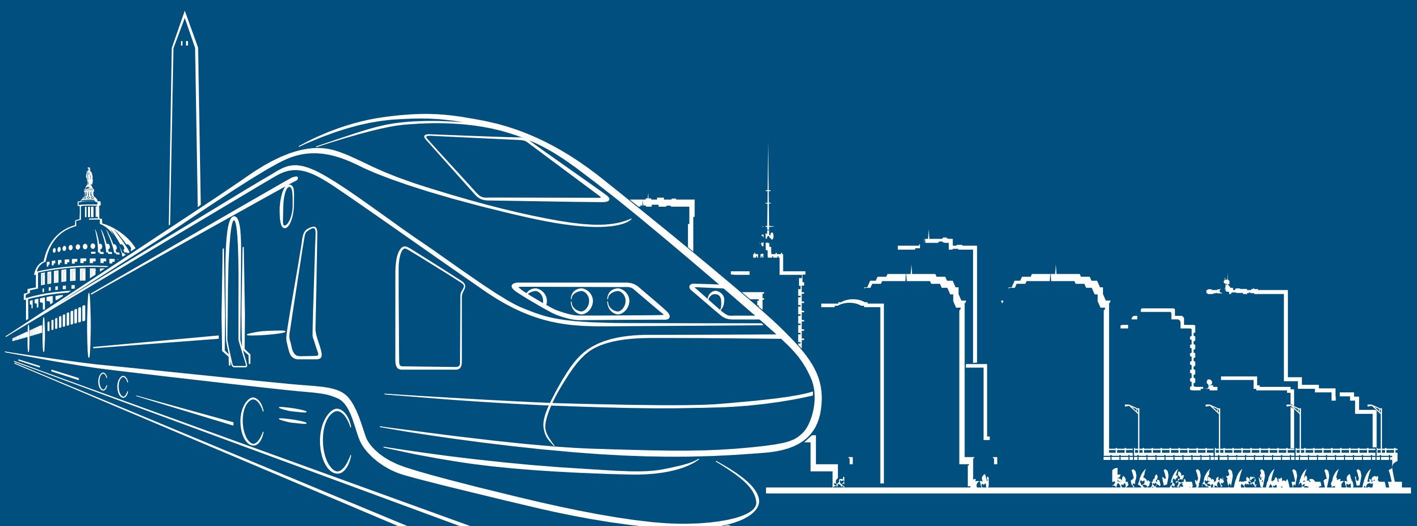

D.C. TO RICHMOND SOUTHEAST HIGH SPEED RAIL

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Long-eared Bat *(Myotis septentrionalis),* Peregrine Falcon *(Falco Peregrinus),* Tiger Salamander *(Ambystoma tigrinum),* Virginia Piedmont Water Boatman *(Sigara depressa),* Wood Turtle *(Glyptemys insculpta).* http://www.vafwis.org/fwis/?Menu=Home.__By+Name. Accessed October 22, 2014.

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DC TO RICHMOND
SOUTHEAST HIGH SPEED RAIL

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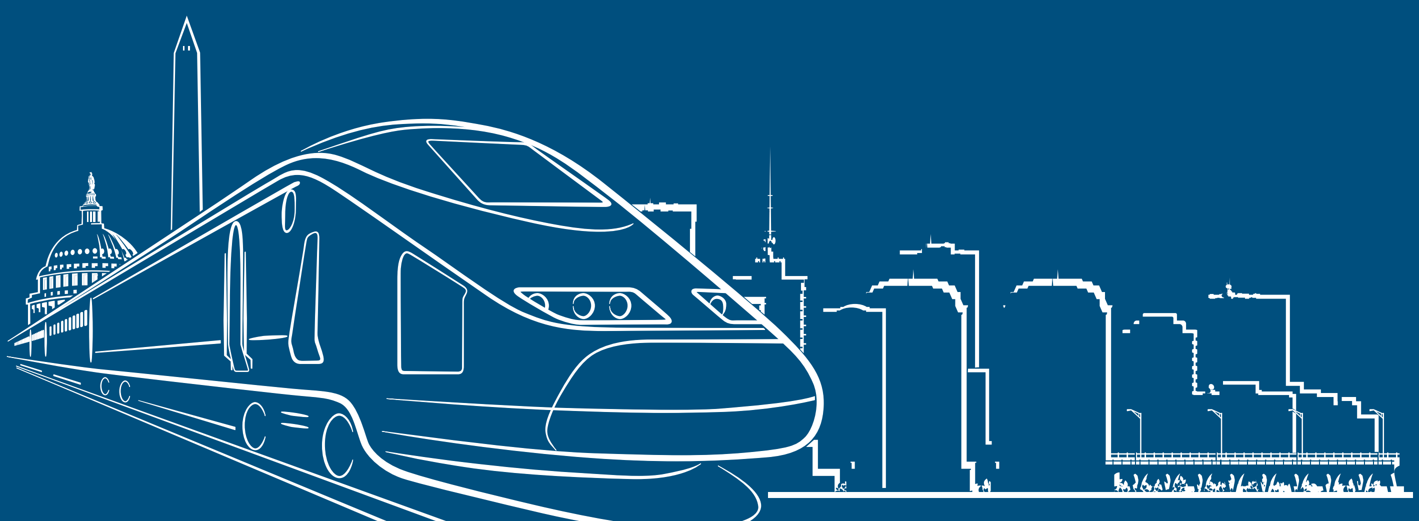

D.C. TO RICHMOND SOUTHEAST HIGH SPEED RAIL

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