9.0 Transportation and Navigation

9.1. Introduction

This chapter defines the transportation and navigation resources pertinent to the Long Bridge Project (the Project), and defines the regulatory context, methodology, and Affected Environment. For each Action Alternative and the No Action Alternative, this chapter also assesses the potential short-term and long-term impacts on transportation and navigation. This chapter also discusses proposed avoidance, minimization, and mitigation measures to reduce adverse impacts of the Project.

The **transportation system** assessed includes all transportation modes, including passenger railroads (Amtrak, Virginia Railway Express [VRE], Maryland Area Regional Commuter [MARC]); freight railroad (CSX Transportation [CSXT], and Norfolk Southern [NS]); the transit system (Metrorail and local bus operations); the pedestrian and bicycle network; parking; the surrounding roadway network; and aviation.

In addition, this chapter evaluates impacts to navigation and the marine transportation system. Federal regulations define **navigable waterways** as "waters that are subject to the ebb and flow of the tide and are presently used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce."[1]

9.2. Regulatory Context and Methodology

This section describes the most pertinent regulatory context for evaluating impacts to transportation and navigation, and summarizes the methodology used for evaluating current conditions and the probable consequences of the alternatives. This section also includes a description of the Study Area. **Appendix D1, Methodology Report**, provides the complete list of laws, regulations, and other guidance considered, and a full description of the analysis methodology**.**

9.2.1. Regulatory Context

When evaluated as an affected resource under the National Environmental Policy Act of 1969 (NEPA), transportation involves a variety of regulatory agencies, depending on the mode of transportation affected and its location in the Study Area, and is subject to various statutes, regulations, and guidance documents. The Federal Railroad Administration (FRA) regulates railroad operations and oversees railroad safety for intercity railroad and commuter railroad service.[2] The Federal Transit Administration (FTA) has a role in safety for public transit service other than for commuter railroad service.[3] Roadway operations, including parking, bus service, and bicycle and pedestrian infrastructure, fall under the regulatory jurisdiction of the District Department of Transportation (DDOT), the Virginia Department of Transportation (VDOT), and, for certain roadways, parking, and pedestrian infrastructure, the National Park Service (NPS), which has regulations in place and also provides guidance in its *Management Policies*

[1] 33 CFR 329
[2] 49 CFR Chapter II
[3] 49 CFR 673

on transportation systems and alternative transportation.[4] Arlington County also oversees pedestrian infrastructure within its boundaries. VDOT guides roadway traffic operations during construction through its *Work Zone Safety: Guidelines for Temporary Traffic Control* and *Traffic Operations and Safety Analysis Manual*.[5,6] DDOT guides traffic operations in the District during construction through the *DC Temporary Traffic Control Manual: Guidelines and Standards* and its *Work Zone Safety and Mobility Policy*.[7,8] Both VDOT and DDOT also must comply with the Federal Highway Administration's *Work Zone Safety and Mobility Rule*.[9] The United States Coast Guard (USCG) controls navigation for marine operations and the United States Army Corps of Engineers (USACE) controls navigable waters of the United States and regulates use of the Virginia Channel (the Federal navigation channel in the Potomac River under Long Bridge) pursuant to the Rivers and Harbors Act of 1899.[10] In addition, Section 14 of the Rivers and Harbors Act of 1899 requires approval from USACE for the alteration or permanent occupation or use of any sea wall, finger pier, jetty, dike, levee, wharf, pier, or other work built by the United States.[11] All of these agencies play a variety of roles in the modes of transportation in the Local Study Area.

9.2.2. Methodology

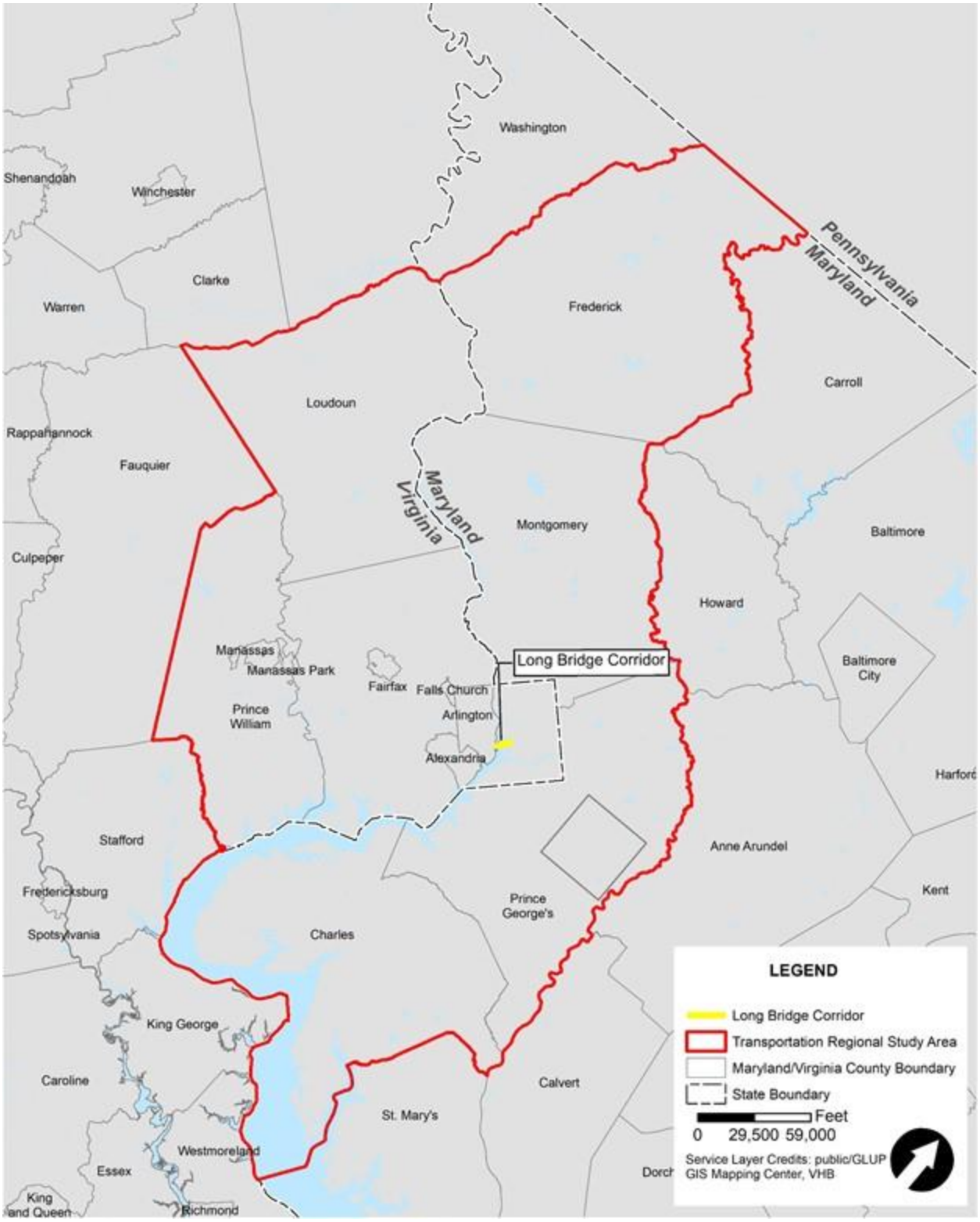
As shown in **Figure 9-1**, the Local Study Area for transportation and navigation encompasses the Project Area and 0.25 miles immediately adjacent to the Project footprint. It includes the tracks, signals, bridges, and related railroad infrastructure that may be affected by the Action Alternatives. It also includes roads, intersections, trails, sidewalks, and waterways that could be impacted by the construction activities for the Action Alternatives.

The Regional Study Area (**Figure 9-2**) includes the jurisdictions covered within the Metropolitan Washington Council of Governments *Financially Constrained Long-Range Transportation Plan*. This includes the District; the Cities of Manassas, Manassas Park, Fairfax, Falls Church, and Alexandria, as well as Prince William, Loudoun, Fairfax, and Arlington Counties in Virginia; and Charles, Prince George's, Montgomery, and Frederick Counties in Maryland. For the purposes of evaluating boat traffic, the analysis identifies marinas outside the Local Study Area but within the Regional Study Area.

[4] 36 CFR 4 - 5
[5] VDOT. 2007. *Work Zone Safety: Guidelines for Temporary Traffic Control*. Accessed from http://www.virginiadot.org/VDOT/Business/Const/asset_upload_file51_30870.pdf. Accessed August 8, 2018.
[6] VDOT. 2015. *Traffic Operations and Safety Analysis Manual, Version 1.0*. Accessed from http://www.virginiadot.org/business/resources/TOSAM.pdf. Accessed August 8, 2018.
[7] DDOT. 2006. *DC Temporary Traffic Control Manual: Guidelines and Standards*. Accessed from https://ddot.dc.gov/page/temporary-traffic-control-manual. Accessed August 8, 2018.
[8] DDOT. 2007.*Work Zone Safety and Mobility Policy*. Accessed from https://ddot.dc.gov/page/work-zone-safety-and-mobility-policy. Accessed August 8, 2018.
[9] 23 CFR 630(J)
[10] 33 USC 322
[11] 33 USC 408

Figure 9-1 | Local Study Area for Transportation and Navigation

Figure 9-2 | Regional Study Area for Transportation



9.2.2.1. Transportation

Documentation of the Affected Environment for current transportation facilities and services used Geographic Information Systems (GIS) data, field reviews, and transportation plans. The transportation analysis addresses the various modes of travel within the study including the surrounding road network, sidewalks, bike system, transit system, and railroad infrastructure.

CSXT, Amtrak, VRE, the Virginia Department of Rail and Public Transportation, and DDOT provided the data necessary to understand existing railroad operations. Data provided information on the existing capacity of Long Bridge; train control and signaling systems present in the Local Study Area; current station dwell times within the Regional Study Area; current service stopping patterns; passenger loading levels during the peak hour of service; and any operational issues within the Regional Study Area. A review of available reports (for example, long-range transportation plans, state railroad plans, and system plans), GIS databases, maps, historical data, and professional judgment provided an understanding of the broader transportation operations of the surrounding network.

The impact analysis qualitatively and quantitatively evaluated both direct and indirect permanent and temporary impacts on transportation, including the potential impact of the Action Alternatives on future railroad operations in the planning year (2040) based on the operators' Long-Range Service Plans. The analysis also evaluated the impacts of the alternatives to the roadway network, marine travel, sidewalks, bicycle system, and transit system.

The analysis of permanent or long-term impacts qualitatively evaluated impacts to the roadway, sidewalk, and bicycle networks as the alternatives did not have substantial impacts to specific intersections or roadway and trail networks that would necessitate a higher level of assessment. Since construction staging and access impact area roadways, the analysis evaluated roadways using a Synchro and Highway Capacity Software (HCS) analyses as appropriate.[12] The analysis also evaluated potential benefits to the transportation network in terms of enhanced multimodal connectivity, safety, and impacts to the railroad network.

9.2.2.2. Navigation

The Affected Environment documented current navigational conditions within the Local Study Area using the USACE survey and mapping that define the Federal channel limits, existing depths, and design depths. National Oceanic and Atmospheric Administration Nautical Chart US12289 provided additional information on nearby navigational obstructions including current bridge clearances, both horizontal and vertical. Other details documented included river currents, flood levels, and normal tide fluctuations. Discussions with local waterway law enforcement officials, including the USCG and District of Columbia Harbor Patrol officials that patrol these waters, provided information related to the type of vessels that navigate this portion of the river and the frequency of use.

12 Synchro is a traffic analysis, optimization, and simulation software produced by Trafficware. Synchro is used to perform macroscopic analyses and optimization of both signalized and unsignalized intersections.

9.3. Affected Environment

This section summarizes the existing conditions of the transportation and navigation resources within the Local and Regional Study Areas. For a complete description of the Affected Environment, see **Appendix D2, Affected Environment Report**. As part of one of the busiest multimodal transportation corridors in the Washington Metropolitan Region, the Local and Regional Study Areas contain a wide range of transportation facilities that accommodate freight service and an array of travel modes, including passenger vehicles, railroad transit, bus transit, bicycles, and pedestrians.

9.3.1. Railroad Infrastructure and Operations

9.3.1.1. CSXT Freight Service

CSXT, a large Class 1 freight railroad serving the eastern United States, operates a complex railroad network of freight trains. Long Bridge is located on the CSXT corridor that runs between Richmond, Virginia, and the District, and is part of the broader CSXT corridor running between Florida and New England along the Eastern Seaboard. Long Bridge is officially located on the CSXT Richmond, Fredericksburg and Potomac (RF&P) Railroad Subdivision, which hosts VRE commuter trains and Amtrak intercity passenger trains, in addition to CSXT freight trains.

All CSXT freight trains use diesel locomotives. An average of 18 CSXT trains per day currently operate over Long Bridge. Of these, typically two are coal trains, six are single-stacked intermodal, and 10 are general merchandise freight trains. On average, coal trains are estimated to weigh 15,000 tons fully loaded and are 6,000 feet long. Average intermodal and merchandise trains are estimated to weigh from 3,400 to 7,000 tons and are 7,300 feet long.

9.3.1.2. Norfolk Southern Freight Service

Although NS currently retains trackage rights across the CSXT-owned Long Bridge, it does not presently operate any freight trains over the bridge. NS operates local trains as far north as Alexandria, Virginia. NS through "road freight" trains cross the Potomac River 75 miles upriver of Long Bridge at Shepherdstown, West Virginia.

9.3.1.3. Amtrak Passenger Service

Twelve Amtrak trains currently operate through the Local Study Area on a typical day in each direction. Of these, six are extensions into Virginia of regional trips operating on the Northeast Corridor (NEC) between New York and the District. The remaining six trains per direction are long-distance services linking the NEC and destinations in the Southeast. South of Washington Union Station (WUS), Amtrak trains run on unelectrified freight track using diesel locomotives.

9.3.2. Transit

9.3.2.1. VRE Commuter Service

VRE, a commuter railway serving Northern Virginia and the District, operates on two lines: the Fredericksburg Line and the Manassas Line. The two lines share track between Alexandria, Virginia, and the northern terminus at WUS, through the Local Study Area.

VRE currently operates 16 trains per day on the Fredericksburg Line. These include eight inbound trains in the morning arriving at WUS between 6:30 AM and 9:30 AM, and seven outbound trains in the afternoon departing WUS between 3:00 PM and 7:00 PM, with one midday outbound departure at 12:55 PM. VRE operates 16 trains per day on the Manassas Line. Six inbound morning trains arrive at WUS between 6:30 AM and 9:30 AM, and two evening inbound trains arrive at approximately 4:00 PM and 6:30 PM. In the outbound direction, six evening trips occur between 5:00 PM and 8:00 PM, as well as one morning and one midday departure.

One VRE station, L'Enfant Station, is in the Local Study Area (**Figure 9-3**). Situated between 6th Street SW and 7th Street SW in the District, the station is the busiest station on the VRE system, with approximately 4,400 average weekday boardings. The station has a side platform served by a single track. A separate ongoing study, conducted by VRE, is examining adding station and track capacity at L'Enfant Station.

9.3.2.2. MARC Commuter Service

MARC, a commuter railway serving West Virginia, Maryland, and the District, does not currently operate through the Long Bridge Corridor. MARC's existing service ends at Union Station, but by 2040 the operator plans to run service to L'Enfant Station and through the Long Bridge Corridor to Northern Virginia.

9.3.2.3. Washington Metropolitan Area Transit Authority (WMATA) Metrorail Passenger Service

Additional rail transit service in the Local Study Area includes WMATA Metrorail, which runs on its own rail transit infrastructure, fully separate from other railroad infrastructure and track. Five Metrorail lines, Yellow, Green, Blue, Orange, and Silver, operate within the Local Study Area (**Figure 9-3**). Metrorail runs underground in the Local Study Area, with the exception of a segment of the Metrorail Yellow Line as it approaches and crosses the Potomac River. In Virginia, the Metrorail Yellow Line transitions from underground to above-ground at a portal approximately 425 feet southwest of the George Washington Memorial Parkway (GWMP). On the District side, the Metrorail Yellow Line transitions from the above-ground segment to an underground segment at a portal located approximately 50 feet from the CSXT tracks, just northwest of the NPS maintenance yard.

Figure 9-3 | VRE and Metrorail Lines and Stations

The Charles R. Fenwick (Fenwick) Bridge, which is part of the 14th Street Bridge Complex, carries the Metrorail Yellow Line over the Potomac River.[13] The Fenwick Bridge is located between Long Bridge and the Arland D. Williams Jr. Memorial Bridge, which carries vehicular traffic on northbound I-395 and US 1. The Fenwick Bridge is approximately 180 feet northwest of Long Bridge.

As shown in **Figure 9-3**, two Metrorail stations are located within the Local Study Area:

- L'Enfant Plaza Metrorail Station. Located at 600 Maryland Avenue SW in the District, this station is an underground transfer station serving the Metrorail Yellow, Green, Orange, Blue, and Silver Lines. In 2017, the L'Enfant Plaza Metrorail Station was the fifth-busiest station on the Metrorail system, with 20,235 average weekday boardings.[14]

- Smithsonian Metrorail Station. Located at 1200 Independence Avenue SW, this station is an underground station serving the Metrorail Orange, Blue, and Silver Lines. In 2017, the Smithsonian Metrorail Station had 9,135 average weekday boardings.[15]

9.3.2.4. Local and Commuter Bus

Eighteen local bus routes, operated by three different agencies, operate within the Local Study Area. Three Metrobus bus routes carry passengers between Virginia and the District using the 14th Street Bridge Complex, while four Metrobus routes cross the Local Study Area in the District. An additional three Metrobus routes cross under the CSXT tracks on 7th Street SW, east of the Project Area but within the Local Study Area. One Arlington Transit bus stop is located in the Virginia portion of the Local Study Area, adjacent to Long Bridge Park. Twenty-seven Metrobus stops and two District Circulator bus stops are within the Study Area in the District.

Several commuter bus services also serve the Local Study Area. Potomac and Rappahannock Transportation Commission's Omniride, which operates service between Prince William County, Arlington County, and the District, has seven routes that traverse the Study Area. Loudoun County Transit runs nine routes through the area, and Martz Group Virginia, which serves the Fredericksburg area, has seven routes. Each route travels across the 14th Street Bridge Complex and has stops in the District.

9.3.3. Pedestrian and Bicycle Network

The Local Study Area features pedestrian and bicycle facilities in both the District and in Virginia, including sidewalk, on-street bicycle facilities, and shared-use trails (**Figure 9-4**). The parkland on both sides of the Potomac River features extensive trail networks that provide mobility within the parks themselves as well as north-south mobility along the Potomac River.

[13] The 14th Street Bridge Complex includes three highway bridges (the George Mason Memorial Bridge, the Rochambeau Memorial Bridge, and the Arland D. Williams Jr. Memorial Bridge), the Metrorail bridge, and Long Bridge.
[14] WMATA, 2017. Metrorail Average Weekday Passenger Boardings. Accessed from https://www.wmata.com/about/records/public_docs/upload/2017_historical_rail_ridership.pdf. Accessed January 11, 2018.
[15] WMATA, 2017. Metrorail Average Weekday Passenger Boardings. Accessed from https://www.wmata.com/about/records/public_docs/upload/2017_historical_rail_ridership.pdf. Accessed January 11, 2018.

196 **Figure 9-4** | Trails, Bike Lanes, and Bikeshare Locations

197

There is one pedestrian and bicycle connection over the Potomac River in the Local Study Area across the George Mason Memorial Bridge, which carries southbound traffic on I-395. There is a 10-foot shared-use path on the upriver side of the bridge, separated from vehicular traffic by a jersey barrier and railing.

In Virginia, the Mount Vernon Trail (MVT), an 18-mile paved shared-use path owned and maintained by NPS, provides active transportation connectivity within Northern Virginia and access to trail connections into the District. According to bi-directional counter data available on the public website of BikeArlington, a program of Arlington County, the George Mason Memorial Bridge path at the MVT had an average weekday volume of 2,247 bicyclists and 303 pedestrians in July 2017, an average weekday volume of 2,149 bicyclists and 266 pedestrians in July 2018, and a total of 551,185 bicycle trips between August 2017 and July 2018.[16,17] This important pedestrian and bicycle connection is the most frequently used trail in Arlington County. The MVT crosses under Long Bridge approximately 50 feet southwest of the Potomac River.

In the District, the National Mall and in East Potomac Park have off-street paths primarily used for recreation and accessing historic and memorial sites. A shared-use path along Ohio Drive SW crosses under Long Bridge approximately 225 feet southeast of East Basin Drive SW. The sidewalk along Ohio Drive SW and a shared-use path on the Francis Case Memorial Bridge, which carries I-395 over Washington Channel, provides pedestrian and bicycle connections over the Channel and Tidal Basin. These facilities connect the National Mall, L'Enfant Plaza, and the southwest waterfront with East Potomac Park. Additionally, a pedestrian bridge crosses Maine Avenue SW adjacent to the existing railroad bridge structure. This bridge connects Maryland Avenue SW around the Mandarin Oriental Hotel before making the connection to Maine Avenue SW.

Seven Capital Bikeshare stations—five in the District and two in Virginia—fall within the Local Study Area boundary. Dockless bikeshare is also available through a number of providers as part of a District demonstration project.

9.3.4. Roadway Network

The Local Study Area includes high-volume roadways that provide critical access and mobility between and within the District and Virginia, including I-395, the GWMP, and US 1 (**Figure 9-1**). Together, these roadways carry approximately 375,000 vehicles daily through the Local Study Area. In addition to these high-volume roadways and their associated ramps, the Local Study Area includes numerous surface roadways that are part of the urban street grid in the District and in Crystal City. The Local Study Area also includes park roads, such as Ohio Drive SW and East Basin Drive, that provide access to and mobility within East Potomac Park and West Potomac Park. DDOT classifies both of these roadways as local streets.[18] **Table 9-1** describes the major roadways (such as interstates and arterials) as they relate to the Local Study Area and lists the annual average daily traffic (AADT) for each of the roadways in 2015.

[16] BikeArlington. Undated. Counter Dashboard. Accessed from http://counters.bikearlington.com/. Accessed January 11, 2018.
[17] BikeArlington. Undated. Counter Dashboard. Accessed from http://counters.bikearlington.com/. Accessed October 21, 2018.
[18] DDOT. District of Columbia Functional Classification Map. September 2016. Accessed from https://ddot.dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/FunctionalClass_2016.pdf. Accessed May 21, 2018.

Roadway owners in the Local Study Area include Arlington County, DDOT, VDOT, and NPS. A private entity, Franklin Haney Company (FLH) Company, owns the part of Maryland Avenue SW located above the CSXT tracks just southwest of 12th Street SW.

Table 9-1 | 2015 Traffic Volumes and Descriptions of Major Roadways in the Local Study Area

Roadway Segment	Description within the Local Study Area	AADT	Functional Classification[1]
I-395 and US 1 (14th Street Bridge)	I-395 and US 1 cross the Potomac River just west of Long Bridge via the 14th Street Bridge Complex, on the George Mason Memorial Bridge, the Rochambeau Memorial Bridge, and the Arland D. Williams Jr. Memorial Bridge. I-395 and US 1 share a designation as they cross the river. I-395 passes under the CSXT railroad tracks approximately 600 feet west of the NPS maintenance facility in East Potomac Park.	234,500	Interstate
US 1 (14th Street SW)	US 1 joins I-395 southwest of the Local Study Area and crosses the Potomac River via the 14th Street Bridge Complex. On the District side of the river, US 1 runs on an elevated structure until D Street SW, where it becomes 14th Street SW, a six-lane surface roadway classified as a Principal Arterial.	41,500	Other Principal Arterial
George Washington Memorial Parkway	The GWMP is an NPS unit that features an approximately 25-mile divided parkway and associated historic landscape along the Potomac River. The GWMP connects to I-395 and US 1 and passes under the CSXT tracks approximately 350 feet southwest of the Potomac River in Virginia.	62,000	Other Principal Arterial
12th Street and 9th Street Expressways	The 12th Street Expressway crosses over the CSXT tracks at D Street SW. The 9th Street Expressway passes under the CSXT tracks just north of D Street SW.	N/A	Other Freeway and Expressway
Independence Avenue SW	Independence Avenue SW is an east-west roadway on the south side of the National Mall in the District. It is classified as a Principal Arterial and has a six-lane cross-section in most segments. Independence Avenue provides connections between I-395, US 1, and I-66 and major office uses in and around Downtown.	27,500	Other Principal Arterial
Maine Avenue SW	Maine Avenue SW is a four-lane Minor Arterial that provides connections between I-395 and US 1 and the District. Maine Avenue SW passes under the CSXT tracks approximately 300 feet north of the Washington Channel.	13,700	Minor Arterial

[1] ***FHWA provides the following definitions for the functional classifications in this table:***

- ***Interstates are the highest classification of arterials and were designed and constructed with mobility and long-distance travel in mind. Roadways in this functional classification category are officially designated as Interstates by the Secretary of Transportation.***
- ***Other Freeways and Expressways, like interstates, are designed to maximize their mobility function. They have directional travel lanes usually separated by a physical barrier, and their access and egress points are limited to on- and off-ramp locations or a very limited number of at-grade intersections.***
- ***Other Principal Arterials serve the major activity centers of a metropolitan area and the highest volume traffic corridors. They carry a significant amount of intra-area travel and serve demand between the central business district and outlying residential areas.***
- ***Minor Arterials provide service for trips of moderate length, serve geographic areas that are smaller than their higher arterial counterparts, and offer connectivity to the higher arterial system.***

Sources: DDOT, VDOT, FHWA

9.3.5. Parking

The Local Study Area has on-street, metered parking, off-street parking, and garage parking available at various locations.

9.3.5.1. On-Street Parking

Several of the streets in the Local Study Area have on-street metered parking. Most of these streets are in the District. **Table 9-2** shows parking allowances and restrictions on surface streets in the Study Area.

Table 9-2 | On-Street Parking in the Study Area

Street Name	Jurisdiction	On-Street Parking Permitted?	Time Restriction	Type
Long Bridge Drive	Arlington	Yes	4 hours	Pay/Display
E. Basin Drive SW	NPS	Permit and tour bus parking	No	N/A
Ohio Drive SW (south of Buckeye Drive)	NPSNPS	Yes, along some sections, except overnight	3 hours	Pay/Display
Ohio Drive SW (north of Buckeye Drive)	NPS	Majority of on-street parking by permit only; some public parking on west side of street	3 hours (for public spaces)	Free
Maine Avenue SW	District	No	N/A	N/A
Frontage Road SW	District	Yes, north side only	2 hours	Meters
D Street SW (14th Street to 12th Street)	District	Yes	2 hours	Pay/Display
D Street SW (12th Street to L'Enfant Plaza)	District	No	N/A	N/A
D Street SW (L'Enfant Plaza to 9th Street)	District	Yes, one side only (alternates)	2 hours	Pay/Display
C Street SW (14th Street to 12th Street)	District	Yes	2 hours	Pay/Display
C Street SW (9th Street to 7th Street)	District	Yes, north side only	2 hours	Pay/Display
Independence Avenue SW	District	Yes, except rush hour	2 hours	Pay/Display
14th Street SW	District	No	N/A	N/A
13th Street SW	District	Yes	2 hours	Pay/Display
12th Street SW	District	Yes, except rush hour	2 hours	Pay/Display
L'Enfant Plaza SW	District	Yes	2 hours	Meters
9th Street SW	District	Yes	2 hours	Pay/Display
7th Street SW	District	Yes, except rush hour	2 hours	Pay/Display and Meters

Sources: ***DDOT, Arlington County***

9.3.5.2. Off-Street Parking

Off street parking in the Local Study Area includes surface and structured parking as shown in **Table 9-3**. Surface parking within East Potomac Park provide 289 public parking spaces. In addition, the public makes use of some of the 336 parking spaces at the National Capital Region headquarters on weekends, particularly during periods of high demand such as the National Cherry Blossom Festival.

Table 9-3 | Off-Street Parking in the Study Area

Lot Name/Location	Number of Spaces	Free or Paid	Users
Long Bridge Park	175	Free	Public
Roaches Run	56	Free	Public
NPS Parking Lot A	104	Paid	Public
NPS Parking Lot B	76	Paid	Public
NPS Parking Lot C	67	Paid	Public
National Capital Region Headquarters	336	Free	Permit, visitors, police, and government vehicles
East Potomac Tennis Center (Ohio Drive SW)	12 6	Free	Tennis patrons Permit
East Potomac Tennis Center (Buckeye Drive)	42 6	Free	Public Permit
National Mall and Memorial Parks Headquarters	48	Free	NPS staff and visitors
Washington Marina	88	N/A	Customers
Portals Garages	1,200 (additional 387 planned)	Paid	Public

9.3.6. Aviation

Ronald Reagan Washington National Airport (DCA) is located in Arlington, Virginia, and is the primary airport serving the District. DCA is situated on 860 acres, with three terminals, three runways, and 44 gates. Airport flight patterns follow the Potomac or Anacostia Rivers. The Long Bridge Corridor is located within a mile north of DCA and is within a flight path for plane landings. Airport operations may be impacted if any object height exceeds 81 feet above mean sea level in the vicinity of Long Bridge.[19]

9.3.7. Navigation

Marine vessel traffic in the Local Study Area consists of both private recreational and commercial tourism use. Based on NOAA Nautical Chart US12285, Long Bridge has a vertical clearance of 18 feet above mean high water. It has the most restrictive vertical clearance of the 14th Street Bridge Complex, and therefore serves as the limiting factor for marine vessel traffic on the Potomac River. A Federal navigation channel (the Virginia Channel) maintained by the USACE runs through the Potomac River, directly under the swing span (spans 9 and 10) of Long Bridge (**Figure 9-5**).[20] The navigation channel in

[19] This height limit was provided by the Metropolitan Washington Airports Authority in their Scoping comments in an email dated October 6, 2016. See the *Scoping Summary Report* (January 2017), Appendix D.
[20] Long Bridge is labeled as a "fixed bridge" on NOAA Nautical Chart US12285.

the Washington Channel does not extend underneath the railroad bridges that cross the Washington Channel at the mouth of the Tidal Basin.

While the Potomac River is navigable for motorized vessels for approximately 3.25 miles upriver of Long Bridge, much of the traffic navigating under Long Bridge and the 14th Street Bridge Complex consists of small recreational motorized and non-motorized vessels due to the vertical clearance limitations of the Long Bridge. Although Long Bridge has a swing span, it is currently inoperable, and has functioned as a fixed span since 1969. Most larger vessels launch or dock at the marinas in the Washington Channel, along the Anacostia River, or downstream of Long Bridge. A notable exception is the Odyssey III, which operates dinner cruises on the Potomac River and can travel north of Long Bridge at low tide. Water taxi services also pass under the 14th Street Bridge Complex. The water taxi provides service between the Wharf, Georgetown, Old Town Alexandria, and National Harbor. In addition, a 6-person jitney operates approximately every 15 minutes between East Potomac Park and the Wharf from March through December.

No commercial facilities receive barge deliveries along the Potomac River upriver of Long Bridge. There is limited potential for commercial operations, aside from passenger transport, upriver of Long Bridge since most of the waterfront along this segment of the river is Federal, state, or District parkland.

Within the Local Study Area are several features protected under Section 14 of the Rivers and Harbors Act of 1899. These include the sea wall surrounding East Potomac Park and the Tidal Basin and the Washington Marina, which was constructed between 1939 and 1941 by the Works Progress Administration as "Yacht Basin One."[21]

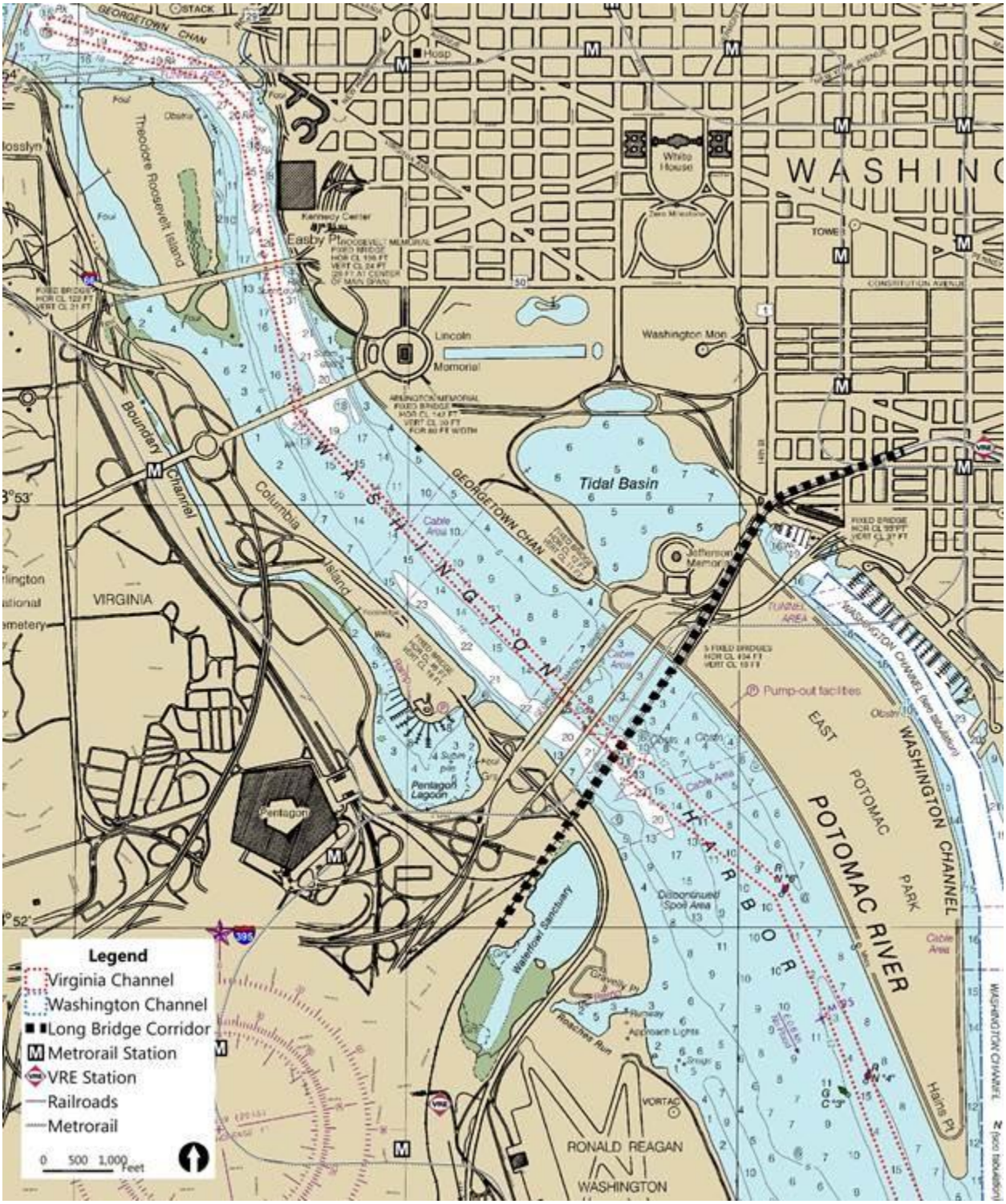
9.4. Permanent or Long-Term Effects

This section discusses the permanent or long-term effects following the construction of the No Action Alternative and Action Alternatives on transportation and navigation resources within the Local and Regional Study Areas. For a complete description of the permanent or long-term effects, see **Appendix D3, Environmental Consequences Report**.

This section describes potential impacts of the alternatives on future railroad operations and potential impacts from alternatives to the roadway network, marine travel, sidewalks, bicycle system, parking, and transit system. The indirect effects of these changes, given the relative size of ridership on commuter rail compared to other modes, are not foreseeable for purposes of NEPA. For example, long-term changes in development patterns due to increased VRE and MARC service, if any, would be spread across the entire commuter rail network, making potential development changes at any given location too difficult to forecast.

[21] The Washington Marina Company. Our History. Accessed from https://www.washingtonmarina.com/our-history/. Accessed July 15, 2019.

Figure 9-5 | Potomac River Depths, with Virginia Channel Identified



Source: NOAA Nautical Chart US12285 and USACE 2015 Condition Survey

9.4.1. Railroad Infrastructure and Operations

This section discusses the effects of the Project on railroad infrastructure and operations, including both Amtrak passenger rail service and freight rail service. Amtrak, CSXT, and NS all plan to increase rail service between Virginia and Washington, DC, as shown in **Table 9-4**. **Section 9.4.2, Transit**, evaluates VRE and MARC service along with other transit infrastructure and service.

9.4.1.1. No Action Alternative

As described in **Chapter 3.2.1, No Action Alternative**, the No Action Alternative includes several projects on the approaches to the Long Bridge Corridor, including expansion to four tracks on both sides of the Potomac River and station improvements at VRE's Crystal City and L'Enfant Plaza stations. The No Action Alternative would result in an anticipated increase of 32 intercity passenger and freight trains per day, including an additional two Amtrak trains and an additional 30 freight trains (**Table 9-4**). However, due to the increase in the number of trains with no associated increase in the number of tracks, substantial delays are expected to occur to train operations under the No Action Alternative. Because of the continued limited two tracks across the river, passenger train operators would not be able to run their planned level of service between the District and Richmond, Virginia.

9.4.1.2. Action Alternative A (Preferred Alternative)

Action Alternative A would result in major permanent direct beneficial impacts on the volume of trains that the Long Bridge can accommodate compared to the No Action Alternative, allowing major permanent direct beneficial impacts on train service frequency. Action Alternative A would help enable an anticipated increase of 18 additional Amtrak passenger trains per day, as shown in **Table 9-4**. Action Alternative A would also have major direct beneficial effects on railroad operational flexibility for both passenger and freight operators, due to installation of additional tracks enabling separation of passenger and freight trains and changes in the track configuration under Maryland Avenue SW. While the tracks would be interoperable for passenger and freight trains, the two western tracks would typically carry passenger trains and the two eastern tracks would typically carry freight trains. The added tracks would also reduce the delays under normal operating conditions and would allow continued operation of two-track service during periods of maintenance or breakdowns, minimizing delays.

9.4.1.3. Action Alternative B

The impact to railroad operations resulting from Action Alternative B would be the same as for Action Alternative A, as shown in **Table 9-4.** However, Action Alternative B would delay the benefit of increased operational flexibility and the volume of trains that the Long Bridge can accommodate by approximately 3 more years because of the longer construction time required for the demolition and replacement of the existing two-track bridge.

Table 9-4 | Freight and Intercity Rail Train Volumes in the Long Bridge Corridor

Train Operator	Current Number of Trains per Day[1]	No Action Alternative Number of Trains per Day[2]	Action Alternatives Number of Trains per Day[3]
Amtrak	24	26	44
CSXT	18	42	42
NS	0	6	6
TOTAL	**42**	**74**	**92**

[1] Current train volumes are based on existing operation agreements and confirmed by bridge stakeholders.
[2] Forecast year 2040 No Action train volumes were established based on the concurrent Washington, DC to Richmond Southeast High Speed Rail (DC2RVA) EIS, Rail Service Growth in the No Build Alternative, Table 2.5-2, http://www.dc2rvarail.com/files/5315/0412/9086/Chapter_02_Alternatives_DC2RVA_DEIS.pdf, and confirmed by bridge stakeholders.
[3] Forecast year 2040 planned train volumes were established based on input from bridge stakeholders, including CSXT, VRE, Amtrak, NS, and MARC, as well as the concurrent DC2RVA EIS.

9.4.2. Transit

This section discusses the permanent or long-term effects of the Project on transit operations such as VRE and MARC under the No Action Alternative and Action Alternatives A and B. The Action Alternatives would not permanently affect the Metrorail Yellow Line, as the bridge across the Metrorail Portal would have sufficient clearance based on WMATA joint development standards. The Action Alternatives would also not affect local and commuter bus services, as they would not permanently modify streets or facilities used by existing these services.

9.4.2.1. VRE Commuter Service

No Action Alternative

The No Action Alternative includes expansion to four tracks on both sides of the Potomac River and station improvements at VRE's Crystal City and L'Enfant Plaza stations. The No Action Alternative would result in an anticipated increase of 34 trains per day to 38 trains per day, as shown in **Table 9-5**. However, due to the increase in the number of trains with no associated increase in the number of tracks, substantial delays are expected to occur to train operations under the No Action Alternative. Because of the continued limited two tracks across the river, VRE would not be able to run its desired number of trains with the existing two tracks over the Potomac River on the Long Bridge Corridor.

Action Alternative A (Preferred Alternative)

Action Alternative A would result in major permanent direct beneficial impacts on the volume of trains that the Long Bridge can accommodate, contributing to major permanent direct beneficial impacts on VRE service frequency by helping enable VRE to run the full 92 trains per day envisioned by its *System Plan 2040* (**Table 9-5**), an increase of 54 trains per day over the No Action Alternative.[22] Action Alternative A would also have moderate permanent direct beneficial effects on railroad operational

[22] VRE. 2014. *Virginia Railway Express System Plan 2040*. Accessed from https://www.vre.org/vre/assets/File/2040%20Sys%20Plan%20VRE%20finaltech%20memo%20combined.pdf. Accessed September 18, 2018.

flexibility, due to the installation of additional tracks enabling separation of passenger and freight trains and changes in the track configuration under Maryland Avenue SW.

Action Alternative B

The effects to VRE service resulting from Action Alternative B would be the same as for Action Alternative A, as shown in **Table 9-5.** However, Action Alternative B would delay the benefit of increased operational flexibility and the volume of trains that the Long Bridge can accommodate by approximately 3 more years because of the longer construction time required for the demolition and replacement of the existing two-track bridge.

Table 9-5 | Commuter Rail Transit Volumes in the Long Bridge Corridor

Train Operator	Current Number of Trains per Day[1]	No Action Alternative Number of Trains per Day[2]	Action Alternatives Number of Trains per Day[3]
VRE	34[4]	38	92
MARC	0	0	8
TOTAL	**34**	**38**	**100**

[1] Current train volumes are based on existing operation agreements and confirmed by bridge stakeholders.
[2] Forecast year 2040 No Action train volumes were established based on the concurrent DC2RVA EIS, Rail Service Growth in the No Build Alternative, Table 2.5-2, http://www.dc2rvarail.com/files/5315/0412/9086/Chapter_02_Alternatives_DC2RVA_DEIS.pdf, and confirmed by bridge stakeholders.
[3] Forecast year 2040 planned train volumes were established based on input from bridge stakeholders, including CSXT, VRE, Amtrak, NS, and MARC, as well as the concurrent DC2RVA EIS.
Note: The current number of VRE trains per day includes non-revenue movements.

9.4.2.2. MARC Commuter Service

MARC currently operates service from West Virginia and Maryland into Union Station in the District. By 2040, MARC plans to extend service from Union Station into Northern Virginia.

No Action Alternative

The No Action Alternative would result in a direct adverse effect on planned MARC operations. Without additional capacity through the Long Bridge Corridor, CSXT would not negotiate operations agreements with new operators and MARC would not be able to run planned future service to Northern Virginia.

Action Alternative A (Preferred Alternative)

Action Alternative A would result in major permanent direct beneficial impacts on the volume of trains that the Long Bridge can accommodate, contributing to major permanent direct beneficial impacts on MARC service frequency by helping enable MARC to run through service into Northern Virginia.[23] With the additional capacity provided by Action Alternative A combined with other capacity-enhancing projects, MARC would be able to operate through-running service to Virginia. Action Alternative A would also have moderate permanent direct beneficial impacts on railroad operational flexibility, due to the

[23] Implementation of run through service would require an agreement between CSXT (the owner of the railroad corridor) and MARC, as well as between MARC and the owner of the new railroad bridge (to be determined).

installation of additional tracks enabling separation of passenger and freight trains and changes in the track configuration under Maryland Avenue SW.

Action Alternative B

The effects to MARC service resulting from Action Alternative B would be the same as for Action Alternative A, as shown in **Table 9-5.**

9.4.3. Pedestrian and Bicycle Network

This section discusses the permanent or long-term effects of the Project on the pedestrian and bicycle network under the No Action Alternative and Action Alternatives A and B. In addition to the effects described below, the project sponsor for final design and construction, the Virginia Department of Rail and Public Transportation (DRPT), would construct a bike-pedestrian crossing upstream of the new upstream railroad bridge in either Action Alternative. See **Chapter 22, Bike-Pedestrian Crossing**, for consideration of the effects of the new crossing on the pedestrian and bicycle network.

9.4.3.1. No Action Alternative

The No Action Alternative would have no adverse permanent impacts on the pedestrian and bicycle network. The decision to not construct the Project would not change the pedestrian and bicycle network. The No Action Alternative does include beneficial permanent impacts to the pedestrian and bicycle network because of the Boundary Channel Drive Interchange Project, which includes enhanced pedestrian and bicycle connections from the MVT to Long Bridge Drive and Long Bridge Park.

9.4.3.2. Action Alternative A (Preferred Alternative)

Action Alternative A would result in minor permanent direct beneficial impacts on the pedestrian network, as the replaced pedestrian bridge between Maryland Avenue SW and Washington Marina would be Americans with Disabilities Act of 1990 accessible, and the relocated retaining wall along the 14th Street ramp at Maine Avenue SW will improve sight distance for pedestrians. Action Alternative A would involve reconstruction of the portion of the MVT relocated during construction, leading to a rehabilitated section of the trail.

9.4.3.3. Action Alternative B

Action Alternative B would have minor permanent direct beneficial impacts on the pedestrian and bicycle network, as the permanent effects on the pedestrian and bicycle network under Action Alternative B would be similar to those under Action Alternative A.

9.4.4. Roadway Network

This section discusses the permanent or long-term effects of the Project on the roadway network under the No Action Alternative and Action Alternatives A and B.

9.4.4.1. No Action Alternative

The No Action Alternative would have no adverse permanent impacts on the roadway network. The decision to not construct the Project would not change the roadway network. The No Action Alternative

does include beneficial permanent impacts on the roadway network because of the Boundary Channel Drive Interchange Project, which will convert the existing full cloverleaf interchange design to a partial cloverleaf configuration and improve traffic operations along Boundary Channel Drive.

9.4.4.2. Action Alternative A (Preferred Alternative)

Action Alternative A would not require permanent modification of and streets, roads, or highways. Construction of new railroad bridges over roads and highways would not impair vehicular or other roadway uses. Therefore, Action Alternative A would not cause long-term effects to the roadway network.

9.4.4.3. Action Alternative B

The permanent effects on the roadway network under Action Alternative B would be identical to those under Action Alternative A.

9.4.5. Parking

This section discusses the permanent or long-term effects of the Project to parking under the No Action Alternative and Action Alternatives A and B.

9.4.5.1. No Action Alternative

The No Action Alternative would have no adverse permanent impacts on parking. None of the projects included in the No Action Alternative would affect parking, and the decision to not construct the Project would not change parking options within the Local Study Area.

9.4.5.2. Action Alternative A (Preferred Alternative)

Action Alternative A would result in moderate permanent direct adverse impacts to parking in two areas: National Park Service Lot C and the Washington Marina parking lot. Action Alternative A would require removing approximately 50 of the existing 67 metered, public parking spaces at NPS Parking Lot C at East Potomac Park to accommodate the addition of the two-track railroad structure directly west of the existing two tracks. This lot is one of three surface parking areas in close proximity, located between the bridges crossing East Potomac Park. In total, there are 247 spaces in those lots. In addition, Action Alternative A would require removing approximately one-third of the private parking spaces for customer use (of approximately 88 spaces) at the Washington Marina. The exact number of parking spots removed would be determined as design advances, as the surface parking areas would be reconfigured to minimize long-term loss of parking spaces.

9.4.5.3. Action Alternative B

Action Alternative B would result in moderate permanent direct adverse impacts to parking in two limited areas, NPS Parking Lot C and the Washington Marina parking lot; these effects would be identical to those under Action Alternative A.

9.4.6. Aviation

This section discusses the permanent or long-term effects of the Project to aviation under the No Action Alternative and Action Alternatives A and B.

9.4.6.1. No Action Alternative

The No Action Alternative would have no adverse permanent impacts on aviation. The decision to not construct the Project would not change the bridge height, which may affect aviation in the Local Study Area.

9.4.6.2. Action Alternative A (Preferred Alternative)

The top of structure of the new bridge under Action Alternative A would be within the limit set by the FAA. Therefore, Action Alternative A would not cause permanent or long-term effects on aviation.

9.4.6.3. Action Alternative B

Under Action Alternative B, impacts to aviation would be the same as under Action Alternative A.

9.4.7. Navigation

This section discusses the permanent or long-term effects of the Project to navigation under the No Action Alternative and Action Alternatives A and B.

9.4.7.1. No Action Alternative

The No Action Alternative would have no adverse permanent impacts on navigation. None of the projects in the No Action Alternative would affect the bridges crossing the Potomac River, and the decision to not construct the Project would not change the bridges crossing the river.

9.4.7.2. Action Alternative A (Preferred Alternative)

Action Alternative A would have no permanent adverse impacts on navigable waters. Under Action Alternative A the new bridge structure would provide additional vertical clearance beyond the 18 feet provided by existing Long Bridge based on NOAA Nautical Chart US12285. Existing horizontal clearances would be maintained.

9.4.7.3. Action Alternative B

Action Alternative B would have no permanent adverse impacts on navigable waters, as both the new bridge and the replacement for the existing Long Bridge would provide additional vertical clearance beyond the 18 feet provided by existing Long Bridge based on NOAA Nautical Chart US12285. Existing horizontal clearances would be maintained.

9.5. Temporary Effects

This section discusses the direct or indirect temporary effects of the No Action Alternative and Action Alternatives during construction, based on conceptual engineering design. This section addresses the change in operational conditions from construction activities, specifically, road, sidewalk, and trail closures as well as altered public transportation schedules or operations and impacts to railroad operations. For the complete technical analysis of the potential impacts to transportation and navigation resources, see **Appendix D3, Environmental Consequences Report**.

9.5.1. Railroad Infrastructure and Operations

This section discusses anticipated effects on railroad operations that are temporary in nature or related to construction of the Project. Railroad operations described in this section include CSXT freight operations and Amtrak passenger service.

9.5.1.1. No Action Alternative

The No Action Alternative would have adverse temporary impacts on railroad operations. Under the No Action Alternative, there are planned projects to expand to four tracks on both sides of the Potomac River and improve the VRE Crystal City and L'Enfant Plaza stations. These construction projects would likely temporarily affect railroad operations. These projects would involve the construction of new or realigned track or station platforms within the active railroad corridor. Construction activities would likely require temporary track outages, off-peak track holds, and other minor disruptions to railroad operations.

9.5.1.2. Action Alternative A (Preferred Alternative)

Action Alternative A would have moderate temporary direct adverse impacts on railroad operations beyond those of the No Action Alternative. Construction of the new two-track bridge and trackwork in Virginia and the District would be completed in several stages to minimize interruptions in service for railroad operators. Work during the first stage would begin with adding new track and shifting track between I-395 and the L'Enfant Plaza VRE station, as well as initial work on the new two-track Long Bridge structure. During the second stage, reconstructing the RO Interlocking in Virginia between the VRE Crystal City Station and the GWMP would help to facilitate work in later stages by allowing trains to switch across all four tracks. The last stage of construction would involve work between East Potomac Park and VRE L'Enfant Plaza Station, including a new bridge over I-395 and demolition of the old structure.

DRPT would work with CSXT to develop the necessary agreements for work within CSXT's right-of-way. CSXT would determine construction staging and coordinate work with Amtrak and VRE. CSXT or contractors working under the direction of CSXT would perform the construction work. Construction staging would be designed to maintain two tracks of railroad service operational during the entire construction period, except for some limited track outages for construction activities. The contractor and operators would schedule interruptions to two-track service to complete track shifts and realignments primarily for nights and weekends and would keep interruptions to a minimum. Outages would be further defined during final design, but it is anticipated that over the duration of the project, there would be seven night outages, one day outage, and three 55-hour weekend outages that would affect maintaining two-track operations. Additional outages may be required; however, they are not anticipated to affect two-track operations. These outages assume work forces will have full on-track time during the outage to complete the work and do not include foul time, which may be needed for adjacent track construction or material transport.

9.5.1.3. Action Alternative B

Action Alternative B would have major temporary direct adverse impacts on railroad operations. The types of temporary effects on railroad infrastructure and operations under Action Alternative B would be similar to those under Action Alternative A, but the duration of construction would approximately 3

years longer to provide for the removal and replacement of the existing two-track Long Bridge structure, pushing some of the limited outages of two-track service further into the future. Construction staging plans would be similar for Action Alternative B, except that the third stage of construction would include the demolition and replacement of the existing two-track structure, and connections to the new bridge would take place approximately 3 years later than connections to the existing bridge under Action Alternative A. Although the level of disruption to two-track service would be the same as under Action Alternative A, four-track railroad service would be delayed by approximately 3 years compared to Action Alternative A.

9.5.2. Transit

This section discusses the temporary effects of the Project on transit operations under the No Action Alternative and Action Alternatives A and B.

9.5.2.1. VRE Commuter Service

No Action Alternative

The No Action Alternative would have adverse temporary impacts on railroad operations. Under the No Action Alternative, there are planned projects to expand to four tracks on both sides of the Potomac River and improve the VRE Crystal City and L'Enfant Plaza stations. These construction projects would likely temporarily affect railroad operations. These projects would involve the construction of new or realigned track or station platforms within the active railroad corridor. Construction activities would likely require temporary track outages and other minor disruptions to railroad operations. Because VRE service is most frequent during the peak AM and PM periods and only runs on weekdays, scheduling these activities during off-peak hours would minimize disruptions for VRE service.

Action Alternative A (Preferred Alternative)

Action Alternative A would have minor temporary direct adverse impacts to VRE service beyond the effects of the No Action Alternative. Construction staging would be developed to maintain two-track service in the Local Study Area as much as feasible, with disruptions scheduled primarily for nights and weekends. Because VRE service is most frequent during the peak AM and PM periods and only runs on weekdays, this approach would minimize disruptions for VRE service.

Action Alternative B

Action Alternative B would result in minor temporary direct adverse impacts to VRE service beyond the effects of the No Action Alternative. Temporary effects for VRE service under Action Alternative B would be similar to those for Action Alternative A, except that replacement of the existing bridge would require additional outages of two-track service. Although the level of disruption to two-track service would be similar as under Action Alternative A, four-track railroad service would be delayed by approximately 3 more years compared to Action Alternative A.

9.5.2.2. WMATA Metrorail Passenger Service

No Action Alternative

The No Action Alternative would not have temporary effects on Metrorail passenger service. None of the projects included in the No Action Alternative would require construction near Metrorail right-of-way.

Action Alternative A (Preferred Alternative)

Action Alternative A would cause minor temporary direct adverse impacts to Metrorail Yellow Line service. Current Metrorail operations involve running Metrorail Yellow Line service between Virginia and the District, over a bridge upstream of Long Bridge and upstream of the new span that would be constructed under Action Alternative A. Metrorail Yellow Line trains currently enter a tunnel at a portal at East Potomac Park directly adjacent to the existing Long Bridge tracks. Action Alternative A would require construction of a bridge over the existing Metrorail tunnel portal, resulting in some limited service disruptions to Metrorail Yellow Line service, primarily during nights and weekends, when Metrorail service is already less frequent than during the peak AM and PM periods on weekdays.

Action Alternative B

Action Alternative B would result in minor temporary direct adverse impacts to Metrorail Yellow Line service. Temporary effects for Metrorail passenger service under Action Alternative B would be identical to those for Action Alternative A.

9.5.2.3. Local and Commuter Bus

No Action Alternative

Construction associated with No Action Alternative projects may cause additional congestion throughout the study area. The No Action Alternative may therefore have temporary effects on local and commuter bus service.

Action Alternative A (Preferred Alternative)

Action Alternative A would have moderate to major temporary direct adverse impacts to local and commuter bus service. Metrobus routes 11Y, 5A, 16E, and 16X would suffer major direct adverse impacts, as they utilize the section of I-395 impacted by construction. Metrobus route D51 may suffer moderate direct adverse impacts due to construction along Maine Avenue. Regarding commuter bus service, Potomac and Rappahannock Transit Commission (PRTC) routes DC-E, LR-E, R1-E, and MC-E, and Loudoun County Transit (LCT) routes 100E, 200E, 250E, 300E, and 400E would suffer major direct adverse impacts along I-395. Additionally, the PRTC DC-E route and all mentioned LCT routes would suffer moderate direct adverse impacts due to traffic congestion associated with construction impacts to Maine Avenue SW.

Action Alternative B

Impacts to local and commuter bus service under Action Alternative B would be similar to those for Action Alternative A. While the overall construction duration for Action Alternative B is substantially longer than Action Alternative A, the duration of construction impacts to the section of I-395 utilized by local and commuter bus service would be the same

9.5.3. Pedestrian and Bicycle Network

This section discusses the temporary effects of the Project to the pedestrian and bicycle network under the No Action Alternative and Action Alternatives A and B.

9.5.3.1. No Action Alternative

Under the No Action Alternative, there would be no construction affecting the multiuse trails in the Local Study Area. However, construction of the projects included in the No Action Alternative could require temporary traffic control measures or use of sidewalks for construction access, thereby having temporary adverse impacts on the pedestrian and bicycle network.

9.5.3.2. Action Alternative A (Preferred Alternative)

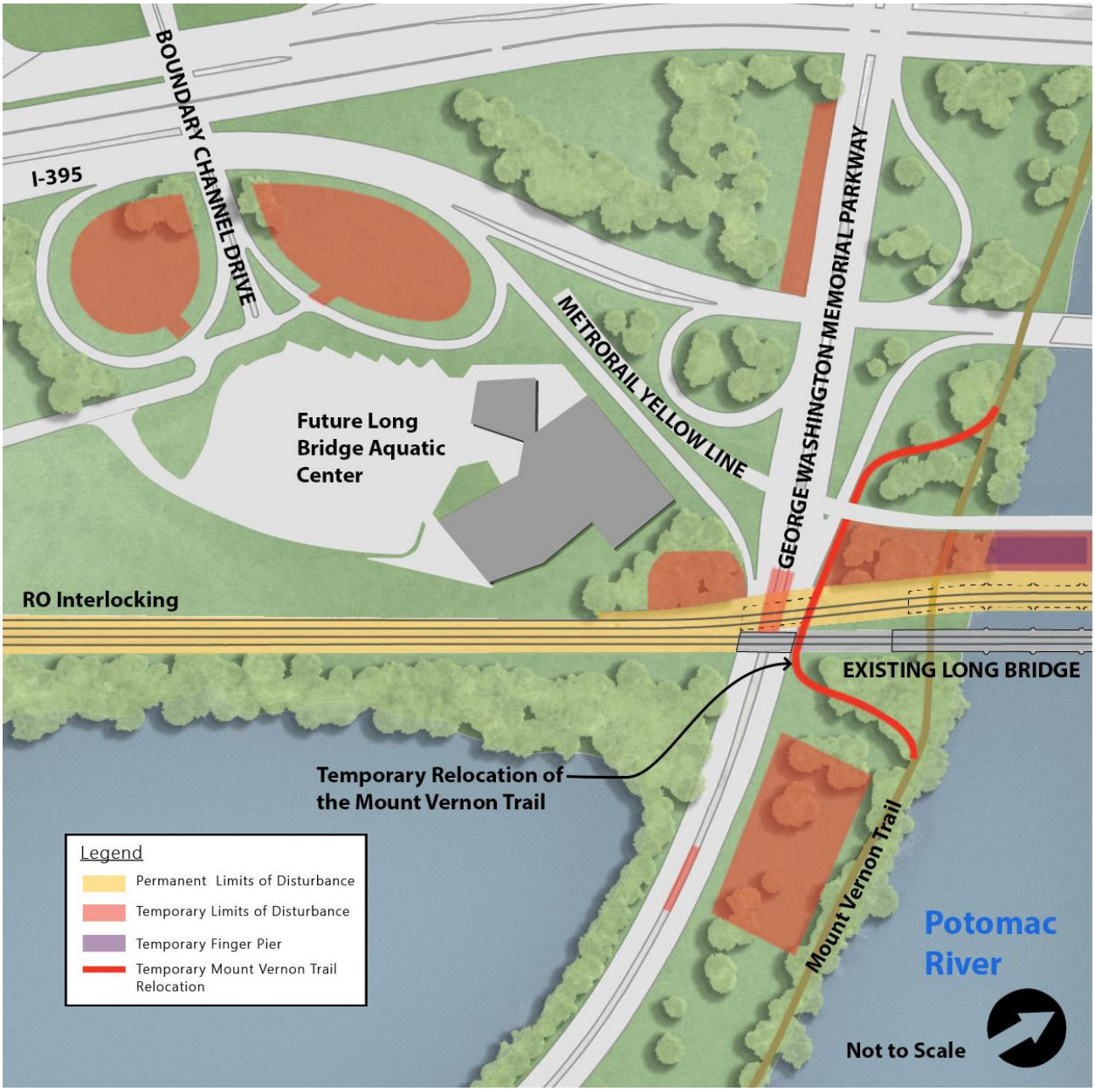
Action Alternative A would have moderate temporary direct adverse impacts on the pedestrian and bicycle network. Action Alternative A would involve constructing a new two-track railroad bridge over the MVT in Virginia. According to bi-directional counter data available on the public website of BikeArlington,[24] the George Mason Memorial Bridge path at the MVT had an average weekday volume of 2,247 bicyclists and 303 pedestrians in July 2017, an average weekday volume of 2,149 bicyclists and 266 pedestrians in July 2018, and a total of 551,185 bicycle trips between August 2017 and July 2018.[25] This important pedestrian and bicycle connection is the most frequently used trail in Arlington County.

During construction, a staging area will be placed adjacent to the GWMP, resulting in the need to reroute the MVT (**Figures 9-6** and **9-7**). Because of the current trail alignment, the MVT would be closed from a point south of the Rochambeau Bridge underpass to a point north of the Metrorail Yellow Line underpass. The trail would be realigned for the Project construction period, and conceptual draft-level designs show a temporary realignment following the eastern berm of the GWMP. The final temporary realignment would depend on final Maintenance of Traffic (MOT) plans for the GWMP and would need to be approved by NPS. Impacts on non-motorized travel time are anticipated to be minimal, but the final realignment must carefully consider safety concerns due to the trail's probable temporary proximity to the GWMP. Temporary full closures to safeguard trail users may be necessary at limited times during construction for the movement of vehicles and materials, estimated to last between minutes and hours.

[24] BikeArlington is a program of the Arlington County Department of Transportation.

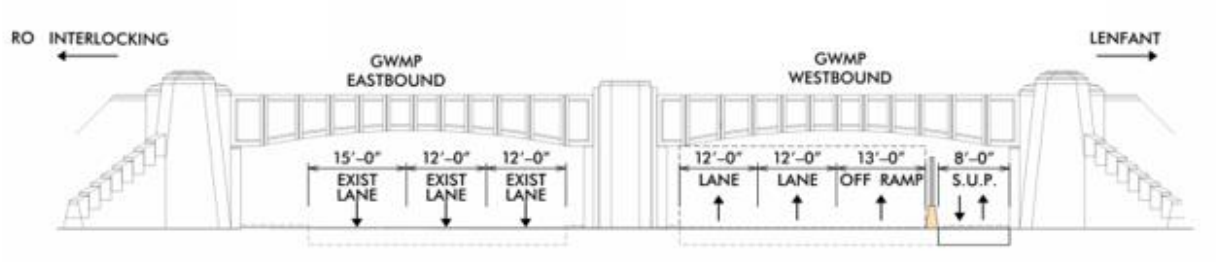
[25] BikeArlington. Undated. Counter Dashboard. Accessed from http://counters.bikearlington.com/. Accessed October 21, 2018.

622 **Figure 9-6** | Mount Vernon Trail Rerouting during Construction

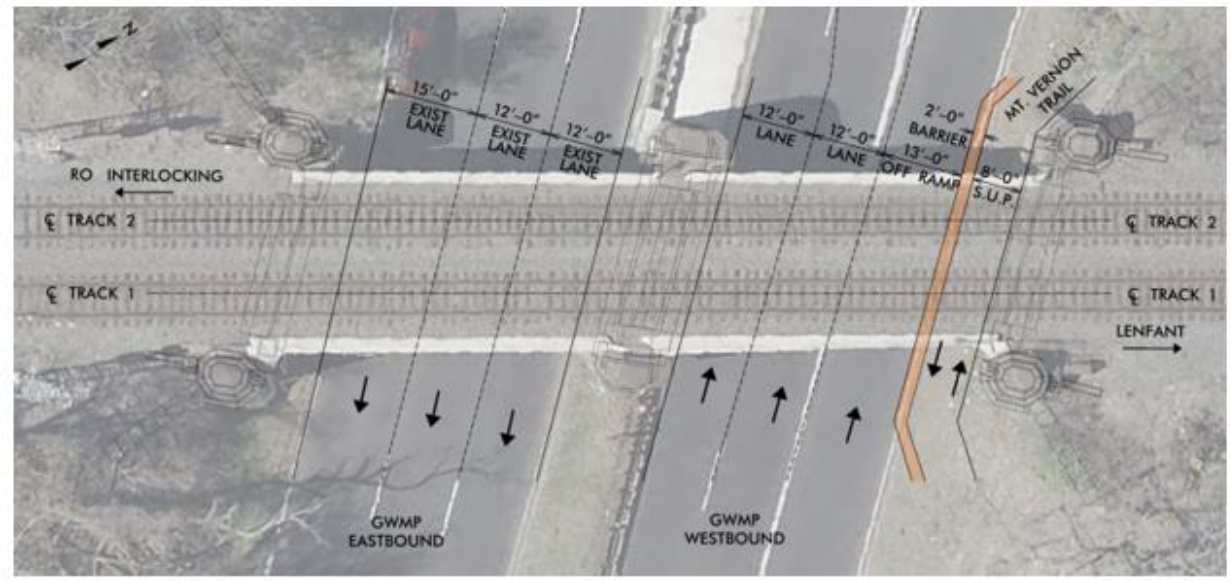


623

Figure 9-7 | Elevation and Plan View of Mount Vernon Trail Relocation during Construction



ELEVATION



PLAN

In addition, pedestrian use of walkways within East Potomac Park and along Maine Avenue SW near the construction of the new rail bridge likely would need to be closed and/or rerouted on a temporary basis during construction.

Action Alternative A would also require demolition of an elevated pedestrian structure in the District that crosses Maine Avenue SW near the Mandarin Oriental Hotel, just east of where the existing Long Bridge Corridor crosses Maine Avenue SW. The pedestrian structure would be replaced after construction with a comparable structure. Prior to the replacement of the pedestrian structure, pedestrians can be accommodated by a signed detour route using existing sidewalks.

Road closures on Maine Avenue SW, described below, would also impact sidewalks, which would have a moderate negative effect on pedestrians and bicyclists. In addition to one travel lane closure in the eastbound and westbound direction (not to occur concurrently), the sidewalk space would also be temporarily closed for durations lasting up to several weeks for construction activities on the same side

as the lane closure. Because of detour routes, bicyclists and pedestrians would face increased travel time and additional street crossings to complete their trips. Final MOT plans including detour routes would be determined in coordination with DDOT.

9.5.3.3. Action Alternative B

The extended duration of impacts to the MVT due to Action Alternative B (5 years and 2 months) and East Potomac Park (8 years and 1 month) would result in major adverse direct effects to the pedestrian and bicycle network. Other bicycle and pedestrian impacts would be similar to Action Alternative A.

9.5.4. Roadway Network

This section discusses the temporary effects of the Project to the roadway network under the No Action Alternative and Action Alternatives A and B.

9.5.4.1. No Action Alternative

Some roadways in the study area, such as I-395 and Maine Avenue SW, would operate under LOS F in the No Action Alternative based on the output of the Synchro and HCS analysis.[26] Construction associated with No Action Alternative projects listed in **Section 3.2.1, No Action Alternative** may result in impacts due to additional congestion throughout the study area.

9.5.4.2. Action Alternative A (Preferred Alternative)

Action Alternative A would have major temporary direct adverse impacts on the roadway network due to temporary impacts to I-395 and Maine Avenue SW during construction. I-395 and Maine Avenue would continue to operate under LOS F during peak periods and during construction. The existing roadway network within the Local Study Area contains several regionally significant arterial and collector roadways that carry large volumes of traffic each day. The high traffic volumes during peak commute times, which can extend for several hours, result in heavy congestion on these roadways causing major delays and poor and sometimes failing LOS in the existing condition. Construction activities may cause a reduction in traffic operations. These reductions in operations would vary depending on the day, time of day, duration of construction activity, and other factors.

Crystal Drive, Long Bridge Drive, and Boundary Channel Drive

Construction access and staging would have negligible to minor adverse direct effects along Crystal Drive, Long Bridge Drive, and Boundary Channel Drive due to increased heavy truck traffic at these locations with associated congestion impacts. Furthermore, there could be temporary short-term minutes-long flagged closures as trucks deliver and remove construction material from the staging access sites.

[26] Level of Service (LOS) is the transportation industry's standard of measurement of traffic congestion graded from A (light to normal traffic conditions) to F (very heavy congestion). The current conditions of I-395 and Maine Avenue SW are based on the HCS and Synchro analyses performed for the Project.

George Washington Memorial Parkway

Construction access and staging would result in moderate adverse direct effects on traffic operations on the GWMP due to traffic control measures, temporary lane closures, and temporary lane shifts on the GWMP for delivery of materials and equipment, and for construction activities for the abutments, piers, and superstructure while maintaining a safe work zone. The crossing of the GWMP by construction vehicles to bring in materials and equipment would be limited to nighttime hours and two lanes would be maintained at all times. Construction vehicles would enter and exit the GWMP via I-395.

I-395

Lane closures required for pier construction and staging would result in major adverse direct effects on traffic operations to I-395 In both the northbound (towards the District) and southbound (towards Virginia) directions, primarily on the ramps connecting the general-purpose travel lanes and the high-occupancy vehicle (HOV) lanes. The merge ramp from the northbound HOV lanes to northbound I-395 and the diverge ramp from southbound I-395 to the southbound HOV lanes would be affected by the construction and would require all-day mainline lane closures to accommodate shifted merge/diverge areas and ramp access.

It is important to note that even in the absence of construction activity and lane reductions, traffic congestion during peak hours on I-395 would be severe, with more vehicles attempting to use the travel lanes than capacity allows. However, conditions would deteriorate significantly with the removal of one lane in each direction, with twice the amount of traffic attempting to use I-395 compared to what the roadway can handle. Motorists would notice severe congestion, and periods of congestion would last significantly longer than they would as compared to the No Action Alternative conditions.

Ohio Drive SW

Construction access across Ohio Drive SW would result in negligible adverse direct effects on traffic operations due to the use of flagging at Ohio Drive SW at NPS Parking Lot C and along Ohio Drive SW at the ballfields and finger pier for approximately 4 years and 9 months. Construction of the new bridge over Ohio Drive SW and the Washington Channel would result in negligible adverse direct effects on traffic operations due to land shifts and the use of flagging. Construction activities would not block park entrances or limit travel on public roads.

Maine Avenue SW

Lane closures required for construction of the new railroad bridge over Maine Avenue SW would result in major adverse direct effects on traffic operations, which would be affected by multiple stages of construction. For the construction of new abutments or a center pier, one lane and the adjacent sidewalk would need to be closed in each direction. These one-lane closures would occur along Maine Avenue SW between the 14th Street Bridge on-ramp (westbound Maine Avenue) and the 14th Street Bridge off-ramp (eastbound Maine Avenue).

A combination of Synchro software and HCS was used to estimate the magnitude of impact caused by these closures. These tools were determined to be acceptable as operational issues are anticipated to be limited to the vicinity of construction and would not have serious adverse impacts on multimodal

operations. Traffic volumes were projected to 2025 levels, and the analysis was limited to one "critical hour"—the hour with the highest volumes between the AM and PM peak traffic hours. In the eastbound direction, this was found to be the AM hour, while in the westbound direction, this was found to be the PM hour.

In the eastbound direction, the analysis found that a one-lane closure affecting the peak period would have a serious adverse effect on traffic operations. Without the closure, under existing conditions, motorists would experience significant wait times because of traffic congestion. With the closure, these wait times would increase significantly and would most likely extend past the peak hour. Furthermore, the amount of traffic attempting to access the road would greatly exceed the road's capacity, indicating that queues would be longer than under No Action conditions and would most likely impact other nearby roads adjacent to Maine Avenue SW.

In the westbound direction, the analysis found that a one-lane closure affecting the peak period would have an adverse effect on traffic operations. Without the closure, motorists would still experience heavy congestion, as they do under existing conditions. However, the amount of traffic attempting to access the roadway would not exceed the road's capacity, indicating that while congestion would still be heavy, the roadway would not experience breakdown conditions. With a one-lane closure and the associated reduction in capacity, the amount of traffic attempting to access the facility would exceed capacity, leading to increased congestion, queues on other roadways and ramps, and longer wait times extending past the current peak period.

Occasionally, during off-peak overnight periods, both eastbound lanes on Maine Avenue SW would be closed, which would require the closure of the ramp from 14th Street NW. Drivers would be instructed to continue north on 14th Street NW and utilize alternate routes to reach their destination. Patrons visiting the restaurants, bars, and clubs in the redeveloping mixed-use areas along Maine Avenue SW generate traffic during off-peak overnight hours. While DDOT does not have traffic counts for the off-peak hours in those locations, it can reasonably be assumed that the overnight closures of these lanes would affect these travelers by requiring them to take potentially longer routes to reach their destinations. The use of alternative routes due to the temporary lane closures would result in higher off-peak traffic volumes on these routes.

Maryland Avenue SW

Alternative A will be designed with 14-foot track spacing underneath Maryland Avenue SW, resulting in no impact or effect on the Maryland Avenue overbuild. No roadway impacts are anticipated.

D Street SW

Lane closures at D Street SW between the 9th Street Expressway and 12th Street SW are anticipated to result in negligible to minor direct adverse effects on traffic operations. Brief intermittent lane closures would be needed to provide safe and secure delivery of construction material, and to guarantee secure track access.

9.5.4.3. Action Alternative B

Temporary impacts during construction under Action Alternative B would be similar to Action Alternative A, except that the extended duration of impacts to the GWMP (5 years and 2 months) would result in a major adverse direct effect, and the duration of impacts on Ohio Drive SW (8 years and 1 month) would result in a minor adverse direct effect.

9.5.5. Parking

This section discusses the temporary effects of the Project to parking under the No Action Alternative and Action Alternatives A and B.

9.5.5.1. No Action Alternative

Based on their current level of conceptual design, construction activities associated with the projects included in the No Action Alternative are not expected to temporarily adversely affect parking in the Local Study Area.

9.5.5.2. Action Alternative A (Preferred Alternative)

Action Alternative A would result in minor to major temporary direct adverse impacts on parking. The temporary closure of NPS Parking Lots B and C would result in the loss of 143 out of 247 spaces for approximately 4 years and 9 months. Closure of the NPS parking lots would be considered a moderate impact because while it would substantially reduce the supply of parking at that location, the lots are currently under capacity except during peak season (during the National Cherry Blossom Festival) and special events. In addition, other surface parking in the area would still be available. Access to the construction area and finger pier from Ohio Drive SW on the Washington Channel side of East Potomac Park would require temporary removal of several on-street parking spaces.

The temporary closure of the surface parking at the Washington Marina for approximately 4 years and 1 month would be considered a major impact because it constitutes the entirety of the marina's parking. Approximately 15 on-street, metered, public parking spaces on Maiden Lane would also be temporarily lost during the 4 years and 1 month of construction in that location, resulting in a minor adverse direct impact.

9.5.5.3. Action Alternative B

Action Alternative B would have similar effects on parking to Action Alternative A, except that the adverse effects due to loss of parking at NPS Parking Lots B and C would be major due to the extended duration during which the surface parking would be unavailable to the public (8 years and 1 month).

9.5.6. Aviation

This section discusses the temporary effects of the Project to aviation under the No Action Alternative and Action Alternatives A and B.

9.5.6.1. No Action Alternative

The No Action Alternative would have no adverse temporary impacts on aviation. Under the No Action Alternative, there would be no construction and therefore no impacts to aviation in the Local Study Area.

9.5.6.2. Action Alternative A (Preferred Alternative)

No temporary effects on aviation are anticipated under the Action Alternative A. The maximum permitted obstruction height during construction is 81 feet above mean sea level. All cranes and other tall equipment would be below that height.

9.5.6.3. Action Alternative B

The temporary effects on aviation under Action Alternative B would be identical to those under Action Alternative A.

9.5.7. Navigation

This section discusses the temporary effects of the Project to navigation under the No Action Alternative and Action Alternatives A and B.

9.5.7.1. No Action Alternative

The No Action Alternative would have no adverse temporary impacts on navigation. Under the No Action Alternative, there would be no construction over the Potomac River and therefore no changes to the railroad infrastructure that would affect navigation in the river.

9.5.7.2. Action Alternative A (Preferred Alternative)

Action Alternative A would have minor temporary direct adverse impacts on navigation on the Potomac River due to periodic closures of the main navigation channel and adjacent spans because of construction activities. Mariners would follow work zone safety guidelines established by the USCG and be advised of closures. The contractor would be required to sign the closure and coordinate via radio with approaching vessels. Closures or stoppages in the channel may require the contractor to provide flagmen to stop traffic. The amount of closures and anticipated times for closures would be conveyed to mariners using traditional methods, such as radio, and social media. It is anticipated that construction activities over the river would last approximately 3 years and 4 months.

9.5.7.3. Action Alternative B

Action Alternative B would have moderate temporary direct adverse impacts on navigation on the Potomac River, as the types of effects of Action Alternative B would be similar to the effects of Action Alternative A, but they would be longer in duration due to the demolition and replacement of the existing two-track Long Bridge (approximately 8 years and 1 month).

9.6. Avoidance, Minimization, and Mitigation

This section describes proposed mitigation for the impacts to vehicular, pedestrian, bicycle, marine, transit, and railroad modes, as appropriate. Proposed mitigation measures would address temporary

impacts, such as closure or reduction in capacity to segments of the transportation network, modifications to signal systems, or other operational changes. Mitigation has not been identified for the No Action Alternative, as the projects under that alternative are being undertaken and designed by a number of different jurisdictions at different points in time. Thus, this section only discusses potential mitigation for Action Alternatives A and B.

9.6.1. Railroad Infrastructure and Operations

Beneficial permanent effects on railroad infrastructure and operations are the intended outcome of the Project, by providing additional capacity for railroad service.

Temporary effects on railroad infrastructure are due to the need to complete construction in the vicinity of existing freight and passenger railroad operations and would be primarily limited to the duration of construction. As described in **Section 9.2, Temporary Effects** CSXT would determine construction staging and coordinate work with Amtrak and VRE. CSXT or contractors working under the direction of CSXT would perform the construction work. Construction staging would be designed to maintain two tracks of railroad service operational during the entire construction period, except for some limited track outages for construction activities. FRA and DDOT have developed construction staging scenarios, as described in **Chapter 3.5.1, Alternatives, Construction Methods and Activities**, to maintain two-track railroad service to the extent feasible and minimize impacts to railroad operations. In addition, all efforts would be made to limit disruptions to two-track service to nights and weekends.

9.6.2. Transit

This section describes proposed avoidance, minimization, and mitigation measures for impacts to VRE, Metrorail, buses, and the pedestrian and bicycle network.

9.6.2.1. VRE

As with railroad service described above, the need to complete construction in the vicinity of existing railroad operations would cause temporary effects to VRE service. As noted previously, FRA and DDOT have developed construction staging scenarios to maintain two-track railroad service to the extent feasible. In addition, all efforts would be made to limit disruptions to two-track service to nights and weekends, where it would have fewer, if any, effects on VRE commuter rail service, which runs primarily during the peak periods in the peak direction of travel.

9.6.2.2. WMATA Metrorail Passenger Service

Temporary impacts to Metrorail Yellow Line service are unavoidable, as construction of a new bridge over the tunnel portal would require short-term interruptions in service. To the extent practicable, contractors would perform work that requires interruption in service during nights and weekends, when Metrorail service is less frequent. The contractor would also coordinate work with WMATA to align activities requiring interruptions in service with any planned Metrorail Yellow Line work also requiring service interruptions, to the extent practicable.

9.6.2.3. Local and Commuter Bus

For bus routes that operate on roadways that may experience delays due to construction, operators may consider temporary detours or rerouting to maintain reliability. Depending on the duration of the

impacts, schedule revisions could reduce the effect of additional congestion on transit passengers. The project sponsor for final design and construction, the Virginia Department of Rail and Public Transportation (DRPT), would require the contractor to coordinate with transit operators to help the operators determine the appropriate steps to take.

9.6.3. Pedestrian and Bicycle Network

DRPT would require the contractor to construct the temporary MVT, and install wayfinding signage, as appropriate, to redirect pedestrian and bicycle traffic during temporary closures due to construction. In addition, temporary crossings of trails for materials delivery would be scheduled during evening hours to the extent practicable, to minimize impacts to trail users.

DRPT would fund construction of a new bike-pedestrian bridge as part of both Action Alternatives as mitigation under Section 4(f) of the U.S. Department of Transportation Act of 1966. This mitigation would improve connectivity between parks and within the regional trail network. See **Chapter 24, Draft Section 4(f) Evaluation**, for a description of Section 4(f) impacts and **Chapter 22, Bike-Pedestrian Crossing**, for a description of the impacts of the new bike-pedestrian bridge.

Washington Marina Pedestrian Bridge Reconstruction

During construction, while the pedestrian bridge is not available, pedestrians would need to walk a longer distance between Maryland Avenue SW and the Washington Marina. Currently, the walk from the traffic circle to the marina parking lot takes 5 minutes using the pedestrian bridge. During construction, walking travel time would increase to about 13 minutes using the street network. Wayfinding signage would be considered as mitigation during the time that the pedestrian bridge is unavailable.

9.6.4. Roadway Network

Construction of Action Alternatives A or B would require typical maintenance of traffic measures such as lane and shoulder closures, lane shifts, potential detours and a host of temporary traffic mitigation strategies to minimize the impacts to the traveling public. The implementation of these measures and strategies would be necessary to construct the project safely while allowing for reasonable production of construction operations.

DRPT would require the final designer or the contractor to develop, with approval by DDOT and NPS, a project-wide Traffic Management Plan (TMP) that includes temporary traffic control plans, the analysis of traffic operations, and a public outreach campaign. The development of the TMP would be completed following the Final Environmental Impact Statement as the design, construction phasing, sequencing and scheduling details would be more defined. During development of the TMP, additional coordination with the Project stakeholders and public would inform the specific measures proposed in the plan. The sections below describe potential mitigation measures for specific locations within the Local Study Area.

Crystal Drive, Long Bridge Drive, and Boundary Channel Drive

Because impacts to access at this location are anticipated to be intermittent, no major mitigation strategies have been developed. However, reducing closures to nights or weekends would reduce the impact on local motorists.

George Washington Memorial Parkway

DRPT would require the contractor to develop maintenance of traffic (MOT) plans to ensure continued through and ramp access along the GWMP as the bridges, embankments, and retaining walls are constructed. Lane closures would be limited to off-peak hours to reduce the impact to motorists to the extent practicable. The crossing of the GWMP by construction vehicles to bring in materials and equipment would be limited to nighttime hours and two lanes would be maintained at all times. Variable message signs (VMS) and detour route signage would be placed in advance of the affected area to increase motorist awareness of potential delays and to offer alternative routes. DRPT and contractor would develop MOT plans with approval by NPS.

I-395

Mainline lane closures on I-395 would have major adverse impacts, especially considering that they would last for extended periods of time and would impact peak periods. Extensive MOT plans and the TMP program described above would be critical for preventing facility breakdown if closures do not only occur overnight. These plans would need to:

- Develop strategies for driver diversion;
- Incentivize the use of non-motorized modes, such as Metrorail Yellow Line or bus service;
- Identify and clearly sign potential detour routes; and
- Develop driver-awareness campaigns regarding probable severe congestion for the duration of the semi-permanent impact.

VMS can offer operational relief to traffic in the area by warning drivers well in advance of expected congestion and alternative routes to downtown Washington, DC. Signs would be placed well in advance to alert motorists to the new traffic pattern during construction to prevent motorist confusion at the point where operational changes are noticed.

Ohio Drive SW

Impacts to access at location are anticipated to be intermittent, no major mitigation strategies have been developed. However, during peak usage (such as during the National Cherry Blossom Festival), it may be advisable to encourage use of other routes through detour route signage utilizing access from I-395 and from Independence Avenue near the 14th Street Bridge. DRPT may provide temporary access to other surface parking or opening additional on-street parking at accessible areas.

Maine Avenue SW

One-lane closures on eastbound and westbound Maine Avenue SW are anticipated to have major effects on through traffic and traffic destined for the 14th Street Bridge. For this reason, a TMP program similar to the one described for I-395 would be critical to mitigation traffic at this location.

During temporary closure of the ramp from 14th Street, the project would need to employ portable VMS to alert drivers to detour routes. Because these closures are anticipated to be limited to overnight hours, VMS communication would be more effective than detour signage.

D Street SW

Because only brief and intermittent change of access is anticipated at this location, no mitigation strategies would be required.

9.6.5. Parking

This section describes proposed avoidance, minimization, and mitigation measures for impacts to parking.

Permanent and temporary loss of parking due to the design of the new track structures and due to construction staging is not avoidable. Potential replacement of permanent parking would be evaluated as project design progresses further.

National Park Service Lot C

During final design, DRPT would coordinate with NPS to identify temporary parking or parking shuttles during construction as potential mitigation for the loss of parking spaces at NPS Parking Lot C, especially during periods of heavy usage, such as during the National Cherry Blossom Festival. Temporary parking locations would be evaluated for ease of access to East Potomac Park facilities and special event locations.

Washington Marina Parking Lot

Depending on the ultimate number of surface parking spaces that would be removed during construction, alternate parking accommodations would be evaluated to consider the use of public and private parking facilities to mitigate the temporary loss of parking. Remote parking accommodations could be considered while encouraging patrons to utilize other options such as the Southwest Shuttle.

9.6.6. Aviation

No permanent or temporary effects on aviation are anticipated from any of the alternatives, so no mitigation has been identified.

9.6.7. Navigation

While there would be no permanent impacts to navigation, temporary impacts during construction would be unavoidable. Construction contractors will follow all USCG requirements for safeguarding river traffic during construction and would attempt to minimize disruptions, especially during times of heavy river traffic, such as summer holidays. Mitigation may include using flaggers to stop vessel traffic during closures of the channel. The amount of and anticipated times for closures would be conveyed to mariners through posting in the USCG's weekly notice to mariners, local radio/news sites, and social media.