LONG BRIDGE PROJECT
Connecting North and South Through our Nation's Capital

Appendix B1:

Alternatives Development Report

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Long Bridge Project

Environmental Impact Statement (EIS)

Alternatives Development Report

June 19, 2018

District Department of Transportation

U.S. Department of Transportation
Federal Railroad Administration

Long Bridge Project EIS

Draft Alternatives Development Report

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1.0 Introduction

The Federal Railroad Administration (FRA), jointly with the District Department of Transportation (DDOT), is preparing an Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act (NEPA) for the Long Bridge Project (Project).[1] The Project consists of proposed improvements to Long Bridge and related railroad infrastructure located between the RO Interlocking near Long Bridge Park in Arlington, Virginia, and the L'Enfant (LE) Interlocking near 10th Street SW in the District (collectively, the Long Bridge Corridor, shown in **Figure 1-1**).[2] This report describes the alternatives development process to identify alternatives for analysis in the Draft EIS (DEIS).

1.1. NEPA Requirements for Alternatives Development

Council on Environmental Quality (CEQ) regulations for implementing NEPA require that Federal agencies "use the NEPA process to identify and assess the reasonable alternatives to proposed action that will avoid or minimize adverse effects of these actions upon the quality of the human environment."[3] The regulations call for the EIS to "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated."[4]

Although the No Action Alternative was not formally evaluated in this report, analysis of a No Action Alternative is required pursuant to CEQ regulations for implementing NEPA.[5] FRA and DDOT will utilize the No Action Alternative to serve as a baseline for comparing the impact evaluation to the alternatives studied in the DEIS. The No Action Alternative is described in **Section 6.2**.

1.2. Purpose of this Report

This Alternatives Development Report documents the development of the Project concepts and the concept screening process that identified the Action Alternatives for evaluation in the DEIS. FRA and DDOT identified a broad and reasonable range of concepts, in addition to a No Action Alternative. They examined the results of a pre-NEPA two-phase feasibility study, considered input from the agency and public outreach process, and coordinated with railroad owners and operators (CSX Transportation [CSXT], Amtrak, and Virginia Railway Express [VRE]). FRA and DDOT screened these concepts in a two-level process using criteria and metrics based on the Project's Purpose and Need statement, in addition to feasibility, to identify the Action Alternatives for evaluation in the DEIS.

[1] 42 USC 4321
[2] Note that "RO" is the proper name of this interlocking. It is not an acronym.
[3] 40 CFR 1500.2
[4] 40 CFR 1502.14
[5] 40 CFR 1502.14

Figure 1-1 | Long Bridge Corridor Map

1.3. Project Background

The existing Long Bridge is a two-track railroad bridge, constructed in 1904, that is owned and operated by CSXT, a Class I freight railroad. The Long Bridge Corridor serves freight (CSXT), intercity passenger (Amtrak), and commuter rail (VRE). Maryland Area Regional Commuter (MARC) service, which currently terminates at Washington Union Station (WUS) in the District, plans to expand across the Long Bridge to L'Enfant Plaza and Northern Virginia.[6] Norfolk Southern (NS), also a Class I freight railroad, has trackage rights on the Long Bridge, but does not currently exercise those rights.

Passenger, commuter, and freight railroad services play an important part in supporting the economic growth and vitality of the DC region. The Long Bridge is a key element of the regional commuter railroad network and national railroad system for intra- and intercity passenger rail service as well as freight railroad service along the Eastern Seaboard of the United States, linking the Northeast Corridor (NEC) and Southeast High-Speed Rail Corridor (SEHSR). Projections indicate that freight and passenger growth will exceed the capacity of the current two-track bridge across the Potomac River. Future demand will require new options and expanded infrastructure to avoid interrupting the movement of goods and passengers across the Potomac River and to provide service to economic centers north and south of Long Bridge.

1.3.1. Phase I and II Studies

In 2011, DDOT received a High Speed Intercity Passenger Rail grant from the FRA to complete a two-phase feasibility and planning study of the rehabilitation or replacement of Long Bridge. The Phase I study, completed in 2015 before initiation of the EIS for the Project, considered eight concepts to address the deficiencies of the Long Bridge Corridor. The concepts included the option of keeping the two-track capacity of the Corridor, or expanding capacity to four tracks. Phase I included three open-house public meetings (on November 13, 2012; June 6, 2013; and December 5, 2013) to introduce the feasibility study and communicate initial results and concepts. The Phase I study did not make recommendations related to specific concepts. Therefore, the concepts identified in the Phase I study were carried over to the Phase II study.

Phase II of the Long Bridge Study included development of a long-range service plan based on future demand in the corridor, further refinement of engineering concepts, and development of draft evaluation criteria to identify and screen concepts carried forward for analysis in the EIS process. FRA and DDOT held a public meeting on February 10, 2016, to update the public on the Phase II study and to receive feedback to inform the concept development and screening process. The Phase II Study expanded the eight concepts evaluated during the Phase I Study to eighteen by adding concepts that would expand the Corridor to three or five (or more) tracks, and by adding a concept that would accommodate additional capacity by constructing a new railroad corridor.

[6] Maryland Transit Administration. September 2013. MARC Growth and Investment Plan Update 2013 to 2050. Accessed from https://mta.maryland.gov/sites/default/files/mgip_update_2013-09-13.pdf. Accessed May 13, 2018.

1.3.2. Initiation of the NEPA Process

On August 26, 2016, FRA and DDOT initiated the formal NEPA process and issued a Notice of Intent (NOI) in the Federal Register to prepare an EIS. FRA and DDOT held public and agency Scoping meetings on September 14, 2016, to receive feedback on the Project's draft Purpose and Need statement, the concepts to be screened, and the draft screening criteria. FRA and DDOT presented 18 concepts at the Scoping meetings, including the No Action Alternative. Following the Scoping, FRA and DDOT expanded the concepts from 18 to 19 by further clarifying that the "new corridor" concept could provide needed capacity either by retaining the existing corridor and constructing a new corridor, or by removing the existing corridor and constructing an entirely new corridor.

1.4. Concept Screening Process

After initiation of the EIS and the Project Scoping process in Fall 2016, FRA and DDOT conducted a two-level screening process to identify a reasonable range of alternatives for further refinement and evaluation in the DEIS.

The first level of screening assessed the concepts developed and retained through the Phase I and II studies and introduced during Scoping based on their ability to meet the Project Purpose and Need. FRA and DDOT presented the findings of the Level 1 Concept Screening process to the public and agencies on May 16, 2017.

The second level of screening evaluated the retained concepts first without and then with alignment options based on additional Purpose and Need metrics, as well as feasibility metrics. FRA and DDOT presented the Level 2 Concept Screening process and draft alternatives to be evaluated in the DEIS to the public and agencies on December 14, 2017.

Section 3.3 of this report describes the details of the two-level screening process. The DEIS will evaluate the alignment options that passed the two-step Level 2 Concept Screening as Action Alternatives.

1.5. Organization of this Report

This report consists of the following sections:

- **Section 1.0: Introduction** describes the project background and NEPA requirements related to alternatives development, provides a high-level summary of the concept screening process, and describes the purpose of the report.
- **Section 2.0: Purpose and Need** describes the reason(s) the Project is being proposed and what the Project expects to achieve.
- **Section 3.0: Alternatives Development Process** explains the pre-NEPA Phase I and II feasibility studies and how they led to the concepts presented during Scoping, describes the results of the NEPA Scoping process, and summarizes the two-step concept screening process used to identify the Action Alternatives to be evaluated in the DEIS.

- **Section 4.0: Level 1 Concept Screening** describes the first level in the concept screening process, including a detailed explanation of the criteria and metrics used, followed by the analysis of each concept. This section also describes the feedback received from agencies and the public.

- **Section 5.0: Level 2 Concept Screening** describes the process for the second level in the concept screening process, including a detailed explanation of the criteria and metrics used, followed by the analysis of each concept. This section also describes the feedback received from agencies and the public.

- **Section 6.0: Opportunities for a Bike-Pedestrian Crossing** describes how FRA and DDOT are continuing to explore the potential opportunity to accommodate a river crossing with connections to the existing pedestrian and bicycle network.

- **Section 7.0: Alternatives to Be Evaluated in the DEIS** describes the two Action Alternatives that resulted from the alternatives development process, as well as the No Action Alternative.

- **Section 8.0: Conclusion and Next Steps** describes the next steps in the NEPA process.

2.0 Purpose and Need

The purpose of the Project is to provide additional long-term railroad capacity and to improve the reliability of railroad service through the Long Bridge Corridor. Currently, there is insufficient capacity, resiliency, and redundancy to accommodate the projected demand in future railroad services. The Project is needed to address these issues and to ensure the Long Bridge Corridor continues to serve as a critical link connecting the local, regional, and national transportation network.

2.1. Why is the Project needed?

Insufficient Railroad Capacity. The Long Bridge Corridor must accommodate combined commuter, intercity passenger, and freight railroad services with minimal operational delays now and in the future. By the forecast year of 2040, passenger and freight train volumes are expected to increase by 150 percent.[7] Capacity constraints at critical infrastructure chokepoints, such as the current Long Bridge, limit service expansion as well as the ability to recover from service delays, making it difficult to accommodate growth in ridership and offer reliable service. Without additional capacity, the increased train volumes forecasted for 2040 and beyond would strain the railroad network through the Long Bridge Corridor.

To meet future demand, the railroad network will need to be able to maintain schedules under normal operations for all types of train travel, and provide flexibility to recover during periods of higher demand and service delays. Based on long-term adopted regional, state, and local transportation plans, the Long Bridge Corridor will continue to be shared by commuter, intercity passenger, and freight railroad services, each of which has different operating characteristics that may conflict (for example, commuter railroads generally make intra-corridor station stops, while intercity railroads generally do not). Under scheduled conditions, each train occupies an assigned time slot and does not interfere with other trains.[8] If a train is delayed and departs or arrives outside its time slot, however, it could delay other trains. Under those conditions, the capacity of the corridor is governed by the slowest train. The ability to recover from service delays, and to limit conflicts, is primarily achieved by providing tracks and crossovers that allow trains to pass each other.

Continued Network Connectivity. The Long Bridge Corridor plays an essential role in the Washington metropolitan region and the East Coast transportation network by providing passenger and freight services. The Long Bridge Corridor connects intercity passenger trains from the Northeast Corridor to major transportation points in the South. The Long Bridge Corridor also connects the Virginia suburbs to established employment centers in the downtown of the District and Crystal City in Arlington, Virginia. CSXT uses the Long Bridge Corridor to connect goods and customers using freight and intermodal facilities through CSXT's network, including Philadelphia, Pennsylvania; Baltimore and Cumberland, Maryland; Newport News, Virginia; and Rocky Mount, North Carolina. Consistent with features shown in adopted regional, state, and local transportation plans, and with railroad operator plans, the Long

[7] Expected train volumes in 2040 were established based on input from CSXT, VRE, Amtrak, NS, and MARC, as well as DRPT's DC to Richmond Southeast High Speed Rail (DC2RVA) study.
[8] "Time slot" is defined as the time and location in the corridor a train is assigned in a timetable. Time slots vary based on the operating characteristics of a train, including whether it makes intermediate stops within the corridor.

Bridge Corridor must facilitate the movement of people and goods, including connections to other parts of the transportation network.

Currently the Long Bridge is a chokepoint because of the available number of railroad tracks, which limits the ability both to facilitate planned high-performance passenger railroad service between the population centers and to provide freight service along the Eastern Seaboard. The existing commuter rail systems (MARC and VRE) both terminate all trains at WUS, which limits the ability to provide cross-jurisdictional trips for passengers (Virginia to Maryland and vice versa).

For commuter railroad passengers, network connectivity also includes access to and from stations within the corridor and transfers to other transportation services such as Metrorail at transportation hubs. VRE's two most utilized stations are just outside the Long Bridge Corridor at Crystal City and L'Enfant Plaza. More than 89 percent of VRE customers transfer to their final destination via Metrorail, bus, biking, or walking.[9]

Insufficient Railroad Resiliency and Redundancy. Resiliency and redundancy are important factors in maintaining normal operations during planned and unplanned events. Resiliency in a railroad context is defined as the ability of a railroad network to resume normal operations and minimize cascading delays following an unplanned event. System redundancy is the duplication of critical components or functions of the railroad system to increase the reliability of the railroad corridor and ensure that it is resilient to changing circumstances. Redundancy enables the railroad system to continue to function during unanticipated outages, catastrophic incidents, or weather-related events, as well as during planned maintenance.

Currently, the railroad network lacks resiliency. The current two-track configuration of the Long Bridge is a physical bottleneck that prevents efficient train flow to the existing three-track and planned four-track sections located north and south of the Long Bridge. Substantial delays to intercity train service occur in the corridor daily, particularly between the District and Alexandria, Virginia. CSXT freight operations are impacted by the current volume of commuter and intercity passenger trains, which limits their ability to operate during peak passenger periods and hinders the flow of their national network. Freight trains are frequently stopped to allow passenger railroad service to pass through the Corridor, affecting the efficiency and reliability of freight movements.

Additionally, the railroad network lacks redundancy. Due to the narrow space between the existing tracks, both tracks need to be closed during construction or maintenance for safety reasons. When both tracks are closed, service across Long Bridge is interrupted, and VRE and Amtrak are not able to provide train service from Virginia across the Potomac River to their primary destinations of L'Enfant Plaza or WUS and vice versa. Under those conditions, CSXT trains would likely be redirected approximately 800 miles on CSXT tracks via Lynchburg, Virginia, and Huntington, Clarksburg, and Harpers Ferry, West Virginia (**Figure 2-2**), substantially increasing service cost and time for CSXT. Harpers Ferry is the next closest freight railroad crossing of the Potomac River.

[9] VRE 2017 Master Agreement Survey, February 22, 2017. Accessed from https://www.vre.org/vre/assets/File/2017%20Customer%20Survey%20Results.pdf. Accessed April 11, 2018.

In addition, incorporating redundant and resilient railroad facilities provides the necessary back-up resources to maintain corridor services and minimize service disruptions during a wide range of planned and unplanned maintenance and upgrades to the system. Providing resiliency and redundancy will better support the reliability of the Long Bridge Corridor and help ensure that it is adaptable to changing circumstances.

2.2. Will the Long Bridge consider bicycle and pedestrian access?

Although not part of the Project's Purpose and Need, the Project will explore the potential opportunity to accommodate connections that follow the trajectory of the Long Bridge Corridor to the pedestrian and bicycle network. The feasibility of this opportunity will be assessed as the Project progresses, and will consider whether a path can be designed to be consistent with railroad operator plans and pursuant to railroad safety practices. Future efforts to accommodate connections to the pedestrian and bicycle network may be advanced as part of the Project, or as part of a separate project(s) sponsored by independent entities.

3.0 Alternatives Development Process

The alternatives development process for the Project commenced before the NOI to develop an EIS with the Phase I Study, completed in Winter 2015. This study developed eight concepts to meet existing and future multimodal capacity needs. The Phase II Study commenced in Fall 2015 and included additional work to prepare for the NEPA process. During Phase II, FRA and DDOT developed additional concepts and carried these concepts forward into the NEPA Scoping process. During the NEPA Scoping period, FRA and DDOT added one additional concept as suggested by public commenters. This process resulted in a total of 19 concepts (including the No Action Alternative) informed by the public and cooperating and participating agencies' input.

Following the development of these concepts, FRA and DDOT screened the concepts in two phases. In the first phase, the Level 1 Concept Screening, FRA and DDOT evaluated concepts using metrics associated with the Purpose and Need for the Project. In the second phase, the Level 2 Concept Screening, FRA and DDOT evaluated concepts using metrics associated with feasibility as well as additional Purpose and Need metrics that were developed based on comments received on the Level 1 Concept Screening process. FRA and DDOT will carry forward the concepts that passed the Level 2 Concept Screening as Action Alternatives in the DEIS.

3.1. Pre-NEPA Alternatives Development (Phases I and II)

The Phase I study launched in August 2012. Public, agency, and stakeholder engagement occurred throughout the study, as explained in greater detail below. The study included analysis of the structural integrity of the existing Long Bridge, multimodal connectivity, opportunities for operational improvements, and long-term multimodal capacity improvements. The study included the development of conceptual engineering plans to assess different bridge and tunnel layout configurations and the number of tracks needed for future operations of all railroad uses.

The Phase I study evaluated eight concepts:

- **Alternative 1**: No Build[10]
- **Alternative 2**: Two-track bridge (rehabilitation or reconstruction of existing system)
- **Alternative 3**: Four-track bridge
- **Alternative 4**: Four-track tunnels
- **Alternative 5**: Four-track bridge with bike-pedestrian connection
- **Alternative 6**: Four-track bridge with two streetcar lanes and a bike-pedestrian connection
- **Alternative 7**: Four-track bridge with two shared streetcar and general-purpose automobile lanes and a bike-pedestrian connection
- **Alternative 8**: Four-track bridge with two shared streetcar and general-purpose automobile lanes, two general-purpose automobile lanes, and a bike-pedestrian connection

[10] Phases I and II used the term "No Build." The NEPA term "No Action" is used for the EIS.

For each of these concepts, the study assessed four bridge types: tied arch, through arch, deck arch, and extradose (cable-stayed). Bridge elevations and cross-sections were developed for each type, taking into account constructability and construction impact, long-term maintenance, adaptability, and aesthetics. The transportation analysis conducted for each alternative included freight and passenger railroad operations, pedestrian and bicycle use of the trail network, transit ridership, and automobile usage.

Public engagement during Phase I included development of the first version of the Project website and three public meetings conducted in an open-house format, held in November 2012, June 2013, and December 2013, shown below in **Table 3-1**. DDOT held an additional public meeting in February 2016 prior to the initiation of the EIS.

Table 3-1 | Summary of Pre-NEPA Public Outreach

Meeting Date	Location	# Of Attendees	Meeting Topics
November 13, 2012 4:00 to 6:00 PM	Westminster Presbyterian Church 400 I Street SW Washington, DC	29	• Feasibility study introduction and overview • Request for input and issues of interest
June 6, 2013 4:00 to 7:00 PM	Westminster Presbyterian Church 400 I Street SW Washington, DC	23	• Communicate initial concepts and receive feedback • Communicate possible footprint for a new bridge
December 5, 2013 4:00 to 7:00 PM	St. Augustine's Episcopal Church 600 M Street SW Washington, DC	26	• Present results of analysis and demand forecasting • Communicate next steps and solicit comments on concepts
February 10, 2016 4:00 to 7:00 PM	L'Enfant Plaza Club Room 470 L'Enfant Plaza SW Washington, DC	42	• Update public on Project status

The Phase I study did not make recommendations related to specific concepts. Therefore, the concepts identified in the Phase I study were carried over to the Phase II study. The Phase II study prepared the Project for the NEPA phase by developing the Long-Range Service Plan, the Draft Purpose and Need statement, additional concepts, and a preliminary environmental inventory. This information led to the concepts that DDOT and FRA presented to the public and agencies during the Scoping process, described below.

3.2. Scoping Process

Following the publication of an NOI to initiate an EIS for the Long Bridge Project on August 26, 2016, FRA and DDOT initiated a Scoping process for the Project lasting from August 26, 2016, to October 14, 2016, in accordance with NEPA, CEQ NEPA Implementing Regulations, and FRA's Procedures for Considering Environmental Impacts. The Scoping process engaged the public (for example, residents, elected

officials, and key stakeholders) as well as local, state, and Federal agencies. The purpose of the Scoping process was to provide the public and agencies an opportunity to inform the range of the alternatives for consideration in the DEIS, to gather input from the public and the agencies to inform the Purpose and Need of the Project, and to guide the development of the EIS by determining and clarifying issues that are relevant to the scope of the study.

During the Scoping process, FRA and DDOT used social media posts, contact through electronic and traditional mailing lists, the Project website, newspaper advertisements, and press releases to engage the public and local, state, and Federal agencies.

The Scoping process included the following major elements:

- Federal Register NOI;
- Scoping Initiation Letters to potential cooperating and participating agencies;[11]
- EIS Scoping Interagency Coordination Meeting (ICM);
- Public Scoping Meeting;
- Scoping Comment Period; and
- Project Scoping Report.

FRA and DDOT held the Public Scoping Meeting for the Project on September 14, 2016. FRA and DDOT presented information to attendees in an open-house format with display boards providing information on the concepts developed during Phases I and II, as well as existing conditions, environmental considerations, EIS milestones, and related studies and projects that FRA and DDOT considered while developing concepts. FRA and DDOT invited attendees to discuss the concepts and the scope of the Project with the Project team, or submit written comments and questions for consideration. FRA and DDOT also invited commenters to submit comments by mail, electronically, or through the Project website.

During the Scoping process, FRA and DDOT invited agencies and the public to comment on 18 preliminary concepts, including the No Build Alternative (the terminology changed to the No Action Alternative following the Scoping process). These concepts included those considered during Phase I, as well as three- and five-track concepts, detailed in **Table 3-2**. Based on comments received during Scoping, Concept 9, New Location, became two concepts: one concept would construct new railroad capacity in a new corridor but retain or replace the existing bridge, and the other concept would build

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[11] *Cooperating agency* means any Federal agency other than a lead agency that has jurisdiction by law or special expertise with respect to any environmental impact involved in a proposal (or a reasonable alternative) for legislation or other major Federal action significantly affecting the quality of the human environment. The selection and responsibilities of a cooperating agency are described in 40 CFR 1501.6. A State or local agency of similar qualifications or, when the effects are on a reservation, an Indian Tribe may by agreement with the lead agency become a cooperating agency.

A *participating agency* as defined in 23 USC 139(d) is any Federal and non-Federal agency that may have an interest in the project. Any Federal agency that is invited by the lead agency to participate in the environmental review process for a project shall be designated as a participating agency by the lead agency unless the invited agency informs the lead agency, in writing, by the deadline specified in the invitation that the invited agency:

A. has no jurisdiction or authority with respect to the project;
B. has no expertise or information relevant to the project; and does not intend to submit comments on the project.

new railroad capacity in a new corridor and remove the existing bridge. At the end of the Scoping process, FRA and DDOT determined 19 concepts, including the No Build (now No Action), would advance to the Level 1 Concept Screening.

During the Scoping period, FRA and DDOT received 21 comment submissions from agencies and 80 comment submissions from the public. The comments were summarized in the Long Bridge Project EIS Scoping Report, available on the Project website (www.longbridgeproject.com). Most public comments focused on the alternatives that should be considered in the DEIS. FRA and DDOT took comments received into consideration throughout the alternatives development process. As described in the next section, comments received during Scoping influenced the metrics used to screen concepts in the Level 1 and Level 2 concept screening processes, and also influenced the concepts to be screened as described above.

Table 3-2 | Preliminary Concepts Presented During Scoping

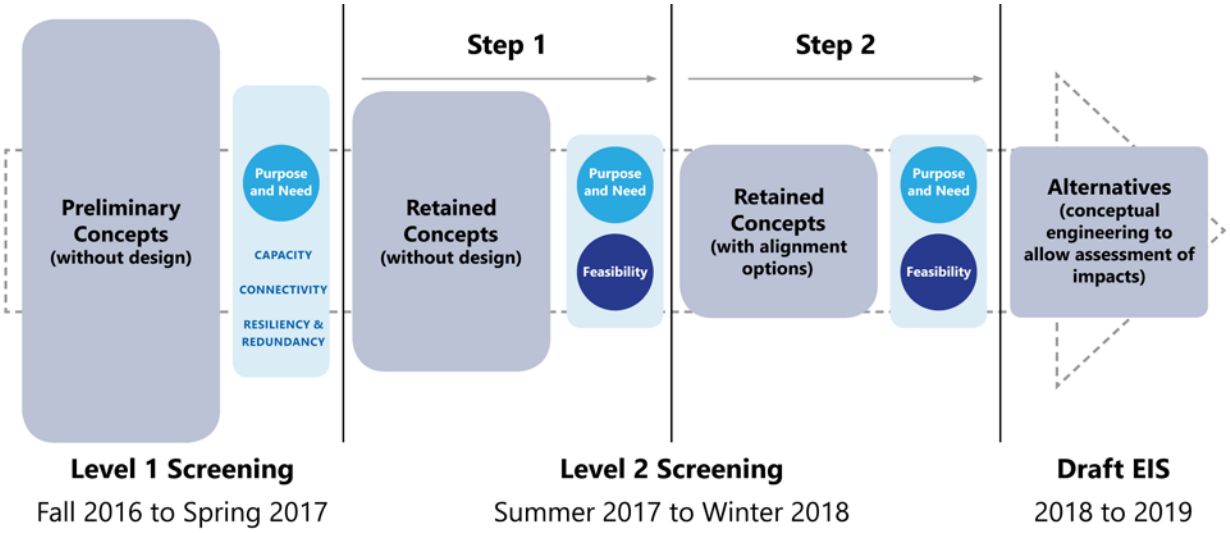
Concept		Description
1	**No Action**[12]	Option against which the Action Alternatives will be assessed in the EIS. This concept was not subject to screening.
2	**Two-Track Bridge**	Replaces the existing two-track bridge with a new two-track structure.
3	**Three-Track Crossing**	Provides a crossing over the Potomac River with three railroad tracks.
3A	**Three-Track Crossing with Bike-Pedestrian Path**	Provides a crossing over the Potomac River with three railroad tracks and a bike-pedestrian shared-use path.
3B	**Three-Track Crossing with Streetcar**	Provides a crossing over the Potomac River with three railroad tracks and two tracks for a streetcar line across the river.
3C	**Three-Track Crossing with General Purpose Vehicle Lanes**	Provides a crossing over the Potomac River with three railroad tracks and additional car lanes.
4	**Three-Track Tunnel**	Provides a tunnel under the Potomac River with three tracks.
5	**Four-Track Crossing**	Provides a crossing over the Potomac River with four railroad tracks.
5A	**Four-Track Crossing with Bike-Pedestrian Path**	Provides a crossing over the Potomac River with four railroad tracks and a bicycle-pedestrian shared-use path.
5B	**Four-Track Crossing with Streetcar**	Provides a crossing over the Potomac River with four railroad tracks and two tracks for a streetcar line across the Potomac River.
5C	**Four-Track Crossing with General Purpose Vehicle Lanes**	Provides a crossing over the Potomac River with four railroad tracks and additional car lanes.
6	**Four-Track Tunnel**	Bores a tunnel under the Potomac River with four railroad tracks.
7	**Two-Track Crossing; Two-Track Tunnel**	Provides a two-track crossing over the Potomac River and bores a tunnel under the river with two railroad tracks.
8	**Five Plus-Track Crossing or Tunnel**	Provides a crossing, a tunnel, or some combination, with five or more railroad tracks in total.
8A	**Five Plus-Track Crossing or Tunnel with Bike-Pedestrian Path**	Provides a crossing, a tunnel, or some combination, with five or more railroad tracks in total and a bike-pedestrian shared-use path.
8B	**Five Plus-Track Crossing and/or Tunnel with Streetcar**	Provides a crossing, a tunnel, or some combination, with five or more railroad tracks in total and two tracks for a streetcar line across the Potomac River.
8C	**Five Plus-Track Crossing and/or Tunnel with General Purpose Vehicle Lanes**	Provides a crossing, a tunnel, or some combination, with five or more railroad tracks in total and additional car lanes.
9	**New Location**	Constructs new railroad capacity along an entirely different corridor.

[12] This concept was referred to as the "No Build" in public and agency Scoping materials. However, the term has been revised to "No Action" for consistency with NEPA requirements.

3.3. Concept Screening Process

Previous studies (Phase I and Phase II) and comments received during Scoping helped DDOT and FRA identify 19 preliminary concepts (including the No Action), as described above. FRA and DDOT then developed a two-level process to screen the preliminary concepts and determine the reasonable range of Action Alternatives that would be carried forward to the conceptual engineering phase and evaluated in the DEIS, as shown in **Figure 3-1**.

Figure 3-1 | Long Bridge Project Screening Process



3.3.1. Level 1 Concept Screening Process

The Level 1 Concept Screening, detailed in **Section 4.0**, evaluated each preliminary concept for its ability to meet the Project Purpose and Need. FRA and DDOT developed specific metrics, informed by comments received during Scoping, to assess each concept's ability to meet Purpose and Need. FRA and DDOT evaluated the 19 preliminary concepts using these metrics in Spring 2017. A finding that any of the concepts were inconsistent with a metric was considered a "fatal flaw" and the concept did not proceed to the Level 2 Concept Screening for further consideration. FRA and DDOT retained concepts not disqualified as fatally flawed for further screening.

FRA and DDOT performed the Level 1 Concept Screening before design and engineering development to determine how each concept could be configured (for example, preservation of existing bridge and addition of new multi-track bridge vs. construction of a new multi-track bridge and conversion of the existing bridge to non-railroad uses). The concepts at this stage focused on the elements (such as number of tracks) to be included in the Project. FRA and DDOT assumed that these elements could be provided in a variety of ways, including one or multiple bridges or the reuse of the existing structure, and that all elements could be provided within existing right-of-way constraints.

On May 16, 2017, following the Level 1 Concept Screening, FRA and DDOT presented the draft retained concepts to the public and agencies for comment and proposed a set of metrics for the Level 2 Concept Screening criteria, including the following considerations:

- Railroad operations efficiency and effectiveness;
- Cost (order of magnitude);
- Preliminary environmental effects considerations; and
- Safety.

3.3.2. Level 2 Concept Screening Process

Following the May 2017 meetings, FRA and DDOT received comments on the Level 2 Concept Screening criteria from agencies and members of the public. Comments included support for evaluating concepts based on their ability to provide needed capacity, minimize impacts, and support multimodal transportation connections. Several comments from the public focused on the need to ensure the Project would provide adequate capacity beyond 2040, and one commenter asked for clarification related to resiliency and redundancy. In addition, in a letter dated July 7, 2017, CSXT, the bridge owner, provided additional detail on operational requirements that affect resiliency and redundancy. Several commenters expressed support for a new bike-pedestrian connection explicitly. One commenter questioned whether there was sufficient information at this stage of the process to use cost and environmental considerations as screening criteria. Comments received on the Level 1 Concept Screening process are described further in **Section 4.4**.

After considering these public and agency comments, FRA and DDOT determined the Level 2 Concept Screening would include two additional metrics to assess the retained concepts' ability to meet Purpose and Need, as well as metrics to assess feasibility. One Purpose and Need metric was included based on comments that the analysis should consider future capacity in the context of long-term needs and separate projects that will expand the approaches to the Long Bridge to four tracks. This metric, related to capacity, focused on the need to eliminate the existing bottleneck and prevent creating a bottleneck in the future. The second additional Purpose and Need metric related to resiliency and redundancy focused on operational impacts to adjacent tracks during maintenance or unanticipated outages.[13]

From the initial list of considerations presented to agencies and the public in May 2017, FRA and DDOT incorporated railroad operations efficiency and effectiveness and safety considerations into the feasibility criterion, as described in more detail in **Section 5.1**. FRA and DDOT determined that the concepts advanced to the Level 2 Concept Screening could feasibly be implemented and would allow for

[13] Routine maintenance, emergencies, derailments, and oversize shipments can affect adjacent tracks by slowing or stopping trains on those tracks. This is due to worker safety measures, the need to ensure an emergency situation has not obstructed or damaged adjacent tracks, bridges, or other structures, and potential obstructions on adjacent tracks. Delays within the Long Bridge Corridor are felt at significant distances to the north and south, potentially causing delays or interruption of service.

safe railroad operations.[14] FRA and DDOT considered cost and environmental issues during the Level 2 Concept Screening; however, these considerations did not substantially differentiate the concepts at this stage in the process. As shown in **Table 3-3,** differences in impacts among the concepts would result from the location of new tracks in relation to the existing corridor (upstream or downstream), and the amount of additional right-of-way required. All concepts would be constructed in the same corridor and would stay within the existing right-of-way to the extent practicable. Therefore, it was determined that:

- All concepts would potentially have impacts to water resources and wildlife habitat such as the Potomac River and Roaches Run; Section 4(f) properties including Long Bridge Park, the George Washington Memorial Parkway (GWMP), and East Potomac Park; and traffic on highways crossed by the corridor.[15] It is not possible to avoid these impacts, but it is also not clear that the impacts of any specific concept would be of such magnitude as to be considered unreasonable.
- FRA and DDOT did not develop cost estimates during this phase—instead, they developed assumptions about cost based on the amount of new construction required, the level of complexity in construction phasing, and anticipated mitigation for environmental, right-of-way, and traffic impacts. While some concepts would have higher costs than others, there was insufficient information and unknowns at this stage to determine whether cost rendered a concept unreasonable.

Accordingly, FRA and DDOT conducted the Level 2 Concept Screening using only the Purpose and Need and feasibility criteria, as described in more detail below.

Table 3-3 | Potential for Impacts Based on Location of New Tracks

	Potential Impacts to Section 4(f) Properties				Potential Construction-Period Traffic Impacts			
	Roaches Run	**Long Bridge Park**	**GWMP**	**East Potomac Park**	**GWMP**	**Ohio Drive SW**	**I-395**	**Maine Avenue SW**
New Track(s) Upstream of Existing	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
New Track(s) Downstream of Existing	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes

[14] CSXT has indicated that the Long Bridge is sufficient to meet the needs of CSXT's freight customers, including anticipated needs through the year 2040. A public version of the inspection report dated June 22, 2017, for CSXT's Long Bridge indicated that the Bridge is confirmed to have the capacity to safely carry traffic currently being operated over the bridge. Based on this assessment, FRA and DDOT consider concepts that retain the existing bridge to be reasonable and feasible. Under these concepts, CSXT would remain responsible for maintaining and operating the existing bridge in accordance with safety procedures and regulations.

[15] Section 4(f) of the U.S. Department of Transportation (USDOT) Act of 1966 prohibits USDOT agencies from using land from publicly owned parks, recreation areas (including recreational trails), wildlife and water fowl refuges, or public and private historic properties, unless there is no feasible and prudent alternative to that use and the action includes all possible planning to minimize harm to the property resulting from such a use. See 49 USC 303.

Concepts retained after the Level 1 Concept Screening were further analyzed in the Level 2 Concept Screening, as further described in **Section 5.0**. FRA and DDOT conducted the Level 2 Concept Screening as a two-step process:

- **Step 1** considered whether each concept, which varied in terms of number of tracks crossing the Potomac River, could be designed with track alignments that would meet the additional Purpose and Need and feasibility metrics. Step 1 did not assess specific alignment options. If the answer was "no" to any metric, FRA and DDOT eliminated the concept from further consideration because it did not meet Purpose and Need, or it was infeasible to construct.

- **Step 2** considered multiple track alignment options for crossings over the Potomac River for the concepts retained from Step 1. Each alignment option was evaluated using the same Purpose and Need and feasibility metrics as in Step 1. If the answer was "no" to any metric, FRA and DDOT eliminated the concept alignment option from further consideration because it did not meet Purpose and Need, or it was infeasible to construct.

  In this step, FRA and DDOT developed nine alignment options based on the remaining concept. These nine alignments represent the full range of potential bridge and track configurations, although there could be slight variations in location within which a specific configuration would be feasible. NEPA does not require consideration of every conceivable alignment for a project; it requires consideration of a reasonable range of potentially feasible alignments that will foster informed decision-making and public participation.

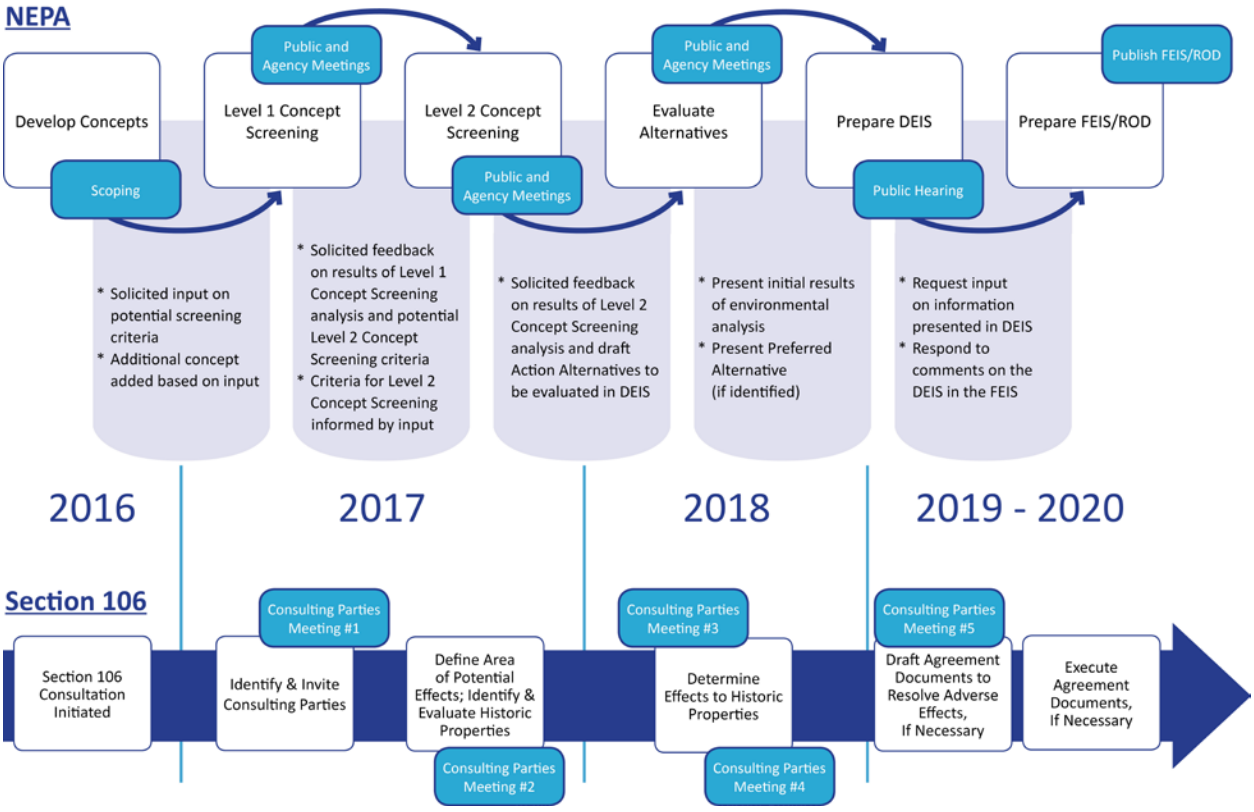
Opportunities to include a bike-pedestrian crossing were included as part of the preliminary concepts evaluated in the Level 1 Concept Screening. For the Level 2 Concept Screening, FRA and DDOT determined that such a crossing could potentially be accommodated with any number of tracks or track alignment options, and the absence or presence of such a crossing did not affect a concept's ability to meet Purpose and Need. Therefore, evaluation of the feasibility of bike-pedestrian crossing opportunities was conducted separately, as described in **Section 6.0**. However, such opportunities were not screened as part of the Level 2 Concept Screening using Purpose and Need.

In December 2017, FRA and DDOT held an agency meeting and a public meeting to present the draft Level 2 Concept Screening results and the proposed alternatives to be evaluated in the DEIS**.** FRA and DDOT invited comments from agencies and the public until January 16, 2018. Majority of comments received focused on the desire for a new bike-pedestrian connection across the Potomac River. Other commenters mentioned the desire from boaters for more clearance under the bridge, support for expanding capacity in the corridor, and existing concerns over vibration. Comments received on the Level 2 Concept Screening process are described further in **Section 5.4**.

Based on feedback received from the agencies and the public at the meetings and during the comment period, FRA and DDOT concluded that no changes to the proposed alternatives were necessary. The issues raised by the public and agencies will be evaluated through the EIS process and through further coordination with agencies including USCG and NPS. FRA and DDOT will refine and evaluate the alignment options advanced beyond the Level 2 Concept Screening process as Action Alternatives in the DEIS.

As shown in **Figure 3-2**, the alternatives development and EIS (NEPA and Section 106)[16] process consists of engagement between the lead agencies, cooperating and participating agencies, the public, and stakeholders. At key milestones in the process, the lead agencies present information to the agencies and the public, who provide input that influences and informs the next phase of work. This engagement will continue through the DEIS and Final EIS (FEIS) phases.

Figure 3-2 | Alternatives Development and the EIS Process



[16] Section 106 of the National Historic Preservation Act requires Federal agencies to seek out consulting parties to request their views and participate in consultation regarding a project's effect on historic properties. The goal of the consultation is to identify historic properties potentially affected by the undertaking, assess its effects, and seek ways to avoid, minimize, or mitigate any adverse effects on historic properties.

4.0 Level 1 Concept Screening

This section describes the results of the Level 1 Concept Screening process. In addition to the No Action Alternative, the Level 1 Concept Screening evaluated 18 concepts. The concepts varied based on number of railroad tracks provided; inclusion of additional transportation operations, including a bike-pedestrian path, streetcar, or general-purpose vehicle lanes; and the type of crossing over the Potomac River, a tunnel, or a crossing or tunnel along a new corridor. Concepts including a crossing over the river could make use of the existing bridge, a new bridge or bridges, or a combination of new and existing bridges to provide the specified number of tracks. These concepts are presented in **Table 4-1**.

4.1. Level 1 Concept Screening Criteria

FRA and DDOT assessed 18 concepts using the Level 1 Concept Screening criteria described below. The No Action was advanced without evaluation, as its evaluation in the EIS is required by NEPA. Under the three criteria, FRA and DDOT developed a total of five metrics to assess the concepts. For each metric, FRA and DDOT evaluated whether the concept was consistent or inconsistent with the metric.

4.1.1. Criterion 1: Railroad Capacity

Metric 1: Enhances the ability to maintain schedules *under normal operations and provides flexibility to recover during periods of higher demand and service delays by enabling trains to pass one another.*

A concept is consistent with Purpose and Need if it would provide additional opportunity for trains to pass one another in the corridor while maintaining bidirectional service, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.

4.1.2. Criterion 2: Network Connectivity

Metric 2A: Facilitates ease of access *(maintains or improves connectivity) to existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other modes of transportation service.*

A concept is consistent with Purpose and Need if it would improve or would not diminish connectivity to existing railroad stations, major employment and residential nodes, freight railroad infrastructure, and other modes of transportation service.

Table 4-1 | Long Bridge Concepts for Screening

Concept		Description
1	**No Action**	Option against which the Action Alternatives will be assessed in the DEIS. This option was not subject to screening.
2	**Two-Track Bridge**	Replaces the existing two-track bridge with a new two-track structure.
3	**Three-Track Crossing**	Provides a crossing over the Potomac River with three railroad tracks.
3A	**Three-Track Crossing with Bike-Pedestrian Path**	Provides a crossing over the Potomac River with three railroad tracks and a bicycle-pedestrian shared-use path.
3B	**Three-Track Crossing with Streetcar**	Provides a crossing over the Potomac River with three railroad tracks and two tracks for a streetcar line across the river.
3C	**Three-Track Crossing with General Purpose Vehicle Lanes**	Provides a crossing over the Potomac River with three railroad tracks and additional car lanes.
4	**Three-Track Tunnel**	Provides a tunnel under the Potomac River with three tracks.
5	**Four-Track Crossing**	Provides a crossing over the Potomac River with four railroad tracks.
5A	**Four-Track Crossing with Bike-Pedestrian Path**	Provides a crossing over the Potomac River with four railroad tracks and a bicycle-pedestrian shared-use path.
5B	**Four-Track Crossing with Streetcar**	Provides a crossing over the Potomac River with four railroad tracks and two tracks for a streetcar line across the Potomac River.
5C	**Four-Track Crossing with General Purpose Vehicle Lanes**	Provides a crossing over the Potomac River with four railroad tracks and additional car lanes.
6	**Four-Track Tunnel**	Bores a tunnel under the Potomac River with four railroad tracks.
7	**Two-Track Crossing; Two-Track Tunnel**	Provides a two-track crossing over the Potomac River and bore a tunnel under the river with two railroad tracks.
8	**Five Plus-Track Crossing or Tunnel**	Provides a crossing, a tunnel, or some combination, with five or more railroad tracks in total.
8A	**Five Plus-Track Crossing or Tunnel with Bike-Pedestrian Path**	Provides a crossing, a tunnel, or some combination, with five or more railroad tracks in total and a bicycle-pedestrian shared-use path.
8B	**Five Plus-Track Crossing and/or Tunnel with Streetcar**	Provides a crossing, a tunnel, or some combination, with five or more railroad tracks in total and two tracks for a streetcar line across the Potomac River.
8C	**Five Plus-Track Crossing and/or Tunnel with General Purpose Vehicle Lanes**	Provides a crossing, a tunnel, or some combination, with five or more railroad tracks in total and additional car lanes.
9	**New Corridor – Retain or Replace Existing**	Constructs new railroad capacity along an entirely different corridor, while the existing two tracks would be provided at the current location either on the existing bridge or on a replaced two-track bridge.
10	**New Corridor – Remove Existing**	Constructs new railroad tracks along an entirely different corridor and the existing bridge would be removed.

Metric 2B: Consistent with the following adopted regional, state, and local transportation plans:

- *Financially Constrained Long-Range Transportation Plan for the National Capital Region*
- *moveDC: Multimodal Long-Range Transportation Plan*
- *Arlington County Comprehensive Plan and Master Transportation Plan(s)*
- *TransAction 2040: Northern Virginia Regional Transportation Plan*
- *VRE System Plan 2040*
- *Southeast High Speed Rail*
- *Virginia Statewide Rail Plan*
- *Virginia Six-Year Improvement Program*

FRA and DDOT reviewed relevant adopted transportation plans. A concept is consistent with the Purpose and Need if it includes features shown in adopted regional, state, and local transportation plans (including features planned to be connected to regional, state, and local transportation infrastructure). Concepts that included features not shown in adopted regional, state, and local transportation plans are inconsistent with the Purpose and Need.[17]

Metric 2C: Compatible with Long Bridge Corridor railroad operator plans and programs: *CSXT National Gateway and the MARC Growth and Investment Plan.*

The CSXT National Gateway program and the MARC Growth and Investment Plan were used to evaluate performance relative to this metric.[18] A concept is consistent with Purpose and Need if it would not preclude the operations and connections envisioned in these plans.

4.1.3. Criterion 3: Resiliency and Redundancy

Metric 5: Provides independently operable tracks and crossovers *to facilitate continued operation of both passenger and freight trains during planned maintenance or emergency conditions along the Long Bridge Corridor, and provides the ability to resume normal operations and minimize cascading delays following an unplanned event.*

A concept is consistent with Purpose and Need if it would provide the ability for trains to operate through the corridor when a single track is out of service due to planned maintenance or emergency conditions.

[17] TransAction 2040 includes streetcar on a new Long Bridge; however, subsequent to the plan's adoption in 2012, Arlington County canceled its streetcar program. Therefore, the inclusion of streetcar is considered inconsistent with local adopted plans.
[18] The CSXT National Gateway program consists of a series of projects that are intended to improve rail connections between ports in the mid-Atlantic and the Midwest by alleviating freight bottlenecks. The Virginia Avenue Tunnel project in the District is part of the National Gateway program.

4.2. Level 1 Concept Screening Analysis

FRA and DDOT assessed whether the 18 concepts were consistent or inconsistent under the five Level 1 metrics. FRA and DDOT eliminated any concept determined to be inconsistent with any metric from further consideration. The evaluation of the concepts is shown in **Table 4-2**. A concept that was consistent with a metric was given a green "check" mark in the table, while a concept that was inconsistent with a metric was given a red "X" mark. The specific measures of consistency are provided for each metric below. A finding that any of the concepts are inconsistent with a metric was considered a "fatal flaw." Any concept deemed inconsistent with any metric did not proceed to the Level 2 Concept Screening for further consideration, as it does not meet the Purpose and Need.

FRA and DDOT eliminated concepts for the following reasons:

- **Two Tracks:** FRA and DDOT eliminated any concepts that have only two tracks because the Corridor must provide more than two tracks to meet future railroad capacity and redundancy needs.
- **Freight Tunnel:** FRA and DDOT eliminated any concept that proposed putting freight service in a tunnel because the tunnel would not connect to existing freight infrastructure. Based on previous studies, a tunnel under the Potomac River and Washington Channel would need to be at least 80 feet deep to avoid existing infrastructure (for example, Metrorail). [19] Given the grade requirements for freight trains (1.25 percent) and the need for the tunnel to connect to VRE Crystal City Station, VRE L'Enfant Station, and the Virginia Avenue Tunnel, the distance of an 80-foot-deep tunnel would require grades that would prevent freight trains from using the tunnel. Therefore, all options that involve a freight tunnel are infeasible. In addition, the resiliency and redundancy criterion requires that all tracks be usable by both passenger and freight trains. Therefore, any concepts that cannot accommodate both passenger and freight trains (such as a passenger railroad–only tunnel) are inconsistent because they do not enable redundancy.
- **Streetcar Tracks or Vehicular Lanes:** Any concept that proposed including streetcar tracks or vehicular lanes in the Long Bridge Corridor is inconsistent with adopted local transportation plans. Such plans do not call for a streetcar line across the Potomac River and there are no streetcar lines on either side of the river to which this proposal would connect. Vehicular lanes are inconsistent with local transportation plans since these plans do not call for additional automobile capacity in this corridor. Plans in the region do not call for another roadway over the Potomac River connecting to existing or planned roadways in this area.

[19] The concept evaluation for the Virginia Avenue Tunnel EIS analyzed a deep bore tunnel that would need to be 80 feet deep and 9 miles long. A tunnel as part of the Long Bridge Project would share many of the same drivers for length and depth. See Virginia Avenue Tunnel Reconstruction Project FEIS, Appendix B: Concepts Evaluation Technical Report. Accessed from http://www.virginiaavenuetunnel.com/sites/default/files/Appendix_B_-_Concepts_Evaluation_Technical_Report.pdf. Accessed April 22, 2018.

Table 4-2 | Level 1 Concept Screening Results

Concepts		1. Railroad Capacity	2. Network Connectivity			3. Resiliency and Redundancy	Concept Retained
		1	2A	2B	2C	3	
1	No Action	--	--	--	--	--	✓
2	Two-Track Bridge (Replace)	✗	✓	✓	✓	✗	✗
3	Three-Track Crossing	✓	✓	✓	✓	✓	✓
3A	Three-Track Crossing with Bike-Pedestrian Path	✓	✓	✓	✓	✓	✓
3B	Three-Track Crossing with Streetcar	✓	✗	✗	✓	✓	✗
3C	Three-Track Crossing with Vehicle Lanes	✓	✓	✗	✓	✓	✗
4	Three-Track Tunnel	✓	✗	✓	✗	✗	✗
5	Four-Track Crossing	✓	✓	✓	✓	✓	✓
5A	Four-Track Crossing with Bike-Ped Path	✓	✓	✓	✓	✓	✓
5B	Four-Track Crossing with Streetcar	✓	✗	✗	✓	✓	✗
5C	Four-Track Crossing with Vehicle Lanes	✓	✓	✗	✓	✓	✗
6	Four-Track Tunnel	✓	✗	✓	✗	✗	✗
7	Two-Track Crossing; Two-Track Tunnel	✗	✓	✓	✓	✗	✗
8	Five Plus-Track Crossing or Tunnel*	✓	✓	✓	✓	✓	✓
8A	Five Plus-Track Crossing or Tunnel with Bike-Ped Path*	✓	✓	✓	✓	✓	✓
8B	Five Plus-Track Crossing or Tunnel with Streetcar	✓	✗	✗	✓	✓	✗
8C	Five Plus-Track Crossing or Tunnel	✓	✓	✗	✓	✓	✗
9	New Corridor – Retain or Replace Existing	✗	✗	✗	✗	✗	✗
10	New Corridor – Remove Existing	✓	✗	✗	✗	✓	✗

** The tunnel options are eliminated for these concepts, but aboveground (bridge) crossings remain.*

- **New Corridor:** Any concept that proposes an entirely new corridor is inconsistent because it fails to facilitate access to existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other modes of transportation because these options would bypass existing facilities. Additionally, any concept encompassing a new corridor failed to conform to adopted transportation plans because the plans do not call for such an alternative corridor.[20]

FRA and DDOT eliminated 12 of the concepts, as well as any version of concepts that included a tunnel, as they are inconsistent with at least one of the metrics. FRA and DDOT retained six concepts, including the No Action concept (Concept 1), for a second level of screening. The following sections provide more detail on the retention and elimination of the concepts.

4.2.1. Concept 2: Two-Track Bridge (Replace)

Screening Result: Concept 2 was eliminated.

Concept 2 is consistent with the following metrics:

- **2A, 2B, and 2C:** The concept would maintain or improve connectivity to existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other modes of transportation service. A two-track bridge would be consistent with adopted regional, state, and local transportation plans because it would provide or maintain continued railroad service in the Long Bridge Corridor. The concept is also consistent with railroad operator plans because it would not preclude future operations as envisioned.

Concept 2 is inconsistent with the following metrics:

- **1:** The concept is inconsistent with this criterion because two tracks would be insufficient to allow trains to pass each other, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **3:** The concept is also inconsistent with the resiliency and redundancy criterion because two tracks on a single bridge would not provide sufficient redundancy to maintain operations when a single track is out of service due to unplanned maintenance or a breakdown.

[20] Although not a screening criterion, it is reasonable to assume that a new corridor would have substantially more environmental effects than concepts that make use of the existing corridor as well as substantial costs, as noted in the Virginia Avenue Tunnel Reconstruction Project, Concepts Evaluation Technical Report (July 2012). Accessed from http://www.virginiaavenuetunnel.com/sites/default/files/07_B_Concepts_Evaluation_Tech_Report.pdf. Accessed April 18, 2018.

4.2.2. Concept 3: Three-Track Crossing

Screening Result: Concept 3 was retained.

Concept 3 is consistent with all metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2A, 2B, and 2C:** The concept would maintain or improve connectivity to existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other modes of transportation service. The concept is consistent with adopted regional, state, and local transportation plans because these plans assume continued railroad service in the Long Bridge Corridor. The concept is also consistent with railroad operator plans because it would not preclude future operations as envisioned.
- **3:** The concept crossing would provide sufficient infrastructure for independently operable tracks and crossovers. These would facilitate continued operations of both passenger and freight trains when a single track is out of service due to planned maintenance or emergency conditions.

4.2.3. Concept 3A: Three-Track Crossing with Bike-Pedestrian Path

Screening Result: Concept 3A was retained.

Concept 3A is consistent with all metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2A, 2B, and 2C**: The concept would maintain or improve connectivity to existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other modes of transportation service. The concept is consistent with adopted regional, state, and local transportation plans. These plans assume continued railroad service in the Long Bridge Corridor The moveDC: Multimodal Long-Range Transportation Plan includes a bike-pedestrian path along the Long Bridge Corridor. The concept is also consistent with railroad operator plans because it would not preclude future operations as envisioned.
- **3:** The concept would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations of both passenger and freight trains when a single track is out of service due to planned maintenance or emergency conditions.

4.2.4. Concept 3B: Three-Track Crossing with Streetcar

Screening Result: Concept 3B was eliminated.

Concept 3B is consistent with the following metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2C:** The concept is consistent with railroad operator plans because it would not preclude future operations as envisioned.
- **3:** The concept would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations of both passenger and freight trains when a single track is out of service due to planned maintenance or emergency conditions.

Concept 3B is inconsistent with the following metrics:

- **2A and 2B:** The concept would not facilitate ease of access to other transportation modes because it would not connect to an existing or planned streetcar network. In addition, the concept is not consistent with adopted regional, state, or local transportation plans because such plans do not call for a streetcar line across the Potomac River in this area.[21]

4.2.5. Concept 3C: Three-Track Crossing with General Purpose Vehicle Lanes

Screening Result: Concept 3C was eliminated.

Concept 3C is consistent with the following metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2A and 2C:** The concept would maintain or improve connectivity to existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other modes of transportation service. The concept is also consistent with railroad operator plans because it would not preclude future operations as envisioned.
- **3:** The concept would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations of both passenger and freight trains when a single track is out of service due to planned maintenance or emergency conditions.

[21] In 2014, subsequent to the 2012 adoption of TransAction 2040, Arlington County canceled its streetcar program.

Concept 3C is inconsistent with the following metric:

- **2B:** The concept is not consistent with adopted regional, state, or local transportation plans because none of these plans call for another roadway over the Potomac River in this area.

4.2.6. Concept 4: Three-Track Tunnel

Screening Result: Concept 4 was eliminated.

Concept 4 is consistent with the following metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2B:** The concept is consistent with adopted regional, state, and local transportation plans because these plans assume continued railroad service in the Long Bridge Corridor.

Concept 4 is inconsistent with the following metrics:

- **2A and 2C:** As noted in **Section 4.2**, a tunnel under the Potomac River could not feasibly connect to existing infrastructure within the grade requirements for freight trains; therefore, Concept 4 does not meet Metric 2A. Additionally, because it would fail to connect to existing infrastructure, the concept is inconsistent with CSXT's railroad operator plans since it would preclude planned future operations and diminish connectivity to the existing transportation network.
- **3:** To provide resiliency and redundancy, each track must be capable of accommodating both freight and passenger trains. Because only a passenger railroad tunnel is feasible, freight trains would not be able to use all tracks; therefore, this concept would not provide the required resiliency and redundancy.

4.2.7. Concept 5: Four-Track Crossing

Screening Result: Concept 5 was retained.

Concept 5 is consistent with all metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays
- **2A, 2B, and 2C:** The concept would maintain or improve connectivity to existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other modes of transportation service. The concept is consistent with adopted regional, state, and local transportation plans because these plans assume continued railroad service in the Long Bridge Corridor. The concept is also consistent with railroad operator plans because it would not preclude future operations as envisioned.

- **3:** The concept would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations of both passenger and freight trains when a single track is out of service due to planned maintenance or emergency conditions.

4.2.8. Concept 5A: Four-Track Crossing with Bike-Pedestrian Path

Screening Result: Concept 5A was retained.

Concept 5A is consistent with all metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2A, 2B, and 2C**: The concept would maintain or improve connectivity to existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other modes of transportation service. The concept is consistent with adopted regional, state, and local transportation plans because these plans assume continued railroad service in the Long Bridge Corridor. The concept is consistent with the moveDC: Multimodal Long-Range Transportation Plan because this plan includes a bike-pedestrian path along the Long Bridge Corridor. The concept is also consistent with railroad operator plans because it would not preclude future operations as envisioned.
- **3:** The concept would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations of both passenger and freight trains when a single track is out of service due to planned maintenance or emergency conditions.

4.2.9. Concept 5B: Four-Track Crossing with Streetcar

Screening Result: Concept 5B was eliminated.

Concept 5B is consistent with the following metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2C:** The concept is consistent with adopted railroad operator plans because the concept would not preclude future operations as envisioned.
- **3:** The concept would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations of both passenger and freight trains when a single track is out of service due to planned maintenance or emergency conditions.

Concept 5B is inconsistent with the following metrics:

- **2A and 2B:** The concept would not facilitate ease of access to other transportation modes because it would not connect to an existing or planned streetcar network. In addition, the

concept is not consistent with adopted regional, state, or local transportation plans because such plans do not call for a streetcar line across the Potomac River in this area.[22]

4.2.10. Concept 5C: Four-Track Crossing with General Purpose Vehicle Lanes

Screening Result: Concept 5C was eliminated.

Concept 5C is consistent with the following metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2A and 2C:** The concept would maintain or improve connectivity to existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other modes of transportation service. The concept is also consistent with railroad operator plans because it would not preclude future operations as envisioned.
- **3:** The concept would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations of both passenger and freight trains when a single track is out of service due to planned maintenance or emergency conditions.

Concept 5C is inconsistent with the following metric:

- **2B:** The concept is not consistent with adopted regional, state, or local transportation plans because none of these plans call for another roadway over the Potomac River in this area.

4.2.11. Concept 6: Four-Track Tunnel

Screening Result: Concept 6 was eliminated.

Concept 6 is consistent with the following metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2B:** The concept is consistent with adopted regional, state, and local transportation plans because these plans assume continued railroad service in the Long Bridge Corridor.

Concept 6 is inconsistent with the following metrics:

- **2A and 2C:** As noted in **Section 4.2**, a tunnel under the Potomac River could not feasibly connect to existing infrastructure within the grade requirements for freight trains; therefore, Concept 4 does not meet Metric 2A. Additionally, due to its failure to connect to existing infrastructure,

[22] In 2014, subsequent to the 2012 adoption of TransAction 2040, Arlington County canceled its streetcar program.

the concept is inconsistent with CSXT's railroad operator plans because it would preclude planned future operations and diminishes connectivity to the existing transportation network.

- **3:** To provide resiliency and redundancy, each track must be capable of accommodating both freight and passenger trains. Because only a passenger railroad tunnel is feasible, freight trains would not be able to use all tracks. Therefore, this concept would not provide the required resiliency and redundancy.

4.2.12. Concept 7: Two-Track Crossing; Two-Track Tunnel

Screening Result: Concept 7 was eliminated.

Concept 7 is consistent with the following metrics:

- **2A, 2B, and 2C:** The concept is consistent with adopted regional, state, and local transportation plans because these plans assume continued railroad service in the Long Bridge Corridor. The concept is also consistent with railroad operator plans because it would not preclude future operations as envisioned. In addition, the concept would facilitate access to the existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other transportation modes, provided the freight railroad service remains aboveground. As noted in **Section 4.2**, a tunnel under the Potomac River could not feasibly connect to existing infrastructure within the grade requirements for freight trains; however, a passenger tunnel is believed to be feasible at this time.

Concept 7 is inconsistent with the following metric:

- **1:** To provide four tracks through a two-track crossing and a two-track tunnel, the tracks for the tunnel would need to diverge from the above-ground tracks before reaching the RO and LE Interlockings. This configuration would not allow trains to pass one another in the Long Bridge Corridor while maintaining bi-directional service, a necessary requirement for maintaining schedules under normal operations and flexibility to recover during periods of higher demand and service delays.
- **3:** To provide resiliency and redundancy, each track must be capable of accommodating both freight and passenger trains. Because only a passenger railroad tunnel is feasible, freight trains would not be able to use all tracks; therefore, this concept would not provide the required resiliency and redundancy.

4.2.13. Concept 8: Five Plus-Track Crossing or Tunnel

Screening Result: Concept 8 was retained, but only with tracks provided via aboveground crossings. The tunnel concept was eliminated.

Concept 8 (with all tracks provided on one or more crossings) is consistent with all metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.

- **2A, 2B, and 2C:** The concept is consistent with adopted regional, state, and local transportation plans because these plans assume continued railroad service in the Long Bridge Corridor. The concept is also consistent with railroad operator plans because it would not preclude future operations as envisioned. In addition, the concept would facilitate access to the existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other transportation modes, provided the freight railroad service remains aboveground.
- **3 (with aboveground crossing only):** The concept would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations when a single track is out of service due to planned maintenance or emergency conditions.

Concept 8 (with any tracks provided in a tunnel) is inconsistent with the following metric:

- **3 (if any tracks provided in a tunnel):** To provide resiliency and redundancy, each track must be capable of accommodating both freight and passenger trains. Because only a passenger railroad tunnel is feasible, freight trains would not be able to use all tracks; therefore, this concept would not provide the required resiliency and redundancy.

4.2.14. Concept 8A: Five Plus-Track Crossing or Tunnel with Bike-Pedestrian Path

Screening Result: Concept 8A was retained, but only with tracks provided via aboveground crossings. The tunnel concept was eliminated.

Concept 8A (with all tracks provided on one or more crossings) is consistent with all metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2A, 2B, and 2C:** The concept is consistent with adopted regional, state, and local transportation plans because these plans assume continued railroad service in the Long Bridge Corridor. The concept is consistent with the moveDC: Multimodal Long-Range Transportation Plan because this plan includes a bike-pedestrian path along the Long Bridge Corridor. Further, the concept would facilitate access to the existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other transportation modes, provided the freight railroad service remains aboveground.
- **3 (with aboveground crossing only):** Five tracks on one or more crossings would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations when a single track is out of service due to planned maintenance or emergency conditions.

Concept 8A (with any tracks provided in a tunnel) is inconsistent with the following metric:

- **3 (if any tracks provided in a tunnel):** To provide resiliency and redundancy, each track must be capable of accommodating both freight and passenger trains. Because only a passenger railroad tunnel is feasible, freight trains would not be able to use all tracks; therefore, this concept would not provide the required resiliency and redundancy.

4.2.15. Concept 8B: Five Plus-Track Crossing or Tunnel with Streetcar

Screening Result: Concept 8B was eliminated.

Concept 8B is consistent with the following metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2C:** The concept is consistent with railroad operator plans because the concept would not preclude future operations as envisioned.
- **3 (with aboveground crossing only):** A five plus-track crossing aboveground would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations when a single track is out of service due to planned maintenance or emergency conditions.

Concept 8B is inconsistent with the following metrics:

- **2A and 2B:** The concept would not facilitate ease of access to other transportation modes because it would not connect to an existing or planned streetcar network. In addition, the concept is not consistent with adopted regional, state, or local transportation plans because such plans do not call for a streetcar line across the Potomac River in this area.[23]
- **3 (if any tracks provided in a tunnel):** To provide resiliency and redundancy, each track must be capable of accommodating both freight and passenger trains. Because only a passenger railroad tunnel is feasible, freight trains would not be able to use all tracks; therefore, this concept would not provide the required resiliency and redundancy.

4.2.16. Concept 8C: Five Plus-Track Crossing or Tunnel with General Purpose Vehicle Lanes

Screening Result: Concept 8C was eliminated.

Concept 8C is consistent with the following metrics:

- **1:** The concept would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **2A and 2C:** The concept would facilitate access to the existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other transportation modes and is consistent with railroad operator plans because it would not preclude future operations as envisioned.
- **3 (with aboveground crossing only):** A five plus-track aboveground crossing would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued

[23] In 2014, subsequent to the 2012 adoption of TransAction 2040, Arlington County canceled its streetcar program.

operations when a single track is out of service due to planned maintenance or emergency conditions.

Concept 8C is inconsistent with the following metrics:

- **2B:** The concept is not consistent with adopted regional, state, or local transportation plans because none of these plans call for another roadway over the Potomac River in this area.
- **3 (if any tracks provided in a tunnel):** To provide resiliency and redundancy, each track must be capable of accommodating both freight and passenger trains. Because only a passenger railroad tunnel is feasible, freight trains would not be able to use all tracks. Therefore, this concept would not provide the required resiliency and redundancy.

4.2.17. Concept 9: New Corridor; Retain or Replace Existing Corridor

Screening Result: Concept 9 was eliminated.

Concept 9 is inconsistent with all the metrics:

- **1:** This concept would maintain two tracks along the existing corridor, which is owned by CSXT, and would construct two or more tracks in a new corridor. Because the existing corridor would continue to have only two tracks, this concept would not allow trains to pass one another in the Long Bridge Corridor while maintaining bi-directional service, a necessary requirement for maintaining schedules under normal operations and flexibility to recover during periods of higher demand and service delays.
- **2A, 2B, and 2C:** If passenger service is moved to a new corridor, this concept would not facilitate passenger railroad access to existing railroad stations, employment and residential nodes, and other transportation modes. If freight service is moved to a new corridor, this concept would not facilitate access to existing freight railroad infrastructure. The concept is not consistent with adopted regional, state, or local transportation plans as those plans do not call for an additional corridor. In addition, freight service in a new corridor would not be compatible with the CSXT National Gateway program, which includes reconstruction of and continued use of the Virginia Avenue Tunnel, because a new freight corridor would not connect to the Virginia Avenue Tunnel.[24] Passenger service in a new corridor would be inconsistent with the MARC Growth and Investment Plan, because it would not enable MARC service between the District and Virginia.
- **3:** Because this concept would maintain only two tracks in the existing corridor, it would not provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations when a single track is out of service due to planned maintenance or emergency conditions. Two tracks on a single bridge would not provide sufficient redundancy to

[24] Alternative corridors that have been evaluated in prior studies or that were suggested during Scoping all run east of the Potomac and Anacostia rivers. The Virginia Avenue Tunnel connects the Long Bridge Corridor to the freight corridor that runs to the east of the Anacostia River. An alternative corridor to the east of the Potomac and Anacostia rivers would therefore have no reason to make use of the Virginia Avenue Tunnel.

maintain operations when a single track is out of service due to planned maintenance or emergency conditions.

4.2.18. Concept 10: New Corridor; Remove Existing

Screening Result: Concept 10 was eliminated.

Concept 10 is consistent with the following metrics:

- **1:** This concept has the potential to provide more than two tracks, which would allow trains to pass one another, which is necessary to enhance the ability to maintain schedules under normal operations and provide flexibility to recover during periods of higher demand and service delays.
- **3:** The potential for more than two tracks would provide sufficient infrastructure for independently operable tracks and crossovers to facilitate continued operations when a single track is out of service due to unplanned maintenance or a breakdown.

Concept 10 is inconsistent with the following metrics:

- **2A, 2B, and 2C:** This concept would not connect to existing railroad stations, employment and residential nodes, freight railroad infrastructure, and other transportation modes and is not consistent with adopted regional, state, or local transportation plans since these plans do not call for a new corridor and assume continued operation of commuter, intercity passenger, and freight railroad service through Alexandria, Arlington, and Southwest DC. This concept is not compatible with railroad operator plans, because it precludes passenger railroad service in the existing corridor. It would not connect commuter railroad passengers to Metrorail or within walking distance to their destinations from VRE L'Enfant and Crystal City stations. In addition, it would not connect to the Virginia Avenue Tunnel.[25]

4.3. Concepts Retained for Level 2 Screening

As noted in **Section 4.2**, if FRA and DDOT found a concept incompatible with any of the Level 1 Concept Screening metrics, they eliminated the concept from further consideration. Therefore, FRA and DDOT eliminated 12 concepts (2, 3B, 3C, 4, 5B, 5C, 6, 7, 8B, 8C, 9, and 10), as well as any version of concepts that included a tunnel, because they did not meet Purpose and Need. FRA and DDOT retained six concepts, not including Concept 1: No Action, for a second level of screening:

- Concept 3: Three-Track Crossing
- Concept 3A: Three-Track Crossing with Bike-Pedestrian Path
- Concept 5: Four-Track Crossing
- Concept 5A: Four-Track Crossing with Bike-Pedestrian Path
- Concept 8: Five Plus-Track Crossing (Crossing Only)

[25] Alternative corridors that have been evaluated in prior studies or that were suggested during Scoping all run east of the Potomac and Anacostia rivers. The Virginia Avenue Tunnel connects the Long Bridge Corridor to the freight corridor that runs to the east of the Anacostia River. An alternative corridor to the east of the Potomac and Anacostia rivers would therefore have no reason to make use of the Virginia Avenue Tunnel.

- Concept 8A: Five Plus-Track Crossing (Crossing Only) with Bike-Pedestrian Path

4.4. Feedback from the Public and Agencies on the Level 1 Concept Screening

DDOT and FRA held public and agency meetings on May 16, 2017, to review the Level 1 Concept Screening and the results of the screening, and to propose Level 2 Concept Screening criteria for feedback.

The public submitted 22 comments through the Project website, through mail, and via the question and answer sessions following the presentation. In relation to the Level 1 screening results, several commenters questioned the elimination of the tunnel concepts, citing a desire to "think big." Other commenters expressed support for a bike-pedestrian crossing of the Potomac. FRA and DDOT also asked members of the public to comment on the proposed considerations for the Level 2 Concept Screening criteria, and offered the following feedback:

- One commenter questioned the inclusion of environmental impacts, and whether the intent is to choose the least environmentally impactful alternative at this stage prior to the NEPA evaluation.
- Other individual commenters suggested that the following considerations be included in the Level 2 concept screening:
    - Navigation
    - Maintenance
    - Location of the bridge
    - Regional health
    - Multimodal connectivity
    - Benefits to water and air quality
    - Order of magnitude costs
    - Delivery methods (such as design/build, bid/build, etc.)
    - Vibration impacts
    - Compatibility with plans (such as the Sustainable DC Plan and the National Park Service National Capital Region [NPS NCR] Paved Trails Study)
- One commenter noted that anything constructed must be able to handle increases in railroad growth envisioned in the Purpose and Need.

The first comment influenced the decision to not use environmental impacts as part of the Level 2 Concept Screening, as described in **Section 3.3.2**. The last comment influenced the decision to add an additional Purpose and Need screening criterion in the Level 2 Concept Screening that evaluated the ability of the concepts to eliminate the existing operational bottleneck and prevent development of a future bottleneck. Finally, FRA and DDOT determined that the other considerations suggested did not affect the screening in relation to Purpose and Need, or feasibility. However, FRA and DDOT will consider these issues as appropriate in the DEIS analysis and selection of the Preferred Alternative.

5.0 Level 2 Concept Screening

FRA and DDOT advanced the six concepts retained from the Level 1 Concept Screening (Concepts 3, 3A, 5, 5A, 8, and 8A) for further evaluation under to the Level 2 Concept Screening. FRA and DDOT also advanced Concept 1: No Action as required by NEPA. This phase of screening further assessed the retained six concepts based on additional Purpose and Need metrics as well as metrics that examined whether the concepts could feasibly be constructed and operated given engineering, constructability, and railroad operational constraints.

Following the Level 1 Screening, FRA and DDOT determined opportunities to include a bike-pedestrian crossing could potentially be accommodated with any number of tracks or track alignment options; however, the metrics related to Purpose and Need and railroad operations did not apply to a bike-pedestrian crossing (the presence or absence of a crossing did not affect a concept's performance related to these metrics). Therefore, bike-pedestrian crossing opportunities were not screened as part of the Level 2 Concept Screening; however, evaluation of the feasibility of bike-pedestrian crossing opportunities will continue, as described in **Section 6.0**.

5.1. Level 2 Concept Screening Criteria

As noted in **Section 3.3**, the Level 2 concept screening criteria included two additional metrics to assess the retained concepts' ability to meet Purpose and Need and metrics to assess feasibility. The metrics are described below.

5.1.1. Criterion 1: Purpose and Need

FRA and DDOT used the Purpose and Need metrics described below in both Step 1 and Step 2 of the Level 2 Concept Screening process. As noted in **Section 4.1**, the Level 1 Concept Screening also used metrics based on Purpose and Need. The Level 2 Concept Screening used additional metrics developed to address stakeholder comments following the Level 1 Concept Screening, as described in **Section 3.3.2**. The Level 2 Concept Screening Purpose and Need metrics included:

Metric 1A: Capacity—Eliminates operational bottleneck or prevents development of future bottleneck. *A concept is consistent if it ensures the investment in Long Bridge does not preclude proposals for expanded capacity in the railroad network connecting to the Corridor and the crossing does not become a bottleneck in the foreseeable future.*

The existing Long Bridge is a two-track bridge with a three-track approach in Virginia (to RO Interlocking) and a two-track approach in the District, widening to three tracks at the LE Interlocking. At the VA Interlocking in the District, near Virginia Avenue SW and 3rd Street SW, the mainline splits into two tracks traveling towards WUS and one track through the Virginia Avenue Tunnel. The Virginia Avenue Tunnel Project, currently under construction, will expand the tunnel to two tracks when complete.

The existing two-track bridge acts as a bottleneck for the three-track approaches through Northern Virginia and the District. In addition, these approaches currently act as bottlenecks for the wider railroad network. Projects underway to expand capacity of the approaches to four tracks, as well as medium- and long-term proposals, include:

- The Virginia Avenue Tunnel Project being undertaken by CSXT, DDOT, and the Federal Highway Administration (FHWA) will expand freight capacity east of the Long Bridge Corridor by replacing the existing single-track tunnel with two new tunnels capable of accommodating double-stack intermodal freight trains. This project, currently under construction, is on schedule for completion by October 2018.

- A proposed fourth track from Virginia (VA) Interlocking near Virginia Avenue SW and 3rd Street SW to LE Interlocking, part of VRE's L'Enfant Station Improvements Project, will expand capacity within the District. This project is planned for completion by 2024.

- The proposed fourth track from RO Interlocking to Alexandria Station is part of Virginia's Atlantic Gateway suite of projects, with environmental clearance being obtained through the DC2RVA Tier II EIS. FRA and the Virginia Department of Rail and Transportation (DRPT) completed the DC2RVA DEIS and circulated it for public comment through November 7, 2017. FRA plans to issue a Record of Decision (ROD) for this separate and independent project by the end of 2018.

The projects and proposals described above are intended to address the identified long-term need for additional capacity in the existing railroad network connecting to the Long Bridge Corridor. Any new bridge will serve the Long Bridge Corridor and the greater railroad network for 100 years or more and must provide sufficient capacity during that time.

Metric 1B: Connectivity, Resiliency, and Redundancy—Improves ability to maintain normal railroad operations and network connectivity during planned maintenance, construction, and unanticipated outages. *A concept is consistent if it provides the ability to maintain at least two tracks in regular operation at all times, including during construction, planned maintenance, or unanticipated outages.*

The Long Bridge provides a critical link in the national, regional, and local railroad system for passenger, commuter, and freight services. If service across the bridge is interrupted, freight trains must divert to the next closest crossing in Harpers Ferry, West Virginia. Any service interruption severs VRE service between Virginia and the District and halts Amtrak service between the Northeast Corridor and the Southeast Corridor.

Generally, track work requires stopping, reducing, or slowing operations on adjacent tracks to prevent accidents and protect passengers and workers. Under current conditions, this railroad safety procedure could result in the complete closure of the existing Long Bridge. To improve the resiliency, redundancy, and network connectivity within this critically important corridor, at least two tracks must remain unaffected and in regular operation during any construction, planned maintenance, or unanticipated outage event.

5.1.2. Criterion 2: Feasibility

The metrics of the feasibility criterion focus on the ability to construct, operate, and maintain any new or retained infrastructure within a constrained corridor that includes multiple other bridges, roadways, and buildings. The metrics are based on railroad best practices and engineering judgement for safety and maintenance access needs.

Metric 2A: Provides a minimum of 25 feet horizontal separation between adjacent structures over the river.

Concepts must provide sufficient space between bridges to enable vessels to access the bridges for construction, maintenance, and future inspection needs. A 25-foot horizontal separation between superstructures over the river is based on railroad industry best practices and engineering judgement.[26]

Metric 2B: Does not preclude replacement or rehabilitation of existing bridge.

The existing bridge will likely need rehabilitation or replacement before newer infrastructure requires replacement. Therefore, concepts must allow replacement or reconstruction of the existing bridge, whether as part of the Long Bridge Project or at a later date.

Metric 2C: Does not require interlocking infrastructure over the river.

Concepts must not require interlocking infrastructure such as switches, turnouts, or crossovers over the Potomac River. Interlocking infrastructure increases the risk of a derailment, which presents a substantial safety concern when that interlocking infrastructure is located over water.

Metric 2D: Avoids Department of Defense Facility.

Concepts must avoid the Department of Defense (DoD) Facility located between the existing Long Bridge Corridor and the NPS NCR headquarters. Concepts should be at least 10 feet from the fence line of the facility to enable equipment and personnel to access the railroad for construction and maintenance purposes. This distance is the minimum distance needed to provide access for construction and maintenance vehicles, based on industry standards.

[26] The 25-foot clearance is an established FRA safety requirement. It represents the minimum distance for a clear zone from the center line of an outside track to a work area. Work within the 25-foot zone requires appropriate worker protection measures.

5.2. Level 2, Step 1 Concept Screening Analysis

Based on the Level 2, Step 1 screening, FRA and DDOT determined only Concept 5 (four-track crossing) and Concept 5A (four-track crossing with bike-pedestrian path) are consistent with all Purpose and Need and feasibility metrics. If a concept is inconsistent with any metric, FRA and DDOT eliminated it from further consideration. The following sections describe the results of the analysis, which are summarized in **Table 5-1.**

Table 5-1 | Results of Level 2 Concept Screening, Step 1

Concept	Purpose and Need		Feasibility				Concept Retained
	1A	1B	2A	2B	2C	2D	
No Action	--	--	--	--	--	--	✓
Concept 3 and 3A (Three Tracks)	✗	✓	✓	✓	✓	✓	✗
Concept 5 and 5A (Four Tracks)	✓	✓	✓	✓	✓	✓	✓
Concept 8 and 8A (Five Tracks)	✗	✓	✓	✓	✗	✓	✗

** Evaluation of the feasibility of bike-pedestrian crossing opportunities continues, but such opportunities were not screened as part of the Level 2 Concept Screening using Purpose and Need metrics.*

5.2.1. Concepts 3 and 3A (Three Tracks)

Concepts 3 and 3A were eliminated.

Concepts 3 and 3A are consistent with the following metrics:

- **1B:** A three-track crossing, if provided on more than two structures, could provide sufficient redundancy during planned maintenance or an unanticipated outage. However, if two of the three tracks are on a single structure, track work on one track would require stopping, reducing, or slowing operations on the adjacent track to prevent accidents and protect passengers and workers, leaving at most one track in normal operation.
- **2A:** There is sufficient space between the existing Long Bridge and the Metrorail bridge, and downstream of the existing Long Bridge, to construct a three-track crossing with at least 25 feet of horizontal separation between bridges over the river.
- **2B:** It is possible to construct a three-track crossing without precluding replacement or rehabilitation of the existing bridge, whether as part of the Project or as part of a separate project. This could be accomplished by constructing an entirely new three-track bridge while

keeping the existing bridge in operation and then replacing it with the new bridge when complete, or by constructing one new track while the existing bridge remains in operation, and then either replacing or continuing to use the existing bridge.

- **2C:** There is sufficient space between the existing interlockings and the riverbank to construct the interlocking for a three-track crossing. Therefore, interlocking infrastructure would not be required over the river.

- **2D:** There is sufficient space between the existing Long Bridge and the Metrorail bridge to construct a three-track crossing that would be at least 10 feet from the DoD Facility fence line, which is located downstream of the existing bridge.

Concepts 3 and 3A are inconsistent with the following metrics:

- **1A:** The three-track concepts would not provide railroad capacity needed to relieve the bottleneck in the Long Bridge Corridor over the long-term. Current projects (the Virginia Avenue Tunnel) and medium-to long-term plans, including DC2RVA, which plans to add a fourth track between Alexandria Station and RO Interlocking in Virginia, and VRE's Fourth Track project between the LE and VA Interlockings in the District will address the need for expanded capacity in the railroad network connecting to the Long Bridge Corridor. With long-term plans for four tracks approaching the RO and LE Interlockings, adding only three tracks between RO and LE Interlockings would perpetuate the existing bottleneck condition.

5.2.2. Concepts 5 and 5A (Four Tracks)

Concepts 5 and 5A were retained.

Concepts 5 and 5A are consistent with all metrics.

- **1A:** Providing four tracks across the Potomac River would provide the railroad capacity needed to eliminate the existing operational bottleneck and prevent the development of a bottleneck in the long-term. Currently, there are three tracks approaching RO and LE Interlockings. Providing an additional track between RO and LE Interlockings would eliminate the existing bottleneck. With long-term plans for four tracks approaching RO and LE Interlockings, the addition of a fourth track between the interlockings would ensure a bottleneck does not occur in the future.

- **1B:** A four-track crossing could provide the redundant infrastructure needed to ensure railroads in the Corridor can maintain at least two tracks in regular operation at all times, including during construction, planned maintenance, or unanticipated outages.

- **2A:** There is sufficient space between the existing Long Bridge and the Metrorail bridge, and downstream of the existing Long Bridge, to construct a four-track crossing with at least 25 feet of horizontal separation between bridges over the river.

- **2B:** It is possible to construct a four-track crossing without precluding replacement or rehabilitation of the existing bridge, whether as part of the Project or as part of a separate

project. This could be accomplished by constructing an entirely new four-track bridge while keeping the existing bridge in operation and then replacing it with the new bridge when complete, or by constructing two new tracks while the existing bridge remains in operation, and then either replacing or continuing to use the existing bridge.

- **2C:** There is sufficient space between the existing interlockings and the riverbank to construct the interlocking for a four-track crossing. Therefore, interlocking infrastructure would not be required over the Potomac River.

- **2D:** There is sufficient space between the existing Long Bridge and the Metrorail bridge to construct a four-track crossing that would be at least 10 feet from the DoD Facility fence line, which is located downstream of the existing bridge.

5.2.3. Concepts 8 and 8A (Five Tracks)

Concepts 8 and 8A were eliminated.

Concepts 8 and 8A are consistent with the following metrics:

- **1B:** A five-track crossing could provide the redundant infrastructure needed to ensure railroads in the Corridor can maintain at least two tracks in regular operation at all times, including during construction, planned maintenance, or unanticipated outages.

- **2A:** There is sufficient space between the existing Long Bridge and the Metrorail bridge, and downstream of the existing Long Bridge, to construct a five-track crossing with at least 25 feet of horizontal separation between bridges over the river.

- **2B:** It is possible to construct a five-track crossing without precluding replacement or rehabilitation of the existing bridge, whether as part of the Project or as part of a separate project. This could be accomplished by constructing an entirely new five-track bridge while keeping the existing bridge in operation and then replacing it with the new bridge when complete, or by constructing three new tracks while the existing bridge remains in operation, and then either replacing or continuing to use the existing bridge.

- **2D:** There is sufficient space between the existing Long Bridge and the Metrorail bridge to construct a five-track crossing that would be at least 10 feet from the DoD Facility fence line, which is located downstream of the existing bridge.

Concepts 8 and 8A are inconsistent with the following metrics:

- **1A:** A five-track crossing would create a long-term bottleneck across the river. There are no long-term plans to expand the right-of-way beyond four tracks approaching RO and LE Interlockings. With a five-track crossing and four-track approaches, the fifth track would essentially be a siding or “pocket track.” Trains using the fifth track would be required to switch back to one of the four tracks on either side of the bridge, requiring trains to slow down and

move between switches on either side of the bridge. This would create a new bottleneck rather than relieving the existing bottleneck. Therefore, a five-track crossing would not meet Purpose and Need.

- **2C:** A five-track crossing would require a large, complex, interlocking to enable movements from the fifth track back to the four-track alignments on either side of the bridge. On the District side of the river, there is not sufficient length to accommodate this infrastructure without the interlocking extending onto the Long Bridge. The design metric does not permit interlocking infrastructure on bridges due to safety concerns. Therefore, a five-track crossing is not feasible.

5.3. Level 2, Step 2 Concept Screening Analysis

In Step 2 of the Level 2 Concept Screening, nine track alignment options were developed for a four-track crossing of the Potomac River. Conceptual engineering drawings for these alignment options are shown in **Appendix B.** Multiple track alignment options are possible for a four-track concept. To develop the alignment options to be screened, the full range of configurations were considered. For each potential configuration, a single horizontal alignment option was developed based on safety considerations, engineering standards, the need for two tracks to remain in operation during construction, and the desire to minimize right-of-way impacts. As noted in **Table 3-3**, all concepts would have potential impacts to parkland; however, alignments were developed to minimize these impacts while still meeting design metrics.

The nine alignment options were evaluated using the same Purpose and Need metrics and feasibility metrics as in Step 1. If an alignment option failed to meet any criterion, it was eliminated from further consideration. The track alignment options are shown in **Figure 5-1** and include:

- **Alignment Option A:** New two-track bridge upstream of existing bridge, with existing two-track bridge retained.
- **Alignment Option B:** New two-track bridge upstream of existing bridge, with existing two-track bridge replaced with a new two-track bridge.
- **Alignment Option C:** New two-track bridge downstream of existing bridge, with existing two-track bridge retained.
- **Alignment Option D:** New two-track bridge downstream of existing bridge, with existing two-track bridge replaced with a new two-track bridge.
- **Alignment Option E:** New four-track bridge upstream of existing bridge, overlapping the footprint of the existing bridge. This option would be built in phases. In the first phase, a new two-track bridge would be constructed close to the existing alignment. The existing bridge would then be demolished and the new bridge expanded to four tracks.
- **Alignment Option F:** New four-track bridge downstream of existing bridge, overlapping the footprint of the existing bridge. This option would be built in phases. In the first phase, a new two-track bridge would be constructed close to the existing alignment. The existing bridge would then be demolished and the new bridge expanded to four tracks.
- **Alignment Option G:** New single-track bridge on each side of existing bridge; retain or replace existing bridge.
- **Alignment Option H:** New four-track bridge upstream of existing bridge; demolish existing bridge.

- **Alignment Option I:** New four-track bridge downstream of existing bridge; demolish existing bridge.

As noted earlier, bike-pedestrian crossing opportunities were not screened as part of the Level 2 Concept Screening. However, evaluation of the feasibility of bike-pedestrian crossing opportunities will continue, as described in **Section 6.0**.

Figure 5-1 | Alignment Options Evaluated in Level 2, Step 2 Concept Screening

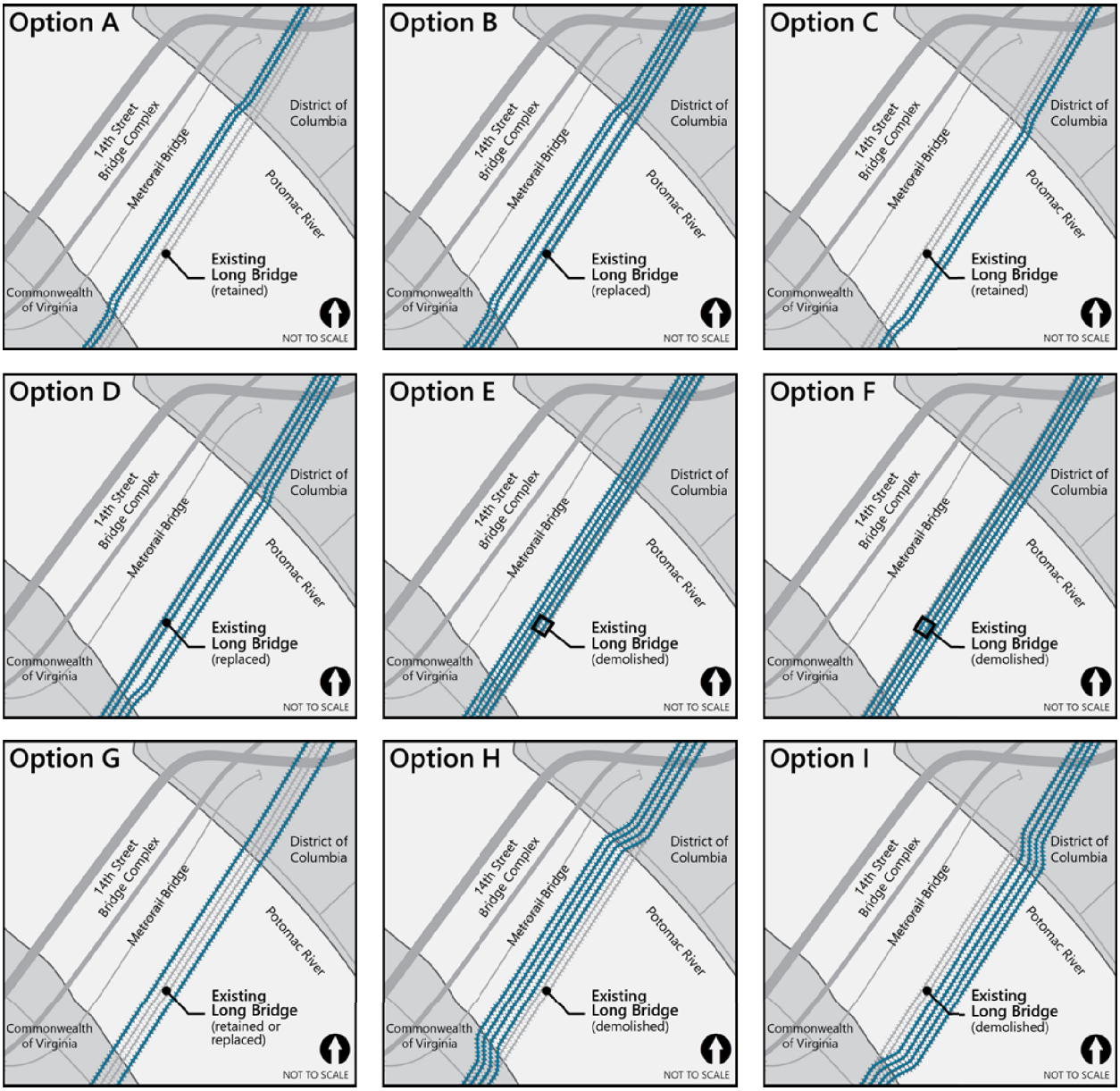


Table 5-2 summarizes the results of the Level 2, Step 2 screening. Based on this screening, the two alignment options that remain (in addition to the No Action Alternative) are:

- **Alignment Option A**: New two-track bridge upstream of existing bridge, with existing two-track bridge retained.
- **Alignment Option B**: New two-track bridge upstream of existing bridge, with existing two-track bridge replaced with a new two-track bridge.

Table 5-2 | Results of Level 2 Concept Screening, Step 2

Four-Track Crossing Alignment Options	Purpose and Need		Feasibility				Concept Retained
	1A	1B	2A	2B	2C	2D	
No Action	--	--	--	--	--	--	✓
A: New two-track bridge upstream, retain existing	✓	✓	✓	✓	✓	✓	✓
B: New two-track bridge upstream, replace existing	✓	✓	✓	✓	✓	✓	✓
C: New two-track bridge downstream, retain existing	✓	✓	✓	✓	✓	✗	✗
D: New two-track bridge downstream, replace existing	✓	✓	✓	✓	✓	✗	✗
E: New four-track bridge upstream, overlapping existing	✓	✗	✓	✓	✓	✓	✗
F: New four-track bridge downstream, overlapping existing	✓	✗	✓	✓	✓	✗	✗
G: New track on either side, retain or replace existing	✓	✗	✓	✗	✓	✓	✗
H: New four-track bridge upstream	✓	✗	✓	✓	✓	✓	✗
I: New four-track bridge downstream	✓	✗	✓	✓	✓	✗	✗

** Evaluation of the feasibility of bike-pedestrian crossing opportunities continues, but such opportunities were not screened as part of the Level 2 Concept Screening using Purpose and Need.*

5.3.1. Alignment Option A: New two-track bridge upstream, retain existing bridge

Alignment Option A includes four tracks crossing the Potomac River. With this alignment option, a new two-track bridge would be constructed upstream of the existing bridge, and the existing bridge would be retained to create a four-track crossing.

Alignment Option A was retained.

Alignment Option A is consistent with all metrics.

- **1A:** Providing four tracks across the Potomac River would eliminate the existing operational bottleneck and prevent the development of a bottleneck in the long-term. Currently, there are three tracks approaching RO and LE Interlockings. Adding an additional track between RO and LE Interlockings would eliminate the existing bottleneck. With long-term plans for four tracks approaching RO and LE Interlockings, the addition of a fourth track between the interlockings would ensure a bottleneck does not occur in the future.
- **1B:** Providing four tracks on two separate substructures (two tracks per structure) would provide the redundant infrastructure needed to ensure railroads in the Long Bridge Corridor can maintain at least two tracks in regular operation at all times, including during construction, planned maintenance, or unanticipated outages.
- **2A:** There is sufficient space between the existing Long Bridge and the Metrorail bridge to construct a new two-track bridge with at least 25 feet of horizontal separation between bridges over the river.
- **2B:** The new two-track bridge would be constructed at least 25 feet upstream of the existing Long Bridge, and would not constrain access to the existing bridge from down river. Therefore, it is possible to construct a new two-track bridge without precluding replacement or rehabilitation of the existing bridge at a later date and as part of a separate project.
- **2C:** There is sufficient space between the existing interlockings and the riverbank to construct the interlocking for a four-track crossing. Therefore, interlocking infrastructure would not be required over the river.
- **2D:** Constructing a new two-track bridge upstream of the existing bridge would enable the new bridge to be at least 10 feet from the fence line of the DoD Facility, which is located downstream of the existing bridge.

5.3.2. Alignment Option B: New two-track bridge upstream, replace existing bridge

Alignment Option B includes four tracks crossing the Potomac River. With this alignment option, a new two-track bridge would be constructed upstream of the existing bridge. Subsequently, the existing bridge would be replaced with a new two-track bridge, creating a four-track crossing.

Alignment Option B was retained.

Alignment Option B is consistent with all metrics.

- **1A:** Providing four tracks across the Potomac River would eliminate the existing operational bottleneck and prevent the development of a bottleneck in the long term. Currently, there are three tracks approaching RO and LE Interlockings. Adding an additional track between RO and LE Interlockings would eliminate the existing bottleneck. With long-term plans for four tracks approaching RO and LE Interlockings, the addition of a fourth track between the interlockings would ensure a bottleneck does not occur in the future.
- **1B:** Providing four tracks on two separate substructures (two tracks per structure) would provide the redundant infrastructure needed to ensure the railroads in the Long Bridge Corridor can maintain at least two tracks in regular operation at all times, including during construction, planned maintenance, or unanticipated outages.
- **2A:** There is sufficient space between the existing Long Bridge and the Metrorail bridge to construct a new two-track bridge with at least 25 feet of horizontal separation between bridges over the river. There would be sufficient space between the new upstream bridge and the existing bridge to construct a replacement in the location of the existing bridge with at least 25 feet of horizontal separation between bridges over the river.
- **2B:** The new two-track bridge would be constructed at least 25 feet upstream of the existing Long Bridge, and would not constrain access to the existing bridge from down river. Therefore, it is possible to construct a new two-track bridge without precluding replacement of the existing bridge as part of the Project.
- **2C:** There is sufficient space between the existing interlockings and the riverbank to construct the interlocking for a four-track crossing. Therefore, interlocking infrastructure would not be required over the river.
- **2D:** Constructing a new two-track bridge upstream of the existing bridge would enable the new bridge to be at least 10 feet from the DoD Facility fence line, which is located downstream of the existing bridge. The replacement for the existing bridge would be constructed in the same location as the existing bridge, which is more than 10 feet from the fence line of the DoD Facility.

5.3.3. Alignment Option C: New two-track bridge downstream, retain existing bridge

Alignment Option C includes four tracks crossing the Potomac River. With this alignment option, a new two-track bridge would be constructed downstream of the existing bridge, and the existing bridge would be retained to create a four-track crossing.

Alignment Option C was eliminated.

Alignment Option C is consistent with the following metrics:

- **1A:** Providing four tracks across the Potomac River would eliminate the existing operational bottleneck and prevent the development of a bottleneck in the long term. Currently, there are three tracks approaching RO and LE Interlockings. Adding an additional track between RO and LE Interlockings would eliminate the existing bottleneck. With long-term plans for four tracks approaching RO and LE Interlockings, the addition of a fourth track between the interlockings would ensure a bottleneck does not occur in the future.
- **1B:** Providing four tracks on two separate substructures (two tracks per structure) would provide the redundant infrastructure needed to ensure the railroads in the Long Bridge Corridor can maintain at least two tracks in regular operation at all times, including during construction of the Project, planned maintenance, or unanticipated outages.
- **2A:** There is sufficient space downstream of the existing Long Bridge to construct a new two-track bridge with at least 25 feet of horizontal separation between bridges over the river. There are no structures downstream of the existing bridge for several miles.
- **2B:** The new two-track bridge would be constructed at least 25 feet downstream of the existing Long Bridge, and would not constrain access to the existing bridge from down river. Therefore, it is possible to construct a new two-track bridge without precluding replacement or rehabilitation of the existing bridge at a later date and as part of a separate project.
- **2C:** There is sufficient space between the existing interlockings and the riverbank to construct the interlocking for a four-track crossing. Therefore, interlocking infrastructure would not be required over the river.

Alignment Option C is inconsistent with the following metric:

- **2D:** Constructing a new two-track bridge downstream of the existing bridge would not avoid the DoD Facility. A new two-track bridge downstream of the existing bridge would require construction of a permanent retaining wall that would be within 10 feet of the fence line of the DoD Facility. This distance is not sufficient to enable equipment and personnel to access the railroad for construction and maintenance purposes. This distance is the minimum distance needed to provide access for construction and maintenance vehicles, based on industry standards.

5.3.4. Alignment Option D: New two-track bridge downstream, replace existing bridge

Alignment Option D includes four tracks crossing the Potomac River. With this alignment option, a new two-track bridge would be constructed downstream of the existing bridge. Subsequently, the existing bridge would be replaced with a new two-track bridge, creating a four-track crossing.

Alignment Option D was eliminated.

Alignment Option D is consistent with the following metrics:

- **1A:** Providing four tracks across the Potomac River would eliminate the existing operational bottleneck and prevent the development of a bottleneck in the long term. Currently, there are three tracks approaching RO and LE Interlockings. Adding an additional track between RO and LE Interlockings would eliminate the existing bottleneck. With long-term plans for four tracks approaching RO and LE Interlockings, the addition of a fourth track between the interlockings would ensure a bottleneck does not occur in the future.
- **1B:** Providing four tracks on two separate substructures (two tracks per structure), would provide the redundant infrastructure needed to ensure the railroads in the Long Bridge Corridor can maintain at least two tracks in regular operation at all times, including during construction of the Project, planned maintenance, or unanticipated outages.
- **2A:** There is sufficient space downstream of the existing Long Bridge to construct a new two-track bridge with at least 25 feet of horizontal separation between bridges over the river. There are no structures downstream of the existing bridge for several miles.
- **2B:** The new two-track bridge would be constructed at least 25 feet downstream of the existing Long Bridge, and would not constrain access to the existing bridge from down river. Therefore, it is possible to construct a new two-track bridge without precluding replacement of the existing bridge as part of the Project.
- **2C:** There is sufficient space between the existing interlockings and the riverbank to construct the interlocking for a four-track crossing. Therefore, interlocking infrastructure would not be required over the river.

Alignment Option D is inconsistent with the following metric:

- **2D:** Constructing a new two-track bridge downstream of the existing bridge would not avoid the DoD Facility. A new two-track bridge downstream of the existing bridge would require construction of a permanent retaining wall that would be within 10 feet of the fence line of the DoD Facility. This distance is not sufficient to enable equipment and personnel to access the railroad for construction and maintenance purposes. This distance is the minimum distance needed to provide access for construction and maintenance vehicles, based on industry standards.

5.3.5. Alignment Option E: New four-track bridge upstream, overlapping existing bridge

Alignment Option E includes four tracks crossing the Potomac River. With this alignment option, a new two-track bridge would be constructed upstream of the existing bridge. The existing bridge would then be replaced and the new bridge would be expanded to four tracks, overlapping the footprint of the previous bridge.

Alignment Option E was eliminated.

Alignment Option E is consistent with the following metrics:

- **1A:** Providing four tracks across the Potomac River would eliminate the existing operational bottleneck and prevent the development of a bottleneck in the long term. Currently, there are three tracks approaching RO and LE Interlockings. Adding an additional track between RO and LE Interlockings would eliminate the existing bottleneck. With long-term plans for four tracks approaching RO and LE Interlockings, the addition of a fourth track between the interlockings would ensure a bottleneck does not occur in the future.
- **2A:** There is sufficient space between the existing Long Bridge and the Metrorail bridge to construct a new four-track bridge with at least 25 feet of horizontal separation between bridges over the river.
- **2B:** The new four-track bridge would replace the existing Long Bridge.
- **2C:** There is sufficient space between the existing interlockings and the riverbank to construct the interlocking for a four-track crossing. Therefore, interlocking infrastructure would not be required over the river.
- **2D:** Constructing a new two-track bridge upstream of the existing bridge and then expanding it to replace the existing bridge would enable the new bridge to be at least 10 feet from the fence line of the DoD Facility, which is located downstream of the existing bridge.

Alignment Option E is inconsistent with the following metric:

- **1B:** Four tracks on a single structure would likely not provide sufficient redundancy during planned maintenance or an unanticipated outage on the middle track. Generally, track work on a middle track would require stopping, reducing, or slowing operations on the two adjacent tracks to prevent accidents and protect passengers and workers, leaving only one track in normal operation.

5.3.6. Alignment Option F: New four-track bridge downstream, overlapping existing bridge

Alignment Option F includes four tracks crossing the Potomac River. With this alignment option, a new two-track bridge would be constructed downstream of the existing bridge. The existing bridge would then be replaced and the new bridge would be expanded to four tracks, overlapping the footprint of the previous bridge.

Alignment Option F was eliminated.

Alignment Option F is consistent with the following metrics:

- **1A:** Providing four tracks across the Potomac River would eliminate the existing operational bottleneck and prevent the development of a bottleneck in the long term. Currently, there are three tracks approaching RO and LE Interlockings. Adding an additional track between RO and LE Interlockings would eliminate the existing bottleneck. With long-term plans for four tracks approaching RO and LE Interlockings, the addition of a fourth track between the interlockings would ensure a bottleneck does not occur in the future.
- **2A:** There is sufficient space downstream of the existing Long Bridge to construct a new four-track bridge with at least 25 feet horizontal separation between bridges over the river. There are no structures downstream of the existing bridge for several miles.
- **2B:** The new four-track bridge would replace the existing Long Bridge.
- **2C:** There is sufficient space between the existing interlockings and the riverbank to construct the interlocking for a four-track crossing. Therefore, interlocking infrastructure would not be required over the river.

Alignment Option F is inconsistent with the following metrics:

- **1B:** Four tracks on a single structure would likely not provide sufficient redundancy during planned maintenance or an unanticipated outage on the middle track. Generally, track work on a middle track would require stopping, reducing, or slowing operations on the two adjacent tracks to prevent accidents and protect passengers and workers, leaving only one track in normal operation.
- **2D:** Constructing new tracks downstream of the existing bridge would not avoid the DoD Facility. The new downstream tracks would require construction of a permanent retaining wall that would be within 10 feet of the fence line of the DoD Facility. This distance is not sufficient to enable equipment and personnel to access the railroad for construction and maintenance purposes. This distance is the minimum distance needed to provide access for construction and maintenance vehicles, based on industry standards.

5.3.7. Alignment Option G: New track on each side, retain or replace existing bridge

Alignment Option G includes four tracks crossing the Potomac River. With this alignment option, two new single-track bridges would be constructed on either side of the existing bridge. The existing bridge would be retained or replaced with a new two-track bridge. To maintain two tracks in regular operation during construction, the new bridges would be constructed while the existing bridge remains in operation. The existing bridge could be replaced following construction of the new bridges, either as part of the Project or at a later date as part of a separate project.

Replacement or major rehabilitation of the existing bridge before constructing two new bridges would result in extensive operational impacts such as single-tracking, full closure with rerouting, or speed restrictions. If the existing bridge is not replaced as part of the Project, it is reasonable to assume that it will require replacement before the new outer bridges.

Alignment Option G was eliminated.

Alignment Option G is consistent with the following metrics:

- **1A:** Providing four tracks across the Potomac River would eliminate the existing operational bottleneck and prevent the development of a bottleneck in the long term. Currently, there are three tracks approaching RO and LE Interlockings. Adding an additional track between RO and LE Interlockings would eliminate the existing bottleneck. With long-term plans for four tracks approaching RO and LE Interlockings, the addition of a fourth track between the interlockings would ensure a bottleneck does not occur in the future.
- **2A:** There is sufficient space between the existing Long Bridge and the Metrorail bridge to construct a new single-track bridge upstream with at least 25 feet of horizontal separation between bridges over the river. There is also sufficient space downstream of the existing Long Bridge to construct a new single-track bridge with at least 25 feet of horizontal separation between bridges over the river. There are no structures downstream of the existing bridge for several miles.
- **2C:** There is sufficient space between the existing interlockings and the riverbank to construct the interlocking for a four-track crossing. Therefore, interlocking infrastructure would not be required over the river.
- **2D:** A new single-track bridge downstream of the existing bridge could be constructed at least 10 feet from the DoD Facility fence line, which is located downstream of the existing bridge.

Alignment Option G is inconsistent with the following metrics:

- **1B (if replacing the existing bridge as part of the Project):** Constructing two new single-track bridges on either side of the existing bridge would not provide the redundant infrastructure needed to ensure the railroads in the Long Bridge Corridor can maintain at least two tracks in regular operation during construction of a new two-track bridge to replace the existing bridge. Demolition and replacement of the existing bridge, with bridges on either side, would require large cranes to reach over the new outer bridges. This construction method would require halting operations on the new outer bridge when cranes were in use for safety, resulting in extensive periods of single-tracking.
- **2B:** Constructing two new single-track bridges on either side of the existing bridge would preclude future replacement and potentially rehabilitation of the existing bridge. As noted above, accessing the existing bridge for demolition and replacement would require large cranes to reach over the new outer bridges. Since the bridges lie in the flight path for Ronald Reagan Washington National Airport, the corridor is subject to height restrictions; the crane height required to reach over the new outer bridges would violate these height restrictions. Therefore, it would not be possible to replace the existing bridge. Additionally, rehabilitation of the existing bridge requiring the use of cranes would similarly not be possible.

5.3.8. Alignment Option H: New four-track bridge upstream

Alignment Option H includes four tracks crossing the Potomac River. With this alignment option, a new four-track bridge would be constructed upstream of the existing bridge. The existing bridge would then be removed.

Alignment Option H was eliminated.

Alignment Option H is consistent with the following metrics:

- **1A:** Providing four tracks across the Potomac River would eliminate the existing operational bottleneck and prevent the development of a bottleneck in the long term. Currently, there are three tracks approaching RO and LE Interlockings. Adding an additional track between RO and LE Interlockings would eliminate the existing bottleneck. With long-term plans for four tracks approaching RO and LE Interlockings, the addition of a fourth track between the interlockings would ensure a bottleneck does not occur in the future.
- **2A:** There is sufficient space between the existing Long Bridge and the Metrorail bridge to construct a new four-track bridge with at least 25 feet of horizontal separation between bridges over the river.
- **2B:** The new four-track bridge would replace the existing Long Bridge.

- **2C:** There is sufficient space between the existing interlockings and the riverbank to construct the interlocking for a four-track crossing. Therefore, interlocking infrastructure would not be required over the river.
- **2D:** Constructing a new two-track bridge upstream of the existing bridge would enable the new bridge to be at least 10 feet from the fence line of the DoD Facility, which is located downstream of the existing bridge.

Alignment Option H is inconsistent with the following metric:

- **1B:** Four tracks on a single structure would likely not provide sufficient redundancy during planned maintenance or an unanticipated outage on the middle track. Generally, track work on a middle track would require stopping, reducing, or slowing operations on the two adjacent tracks to prevent accidents and protect passengers and workers, leaving only one track in normal operation.

5.3.9. Alignment Option I: New four-track bridge downstream

Alignment Option I includes four tracks crossing the Potomac River. With this alignment option, a new four-track bridge would be constructed downstream of the existing bridge. The existing bridge would then be removed.

Alignment Option I was eliminated.

Alignment Option I is consistent with the following metrics:

- **1A:** Providing four tracks across the Potomac River would eliminate the existing operational bottleneck and prevent the development of a bottleneck in the long term. Currently, there are three tracks approaching RO and LE Interlockings. Adding an additional track between RO and LE Interlockings would eliminate the existing bottleneck. With long-term plans for four tracks approaching RO and LE Interlockings, the addition of a fourth track between the interlockings would ensure a bottleneck does not occur in the future.
- **2A:** There is sufficient space downstream of the existing Long Bridge to construct a new four-track bridge with at least 25 feet of horizontal separation between bridges over the river. There are no structures downstream of the existing bridge for several miles.
- **2B:** The new four-track bridge would replace the existing Long Bridge.
- **2C:** There is sufficient space between the existing interlockings and the riverbank to construct the interlocking for a four-track crossing. Therefore, interlocking infrastructure would not be required over the river.

Alignment Option I is inconsistent with the following metrics:

- **1B:** Four tracks on a single structure would likely not provide sufficient redundancy during planned maintenance or an unanticipated outage on the middle track. Generally, track work on a middle track would require stopping, reducing, or slowing operations on the two adjacent tracks to prevent accidents and protect passengers and workers, leaving only one track in normal operation.
- **2D:** Constructing new tracks downstream of the existing bridge could not avoid the DoD Facility. The new downstream tracks would go through the DoD Facility property.

5.4. Feedback from the Public and Agencies on the Level 2 Concept Screening

DDOT and FRA presented the results of the Level 2 Concept Screening to the public and agencies at meetings in December 2017. The following sections summarize comments and questions received from the public and agencies.

5.4.1. Agency Comments on the Level 2 Concept Screening

FRA and DDOT held an interagency meeting on December 12, 2017. Representatives from participating and cooperating agencies attended the meeting. Much of the discussion at the meeting focused on clarifying questions related to the concept screening and the issues that would be analyzed in the DEIS. Specific clarifying questions related to the screening included asking for additional reasoning for why five tracks would create a bottleneck (from District of Columbia State Historic Preservation Office [DC SHPO]) and for the basis for the 25-foot clearance between structures across the river (Washington Metropolitan Area Transit Authority [WMATA]). Both questions resulted in the inclusion of additional explanatory text in this report in **Section 5.1**. Agencies also asked for additional detail related to the alternatives, including:

- Amount of existing bridge infrastructure retained under each alternative (DC SHPO);
- Potential re-use of the existing piers (DC SHPO);
- Whether the entire structure will be supported from below or whether a truss will be required (DC SHPO);
- Whether navigation requirements will affect how much of the structure can be supported from below (Commission of Fine Arts [CFA]);
- Whether the bridge over Maine Avenue will need to be rebuilt for four tracks, and whether this and impacts to other minor bridges would affect views towards the Monumental Core (CFA); and,
- Whether either of the Action Alternatives would affect the potential for future development along Maryland Avenue (District Office of Planning [DCOP]).

National Capital Planning Commission (NCPC) also recommended that the future Long Bridge design be developed with consideration of other existing and planned future bridges across the Potomac River and

improvements to Maryland Avenue and VRE L'Enfant Station. These issues will be addressed through the DEIS analysis, as appropriate. The Virginia Department of Historic Resources (VDHR) also asked whether the No Action Alternative projects will serve as the baseline for the Section 106 analysis as well as for NEPA. FRA responded that the cumulative effects of these projects will be considered under Section 106.

Cooperating and participating agencies also addressed the potential bike-pedestrian crossing options in their comments. CFA stressed the importance of connections between activity centers, and encouraged FRA and DDOT to explore extending the crossing over the GWMP to Long Bridge Park and Crystal City. NCPC noted that any bike-pedestrian connection should maximize utility and enhance experience for all users, and should consider future connections to Crystal City, the Mount Vernon Trail, East Potomac Park, Maine Avenue, and the Southwest Waterfront, including connections to the Anacostia Riverwalk Trail (part of the Potomac Heritage National Scenic Trail). Arlington County expressed support for constructing a bike-pedestrian crossing as part of the Project, and expressed support for providing a direct bike-pedestrian connection to Long Bridge Park. However, DRPT noted that the primary focus of the Project is increasing rail capacity, and expressed significant concerns regarding safety and constructability of any combined-mode structure. VRE also expressed concern over the safety and security implications of any combined-mode structure.

NPS expressed support for carrying the potential bike-pedestrian crossing options forward in the DEIS. However, NPS expressed possible concerns related to impacts to the Mount Vernon Trail and the need to evaluate potential impacts, including congestion, visual challenges, and loss of vegetation and trees.

5.4.2. Public Comments on the Level 2 Concept Screening

FRA and DDOT held a public information meeting on December 14, 2017, which had 42 attendees. A detailed summary of the public meeting is available on the Project website (www.longbridgeproject.com). At the meeting, the public provided a total of 29 questions and comments, either submitted on comment cards and Title VI questionnaires or presented during the question-and-answer sessions. Following the meeting, the public submitted 1,629 emailed comments through the end of the public comment period on January 16, 2018.

The majority of comments and questions received at the public meeting addressed the opportunity for a bike-pedestrian connection across the Potomac River, while other comments addressed railroad capacity, navigation, aesthetics, floodplain management, public health and safety, noise and vibration, funding, and general comments about the meeting. The majority of emailed comments related to the bike-pedestrian crossing options. Other comments related to navigation, railroad capacity, noise and vibration, and funding.

At the public meeting, FRA and DDOT presented three potential bike-pedestrian crossing options that would land near the Mount Vernon Trail in Virginia and in East Potomac Park in the District. Following the public meeting, the public submitted 1,604 email comments in support of a bike-pedestrian crossing

as part of the Long Bridge Project, and one email comment against it.[27] Of the 1,604 email comments in favor of a bike-pedestrian crossing, 98 percent of commenters supported extending bike-pedestrian landings across the GWMP to destinations in Arlington and across the Washington Channel to destinations in the District.

[27] 1,277 of these comments (or 80 percent) were a form letter which is documented in the detailed public meeting summary on the project website. A further 231 comments (or 14 percent) were modified versions of the form letter. A further 97 (16 percent) unique email comments were received.

6.0 Opportunities for a Bike-Pedestrian Crossing

As noted in **Section 2.2**, a bike-pedestrian crossing is not part of the Purpose and Need of the Long Bridge Project. However, some commenters have expressed strong support for a crossing. Therefore, the Project will explore the potential opportunity to accommodate a river crossing with connections to the pedestrian and bicycle network on each shoreline. FRA and DDOT advanced concepts including a bike-pedestrian crossing from the Level 1 to the Level 2 Concept Screening. During the Level 2 Concept Screening, FRA and DDOT evaluated opportunities for a bike-pedestrian crossing separately from the railroad concepts, with a focus on feasibility rather than Purpose and Need (the railroad concepts were evaluated based on both feasibility and Purpose and Need).

The bike-pedestrian crossing study limits extend from the Long Bridge Park side of the GWMP to Ohio Drive SW, with an evaluation of connections to the Mount Vernon Trail and Ohio Drive SW. During the Level 2 Concept Screening, FRA and DDOT developed four potential bike-pedestrian crossing options for further evaluation. The alignments developed minimized right-of-way impacts and were consistent with the following metrics:

- A minimum of 25 feet horizontal separation between structures over the river;
- Connects to existing bike-pedestrian facilities, paths, or on-street infrastructure, including bike-friendly streets; and
- Does not require more than a 5 percent slope for ramps from the crossing to existing connections (required by Americans with Disabilities Act [ADA] regulations).

Options that would place the bike-pedestrian crossing between the two railroad bridges in Alignment Options A and B were eliminated from consideration because these options would require the railroad bridges to be located farther apart from each other, expanding the area of right-of-way impact on the Virginia and District sides of the river. This right-of-way impact would be to parkland, which is a Section 4(f) resource as described in **Section 3.3.** This additional spacing would be required to maintain 25 feet of horizontal separation between bridges over the river to enable maintenance and future inspection needs. Additionally, connecting the bike-pedestrian crossing to existing facilities would be more difficult if the bike-pedestrian crossing were located between the two railroad bridges.

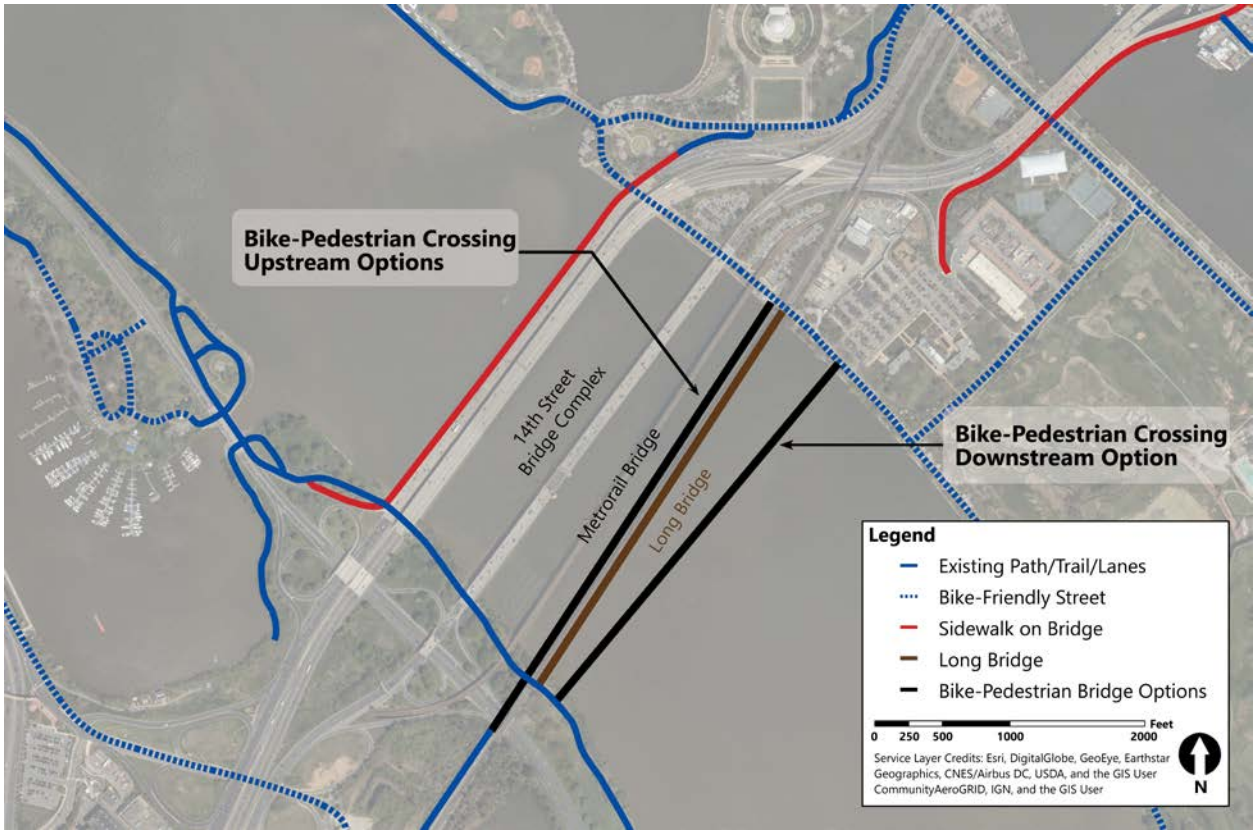
Four bike-pedestrian crossing options have been retained for further analysis. Options shown at the public and agency meetings in December 2017 did not show the crossing connecting across the GWMP to Long Bridge Park. However, following significant feedback received from the public and agencies (CFA, NCPC, and Arlington County) that each emphasized the importance of a connection to Crystal City, the potential to cross the GWMP will be evaluated as part of all four options.

The ramps connecting to the Mount Vernon Trail in Virginia and to Ohio Drive in the District will begin sloping down to existing ground once the crossing reaches land on either side of the river, or may begin sloping down while still over the river, which would minimize the need for ramp switchbacks. The determination of whether the bridge can begin sloping downward while still over the river channel will be made in consultation with the USCG regarding the minimum allowable vertical clearance over the channel.

The four bike-pedestrian crossing options are illustrated in **Figure 6-1** and summarized as follows:

- **Option 1—attached to the upstream side of the new upstream railroad bridge:** Option 1 would attach the bike-pedestrian crossing to the upstream side of a new railroad bridge located upstream of the existing railroad bridge using shared superstructures and substructures with the railroad bridge.
- **Option 2—attached to the upstream side of the new upstream railroad bridge:** Option 2 would attach the bike-pedestrian crossing to the upstream side of a new railroad bridge also located upstream of the existing railroad bridge. This option is similar to Option 1, but would have separate superstructures supported on a substructure with the railroad bridge.
- **Option 3—independent bridge upstream of new upstream railroad bridge:** Option 3 would locate the bike-pedestrian crossing upstream of a new railroad bridge on a separate bridge.
- **Option 4—independent bridge downstream of existing railroad bridge:** Option 4 would locate the bike-pedestrian crossing downstream of the existing railroad bridge on a separate bridge. To optimize connections to bicycle and pedestrian facilities, the crossing would connect in the District to Ohio Drive SW near the NPS NCR Headquarters, rather than landing next to Long Bridge.

Figure 6-1 | Bike-Pedestrian Crossing Alignment Options



The four bike-pedestrian crossing options identified are being evaluated using a Hazard Analysis (HA) and Threat, Vulnerability, and Risk Assessment (TVRA). The assessment will identify potential safety hazards, risks, and threat scenarios, and will provide suggestions to eliminate or reduce hazards and risks and enhance security. This information will be used to further evaluate the feasibility of the potential opportunity to accommodate connections that follow the trajectory of the Long Bridge Corridor to the pedestrian and bicycle network.

DDOT and FRA will use the results of the HA and TVRA to determine if the potential opportunity for a bike-pedestrian crossing should be further evaluated. Based on the results of the HA and TVRA, further conceptual engineering analysis may be completed to develop proposed bike-pedestrian crossing concepts that further define bridge, ramp, and path geometry along with the associated temporary and permanent limits of disturbance and impact areas.

7.0 Alternatives to Be Evaluated in the DEIS

7.1. Action Alternatives

Based on the results of the Level 1 and Level 2 Concept Screenings, and feedback from agencies and the public, the two Action Alternatives to be evaluated in the DEIS will be Action Alternative A and Action Alternative B. With the transition from concept screening phases of the Project to the preparation of the DEIS, the concept alignment options will now be referred to as Action Alternatives.[28] Each Action Alternative involves constructing a new two-track bridge upstream of the existing bridge. The Action Alternatives vary in whether they retain or replace the existing bridge.

- **Action Alternative A**: With this alternative, a new two-track bridge would be constructed upstream of the existing Long Bridge. The existing two-track Long Bridge would be retained to create a four-track crossing.
- **Action Alternative B:** With this alternative, a new two-track bridge would be constructed upstream of the existing bridge. Subsequently, the existing bridge would be replaced with a new two-track bridge, creating a four-track crossing.

7.2. No Action Alternative

The DEIS will also evaluate the No Action Alternative, pursuant to the CEQ regulations for implementing NEPA.[29] The No Action Alternative consists of the conditions that will likely exist in an analysis year if a proposed action (in this case, the Long Bridge Project) is not implemented. While the No Action Alternative is not consistent with the Long Bridge Project's Purpose and Need, it serves as a baseline against which the potential impacts of the Action Alternatives can be compared.

The Long Bridge Corridor is part of multimodal transportation network that consists of railroads, transit, trails (bicycle and pedestrian), and roadways. The No Action Alternative consists of the existing transportation network, plus all transportation projects within the Project Area (one-quarter mile of the existing Long Bridge Corridor) that are predictable in the planning year of 2040, as shown in **Figure 7-1**. The No Action Alternative includes all projects that could affect or be affected by the Project. Because there are no non-transportation projects within the footprint of the Project, the No Action Alternative includes only transportation projects. The quarter-mile radius was chosen because it encompasses transportation network projects that could affect operations within the Long Bridge Corridor.[30] The projects that will be included in the No Action Alternative are described in detail below.

[28] The Level 1 and Level 2, Step 1 screenings evaluated "concepts" that were identified by number. For the Level 2, Step 2 screening, "alignment options" were developed for Concepts 5 and 5A and were identified by letter (A through H). Alignment Option A and Alignment Option B will become Action Alternative A and Action Alternative B in the DEIS.
[29] 40 CFR 1502.14.

Figure 7-1 | No Action Alternative Projects

7.2.1. No Action Alternative Infrastructure

The No Action Alternative for the Long Bridge Project DEIS includes planned and funded transportation projects likely to be implemented by 2040, and maintenance projects necessary to keep the existing bridge and corridor in service. All of these projects have independent utility from the Long Bridge Project.

The No Action Alternative includes the following transit and railroad projects:

- **Fourth Track from AF to RO Interlocking**:[31] DRPT plans to add a fourth track from AF to RO Interlockings as part of corridor-wide upgrades to support higher operating speeds. This project is planned for completion by 2025 as part of Virginia's Atlantic Gateway suite of projects, with environmental clearance through the DC2RVA project.
- **Crystal City-Potomac Yard Transitway Extension**: Arlington County plans to extend the Transitway from the Crystal City Metrorail Station to the Pentagon City Metrorail Station and install stations along the new route, including at Crystal Drive and 18th Street. This project is planned for completion by 2021.
- **Crystal City Metro Station East Entrance**: Arlington County plans to construct a new entrance at the east end of the Crystal City Metrorail Station to provide easier access from Crystal Drive, VRE Crystal City Station, and the Transitway station at Crystal Drive and 18th Street South. This project is planned for completion by 2022.
- **VRE Crystal City Station Improvements**: VRE plans to construct a new island platform with two platform edges near the existing station, with two grade-separated access points between the platform and Crystal Drive. This project is planned for completion by 2023.
- **Fourth Track from LE to VA Interlocking**: VRE plans to provide an additional main track between the LE and VA Interlockings in the District. This project is planned for completion by FY 2023.
- **VRE L'Enfant Station North and South Storage Track** (under construction): VRE is converting existing side tracks at VRE L'Enfant Station to storage tracks while the permanent Midday Storage Facility is being constructed. Storage tracks will be converted to a fourth mainline track after the Midday Storage Facility is built. This project is planned for completion in 2018.
- **VRE L'Enfant Station Improvements**: VRE plans to construct an island platform to allow for simultaneous boarding of two tracks at L'Enfant Station, and to extend and widen the platform to accommodate eight-car trains and a future fourth track. This project is planned for completion by FY 2024.
- **Virginia Avenue Tunnel** (under construction): CSXT is replacing the existing tunnel with two new tunnels capable of accommodating double-stack intermodal freight trains. This project is planned for completion by late 2018.

[31] Note that the proper names of AF and RO Interlockings are "AF" and "RO." These are not acronyms.

The No Action Alternative includes the following airport and roadway projects:

- **Project Journey:** The Metropolitan Washington Airports Authority (MWAA) plans to construct a new commuter concourse and security checkpoint at the Ronald Reagan Washington National Airport in Arlington, Virginia. This project is planned for completion by 2021.
- **Ronald Reagan Washington National Airport Roadway Network Improvements:** MWAA plans to construct a consolidated rental car facility, public parking, employee parking, and roadway improvements to address on-Airport traffic conditions, parking deficiencies, and rental car capacity constraints. The project is planned for completion by 2026.
- **Arlington Complete Streets:** Arlington County plans to transform the streets in Crystal City and Pentagon City (Army Navy Drive, Crystal Drive, Clark Bell Street, 12th Street South, 18th Street South, 23rd Street South, and 27th Street South) from auto-centric to multimodal complete streets, including bike lanes, pedestrian facilities, accommodations for Transitway, on-street parking, lighting, traffic signals, and ADA facilities. This project is planned for completion by 2037.
- **Boundary Channel Drive Interchange:** Arlington County plans to redesign and reconstruct the Long Bridge Park Drive interchange with I-395 and Boundary Channel Drive to increase safety and better accommodate multimodal transportation. This project includes a bicycle connection from the Humpback Bridge (Mount Vernon Trail) to Long Bridge Park. This project is planned for completion by 2021.
- **I-395 HOT (High Occupancy Toll) Express Lanes**: Virginia Department of Transportation (VDOT) plans to convert the High Occupancy Vehicle (HOV) 3+ lanes on I-395 to HOT 3+ lanes. This project is planned for completion by 2020 as part of Virginia's Atlantic Gateway suite of projects.

7.2.2. No Action Alternative Operations

FRA and DDOT have based their assumption of train volume operations in the Long Bridge Corridor under the No Action Alternative on reasonably foreseeable decisions by the railroad operators given railroad capacity constraints, as detailed in **Table 7-1**. This assumption is consistent with the No Action Alternative train volumes assumed in the DC2RVA DEIS. Currently VRE, MARC, Amtrak, and NS have agreements with CSXT, the owner of Long Bridge. These agreements provide a maximum number of trains each operator can run per day through the Long Bridge Corridor. Under the No Action Alternative, which would not increase the capacity of the Long Bridge Corridor, it is assumed that CSXT would not renegotiate these agreements to give additional slots to operators. This assumption is based on CSXT's need to maintain adequate capacity for freight operations. It should be noted that the demand-based train volume planned by the railroad operators for 2040 is higher than the current railroad operator agreement volumes.

Table 7-1 | Train Volumes in the Long Bridge Corridor

Train Operator	Current Number of Trains per Day[32]	2040 No Action Alternative Number of Trains per Day[33]	2040 Planned Number of Trains per Day[34]
VRE	34*	38	92
MARC	0	0	8
Amtrak/DC2RVA	24**	26**	44
CSXT	18	42	42
Norfolk Southern	0	6	6
TOTAL	**76**	**112**	**192**

**including non-revenue movements*
***does not include the Auto Train from Lorton, Virginia, to Sanford, Florida*

[32] Current train volumes are based on existing operation agreements and confirmed by CSXT, VRE, Amtrak, NS, MARC, and DRPT.
[33] Forecast year 2040 No Action train volumes were established based on DRPT'sDC2RVA Study, 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 CSXT, VRE, Amtrak, and DRPT.
[34] Forecast year 2040 planned train volumes were established based on input from CSXT, VRE, Amtrak, Norfolk Southern, and MARC, as well as DRPT's DC2RVA Study.

8.0 Conclusion and Next Steps

Through the alternatives development process, FRA and DDOT identified and screened a reasonable range of alternatives. Action Alternatives A and B, in addition to the No Action Alternative, will be evaluated in the DEIS. A more detailed level of conceptual engineering design development will be completed for the Action Alternatives to inform an assessment of their potential environmental effects in the DEIS. Additionally, capital cost estimates will be developed, which will also factor into the evaluation of alternatives in the DEIS.

FRA and DDOT plan to identify a Preferred Alternative in the DEIS, and will publish it for review and public comment. During the DEIS public comment period, the lead agencies will hold a public hearing. FRA and DDOT plan to publish a combined FEIS/Record of Decision (ROD), which will respond to comments received on the DEIS, identify the lead agencies' selected alternative, describe the basis for the choice, and establish any appropriate mitigation measures.

Appendix: Conceptual Engineering Plans of Level 2 Concept Screening Alignment Options

Note: Conceptual engineering plans not included for Options D and G; these options were determined to not be feasible prior to developing plans.