3 Alternatives

This chapter describes the Project Action Alternatives that meet the Purpose and Need for the Washington Union Station (WUS) Expansion Project (Project) and that the Federal Railroad Administration (FRA) has retained for analysis in this Draft Environmental Impact Statement (DEIS). The chapter also describes the multi-step alternatives development and evaluation process FRA conducted to identify the reasonable range of alternatives. **Figure 3-1** summarizes this process.

The No-Action Alternative, presented in this chapter, is a requirement of the National Environmental Policy Act (NEPA). The No-Action Alternative establishes the conditions that would exist in the absence of the Project. The No-Action Alternative serves as a baseline to which the potential benefits and impacts of the Action Alternatives can be compared. In this DEIS, conditions under the No-Action Alternative reflect the potential state of the environment in the absence of the proposed Project in the horizon year of 2040.[1]

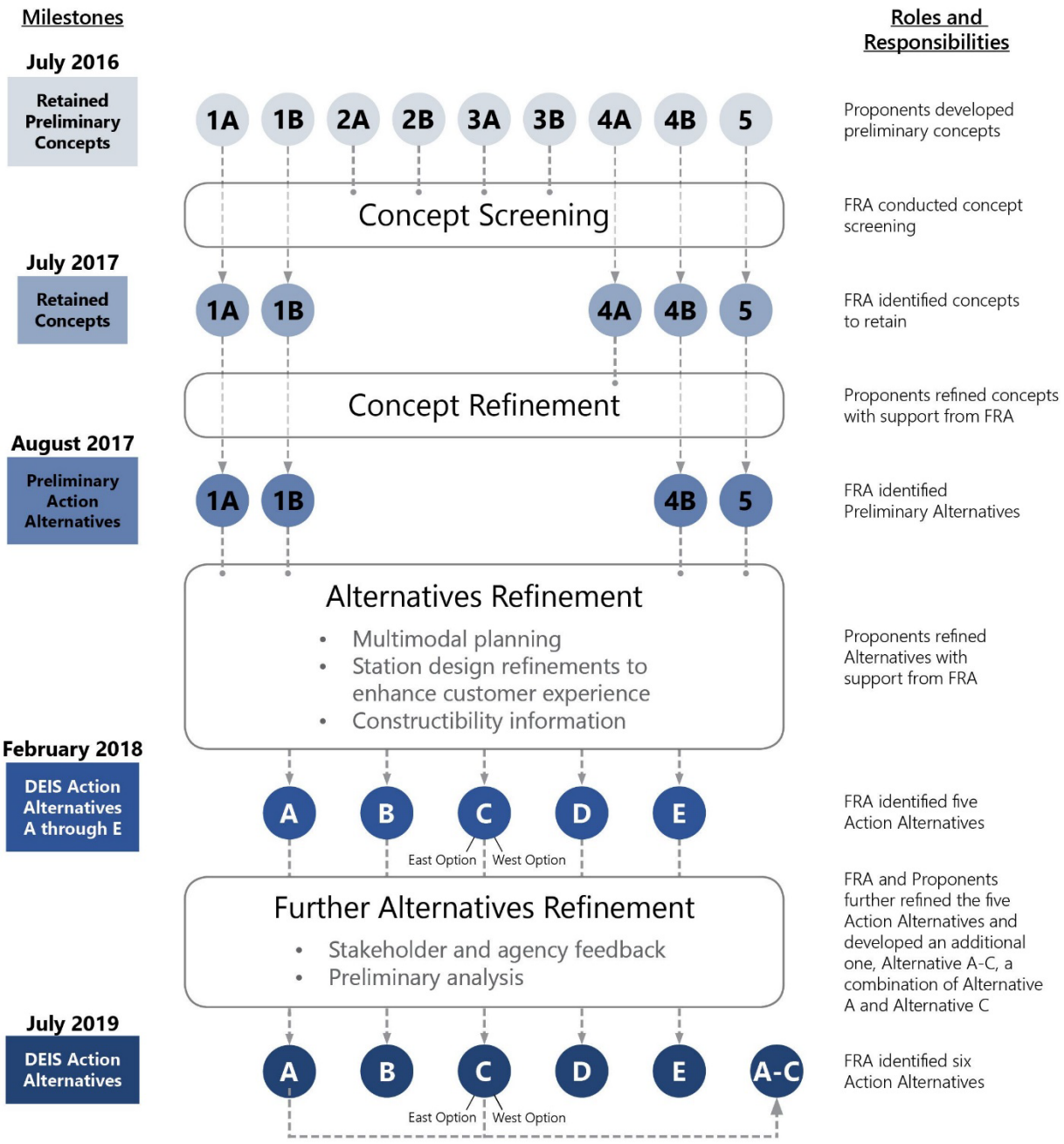
As summarized in **Figure 3-1**, the Project Proponents, Union Station Redevelopment Corporation (USRC) and the National Railroad Passenger Corporation (Amtrak) initially developed 18 preliminary concepts for the Project. FRA evaluated the preliminary concepts against various program elements and objectives based on the Project's draft Purpose and Need.[2] The *Concept Development and Evaluation Report* (CDR), completed in July 2016 and included in this DEIS as **Appendix A3**, documents this evaluation.[3]

[1] 2040 is the horizon year for the Project consistent with the vision for rail service in the Northeast Corridor (NEC) laid out in FRA's NEC Future Final EIS, which had a 2040 planning year.

[2] The Purpose and Need for the Project was still in draft stage when the Project Proponents were developing the preliminary concepts and FRA began screening these concepts. The Purpose and Need was finalized in October 2016, prior to the completion of the screening process.

[3] USRC and Amtrak. July 2016. *Final Concept Development and Evaluation Report*.

Figure 3-1. Concept and Alternative Development and Screening Process.



After seeking and considering public and agency input, in October 2016, FRA retained nine preliminary concepts for evaluation through the Concept Screening step. The July 31, 2017 *Concept Screening Report* (CSR), **Appendix A4** of this DEIS, documents the Concept Screening step.[4] This step resulted in five retained concepts.

The January 2020 *Action Alternatives Refinement Report* (AARR), **Appendix A5** of this DEIS, provides additional detail about the alternatives.[5] FRA found that the resulting Action Alternatives A, B, C (with East and West Options), D, and E constitute a reasonable range of alternatives consistent with the requirements of NEPA. FRA shared the Action Alternatives and No-Action Alternative with the agencies and the public in March 2018.

After the March 2018 presentation, the preliminary impact analysis, agency and stakeholder feedback, and continued coordination with cooperating agencies revealed several issues of concern with the Action Alternatives. To address these issues, FRA, working with the Proponents, combined key features of Alternative A and Alternative C to develop a sixth Action Alternative, Alternative A-C. FRA and the Proponents agreed that Alternative A-C best addresses the identified issues while being consistent with the Project's Purpose and Need. FRA and the Proponents shared Alternative A-C with agencies, stakeholders, and the public in fall 2019.

All Action Alternatives would place some of the Project elements and access roads above the rail terminal on a structural, overbuild deck. Based on the alternatives development process summarized in **Section 3.1** below, there are no reasonable alternatives that would avoid the use of the deck for bus facility and circulation as well as some pick-up and drop-off activities. The private air-rights development (see **Section 1.3**, *Project Area*) would also be constructed on a deck over the rail terminal. The Project and the private air-rights development are separate and independent of one another and either can be implemented without the other. If only the Project is built, only those portions of the deck needed to support Project elements and roads would be constructed.[6].

3.1 Concept Screening and Alternatives Development Process

The Project Proponents first developed and refined various station expansion concepts. FRA then screened these concepts using a multi-step, iterative evaluation process that included public participation. The overall process included six steps:

[4] FRA. July 31, 2017. *Washington Union Station Concept Screening Report.*

[5] FRA, USRC, and Amtrak. January 2020. *Washington Union Station Expansion Project. Final Action Alternatives Refinement Report*.

[6] See **Section 3.4.1.5**, *Private Air-Rights Development*, for more information on the private air-rights development.

- Identification of Project Elements (**Section 3.1.1**);
- Concept Development (**Section 3.1.2**);
- Concept Screening (**Section 3.1.3**);
- Concept Refinement (**Section 3.1.6**);
- Alternatives Refinement (**Section 3.1.8**); and
- Further Alternatives Refinement (Section 3.1.9).

3.1.1 Identification of Project Elements

Project Elements are the different components of the multimodal Station. The key program elements for the Project are: historic station, tracks and platforms, bus facility, train hall, parking, concourse and retail, for-hire vehicles, and bicycle and pedestrian access. The Project Proponents[7] identified the program elements through feedback received during stakeholder engagement activities conducted between Fall 2015 and Spring 2016 and from a review of the statutory requirements stated in the *Union Station Redevelopment Act of 1981* (USRA).[8] On March 30, 2016, FRA hosted a public informational forum to present and receive public feedback on the program elements.

Sections 3.1.1.1 through 3.1.1.8 briefly describe the eight program elements. The Project Action Alternatives must address all eight elements. Together, the elements form a cohesive whole that accommodates the full range of multimodal functions at WUS. The Project does not require the prior or simultaneous construction of any other project.

3.1.1.1 Historic Station

The historic station building, listed in the National Register of Historic Places (NRHP), is an important part of the urban fabric of Washington, DC. All concepts preserve the historic station and would sensitively integrate it with the Project. The historic station building would continue to be the primary entrance to WUS and a grand welcoming space worthy of the nation's capital.

[7] In addition to the Project Proponents, Akridge, the private air-rights owner and developer, participated in identifying Project elements and in the early stages of concept development.

[8] Public Law 97-125.

3.1.1.2 Tracks and Platforms

The tracks and platforms, which provide space for trains and their passengers, serve a core function of WUS. Amtrak initially evaluated 21 options for tracks and platforms, based on how each option would meet 2040 capacity needs and adhere to operational requirements.[9] Following the evaluation, Amtrak advanced two track and platform options: Terminal Infrastructure (TI) Option 14 and Option 16. Both options would meet the requirements of the 2040 operating plan, and both could accommodate the same level of future rail demands and needs for increased operational reliability. The rejected track and platform options failed because they would have provided insufficient track or platform space or lacked the required redundancy to meet future demands.

TI Option 14 would provide 19 revenue tracks,[10] including seven run-through tracks.[11]. This option also would feature 30-foot-wide platforms with an opening to provide light and air for a concourse beneath the track level. The opening would be between the stub-end and run-through tracks and would narrow from the terminal northward into the rail terminal. TI Option 16 would have the same number of tracks but feature a large central platform with the potential to accommodate openings for skylights at track level to let light into the concourse below.

Though both TI options would meet future rail demand and increase operational reliability, FRA chose to advance TI Option 14 through the DEIS analysis because of anticipated operational benefits. **Figure 3-2** illustrates TI Option 14. TI Option 16 remains available as a potential refinement at a later stage of Project design since it would accommodate the same number of tracks and platforms and result in similar impacts.[12]

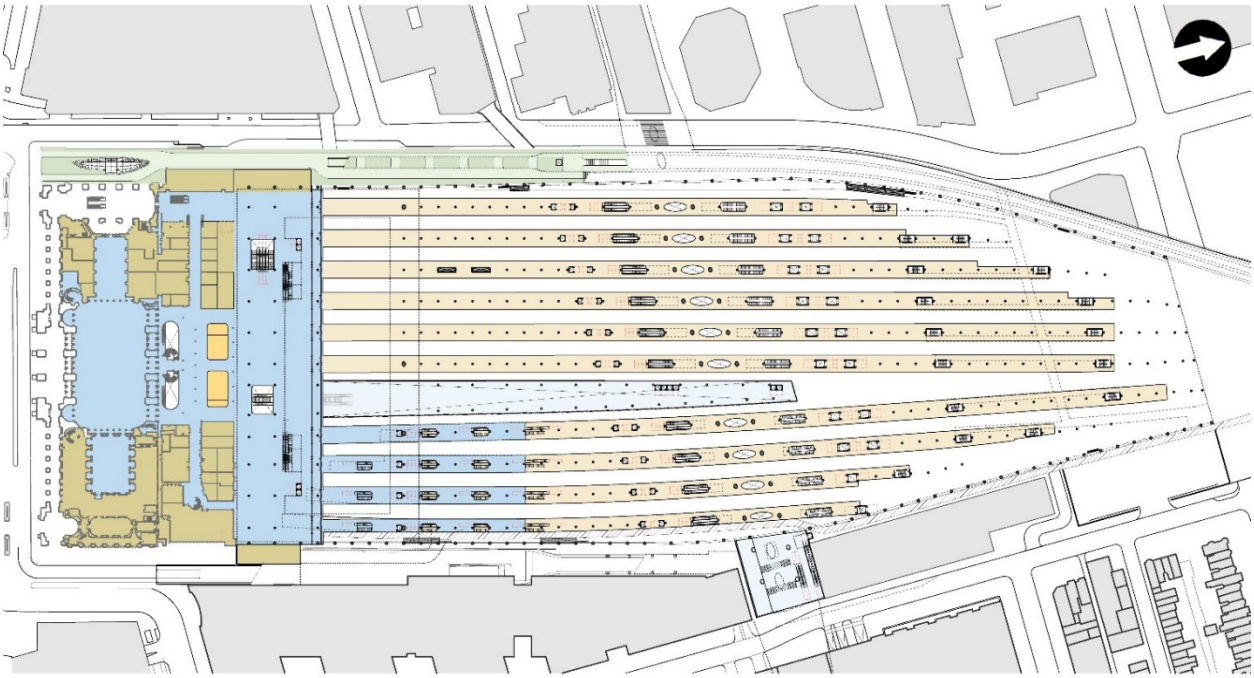
[9] See **Appendix A3a**, *Final Concept Development and Evaluation Report, Technical Backup Information, Appendix A,* Section A-5, *Compendia of Relevant Planning Studies, Track and Platform Study* and **Appendix B,** *Washington Union Station Terminal Infrastructure EIS Report.*

[10] Revenue tracks are a route or track section that is used to carry passengers or revenue-earning freight or goods.

[11] Run-through tracks are tracks that allow trains to enter in one direction and leave in the same direction without backing in or out.

[12] An illustration of Option 16 can be found in **Appendix A5**, *Action Alternatives Refinement Report*, *Section 3.4.1*, *Tracks and Platforms*.

Figure 3-2. TI Option 14



3.1.1.3 Bus Facility

Intercity, transit, and charter bus services are parts of the WUS programming identified in the USRA and long-established transportation modes at WUS.[13] During concept development, the Proponents estimated 2040[14] peak bus demand to be 47 active spaces, compared to 61 total spaces in the facility today.[15] (FRA and the Project Proponents revised this demand estimate during concept refinement, as described in **Section 3.1.6.1**, *Bus Program Size*). The Proponents initially identified and evaluated thirteen options for the bus facility, including five off-site options.[16]

3.1.1.4 Train Hall

A monumental train hall is an architectural feature that adds air and light to the main train concourses and train platforms. It enhances passenger and visitor experience and is a

[13] Public Law 97-125.

[14] 2040 is the horizon year for the Project. Rail, bus, and vehicular needs are projected to 2040 in the planning of the Project.

[15] Active spaces are spaces available for active operations. These include buses entering the facility, loading or unloading passengers, and departing within less than two hours. Bus operators at WUS provided input on the duration of a basic operation.

[16] See **Appendix A3a**, *Final Concept Development and Evaluation Report, Technical Backup Information*, *Appendix A, Section A-4, Components Evaluation-Bus*.

common feature at large train stations across the world. The Proponents initially identified four train hall options.

3.1.1.5 Parking

Parking has been a component of the WUS program since the USRA and is a primary source of revenue for USRC. Parking at WUS serves Amtrak passengers, WUS users, and car rental companies. During concept development, the Proponents estimated 2040 peak parking demand to be 2,730 spaces to meet the needs of Amtrak passengers, WUS users, and rental car companies. Current total parking capacity is approximately 2,450 vehicles. The Proponents initially identified and evaluated eleven options for a parking facility, including five off-site options.[17]

3.1.1.6 Concourses and Retail

Concourses provide circulation space for passengers as well as room for retail, which contributes revenue for WUS maintenance and operations. Circulation space and retail opportunities in concourses enhance passenger experience. The Project Proponents initially identified and evaluated ten concourse options. Ultimately, they developed a concourse plan common to all Project concepts. The plan included:

- East-west Concourse A, just next to the historic station and opening to the stub-end track level;
- East-west H Street Concourse, beneath the tracks and the H Street Bridge, with entrances at First Street NE and 2nd Street NE, and providing access to H Street NE, the track level, First Street Concourse, and Central Concourse;
- North-south Central Concourse, running parallel to and beneath the tracks, accessible from Concourse A and the H Street Concourse; and
- North-south First Street Concourse, running parallel to and beneath the tracks along the First Street side of WUS, and accessible from Concourse A and the H Street Concourse.

3.1.1.7 For-Hire Vehicles

For-hire vehicle facilities provide WUS users and visitors with a range of transportation options.[18] The Project concepts to incorporate for-hire vehicles included pick-up and drop-off areas at the front of the historic station; in an underground facility; on the same level as H

[17] See **Appendix A3a**, *Final Concept Development and Evaluation Report, Technical Backup Information*, *Appendix A, Section A-4, Components Evaluation-Public Parking Garage.*

[18] "For-hire vehicle" refers to taxis and transportation networking companies like Uber and Lyft.

Street NE; and on First and 2nd Street NE. The Proponents identified and evaluated 17 options for pick-up and drop-off areas.[19]

3.1.1.8 Bicycle and Pedestrian Access

Ensuring quality bicycle and pedestrian access is essential for a multimodal facility in an urban environment. All concepts and alternatives envisioned enhancements to bicycle and pedestrian access to, and circulation within, WUS as well as new opportunities for bicycle parking. The Proponents identified and evaluated six new entrances to WUS.

3.1.2 Concept Development

Concept Development is the second step of the Concepts to Alternatives process. During Concept Development, the Project Proponents developed a total of 18 preliminary concepts by variously combining the eight program elements. All preliminary concepts had elements in common, including preservation of the historic station, the tracks and platforms (see **Section 3.1.1.2**, *Tracks and Platforms*), and the concourses (see **Section 3.1.1.6**, *Concourses and Retail*). The Proponents evaluated the concepts based on feasibility and whether they would help achieve a set of design goals derived from the Project's draft Purpose and Need.

Nine of the 18 concepts proposed placing additional tracks beneath WUS (below grade) to accommodate increased high-speed rail passenger capacity. However, Amtrak conducted an analysis of future rail capacity needs and found that it would not need additional tracks within the time horizon of the Project (2040). Therefore, FRA retained only the nine preliminary concepts without below-grade tracks for screening.[20] All preliminary concepts required placement of some elements within private air rights. Delivery by the Project Proponents of the CDR to FRA on July 13, 2016 marked the end of the Concept Development step and the beginning of the Concept Screening step.

3.1.3 Concept Screening

FRA treated the nine concepts presented in the CDR as preliminary. **Table 3-1** provides a brief description of these preliminary concepts (Concepts 1A, 1B, 2A, 2B, 3A, 3B, 4A, 4B, and 5). The CSR (**Appendix A4** of this DEIS) contains more detailed descriptions and diagrams of each preliminary concept in Section 4, *What was the Concept Development Process*?, Figure 4-6 through Figure 4-14.

[19] See **Appendix A3a**, *Final Concept Development and Evaluation Report, Technical Backup Information*, *Appendix A, Section A-4, Components Evaluation-Taxi and Pick-up Drop-off*.

[20] **Appendix A3**, *Final Concept Development and Evaluation Report, Section 4.3, Summary of the Preliminary Range of Concepts*.

Table 3-1. Nine Preliminary Concepts Retained for Screening

Concept	Tracks and Platforms	Train Hall Orientation	Parking	Bus
Concept 1A	Options 14 or 16	North-south	Above ground southwest of H Street Parking for 1,664 vehicles	Southwest of H Street 34 active bus slips
Concept 1B	Options 14 or 16	North-south	Below the tracks Parking for 2,497 vehicles	Southwest of H Street 34 active bus slips
Concept 2A	Options 14 or 16	North-south	Above ground southeast of H Street Parking for 1,936 vehicles	Southeast of H Street 48 active bus slips
Concept 2B	Options 14 or 16	North-south	Below the tracks Parking for 2,497 vehicles	Southeast of H Street 48 active bus slips
Concept 3A	Options 14 or 16	North-south	Above ground north of H Street Parking for 1,827 vehicles	North of H Street 42 active bus slips
Concept 3B	Options 14 or 16	North-south	Below the tracks Parking for 2,497 vehicles	North of H Street 42 active bus slips
Concept 4A	Options 14 or 16	North-south	Above ground to the north of H Street Parking for 1,827 vehicles	North of H Street 42 active bus slips
Concept 4B	Options 14 or 16	East-west	Below the tracks Parking for 2,497 vehicles	North of H Street 42 active bus slips
Concept 5	Options 14 or 16	East-west	Below the tracks Parking for 2,497 vehicles	In east-west train hall 40 active bus slips

FRA evaluated the preliminary concepts through a screening process based on the Project's Purpose and Need. During the Concept Screening step, FRA first reviewed the CDR and found that the nine preliminary concepts recommended in the report were reasonable and feasible. Then, FRA conducted an initial assessment of whether each concept would meet the Purpose and Need. The assessment was based on a "yes or no" review of whether, at a minimum, the concepts addressed the different aspects of the Purpose and Need.[21] FRA found that all the concepts met the Purpose and Need and would:

[21] FRA finalized the Purpose and Need for the Project prior to the completion of the Concept Screening step.

- Support current and future long-term growth in rail service by meeting 2040 rail capacity demands of 95 percent growth for Amtrak, 151 percent growth for Maryland Area Regional Commuter (MARC) Train, and 250 percent growth for Virginia Railway Express (VRE);
- Achieve compliance with the Americans with Disabilities Act (ADA) and emergency egress requirements;
- Facilitate intermodal travel by providing space for a predicted 20 percent growth in intercity buses and 51 percent growth in tour and charter buses, and for private vehicles and for-hire vehicles as well as circulation space to connect across those modes;
- Provide a positive customer experience with increased concourse space, added passenger amenities, and the provision of a train hall;
- Enhance integration with adjacent neighborhoods, businesses, and planned land uses by creating new connections to the surrounding areas and leaving space for air-rights development;
- Sustain WUS's economic viability by increasing the amount of retail space available in the station; and
- Support continued preservation and use of the historic station building by keeping it as the "front door" of WUS and connecting it with the WUS expansion.

Following this initial review, FRA further assessed the nine preliminary concepts for the degree to which they would meet the Purpose and Need. For this assessment, FRA developed and used ten screening criteria (see **Table 3-2)**. Nine criteria directly reflected the Purpose and Need. The tenth criterion—constructability—was not based on the Purpose and Need but addressed whether the proposed concepts are buildable and, therefore, feasible.

Each of the ten screening criteria in **Table 3-2** addresses a range of factors expressed as sub-criteria. FRA assessed whether each preliminary concept had high compatibility, medium compatibility, or low compatibility with each sub-criterion. FRA assessed the concepts both qualitatively and quantitatively when possible, based on the information available at the time. The analysis yielded a score for, and an initial ranking of, each preliminary concept.

Table 3-2. Project Purpose and Screening Criteria

Purpose and Need Statement	Screening Criterion	Sub-Criteria
Support current and future long-term growth in rail service and operational needs	1.Provide needed platform/rail capacity and rail operational requirements	• Adequate track and platform capacity to meet future operational needs • Multiple access points to each platform • Accommodate increased passenger volumes without substantially impeding the concourses or other key circulatory corridors • Platforms accommodate two trains on the same track
Achieve compliance with the ADA and emergency egress requirements	2.All nine concepts were designed to meet code and regulatory requirements and therefore were not further screened on this item	• n/a
Facilitate intermodal travel	3.Meet future multimodal capacity needs	• Capacity of taxi and shared-ride pick-up/drop-off facilities • Capacity of bus facility • Parking capacity • Increased bicycle capacity
	4.Meet operational needs of multimodal facilities and minimize impact on roadways	• Operations of taxi and shared-ride facilities • Operations of bus facility • Parking operations • Cumulative impacts of location of new vehicular access points for parking, buses, and taxi/shared-ride vehicles relative to the local street system
	5.Improve internal circulation	• Improved passenger movement between trains and the Metrorail station • Improved passenger navigation • Reduced or eliminated congestion points • Ease of movement between the bus facility and the main concourse (Concourse A)

Purpose and Need Statement	Screening Criterion	Sub-Criteria
		• Ease of movement between the bus facility and the H Street Concourse • Ease of movement between parking and the main concourse (Concourse A) • Ease of movement between parking and the H Street Concourse • Provide ingress and egress for all modes or connections, including bicycle and pedestrian, to meet current and future demand
Provide a positive customer experience	6.Quality of the train hall experience	• Volume of the train hall • Number of platforms/tracks served by the train hall • Percentage of users who would be able to experience the train hall • Visual experience provided by the train hall • Spatial experience provided by the train hall • Visual experience provided by the concourses • Spatial experience in the concourses • Space for train amenities (Club Acela, waiting areas, restrooms, baggage claim)
Enhance integration with the adjacent neighborhoods, businesses, and planned land uses	7.Enhance integration with the adjacent neighborhoods, businesses, and planned land uses	• The estimated number and maximum size of development parcels within the 14-acre air-rights development area (based on zoning height and footprint) • Availability of southeast corner of air-rights area for development • Availability and size of air-rights development area

Purpose and Need Statement	Screening Criterion	Sub-Criteria
		parcels during the early phases of the Project • Integration with adjacent neighborhoods and businesses outside of the rail terminal footprint
Sustain the station's economic viability	8.Sustain the station's economic viability	• Space available for retail to increase USRC revenue stream to support maintaining the historic building • Parking spaces available to serve station retail • Proximity of parking to existing station retail
Support continued preservation and use of the historic station building	9.Preserve and maintain the historic Union Station building and urban environment	• Visual relationship between the expansion and the historic Union Station building • Alteration of the historic Union Station building • Impact on important viewsheds • Impact on L'Enfant Plan Streets • Urban design context of overbuild (parking/bus) • Impacts on nearby historic properties • Alterations or use of Columbus Plaza
Constructability	10.Offer comparative ease of construction and maintain station operations during construction	• Impacts on railroad and station operations • Available staging locations • Excavation • Impacts to garage operations • Site restrictions • Construction techniques • Impacts to Washington Metropolitan Area Transit Authority (WMATA) • Site security

FRA presented the preliminary screening results to members of the public, cooperating agencies (listed in **Section 1.8**, *Cooperating Agencies*), and interested agencies,[22] in a series of meetings held in October 2016. The information materials made available to the public during this effort are available on the Project's website.[23] When identifying the concepts that it would retain for further refinement, FRA considered the comments received in those meetings and during a comment period that ended on November 6, 2016.

Members of the public, cooperating agencies, and interested agencies provided comments on the preliminary concepts, including general opinions; preliminary discussion of the concepts' potential environmental impacts; and suggestions for approaches that FRA and the Proponents may not have considered. Public and agency input yielded suggestions that called for further investigation during the Concept Refinement and Alternatives Refinement steps. **Table 3-3** summarizes the results of FRA's screening process**.**

3.1.4 Concepts Retained for Further Analysis

Based on the screening process and comments received, FRA retained Concepts 1 (both A and B), 4 (both A and B), and 5 for further refinement and evaluation of their suitability for analysis in the DEIS.[24] FRA evaluated the concepts holistically and selected the concepts it would retain based on their average performance under the different criteria.

- **Concept 1 (A and B)** – This concept scored third highest on average in the screening process. Concept 1 would promote multimodal connections and internal circulation because of the closeness of the bus/parking facility to the station. It would minimize impacts to private land uses by placing most of the bus/parking facility in Federal air rights. However, these concepts raised concerns about the feasibility of maintaining parking and bus operations during construction. There would be a need to identify temporary locations for these important elements for an extended period. The placement of the parking facility next to the historic station building may affect the historic setting. Finally, bus movements in and out of the bus facility posed a challenge because the access ramp would require buses to make sharp turns.

[22] Interested agencies include: Architect of the Capitol (AOC), Commission of Fine Arts (CFA), Office of the Deputy Mayor for Planning and Economic Development (DMPED), DC Office of Planning (DCOP), District Department of Energy and Environment (DOEE), District Historic Preservation Office (DCHPO), Federal Highway Administration (FHWA), Government Publishing Office (GPO), General Service Administration (GSA), Maryland Department of Transportation (MDOT), Maryland Transit Administration (MTA), Metropolitan Washington Council of Governments (MWCOG), Transportation Security Administration (TSA), VRE, Virginia Department of Rail and Transportation (VA DRPT), and Washington Metropolitan Area Transit Authority (WMATA).

[23] www.wusstationexpansion.com.

[24] The concepts are characterized in **Table 3-1** and illustrated in **Appendix A4**, *Washington Union Station Concept Screening Report*, Figures 4-6 through 4-14.

Table 3-3. Concept Screening Results[25]

High Compatibility:	Medium Compatibility:	Low Compatibility:

	CRITERION	CONCEPTS								
		1A	1B	2A	2B	3A	3B	4A	4B	5
1	Provide Needed Platform/Rail Capacity and Rail Operational Requirements	⬢	⬢	⬢	⬢	⬢	⬢	⬢	⬢	⬢
2	Achieve compliance with the ADA and emergency egress requirements	⬢	⬢	⬢	⬢	⬢	⬢	⬢	⬢	⬢
3	Meet Future Multimodal Capacity Needs	◆	◆	⬢	⬢	◆	⬢	◆	⬢	⬢
4	Meets Operational Needs of Multimodal Facilities and Minimizes Impacts on Roadways	◆	◆	●	◆	◆	◆	◆	◆	◆
5	Improves Internal Circulation	⬢	⬢	⬢	⬢	◆	◆	◆	⬢	⬢
6a	Quality of Train Hall Experience	●	◆	●	◆	●	●	⬢	⬢	◆
6b	Quality of Concourse Experience	⬢	⬢	⬢	⬢	⬢	⬢	⬢	⬢	⬢
7	Enhances Integration with Adjacent Businesses, Neighborhoods, and Future Land Uses	⬢	⬢	◆	◆	◆	◆	⬢	⬢	⬢
8	Sustains the Station's Economic Viability	⬢	⬢	⬢	⬢	◆	⬢	◆	⬢	⬢
9	Preserves and Maintains the Historic Union Station Building and Urban Environment	◆	⬢	◆	⬢	⬢	⬢	⬢	⬢	⬢
10	Offers Ease of Construction and Maintains Station Operations During Construction	◆	◆	◆	◆	◆	◆	◆	◆	◆

[25] **Appendix A4**, *Concept Screening Report*, *Table 5-2, Screening Results*.

- **Concept 4 (A and B)** – This concept scored second highest on average in the screening process. Concept 4 scored well because it would provide an east-west train hall that would enhance the experience of all passengers. Additionally, locating the bus and/or parking facility in the northern part of the rail terminal footprint would minimize aesthetic impacts on the historic station building given the distance between these two elements. However, there were concerns about the long distance that users of the bus and parking facility would have to walk to reach the station.
- **Concept 5** – This concept scored first overall in the screening process. Concept 5 scored well because it would bring together the various elements of WUS in an integrated bus facility-train hall and would optimize the amount of air-rights space available for future development. However, Concept 5 raised concerns about the impact of the bus facility on the quality of the train hall experience for passengers and the potential historic preservation effects from placing this element next to the historic station building.

3.1.5 Concepts Evaluated and Removed from Further Consideration

FRA dismissed Concepts 2A, 2B, 3A, and 3B from further consideration for the following reasons:

- **Concept 2 (A and B)** – Concept 2 scored the lowest on average of any of the five concepts. While Concept 2 met the bus program requirements, its multimodal operations would have been difficult because parking and for-hire vehicle operations would have exited at an un-signalized intersection. Compared to the other concepts, it would also have required the acquisition of the greatest amount of private air rights. Compared to Concept 1, which would provide similar facilities on the west side of a north-south train hall, Concept 2 would have resulted in more challenging operations for taxis, cars, and buses.
- **Concept 3 (A and B) –** Concept 3 scored the second-lowest on average of the five concepts. Concept 3's placement of the bus/parking facility on the north side of the rail terminal's footprint would have had some historic preservation and urban design benefits because of the distance between these elements and the historic station building. However, Concept 3 did not score as highly as Concept 4—to which it is similar—because it would have required acquiring more private air rights and the north-south train hall would have provided a positive experience for fewer customers. This is because the north-south train hall would cover three to four tracks only while the east-west train hall (as in Concept 4) would cover all tracks.

3.1.6 Concept Refinement

During the Concept Refinement step, FRA worked with the Project Proponents to refine the retained concepts (Concepts 1A, 1B, 4A, 4B, and 5) and address public and agency comments.

In addition, FRA analyzed some of the suggestions and issues put forth by the public, agencies, and Project Proponents during Concept Screening.[26] Using the same approach as for the initial nine preliminary concepts, the agency assessed new suggestions for feasibility, reasonableness, and compatibility with the Project's Purpose and Need.

The issues and suggestions considered during Concept Refinement were:

- Bus access via the New York Avenue Viaduct;
- Underground bus facility;
- Metrobus/commuter bus using the bus facility;
- Placing elements outside the rail terminal footprint, including parking under Columbus Plaza;
- Repurposing the existing Retail and Ticketing Concourse;
- Bus program size;
- Parking program size;
- An alternative Concept 5 that would separate buses from the train hall;
- Reinstating the ends of the existing Retail and Ticketing Concourse;
- Alternative below-ground parking options; and
- Bus facility on First Street NE.

Section 6, *How Has FRA Advanced Concepts to Preliminary Alternatives?*, of the CSR (**Appendix A4** of this DEIS) describes these considerations in more detail. FRA and the Project Proponents considered nine potential off-site locations for the bus and parking elements. They identified these locations as potentially suitable based on their current functions or uses. The nine locations included two Architect of the Capitol (AOC) parking lots; Columbus Plaza and Circle (underground); Postal Square Building; U.S. Government Publishing Office (GPO) Warehouse #4; lot at First and L Streets NE, south side; lot at First and L Streets NE, north side; lot at North Capitol Street and K Street; and GPO parking lot. Review indicated that none of these locations was a reasonable option for siting bus and parking elements, for the reasons explained in Section 6.4, *Element Options Outside the Railyard Footprint, including Parking under Columbus Plaza*, of the CSR (**Appendix A4**).

Section 3.1.6.1, *Bus Program Size,* and **Section 3.1.6.2**, *Parking Program Size*, summarize the two considerations that resulted in changes to the preliminary concepts. **Section 3.1.6.3**, *Modifications to the Retained Concepts*, outline the changes made to the concepts to address these two considerations.

[26] FRA addressed the remainder of comments and design issues raised during Concept Screening as part of the Alternatives Refinement step (see **Section 3.1.8**).

3.1.6.1 Bus Program Size

Commenters expressed concerns about the size of the bus program envisioned in the retained concepts. While some commenters wanted a larger bus facility, most asked about the feasibility of a smaller facility. One commenter asked about moving "layover" facilities for buses away from the rail terminal footprint. Another expressed a concern that the size of the bus facility could "constrain and negatively impact" the Project and the private air-rights development. In response to these concerns, FRA and the Project Proponents further explored the size of the bus program. In the CDR, the Proponents used a program estimate of 47 active slips for the bus facility. The concepts presented to FRA and the public as part of the Concept Development and Concept Screening steps had between 34 and 48 active slips on two levels. FRA and the Project Proponents reviewed current and future bus demand at WUS using data from Amtrak and Union Station Parking Garage, LLC (USPG)[27]. Upon this review, they agreed on an active management approach[28] that would allow the proposed facility to operate with shorter turnaround times for tour/charter and intercity operators. FRA and the Project Proponents determined that active management would allow a program of approximately 25 slips to adequately meet 2040 bus demand at WUS. FRA and the Proponents adjusted the retained concepts to reflect this reduced bus program.

3.1.6.2 Parking Program Size

In response to commenters' concerns about the amount of parking envisioned in the retained concepts, FRA explored the feasibility of a smaller parking program. In the CDR, the Proponents projected a demand of approximately 2,730 spaces in 2040 for Amtrak passengers, WUS users, and rental cars. FRA worked with the Project Proponents to reduce the parking program. As a result, the program was reduced to 1,600 spaces. This program would be consistent with USRC's existing lease agreements with Union Station Investco (USI), which manages WUS retail. The lease requires USRC to provide 600 spaces for retail uses, 75 rental car spaces, and 900 additional spaces. FRA and the Project Proponents incorporated the revised parking program into the retained concepts. Section 1 of **Appendix A6**, *Parking Program Memorandum*, provides more information on the development of the parking program.[29]

3.1.6.3 Modifications to the Retained Concepts

Following the Concept Refinement step, FRA and the Project Proponents made the following modifications to the retained concepts:

[27] USPG operates the parking facility on behalf of USRC.

[28] Active management of bus facilities is an approach used primarily in the United Kingdom. It involves sharing bus slips across operators and dynamically assigning the available slips to specific buses as needed to make optimal use of bus facility space. This approach allows for more bus movements in fewer slips.

[29] See **Section 3.3.1.3**, *Parking Working Group*, for further discussion of the parking program.

- **Concepts 1A and 1B** – Consistent with the reduced bus program, the Project would feature a one-level bus facility with approximately 26 spaces instead of a two-level facility with 34 spaces. This would free more Federal air-rights space for potential future development. Consistent with the reduced parking program, Concept 1B would provide approximately 1,888 parking spaces instead of 2,497. The number of parking spaces in Concept 1A would stay the same (around 1,664 spaces). Under both concepts, the north-south train hall would cover five tracks (instead of three or four).
- **Concept 4A** – FRA eliminated Concept 4A from further consideration because the agency determined that the space above the bus facility could not reasonably accommodate the full parking program after revising this facility to address concerns about the bus program. The elongated shape of the reduced bus facility would create an inefficient vehicle parking layout and need circulation ramps that would cause additional impacts on private property.
- **Concept 4B** – Consistent with the reduced bus program, the Project would provide a one-level bus facility with approximately 29 spaces instead of a two-level facility with 42 spaces. Consistent with the reduced parking program, underground parking would have approximately 1,888 spaces instead of 2,497. The bus drop-off area would be south of the east-west train hall instead of north of it. As a result, the train hall would be separated by the bus drop-off area from the historic station building. The footprint of the bus facility in the northern part of the rail terminal would be smaller and narrower than in the original concept. This would free more space for potential future development and bring the facility closer to the historic station and train hall.
- **Concept 5** – Consistent with the reduced bus program, the Project would feature a one-level bus facility with approximately 25 spaces instead of a two-level facility with 34 spaces. Consistent with the reduced parking program, underground parking would provide approximately 1,888 spaces instead of 2,497. The reduction in size of the bus facility would allow for expanding the size of the east-west train hall, which would be comparable to the Concept 4B train hall.

3.1.7 Preliminary Alternatives

Upon completing the Concept Refinement step, FRA decided that the four remaining concepts, 1A, 1B, 4B, and 5, as modified, would move forward as preliminary alternatives into the Alternatives Refinement step. FRA documented this conclusion in Section 7, *What are the Preliminary Alternatives?* of the CSR (**Appendix A4** of this DEIS). Figure 7-1 through Figure 7-4 of the CSR illustrate the four preliminary alternatives. FRA made the CSR available to the public in August 2017.

3.1.8 Alternatives Refinement

During the Alternatives Refinement step, the Project Proponents, with support from FRA, further developed the preliminary alternatives to better address issues raised by agency and public comments and to advance the quality of the design of the Action Alternatives. The CSR (**Appendix A4** of this DEIS), Section 8, *What Issues will be considered during Alternatives Refinement?*, and the AARR (**Appendix A5** of this DEIS), Section 2, *Preliminary Alternatives Planning and Design Refinements,* describe this step. During the Alternatives Refinement step, FRA and the Project Proponents investigated the topics described below.

3.1.8.1 Cost and Constructability

Amtrak led the preparation of a detailed cost and constructability analysis in cooperation with USRC and FRA.[30] This analysis found that, while it was possible to build the preliminary alternatives, the construction process raised challenges with regard to duration and cost. These challenges primarily arose from the complexity of performing extensive construction in a dense urban environment while maintaining operations of the active rail terminal, bus facility, and parking garage.

The extent of below-ground construction, and associated costs, were another major consideration. Some elements of the preliminary alternatives could reach below the water table, adding further complexity and cost to the Project. In reviewing the analysis, FRA and the Proponents identified other concerns pertaining to construction around the east-side run-through tracks. These tracks present a constraint, as they are fewer than the stub-end tracks and provide the only access to Virginia and points south through the First Street Tunnel. Based on these concerns, FRA and the Proponents decided to modify the alternatives while retaining a range of below-ground elements for consideration.

To achieve this, FRA and the Proponents reduced below-ground parking and took advantage of the reduced Amtrak operational space, or "back of house programs" (see **Section 3.1.8.2**, *Reduction of the Amtrak Operational Space*) to minimize excavation under the run-through tracks on the east side of the rail terminal. This reduction in below-ground space would lower the cost and duration of construction and minimize track outages.

However, the removal of parking underneath the run-through tracks required two levels of below-ground parking to meet the full parking program. To evaluate options that would limit below-ground parking to one level, FRA and the Proponents identified additional alternatives that moved some of the below-ground parking in Preliminary Alternatives 4B and 5 to above-ground locations (as described further in **Section 3.1.8.13**, *Modifications to Preliminary Alternatives*). To accommodate the Amtrak operational space in Preliminary Alternative 1A,

[30] Akridge, the owner of the private air rights, had an opportunity to review the results of this analysis.

FRA and the Proponents eliminated the below-ground, for-hire vehicle facility from this alternative.

3.1.8.2 Reduction of the Amtrak Operational Space

During the Concept Development step, Amtrak had identified a specific planning program size for its operational space (referred to as "back of house" space[31] in the *CDR* [**Appendix A4** of this DEIS] and *AARR* [**Appendix A5**]) of 335,400 gross square feet. This space was primarily below the tracks. Because of the constructability challenges associated with below-ground construction, Amtrak reevaluated the operational space it needs to achieve its goals at WUS. Based on that re-analysis, Amtrak revised the required square footage to 290,700 gross square feet. This revised program allowed for the reduction of below-ground construction (see also **Section 3.1.8.1**, *Cost and Constructability*, and **Section 3.1.8.13**, *Modifications to Preliminary Alternatives*).

3.1.8.3 Continued Use of the Existing Garage

The existing garage is adequate for current operations and would remain in use until its removal during construction of the Project. USRC continues to maintain and update the garage through state-of-good-repair projects and the garage's structural systems are suitable for continued use. The existing parking garage stands northwest of the Claytor Concourse.[32] Part of the garage deck was completed in 1976, with the other parking levels being finished between 5 and 10 years later. An expansion on the northern side of the garage was completed in 2006. In 2010, intercity bus operations relocated from city-wide locations to the bus deck. Upgrades to the bus deck were completed in 2011.

FRA and the Project Proponents investigated whether it would be feasible to keep the existing garage to reduce the complexity and cost of the Project while remaining consistent with the Project's Purpose and Need. This review established that keeping the existing garage would not be feasible because:

- The location of the columns supporting the garage conflicts directly with the proposed new tracks and platforms, which cannot be accommodated within the structural grid of the existing garage. Modifying the proposed track and platform arrangement to maintain the existing garage columns would result in platforms that are too narrow to meet National Fire Protection Association (NFPA) as well as ADA standards and requirements and would be incapable of accommodating the longer trains needed to carry future passenger volumes. The modified, narrower platforms

[31] "Back of house space" refers to areas used by Amtrak to provide service to trains, store equipment for maintenance and operations, and provide operational space for staff.

[32] Built in 1980, the Claytor Concourse is located immediately to the north of the historic station building. It provides access to the tracks and platforms, the Metrorail Station, the bus facility and parking garage, and various passenger and visitor services and amenities, including waiting areas and retail and food outlets.

would fail to meet Amtrak standards to serve the needed longer trains as well as functional criteria. This would be inconsistent with the purpose of the Project to support current and future long-term growth in rail service and operational needs.

- The H Street Bridge profile forces the lowering of new tracks along the west side of the rail terminal to an elevation below the existing garage foundations. Additionally, space is needed above the tracks and platforms to provide clearance for required mechanical and fire and life safety systems. Lowering the elevation of the tracks as necessary to obtain adequate vertical clearance would require extensive underpinning of the existing garage's foundations. The estimated total cost of this modification alone could be significantly greater than the cost of replacing the garage with a new facility.

3.1.8.4 Traffic Operations on H Street NE

Public and agency comments revealed concerns about future traffic operations on H Street NE. The street would provide additional access points to WUS, the potential developments on both public and private air rights, and the DC Streetcar, while remaining a major east-west thoroughfare. Therefore, FRA and the Project Proponents developed approaches to facilitate traffic operations on H Street. The agencies coordinated this effort with the District Department of Transportation (DDOT), including the teams working on the H Street Bridge Replacement Project and the extension of the DC Streetcar.

As part of this work, FRA and the Project Proponents investigated different multimodal circulation options for the different vehicle types making use of H Street NE. With that information, FRA and the Project Proponents developed a proposed deck level circulation plan for each alternative that would meet the multimodal circulation needs of WUS while minimizing conflicts with vehicular and streetcar operations on H Street NE. DDOT encouraged continued coordination with FRA and the Proponents on these designs.

3.1.8.5 K Street Access and Operations

Three of four preliminary alternatives would provide parking below the rail terminal. FRA and the Proponents assessed multiple potential access locations for below-ground parking in coordination with DDOT. This was done taking into account Project needs and DDOT's vision for pedestrian and bicycle infrastructure along K Street as outlined in the *K Street NE Corridor Safety Assessment*.[33] Following this effort, FRA and the Proponents found that the only feasible location for a parking ramp would be on K Street NE, in the underpass between First and 2nd Streets NE.

[33] DDOT. January 24, 2019. *Corridor Safety Assessment K Street NE*. Available from: http://anc6c.org/wp-content/uploads/2019/01/K-Street-NE-Presentation-01.24.19.pdf.

Because this location still posed several challenges, FRA and the Proponents continued to evaluate K Street parking access during the Alternatives Refinement step. K Street NE between First and 2nd Streets NE runs under the railroad tracks, which cross the street on two bridges. Bridge-supporting columns are located between the street's two through lanes in each direction. In addition, the north and south masonry walls of the K Street NE underpass are contributing features to WUS as a historic property.

FRA and the Proponents considered four options for parking access in the K Street underpass: two single-entrance options and two double-entrance options. One single-entrance option was a right-in, right-out intersection on the south side of K Street NE. The other was a full-movement intersection, also on the south side. One double-entrance option provided two separate entrances on the south side of K Street NE. The other featured an entrance on each side of the street.[34]

Analysis showed that the single-entrance, right-in, right-out option would not adequately accommodate the anticipated volumes of exiting vehicles. Among the double-entrance options, the south-side one would create unnecessary conflicts and require making two openings in the historic wall. The other double-entrance option would do the same, and additionally face substantial structural challenges. Therefore, FRA and the Proponents advanced the option with a single-entrance and full-movement intersection. The access road to the parking facility would consist of two lanes out and one lane in on the southern side of K Street NE. Constructing the new intersection would require demolishing two existing bridge-supporting columns to allow for left turns into or from the parking facility entrance.

3.1.8.6 Bicycle and Pedestrian Access

Following the October 2016 public meeting, FRA received comments requesting more detailed planning related to bicycle accommodations and sufficient consideration of pedestrian access. To promote sustainable access to WUS, FRA and the Proponents further advanced pedestrian and bicycle access approaches during the Alternatives Refinement step. Refinements included new entrances on First, 2nd, and H Streets NE that would provide adequate infrastructure for cyclists and pedestrians to access WUS comfortably and efficiently. They also included upgrades to sidewalks, crosswalks, bike lanes, bike parking, and Capital Bikeshare stations. FRA and the Proponents shared the proposed improvements with DDOT and refined them based on DDOT's comments. As design progresses, refinement of pedestrian and bicycle infrastructure options will continue in coordination with DDOT.

3.1.8.7 Modifications to East-West and North-South Train Halls

FRA received comments requesting the agency to consider solutions that would improve the connection between the east-west train hall and H Street NE and provide light to the Central

[34] These options are documented in more detail in **Appendix A5b**, *Washington Union Station Expansion Project. Action Alternatives Refinement Report, Appendix A2, Compendium of Relevant Studies*, Section A-2.8.

Concourse (the subsurface Central Concourse provides the pedestrian connection between H Street and the east-west train hall). To address these comments, FRA and the Proponents refined the east-west train hall. A new H Street headhouse would compensate for the distance between H Street NE and the east-west train hall.[35] The headhouse would provide an attractive entrance to WUS on H Street NE near the DC Streetcar stop. It would afford access to the H Street Concourse and to the east-west train hall via the Central Concourse. It could incorporate daylighting and pedestrian access features between H Street and the train hall above the Central Concourse.

Commenters also requested modifications to the north-south train hall so it would: cover more tracks; reduce barriers between the east and west sides of the train hall; and foster pedestrian activity rather than more vehicular activity than strictly necessary to serve the train hall. To address these comments, FRA and the Project Proponents sought to enhance customer experience and improve pedestrian accommodations by refining the north end of the train hall to create an opportunity for the construction of a plaza that would provide a quality public space and entrance to WUS from H Street NE. They also refined the concept for the roadway next to the train hall to provide adequate accommodations for pick-up and drop-off activities. In the process, FRA and the Proponents revised the width of the north-south train hall to accommodate structural requirements. The refined north-south train Hall would cover three tracks instead of five.

3.1.8.8 Modifications to Parking/Bus Facility North of H Street

Based on the comments received and constructability information, FRA and the Project Proponents investigated potential alterations to the bus facility north of H Street NE included in Preliminary Alternative 4B. As noted in **Section 3.1.8.1**, *Cost and Constructability*, concerns about the cost and complexity of constructing below-ground parking led FRA and the Proponents to explore reductions in the amount of below-ground parking. Therefore, FRA and the Proponents modified Preliminary Alternative 4B to accommodate a partial parking program above the bus facility, thus allowing for a reduction in the amount of below-ground parking. As explained in **Section 3.1.6.3**, *Modifications to the Retained Concepts*, FRA and the Proponents eliminated Concept 4A during the Concept Refinement step because of difficulty accommodating a full parking program above the bus facility. However, they found that it would be possible to accommodate a partial parking program by modifying Preliminary Alternative 4B to widen the footprint of the facility.

FRA and the Project Proponents investigated limiting bus circulation from the north entrance of the bus facility to an intersection on the west side of the H Street Bridge. If practicable, the facility should have two entrances to allow it to remain fully operational during maintenance

[35] A headhouse is an entrance to a train station that provides access to tracks and platforms.

activities or in case of incidents.[36] To minimize the need for a second entrance, FRA and the Proponents initially considered a design with perpendicular, rather than angled, slips, which would have allowed buses to travel in and out of the same H Street Bridge access point. However, bus companies expressed safety concerns about perpendicular slips.[37] Therefore, FRA and the Proponents reverted to the original angled slip configuration from Preliminary Alternative 4B but added a bus turning loop to allow the bulk of bus traffic to both enter and exit through the H Street access point. As a result of this refinement, FRA and the Proponents reduced the capacity of the bus facility to 25 slips.

3.1.8.9 Refinements to Design to Enhance Passenger Experience

During the Alternatives Refinement step, FRA and the Project Proponents investigated three aspects of the Project related to passenger experience and advanced the level of design of the train hall and concourses accordingly. The three aspects considered were: the air conditioning strategy in the concourses and train hall; pedestrian flow within the station; and passenger boarding and ticketing control strategies.

Conditioning Strategy

There are various approaches to regulating thermal comfort and air movement in the public areas of a major station like WUS. Different areas of the station serve varying functions and have distinct circulation patterns that call for specific conditioning approaches. With diesel trains operating at the station and attendant fumes, heat, and noise, it is important to consider comprehensively the environment of the enclosed areas (concourses, waiting areas, and train hall). Meeting requirements such as life safety, ventilation, and health/safety while optimizing passenger comfort is essential. Three distinct thermal zones were defined:

- **Unconditioned but Ventilated** – Exterior or semi-enclosed areas, such as platforms, mechanical ventilation would have ventilation but there would be no conditioning and the temperature would reflect outside conditions.
- **Conditioned** – Interior areas, such as ticketing and lounges, retail (non-platform), and the concourses would be fully conditioned to optimize thermal comfort.
- **Tempered** – In other spaces, there would be a mix of conditioned and unconditioned air. A tempered environment can reduce overall energy costs and the visual impacts associated with the compartmentalization of space needed to support full conditioning. Examples of tempered areas include concourse spaces opening into unconditioned but ventilated areas such as the platforms.

[36] The rationale for USRC's position is documented in a Memorandum prepared by USRC, dated April 17, 2018. A copy of the Memorandum is in **Appendix A5e**, *Washington Union Station Expansion Project. Action Alternatives Refinement Report, Appendix D, Reference Memoranda*.

[37] FRA held coordination meetings with Greyhound, Megabus, and Peter Pan on December 8, 2017.

After considering the balance of cost, passenger comfort, safety, and passenger experience, the Project Proponents and FRA developed a conditioning strategy combining these three thermal zones within WUS. A range of architectural strategies would implement the conditioning strategy. Full-height glazed walls separating fully conditioned spaces from partially-conditioned or conditioned-but-ventilated areas are an example of potential architectural strategy.

Pedestrian Flow

The Project Proponents studied pedestrian flows to analyze the effectiveness of the preliminary alternatives in meeting projected 2040 pedestrian demand at WUS. The Proponents derived pedestrian flow volumes from Amtrak's proposed 2040 TI Operating Plan and used Preliminary Alternative 5 (later DEIS Alternative E) for the analysis. This is because the integrated train hall would provide the largest mix of uses in Concourse A, which would generate a larger number of pedestrian movements within the southern parts of WUS than under the other alternatives, where program elements are more distributed. Based on the pedestrian flow analysis, the Proponents added additional vertical connections to the platforms for run-through tracks to better accommodate the increased volumes associated with enhanced VRE service and potential MARC through-running service. The Proponents also added vertical connections between the platform level and the lower level concourse in Concourse A to enhance pedestrian movements to and from the WMATA Metrorail station.

Passenger Boarding and Control

Current passenger boarding operations at WUS often cause queues to form into the passageways of the Claytor Concourse, compromising pedestrian circulation. No formal security screening of passengers occurs, apart from random searches, including canine searches, by Amtrak Police Department personnel. During the Alternatives Refinement step, FRA and the Proponents considered different approaches to improve future screening and boarding procedures. These approaches included individual-platform screening, screening for groups of platforms, or screening for all platforms through a few central screening areas.

Regardless of screening procedures, a range of alternative boarding procedures are also possible. These may include ticket scanners that give travelers access to waiting areas in advance of train boarding or more open boarding procedures that allow ticketed passengers greater access to platforms in advance of their train's departure.

3.1.8.10 Bus and Other Multimodal Uses on First Street

Commenters asked that FRA consider bus uses on First Street NE next to WUS. FRA and the Proponents examined opportunities on First and G Streets NE to accommodate a variety of multimodal uses. As envisioned during the Concept Development and Concept Refinement steps, there were spaces for buses and pick-up/drop-off activity near the entrance to the H Street Concourse on First Street NE. Along G Street NE, there were six bus parking spaces, primarily to allow hop-on/hop-off sightseeing buses to load and unload passengers. The new

parking spaces on G Street would also allow tour/charter buses to load and unload during peak seasons.

FRA and the Proponents shared these proposals with DDOT. Upon review, DDOT requested that FRA and the Proponents remove pullout areas on First Street NE for pick-up and drop-off (so that pick-up and drop-off would occur at a traditional curbside); focus bus operations on G Street NE; and try to accommodate sidewalks along First Street NE that would be at least 12 feet wide. In response to these comments, FRA and the Proponents further refined the preliminary alternatives to remove bus activity from First Street NE. They incorporated the resulting improvements in the refined alternatives.

3.1.8.11 Columbus Circle Roadway Modifications

FRA received comments requesting traffic engineering changes to Columbus Circle and the pick-up and drop-off lanes in front of the historic station building. In response, during the Alternatives Refinement step, FRA and the Proponents developed proposed improvements to circulation on Columbus Circle in front of WUS that would make pick-up and drop-off operations more efficient, reduce congestion, and minimize queuing. FRA and the Proponents incorporated the improvements into the refined alternatives. FRA and the Proponents shared the improvements with DDOT in July 2017 and February 2018 as part of their ongoing coordination effort with this agency. The improvements were refined based on DDOT's feedback. They are further described in **Section 3.4.2.9**, *Pedestrian and Bicycle Access* and **Section 3.4.2.10**, *Pick-up and Drop-off Areas*.

3.1.8.12 WMATA Metrorail Station

Public and agency comments asked that FRA further evaluate the connection between WUS and the Union Station WMATA Metrorail station. The new concourses are common to all the preliminary alternatives. They would support improved circulation to and from the Metrorail station. They would allow for the future construction, as a separate and independent project, of a central concourse at the Metrorail station that would tie into the WUS concourses. To better accommodate the volume of passengers, FRA and the Proponents modified the design of Concourse A to add vertical circulation elements for train passengers transferring to and from the Metrorail station.

3.1.8.13 Modifications to Preliminary Alternatives 1A, 1B, 4B, and 5

To address the issues considered during the Alternatives Refinement step, FRA and the Project Proponents made several changes to the preliminary alternatives, including a set of conditioning strategies and multimodal access and circulation design refinements common to all them.

The cost and constructability analysis and the adjustments to Amtrak operational space requirements prompted larger modifications. These included the elimination of below-

ground construction other than concourse space around the run-through tracks. To reduce the amount of below-ground construction, FRA and the Proponents modified the preliminary alternatives as follows:

- **Preliminary Alternative 1A:** Moved all Amtrak operational space to the west side of the rail terminal; eliminated the below-ground taxi facility to accommodate Amtrak's operational space needs and reduce the amount of below-ground construction.
- **Preliminary Alternative 1B:** Moved all Amtrak operational space and below-ground parking to the west side of the rail terminal; provided parking below the concourse.
- **Preliminary Alternative 4B:** Moved all Amtrak operational space and approximately half of the below-ground parking to the west side of the rail terminal; placed approximately half the parking above the bus facility north of H Street NE; and added an option with the bus and parking facility on the west side of WUS to address concerns about the proximity of the bus and parking facilities to the residential neighborhoods east of WUS. This new preliminary alternative was named 4AB.
- **Preliminary Alternative 5:** Created two versions of this preliminary alternative. In **5A,** all Amtrak operational space and approximately half of the below-ground parking would be on the west side of the rail terminal and approximately half of the parking would be above ground, north of I (Eye) Street NE. In **5B,** all Amtrak operational space and below-ground parking would be on the west side of the rail terminal and parking would be below the concourses.

3.1.8.14 Alternatives Retained for Analysis in the DEIS

Following these modifications, FRA decided to retain Preliminary Alternatives 1A, 1B, 4AB, 5AB, and 5B for analysis in the DEIS. For ease of understanding, the alternatives received new names, as shown in **Table 3-4**.

Table 3-4. Alternative Renaming for DEIS

Preliminary Alternative Name	DEIS Alternative Name
No-Action Alternative	No-Action Alternative
1A	A
1B	B
4AB – East Parking Option	C – East Option
4AB – West Parking Option	C – West Option
5AB	D
5B	E

As coordination with Project stakeholders continued, FRA and the Proponents made some adjustments to Action Alternatives A through E:

- Following the March 2018 public meeting, FRA and the Proponents received comments from residents, Advisory Neighborhood Commission (ANC) 6C, and DDOT concerning the design and use of the K Street entrance. Based on those comments, FRA and the Proponents advanced more detailed designs for K Street NE to validate the feasibility of the design, including plans for signals, lighting, and warning signs as well as compatibility with the *K Street NE Corridor Safety Assessment*, which calls for the provision of pedestrian and bicycle infrastructure in the K Street underpass. [38] FRA and the Proponents determined that the approach they proposed was feasible from an operational perspective and would not preclude the improvements outlined in the *Safety Assessment*. FRA and the Proponents will continue to coordinate with DDOT on this subject, as needed, as project planning progresses.
- In a letter to FRA, the District of Columbia State Historic Preservation Office (DC SHPO) expressed concerns about potential adverse historic preservation and urban design effects from the provision of daylighting features above the off-centered Central Concourse, resulting in an asymmetrical development to the north of the station. [39] To address this concern and avoid the impression of precluding appropriate design solutions, FRA and the Proponents delineated areas (Visual Access Zone and Daylight Access Zone) for those alternatives with an east-west train hall. The Daylight Access Zone is the general area where daylighting features, such as skylights, may be established through agreement with the private air-rights developer. Such features would only use a portion of the Daylight Access Zone. The Visual Access Zone is the general location where the private air-rights developer could provide a visual connection from H Street to the new train hall and station. The Visual Access Zone may be centered on the historic station building. The access zones are located within the private air rights and are not a part of the Project, but the Project would not preclude them from being developed as part of the private air-rights development. [40]
- To address traffic circulation concerns, FRA and the Proponents decided to repurpose the existing ramp along the west side of WUS to maintain a link between the station facilities at deck level and First Street NE. The ramp would provide pedestrian and bicycle access and one southbound vehicular lane accessible from H Street NE. To the south, the traffic lane would connect to First Street NE. To the north, it would connect to a new road (southwest road) that would in turn connect to H Street NE (see **Section 3.4.2.6**, *H Street Bridge Intersections and Deck Circulation*, below).

[38] DDOT. January 24, 2019. *Corridor Safety Assessment K Street NE*. Available from: http://anc6c.org/wp-content/uploads/2019/01/K-Street-NE-Presentation-01.24.19.pdf. Accessed on April 3, 2020.

[39] Letter from DC SHPO to FRA, dated March 30, 2018. Meetings were also held with the DC SHPO and CFA on April 24, 2018 and August 21, 2018.

[40] In Alternative A-C, the southern end of the Visual Access Zone, just north of the new train hall and historic station building, would be within the federally owned air rights. Neither the Project nor the potential federal air-rights development would create an obstruction in that part of the Visual Access Zone that might preclude the private air-rights developer from providing a visual connection from H Street to the new train hall and station.

3.1.9 Further Alternatives Refinement

3.1.9.1 Further Evaluation and Refinement of Alternatives A through E

Following the identification of Alternatives A through E for evaluation in the DEIS, FRA analyzed their environmental impacts and continued constructability analysis and coordination with stakeholders and agencies. The initial results of the impacts analysis and stakeholders and agencies coordination indicated that the following issues warranted further consideration:

- Depth and complexity of construction;
- Location of the intermodal uses relative to the historic station building;
- Traffic operations on the H Street Bridge and the public street network;
- Impacts to the air rights above the rail terminal; and
- Quality of the urban setting at the deck level.

Based on coordination with DDOT about traffic operations on the H Street Bridge, FRA and the Proponents investigated how the different vehicular modes serving WUS would circulate on the deck-level roads connecting to H Street NE. To improve operations on the bridge, DDOT recommended that WUS adopt a one-way circulation pattern on the deck and minimize left-turn opportunities in and out of H Street. Based on this recommendation, FRA and the Proponents modified Alternatives A through E to establish an east-west, one-way deck circulation pattern for WUS-related traffic. The pattern would vary slightly depending on the alternative and the location of the various above-ground project elements. It is described for each alternative in **Section 3.4**, *Description of the Alternatives*.

3.1.9.2 Development of Alternative A-C

After review of the major elements of each Action Alternative – including below-and above-ground parking, train hall, and bus facility – in light of the issues outlined in the previous section, the Project Proponents and FRA developed an additional Action Alternative, Alternative A-C. This alternative combines elements of Alternative A (bus facility and above-ground parking combined into a multimodal surface transportation center to the southwest of the H Street Bridge; no below-ground parking) and Alternative C (east-west train hall). Alternative A-C would:

- **Minimize depth and complexity of construction**: Alternative A-C would place all parking and pick-up and drop-off areas above ground and require no significant excavation below the concourse level. This would avoid excavating below the water table and eliminate the need for deep cut-off walls or significant short-term and long-term dewatering. Additionally, Alternative A-C's east-west train hall would not

include integrated bus facilities (like those featured in Alternatives C through E), which would simplify the design and construction of the train hall.

- **Keep intermodal uses close to the main station**: In Alternative A-C, all bus operations would be located in the bus facility, which would be constructed approximately where the parking garage stands today.[41] This location would maintain convenient access for bus facility users to WUS amenities and minimizes distances for intermodal transfers.

- **Minimize operational traffic impacts on the H Street Bridge and public street network:** Like all Action Alternatives, Alternative A-C would include a one-way circulation pattern on the deck. It would retain the existing west intersection and require only one new intersection with the H Street Bridge, on the east side. Alternative A-C would minimize and simplify bus movements on the deck roadways by using the existing bus exist ramp onto H Street SE. It would also reverse the direction of the west ramp to allow for deck access from the southwest via First Street NE. Together, these features were anticipated to reduce operational traffic impacts on the H Street Bridge.

  Alternative A-C would minimize the risk of queueing by for-hire and private pick-up and drop-off vehicles on public streets by including a deck-level pick-up and drop-off area just north of the train hall. The second level of the bus facility could accommodate pick-up and drop-off activities if it is not needed for buses. Finally, Alternative A-C does not include any below-ground parking. Therefore, it does not require a parking entrance on K Street NE, which would minimize traffic impacts on this street.

- **Make optimal use of the Federal air rights and minimize impacts on the private air rights:** Alternative A-C would reuse the entire existing west ramp (which may be fully or partially reconstructed). This would allow shifting the multimodal surface transportation center to the west relative to where they would be in Alternative A, placing them almost entirely within the Federally owned air rights. This would minimize the need to use privately owned air rights for Project elements.

- **Enhance the urban setting at the deck level:** Alternative A-C would align the multimodal surface transportation center with the western edge of the historic station building, a feature that would enhance visual consistency among Project elements. It would allow for Visual and Daylight Access Zones, similar to Alternatives C through E. Alternative A-C would also enhance commercial development opportunities around the multimodal surface transportation center.

[41] As in all the other Action Alternatives, hop-on/hop-off sightseeing buses would use a new bus location on G Street NE, which would also accommodate occasional overflow tour and charter buses.

729 ■ **Reduce overall project costs and risk** with a flexible and compact above-ground bus
730 and parking facility, and efficient train hall layout.

3.1.9.3 Alternative A-C Retained for Analysis in the DEIS

731 Consistent with the screening process previously conducted when developing Alternatives A
732 through E and described in **Section 3.1.3**, *Concept Screening* above, FRA determined that
733 Alternative A-C would meet the Purpose and Need of the Project, as summarized in **Table 3-**
734 **5**. Therefore, Alternative A-C was retained for analysis in the DEIS along with Alternatives A
735 through E.

Table 3-5.Purpose and Need Assessment, Alternative A-C

Purpose and Need Element	Alternative A-C
Support current and future long-term growth in rail service and operational needs?	Yes. Alternative A-C would provide the needed platform/rail capacity and rail operational requirements.
Achieve compliance with the ADA and emergency egress requirements?	Yes. Alternative A-C would achieve compliance with the ADA and emergency egress requirements, which would be incorporated in Project design.
Facilitate intermodal travel?	Yes. Alternative A-C would provide facilities that meet future multimodal capacity needs. It would improve internal circulation by keeping these facilities close to the front of the station.
Provide a positive customer experience?	Yes. Alternative A-C would provide a new train hall and concourses with room for enhanced amenities. It would keep multimodal uses close to the front of WUS.
Enhance integration with the adjacent neighborhoods, businesses, and planned land uses?	Yes. Alternative A-C would minimize the need to use of private air rights. It would align the train hall and bus/parking facility with the western edge of the historic station building.
Sustain the station's economic viability?	Yes. Alternative A-C would provide additional space for retail, commercial, and station uses to generate revenue to maintain the station's economic viability.
Support continued preservation and use of the historic station building?	Yes. Alternative A-C would preserve and maintain use of the historic station building. By aligning the multimodal surface transportation center with the western edge of the historic station building, it would support visually consistent development on the deck.

3.2 Summary of DEIS Alternatives

Following concept development, concept screening, concept refinement, and alternatives refinement, FRA identified six Action Alternatives, in addition to the No-Action Alternative, for analysis in the DEIS. Each Action Alternative incorporates the eight program elements described in **Section 3.1.1**, *Identification of Project Elements*. All the Action Alternatives accommodate the full range of multimodal functions at WUS and meet the Project's Purpose and Need. None of the Action Alternatives requires the prior or simultaneous completion of any other project.

The following bullets briefly characterize the alternatives. **Section 3.4**, *Description of the Alternatives*, provides more detailed descriptions.

- **No-Action Alternative:** The future condition in the absence of the Project in the Project horizon year of 2040. The No-Action Alternative includes the private air-rights development on an elevated deck above part of the rail terminal, station and track improvement projects, and planned transportation projects.
- **Alternative A:** Full reconstruction of tracks and platforms. Four new concourses. North-south train hall. Bus and parking above ground, southwest of H Street NE.
- **Alternative B:** Full reconstruction of tracks and platforms. Four new concourses. North-south train hall. Bus facility above ground, southwest of H Street NE. Parking below ground, under the tracks.
- **Alternative C, with East or West Option**: Full reconstruction of tracks and platforms. Four new concourses. East-west train hall. Bus facility above ground either northeast (East Option) or northwest (West Option) of H Street NE. Parking below ground, under the tracks and above ground, over the bus facility.
- **Alternative D:** Full reconstruction of tracks and platforms. Four new concourses. East-west train hall. Bus facility above ground integrated into the train hall. Parking below ground, under the tracks and above ground, south of K Street NE.
- **Alternative E:** Full reconstruction of tracks and platforms and new concourses. East-west train hall. Bus facility above ground integrated into the train hall. Parking below ground under the tracks.
- **Alternative A-C**: Full reconstruction of tracks and platforms and new concourses. East-west train hall. Bus and parking above ground, southwest of H Street NE.

3.3 Preferred Alternative

3.3.1.1 Identification of Alternative A-C as the Preferred Alternative

After carefully considering the Purpose and Need for the Project as well as stakeholder, agency, and public input, FRA and the Proponents identified Alternative A-C as the Preferred Alternative. Alternative A-C best responds to the full range of issues and concerns raised during the development and preliminary analysis of the Action Alternatives and it meets the Project's Purpose and Need as well as or better than the other Action Alternatives (See **Table 3-5** above).

Alternative A-C would keep all WUS intermodal uses close to the front of the station and require minimal excavation below the concourse level. By featuring an east-west train hall, as in Alternative C but without a bus pick-up and drop-off area, and by placing the multimodal surface transportation center farther to the west than in Alternative A, Alternative A-C would minimize the need to use private air rights to construct Project elements. Alternative A-C would also offer enhanced opportunities for development and urban design on the remaining deck area. See **Section 3.1.9.2**, *Development of Alternative A-C* above for more details.

3.3.1.2 Public and Agency Coordination

FRA and the Project Proponents presented the Preferred Alternative to DDOT on October 25, 2019 and to the Commission of Fine Arts (CFA) during a public information meeting on November 21, 2019. On January 9, 2020, the National Capital Planning Commission (NCPC) reviewed and commented on Alternative A-C at a Concept Review Hearing. The Preferred Alternative was made public on the Project website in December 2019.[42]

DDOT noted that maintaining the west intersection on its existing alignment would create an offset intersection with the potential access road along the northwest side of the private air-rights development. DDOT also noted that the distance between the new bus facility's exit ramp, which would be in the same location as the existing exit, and the potential private air-rights development's center road would be less than desirable. DDOT confirmed that the road and intersection locations are consistent with the H Street Bridge replacement project and that the issues it identified would also occur with the No-Action Alternative.

In a letter dated November 27, 2019, CFA indicated its support for Alternative A-C, including general approach, sectional disposition, and plan layout of the programmatic elements. CFA also noted that "inclusion of a bus terminal at Union Station is an important, equitable

[42] https://railroads.dot.gov/current-environmental-reviews/washington-union-station-expansion-project/alternative-c-preferred.

convenience for travelers." However, CFA expressed concerns about the planning assumptions underlying the parking element and the volume represented by the combined bus facility and parking garage. Therefore, CFA requested FRA and the Proponents reconsider the parking element of the Project in order to develop a more appropriately sized and sympathetically configured massing.

During the January 9, 2020 Concept Review Hearing, the NCPC commissioners expressed their support for the overall project purpose; reconfiguration of the train platforms; east-west train hall; and new pedestrian entrances. The commissioners agreed that the rail station, bus facility, and Metrorail station should be located in close proximity to each other to facilitate intermodal travel. However, they expressed concerns with the size of the parking program, particularly the massing of an above-grade facility. The commissioners found that the placement of parking beneath the station tracks and lower concourses may be challenging due to constructability and cost and they noted the significant challenges facing any off-site locations for parking. The commissioners requested that FRA and the Proponents further coordinate with the District to evaluate and confirm the appropriate amount of parking given the mix of uses, traffic and urban design impacts, and transit-oriented nature of the project prior to the next stage of NCPC review.

3.3.1.3 Parking Working Group

In response to these comments and to public input received during and after the January 9, 2020 NCPC Concept Review Hearing, FRA and the Project Proponents coordinated with DDOT and DCOP to review the parking program in light of the Project's Purpose and Need, USRA requirements, NEPA standards based on best available scientific information, and the District's applicable parking policies. This coordination was conducted through a Parking Working Group comprised of representatives of DDOT, DCOP, NCPC, FRA, and the Project Proponents. The Parking Working Group met several times between February and April 2020. This process is documented in more detail in Section 2 of **Appendix A6**, *Parking Program Memorandum.*

In the Working Group meetings, FRA and USRC provided information supporting the 1,600 space parking program used for the development of the DEIS Action Alternatives, including Alternative A-C. FRA and USRC stressed the need to base parking analysis and ultimate decision-making on objective data and evidence-based modeling, consistent with NEPA. They explained to the Working Group that all DEIS Action Alternatives would substantially reduce the existing parking program despite projections of greatly increased ridership and use at WUS by 2040.

During the Working Group meetings, DDOT and DCOP staff proposed a parking program that would provide from 47 to 375 parking spaces. In subsequent communication to FRA, DCOP recommended a total of 295 spaces. [43] Neither DDOT nor DCOP provided projections supporting the recommended parking program. The agencies based their program on stated policy goals to reduce vehicular parking in the District's downtown core, generally shift users away from using private vehicles, and provide more space for residential, commercial, or mixed development.

After considering the District's recommended parking program, FRA determined that the best information currently available does not warrant a further reduction of the Project's parking program at this time. Therefore, the DEIS continues to reflect the parking program used to develop the Action Alternatives, which is consistent with the USRA and is supported by analysis conducted to support the NEPA review. The Action Alternatives with this parking program support the Project's Purpose and Need by maintaining full multimodal functionality at WUS and a reliable source of commercial revenue for the preservation of the historic station building.

FRA recognizes the substantial interest in the amount of parking included in the Project. Therefore, FRA specifically seeks public comments about the parking program for FRA to consider. To help inform public comments on this subject, a high-level analysis of how a reduced parking program would affect the impact analyses presented in this DEIS can be found in Section 3 of **Appendix A6**.

3.4 Description of the Alternatives

3.4.1 No-Action Alternative

NEPA requires considering a No Action Alternative, which is an alternative reflecting the conditions that would exist if the proposed action were not implemented. The No-Action Alternative reflects the state of the environment in the absence of the Project in the horizon year of 2040. The future state of the environment includes the effects of projects that would result in changes to existing conditions in the Project Area and have independent utility[44] relative to the Project. Where no changes are anticipated to occur, the No-Action Alternative consists of the continuation of existing conditions at WUS and in the Project Area.

[43] This would include parking for WUS land uses (including office space) and long-term and short-term parking for intercity travelers. DCOP made no specific recommendation for rental car parking, explaining that the District does not have enough data to show that the inclusion of a traditional car rental facility is appropriate to support the needs of intercity travelers. See Section 2.2.3 of **Appendix 6** for more detailed information on the District's recommended parking program.

[44] "Independent utility" means that the projects can occur regardless of whether the WUS Expansion Project takes place and that, conversely, implementation of the WUS Expansion Project is not dependent upon the occurrence or non-occurrence of the projects.

The No-Action Alternative would not meet the Project's Purpose and Need. In particular, the No-Action Alternative would not adequately support current and future long-term growth in rail service and operational needs, as it would make no changes to the existing track and platform configuration. For the same reason, it would fail to achieve compliance with the ADA. By keeping in operations facilities that would become less and less capable of accommodating growing passenger volumes, it would not facilitate intermodal travel and would cause a deterioration in customer experience.

The following sections describe the various components of the No-Action Alternative.

3.4.1.1 Continuing Conditions at WUS

Under the No-Action Alternative, many aspects of WUS would stay unchanged relative to existing conditions and would continue as at present, including:

- **Structures:** No major new infrastructure would be built. Routine maintenance and repairs would continue as at present.
- **Mix of Uses:** The current mix of uses at WUS would continue, including approximately 208,000 square feet of retail space, 120,000 square feet of office space, and 85,600 square feet of Amtrak support areas.
- **Parking:** Parking would remain southwest of H Street NE within the existing garage, capable of accommodating approximately 2,450 cars (including rental cars). Ingress into the garage would continue to be from H Street NE (west intersection) and Columbus Circle (east ramp). Egress would continue to be through H Street NE via the west intersection and through the ramp running parallel to First Street along the west side of the station (west ramp).
- **Buses:** There would continue to be 61 bus spaces in the existing facility southwest of H Street NE, below the parking garage. Buses would continue to enter the facility via the H Street west intersection and to exit through the bus-only exit ramp to H Street NE.
- **For-Hire Vehicles/Pick-up and Drop-off:** The two northernmost lanes of Columbus Circle would continue to be reserved for taxi pick-ups and drop-offs. Together, these two lanes can and would continue to accommodate approximately 24 taxis. Non-taxi for-hire vehicles would continue to share with private vehicles the two southernmost traffic lanes of the circle.
- **Bicycles:** Bikeshare facilities would remain on the east side of WUS at F Street NE, with 54 bikeshare spaces. The bicycle station parking facility in the southwest would continue to offer around 100 bicycle parking spaces.
- **Pedestrians:** Pedestrians would continue to enter or exit WUS via the WMATA Metrorail First and G Street entrances, the southwest portico and front of the historic station building, and the H Street bus facility.

- **Intercity and Commuter Operations and Ridership:** Operations would continue but with increased passenger volumes and levels of service, as described below.

3.4.1.2 Projected Increases in Ridership and Levels of Service

Anticipated increases in rail and bus ridership in the No-Action Alternative are based on regional modeling performed for the Northeast Corridor (NEC) FUTURE Final EIS (2017) and the 2025 Operating Plan.[45] *NEC FUTURE* is FRA's comprehensive plan for improving the Northeast Corridor from Washington, DC, to Boston, MA. FRA conducted extensive ridership modeling for the *NEC FUTURE* FEIS. This modeling identified No-Action Alternative ridership estimates for the Northeast Corridor. For this DEIS, these estimates were adjusted based on a No-Action Alternative Operating Plan developed by Amtrak. This operating plan represents the railroad growth possible without the railroad improvements proposed in the Action Alternatives. Increases in WMATA Metrorail ridership were estimated consistent with National Capital Region Transportation Planning Board (TPB) Travel Demand Model outputs. **Table 3-6** shows the adjusted ridership estimates and changes in levels of service.

Table 3-6. Passenger and Train Volumes by Service, No-Action Alternative

Service	Existing Passenger Volumes	2040 Passenger Volumes	Train or Bus Volumes Increase over Existing
Amtrak	16,400 daily 5.033 million annually	21,800 daily (+33%) 6.694 million annually	+24%
MARC	28,100 daily 7.683 million annually	37,900 daily (+35%) 9.483 million annually	+11%
VRE	3,900 daily 1.06 million annually	4,900 daily (+26%) 1.378 million annually	+6%
WMATA	29,000 daily boardings[46] 7.250 million annual boardings	43,800 daily boardings (+51%) 10.950 million annual boardings	+0% [47]
Intercity Bus	10,000 daily 2.500 million annually	12,700 daily (+27%) 3.175 million annually	+27%

3.4.1.3 Near-term Station and Track Improvements at WUS

The Project Proponents have identified several station and track improvement projects programmed for the next five years and with likely completion dates prior to 2040. These projects are independent of the WUS Project. USRC also identified several other near-term

[45] **Appendix B,** *Washington Union Station Terminal Infrastructure EIS Report, Appendix D.*

[46] WMATA reports ridership based on boardings not total ridership (boardings and alightings). Other figures in this table represent total ridership.

[47] Operationally, based on information from WMATA, it is expected that in 2040, trains would continue to serve the WUS Metrorail station with the same frequency as today, including every three minutes during the peak periods. However, it is anticipated that all peak-period trains on the Red Line would be eight-car trains, increasing overall capacity.

907 projects whose precise timing is currently unknown. **Table 3-7** lists the near-term station and
908 track improvement projects included in the No-Action Alternative.

Table 3-7. Station and Track Improvement Projects Included in the No-Action Alternative

Station and Track Improvements	Description	Design Completion	Construction Completion Year(s)
General Garage Restoration	Ongoing structural repairs and maintenance to the mezzanine rental car level and levels 1-4 of the parking garage.	Ongoing	Ongoing
West End Mezzanine Patio	Creation of a new eatery patio seating area at mezzanine level above the Le Pain Quotidien space.	Complete	Complete
Relocate Heating Ventilation and Air Conditioning (HVAC) Unit	Decommission units in the train concourse mechanical rooms and install new units on the roof of the Claytor Concourse.	Complete	2018
Rehabilitate Track 22	Rehabilitate engine storage track to provide revenue service and improve operational flexibility.	Complete	2022
Original Concourse Ceiling Repair	Plaster repair to the original concourse ceiling damaged by the 2011 earthquake. Structurally reinforce the ceiling to be seismically sound.	Complete	Complete
Replace North Hangar Escalator	Replace six escalators connecting to the eastern run-through platforms.	Complete	2018
New Elevator Tracks 27-28	Install new ADA-compliant elevator.	Complete	2019
Electrify Tracks 8-9	Electrify tracks to enhance operational flexibility.	Complete	2019
Amtrak Police Relocation	Relocate personnel to Railway Express Agency (REA) Building; construct new one-story patrol facility.	Ongoing	2022
Relocate Satellite Commissary	Replace refrigerated storage area from under H Street Bridge.	Ongoing	2022

Station and Track Improvements	Description	Design Completion	Construction Completion Year(s)
K Tower Improvements	Implement new train dispatch software and relocate Amtrak operational personnel to the REA Building.	Complete	2020
Concourse Modernization Project	Fully renovate the Claytor Concourse and North Hangar. Expand passenger areas and add a new Club Acela lounge.	Ongoing	To be Determined (TBD)
Sub-basement Track-bed Replacement	Repair track-bed support elements in the sub-basement.	2021	2025
Substation 25A Relocation	Relocate and replace substation; sectionalize overhead catenary to improve operational flexibility.	2021	TBD
Crew Base Renovation	Renovate and potentially expand the existing Transportation Building for operational functions.	2021	TBD
Retail Mezzanine Development	Reconfiguration of the Retail Concourse Mezzanine to create a more open layout and expose more historic fabric to the public than what currently exists.	TBD	TBD
Presidential Reception Room	Reconfiguration of the Presidential Reception Room's west wall to create a new entrance connection to the lobby area and East Hall. The new entrance would create a more direct connection to the lobby area and East Hall from the Presidential Reception Room.	TBD – DC SHPO approved	TBD

3.4.1.4 Transportation Projects within the Project Area

Transportation projects in the Project Area that are independent of the WUS Project and have completion dates earlier than 2040 include:

VRE Midday Storage Facility Project

The VRE Midday Storage Facility Project would replace the current storage space leased from Amtrak at the Ivy City Coach Yard in the District. The project involves planning, designing, and constructing a permanent midday storage facility for VRE trains traveling to the District. VRE intends to use the facility to store commuter trains on weekdays between the inbound morning commute and the outbound afternoon commute. Environmental review by the Federal Transit Administration was completed in 2019 and final design is slated to begin in 2020.[48]

H Street Bridge Replacement

The H Street Bridge extends from North Capitol Street to 2nd Street NE. DDOT, in conjunction with the Federal Highway Administration, is planning to replace the bridge because the deck is reaching the end of its useful life. The new bridge would continue to accommodate the DC Streetcar extension and be consistent with the proposed new tracks and platforms at WUS. As of March 2020, preparation of a Categorical Exclusion for this project was ongoing.

Streetcar Extension

The existing DC Streetcar line, which opened in February 2016 and runs from WUS to Benning Road NE and Oklahoma Avenue NE, is programmed for extension eastward and westward. The eastern segment would extend the line along Benning Road to the Benning Road Metrorail Station. The western extension would carry the streetcar from WUS to Georgetown along H Street, New Jersey Avenue, Mount Vernon Square, and K Street.

The construction of a new streetcar stop and the realignment of tracks on the H Street Bridge needed to accommodate the western extension would take place within the Project Area. While the DC Council deleted the short-term funding for implementing the western extension during the FY2018 budget process and DDOT stopped work related to this extension at the beginning of 2020,[49] it is included in the TPB Constrained Long Range Transportation Plan. Therefore, the No-Action Alternative includes the relevant portion of the western extension. DDOT and FRA continue to coordinate about the design of the respective projects.

[48] *VRE Midday Storage Facility*. Accessed from https://www.vre.org/development/maintenance-storage-facilities/midday-storage-facility/. Accessed on March 21, 2020.

[49] District of Columbia Chief Financial Officer. *FY 2018-2023 Capital Improvements Plan.* Page 5-10. Accessed from https://cfo.dc.gov/sites/default/files/dc/sites/ocfo/publication/attachments/DC%20GOVT%20FY%202018%20BUDGET%20%E2%80%93%20CONGRESS%20%E2%80%93%20VOL%205.pdf Accessed on April 3, 2020.

Metrorail Station Improvements

936 WMATA's 2011 *Access and Capacity Improvement Study* identified phased projects that
937 would address capacity problems at the Union Station Metrorail station.[50] The No-Action
938 Alternative includes only the "Phase 0" improvements, which are due to occur within the
939 timeframe of the Project.

940 Phase 0 is a scaled-down version of the "partial-build" options identified in the 2011 study. In
941 Phase 0, WMATA would expand and relocate the entrance from First Street into the North
942 Mezzanine. The new ramp would be outside of the station, above the First Street sidewalk
943 (see **Figure 3-3**). Moving the ramp outside would make room for additional fare gates and
944 circulation space inside. Stairs would connect the North Mezzanine level to the Claytor
945 Concourse.

946 Red Line operations at the WMATA Metrorail Station by 2040 are expected to include 100
947 percent eight-car train operations at three-minute headways, consistent with regional
948 modeling assumptions and WMATA direction to FRA.

Figure 3-3. Proposed Entrance Relocation at WUS Metrorail Station on First Street NE

Source: WMATA 2017.

[50] Washington Metropolitan Area Transit Authority Department of Planning and Joint Development. "Union Station Access and Capacity Improvement Study Project Report." 2011. Accessed from https://www.wmata.com/initiatives/plans/upload/Final-Union-Station-Project-Report-Feb182011.pdf. Accessed on April 3, 2020.

3.4.1.5 Private Air-Rights Development

In 1997, Congress directed the General Services Administration (GSA) to sell, at auction, the Federally owned air rights above the railroad infrastructure to the north of the historic station building for development purposes.[51] In 2002, a private developer won the public auction, completing the transaction in 2006. Through this transaction, the private developer acquired air rights for a 14-acre area starting 70 to 80 feet above the tracks and extending from north of the historic station to K Street NE, excluding the areas currently occupied by the Claytor Concourse, vehicular ramps, WUS's bus and parking facility, and the H Street Bridge.[52]

Following the acquisition, the private developer applied for specific zoning for the property. In response to the request, the District of Columbia Office of Planning (DCOP) developed the Union Station North (USN) Zoning District specifically for the private air rights.[53] On June 3, 2011, the District issued a Notice of Final Rulemaking setting forth the USN Zoning District regulations.[54] The USN Zoning District encompasses a total of 14 acres and two parcels: Lot 7000, which extends from H Street NE north to K Street NE; and Lot 7001, which extends from H Street NE south to WUS, east of the existing parking garage. The USN Zoning Regulations set maximum heights for buildings within the private air rights. These range from a maximum of 90 feet above the height of the H Street Bridge for areas closer to the historic station building to a maximum of 130 feet in those areas south of H Street NE closest to the bridge and in all areas north of H Street NE.[55]

In the sections where maximum permitted heights are below 130 feet, density bonuses are available that would add 20 feet of height (to a maximum of 110 feet adjacent to the station and 130 feet elsewhere). The USN District allows as a matter of right any use permitted in the C-3-C Zoning District, with the stipulation that 100 percent of the ground floor uses along the H Street Bridge must be retail, service, or arts uses.[56] The regulations set a maximum non-residential floor area ratio (FAR)[57] of 5.5 with no minimum requirements for parking.[58] At all heights, an additional 20 feet of inhabitable penthouse are permissible.

DCOP, in official submittals to the MWCOG for the purposes of regional modeling, identified within the 2030 development horizon the construction of a mixed-use development project

[51] Public Law 105-33.
[52] Referred to as "private air rights" in this document. The owner is generally referred to as "the private developer." The private developer is currently Akridge.
[53] NCPC. 2011. Text and Map Amendments to the Zoning Regulations of the District of Columbia, Union Station North (USN) Zoning District.
[54] 58 District of Columbia Register (DCR) 4788, 4793.
[55] District of Columbia Municipal Regulations (DCMR) Section 11-2905.
[56] DCMR Section 11-741.
[57] The floor area ratio is the ratio of a building's total floor area to the size of the lot on which the building is built.
[58] DCMR Section 11-2908.

977 in the privately owned air rights (Burnham Place).[59] On this basis, the No-Action Alternative
978 includes the development of the private air rights.

979 On May 31, 2016, the private developer submitted two development scenarios to FRA to
980 illustrate how it might pursue development of the air rights if the Project were not to
981 proceed.[60] In its transmittal to FRA, the developer reserved the right to adjust this approach
982 in the future. One scenario had more residential development while the other had more
983 office development, both being consistent with the zoning (see **Table 3-8**).

Table 3-8. Estimated Allocation Scenarios for the Private Air-Rights Development

Component	Scenario 1	Scenario 2
Residential	1,050,000 sf	1,660,000 sf
Hotel	410,000 sf	410,000 sf
Office	2,160,000 sf	1,560,000 sf
Retail	120,000 sf	130,000 sf
Total	3,740,000 sf	3,760,000 sf
Parking	1,320 spaces	1,290 spaces

984 The DEIS uses Scenario 1 for the impact analysis because this scenario would have greater
985 impacts on traffic than Scenario 2.[61] For the purposes of the No-Action Alternative, based on
986 information from the developers, FRA has assumed that the private air-rights development
987 would consist of:

988 - 14 acres of development on two overbuild decks (south and north of H Street NE);
989 - Buildings with heights in accordance with Section 2905 (up to 130 feet above the
990 elevation of H Street NE);
991 - Approximately 3.8 million square feet of development, including 2.1 million square
992 feet of office space; 1.05 million square feet of residential space, 410,000 square feet
993 of hotel space, and 120,000 square feet of retail space;
994 - FAR of 6.5;
995 - Access from H Street NE via three intersections;

996

[59] DCOP. 2016. *Development Activity by Select TAZs Surrounding Union Station – Washington D.C. as 4th Quarter 2015*. August 2016.

[60] Letter from Akridge to FRA dated May 31, 2016.

[61] This is because of the larger amount of office space under Scenario 1. Per the Institute of Transportation Engineers (ITE) *Trip Manual* 10th Edition, 1,000 square feet of office space generate more trips than the same amount of residential uses.

- Internal road network;
- Open space; and
- Parking to serve the development.

Support Systems for Overbuild Construction

The conceptual drawings and information provided by the private developer in support of the zoning application did not include information on the utilities and infrastructure required to deck over the rail terminal, tracks, and platforms. The development would likely require modifications to the existing platforms and canopies to integrate column and footing placement and would require new systems under the decks to support fire and life safety.

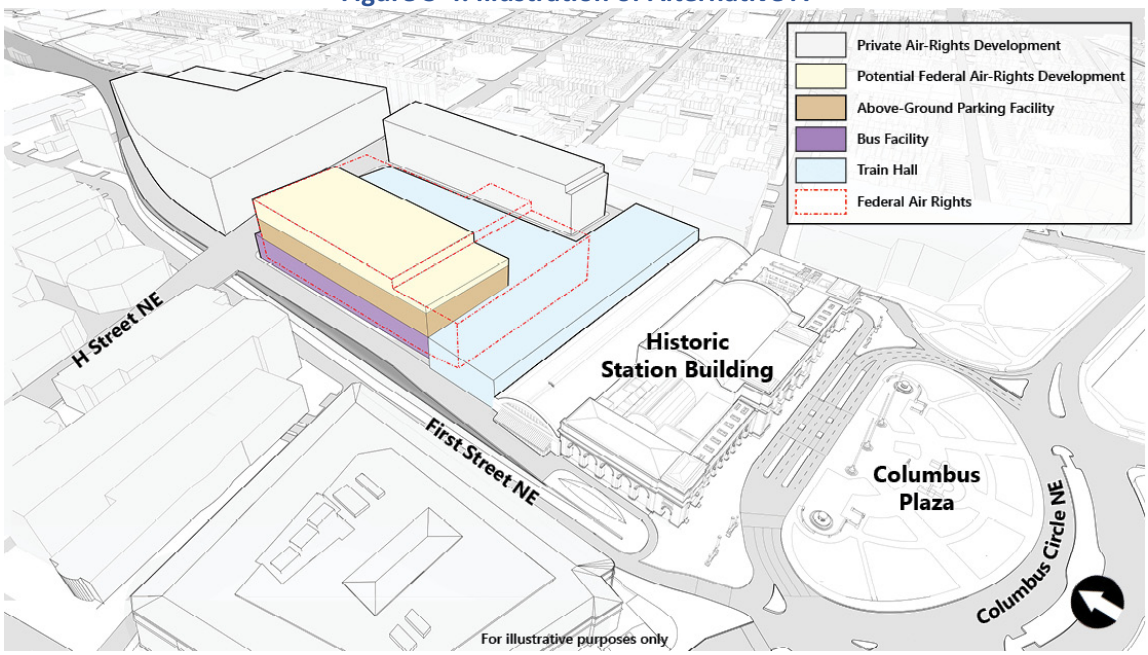
These new systems would include fire suppression and safety systems and new egress locations, as well as ventilation systems to remove train exhaust and smoke from the rail terminal. Amtrak would have to authorize all work within the rail terminal.

3.4.2 Alternative A

3.4.2.1 Summary Description

Alternative A features a north-south train hall between H Street NE and Concourse A. The bus facility and parking facility would be in a new, above-ground structure (multimodal surface transportation center) in the southwest corner of the Project Area, approximately where the existing parking garage now stands. The Federally owned air-rights space not used for the multimodal surface transportation center would be available for potential future development. **Figure 3-4** illustrates Alternative A. Summary descriptions of its key features are provided below.

Figure 3-4. Illustration of Alternative A



- **Structures:** The north-south train hall would be approximately 180,000 square feet in size and cover portions of three centrally located platforms between H Street NE and the south ends of the tracks. The bus facility and parking facility would be approximately 105,400 square feet and 599,000 square feet, respectively.
- **Mix of Uses:** Retail space would be approximately 280,000 square feet and the Amtrak support area approximately 297,400 square feet.
- **Parking:** Parking would be southwest of H Street NE, above-ground in the new multimodal surface transportation center. There would be space for approximately 1,750 cars.
- **Buses:** A 26-slip facility would be located southwest of H Street, below the parking facility.
- **For-Hire Vehicles/Pick-up and Drop-off:** For-hire and private vehicles would have a total of around 40 spaces for pick-up and drop off. Pick-up/drop-off areas would be provided in front of WUS, on First and Second Streets NE near H Street, and at deck-level next to the train hall. The parking facility would have storage space for for-hire vehicles.
- **Bicycles:** Bikeshare and bicycle parking options would remain at First and 2nd Streets NE and would offer more Bikeshare bicycles (approximately 105). The capacity for bike storage would increase by approximately 200 spots.

- **Pedestrians:** Pedestrians would be able to access the station via the existing Metrorail station's First and G Street entrance, the southwest portico of the historic station, the front of the station, and from H Street NE. New entrances would be available under the H Street Bridge at First and 2nd Streets NE and at the train hall headhouse on the H Street Bridge.
- **Intercity and Commuter Operations and Ridership:** Levels of service would grow along with projected demand. Train volume increases relative to existing levels would range from 148 percent (Amtrak) to 187 percent (VRE).
- **Property Acquisition:** Approximately 3.1 acres of private air rights would be acquired for the train hall, circulation roadways, and other Project elements.
- **Potential Development of Federal Air Rights[62]:** The Federal air rights not needed for the new bus and parking facilities would be available for potential future transfer and development. The potentially developable envelope would encompass approximately 323,720 gross square feet (GSF).[63]
- **Estimated Construction Cost:** Alternative A would cost approximately $6.1 billion to construct.[64]
- **Estimated Construction Duration:** Alternative A would take an estimated 11 years and 5 months to construct.

Sections 3.4.2.2 through 3.4.2.11 provide more detailed descriptions of some of the major components and features of Alternative A. These descriptions supplement, but do not duplicate, the summary bullets above.

3.4.2.2 Tracks and Platforms/Rail Support Function

The new tracks and platforms would be the same in all Action Alternatives. The Project would replace the existing tracks with 19 new tracks: 12 stub-end tracks on the west side and seven run-through tracks on the east side. The Central Concourse (see below) would separate the

[62] Although any development of the Federally owned air rights is not part of the Project, the development of those rights may result from the Project. Therefore, the impacts associated with potential future development of the Federal air rights are evaluated in Chapter 5 as indirect impacts.

[63] This is based on the assumption that development of the Federal air rights would be consistent with the USN zoning applied to the adjacent private air rights. This assumption is consistent across all Action Alternatives and supports a realistic assessment of potential indirect impacts. FRA determined that a change to USN zoning in the Federal air rights parcel was reasonably foreseeable based on coordination with the DCOP; the limitations of the existing zoning (PDR-3 precludes residential development), which is inconsistent with the adjacent USN zoning; and the goals of the DC SHPO to promote a symmetrical development north of the historic station. The nature of the potential future Federal air-rights development is undetermined. However, commercial development is likely. For the purposes of the impact analysis, given its location above a multi-story bus and parking facility and the lack of opportunity for a direct connection to the street level, the DEIS assumes that it would consist of additional parking. This assumption is conservative because of the plausible uses of the space in Alternative A, parking would generate the most vehicular trips.

[64] See **Appendix A8**, *Action Alternatives Cost Estimates Memorandum* for the basis of this estimate.

stub-end tracks and platforms from the run-through tracks and platforms. The stub-end platforms would be at the same elevation as Concourse A, allowing direct access for passengers coming in through the southern end of the station. The run-through platforms would be at a lower elevation. Passengers would reach them via vertical circulation elements (such as stairs, escalators, or elevators). Vertical circulation elements in the middle of all the platforms would bring passengers down to the H Street Concourse. The tracks and platforms would be open on both the east and west sides of the rail terminal to let in light and air.

The run-through tracks pass through the First Street Tunnel underneath the east side of the historic station building as they converge toward the two-track portion of the tunnel via Interlocking A. Construction of the new tracks and platforms would require reconfiguring Interlocking A and realigning the tracks. To accomplish this, 18 of the 28 building-supporting columns that currently extend from the track bed to the floor of the Retail and Ticketing Concourse would have to be removed.

From north to south, the existing columns are arrayed in one east-west line of three columns (Column Line A.1) and five east-west lines of five columns (Column Lines B through F). The track bed in the portion of the tunnel between Columns Lines A.1 through D rests on a structure that spans a lower-level space – the Subbasement Area – presently housing electrical substations and utility conduits (see **Figure 3-5**).[65]

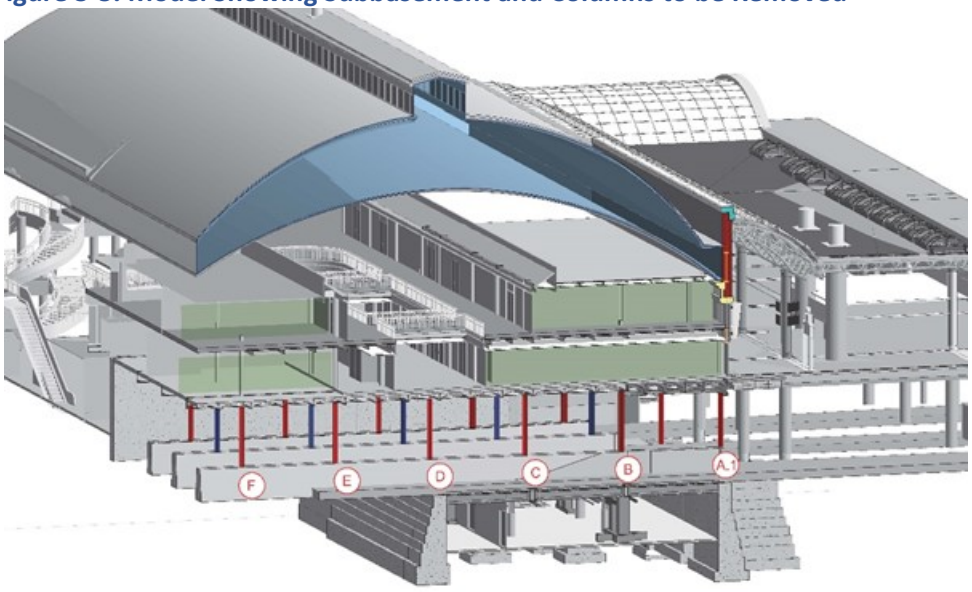
Column removal would require installing temporary shoring towers and foundations[66]; potentially demolishing the Retail and Ticketing Concourse floor as well as the retail shops above the tunnel; potentially removing the historic terracotta and concrete floor structure and installing new transfer girders; removing three of the five columns in Column Lines B through F; strengthening some of the remaining ten columns; reconstructing crash walls between the tracks; and replacing the three columns of Column Line A.1 with two new columns. Column Line A.1 supports the barrel vault roof of the Retail and Ticketing Concourse and the heaviest loads. Like the existing columns, the two new columns in Line A.1 would rest on the northern abutment of the Subbasement structure.

The construction of temporary shoring towers on Column Lines E and F, which are not above the Subbasement Area, would potentially require the installation of foundations. Column removal would also likely require replacing a portion of the First Street tunnel's existing east wall.

[65] The track bed structure's condition has deteriorated over time and it is slated for replacement as part of a separate and independent project that would be completed before work on the tracks and platforms starts.

[66] Depending on how design progresses, some foundations may be left permanently in place.

Figure 3-5. Model Showing Subbasement and Columns to be Removed



Source: Amtrak. May 10, 2019. *Project Definition Report. Washington Union Station Subbasement Structural Replacement Project*.

In its current conditions, this brick masonry wall may not be able to adequately support future transferred loads. If this is confirmed, it would likely be reconstructed as a concrete wall (similar to the existing west tunnel wall) or steel support system with adequate load-bearing capacity.

Alternative A, as well as the other Action Alternatives, would place rail support spaces primarily north of the H Street Concourse, on the lower concourse level and just below existing street grade. Rail support would have access to the tracks and platforms via dedicated service elevators without having to cross any tracks and with minimal disruption to passengers. This would also support more efficient train servicing and, therefore, shorter dwell times.[67] Amtrak would use these service elevators for train servicing, baggage movement to trains, and commissary support.

3.4.2.3 Loading

The two existing loading docks would continue to support the unloading and distribution of goods at WUS. The realignment of First Street NE (see **Section 3.4.2.9**, *Pedestrian and Bicycle Access*) would include providing a pull-out lane by the U.S Post Office Building across the street to facilitate turns into the loading dock (see **Figure 3-10** below). Additionally, a new loading dock would be provided on 2nd Street NE, adjacent to the REA building. Users of the

[67] Dwell time is the time that trains sit at platforms during loading and unloading operations.

new loading dock, which would have approximately 12 slips, may include new retail and Amtrak back of house services.

3.4.2.4 Concourses and Retail

In all Action Alternatives, several new concourses would facilitate public access to and circulation through WUS. The concourses would connect the various transportation modes serving the station, including the train platforms, the bus facility, the Metrorail station, and the DC Streetcar. Additionally, they would offer various services and amenities. These may include information, ticketing, and baggage services. Waiting areas would provide secure and organized access to the platforms. Retail would be available for passengers and visitors circulating through the station. **Figure 3-6** and **Figure 3-7** show the proposed concourses. They would be the same for all Action Alternatives:

- **Concourse A:** This east-west concourse, replacing the Claytor Concourse, would connect directly to the existing Retail and Ticketing Concourse and the stub-end platforms, providing more room for passenger amenities, including retail, and the Metrorail station. The other concourses would be accessed via vertical circulation elements.
- **Central Concourse:** The north-south Central Concourse would connect Concourse A to the H Street Concourse. It would have new retail uses for passengers and visitors.
- **H Street Concourse:** The east-west H Street Concourse would run below H Street NE and provide access to WUS and the platforms. Passenger amenities and services would include information, police station, ticketing, baggage services, and retail. New waiting areas would facilitate movements up the escalators or elevators connecting to the platforms. The H Street Concourse would connect the neighborhoods east and west of WUS with entrances at First Street NE and 2nd Street NE. Vertical circulation elements would bring people up to H Street NE, providing a transfer point to the DC Streetcar.
- **First Street Concourse**: This north-south concourse would run parallel to First Street NE and connect the H Street Concourse to Concourse A and the Metrorail station. Retail would be available along the concourse.

Figure 3-6. New Concourses – Upper Level (Common to All Action Alternatives)

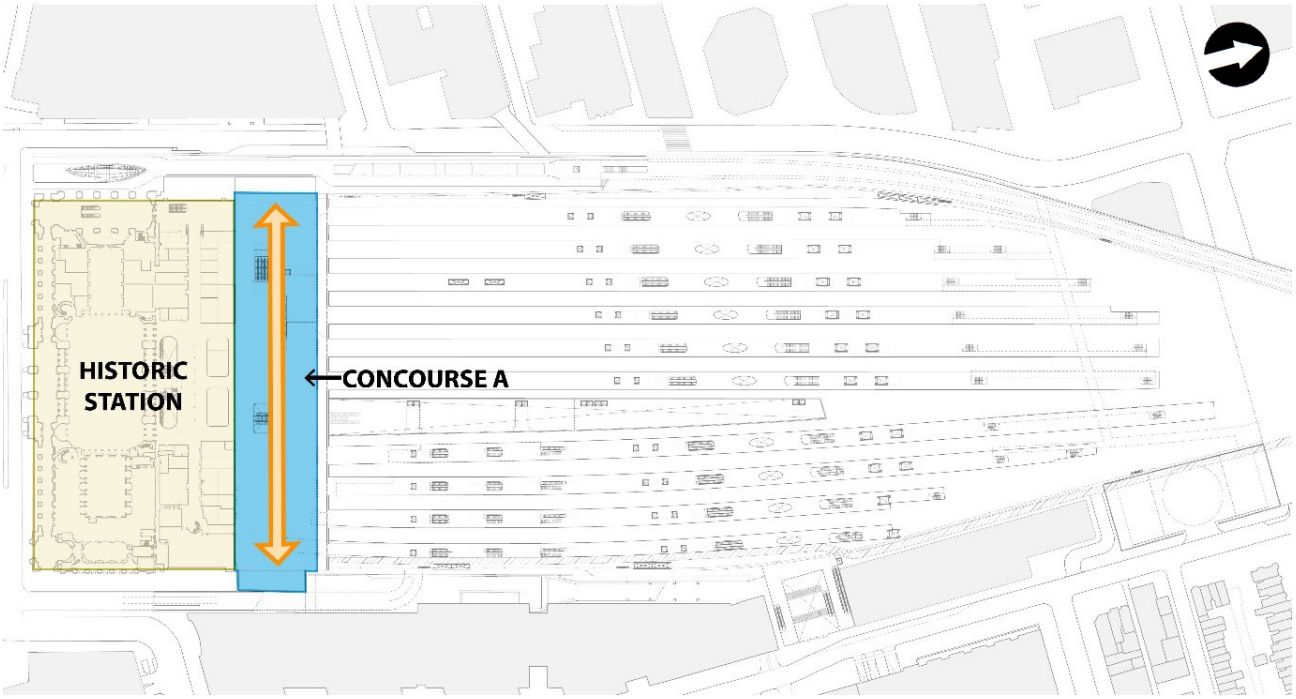
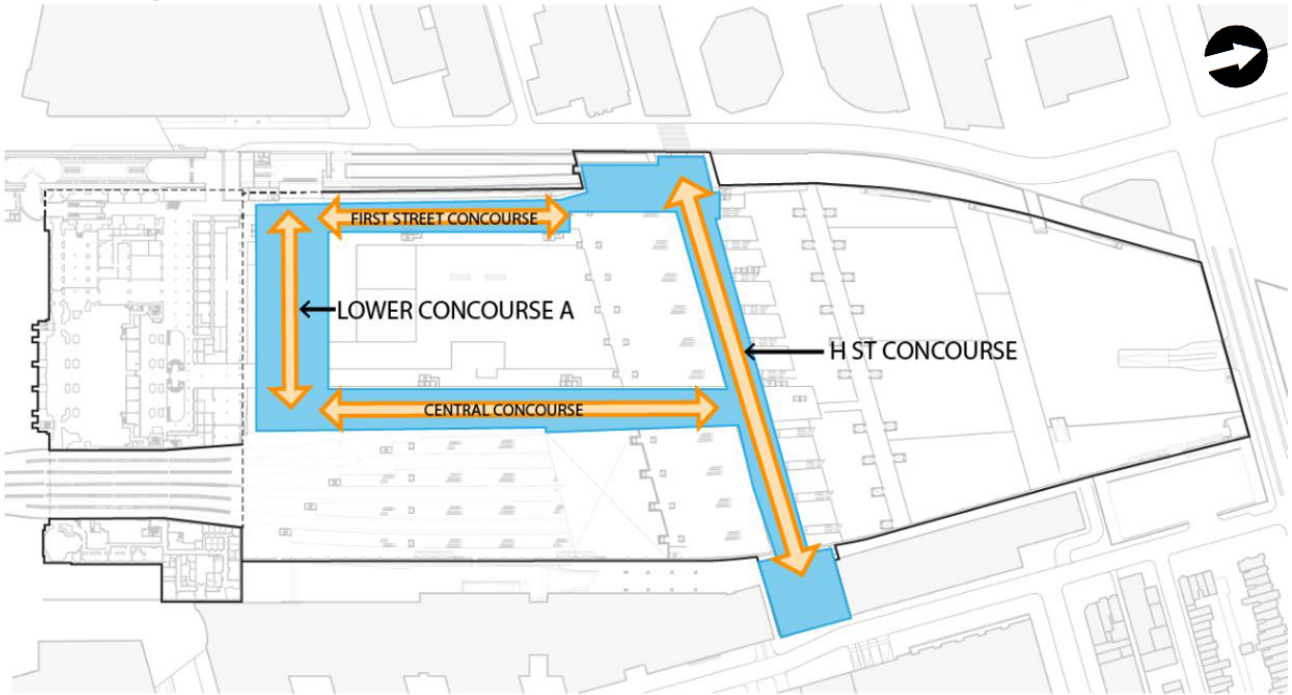


Figure 3-7. New Concourses – Lower Level (Common to All Action Alternatives)



3.4.2.5 Train Hall

The train hall is a structure that would enclose a space encompassing various concourses, tracks, and platforms and provide passengers and visitors entering WUS with a sense of grandeur complementing the historic station. The design of the train hall would support ventilation requirements and compartmentalized conditioning without compromising passenger experience. Its height would maximize daylighting.

Alternative A would feature a north-south train hall between H Street NE and Concourse A. It would rise approximately 42 feet above the elevation of the H Street Bridge and would create an opportunity for placemaking on H Street. The north-south train hall would encompass the Central Concourse, providing it with a lofty ceiling and allowing daylight to reach the center stub-end tracks and platforms. At its southern end, the train hall would form a unified space with Concourse A. On its west side, the train hall would be contiguous to the bus facility.

3.4.2.6 H Street Bridge Intersections and Deck-Level Circulation

Deck-level circulation patterns in Alternative A are illustrated in **Figure 3-8**. [68]

As noted in the introduction, key project elements would be built on or accessed from an overbuild deck over the rail terminal. Three new intersections would be established to connect the H Street Bridge to three new roads that WUS-related traffic would use:[69]

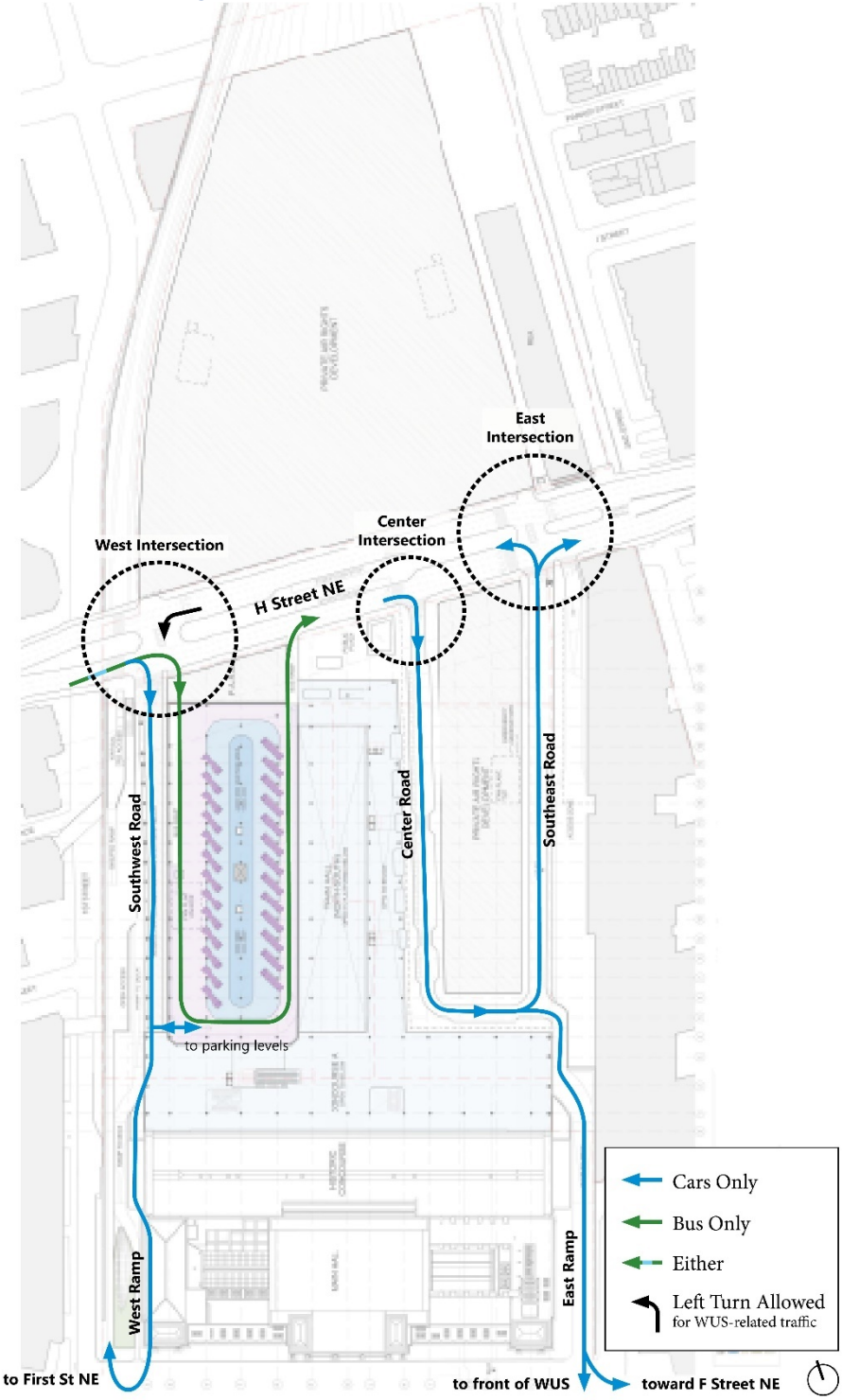
- **West Intersection**: A new west intersection would provide access from H Street to a new road along the southwest side of the Project Area (southwest road). The new intersection would be located slightly to the east of the existing parking garage entrance. The west intersection would provide access to the new combined bus and parking facility (see **Section 3.4.2.7**, *Bus Facility*, and **Section 3.4.2.8**, *Parking* below). The southwest road would connect to the repurposed existing west ramp and, via this ramp, to First Street.[70] The exit ramp from the bus facility would connect directly to H Street a short distance to the east of the west intersection, a configuration similar to what exists today.

[68] Figure 3-8 is intended to illustrate WUS-related traffic movements only. It does not reflect the exact configuration of the new intersections or the H Street Bridge. Roadway alignments are approximate. The location of the garage entrance is conceptual and would be determined during design.

[69] Traffic to and from the private air-rights development would also use these roadways if, as assumed in this DEIS, both projects are built. In that case, the west, center, and east intersection may have north legs consisting of roadways serving the private development north of the bridge. These roadways are not part of the Project in Alternative A.

[70] The southwest road and its connection to the repurposed west ramp are common to Alternatives A through E.

Figure 3-8. Deck Circulation in Alternative A



- **Center Intersection**: A new center intersection would connect H Street to a new central road. The center intersection would be east of the north-south train hall. At its southern end, the central road would connect to the southeast road described below. The central road would be used by WUS-related traffic to reach the pick-up and drop-off areas located adjacent to the train hall and Concourse A (see **Section 3.4.2.10**, *Pick-up and Drop-off Areas*, below). Alternative A and Alternative B are the only Action Alternatives that include a central road and center intersection for WUS-related traffic.
- **East Intersection**: A new east intersection would provide access to H Street NE from a new road running along the southeast side of the Project Area (southeast road). This new intersection would incorporate the existing driveway serving the nearby Kaiser Permanente building and the station's east loading dock. At its southern end, the southeast road would connect to the existing east ramp along the side of the historic station building. As currently, the east ramp would provide access to the front of WUS for taxis, but it would be modified to allow all vehicles to reach F Street NE. The southeast road would be used by WUS-related traffic that entered the deck via the center intersection and central road (see **Section 3.4.2.10**, *Pick-up and Drop-off Areas*, below).

WUS-related traffic would move in a one-way, counterclockwise circulation pattern across the deck. Cars would access the parking facility parking via the west intersection. Car access to the deck-level pick-up and drop-off area would be via the center intersection, traveling southbound down the center road. From there, cars could return to H Street NE by traveling northbound long the southeast road. Alternatively, they could exit to the south via the east ramp toward F Street NE or the front of WUS (taxis only). Traffic from the west intersection or parking facility would exit to the south through the west ramp southbound toward First Street NE. Buses would enter the bus facility via the west intersection and leave via a dedicated bus ramp just to the east of this intersection.

3.4.2.7 Bus Facility

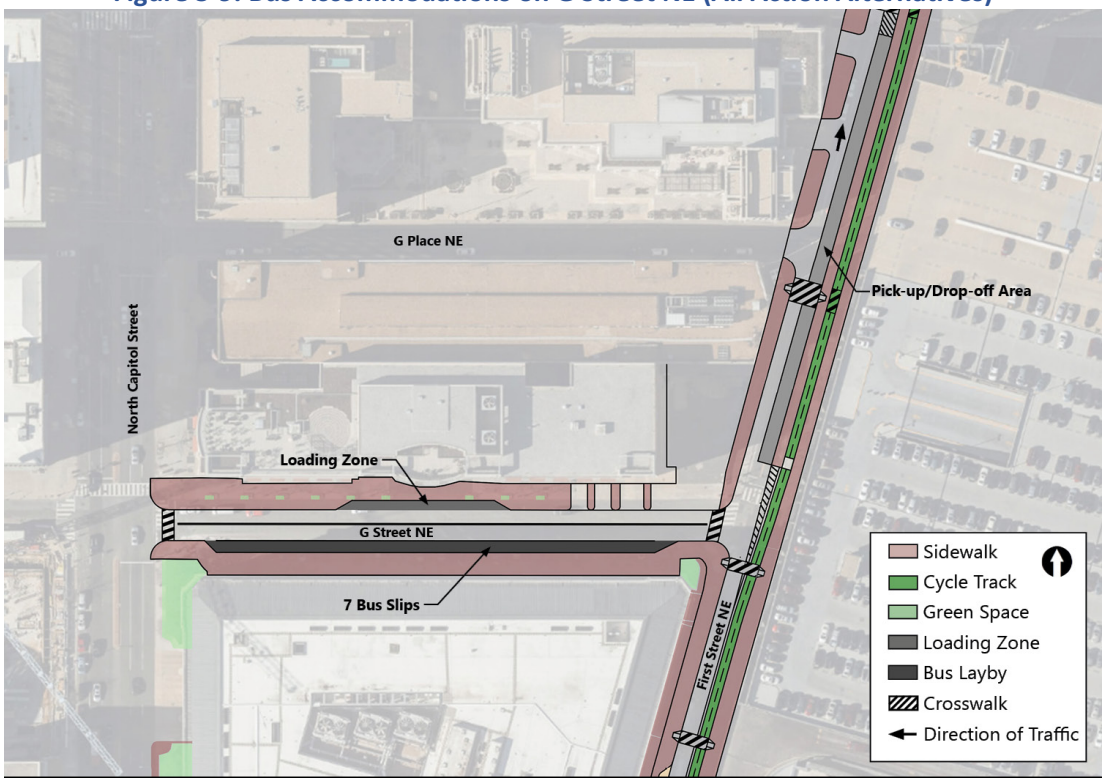
The bus facility would be southwest of H Street NE, contiguous to the train hall above the tracks. It would have two levels: a lower mezzanine level for passenger circulation and an upper level with a bus loop featuring 26 bus slips in an angled configuration.

Buses would access the facility from H Street NE through the new west intersection. Inbound buses could turn right or left from H Street NE onto the ramp. Buses would exit via a dedicated ramp onto H Street NE. Exiting buses could only make a right turn onto H Street NE.

A mezzanine-level waiting area for passengers would extend in a north-south direction below the bus loop level. It would house passenger services and amenities (ticketing, information, seating areas). Vertical circulation elements would connect the mezzanine to the bus loop on the one hand and to Concourse A on the other. There could also be access from H Street NE.

Intercity and some tour and charter operations would use the bus facility. In Alternative A and all Action Alternatives, hop-on/hop-off sightseeing buses as well as occasional overflow tour and charter buses, would use an additional bus location on G Street NE, illustrated in **Figure 3-9**. This location would provide room for up to seven buses.

Figure 3-9. Bus Accommodations on G Street NE (All Action Alternatives)



3.4.2.8 Parking

Vehicular parking would be provided in six levels above the bus facility. There would be space for approximately 1,750 cars. The parking facility would also include space for pick-up and drop-off activities. Vehicular access would be from H Street NE via the new west intersection and southwest road. Vehicles would exit to the south toward First Street NE via the repurposed west ramp.

Pedestrians would access the parking levels from the bus facility's mezzanine level, via vertical circulation elements.

3.4.2.9 Pedestrian and Bicycle Access

Front of WUS

The front of WUS is the main access point to the station for pedestrians and cyclists. It would remain so under all Action Alternatives due to its direct connection to the District's larger

pedestrian and bicycle network and to Capitol Hill. Existing pedestrian and bicycle facilities at the historic station building include a wide sidewalk in front of the building; pedestrian islands on both its east and west sides for easier and safer pedestrian navigation; a two-way cycle track starting on First Street NE; a bike locker on the west side; and a Bikeshare station on the east side.

Today, pedestrians must use four crosswalks to cross from WUS to the west side of First Street NE. In all Action Alternatives, they would need to navigate only one crossing, as illustrated in **Figure 3-10**. First Street NE, currently a two-way road, would become one-way northbound, eliminating the need for a right-turn lane to Massachusetts Avenue NE. As a result, the pedestrian island and drive aisles now at the end of the west ramp would become one large pedestrian zone.

The existing cycle track would remain on the east side of First Street NE, with modifications to improve safety by minimizing conflicts with pick-up and drop-off activities at the new entrance at First and H Streets NE.[71] The repurposing of the existing ramp along the west side of WUS, which connects H Street NE to the western end of Columbus Circle, would provide pedestrian and bicycle access to the deck level and one southbound vehicular lane that would be used by southbound traffic from the deck level. It would connect to First Street NE northbound as shown in **Figure 3-10**.

First Street NE

The new H Street Concourse entrance on First Street NE would have to accommodate a high number of pedestrians. The sidewalk would be widened, with new bike racks and a new Bikeshare station on the west side of the street, under the H Street Bridge. A pedestrian island would be constructed for pick-up and drop-off operations. These changes are common to all Action Alternatives.

2nd Street NE

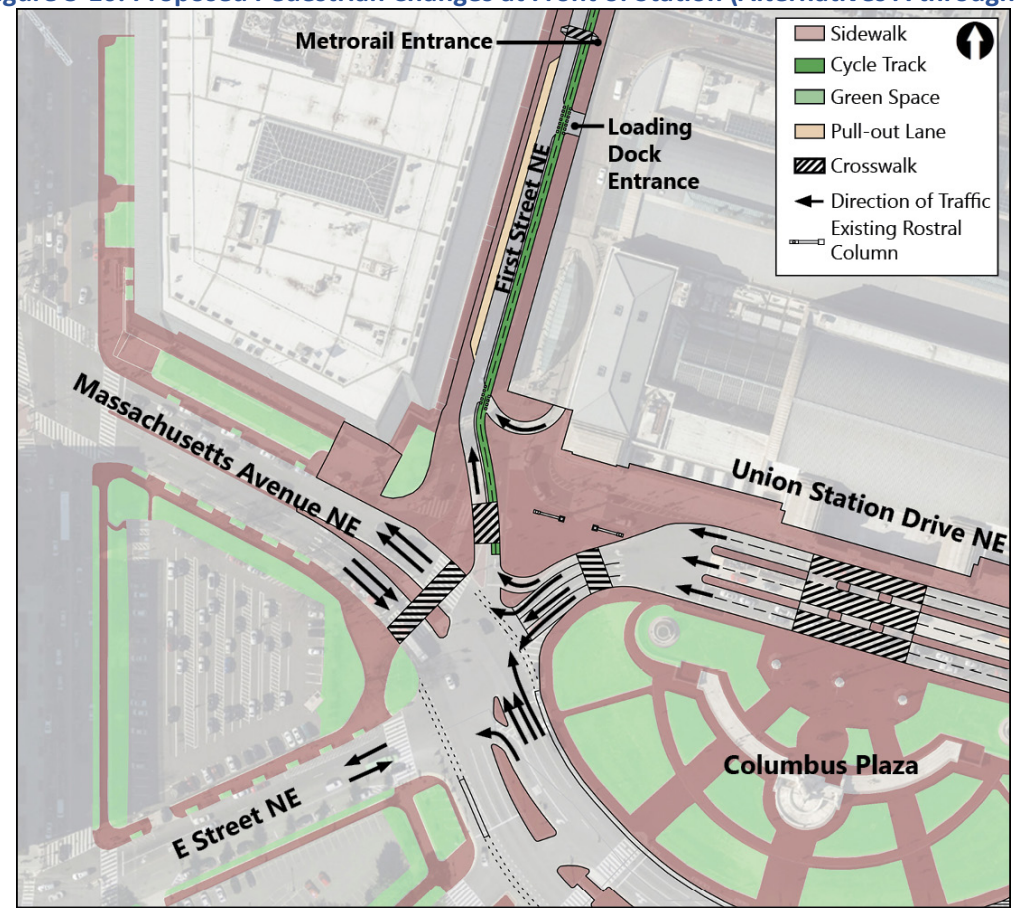
The entrance on 2nd Street NE would feature elements like those of the entrance on First Street NE: a wider sidewalk; new bicycle racks; and a new Bikeshare station on the west side of the street under the H Street Bridge. This is common to all Action Alternatives.

H Street NE

All Action Alternatives include adequate pedestrian infrastructure, bicycle parking, and Bikeshare stations to support access to WUS from H Street NE. Vertical connections to the H Street Concourse would accommodate cyclists and pedestrians in the southwest and northeast areas of H Street NE.

[71] The location of cycle track will be further evaluated following impact analysis and public comments. If warranted by public or agency comments, shifting the track to the west side of First Street NE may be considered in the Final EIS.

Figure 3-10. Proposed Pedestrian Changes at Front of Station (Alternatives A through E)



3.4.2.10 Pick-up and Drop-off Areas

Front of WUS

There are now six lanes of traffic on the north side of Columbus Circle in front of WUS. Traffic moves counterclockwise around the circle. Upon reaching the front of the station, the two-lane approach from the southeast splits into a two-lane pick-up/drop-off area (south lanes) and a two-lane bus area (central lanes) for hop-on/hop-off sightseeing buses. North of the two bus lanes are two more lanes (north lanes) used for taxi pick-up activity. These taxis access the circle using the east ramp that connects to the existing parking garage and H Street NE. The east ramp currently allows vehicle flow in both directions. However, taxis may only circulate southbound and general traffic may only circulate northbound.

The pick-up/drop-off lanes and the taxi lanes are 9 feet wide each and the bus lanes are 12 feet wide. Eight-foot wide medians separate the three sets of lanes. At the western end of the circle, the three sets of lanes, together with the existing southbound West Ramp from H

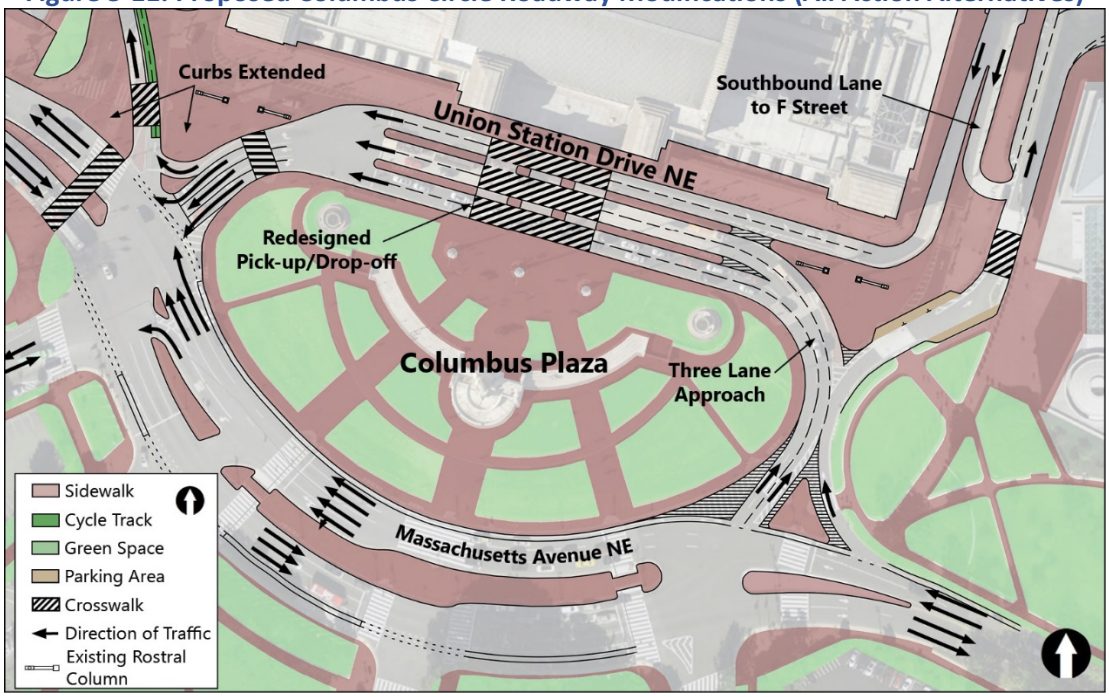
Street NE, merge into three lanes by which vehicles can exit to Massachusetts Avenue (eastbound or westbound) or E Street NE (southbound).

In Alternative A and all other Action Alternatives, the six existing lanes in front of the historic station building would remain but the width of the south and central lanes would be 10.5 feet, with an 8-foot median. Because hop-on/hop-off bus activity would move to G Street NE, both the south and central lanes would be available for pick-up and drop-off. Taxis would continue to have the exclusive use of the north lanes as they do now. They would continue to use the east ramp to reach the front of WUS.

At the western end of the circle, three exit lanes to Massachusetts Avenue and E Street would be maintained. The existing connection with the southbound West Ramp would be eliminated and replaced with a fourth exit lane providing northbound access to First Street NE.

All Action Alternatives also include changes to the circle's approaches on the east side. A third lane would be added to the approach from the southeast to minimize queuing. Modification of the east ramp to allow southbound traffic only would minimize queuing from H Street NE and provide an exit from the ramp to F Street NE. The connection for vehicles traveling northbound from Massachusetts Avenue NE and Columbus Circle to F Street NE would stay as it is now. However, on the left side of that segment, there would be two pick-up/drop-off spaces for use by WUS commercial tenants. **Figure 3-11** illustrates the proposed improvements.

Figure 3-11. Proposed Columbus Circle Roadway Modifications (All Action Alternatives)



Deck Level

At deck level, pick-up and drop-off areas (active loading and unloading) would be provided along the east side of the north-south train hall and the north side of Concourse A. Vehicles would access these locations via the center intersection on the H Street Bridge and from there travel counterclockwise either back to H Street via the southeast road and east intersection or down the southbound east ramp to F Street NE. Taxis could also use that ramp to reach the front of the station and pick up passengers.

First and 2nd Streets NE

In addition, room for pick-up or drop-off activities would be provided on First Street NE in two segments to the south (approximately from G Street to H Street) and north (from H Street to I Street) of the new H Street Concourse entrance, respectively. Each segment would be capable of accommodating approximately 15 vehicles. This space could also accommodate buses when needed. To keep pick-up and drop-off activity on the same side as the new WUS entrance and minimize crossings, First Street would become one-way northbound with, from west to east, sidewalk, one through traffic lane, one pick-up and drop-off lane, pick-up and drop-off median, cycle track, and sidewalk. North of I Street, there would be two northbound traffic lanes to K Street. Except at marked crosswalks, the cycle track would be separated from the pick-up and drop-off median by a railing. The new configuration for First Street would allow through vehicles to bypass a stopped pick-up/drop-off vehicle, avoiding the potential for a stopped vehicle to create traffic congestion or unsafe passing behavior.

Pick-up and drop-off space would also be provided on 2nd Street NE. Just south of the H Street Bridge, a pick-up and drop-off lane with room for approximately seven vehicles would be provided on the west (southbound) side of the street through lane shifting, restriping, and potentially a slight narrowing of the 31-foot-wide sidewalk at that location. Just north of the H Street Bridge, portion of the existing parking lane on the east (northbound) side of the street would be converted to a pick-up and drop-off lane for approximately eight vehicles. A raised crosswalk would be provided under the bridge to facilitate safe pedestrian movement between this area and the new station entrance.

3.4.2.11 Intercity and Commuter Operations and Ridership

Common to all Action Alternatives, the Project would allow intercity, commuter and transit passenger volumes to grow as shown in **Table 3-9.** These estimates are the same across all Action Alternatives. The greatest increase would be for VRE, with a 187 percent increase in service accommodating an almost 250 percent increase in passengers. Amtrak and MARC would also experience substantial increases in passenger volumes and service.

Table 3-9 shows the changes in levels of service that would occur for each service to accommodate the increased ridership. To accommodate these increased volumes, each full day, Amtrak would operate 57 high-speed trains per direction, 23 intercity trains per direction, and 6 long distance trains per direction. Additionally, Amtrak would run 58 Metropolitan trains per direction daily. MARC full-day service would consist of 57 Penn Line trains, 30 Camden Line trains, and 38 Brunswick Line trains per direction. Of 14 peak-hour Penn Line trains, it is anticipated that eight would continue to Virginia. For VRE, daily, 23 trains per direction would run on the Fredericksburg Line and 23 trains per direction would run on the Manassas Line.

Table 3-9. Passenger and Train Volumes by Service in All Action Alternatives

Service	Existing Passenger Volumes	2040 Passenger Volumes	Train or Bus Volume Increase over Existing
Amtrak	16,400 daily 5.033 million annually	32,000 daily (+95%) 9.070 million annually	148%
MARC	28,100 daily 7.683 million annually	70,700 daily (+152%) 19.293 million annually	163%
VRE	3,900 daily 1.060 million annually	13,600 daily (+249%) 3.706 million annually	187%
WMATA	29,000 daily boardings 7.250 million annual boardings	43,800 daily boardings (+51%) 10.950 million annual boardings	0%[72]
Intercity Bus	10,000 daily 2.500 million annually	11,900 daily (+19%) 2.975 million annually	19%

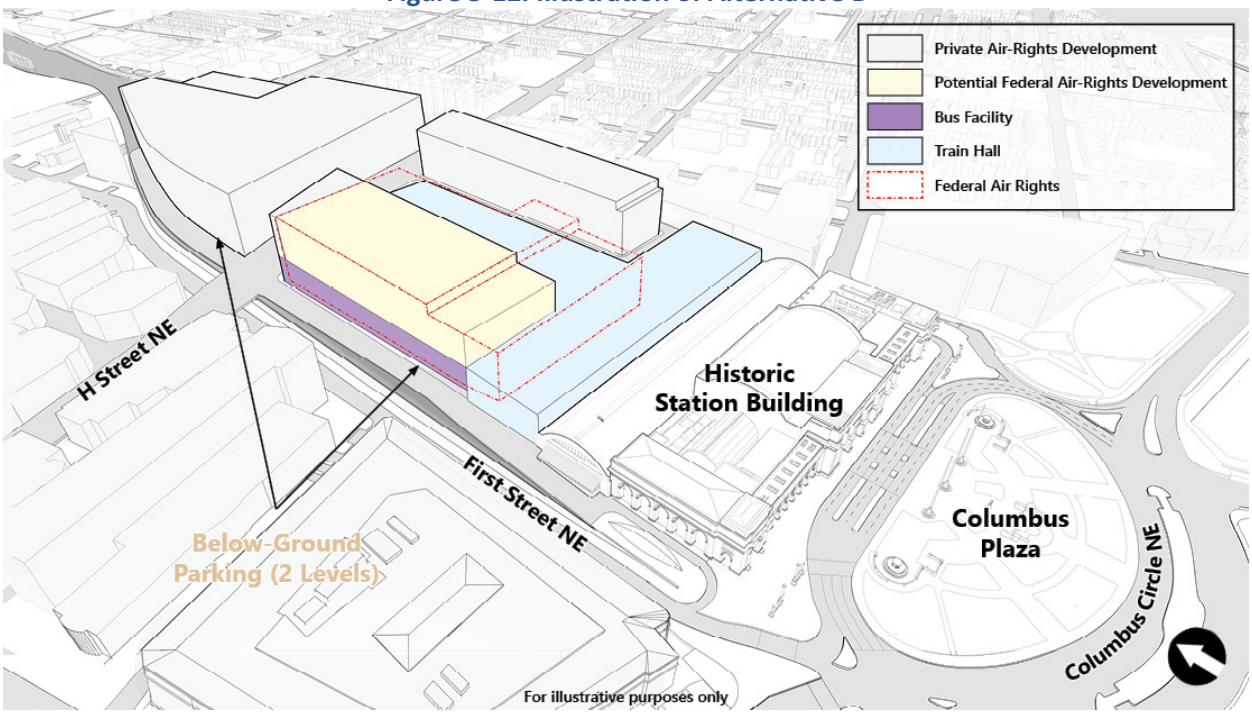
3.4.3 Alternative B

3.4.3.1 Summary Description

Alternative B features a north-south train hall between H Street NE and Concourse A. The bus facility would be in the southwest corner of the Project Area, approximately where the existing parking garage is located. All parking would be below ground. The portion of the Federally owned air rights not needed for the bus facility would be available for potential future development. **Figure 3-12** illustrates Alternative B.

[72] As in the No-Action Alternative, it is expected that in 2040, trains would continue to serve the WUS Metrorail station with the same frequency as today, including every three minutes during the peak periods, and it is anticipated that all peak-period trains on the Red Line would be eight-car trains.

Figure 3-12. Illustration of Alternative B



- **Structures:** The north-south train hall would be approximately 180,000 square feet in size and cover portions of three centrally located platforms between H Street NE and the ends of the tracks. The new bus facility would be approximately 105,400 square feet.
- **Mix of Uses:** Retail space would be approximately 280,000 square feet and the Amtrak support area approximately 297,400 square feet.
- **Parking:** Parking would be in two below-ground levels between K Street NE and Concourse A. It would accommodate approximately 2,000 cars.
- **Buses:** A 26-slip facility would be provided southwest of H Street NE.
- **For-Hire Vehicles/Pick-up and Drop-off:** For-hire and private vehicles would have a total of around 50 spaces for pick-up and drop off. Pick-up/drop-off areas would be provided in front of WUS, on First and Second Streets NE near H Street, at deck-level next to the train hall, and in the below-ground parking facility.
- **Bicycles:** Bikeshare and bicycle parking options would remain at First and 2nd Streets NE and would offer more Bikeshare bicycles (approximately 105). The capacity for bike storage would increase to approximately 200 bicycles.
- **Pedestrians:** Pedestrians would be able to access the station via the Metrorail station's First and G Street entrance, the southwest portico of the historic station,

the front of the station, and from H Street NE. New entrances would be located under the H Street Bridge. Entrances would also be available at the train hall headhouse on the H Street Bridge.

- **Intercity and Commuter Operations and Ridership:** Levels of service would grow along with projected demand. Train volume increases relative to existing levels would range from 148 percent (Amtrak) to 187 percent (VRE).
- **Property Acquisition**: Approximately 2.8 acres of private air rights would be acquired for the train hall, circulation roadways, and other Project elements.
- **Potential Development of Federal Air Rights:** [73] The Federal air rights not needed for the new bus facility would be available for potential future transfer and development. The potentially developable envelope would encompass approximately 917,420 GSF.[74]
- **Estimated Construction Cost:** Alternative B would cost approximately $7.5 billion to construct.[75]
- **Estimated Construction Duration:** Alternative B would take an estimated 14 years and 4 months to construct.

The following features of Alternative B are common to all Action Alternatives: tracks and platforms (see **Section 3.4.2.2**), loading (see **Section 3.4.2.3**), concourses (see **Section 3.4.2.4**), and intercity and commuter operations and ridership (see **Section 3.4.2.11**). The following features of Alternative B are the same as in Alternative A: train hall (see **Section 3.4.2.5**) and pedestrian and bicycle access (see **Section 3.4.2.9**). H Street Bridge intersections and deck circulation would be the same as in Alternative A as well (see **Section 3.4.2.6**) except that in Alternative B, there would be no parking access from the new southwest road; the southwest road would provide access to First Street from the deck level.

Section 3.4.3.2, **Section 3.4.3.3**, and **Section 3.4.3.4** below provide more detailed descriptions of those feature of Alternative B that differ from those of one or more of the

[73] Although development of the Federally owned air rights is not part of the Project, the development of those rights may result from the Project. Therefore, the impacts associated with potential future development of the Federal air rights are evaluated in Chapter 5 as indirect impacts.

[74] This is based on the assumption that development of the Federal air rights would be consistent with the USN zoning applied to the adjacent private air rights. This assumption is consistent across all Action Alternatives and supports a realistic assessment of potential indirect impacts. FRA determined that a change to USN zoning in the Federal air-rights parcel was reasonably foreseeable based on coordination with the DCOP; the limitations of the existing zoning (PDR-3 precludes residential development), which is inconsistent with the adjacent USN zoning; and the goals of the DC SHPO to promote a symmetrical development north of the historic station. The nature of the potential future air-rights development is undetermined. However, commercial development is likely. For the purposes of the impact analysis, the DEIS assumes that it would consist of office space. This is a conservative assumption because, of the likely uses, office space would generate the most vehicular trips. Per the ITE *Trip Manual* 10th Edition, 1,000 square feet of office space generate more trips than the same amount of residential uses.

[75] See **Appendix A8**, *Action Alternatives Cost Estimates Memorandum* for the basis of this estimate.

other Action Alternatives. These descriptions supplement, but do not duplicate, the summary bullets above.

3.4.3.2 Bus Facility

The bus facility in Alternative B would be generally the same as in Alternative A (see **Section 3.4.2.7**, *Bus Facility*). However, Alternative B includes no parking above the facility. The Federally owned air rights not needed for the bus facility would be available for potential future transfer and development. Intercity and some tour and charter operations would use the bus facility. In Alternative B as in all Action Alternatives, hop-on/hop-off sightseeing buses, as well as occasional overflow tour and charter buses, would use an additional bus location on G Street NE (see **Figure 3-9** above).

3.4.3.3 Parking

Vehicular parking would be entirely below ground, on two levels beneath the lowest concourse level: Level B1 (approximately 900 cars) and Level B2 (approximately 1,100 cars). The below-ground facility would extend between K Street NE and Concourse A, underneath the stub-end tracks and the Central Concourse. Pedestrians would access it via vertical circulation elements from the H Street Concourse, Central Concourse, and First Street Concourse. Access would also be potentially available from Concourse A.

Vehicular access into the parking facility would be from K Street NE, via a new signalized intersection in the underpass between First Street and 2nd Street NE. The new intersection would require the removal of a limited number of the columns that support the overhead bridge and separate the existing outside eastbound travel lane from the inside eastbound travel lane. The intersection would consist of three legs. The parking entrance would have one inbound lane, one outbound lane for left turns only, and one outbound lane for right turns only. The lane configuration on K Street NE would be as follows, moving from the north side of the underpass to its south side:

- One free-flowing westbound through lane.
- One westbound lane allowing both through movements and left turns into the parking facility.
- One eastbound through lane.
- One eastbound lane allowing both through movements and right turns into the parking facility.

3.4.3.4 Pick-up and Drop-off Areas

Alternative B would provide the same pick-up and drop-off areas as Alternative A in front of WUS, on the overbuild deck, and on First and 2nd Streets NE (see **Section 3.4.2.10**, *Pick-up and Drop-off Areas*). In addition, an area within the below-ground parking facility would be set aside for pick-up operations.

3.4.4 Alternative C

3.4.4.1 Summary Description

Alternative C would provide an east-west train hall encompassing Concourse A and a bus pick-up and drop-off area between the train hall and the historic station building. The main bus facility would be north of H Street NE. Vehicular parking would be both above the bus facility and below ground. Alternative C has two options. The East Option (illustrated in **Figure 3-13**) would place the bus facility and above-ground parking along the east side of the Project Area. The West Option (illustrated in **Figure 3-14**) would place them along the west side of the Project Area.

Figure 3-13. Illustration of Alternative C, East Option

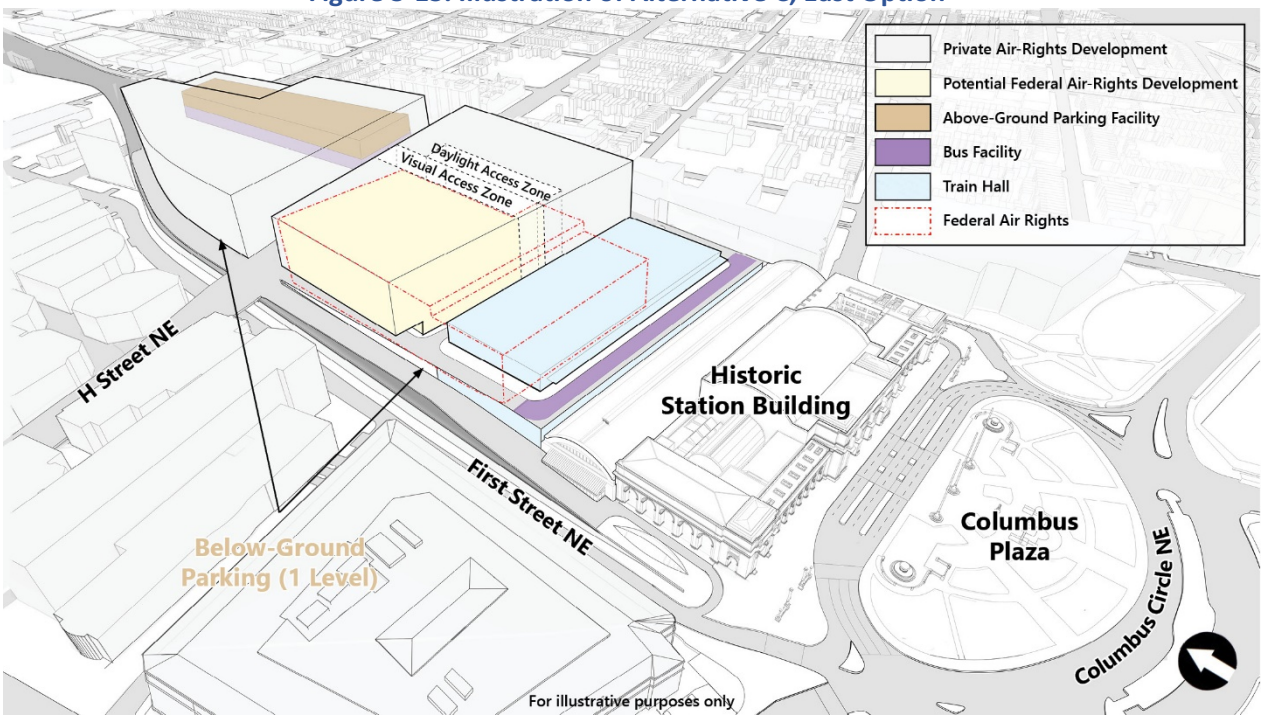
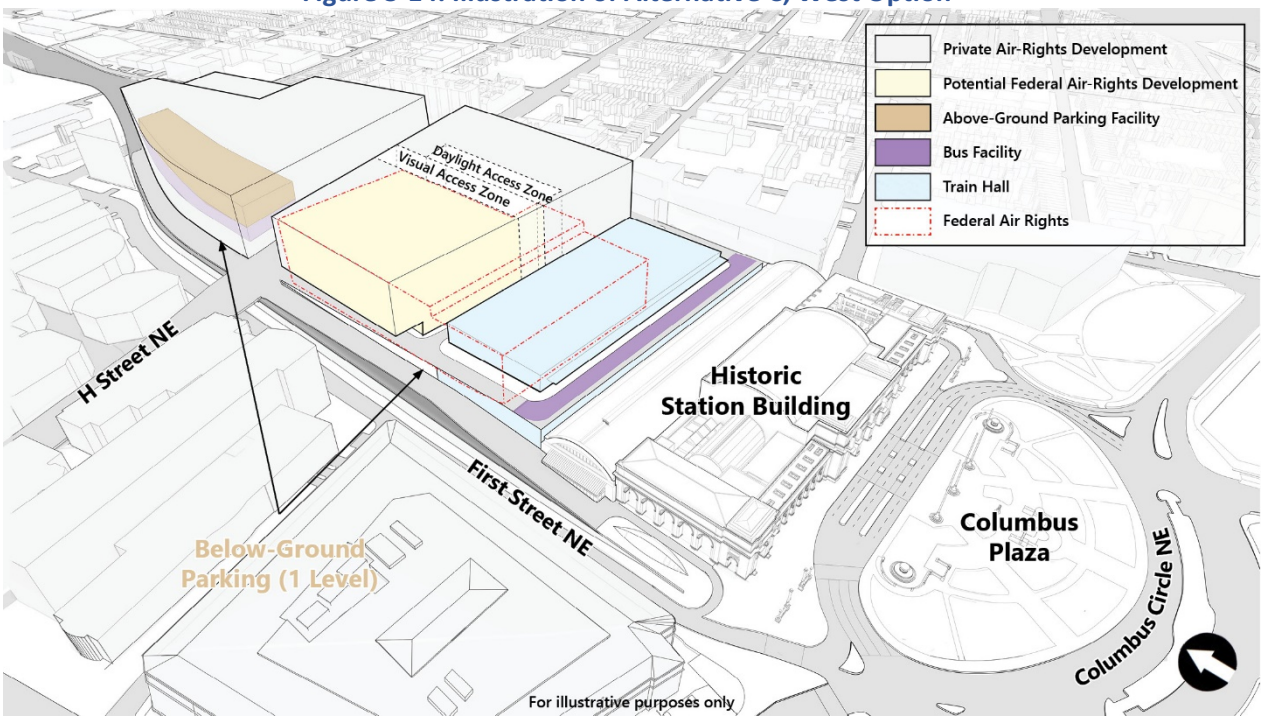


Figure 3-14. Illustration of Alternative C, West Option



- **Structures:** The east-west train hall would be approximately 115,000 square feet. It would cover the train engines and part of the first car on all the tracks. The main bus facility would be approximately 122,250 square feet (East option) or 130,000 square feet (West Option). The pick-up and drop-off area would be approximately 37,600 square feet in both options. The above-ground parking facility would be approximately 387,000 square feet (East Option) or 360,000 square feet (West Option).
- **Mix of Uses:** Retail space would be approximately 280,000 square feet and the Amtrak support area approximately 297,400 square feet.
- **Parking:** Parking would be provided above the bus facility in the northeast (East Option) or northwest (West Option) part of the Project Area. Both options would also have one level of below-ground parking. The East Option would provide space for a total of approximately 1,650 cars and the West Option for a total of approximately 1,610 cars.
- **Buses:** The main bus facility would be built northeast of H Street NE and have 17 slips (East Option) or it would be built northwest of H Street NE and have 19 slips (West Option). The bus pick-up and drop-off area would accommodate nine buses.
- **For-Hire Vehicles/Pick-up and Drop-off:** For-hire and private vehicles would have a total of around 50 spaces for pick-up and drop off. Pick-up/drop-off areas would be

provided in front of WUS, on First and Second Streets NE near H Street, at deck-level next to the train hall, and in the below-ground parking facility.

- **Bicycles:** The existing Bikeshare and bicycle parking would stay at First and 2nd Street NE. Additional Bikeshare spots would be provided (approximately 104). The capacity for bicycle storage would be approximately 200 bicycles.
- **Pedestrians:** Pedestrians would access WUS via the existing Metrorail station's First and G Street entrance, the southwest portico of WUS, the front of the station, and from H Street NE. New entrances would be located under the H Street Bridge.
- **Intercity and Commuter Operations and Ridership:** Levels of service would grow along with projected demand. Train volume increases relative to existing levels would range from 148 percent (Amtrak) to 187 percent (VRE).
- **Property Acquisition**: Approximately 4.6 acres (East Option) or 4.8 acres (West Option) of private air rights would be acquired to accommodate various elements of the Project.[76]
- **Potential Development of Federal Air Rights:** [77] The Federal air rights not needed for the Project would be available for potential future transfer and development. The potentially developable envelope would encompass approximately 952,600 GSF. [78]
- **Estimated Construction Cost:** Alternative C (either option) would cost approximately $6.2 billion to construct. [79]
- **Estimated Construction Duration:** Alternative C (either option) would take an estimated 12 years and 3 months to construct.

[76] Additionally, daylighting features for the underlying concourse may be installed within the Daylight Access Zone (see **Section 3.1.8.14** above). These features would occupy only a small portion of the Daylight Access Zone and would require an agreement with the owner of the private air right.

[77] Although any development of the Federally owned air rights is not part of the Project, the development of those rights may result from the Project. Therefore, the possible impacts associated with potential future development of the Federal air rights are evaluated in Chapter 5 as indirect impacts.

[78] This is based on the assumption that development of the Federal air rights would be consistent with the USN zoning applied to the adjacent private air rights. This assumption is consistent across all Action Alternatives and supports a realistic assessment of potential indirect impacts. FRA determined that a change to USN zoning in the Federal air-rights parcel was reasonably foreseeable based on coordination with the DCOP; the limitations of the existing zoning (PDR-3 precludes residential development), which is inconsistent with the adjacent USN zoning; and the goals of the DC SHPO to promote a symmetrical development north of the historic station. The nature of the potential future air-rights development is undetermined. However, commercial development is likely. For the purposes of the impact analysis, the DEIS assumes that it would consist of office space. This is a conservative assumption because, of the likely uses, office space would generate the most vehicular trips. Per the ITE *Trip Manual* 10th Edition, 1,000 square feet of office space generate more trips than the same amount of residential uses.

[79] See **Appendix A8**, *Action Alternatives Cost Estimates Memorandum* for the basis of this estimate.

Alternative C has the following features in common with all Action Alternatives: tracks and platforms (see **Section 3.4.2.2**), loading (see **Section 3.4.2.3**), concourses (see Section **3.4.2.4**), and intercity and commuter operations and ridership (see **Section 3.4.2.11**).

Section 3.4.4.2 to **Section 3.4.4.7** below provide detailed descriptions of those feature of Alternative C that differ from those of one or more of the other Action Alternatives. These descriptions supplement, but do not duplicate, the summary bullets above.

3.4.4.2 Train Hall

The train hall (for both options of Alternative C) would encompass Concourse A and a part of the southern end of the tracks and platforms. Height above H Street NE would be approximately 42 feet. A vertical glazed wall would separate the platforms from Concourse A, which would be sealed and ventilated.

3.4.4.3 H Street Bridge Intersections and Deck-Level Circulation

Deck-level circulation patterns in Alternative C are illustrated in **Figure 3-15** (East Option) and **Figure 3-16** (West Option).[80] As in all Action Alternatives, key elements of Alternative C would be built on or accessed from an overbuild deck over the rail terminal. Two new intersections would be established to connect the H Street Bridge to new deck-level roads that WUS-related traffic would use:[81]

- **West Intersection**: A new west intersection would provide access from H Street NE to a new road along the southwestern side of the Project Area (southwest road). The new intersection would be located slightly to the east of the existing parking garage entrance. The west intersection and southwest road would provide access to the bus pick-up and drop-off area (see **Section 3.4.4.4**, *Bus Facility* below) via a loop road around the train hall. Buses would loop back around to the southeast road described below to exit back to H Street NE.

  In Alternative C, West Option, the west intersection would have a north leg consisting of access ramps to and from the main bus facility (see **Section 3.4.4.4**, *Bus Facility* below) and above-ground parking (see **Section 3.4.4.5**, *Parking*).

[80] These figures are intended to illustrate WUS-related traffic movements only. they do not reflect the exact configuration of the new intersections or the H Street Bridge. Roadway alignments are approximate.

[81] Traffic to and from the private air-rights development could also use these new intersections and roadways if both projects are built, as assumed in this DEIS. Additionally, the east intersection (in Alternative C, West Option) or the west intersection (in Alternative C, East Option) would have a north leg consisting of a roadway serving the east (West Option) or west (East Option) side of the private air-rights development north of the bridge. Finally, there would be a central intersection connecting H Street to center roads serving the private air-rights development to the north and south of the bridge. These facilities are not part of the Project in Alternative C.

Figure 3-15. Deck Circulation in Alternative C, East Option

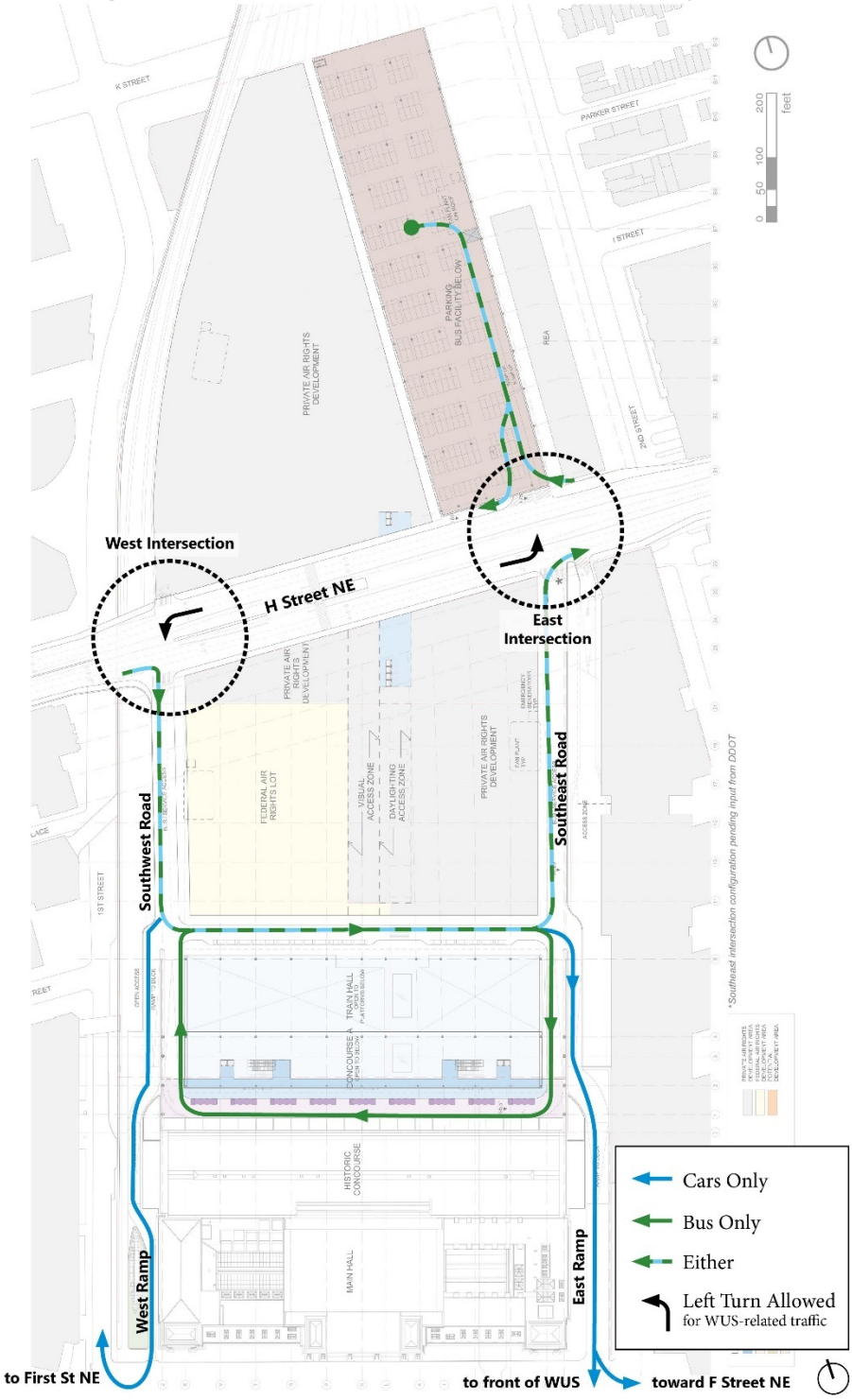
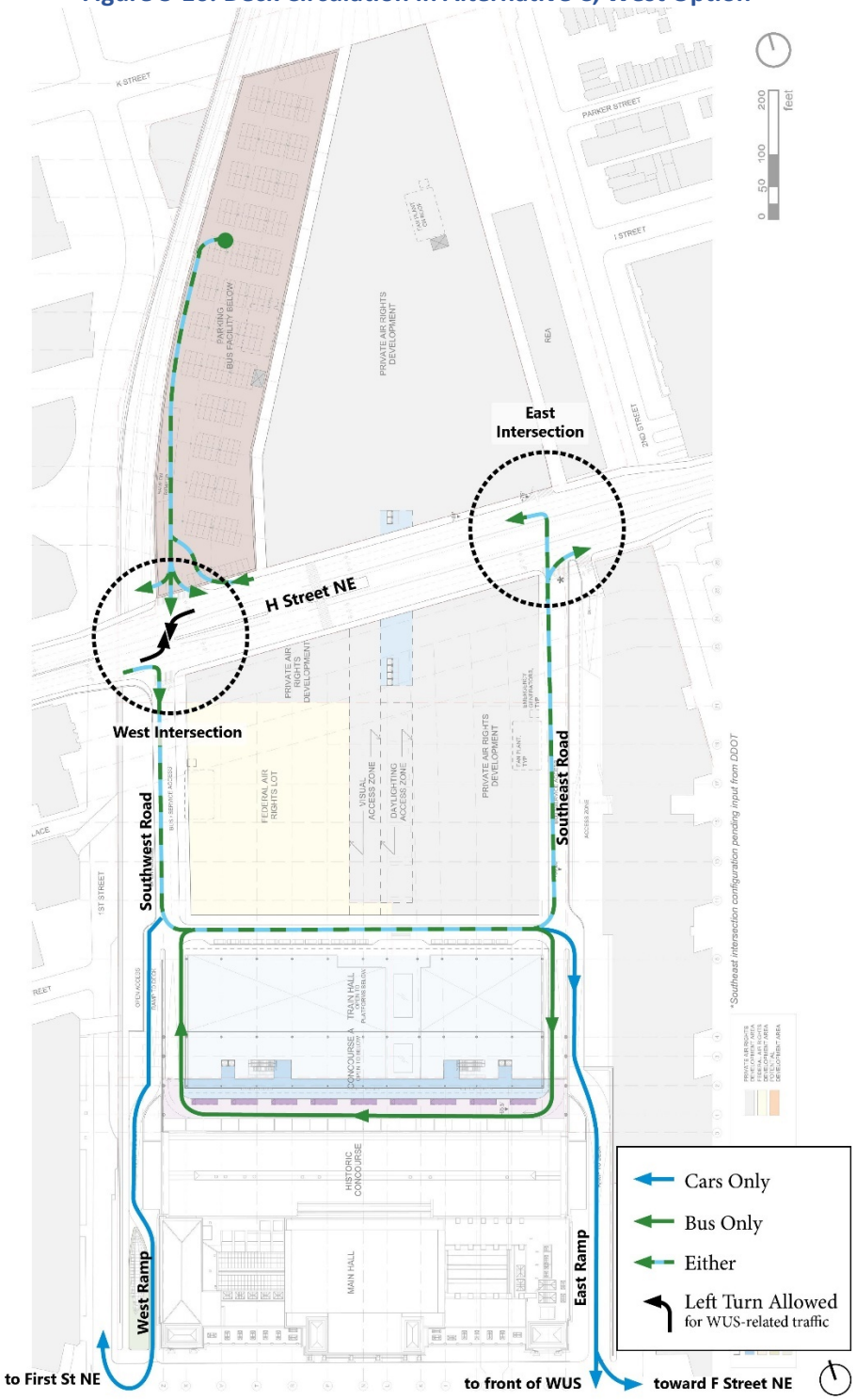


Figure 3-16. Deck Circulation in Alternative C, West Option



- **East Intersection**: A new east intersection would provide access to H Street NE from a new road running along the southeast side of the Project Area (southeast road). This new intersection would incorporate the existing driveway serving the nearby Kaiser Permanente building. At its southern end, the southeast road would connect to the loop road around the bus pick-up and drop-off area and train hall. It would also connect to the east ramp and via this ramp to F Street NE and the front of WUS. The southeast road and east intersection would be used by WUS-related traffic, including buses, to exit the deck toward H Street NE.

  In Alternative C, East Option, the east intersection would have a north leg consisting of access ramps to and from the main bus facility (see **Section 3.4.4.4**, *Bus Facility* below) and above-ground parking (see **Section 3.4.4.5**, *Parking*).

WUS-related traffic would move in a one-way, counterclockwise pattern across the deck, entering from H Street NE via the west intersection, traveling southbound along the southwest road then northbound along the southeast road to exit back to H Street NE. To the south, vehicles could exit through the west ramp to First Street NE or the east ramp to F Street NE or the front of WUS (for taxis). Buses making use of the bus pick-up and drop-off area would enter from H Street NE via the west intersection and southwest road, loop clockwise around the train hall, and return to H Street via the southeast road and east intersection

3.4.4.4 Bus Facility

The bus facility would be north of H Street NE in either the northeast or northwest part of the Project Area, depending on the option. It would have a conditioned area for passenger services and amenities (retail, ticketing, information), potentially facing H Street NE. The bus loop would have 17 active bus slips under the East Option and 19 active slips under the West Option. The loop would be semi-open and naturally ventilated in both options. Passengers would have direct access to the DC Streetcar upon exiting the facility. An entrance into WUS would be across the street from the bus facility.

In the East Option, buses would enter the facility at the new east intersection by turning right or left onto a dedicated ramp. They would exit at the same location after having looped around in the facility. There would be a redundant access point at the north end of the facility. With the West Option, buses would enter and exit the facility via the west intersection and dedicated ramp. There would be a redundant access point at the north end of the facility as well.

Transfer from the bus facility to rail or Metrorail would be via adjacent vertical circulation elements, which would give access to the Central Concourse and the platforms. With the East Option, passengers would need to travel west through the H Street Concourse to the First Street Concourse to reach the Metrorail station. With the West Option, they would just travel south through the First Street Concourse.

In both options, the bus facility would include a separate bus pick-up and drop-off area located between the train hall and the historic station building. Up to 9 buses could use this area simultaneously. Buses would reach this drop-off and pick-up area via the new west intersection and southwest road. From the bus drop-off and pick-up area, passengers would be able to enter the train hall through the mezzanine level, where they would access vertical circulation elements that would bring them down to Concourse A. Buses would leave via the southeast road and east intersection.

In Alternative C as in all Action Alternatives, hop-on/hop-off sightseeing buses, as well as occasional overflow tour and charter buses, would also use an additional bus location on G Street NE (see **Figure 3-9** above).

3.4.4.5 Parking

Alternative C would provide both above-ground and below-ground parking. Under both options, the above-ground parking would be in a three-level structure constructed above the bus facility. It would accommodate approximately 710 (West Option) or 750 cars (East Option). Vehicles would enter and leave the facility via H Street NE (west or east intersection, depending on the option). The portion of the privately owned air rights not needed for the parking facility would remain available for development.

Regardless of the option, below-ground parking would consist of one level capable of accommodating approximately 900 vehicles. It would extend below the stub-end tracks and the Central Concourse. Vehicular access would be from K Street NE, through an intersection like the one described for Alternative B (see **Section 3.4.3.3**, *Parking*).

Pedestrians access to the above-ground parking facility would be via vertical circulation elements from the H Street Concourse to the street level, then from other vertical circulation elements from the street level to the parking facility. Pedestrians would reach the below-ground parking via vertical circulation elements in the H Street Concourse, Central Concourse, and First Street Concourse.

3.4.4.6 Pedestrian and Bicycle Access

Alternative C (either option) would provide the same pedestrian and bicycle access improvements as Alternative A (see **Section 3.4.2.9**, *Pedestrian and Bicycle Access*).

In addition, on H Street NE, Alternative C would provide access via vertical circulation elements both north and south of the street. On the south side, access would consist of an enclosed headhouse that could potentially be incorporated into the private air-rights development.

3.4.4.7 Pick-up and Drop-off Areas

Alternative C (either option) would provide the same pick-up and drop-off areas as Alternative A in front of WUS and on First and 2nd Street NE (see **Section 3.4.2.10**, *Pick-up and Drop-off Areas*).

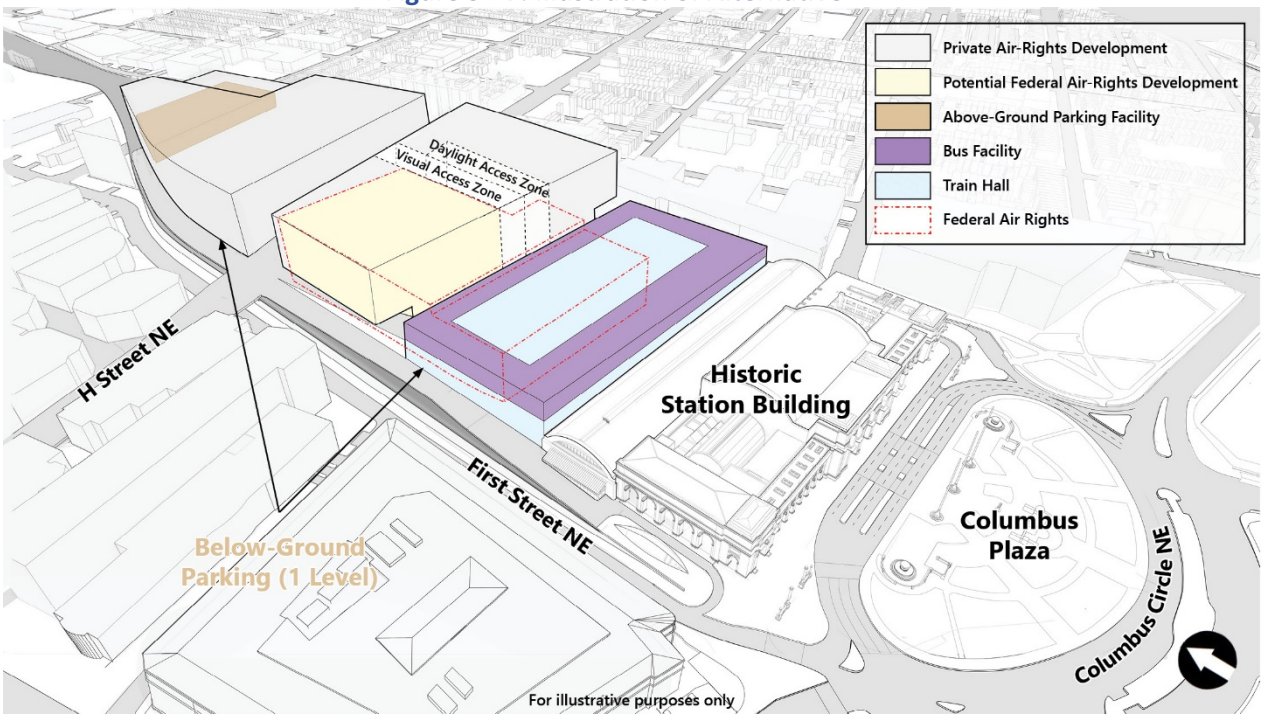
On the deck, pick-up and drop-off areas (active loading and unloading) would be provided along the north side of the east-west train hall. Using a one-way circulation pattern, vehicles would access these spaces via the west intersection and southwest road; they would exit via the southeast road and east intersection or the new east ramp to F Street NE. Taxis could use the east ramp to access the pick-up lanes at the front of WUS.

3.4.5 Alternative D

3.4.5.1 Summary Description

Alternative D features an east-west train hall with integrated bus facility; above-ground parking just south of K Street NE; and below-ground parking. **Figure 3-17** illustrates Alternative D.

Figure 3-17. Illustration of Alternative D



- **Structures:** The east-west train hall would be approximately 100,000 square feet. It would cover the train engines and part of the first car on all the tracks except for the easternmost and westernmost ones. The approximately 108,000-square-foot bus facility would be integrated with the train hall. The above-ground parking facility would be approximately 288,000 square feet in size.
- **Mix of Uses:** Retail space would be approximately 308,000 square feet and the Amtrak support area approximately 297,400 square feet.
- **Parking:** An above-ground parking facility would be built in the far north part of the Project Area (just south of K Street NE). One level of below-ground parking would also be provided. There would be space for a total of approximately 1,650 cars.
- **Buses:** The integrated bus facility would have 27 spaces distributed on either side of the train hall.
- **For-Hire Vehicles/Pick-up and Drop-off:** For-hire and private vehicles would have a total of approximately 50 spaces for pick-up and drop-off. Pick-up/drop-off areas would be provided in front of WUS, on First and Second Streets NE near H Street, at deck-level next to the train hall, and in the below-ground parking facility.
- **Bicycles:** The existing Bikeshare and bicycle parking options would remain at First and 2nd Street NE. Additional Bikeshare bicycles would be provided (approximately 104). The capacity for bicycle storage would be approximately 200 bicycles.
- **Pedestrians:** Pedestrians would access WUS via the existing Metrorail station's First and G Street entrance, the southwest portico of WUS, the front of the station, and from H Street NE. There would be new entrances under the H Street Bridge.
- **Intercity and Commuter Operations and Ridership:** Levels of service would grow along with projected demand. Train volume increases relative to existing levels would range from 148 percent (Amtrak) to 187 percent (VRE).
- **Property Acquisition**: Approximately 4.8 acres of private air rights would be acquired to accommodate various elements of the Project.[82]

[82] Additionally, daylighting features for the underlying concourse may be installed within the Daylight Access Zone (see **Section 3.1.8.14** above). These features would occupy only a small portion of the Daylight Access Zone and would require an agreement with the owner of the private air right.

- **Potential Development of Federal Air Rights:** [83] The Federal air rights not needed for the Project would be available for potential future transfer and development. The potentially developable envelope would encompass approximately 688,050 GSF. [84]
- **Estimated Construction Cost:** Alternative D would cost approximately $6.2 billion to construct. [85]
- **Estimated Construction Duration:** Alternative D would take an estimated 12 years and 3 months to construct.

The following features of Alternative D are common to all Action Alternatives: tracks and platforms (see **Section 3.4.2.2**), loading (see **Section 3.4.2.3**), concourses (see **Section 3.4.2.4**), and intercity and commuter operations and ridership (see **Section 3.4.2.11**). Pedestrian and bicycle access as well as pick-up and drop-off areas would be as in Alternative C (see **Sections 3.4.4.6** and **3.4.4.7,** respectively).

Section 3.4.5.2 to **Section 3.4.5.5** below provide more detailed descriptions of those feature of Alternative D that differ from those of one or more of the other Action Alternatives. These descriptions supplement, but do not duplicate, the summary bullets above.

3.4.5.2 Train Hall

Alternative D would provide an east-west train hall similar to Alternative C and rising approximately 44 feet above the level of the H Street Bridge. However, an integrated bus facility would encircle the upper, outer edge of the train hall. Concourse A and the south end of the tracks and platforms would be under the train hall, whose roof would also protect the bus loop from the weather. A vertical glazed wall would allow for a fully-conditioned indoor environment within Concourse A and the passenger waiting area for the bus facility.

[83] Although development of the Federally owned air rights is not part of the Project, the development of those rights may result from the Project. Therefore, the possible impacts associated with potential future development of the Federal air rights are evaluated in Chapter 5 as indirect impacts.

[84] This is based on the assumption that development of the Federal air rights would be consistent with the USN zoning applied to the adjacent private air rights. This assumption is consistent across all Action Alternatives and supports a realistic assessment of potential indirect impacts. FRA determined that a change to USN zoning in the Federal air-rights parcel was reasonably foreseeable based on coordination with the DCOP; the limitations of the existing zoning (PDR-3 precludes residential development), which is inconsistent with the adjacent USN zoning; and the goals of the DC SHPO to promote a symmetrical development north of the historic station. The nature of the potential future air-rights development is undetermined. However, commercial development is likely. For the purposes of the impact analysis, the DEIS assumes that it would consist of office space. This is a conservative assumption because, of the likely uses, office space would generate the most vehicular trips. Per the ITE *Trip Manual* 10th Edition, 1,000 square feet of office space generate more trips than the same amount of residential uses.

[85] See **Appendix A8**, *Action Alternatives Cost Estimates Memorandum* for the basis of this estimate.

3.4.5.3 H Street Bridge Intersections and Deck-Level Circulation

Deck-level circulation patterns in Alternative D are illustrated in **Figure 3-18**.[86] Two new intersections would be established to connect the H Street Bridge to new deck-level roads that WUS-related traffic would use:[87]

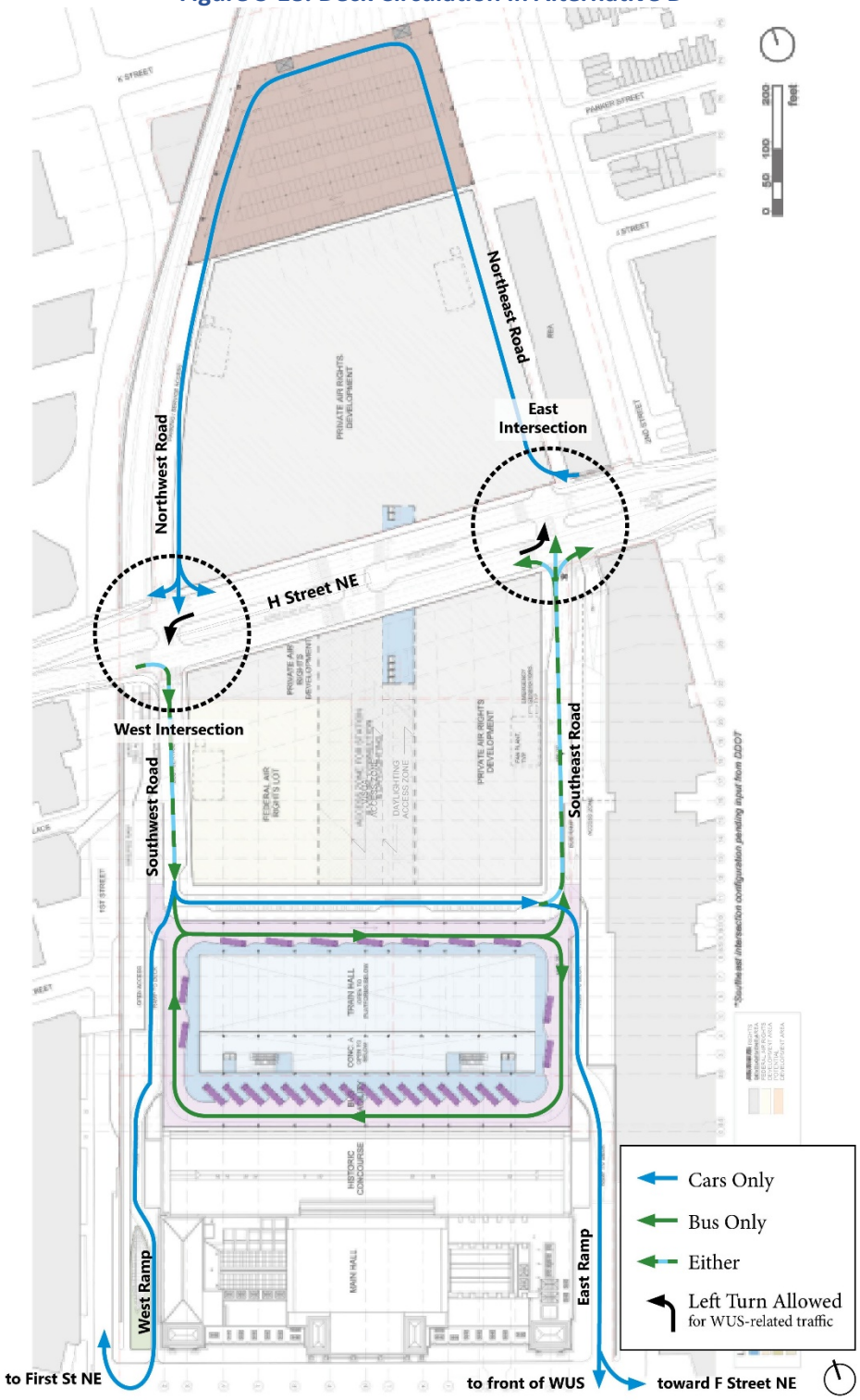
- **West Intersection**: A new west intersection would provide access from H Street NE to a new road along the southwestern side of the Project Area (southwest road). The new intersection would be located slightly to the east of the existing parking garage entrance. The west intersection and southwest road would provide access to the bus facility (see **Section 3.4.5.4**, *Bus Facility* below). After looping around the bus facility, buses would return to H Street NE via the southeast road described below. The north leg of the west intersection would consist of a new road along the northwestern side of the Project Area (northwest road) that vehicles leaving the above-ground parking facility would use to reach H Street NE (see **Section 3.4.5.5**, *Parking*).
- **East Intersection**: A new east intersection would provide access to H Street NE from a new road running along the southeast side of the Project Area (southeast road). This new intersection would incorporate the existing driveway serving the Kaiser Permanente building. At its southern end, the southeast road would connect to the loop road around the bus facility and, via the east ramp, to F Street NE and the front of WUS. The southeast road and east intersection would be used by WUS-related traffic, including buses, to exit the deck toward H Street NE. The north leg of the east intersection would consist of a new road along the northeastern side of the Project Area (northeast road) that cars would use to reach the above-ground parking facility (see **Section 3.4.5.5**, *Parking*).

WUS-related traffic would move in a one-way, counterclockwise pattern across the deck. The southwest road would be for southbound traffic only. Buses would use it to reach the bus facility from H Street. Cars could use it to reach the pick-up and drop-off area along the north side of the bus facility and train hall or could continue via the west ramp connecting toward First Street NE. The southeast road would be used only by northbound cars and buses returning to H Street NE. To the south, vehicles could use the east ramp to reach F Street NE or (for taxis) the front of WUS. North of H Street, parking users would use the northeast road to travel northbound toward the parking facility and the northwest road to travel southbound back to H Street NE.

[86] Figure 3-18 is intended to illustrate WUS-related traffic movements only. It does not reflect the exact configuration of the new intersections or the H Street Bridge. Roadway alignments are approximate.

[87] Traffic to and from the private air-rights development could also use these new intersections and roadways if, as is assumed in this DEIS, both projects are built. In that case, there would likely be a central intersection connecting H Street to center roads serving the private air-rights development to the north and south of the bridge. These facilities are not part of the Project in Alternative D.

Figure 3-18. Deck Circulation in Alternative D



3.4.5.4 Bus Facility

As noted above, the train hall and bus facility would be integrated in Alternative D. The bus facility would have two levels: a mezzanine passenger level and an upper bus loop level, connected by vertical circulation elements. The mezzanine level would offer passenger amenities and services in a conditioned environment. The upper bus loop would have 16 angled slips and 11 sawtooth slips. This configuration would allow for a wider opening in the middle of the loop, which would let more natural light into Concourse A and the train hall.

Buses would access the facility by turning left or right from H Street NE onto the new southwest road then circulate clockwise around the loop to exit via the southeast road and the east intersection. Passengers would access the mezzanine directly from Concourse A. They could also enter directly from the street north of the train hall.

In Alternative D as in all Action Alternatives, hop-on/hop-off sightseeing buses, as well as occasional overflow tour and charter buses, would also use an additional bus location on G Street NE (see **Figure 3-9** above).

3.4.5.5 Parking

Alternative D would provide both above-ground and below-ground parking. The above-ground parking structure would be located just south of K Street NE. It would consist of three levels accommodating a total of approximately 750 cars. Vehicular access would be from H Street NE via the new northeast road (inbound) and northwest road (outbound). Pedestrians access would be via vertical circulation elements in the H Street Concourse: once on the street level, pedestrians would walk north to enter the parking structure.

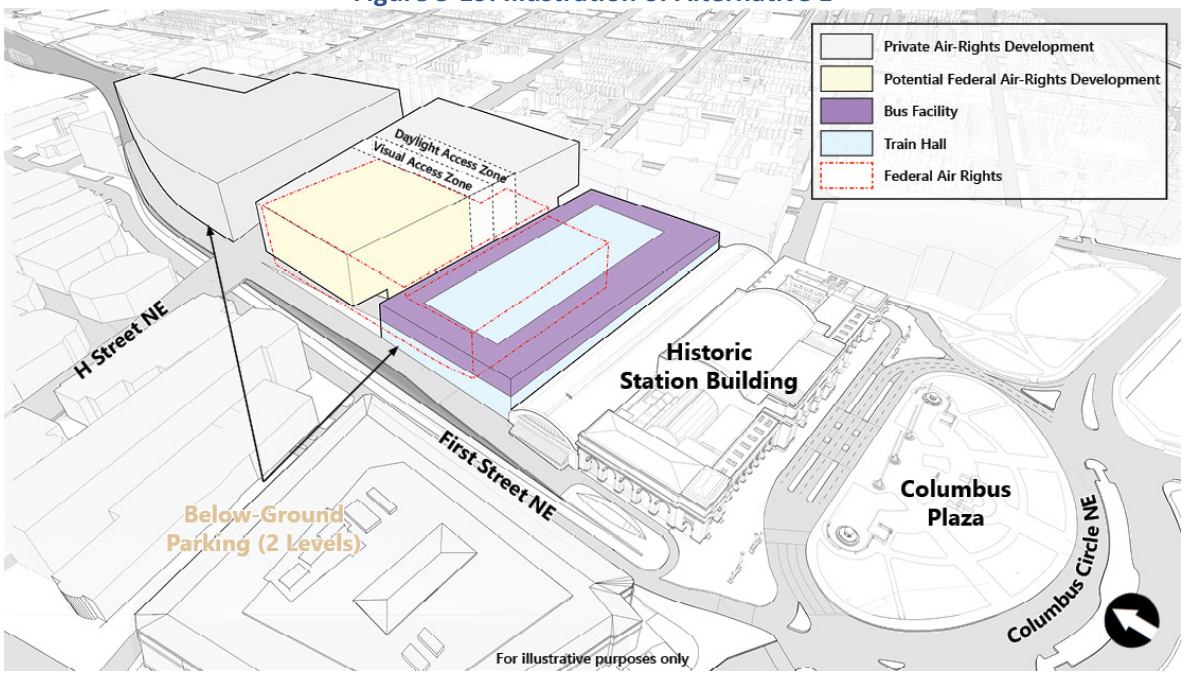
The below-ground parking facility would be like the facility in Alternative C and consist of one level with space for about 900 vehicles. Vehicular access would be from K Street NE through a new intersection under the bridge, as in Alternatives B and C (this intersection is described in **Section 3.4.3.3**, *Parking*). Pedestrians would access the parking level via vertical circulation elements from the H Street Concourse, Central Concourse, and First Street Concourse.

3.4.6 Alternative E

3.4.6.1 Summary Description

Alternative E features an east-west train hall with integrated bus facility and only below-ground parking. **Figure 3-19** illustrates Alternative E.

Figure 3-19. Illustration of Alternative E



- **Structures:** The east-west train hall would be approximately 100,000 square feet in area. The train hall would cover the train engines and part of the first car on all the tracks with the exception of the easternmost and westernmost ones. The bus facility (integrated with the train hall) would be approximately 108,000-square-foot.
- **Mix of Uses**: Retail space would be approximately 308,000 square feet and the Amtrak support area approximately 297,400 square feet.
- **Parking:** Parking would be southwest of H Street NE in two below-ground levels. It would provide space for approximately 2,000 cars.
- **Buses:** The integrated bus facility would have 27 spaces distributed on either side of the train hall.
- **For-Hire Vehicles/Pick-up and Drop-off:** For-hire and private vehicles would have a total of approximately 50 spaces for pick-up and drop-off. Pick-up and drop-off areas would be provided in front of WUS, on First and Second Streets NE near H Street, at deck-level next to the train hall, and in the below-ground parking facility.
- **Bicycles:** The existing Bikeshare and bicycle parking options would remain at First and 2nd Streets NE. Additional Bikeshare bicycles would be provided (approximately 104). The capacity for bicycle storage would be approximately 200 bicycles.
- **Pedestrians:** Pedestrians would access WUS via the existing Metrorail station's First and G Street entrance, the southwest portico of WUS, the front of the station, and from H Street NE. New entrances would be located under the H Street Bridge.

- **Intercity and Commuter Operations and Ridership:** Levels of service would grow along with projected demand. Train volume increases relative to existing levels would range from 148 percent (Amtrak) to 187 percent (VRE).
- **Property Acquisition**: Approximately 1.9 acres of private air rights would be acquired to accommodate various elements of the Project.[88]
- **Potential Development of Federal Air Rights:** [89] The Federal air rights not needed for the Project would be available for potential future transfer and development. The potentially developable envelope would encompass approximately 688,050 GSF. [90]
- **Estimated Construction Cost:** Alternative E would cost approximately $6.9 billion to construct. [91]
- **Estimated Construction Duration:** Alternative E would take an estimated 14 years and 4 months to construct.

The following features of Alternative E are common to all Action Alternatives: tracks and platforms (see **Section 3.4.2.2**), loading (see **Section 3.4.2.3**), concourses (see **Section 3.4.2.4**), and intercity and commuter operations and ridership (see **Section 3.4.2.11**). Parking would be as under Alternative B (see **Section 3.4.3.3**). The bus facility would be the same as Alternative D's (see **Section 3.4.5.4**). Pedestrian and bicycle access as well as pick-up and drop-off areas would be as in Alternative C (see **Sections 3.4.4.6** and **3.4.4.7**, respectively).

3.4.6.2 H Street Bridge Intersections and Deck-Level Circulation

Deck-level circulation patterns in Alternative E are illustrated in **Figure 3-20**.[92]

[88] Additionally, daylighting features for the underlying concourse may be installed within the Daylight Access Zone (see **Section 3.1.8.14** above). These features would occupy only a small portion of the Daylight Access Zone and would require an agreement with the owner of the private air right.

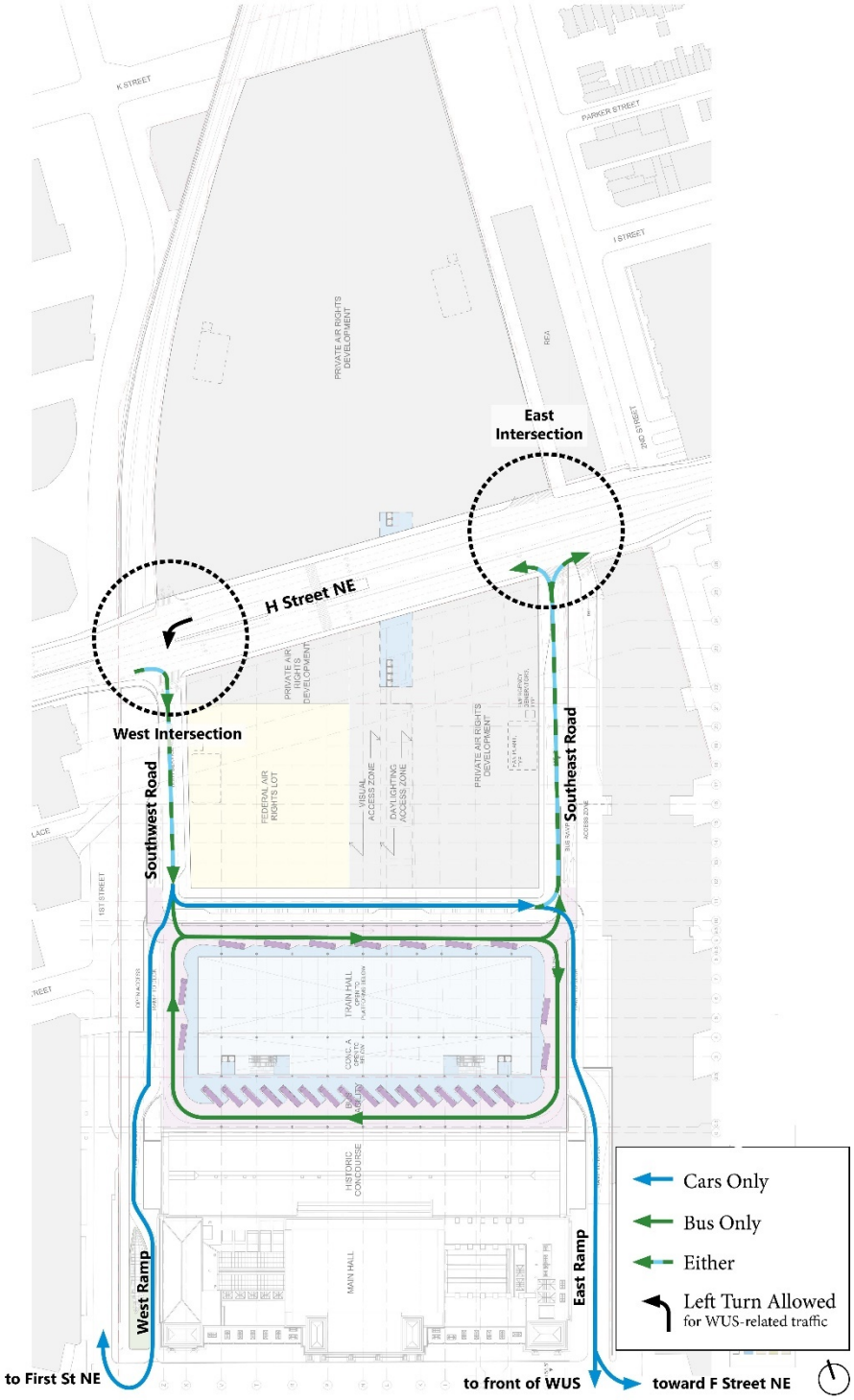
[89] Although any development of the Federally owned air rights is not part of the Project, the development of those rights may result from the Project. Therefore, the possible impacts associated with potential future development of the Federal air rights are evaluated in Chapter 5 as indirect impacts.

[90] This is based on the assumption that development of the Federal air rights would be consistent with the USN zoning applied to the adjacent private air rights. This assumption is consistent across all Action Alternatives and supports a realistic assessment of potential indirect impacts. FRA determined that a change to USN zoning in the Federal air-rights parcel was reasonably foreseeable based on coordination with the DCOP; the limitations of the existing zoning (PDR-3 precludes residential development), which is inconsistent with the adjacent USN zoning; and the goals of the DC SHPO to promote a symmetrical development north of the historic station. The nature of the potential future air-rights development is undetermined. However, commercial development is likely. For the purposes of the impact analysis, the DEIS assumes that it would consist of office space. This is a conservative assumption because, of the likely uses, office space would generate the most vehicular trips. Per the ITE *Trip Manual* 10th Edition, 1,000 square feet of office space generate more trips than the same amount of residential uses.

[91] See **Appendix A8**, *Action Alternatives Cost Estimates Memorandum* for the basis of this estimate.

[92] Figure 3-20 is intended to illustrate WUS-related traffic movements only. It does not reflect the exact configuration of the new intersections or the H Street Bridge. Roadway alignments are approximate.

Figure 3-20. Deck Circulation in Alternative E



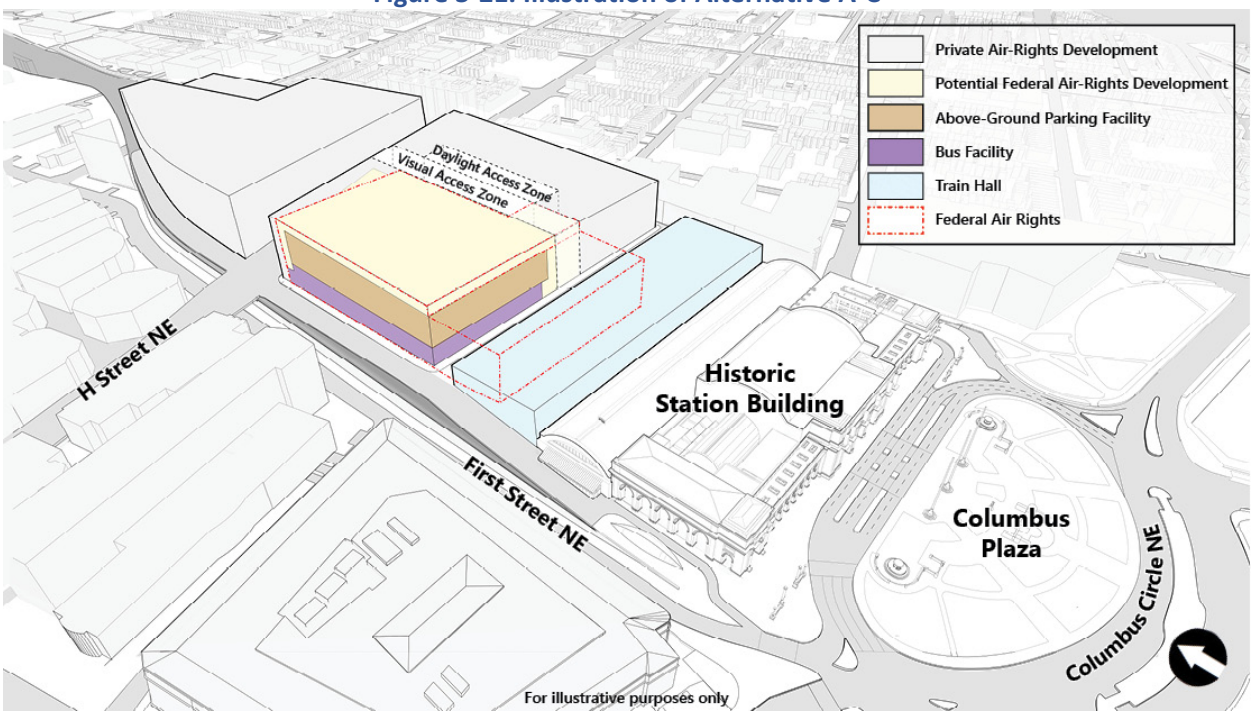
Circulation would be as in Alternative D (see **Section 3.4.5.3**, *H Street Bridge Intersections and Deck-Level Circulation*) except that there would be no WUS-related roadways or traffic north of the H Street Bridge.

3.4.7 Alternative A-C (Preferred Alternative)

3.4.7.1 Summary Description

Alternative A-C features an east-west train hall encompassing Concourse A. The bus facility and parking facility would be in a new, above-ground structure (multimodal surface transportation center) located in the southwest corner of the Project Area, approximately where the existing parking garage now stands. The portion of the Federally-owned air rights not used for the multimodal surface transportation center would be available for potential future development. **Figure 3-21** illustrates Alternative A-C.

Figure 3-21. Illustration of Alternative A-C



- **Structures:** The east-west train hall would be approximately 113,500 square feet in size. All track and platform ends would remain outside the train hall. The bus facility and parking facility would be approximately 210,000 square feet and approximately 690,000 square feet, respectively.
- **Mix of Uses:** Retail space would be approximately 280,000 square feet and the Amtrak support area approximately 297,400 square feet.

- **Parking:** Parking would be southwest of H Street NE, above-ground in the multimodal surface transportation center. There would be space for approximately 1,600 cars.
- **Buses:** A two-level facility capable of accommodating 40 bus slips (20 per level) located southwest of H Street in the multimodal surface transportation center. If not needed for buses, the second level could potentially be used for other activities such as for-hire and private pick-up and drop-off.
- **For-Hire Vehicles/Pick-up and Drop-off:** For-hire and private vehicles would have a total of around 50 spaces for pick-up and drop off. Pick-up/drop-off areas would be provided in front of WUS, on First and Second Streets NE near H Street, and at deck-level next to the train hall.
- **Bicycles:** Bikeshare and bicycle parking options would remain at First and 2nd Streets NE and would offer more Bikeshare bicycles (approximately 105). The capacity for bike parking would increase by approximately 200 spots.
- **Pedestrians:** Pedestrians would be able to access the station via the existing Metrorail station's First and G Street entrance, the southwest portico of the historic station, the front of the station, and from H Street NE. New entrances would be available under the H Street Bridge.
- **Intercity and Commuter Operations and Ridership:** Levels of service would grow along with projected demand. Train volume increases relative to existing levels would range from 148 percent (Amtrak) to 187 percent (VRE).
- **Property Acquisition:** Approximately 1.1 acres of private air rights would be acquired for the train hall, bus facility, and roadways. [93]
- **Potential Development of Federal Air Rights:**[94] The Federal air rights not needed for the new bus and parking facilities would be available for potential future transfer and development. The potentially developable envelope would encompass approximately 380,000 GSF.[95]

[93] Additionally, daylighting features for the underlying concourse may be installed within the Daylight Access Zone (see **Section 3.1.8.14** above). These features would occupy only a small portion of the Daylight Access Zone and would require an agreement with the owner of the private air right.

[94] Although any development of the Federally owned air rights is not part of the Project, the development of those rights may result from the Project. Therefore, the impacts associated with potential future development of the Federal air rights are evaluated in Chapter 5 as indirect impacts.

[95] This is based on the assumption that development of the Federal air rights would be consistent with the USN zoning applied to the adjacent private air rights. This assumption is consistent across all Action Alternatives and supports a realistic assessment of potential indirect impacts. FRA determined that a change to USN zoning in the Federal air rights parcel was reasonably foreseeable based on coordination with the DCOP; the limitations of the existing zoning (PDR-3 precludes residential development), which is inconsistent with the adjacent USN zoning; and the goals of the DC SHPO to promote a symmetrical development north of the historic station. The nature of the potential future Federal air-rights development is undetermined. However, commercial development is likely. For the purposes of the impact analysis, the DEIS assumes that it would consist of office space. This is a conservative assumption because, of the likely uses for the Federal air rights in

- **Estimated Construction Cost:** Alternative A-C would cost approximately $5.8 billion to construct. [96]
- **Estimated Construction Duration:** Alternative A-C would take an estimated 11 years and 5 months to construct**.**

The following features of Alternative A-C are common to all Action Alternatives: tracks and platforms (see **Section 3.4.2.2**), loading (see **Section 3.4.2.3**), concourses (see **Section 3.4.2.4**), and intercity and commuter operations and ridership (see **Section 3.4.2.11**).

Section 3.4.7.2 to **Section 3.4.7.7** below provide detailed descriptions of those feature of Alternative A-C that differ from those of the one or more of the other Action Alternatives. These descriptions supplement, but do not duplicate, the summary bullets above.

3.4.7.2 Train Hall

The train hall in Alternative A-C would generally be similar to the train hall in Alternative C (see **Section 3.4.4.2**, *Train Hall*). However, in Alternative A-C, because there would be no bus pick-up and drop-off area, the train hall would be directly adjacent to the back of the historic station building and flush with its west and east sides. The height of the train hall would be approximately 42 feet above H Street NE.

3.4.7.3 H Street Bridge Intersections and Deck Circulation

Deck-level circulation patterns in Alternative A-C are illustrated in **Figure 3-22**.[97] WUS-related traffic would use two intersections to travel to and from station elements: [98]

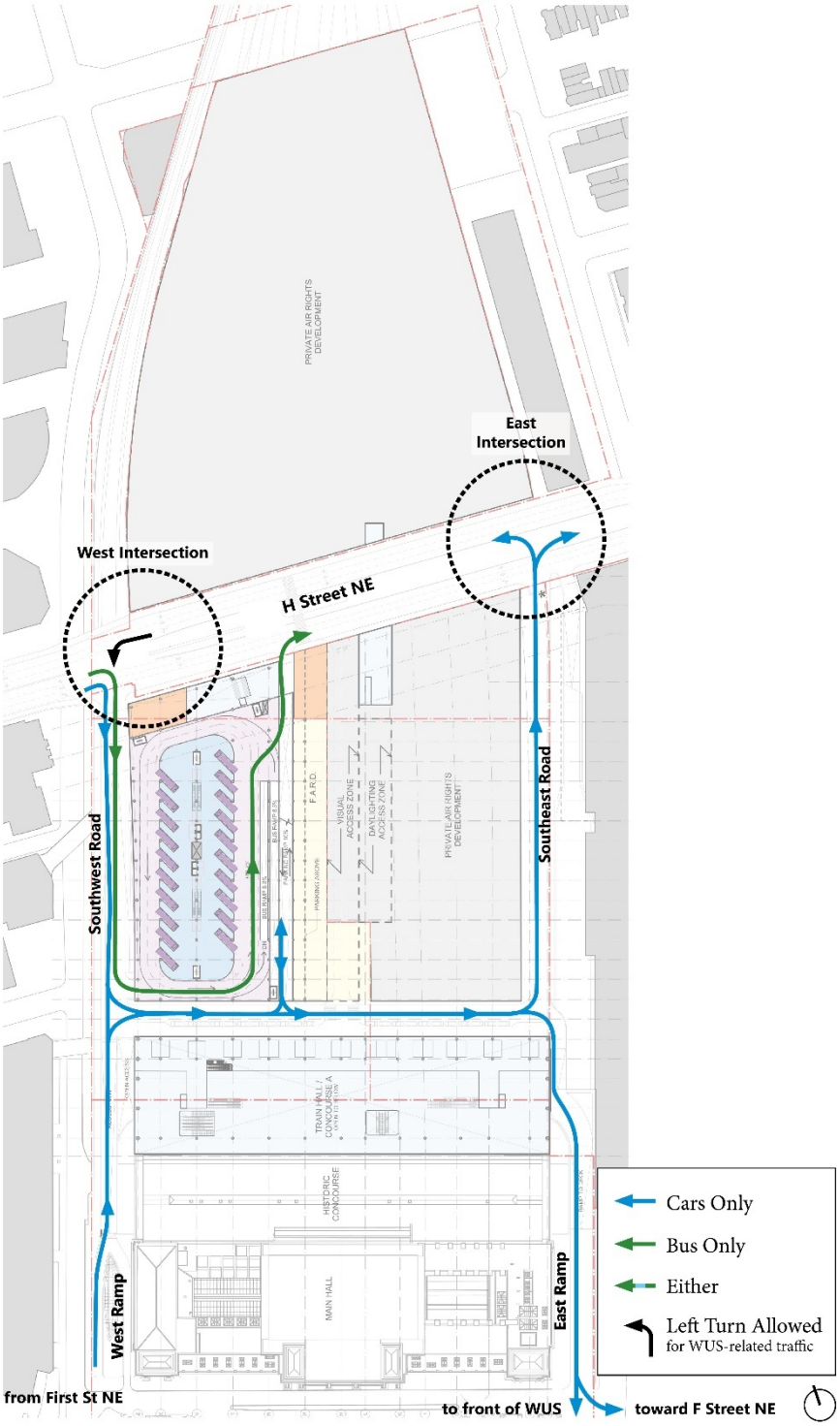
Alternative A-C, office space would generate the most vehicular trips. Per the ITE *Trip Manual* 10th Edition, 1,000 square feet of office space generate more trips than the same amount of residential uses.

96 See **Appendix A8**, *Action Alternatives Cost Estimates Memorandum* for the basis of this estimate.

97 Figure 3-22 is intended to illustrate WUS-related traffic movements only. It does not reflect the exact configuration of the new intersections or the H Street Bridge. Roadway alignments are approximate.

98 Traffic to and from the private air-rights development could also use these intersections and roadways if both projects are built, as assumed in this DEIS. Additionally, the west intersection and the east intersection would have north legs consisting of roadways serving the development north of H Street. In the case of the west intersection, based on current property boundaries, this would result in an offset intersection because the southwest road and the road to the north would not be aligned. These facilities are not part of the Project in Alternative A-C.

Figure 3-22. Deck Circulation in Alternative A-C



- **West Intersection**: In Alternative A-C, the existing intersection of H Street and the access ramp to the parking facility and down to the front of WUS would be repurposed or reconstructed at its existing location into a new southwest road. It would provide access to the new bus and parking facilities (see **Section 3.4.7.4**, *Bus Facility* and **Section 3.4.7.5**, *Parking* below). Just north of the train hall, the southwest road would connect to a new east-west road running along the length of the train hall and connecting to the southeast road described below. The exit ramp from the bus facility would connect directly to H Street NE a short distance to the east of the west intersection. This would be similar to the existing configuration.
- **East Intersection**: The new east intersection and a new southeast road in Alternative A-C would be similar to what they would be in Alternative A (see **Section 3.4.2.6**, *H Street Bridge Intersections and Deck Circulation*). Just north of the train hall, the southeast road would connect with the east-west road. It would be used by traffic that enters the deck via the west intersection and travels along the east-west road to return to H Street NE (see **Section 3.4.7.7**, *Pick-up and Drop-off Areas*, below).

As in the other Action Alternatives, WUS-related traffic would move in a one-way, counterclockwise pattern across the deck, southbound only along the southwest road from H Street NE to the east-west road and eastbound only along the east-west road. From there, vehicles would travel northbound only along the southeast road back to H Street NE or southbound only via the east ramp to F Street NE or (for taxis) the front of WUS. In Alternative A-C, unlike in the other Action Alternatives, the west ramp would be one-way northbound from First Street NE to its intersection with the east-west road. It would be accessed via First Street NE and all vehicles would have to turn right into the east-west road.

3.4.7.4 Bus Facility

In Alternative A-C, the bus facility would be southwest of H Street NE, approximately where the existing facility stands. It would consist of two levels, with a lower mezzanine connected to the train hall and Concourse A for passenger circulation. There could also be access from H Street NE. The first level, at deck level above the mezzanine, would feature 20 bus slips in an angled configuration. The second level could accommodate 20 more slips, for a total of 40. If it is not needed for buses, the second level could be used for other activities such as for-hire or private pick-ups and drop-offs. Access to and from the second level would be via the same ramps as used for passenger vehicle parking or via internal ramps in the bus facility.

Buses would access the facility from H Street NE by turning left or right into the southwest road via the west intersection. The ramp into the facility would be located off the southwest road, north of its intersection with the east-west road. Buses would exit the facility via a dedicated ramp directly onto H Street NE similar to the existing configuration. Only right turns would be possible.

As in all Action Alternatives, intercity and some tour and charter operations would use the bus facility. Hop-on/hop-off sightseeing buses, as well as occasional overflow tour and charter buses, would use an additional bus location on G Street NE (see **Figure 3-9** above).

3.4.7.5 Parking

Six levels above the bus facility would provide space for approximately 1,600 cars. Pedestrians would access the parking levels through the bus facility's mezzanine level and via vertical circulation elements. Vehicular access would be via a ramp off the east-west road, on the east side of the structure. Cars would reach this ramp from H Street NE, traveling southbound along the southwest road and turning right into the east-west road or from First Street traveling northbound along the west ramp. Vehicles leaving the parking facility would turn left onto the east-west road and go to either H Street NE via the southeast road or F Street via the east ramp.

3.4.7.6 Pedestrian and Bicycle Access

Front of WUS

As in the other Action Alternatives, in Alternative A-C, the front of WUS would remain the primary access point to the station for pedestrians and cyclists. Pedestrian access would generally be similar to what it would be in all Action Alternatives, the one difference being the configuration of the ramp connecting First Street NE to the west ramp along the side of WUS. Because in Alternative A-C the west ramp would be northbound only, the configuration of the access ramp would be different from what it would be in the other Action Alternatives. **Figure 3-23** shows an illustration of this connection.

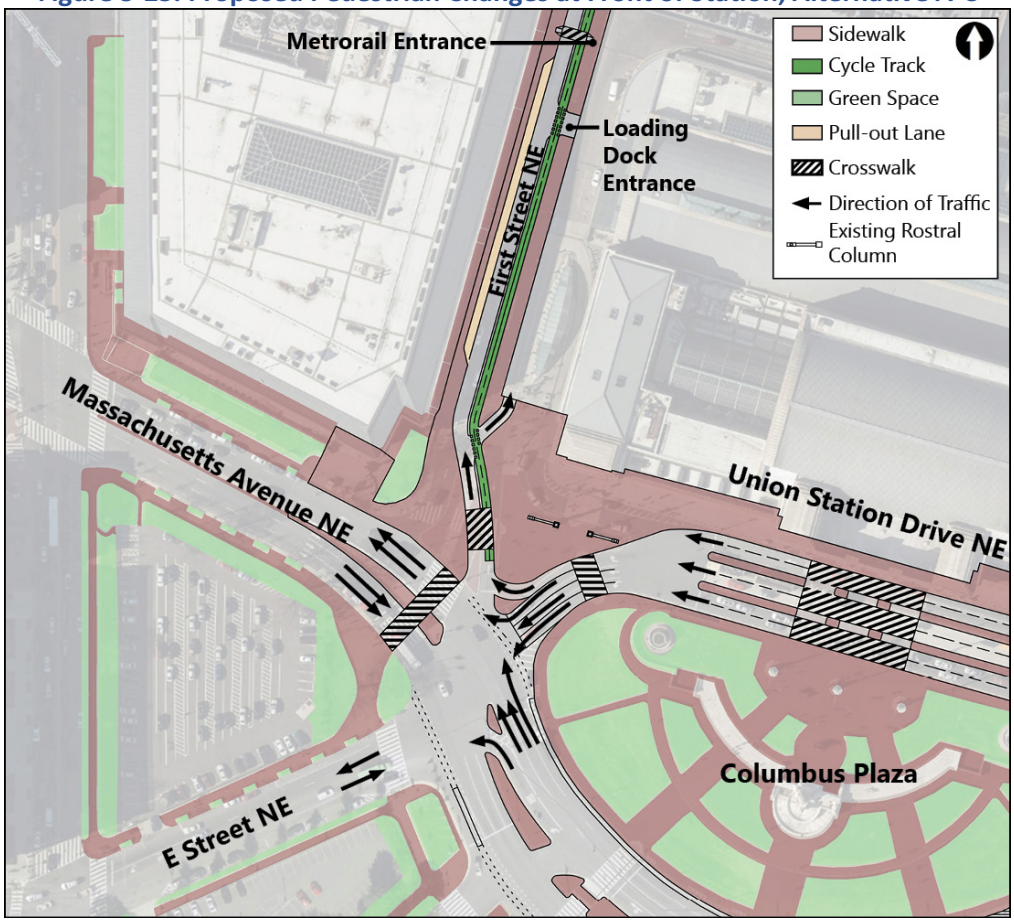
First Street NE

First Street NE pedestrian and bicycle access in Alternative A-C would be as described for Alternative A and the other Action Alternatives in **Section 3.4.2.9**, *Pedestrian and Bicycle Access, First Street NE*.

2nd Street NE

Second Street NE pedestrian and bicycle access in Alternative A-C would be as described for Alternative A and the other Action Alternatives in **Section 3.4.2.9**, *Pedestrian and Bicycle Access, 2nd Street NE*.

Figure 3-23. Proposed Pedestrian Changes at Front of Station, Alternative A-C



H Street NE

Like all Action Alternatives, Alternative A-C would include adequate pedestrian infrastructure, bicycle parking, and Bikeshare stations to support access to WUS from H Street NE. There would be access via vertical circulation elements both north and south of the H Street NE. On the south side, this access would consist of an enclosed headhouse. Some distance to the west of the headhouse, there would be an entrance to the bus facility. These access points could potentially be incorporated into the private air-rights development.

3.4.7.7 Pick-up and Drop-off Areas

Alternative A-C would provide the same pick-up and drop-off areas as Alternative C in front of the new train hall, on the deck, and on First and 2nd Streets NE (see **Section 3.4.4.7**, *Pick-up and Drop-off Areas*). Additionally, the second level of the bus facility could potentially be used for for-hire and private pick-up and drop-off activities if not needed for buses.

In Alternative A-C, cars could reach the deck-level pick-up and drop-off area from the south via First Street NE and the northbound west ramp, or they could reach it from the north via H Street NE, the west intersection, and the southwest road. They would exit to H Street NE via the southeast road or to F Street NE or the front of WUS via the east ramp.

3.5 Construction Methods and Activities

FRA and the Project Proponents evaluated the constructability of the Project by considering the following factors: sequencing, duration, needed equipment, staging, traffic routing, materials removal, excavation, and dewatering. A detailed constructability analysis concluded that all Action Alternatives are constructible. However, they vary in their construction duration and cost based primarily on the depth of excavation associated with each alternative. The summary description of construction activities presented in this section is based on the constructability analysis.[99]

3.5.1 Construction Phasing and Sequence

After reviewing different potential approaches for construction, Amtrak and USRC, with participation from FRA, determined that construction would proceed in four sequential phases. This approach would adequately balance the need to maintain an acceptable level of train service throughout the construction period while allowing construction to proceed in a reasonable amount of time. It would keep a minimum of three low-level, run-through platforms in operation at all times, which is necessary to adequately maintain VRE, long-distance train operations, and regional run-through service. During each phase, a set number of tracks and platforms would be taken out of service and become an active construction zone. The need to provide adequate space for construction and the maximum number of tracks that can be removed while still maintaining adequate rail operations would determine each phase's width. The minimum average phase width would be approximately 90 feet.

Construction would proceed from east to west. Part of the constructability study considered other approaches, including west-to-east, middle-out, south-to-north, and north-to-south. Middle-out construction would make it impossible to maintain Acela service throughout. South-to-north and north-to-south construction would eliminate passenger access to the front of the station during much of the construction period. The west-to-east approach

[99] Amtrak. November 2019. *Washington Union Station Terminal Infrastructure Project Constructability Report*. Construction of a project such as the Union Station Expansion Project is a highly complex undertaking requiring extensive planning and involving a wide range of simultaneous and sequential activities. This section focuses on those activities that are most relevant to the environmental impact analysis and describes them with the degree of specificity achievable at this early stage of project planning. It is not intended to be a comprehensive description of Project construction activities across the entire construction period.

would require significant design modifications and have substantial operational impacts.[100] Therefore, FRA determined that the east-to-west approach would be analyzed in the DEIS.

The construction sequence would follow the same general approach within each phase. A set of tracks would be taken out of service. Temporary tracks and connections would be constructed as needed to help maintain operations and potentially support the operation of work trains. Cut-off and support walls (slurry, sheet-pile, or secant-pile walls: see **Section 3.5.2**, *Support of Excavation Options*, for more details) would be installed, as needed, to support excavation and keep groundwater out. Following excavation, drilled shafts would be constructed to provide deep foundations for the slabs supporting the new tracks and the columns supporting the deck on which the Project elements would stand. As construction moves to the next phase, the deck-level Project elements would be constructed.

The First Street Tunnel column removal work (see **Section 3.4.2.2**, *Tracks and Platforms/Rail Support Function*) would take place in three sequential phases, also from east to west (henceforth, these phases are referred to as CR Phases 1 through 3 to distinguish them from main construction Phases 1 through 4 described above). Work would follow approximately the same pattern during each CR phase: strengthening and modifying the structural connections of the tunnel columns to be maintained; replacing or strengthening the overhead tunnel roof beams to span across the gaps created by the removal and replacement of the existing columns and crash walls; removing select existing columns and crash walls; finalizing tunnel deck substructure improvements as needed; and shifting the tracks.

The column removal work would be conducted simultaneously, and largely overlap, with the main construction effort. CR Phase 1 would take place during main construction Phase 1 and CR Phase 3 during main construction Phase 2. To maintain adequate levels of rail service, CR Phase 2 must start after main construction Phase 1 is complete and be finished before main construction Phase 2 begins. Therefore, there would be a period – anticipated to extend over approximately 12 months – between Phase 1 and Phase 2 during which only column removal work (CR Phase 2) would be conducted.

3.5.2 Support of Excavation Options

Construction of each of the Action Alternatives would require excavating the stub-end portion of the rail terminal. The maximum depth of excavation would vary with the Action Alternative, as shown in **Table 3-10**. Alternatives A and A-C, with minimal construction below the level of the Central Concourse, would involve the least excavation. Alternatives B and E, with two levels of below-ground parking, would require the most.

Walls would be needed to support the excavation and control groundwater seepage. The constructability analysis considered seven support of excavation (SOE) options involving

[100] Email from Amtrak to VHB dated October 15, 2019.

different types of walls and different depths of construction. Upon review of those options, FRA and the Project Proponents selected three SOE options for analysis in the DEIS based on the depth of excavation required by each Action Alternative. This analysis is described in more details below. In addition to depth of excavation, the selection was based on an assessment of the anticipated efficiency of the SOE option in controlling groundwater seepage, construction costs, and construction duration.

Table 3-10. Approximate Depth of Excavation per Action Alternative (Feet)

Action Alternative	Depth below Existing Grade	Elevation above Mean Sea Level
Alternative A	32	20
Alternative B	62	- 10
Alternative C (both options)	49	3
Alternative D	49	3
Alternative E	62	- 10
Alternative A-C	32	20

1. Existing grade is approximately 52 feet above mean sea level

3.5.2.1 Alternatives A and A-C: Secant Pile Cut-off Wall to 64 Feet

Construction of Alternative A or Alternative A-C would involve establishing an approximately 64-foot deep secant-pile cut-off wall around the excavated portion of the rail terminal.[101] Secant-pile walls are made of intersecting reinforced concrete piles reinforced with either steel rebar or steel beams. The piles are installed by drilling into the ground. Because excavation in Alternative A would mostly remain above groundwater level, the secant-pile wall would be sufficient to prevent significant groundwater seepage into the excavation.

Within the perimeter, 100-foot or 64-foot deep sheet-pile walls would be used to separate construction phases and establish passageways for internal circulation of trucks and equipment. Sheet-pile walls consist of prefabricated steel wall sections driven into the ground. The joints of adjacent sections are connected to form the full wall.

3.5.2.2 Alternative B and E: Slurry Cut-off Wall to Bedrock

Construction of Alternatives B or E would involve building a slurry cut-off wall to a depth of 210-foot deep around the stub-end track portion of the rail terminal, which would be excavated to build the two levels of below-ground parking.[102] The slurry wall would reach down to the bedrock underneath the Project Area and would isolate the construction site from the underlying aquifers.

[101] **Appendix A7**. *Support of Excavation (SOE) Diagrams, SOE Option 2 & 3, Alternate A – SOE 2*. This would also apply to Alternative A-C.

[102] **Appendix A7**. *Support of Excavation (SOE) Diagrams, SOE Option 1, Alternate B & Alternate E*.

Constructing a slurry wall involves excavating a trench that is simultaneously filled with a mix of bentonite and water (slurry), which keeps the trench from collapsing. The trench is then filled with concrete from the bottom up after installation of reinforcing steel. The concrete displaces the slurry as the trench fills up and hardens around reinforcement to form a structural wall.

The excavated portion of the run-trough track area of the rail terminal would be surrounded by a 64-foot secant pile wall, similar to that described for Alternative A. Within the rail terminal, 100-foot sheet-pile walls would separate construction phases and create passageways for construction trucks and equipment.

3.5.2.3 Alternatives C and D: Sheet-pile Cut-off Wall to Clay Layer

Construction of Alternatives C (both options) or D would involve building a 100-foot deep sheet-pile cut-off wall around the stub-end track portion of the rail terminal, which would be excavated to build one level of below-ground parking, and H Street Tunnel. This wall would reach down to the Potomac Clay layer underneath WUS. As such, it would isolate the construction site from the underlying upper aquifer and would be sufficient to prevent groundwater seepage into the Project area to allow for the excavation of the single level of below-ground parking beneath the Concourse level.[103]

The excavated portion of the run-through area of the rail terminal would be surrounded by a 64-foot deep sheet-pile wall. Similar 64-foot deep sheet-pile walls would be used to separate construction phases and establish passageways for construction trucks and equipment.

3.5.3 Excavation Method

The constructability analysis assessed both open-cut and top-down construction techniques. Open-cut, or traditional excavation methods, would build the Project by excavating a trench within the construction area and then building upwards to the completion of each phase. Top-down construction would build the Project by first rebuilding the track level, structural supports, and deck above, then completing the below-ground portions after the above-grade elements are sufficiently complete.

FRA determined that the DEIS would assess the open-cut construction approach for the following reasons. The use of the open-cut approach would work for all Action Alternatives. In all Action Alternatives, open-cut construction would be less expensive and take less time than top-down construction. For instance, with the top-down approach, construction of Alternative B would take an estimated 15 years and 5 months instead of 14 years and 4 months with the open-cut approach. It would also cost an estimated $522 million more.

[103] **Appendix A7**. *Support of Excavation (SOE) Diagrams, SOE Option 5, Alternate C & Alternate D*.

The open-cut approach would also allow for easier access to the excavation area; provide more staging space; and make it easier to use work trains for excavation spoil removal.

3.5.4 Drilled Shaft Construction

Drilled shafts would be the basic foundation for track support and other Project elements, including supporting decks. Up to approximately 945 drilled shafts would be built.[104] They would range in diameter from 5 feet to 12 feet. Average depth would be up to 150 feet. Construction of a drilled shaft would involve drilling a hole, stabilizing it using either a casing or a slurry, installing reinforcing bars, and filling the hole with concrete.

3.5.5 Construction Equipment

Several elements of the Project would require the use of large construction equipment:

- Three major construction operations would require large cranes: SOE, drilled shaft construction, and construction of the superstructure supporting the Project's above-ground elements. These operations would require cranes with boom lengths of 150 to 250 feet.
- Construction of drilled shafts would involve the use of large drilling rigs. A typical drilling rig would be approximately 88.5 feet tall.
- Concrete production may require the installation of a small concrete batch plant, likely in the West Rail Yard. [105]
- Construction of slurry walls (Alternatives B and E only) would require setting up slurry plants.[106]

The setting of the Project in a dense urban environment and active rail terminal would affect the type of equipment used for construction. It would need to be equipment that can maneuver in cramped conditions and minimize disruption to adjacent areas.

[104] This total includes drilled shafts for both the Project and the private air-rights development. As previously noted, the Project and the private air-right development may be constructed in a coordinated manner. However, they are separate and independent projects. Should the private air-rights development not move forward, drilled shafts would be fewer.

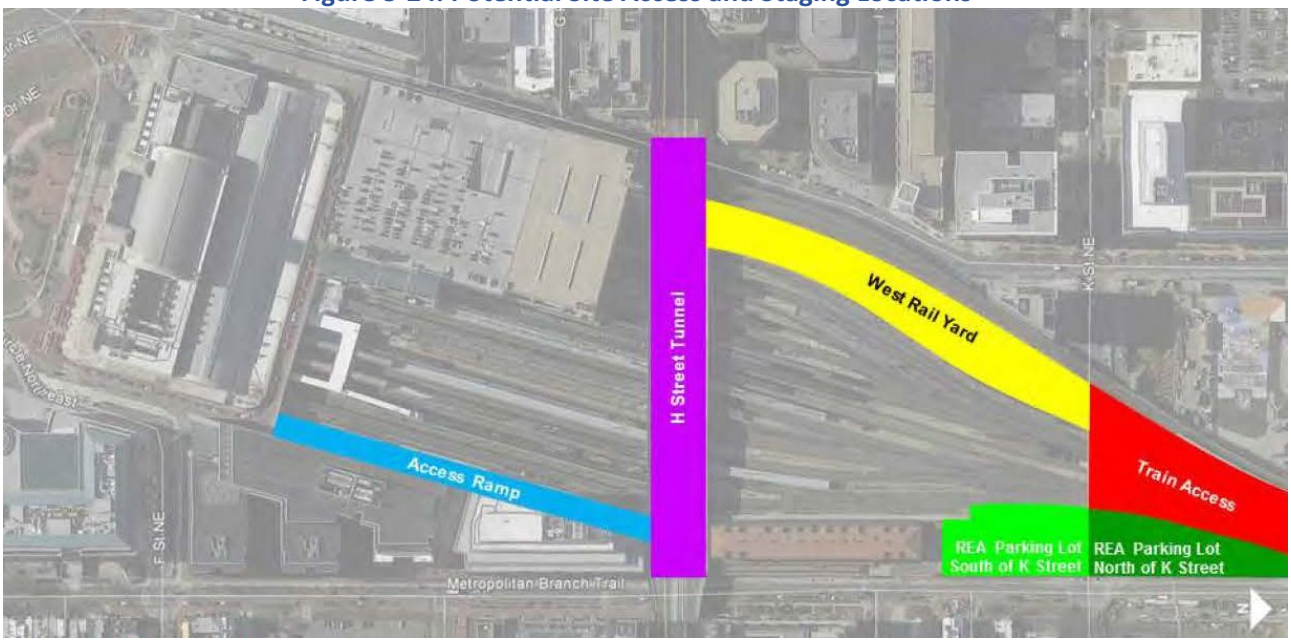
[105] A concrete batch plant is a piece of equipment that combines various ingredients to produce large amounts of concrete. Ingredients include but are not limited to water, air, sand, aggregate (such as rocks or gravel), and cement. The concrete batch plant would be a different piece of equipment from the slurry plants mentioned in the following bullet.

[106] A slurry plant or slurry mix plant is a piece of equipment that produces the slurry used for the construction of slurry walls. Bentonite slurry is produced by mixing bentonite powder and water in a high-shear mixer.

3.5.6 General Construction Site Access and Staging

The constructability analysis identified five potential areas for construction site access and staging (see **Figure 3-24**). Construction staging areas would be used to lay down materials, stage equipment and personnel, and set up concrete batch plants.

Figure 3-24. Potential Site Access and Staging Locations



The five staging areas are:

- **Access Ramp:** The east loading dock access ramp and local roads (First Street, 2nd Street, H Street) would serve as access points for personnel, minor equipment, and limited material.
- **H Street Tunnel:** The H Street Tunnel would serve as a major access point for all phases of construction. It would serve as access for personnel, equipment, and materials. After the completion of Phase 1, construction access would be at First Street NE only. Use of the H Street Tunnel would need to be coordinated with DDOT.
- **West Yard:** The west yard would serve as a major staging area for all phases. It would be used for deliveries and potential excavation spoil removal by work trains. It may also potentially serve as a location for the small concrete batch plant.
- **REA Parking Lot:** The REA Parking Lot would serve as a major access point during construction for personnel, equipment, and materials. It may also serve as a potential staging area for construction materials.

- **Train Access Area:** This area would provide access for work trains during the construction period. Materials may be delivered and removed by train to reduce truck volumes during construction.

As construction proceeds, some space on the deck may be available for construction staging as well.

3.5.7 Station Access During Construction

Construction activities would disrupt the various transportation modes serving WUS, though the modes affected, and the level of disruption would vary with the phase. Operations would be maintained, as much as possible, to minimize disruptions to the traveling public.

3.5.7.1 Taxi

Construction would require the closure and removal of the taxi queue along the east ramp and back of the Claytor Concourse starting in Phase 1. Passenger pick-up and drop-off would remain available in front of WUS. Alternative routes and queuing locations would be provided. Depending on the construction phase, these may include the west ramp to the front of the historic station building, 2nd Street NE, and the completed portions of the overbuild desk via H Street NE.

3.5.7.2 Bus

During Phase 3, partial demolition of the existing parking garage would require the relocation of the bus facility to the unaffected portion of the structure. Operations could continue. In Phase 4, the existing structure would be entirely demolished. At that time, in all Action Alternatives except Alternative C, East Option, temporary off-site bus facilities or loading zones would be needed, as provided by the District of Columbia, to help maintain operations. Alternative C with the East Option would build the final bus facility during Phases 1 and 2 and the new facility would be operational by the time the existing one is demolished.

3.5.7.3 Parking

Starting in Phase 1, construction would eliminate vehicular access to the existing parking garage via the east ramp. Pedestrian access would remain available. Partial demolition of the existing garage would start during Phase 3 and the facility would be entirely demolished during Phase 4. To make up for the loss of parking capacity, temporary parking would be needed until the new parking facilities are available. In Alternative C with the East Option, above-ground parking would be constructed during Phases 1 and 2 and would be available during Phase 4. The below-ground parking would likely not be available until the end of Phase 4, however, and interim parking would still be needed.

3.5.7.4 Construction Equipment and Access

Construction equipment and material staging would take place in the REA Parking Lot south of K Street NE (Phase 1) and the West Yard (Phases 1 through 3 and half of Phase 4). After completion of Phase 1, parts of the east overbuild deck would potentially be available for staging as well. The west side of the H Street Tunnel would be the main access point during all phases. The east side of the tunnel would provide access during Phase 1 but it would be demolished as part of the excavation of this phase.

3.5.8 Duration of Construction

The construction analysis provided a preliminary estimate of construction duration for the different Action Alternatives by phase (see **Table 3-11**). For all Action Alternatives, Phase 1 would be the shortest phase and Phase 4 the longest one. As explained in **Section 3.5.1**, *Construction Phasing and Sequence*, in all Action Alternatives, there would be a period of approximately 12 months between Phases 1 and 2 during which only column removal work would be conducted. This period of lower construction activity is designated in **Table 3-11** as the Intermediate Phase. The column removal component of the Project would be completed in approximately 2 years and 6 months, starting during main construction Phase 1 and ending during main construction Phase 2.

Alternatives A and A-C would have the shortest construction schedule, at 11 years, 5 months. Alternatives B and E would have the longest construction schedule, at 14 years, 4 months. The difference is mainly due to the variances in the extent of the below-grade excavation in each Action Alternative.

Table 3-11. Estimated Construction Schedule per Action Alternative

Phase	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative A-C
Phase 1	2 years, 5 months	2 years, 5 months	2 years, 5 months	2 years, 5 months	2 years, 5 months	2 years, 5 months
Intermediate Phase	*12 months*	*12 months*	*12 months*	*12 months*	*12 months*	*12 months*
Phase 2	2 years, 5 months	3 years	2 years 4 months	2 years 4 months	3 years	2 years, 5 months
Phase 3	2 years 6 months	3 years	2 years 6 months	2 years 6 months	3 years	2 years 6 months
Phase 4	3 years 1 month	4 years, 11 months	4 years	4 years	4 years, 11 months	3 years 1 month
Total Project Completion	11 years, 5 months	14 years, 4 months	12 years, 3 months	12 years, 3 months	14 years, 4 months	11 years, 5 months
Midpoint	5 years, 8.5 month	7 years, 2 months	6 years, 1.5 months	6 years, 1.5 months	7 years, 2 months	5 years, 8.5 month

3.5.9 Removal and Transport of Materials

Spoils containing rocks and soils would be removed throughout excavation operations. Hydrocarbons, heavy metals, and polychlorinated biphenyls may be present in the spoil in excess of regulatory thresholds. Contaminated materials would be disposed of in compliance with applicable laws and regulations. **Table 3-12** provides estimates of the amount of spoils that would be removed from the Project Area.

Table 3-12. Estimated Spoils in Cubic Yards (CY) for Each Action Alternative

	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative A-C
Phase 1	117,775	117,775	117,775	117,775	117,775	117,775
Phase 2	218,035	281,058	241,996	241,996	281,058	218,035
Phase 3	195,073	341,584	268,788	268,788	341,584	195,073
Phase 4	436,521	797,270	627,360	627,360	797,270	436,521
Total	967,404	1,537,686	1,255,918	1,255,918	1,537,686	967,404
Swell Factor	1.2	1.2	1.2	1.2	1.2	1.2
Total	1,160,885	1,845,224	1,507,102	1,507,102	1,845,224	1,160,885

Note: Spoils from excavation only

Removal of excavation spoil from the site would be by trucks or work trains, or a combination of both. Based on the estimated amount of spoil that would need to be disposed of, removal by trucks only would require up to 120 truck trips a day, spread over a 20-hour day, in addition to 10 to 20 truck trips for deliveries. Alternatively, spoil removal could be by work train. Two 20-gondola work trains a day would be sufficient to haul off the same amount of spoil as 120 trucks. This would limit daily truck traffic to the 10 to 20 delivery trips a day previously mentioned. The work trains would be scheduled in a manner that does not interfere or conflict with Amtrak, VRE, or MARC operations.

Because the method of excavation spoil removal has not yet been determined, where relevant, the DEIS considers scenarios involving removal only by trucks, removal only by work trains, or a mix of both.

3.6 Comparison of Alternatives

The various factors and elements of each of the six Action Alternatives are compared below in **Table 3-13**.

Table 3-13. Summary of Action Alternatives

Factor	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative A-C (Preferred)
Building Height (Feet above H Street Bridge)	Train hall: 42 Above-ground bus and parking facilities: 91	Bus facility and Train hall: 42	Train hall: 42 Above-ground bus and parking facilities: 59	Train hall: 44 Above-ground parking: 43	Train hall: 44	Train hall: 42 Above-ground bus and parking facilities: 106
Additional Retail Space (Square Feet)	72,000	Same as Alternative A	Same as Alternative A	100,000	Same as Alternative D	Same as Alternative A
Amtrak Support Space (Square Feet)	297,400	Same as Alternative A	Same as Alternative A	Same as Alternative A	Same as Alternative A	Same as Alternative A
Train Hall Area (Square Feet)	180,000 (integrated train hall + Concourse A)	Same as Alternative A	115,000 (train hall only)	100,000 (train hall only)	Same as Alternative D	113,500
Parking Location	Above-ground southwest of H Street NE	Below ground between K Street NE and Concourse A	Above-ground northeast or northwest of H Street NE and below ground between K Street NE and Concourse A	Above ground far north of H Street NE near K Street and below ground between K Street NE and Concourse A	Same as Alternative B	Above-ground southwest of H Street NE
Parking Capacity	1,750	2,000	East Option: 1,650 Total (750 above ground, 900 below ground) West Option: 1,610 Total (710 above ground, 900 below ground)	1,650 Total (750 above ground and 900 below ground)	Same as Alternative B	1,600
Bus Facility Location	Southwest of H Street NE	Southwest of H Street NE	Northeast or northwest of H Street NE	South of H Street integrated with train hall	Same as Alternative D	Southwest of H Street NE below parking
Number of Bus Slips	26	Same as Alternative A	17 (East), 19 (West) 9 at bus drop-off and pick-up area (either option)	27	Same as Alternative D	40
Pick-up and Drop off Locations	Front of historic station, First Street entrance, 2nd Street entrance, and adjacent to train hall on deck level	Front of historic station, First Street entrance, 2nd Street entrance, adjacent to train hall on deck level, and below-ground parking facility	Front of historic station, First Street entrance, 2nd Street entrance, adjacent to train hall on deck level, and below-ground parking facility	Front of historic station, First Street entrance, 2nd Street entrance, adjacent to train hall on deck level, and below-ground parking facility	Front of historic station, First Street entrance, 2nd Street entrance, adjacent to train hall on deck level, and below-ground parking facility	Front of historic station, First Street entrance, 2nd Street entrance, adjacent to train hall on deck level, and potentially on second level of the bus facility if it not needed for buses.
Approximate Number of Pick-up/Drop-off Spaces	40	50	50	50	50	50
Bicycle Facilities	Bikeshare on east side of F Street, Bike station parking facility at southwest, bikeshare and parking at First Street and 2nd Street, bicycle parking near train halls at deck level	Same as Alternative A	Same as Alternative A	Same as Alternative A	Same as Alternative A	Same as Alternative A
Number of Bicycle Spaces	104 bikeshare spaces; 200 bicycle storage spaces	Same as Alternative A	Same as Alternative A	Same as Alternative A	Same as Alternative A	Same as Alternative A

Factor	Alternative A	Alternative B	Alternative C	Alternative D	Alternative E	Alternative A-C (Preferred)
Pedestrian Access	Existing entrances at First Street and G Street (WMATA entrance), southwest portico of historic station building, and front of historic station building; new entrances at First and 2nd Street (H Street Concourse) and onto H Street (via headhouse and train hall)	Same as Alternative A	Same as Alternative A	Same as Alternative A	Same as Alternative A	Same as Alternative A
Acquisition of Private Air rights (Acres)	3.1	2.8	4.6 (East Option) 4.8 (West Option)	4.8	1.9	1.1
Potentially Developable Federal Air Rights Available (Square Feet)	323,720	917,420	952,600	688,050	Same as Alternative D	380,000
Support of Excavation Method	Secant-pile cut-off wall down to 64 feet	Slurry cut-off wall to bedrock	Sheet-pile cut-off wall to clay layer	Sheet-pile cut-off wall to clay layer	Slurry cut-off wall to bedrock	Same as Alternative A
Extent of Below-ground Construction	Concourse A and small areas to facilitate emergency egress	Concourse A and two levels of parking	Concourse A and one level of parking	Same as Alternative C	Same as Alternative B	Same as Alternative A
Amount of Below-ground Excavation (Loose Cubic Yards)	1,160,885	1,845,224	1,507,102	Same as Alternative C	Same as Alternative B	Same as Alternative A
Duration of Construction	11 years, 5 months	14 years, 4 months	12 years, 3 months	Same as Alternative C	Same as Alternative B	Same as Alternative A