WASHINGTON UNION STATION
STATION EXPANSION

Draft Environmental Impact Statement for Washington Union Station Expansion Project

Appendix A3 – Final Concept Development and Evaluation Report

U.S. Department of Transportation
Federal Railroad Administration

July 13, 2016

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WASHINGTON
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STATION EXPANSION

Washington Union Station Expansion Project

FINAL

Concept Development and Evaluation Report

July 13th, 2016

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Preface

The Concept Development process for the Washington Union Station (WUS) Station Expansion Project (SEP) is led by the Union Station Redevelopment Corporation (USRC) and the National Railroad Passenger Corporation (Amtrak), in coordination with the private developer, Akridge. USRC, Amtrak, and Akridge collectively form the 2nd Century Partners (Partners). USRC and Amtrak are the Project Proponents. The List of Stakeholders involved in the SEP is shown in the Appendix G.

The Concept Development process synthesizes the findings from the previous planning tasks such as data collection, analysis, and programming for various disciplines (architecture, engineering, urban design, retail market demand, and multimodal transportation). This phase also included rigorous coordination between the design team, the Partners, and other stakeholders that, together with the planning and analysis, established and substantiated the project needs related to the SEP. As such, the concepts are the culmination of programming for the project elements.

This report is the summary of Concept Development process. It documents the concepts that were coordinated and informed by a series of meetings and Partner Workshops and are proposed by USRC and Amtrak to the Federal Railroad Administration (FRA) for their review and screening within the National Environmental Policy Act (NEPA) process. Based on their review and screening, FRA will select alternatives to be carried into the Environmental Impact Statement (EIS) for more rigorous analysis by the design team.

Structure Of the Concept Development and Evaluation Report

The Concept Development Report includes the following sections:

1. Introduction
2. Project Design Goals and Objectives
3. Programming
4. Concept Development Process
5. Concept Evaluation
6. Options Considered but Dismissed

Appendix

A. Supporting Technical Backup Information
B. Supporting Urban Design and Open Space Information
C. Supporting Retail Information
D. Supporting Station Infrastructure (Fire, MEP, and Structure) Information
E. Supporting Pedestrian Flow Information
F. Partners' Comment on Concepts
G. List of Stakeholders
H. Bus Terminal Capacity Technical Memorandum

1 Introduction

1: Introduction

1.1 Executive Summary

The purpose of this report is to summarize the concept design process for the Washington Union Station (WUS) Station Expansion Project (SEP). The concept design process includes the study of all options for program elements; eliminating options that do not meet the project requirements; and amalgamating the best options into a range of unified concepts. The report summarizes the process by which concepts were developed by reviewing project Design Goals and Objectives to systematically outline the project requirements, defining the current Range of Concepts, and providing a framework for the evaluation of the concept relative to the project Design Goals and Objectives. The design materials and descriptions documented with this report are intended to support the formal review and screening required by the National Environmental Policy Act (NEPA) process. As such, this report presents a range of reasonable concepts that meet the programmatic criteria. The SEP is being prepared in close coordination with the Terminal Infrastructure (TI) project – which will define the requirements for the rail infrastructure at WUS, including the new tracks and platforms.

The TI project is being developed concurrently with the SEP as a separate project, thus subject to change over time. The TI reference material and associated discussions shown in this report reflect a moment in the development of that project. This report includes the layouts for the reconstructed rail terminal as well as any options for additional below grade tracks.

Throughout an extensive set of Workshops and Meetings, the design team, in collaboration with the 2nd Century Partners (Partners) and other stakeholders, conducted a rigorous process which included: identification of issues critical for the success of the overarching SEP design; review of the project opportunities; development of key project Design Goals and Objectives to evaluate design solutions; and initial description of the most promising design concepts.

Union Station was designed by Daniel Burnham, and opened in 1907. Over time, WUS has become one of the nation's busiest train stations, while also growing into a multimodal transportation hub with the addition of the bus terminal, parking garage, Washington Metropolitan Area Transit Authority (WMATA) Metrorail station, and DC Streetcar stop. The station accommodates passengers using multiple short and long-distance commuter and regional trains as well as numerous bus lines. Although WUS has been serving the National Capital Region well for over a century, it is now operating beyond its capacity.

Acknowledging the need for expansion of the region's principal transportation hub, project Design Goals and Objectives also recognize that the WUS will continue its role as a remarkable civic place that also retains its historic character. The expanded and modernized station, along with the original historic station, will become the heart of the brand new destination that is inviting, exciting, and memorable. The SEP is founded upon an integrated passenger and visitor environment with unsurpassed quality: offering safety, comfort, seamless connectivity, as well as flexibility for future increase in capacity and development.

The SEP seeks to improve access to and help invigorate adjacent neighborhoods. The expanded station would bring everyday benefits to the larger community by presenting a strong image of distinct public space with additional amenity, retail, restaurants, and public gathering areas. The SEP seeks to be organized in a way that inter-connects the existing and new diversely programmed public spaces with the overall existing urban fabric.

The project Design Goals and Objectives for the SEP documents the aspirations of the Partners. The collaboration between the design team, agency stakeholders, and the Partners has been critical to create a shared vision that reflects a broad coalition of interests.

In June 2016, Amtrak, in collaboration with the FRA, made the decision to cease inclusion of the additional below grade tracks (ABGT) in concepts developed for the SEP going forward. After a thorough and complete analysis of future rail operations and service plans and rigorous coordination with other future rail planning initiatives, Amtrak, in collaboration with FRA, determined the future projected rail capacity at Washington Union Station could be accommodated within the proposed track alignments in a manner that is consistent with both the Northeast Corridor Future (NECF) and other future operating plans. These findings and proposed track alignments will be detailed further in the Terminal Infrastructure report.

1.2 Scope of Work

The project scope includes planning of architectural, engineering, and urban design for the SEP, the area defined by Massachusetts Avenue to the south, Second Street, NE to the east, New York Avenue, NE to the north, and First Street, NE to the west (See Figure 1). There could be a need to study some components outside this area, for proper integration between the SEP and

the larger context for potential opportunities available at adjacent properties.

Following the completion of the data collection process, the Concept Design process commenced in August 2015. As an initial step, the design team and the Partners established a set of project “Design Goals and Objectives” that reflected the shared vision for the success of the SEP. These Design Goals and Objectives are also reflected in the SEP project Purpose and Need.

Following the definition of Design Goals and Objectives, the main “Program Elements” were identified (, i.e., program types such as Rail, Bus, Public Parking, Taxi/Share ride, Concourses, Train Tall, and Adjacent Elements). The next step was to develop a comprehensive list of options for each program element. This list was previewed and filtered to leave only reasonable options that met the programming requirements. Based on this list, the design team proceeded with exploring preliminary ideas for combining the program element options into coherent concepts. These concepts were developed further in a series of workshops with the Partners, resulting in a proposed range of Concepts which are documented in this report.

This report includes a documentation of the proposed range of Concepts including diagrammatic floor plans, sections, and 3-D views that delineate and summarize the outcomes of the process (See Section 4 for full descriptions with detailed drawings in Appendix A Supporting Technical Backup Information).

Figure 1. Project Area

1.3 Adjacent Projects

The SEP requires close coordination with a number of adjacent projects that share their boundaries with the project area. The current range of Concepts seek to integrate the SEP with the surrounding vicinity.

Burnham Place

Burnham Place (BP) is a 14 acre area of potential air rights development envisioned to be located above portions of the rail terminal (rail yard). BP is separated into two parcels (north and south) split by the H Street Bridge. Per the zoning regulations, BP is envisioned to provide approximately three million square feet of mixed-use space. It is anticipated that certain elements of the SEP may possibly extend into areas of the air right development including bus facilities, entrances, and Train Hall features. Furthermore, there are extensive engineering systems for both the SEP and the air rights development that will need to be integrated such as structural, mechanical systems and utilities.

H Street Bridge

The H Street Bridge provides vehicular access to all SEP elements above the rail terminal, as well as into the northern and the southern portions of the potential BP area. The District Department of Transportation (DDOT) plans to rebuild the bridge as an independent project. Since the bridge would be directly above the reconstructed rail terminal, the new concourse, and other below-grade areas, its rebuilding requires close coordination between the TI and SEP projects. The bridge-support structure will land within and continue through these projects. For a successful reconfiguration of the H Street Bridge that is compatible with the TI and SEP projects, the following design factors need to be considered: the number of lanes and widths, parking, streetcar placement, sidewalk width, streets alignments, adjacent to the Union Station complex, as well as landscape and daylighting. The existing H Street Bridge currently accommodates a street car stop, opened in February 2016.

Publicly Accessible Open Space (greenway)

The 2012 Amtrak Master Plan proposed a linear greenway park, a bike trail, and a pedestrian circulation route along the west side of the potential BP development area above the WMATA tracks and within the WMATA right-of-way. The main design issues for consideration in the SEP are related access points for pedestrians and cyclists, connections to station circulation elements, and the relationship of the proposed Publicly Accessible Open Space (greenway) to the historic Burnham wall and WUS.

If the Publicly Accessible Open Space (greenway) is selected as a desired feature common to one of more Alternatives, BBB/G will continue to coordinate with WMATA's department of adjacent construction for issues related to constructability, structural coordination, clearance, and drainage in the next phase of design. The SEP will not provide the Publicly Accessible Open Space landscape itself, but the design will allow space for it and reflect functional requirements within its footprint for station access (vertical and horizontal) and ventilation.

WMATA Metrorail Station

The Union Station stop on the Metrorail Red Line is one of the busiest in WMATA's system. Metro is currently undertaking an extensive study for access and capacity improvement. The study area includes a mezzanine located to the west of and approximately 18' below the existing Concourse A in WUS. The mezzanine is an important link between the Metrorail station and the WUS concourses, and is currently compromised by serious congestion in peak hours. The SEP takes into account the complication of different levels between the two projects and the need for connection points to provide seamless pedestrian flows. Given their very preliminary nature, WMATA's longer range plans for system expansion in and around WUS have not been specifically addressed by the SEP.

1.4 Surrounding Sites

The SEP considers coordination with a number of off-site adjacent properties, to provide opportunities for accommodation of increased functions of the expanded SEP. The properties include those that share boundaries with the Project Area, as well as other remote ones.

This section includes the account of the following surrounding properties, only those that share their boundaries with the Project Area. Some of the studies about other remote potential properties, such as Government Printing Office (GPO) and Postal Building, are included in Appendix A-4. However, the SEP does not include any exhaustive study of programming options for off-site locations.

Columbus Circle

Columbus Circle refers to the roadway system adjacent to Columbus Plaza, which includes Massachusetts Avenue, Columbus Circle NE, First Street NE, and Union Station Drive. It is not anticipated that Columbus Circle would undergo physical modification as a direct consequence of the SEP and it would continue to serve as the front door to WUS and be maintained by the National Park Service (NPS). However, as the design of alternatives is advanced, changes or improvements to vehicular or pedestrian movement patterns on Columbus Circle may emerge as recommendations.

Railway Express Agency (REA) Building

The existing REA building is proposed to remain in place based on the guidance from the Partners and their consideration of its historic significance. The Historic Preservation Plan (HPP) describes the REA building as an important component of the original station complex. Its parking area may be utilized for expanded loading and screening facilities. Although the SEP proposes options for the use of the REA parking area, the relocation and movement of the existing substation adjacent to the REA is considered outside the SEP, as a near-term project by Amtrak.

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2 Design Goals and Objectives

2: Design Goals and Objectives

2.1 Development Process

At the outset of the project, the design team, Partners, and stakeholders engaged in a collaborative process through a series of Partners Workshops and stakeholder meetings, to establish a comprehensive set of project Design Goals and Objectives. These Design Goals and Objectives are the underlying framework within which the design process operates.

Through the course of several Partner Workshops in September 2015, the Design Goals and Objectives and NEPA Purpose and Need and corresponding Goals and Objectives were streamlined into a single list that reflected input from the Partners.

These Design Goals and Objectives were discussed and refined at multiple Partners Workshops and meetings, and include design principles for the expansion and modernization of the SEP.

2.2 Design Goals and Objectives

Positive Customer Experience

The SEP shall provide enhanced passenger experience through ample amount of daylighting, intuitive and effective wayfinding, and improved passenger amenities. The well-thought station layout with high-quality spaces shall efficiently moderate the complex patterns of pedestrian movements that enter from multiple transportation modes. Furthermore, the architectural quality of the SEP shall anchor the experience, and ultimately create a destination for passengers and visitors.

Rail Operation

The SEP shall accommodate future rail-operational needs projected by the expected growths of northeast population and train ridership, stated in the research conducted by the Regional Plan Association and the Amtrak Analysis for the Northeast Corridor (NEC) Master Plan, respectively. The SEP shall account for the expanded rail infrastructure and facilities necessary to support Amtrak, Acela, commuter rail, Metrorail, and other rail services. The SEP also studied options for expanded infrastructure in the form of future additional below grade tracks (ABGT*) to accommodate additional rail capacity.

The ABGT is no longer being considered as a project element. Please refer to the Executive Summary for a description of the current status of the ABGT options.

The improved rail infrastructure includes but is not limited to the compliance with modern Amtrak engineering and design standards, including wider and longer platforms as well as vertical circulation elements (VCE) to accommodate the necessary rail operations, American Disability Act (ADA), and Life Safety requirements. It is also supported by adequate building systems such as MEP and structure. The improved facilities include but are not limited to waiting areas, lounges, ticketing, servicing, loading, as well as security measures.

Intermodal Travel

The SEP shall reflect future increases in intermodal transportation capacity. The intermodal elements include bus (Intercity, Shuttle, DC Circulator, Tour/Charter, Sightseeing), WMATA, streetcar, parking, car rental/sharing, taxi, bike, and pedestrian. The SEP shall integrate these various transportation modes effectively by providing better access, adequate space, adjacency, and a supply of support facilities necessary to accommodate a well-functioning inter-modal transportation center. The support facilities include, but are not limited to, passenger facilities such as waiting, boarding, and circulation area; ticketing points; employee support spaces; queuing area; MEP equipment; and information systems.

Economic Viability

The SEP shall be economically viable and financially sustainable to support everyday station maintenance and operations. The SEP considers revenue generating features such as improved retail amenity and parking as part of the planning.

Continued Historic Preservation

The SEP shall be consistent with the HPP, which was developed by the Partners. The HPP identified and assessed the historic resources within and adjacent to the expanded station, and is an important framework to further shape the relationship between the old and the new components. The planning and design shall consider physical connections, materials, as well as spatial integration with and preservation of the historic elements.

Integration with Context

The SEP shall develop a character suitable for the urban public realm in and around the project area. The project shall provide seamless access to the station through multiple entrances from the surrounding neighborhoods, such as Near Northeast/ Stanton Park, NoMa and Capitol Hill. In addition, the surrounding neighborhoods will continue to develop based on the future planned land uses. To enhance the historic significance of the area as well as to accommodate the future planned land uses, the SEP shall establish a significant urban place in Washington, D.C., by providing more pedestrian activities and neighborhood connections.

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3 Programming

3: Programming

3.1 Overview

This chapter provides a description of the program organization for the SEP. As illustrated in the following pages, the SEP consists of three distinct programmatic categories:

- SEP Program Elements
- Other SEP Programmatic Considerations
- Adjacent Elements

Following the definition of each programmatic category, the chapter details their respective requirements. The detailed requirements reflect the technical and operational parameters outlined in the Purpose and Need Statement.

SEP PROGRAM ELEMENTS

The Program Elements are the eight core constituent parts of the SEP that fulfill the major programmatic requirements, consisting of the following:

Rail

The Rail Program Element consists of the reconstructed tracks, platforms, and associated infrastructure in the area of the existing rail terminal. The existing rail terminal would be upgraded to meet future long-distance and commuter ridership requirements, operational criteria, and modern design standards (ADA and Life Safety requirements). It also includes considerations for any additional tracks and platforms that may be placed in other areas of WUS. The Rail Program Element is led by Amtrak and requires close coordination with the SEP project.

Bus Terminal

The Bus Program Element includes new parking/loading bays and platforms for intercity, tour, sightseeing, and charter buses, replacing the existing facilities at USPG. Its programmatic requirements are based on ridership projections that are being refined to meet future needs.

Train Hall

The Train Hall Program Element is a new public space of civic scale to improve the passenger experience at WUS. It will provide portions of the track, platform and concourse areas with daylight and space commensurate to the role of WUS as the National Capital Region's primary transportation hub.

Parking

The Parking Program Element provides parking capacity to meet the future demand for vehicular access to the different transportation modes at WUS. It will include public parking and rental vehicle parking.

Concourses

The Concourse Program Element provides the passenger circulation areas required to accommodate the future ridership and operational improvements. It would be composed of multiple areas that allow for access to and transfers between the transportation modes at or adjacent to WUS, such as Rail, Bus, Metro, Streetcar, Bike, Vehicles, as well as Taxi and Shared Ride.

Bike & Pedestrian Access

The Bike & Pedestrian Access Program Element outlines the need for increased access to and from the existing street context and the surrounding neighborhoods. The Bike & Pedestrian Access element is further described in the Appendix B, Supporting Urban Design and Open Space Information.

Taxi / Shared Ride

The Taxi Program Element specifies the need for improvement of the existing taxi and private car service drop-off, pick-up, and queuing amenities.

Historic Station

The Historic Station Program Element outlines the need for integration with the existing Historic Station, in conjunction with the requirements of the HPP.

OTHER SEP PROGRAMMATIC CONSIDERATIONS

The Other Programmatic Considerations are the supporting functions that allow for systematic viability to the SEP Program Elements.

Rail Support Function

The Rail Support Function element is comprised of the expansion of the existing Amtrak support spaces, which results from the improvement in Rail function and operation.

Service Access and Loading

The Service Access and Loading element allows for expansion and relocation of the truck-access and loading area, to account for the expanded WUS.

Support Systems

The Support Systems element specifies the SEP building engineering systems, such as adequate mechanical, electrical, plumbing and fire protection, as well as utilities and other infrastructure. Support Systems element is further described in the Appendix D, Supporting Station Infrastructure Information.

ADJACENT ELEMENTS

Adjacent Elements are areas, infrastructure, or buildings immediately outside of the project boundary that require close coordination with the SEP. Adjacent Elements are described in Sections 1.3 and 1.4 of this report.

It is important to note that the Adjacent Elements are not within the scope or control of the SEP. However, due to the proximity and immediate relationship that these Adjacent Elements share with SEP, their programmatic requirements need to be considered within the planning for SEP and are therefore reflected in the diagram below. (Figure 2)

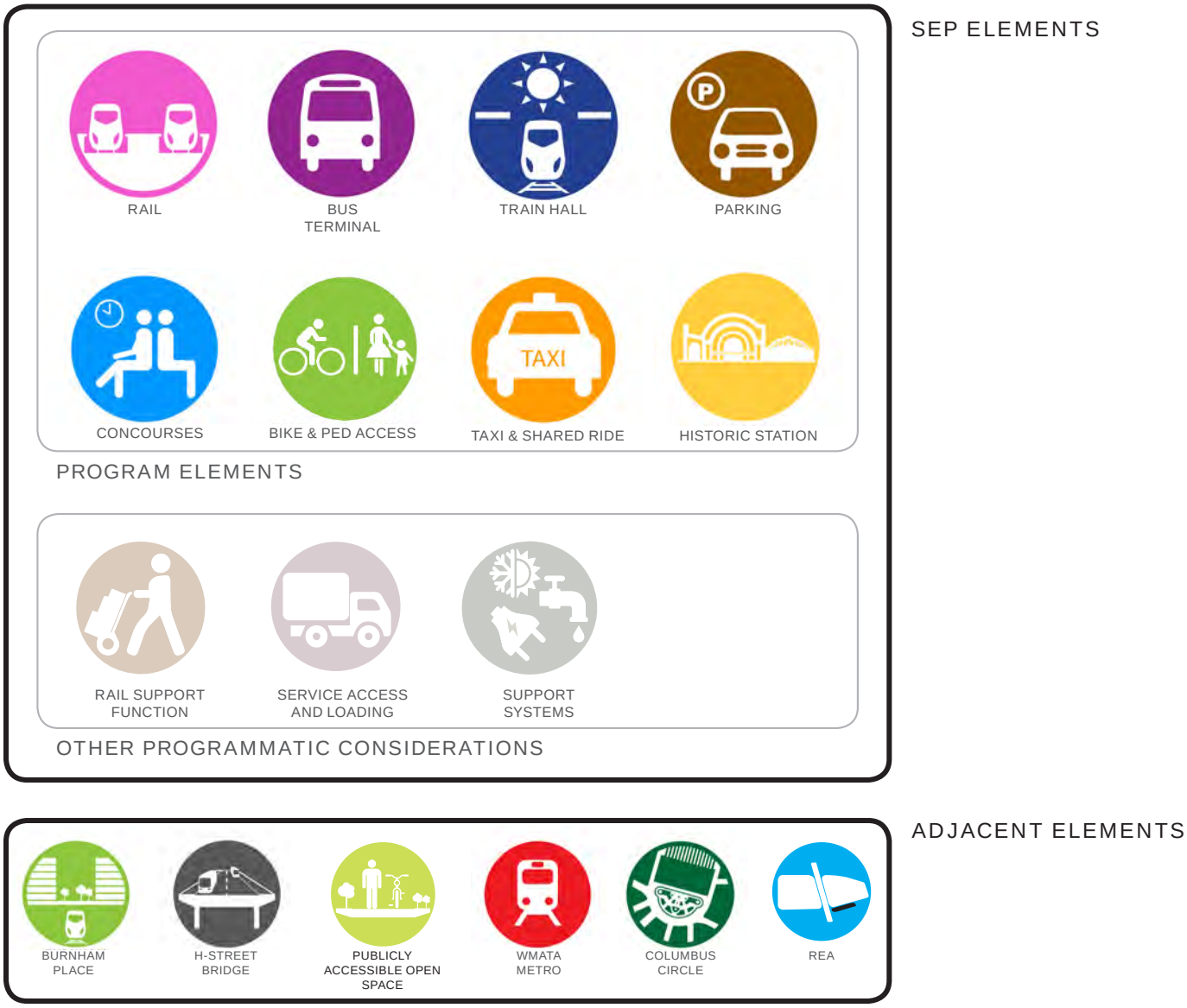


Figure 2. Program Organization

PRINCIPLES AND FEASIBILITY

Figure 3. Washington Union Station looking east

Figure 4. Washington Union Station looking south

The Program Elements were determined in conjunction with the preparation of the Purpose and Need Statement. While the ultimate composition of the program continues to be refined, the detailed basis for the space program reflects the technical and operational parameters that allows the existing station, the transportation based components (including Rail Passenger and Multimodal Transportation functions), the expanded station facilities, and the associated open spaces and streetscapes to function and be experienced as a coherent place.

• Based on information provided by the key operators and facilities managers, the program reflects the current understanding of the operations in the existing WUS and proposed operations as envisioned by the Project Proponents in coordination with the NECF Tier 1 EIS.

• Workshops and technical meetings with the Project Proponents and key stakeholders are being conducted to further understand programmatic and operational needs to define the Space Program.

• Extensive planning exercises assisted in the establishment of a hierarchy of program planning principles appropriate to usage type. As the design processes, adjacency diagrams will be prepared and tested via blocking and stacking diagrams.

• Based on current ridership data from the pertinent transportation agencies, the initial pedestrian flow parameters informs concourse and circulation spatial requirements, test entry and exit strategies, as well as intermodal connectivity and pedestrian movement generally, taking into particular consideration peak movements when these spaces are most stressed.

• The market research and the retail analysis and meetings with Ashkenazy Acquisition Corporation (USI) informed the development of guidance to determine the appropriate retail and tenant mix and parameters for their successful location within the development. USI is the current retail leaseholder for the historic station. The leasehold over retail in the new concourses is not yet appointed.

• The private developer, Akridge, provided a preliminary program that was consistent with the air rights zoning. This preliminary program provided a baseline understanding of the intended level of development.

• Existing building walk-throughs and meetings with operators provided additional information regarding the secondary and support related program. The requirements for back-of-house areas need to be refined and planned to address service requirements, loading docks, trash, recycling, food service and storage, general storerooms, commissary areas, and a VIP secured entrance. Security requirements, both systems and operations related are critical and will also be used in the development of this study. Additionally, the TI team will provide back of house (BOH) planning requirements for Amtrak managed areas, for reference in the overall Station Framework program.

3.2 Programming Requirements

PROGRAM ELEMENTS: RAIL

Figure 5. Bijlmer station, Amsterdam

Figure 6. Reading Station, Reading

Tracks and Platforms

The track area of WUS currently includes 23 operational tracks, numbered Tracks 7 to 30 (Track 21 does not exist). Twenty tracks are used for revenue service, while three are used for storage and pooling. The track area is divided into two levels, the west side Stub End tracks (the Upper Level), and the east side Run-Through tracks (the Lower Level). The Upper Level contains 14 stub end tracks with two low-level platforms and five high-level platforms used for revenue service. Low-level platforms are currently eight (8) inches above-top-of-rail (ATR) and will be 15 inches ATR in the future condition. High-level platforms are 48 inches ATR in both current and future conditions. The Upper Level tracks (Tracks 7-20) and platforms are served by MARC, Amtrak Acela Express, Amtrak Northeast Regional trains, Vermonter, and Capitol Limited, which terminate at WUS. The Upper Level tracks connect to three rail lines to the north; the NEC to the northeast; the CSX Capital Subdivision to the north (used by MARC Camden Line trains), and the CSX Metropolitan Subdivision to the west (used by MARC Brunswick Line trains).

The Lower Level has nine (9) tracks, of which only six (6) are for revenue service. The Lower Level (Tracks 23-28) are used by Amtrak Regionaltrains, Amtrak Long Distance trains (Crescent, Cardinal, Palmetto, Silver Star, and Silver Meteor), MARC, and VRE. Tracks 22 and 29 are through tracks without usable platform faces used by trains to travel through the station without loading/unloading passengers; Tracks 23 to 28 are used in revenue service to load and unload passengers, and Track 30 is a Stub End storage track is used for midday storage and to switch locomotives. The Lower Level Run-Through tracks connect to the First Street Tunnel (south of WUS) and to the three rail lines to the north of WUS.

Certain activities at WUS consume time and terminal capacity that would otherwise be used for revenue train service. Due to a lack of storage yard capacity outside the terminal limits, MARC trains are stored on the Upper and Lower Level tracks during the midday.

On the Lower Level, Amtrak Run-Through trains require long dwell times to accommodate the need to change locomotives (from diesel to electric and vice versa), for passenger boarding and alighting, and to re-stock food and beverage cars. All of these activities occur on the station platforms and tracks resulting in dwell times of up to 24 minutes per Amtrak Long Distance and Regional train. These long dwell times consume platform capacity that may have otherwise been used for revenue train operations.

Amtrak is required by FRA to provide level boarding at WUS. Amtrak trains currently operate from high-level platforms. VRE trains, on the other hand, can only operate from low level platforms with on-board wheelchair lifts to meet ADA requirements. The two different systems therefore constrain the sharing of tracks by Amtrak and VRE. Amtrak can still operate from low-level platforms, if necessary, though doing so poses challenges for meeting ADA requirements.

In developing the Track Options, Amtrak began by developing a Basis of Design document that outlines the criteria necessary for developing the various concepts. As Amtrak developed the Track Options they considered a number of key criteria including:

- Terminal Capacity
  - Number of revenue tracks, track centers, platform width, platform length and passenger egress
- Concourse Compatibility
  - Expansion and improvement of concourses, access to and

from platforms and daylighting opportunities
- Interlocking Characteristics
  - The design of or any modifications to A, K, and C Interlocking to provide for simultaneous parallel moves, turnout size, addition of Track 43
- Operational Characteristics
  - Redundancy, limiting portal modification, pooling track, engine switching capability

In addition to the criteria, a key constraint that limited the potential solutions was that the Right of Way (ROW) of the terminal was held between 625.5 to 630 feet. It was not assumed that any additional ROW was available for the terminal width, other than the REA building parking lot. The terminal is constrained both to the east (by Second Street, NE and adjacent development) and the west (by First Street, NE, Metrorail, and adjacent development). At least four (4) tracks must have 1200' platforms for future Acela HSR service for future growth. Ultimately two options were identified for the track and platform layout.

The resulting track and platform layout options have been prepared by the TI project, in close coordination with SEP. Those options allow for the following:

- 19 Revenue Tracks:
  - 12 Stub End tracks on upper level and seven (7) Run-Through Tracks on lower level
  - consideration for one (1) additional Stub End track on lower level
- 30' Wide Platforms

Note that the TI options are still under development by Amtrak. Amtrak is currently exploring adding an east side Stub End track for engine storage/pooling. Please refer to the TI studies for more information.

Figures 5 and 6 are examples of track and platform design that conforms to modern design standards.

Ridership Projections

As part of the planning for the SEP, future ridership projections have been developed for several transportation modes at WUS that will drive the future program. These include:
- Amtrak
- Maryland Area Regional Commuter (MARC)
- Virginia Railway Express (VRE)
- Intercity, Tour and Local Buses

The number of trains on a weekday in the WUS for current and future operations are shown in Table 1.

Amtrak

Amtrak currently supports over 16,000 passengers daily and 162 train movements. Amtrak has developed Operating Plans for 2030+. These plans provide an increased level of train service. The chart below summarizes the increase in train movements for both the 2020 and 2030+ Operating Plans.

In addition to increased train service, the NECF Plan has been developed by FRA and provides additional detail on the anticipated number of passengers that will board and alight at WUS by 2040. The chart below provides a summary of the anticipated future ridership. Ridership projections for WUS are based on the NECF Preferred Alternative. These numbers have also been adjusted to include the additional trips that are not captured in the NECF Study area.

Amtrak current and projected future riderships are shown in Table 2.

MARC

MARC has recently completed its Growth and Investment Plan – Update 2013 to 2050. It proposes to increase peak and off-peak service, provide limited and express train service, and provide late evening and weekend service. Specific near-term (from 2013 to 2019) and long-term (from 2020 to 2029) proposals by line include:
- Penn Line: Introduce weekend service between Baltimore and Washington, D.C. (near-term). Expand peak and reverse peak hours, operate more frequent off-peak service with 30 minute headways, and run semi express trains (long-term).
- Camden Line: Lengthen existing trains to accommodate more riders, add two additional round-trips and a turn back service between Washington, D.C. and Dorsey (near-term). Provide additional peak and reverse peak train service (long-term).
- Brunswick Line: Utilize longer trains to accommodate more riders (near-term). Add reverse peak service, limited and express train service, and an additional round-trip between Brunswick and Washington (long term).

Similar to the Amtrak Services the NECF provides additional detail on the number of MARC passengers that are anticipated to board and alight at Washington Union Station by 2040.

MARC current and projected future riderships numbers are shown in Table 3.

VRE

The Virginia Railway Express System Plan 2040 Study seeks to expand service for current VRE riders and serve emerging ridership markets. VRE's ridership growth since starting revenue service has been driven primarily by strong residential growth in the Virginia communities along or near the VRE commuter lines, and employment growth in the central core area from Alexandria to Washington, D.C. Journey-to-work trips in the VRE region have increased over the years and VRE's ridership has grown

in tandem. Similar market driving growth is forecast to continue through 2040, with a projected increase to the VRE-oriented market by 40 to 60 percent. The rapid residential growth is projected in the areas using the outer Fredericksburg line stations (the counties of Spotsylvania, King, George, and Stafford, and the City of Fredericksburg) which generate approximately 60 percent of the line's current riders. The areas around the middle stations (the counties of Prince William, Fauquier, and Loudon, and the cities of Manassas and Manassas Park) on both lines are anticipated to have less growth, particularly after 2025 as these areas become more fully developed. In the inner station areas (Fairfax County and the City of Falls Church), which are already relatively developed, growth is forecast to be the slowest. Through planned system capital investments and new railroad agreements, VRE plans to increase its weekday peak period trains, introduce reverse peak service, and expand off-peak service. These improvements will not only increase ridership on the VRE system, but will increase the number of VRE passengers using WUS.

Similar to the Amtrak Services the NECF provides additional detail on the number of MARC passengers that are anticipated to board and alight at WUS by 2040. VRE current and projected future ridership numbers are shown in Table 4.

Table 1. WUS - Total Weekday Train Movements by Railroad

RAILROAD / SERVICE	EXISTING (2014) OPERATION PLAN	2020 PROPOSED OPERATING PLAN	PERCENT DIFFERENCE VS EXISTING OPERATING PLAN	2030 PROPOSED OPERATING PLAN	PERCENT DIFFERENCE VS EXISTING OPERATING PLAN
Acela	32	60	+88%	90	+181%
Amtrak Long Distance	28	28	0%	28	0%
Amtrak Regional	54	58	7%	84	+56%
MARC	92	114	+24%	122	+33%
VRE	32	34	+6%	38	+19%
Total	**238**	**294**	**+24%**	**362**	**+52%**

Source: Amtrak July 2016. Existing (2014), 2020, and 2030 Operating Plans.

Table 2. WUS - Amtrak Ridership

AMTRAK RIDERSHIP PROJECTION	CURRENT RIDERSHIP (2015)	PROJECTED 2040 RIDERSHIP	PERCENT DIFFERENCE VS EXISTING RIDERSHIP
Annual Ridership (one-way trips)	4,971,128	9,694,067	+95%
Daily Ridership (one-way trips)	16,395	31,968	+95%

Source: FRA NEC Future and Amtrak.

Table 3. WUS - MARC

	CURRENT RIDERSHIP (2012)	PROJECTED 2040 RIDERSHIP	PERCENT DIFFERENCE VS EXISTING RIDERSHIP
Daily Ridership (one-way trips)	28,142	70,670	+151%

Source: FRA NEC Future and MARC.

Table 4. WUS - VRE

	CURRENT RIDERSHIP (2012)	PROJECTED 2040 RIDERSHIP	PERCENT DIFFERENCE VS EXISTING RIDERSHIP
Daily Ridership (one-way trips)	3,882	20,070	+417%

Source: FRA NEC Future and VRE.

PROGRAM ELEMENTS: BUS TERMINAL

Figure 7. Stroke-on-Trent Bus Terminal

Figure 8. Denver Union Station Bus Concourse

The program for the Bus Terminal is based on the existing usage of the facility and increasing the number of spaces based on growth factors outlined in the NECF Ridership projections, and Metropolitan Washington Council of Governments (MWCOG) study, and historical increases in visitors to Washington, D.C. These numbers have been refined based on data collection provided by USPG, site visits, and discussions with the bus companies. See Table 5 for a summary of current and future capacity needs. The methodology for estimating these needs is provided as Appendix H.

The 47 spaces represent the current peak program to which the programmatic concepts for the bus layouts conform, to varying extents based on the option for their location on site.

Figures 7 and 8 are examples of Bus Terminal designs that provide passenger amenities adequate for the required bus capacity.

Intercity Buses

In November 2011, intercity bus service moved into the WUS USPG, following an agreement earlier that year by the U.S. Department of Transportation (USDOT), USRC, DDOT, and bus operators, to shift the intercity bus hub to WUS. The Bus Terminal contains 61 bus slips, 30 are permanently reserved (by intercity, tour, and shuttle providers), four are available for pick ups and drop offs, and 18 are available for hourly and daily use and rental. The D.C. Circulator operates from five (5) slips and there are also designated stops for two local tourist bus operators. There are a handful of unmarked slips in the Bus Terminal for temporary loading and unloading and are used primarily by tourist buses. In addition, the USPG currently serves oversized vehicles such as vans and Recreational Vehicles (RVs).

While there are 61 slips in the facility, actual conditions indicate that 35 active slips and 12 layover slips are presently needed to accommodate the variety of uses in the Bus Terminal. In order to maximize the effectiveness of the Terminal and to balance the limited space available in the project site, layover uses will not be accommodated in the future Bus Terminal.

Intercity buses presently make use of 19 active slips for their operations. The NECF studied future intercity bus demand along the Northeast Corridor. NECF estimated 19 percent growth in ridership by 2040. Table 6 provides a summary of the anticipated future ridership. Based on that future ridership, an estimated 25 active slips will be needed to accommodate intercity bus demand. The primary concern with passenger growth is the ability to handle passenger flows and queuing within the Bus Terminal. Given current challenges, such increases will substantially decrease the comfort and safety of passengers, likely leading to failing pedestrian level of service conditions during peak periods.

In addition to pedestrian concerns, the current Bus Terminal is limited in its ability to handle all types of intercity buses. Megabus normally operates double-deck buses (currently 13 feet 2 inches tall) and is limited in the bays it can use because of the extra height of the vehicles. Megabus may transition its fleet to vehicles up to 13 feet 6 inches in height. There are discussions in the motorcoach industry to shift to a new chassis, similar to those in use in Europe today. These are 49.2 feet (15 meters) in length, longer than the current standard of 45 feet and would be constrained within the existing facility. Further refinement is needed to assess how the new facility would accommodate these larger vehicles.

The current Bus Terminal layout provides the most potential bus spaces within the existing floor space available. While the layout offers 61 bus slips, their layout in the Terminal creates a number of conflicts with pedestrians moving from the Station to the bus pick-up locations, requiring staff to direct traffic and pedestrians across these drive aisles. In addition, there is limited space for bus riders to stand and wait to get on the buses. These areas are generally marked by painted stripes on the pavement or by temporary pedestrian barriers, instead of curbs.

In addition, where feasible Bus Terminals such as WUS would

include saw-tooth spaces that allow for buses to pull up to the space then move forward to exit the space. The other style bus spaces are angled pull-in and back-out spaces that require a staff person to direct the bus as it backs into the drive aisle. Saw-tooth are safer and reduce staffing needs, but require more space to operate while the pull-in and back-out spaces allow for more buses to occupy the same amount of space.

Charter, Tour, and Sightseeing Buses

Tour, charter, and daily sightseeing buses currently use 10 active and seven (7) layover spaces in the terminal. A key factor in determining the future requirements for charter, tour, and sightseeing buses is the growth in visitors to Washington, D.C. MWCOG prepared a Regional Bus Staging, Layover, and Parking Location Study in March 2015. This study provides estimates in growth of parking needs for tour/charter buses in the Washington, D.C. region through 2025. This study indicates that there are 755 existing spaces for tour/charter buses in the region and estimates that by 2025 there will be a need for 1060. This is a 305 space, or 40 percent increase.

Another basis for estimating future charter/tour bus requirements is the annual Washington, D.C. visitor statistics. Over the last 10 years, Washington, D.C. has seen both increases and decreases in visitors on an annual basis due to economic changes, but overall the number of visitors has increased. Destination DC maintains an annual survey of visitation to Washington, D.C. Over the last 10 years there has been over a 30-percent increase in the number of visitors to Washington, D.C. Destination DC predicts that the number of visitors will continue to grow at 2-3 percent annually for the next 25 years, which would equate to a 160% total increase over that time period. For the purposes of this analysis, these two projections were averaged, resulting in a predicted growth in charter, tour, and sightseeing bus demand of 50 percent. See Table 7. Based on that projection, an estimated 18 active slips will be needed for tour, charter, and sightseeing uses.

The bus demand projections data described here provides a basis for estimating the bus programming requirements for the SEP.

Table 5. WUS - Bus Terminal

BUS TYPE	ACTIVE NO*	LAYOVER NO	2040 GROWTH FACTOR**	ACTIVE SPACES	ADDITIONAL SPACES FOR OPERATIONAL FLEXIBILITY	TOTAL
Intercity	19	0	+19%	23	2	25
DC Circulator	4	1		4	0	4
Shuttle***	2	0		0	0	0
Evacuation Shuttle	0	4		0	0	0
Charter/Tour	8	7	+50%	12	2	14
Sightseeing	2	0	+50%	3	1	4
Total	**35**	**12**		**42**	**5**	**47**

* Current active number is based on data provide by USPG May 31, 2016 and site visits by VHB.

** Growth factor per ridership projections

*** Shuttles not included in future program requirements for WUS

Table 6. WUS - Intercity Bus

	CURRENT RIDERSHIP (2012)	PROJECTED 2040 RIDERSHIP	PERCENT DIFFERENCE VS EXISTING RIDERSHIP
Annual Ridership (one-way trips)	1,856,000	2,215,000	+19%

Source: FRA NEC Future.

Table 7. WUS - Annual Tour / Charter Parking

	CURRENT PARKING (2010)	PROJECTED 2025 PARKING	PERCENT DIFFERENCE VS EXISTING RIDERSHIP
Annual Parking	755	1,133	+50%

Source: MWCOG and Destination DC.

PROGRAM ELEMENTS: TRAIN HALL

Figure 9. Bijlmer Station, Amsterdam

Figure 10. Southern Cross Station, Melbourne

Figure 11. Rotterdam Central Station, Rotterdam

Figure 12. Union Station Historic Concourse

When considering the factors that contribute to a positive passenger experience in a busy and high energy station environment, certain qualitative elements must be given due consideration in the development of a design to elevate the quality of the experience from the ordinary. Transitory spaces are complex and require functional efficiency at a minimum. However factors such as the civic nature and quality of the of the space, as well as enhanced daylighting, promote good wayfinding and engender a sense of placemaking that befits this prominent location in the nation's capital and best serves the public.

A compelling Train Hall can transform a station into a place worth visiting, that creates a sense of arrival and provides commuters but local users alike with a reason to return on repeated occasions for its intermodality as well as civic spaces and amenities.

Figures 9 to 12 are examples of high quality civic spaces within active station environments.

Design Drivers and Considerations:

Spatial Quality and Daylighting:

- The spatial volumes must be well proportioned, appropriate for their use and feasible to maintain
- Maximize and control the amount of natural daylight in the station as well as to carefully consider the artificial lighting

Wayfinding:

- The spatial design should allow clear sight-lines and views between principal destinations and promote passenger wayfinding

National Capital Character and Placemaking:

- The cultural status of the existing WUS justifies a distinctive, landmark design that would foster a distinctive identity
- Consideration for the impact beyond the immediate boundary of the SEP and a significant consideration for place-making which influences the local economy, its cultural identity and environmental sustainability.

PROGRAM ELEMENTS: PARKING

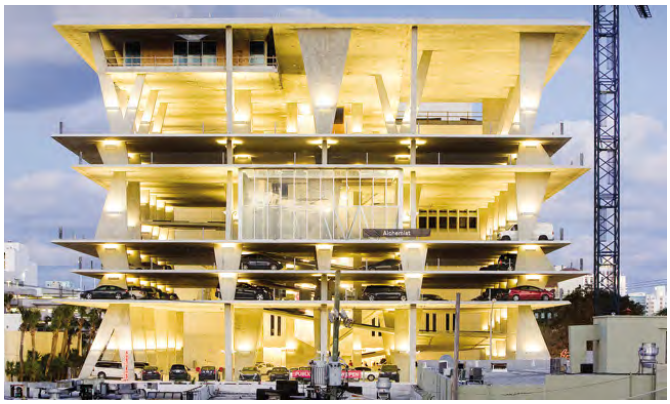


Figure 13. 111 Lincoln Road, Miami

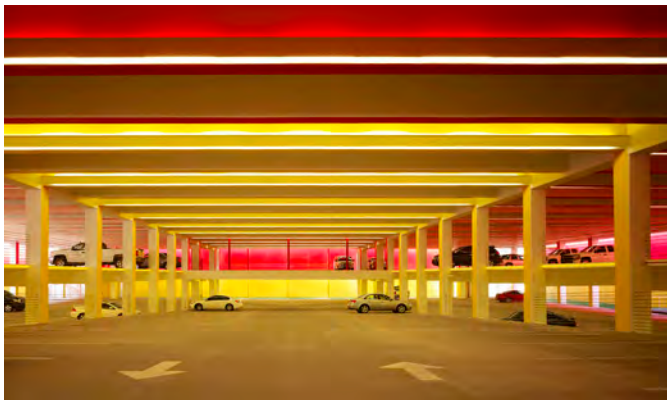


Figure 14. Car Park One, Oklahoma City

Figure 15. The Cathy Car Park, Singapore

Figure 16. Glamouröses Parkhaus , Seoul

The USPG currently contains 2205 spaces available for use by the public. Of those, one floor (536) is reserved for monthly parkers who lease spaces. Car sharing services Zipcar and Enterprise Carshare make use of spaces on the leased floor. USPG provided data on occupancy for the past year, with the peak observed occupancy regularly reach 90-95% of capacity. The peak was mid-week in the spring when 2,078 spaces were marked as occupied. Excluding the leased spaces (as these are generally always considered occupied in the USPG data), transient (daily) parking demand peaks at 1,542 spaces. In addition there are approximately 140 rental car spaces today in the USPG. Present conditions in those 140 spaces are very constrained, with operators having to employ stack parking to accommodate all of their vehicles.

To estimate the future parking demand, two approaches were employed. One approach is to analyze the USPG provided data that includes a daily count for the garage for 2015. The parking usage fluctuates throughout the year and during each week. The calculations were based on the 40 busiest days of the year and averaged the usage across those days. For cars that remain in the garage over one day, those spaces were multiplied by the total number of days and averaged across the 40 days.

All vehicles that are in the garage for more than one day are assumed to be using the Amtrak or intercity services. Cars that are in the garage less than 5 five hours are assumed to be either accessing the site for other services at WUS or to go to nearby offices, retail or other uses. It was estimated that approximately 1,178 vehicles are in the garage each day using Amtrak or intercity bus services. These spaces were increased by 95 percent, which is the projected growth calculation for Amtrak. This total is reduced by 10% to estimate future shifts toward other modes. In addition, spaces are added for the retail and rental car facility, which is an important amenity to retain for Amtrak customers. This calculation then provides an estimate of future parking requirements.

A second approach to this estimate also includes using the projected future ridership based on an 8% mode split of rail passengers using vehicles to access the station. The 8% is based on Amtrak survey data. This analysis provides second calculation to consider future parking requirements.

Table 8 and Table 9 summarize the estimated totals for parking using these two methods.

In addition to the future public parking, there is a need for an estimated 260 future spaces leased to rental car companies. This also includes basic maintenance, a car wash and other support facilities which could be in a garage or in separate location as long as they are adjacent to the future rental car program.

Figures 13 to 16 are examples for suitable parking structures, which accommodate the parking space needed while providing a visually and spatially appealing environment.

Table 8. WUS - Parking Estimate Based on Current Usage

ESTIMATE BASED ON EXISTING PARKING		2040 GROWTH FACTOR	SUBTOTAL	MODAL CHANGE REDUCTION	TOTAL
Average Existing Long Term Parking for Station	1,178	1.95	2,297		
Retail Parking			400		
Subtotal			2,697	.90	2,427
Rental Car Parking					260
Total					**2,687**

Source: USPG, Gorove Slade, VHB analysis of 40 busiest parking days.

Table 9. WUS - Parking Estimate Based on Amtrak Survey Data

ESTIMATE BASED ON AMTRAK SURVEY DATA		2040 GROWTH FACTOR	SUBTOTAL	MODAL CHANGE REDUCTION	TOTAL
Daily Amtrak Ridership	16,394				
Riders Access via Vehicle	8%				
Total Spaces (divided by 2)	656			.	2,427
Average Length of Stay	1.87				260
Subtotal	1.226	1.95	2,391		2,687
Retail Parking			400		
Subtotal			2,791	0.9	2,512
Rental Car Parking					260
Total					**2,772**

Source: Amtrak, VHB analysis of USPG parking data.

PROGRAM ELEMENTS: CONCOURSES

Figure 17. King's Cross Station, London

Figure 18. Paddington Station, London

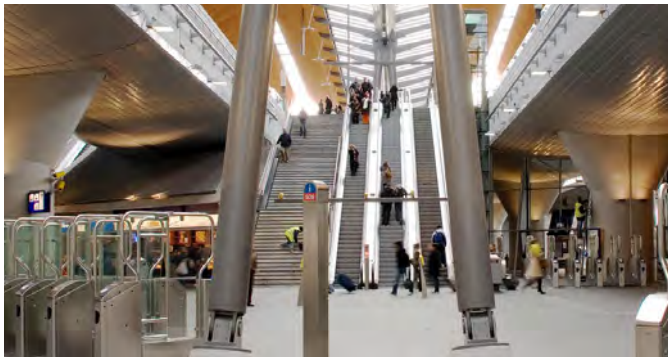


Figure 19. Bijlmer Station, Amsterdam

Figure 20. Rotterdam Centraal Station, Rotterdam

The concourse program requires adequate space planning in order to accommodate the projected ridership growth as well as the expanded station operations. The concourse program also requires spatial organization that can facilitate effective connections between multimodal transportation functions. In addition to the intermodal station functionality, the concourse program shall account for integration with the historic structure, accessibility to the adjacent neighborhoods, as well as retail and cultural programs therein. Finally, the concourse program shall provide a high quality spatial experience as a major public space.

The concourse program shall accommodate the adequate passenger circulation areas for SEP's different transportation modes. The passenger will transfer between Rail, Bus, Metro, Streetcar, Bike, as well as Taxi and Shared Ride. The existing Claytor Concourse north of the Historic Station currently functions as a connection hub between these transportation modes except the Streetcar element. The main level in the Claytor Concourse provides direct access to Rail, Metro, and the Historic Station to the south which provides access to Metro and existing Bike. The mezzanine level in the Claytor Concourse provides direct access to the existing Bus and Parking. As the existing Bus and Parking elements will be removed, the existing Claytor Concourse will be completely reconstructed into Concourse A.

The fully reconfigured transportation hub in the new Concourse A shall be taller and more expansive, to accommodate the expanded and enlarged SEP function. The new Concourse A would provide opportunities to better integrate the Historic Station. Reconstructing the existing Claytor Concourse as Concourse A is a separate near-term project.

The reconstructed TI would give the opportunities for improvement in rail access while accommodating the projected ridership growth. The improved access to Rail shall be provided by new public concourses below the new set of tracks and platforms where passengers access to and from the adjacent neighborhoods. The SEP proposes to provide new lower level concourses at H Street, First Street, and in the center of the project. This network of lower level concourses shall provide east-west connectivity between First Street and Second Street, vertical link to Streetcar on the H Street Bridge, and north-south connectivity between the H Street and Concourse A as well as the Historic Station.

The reconstructed TI would also give opportunities for improvement in station operation by meeting the current design and safety standards. Accordingly, the lower level concourses need to be planned to accommodate Amtrak operations and improved service access to the platforms above. The design team will coordinate with Amtrak for detailed space planning in the next phase of design.

The new network of concourses shall provide high quality spatial experience as a major civic space. The concourses shall provide distinct directionality and intuitive spatial organization to promote wayfinding. The introduction of ample daylighting as well as artificial lighting shall enhance the experience as the passengers and visitors move through. The strategic layout of retail and cultural elements shall augment the sense of arrival.

Figures 17 to 20 are examples of high quality concourse designs that provide connections with the efficiency and the grandeur in spatial experience as a major civic space.

PROGRAM ELEMENTS: BIKE & PEDESTRIAN ACCESS

Figure 21. SW Moody Avenue, Portland

Figure 22. Superkilen, Copenhagen

Pedestrian

A large portion of the people entering and exiting WUS are pedestrians. Currently they enter and exit from Columbus Circle and First Street with a small number from the H Street entrance and from the SEC pedestrian bridge. During the review of existing conditions and the scoping process, comments were made regarding the pedestrian crossing the drive lanes in front of WUS, confusion for pedestrians at the intersection of First Street and Massachusetts Avenue and pedestrians crossing First Street at various locations.

A key element of the future program is to improve these pedestrian connections and provide additional locations for pedestrians to access WUS. Improving these connections should include additional separation of the pedestrian space from the vehicular and bicycle lanes, improved signage, and use of materials to differentiate between these modes. New facilities should include these design features and be sized to meet the peak flows of passengers in and out of WUS.

Bicycle

Bicycle access to WUS continues to increase in parallel with the general growth across Washington, D.C. A number of new bike facilities have been implemented in recent years including the First Street cycle track and bike lanes on several adjacent streets. DDOT also has plans to extend a protected bike lane along Louisiana Avenue that would connect to the Pennsylvania Avenue bike lane. As a major multimodal hub, WUS is a key terminus for some of these routes. Currently, in addition to the bike lanes, there is a Capital Bikeshare station on the east side of WUS and both a bike rental facility and bike racks located on the west side.

Currently these bike facilities are highly used with few bikes available in the Capital Bikeshare station and the bike racks full. Bicycle ridership is anticipated to grow by 250 percent, at the same rate as train ridership growth. Therefore, additional bike racks and Capital Bikeshare station facilities will need to be added to the WUS. At this stage, it is recommended that these facilities should triple in size as the ridership expands and bike use increases. These facilities should be located in places beyond the front of WUS, including on the deck where drop-off areas are proposed as part of the planned WUS.

Figures 21 and 22 are examples of bike path design, which integrates with roadway system and sidewalks to bring lively atmosphere and urbane sensibility.

Pedestrian Flow

Pedestrian data was collected on Wednesday, April 6, 2016 from 6:30 AM to 9:00 AM, from 11:30 AM to 1:30 PM, and from 3:30 PM to 7:00 PM to determine the peak five-minute pedestrian utilization of several points within and surrounding WUS. Data were collected at 23 locations within WUS itself and at six crosswalk locations outside of WUS during a period when both local schools and Congress were in session.

These locations were examined to determine the pedestrian flow patterns during each overall observation period and in an effort to identify peak five-minute periods. The overall pedestrian activity for the AM observation period, midday observation period, and PM observation period are shown graphically below in Figures 6, 7, and 8, respectively. It should be noted that the pedestrian activity depicts the overall number of pedestrians counted for all locations and would include some “double-counting” given that individual pedestrians likely walked past multiple count locations as they traversed WUS. This notwithstanding, the overall pedestrian activity patterns bore out the following:

- The AM pedestrian activity patterns inside the Station show a clear ebb and flow pattern that likely follows train arrival

patterns with pedestrian activity inside WUS. varying greatly within 30-minute periods. The pedestrian activity exterior to WUS. reveals a gradual rise to approximately 8:40 AM, which would correspond to commuter flows.

- The midday pedestrian activity show a much more general upwards trend between 11:30 AM and 12:30 PM which begins to decline after approximately 1:15 PM, corresponding to pedestrians that may come to WUS to eat lunch at one of many restaurants. It should be noted, however, that some spikes in pedestrian activity do remain, likely attributable to train arrivals. Pedestrian activity outside of WUS was generally stable throughout the midday period.
- The PM pedestrian activity inside WUS showed a more identifiable peak in activity at approximately 5:15 PM with flows gradually increasing prior to this point and then decreasing afterward. Not as pronounced as in the AM and midday observation periods, but otherwise still present were smaller peaks likely associated with the arrival and departure of trains in WUS. As with the midday observation period, the pedestrian activity outside of the Station remained relatively stable throughout the PM observation period.

Based on the information tabulated and described above, the peak five-minute periods inside of WUS were generally determined to be from 8:40 AM to 8:45 AM, from 12:45 PM to 12:50 PM, and from 5:10 PM to 5:15 PM. The pedestrian count data inside WUS and exterior counts are summarized on in the figures on this page.

The count data shown on the figures note that the greatest concentration of pedestrians in the peak five-minute periods were noted in the northwestern quadrant of WUS where passengers can connect from trains serving WUS to Metrorail. Some additional peaks were noted on the escalator connecting WUS concourse with the bus garage level, primarily associated with charter bus and intercity bus passengers entering and exiting WUS (a smaller portion of this is due to USPG pedestrians).

Outside of WUS, a significant number of pedestrians were noted crossing the crosswalks on First Street on the west side of WUS near Columbus Circle. It should be noted that, due to the layout of the crosswalks across the northbound, southbound, and bike lanes ~~of~~ on First Street in relation to the adjacent Metrorail and WUS entrances, a number of pedestrians do not use the crosswalks and instead jaywalk in this area. Pedestrian counts noted previously include those pedestrians within the crosswalk and within approximately 20 feet of the crosswalk to account for crosswalk usage.

Based on these counts and further analysis of the data, the largest percentages of people entering and existing WUS are traveling between these major destinations shown in table 10.

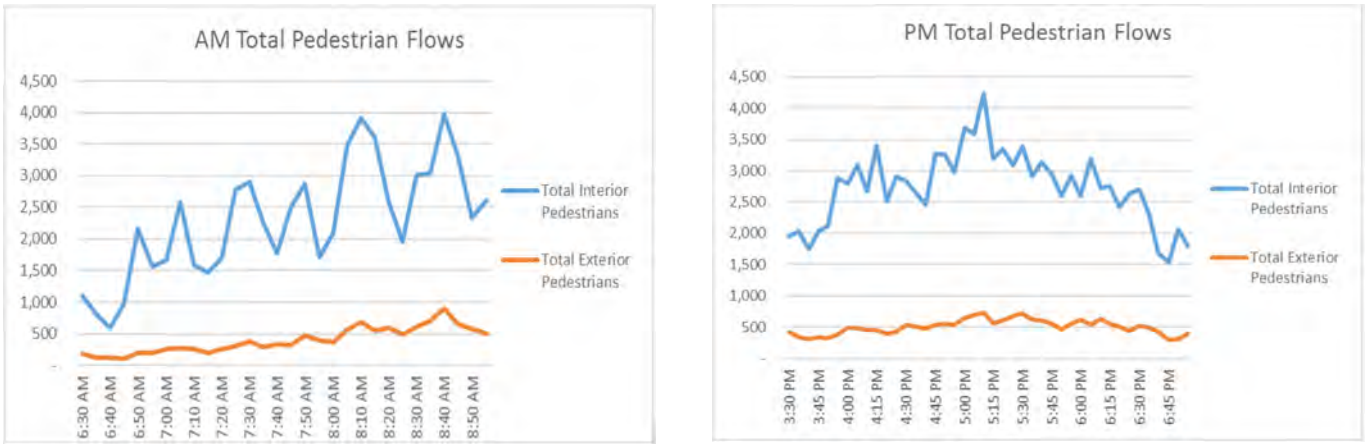


Figure 23. Pedestrian count data for morning and evening time periods

Table 10. WUS - Major Pedestrian Origin and Destinations

PEDESTRIAN ORIGIN AND DESTINATION	PERCENT
Metrorail and Amtrak/MARC/VRE	40%
Parking Garage and Amtrak/MARC/VRE	1%
Columbus Plaza and Amtrak/MARC/VRE	12%
1st Street and Amtrak/MARC/VRE	16%

Source: Gorove Slade, VHB

Figure 24. Paddington Station, London

Figure 25. Aberdeen Station, Scotland

Taxis play an important role at WUS, in particular for rail passengers. According to 2015 Amtrak survey data, 30 percent of arriving passengers depart the station via taxi or private car service and 20 percent arrive by taxi or private car, excluding those who connect to/from another Amtrak train. An unknown amount utilize ride sharing services, such as Uber and Lyft, to travel to and from WUS.

Taxi pick-up occurs in Columbus Circle, directly in front of the station. Passengers queue in the portico in front of the main Station doors. Taxis queue around the east side of WUS to the back, across and above the tracks. At peak times, the taxi queue extends north through the parking garage and spills on to H Street. The queue regularly extends for roughly one half mile, taking taxi drivers from 30 to 45 minutes to traverse. In addition to the lost time, the spillover onto H Street interferes with traffic operations on H Street, and blocks drivers attempting to enter the parking garage.

Based on observations, much of the congestion appears to be linked to the limited throughput of the current taxi stand. There is limited curb space along which to load passengers. In addition, the taxi lane is metered by the traffic light which controls both the taxis as well as the other loading/unloading lanes in front of the Station. Traffic volumes exceed the capacity of the approach, resulting in Level of Service (LOS) F during the morning peak. Vehicle queues exceed available storage in both the morning and afternoon peaks. Taxi drop-off occurs in the regular loading/unloading lane with private vehicles and other car services. In periods of high demand, taxis may load passengers in this lane, at the discretion of the taxi stand manager.

In addition to licensed taxis, the popularity of services such as Uber and Lyft has grown dramatically in the Washington, D.C. area. Their usage and impact on the Station is hard to track as users may not categorize them as “taxis/limousines” when responding to survey data. Moreover, they use the private vehicle loading/unloading lane at Columbus Circle. Interviews with customers and other patrons at WUS indicate that many will elect to drop-off/pick-up adjacent to WUS, but not in Columbus Circle, to avoid congestion there. These locations can include First and Second Streets NE and even one to two blocks from the station such as F Street, G Street, G Place and North Capitol Street.

Future demand for taxis and private cars is expected to remain closely tied to rail ridership arriving and departing the Station. In order to accommodate future taxi and private car service demand, WUS will require additional capacity. While it may be possible to accommodate future demand through improvements to the existing taxi stand, it is likely that one or more additional taxi stands will be required. Additional curbside areas would also need to be designated to prevent substantial congestion from ride sharing services, such as Uber and Lyft.

Figures 24 and 25 are examples of taxi queue and layout designs in a railway station that effectively serve as entrance to the station for both vehicles and passengers.

PROGRAM ELEMENTS: HISTORIC STATION

Figure 26. Historic Station


Figure 27. Historic Station

Integration between the Historic Station and the SEP is essential. Any work in and around the Historic Station requires coordination with the HPP. The existing ticketing, baggage handling, customer service, information desk, and lost and found in the Historic passenger concourse, in particular, would be updated. In order to meet the project wayfinding criteria as well as to respond to technical advances in passenger handling, these components may be reconfigured as part of the SEP. Other parts of historic structure such as the main hall and the retail in the passenger concourse are not currently part of the programmatic considerations for the SEP.

OTHER PROGRAMMATIC CONSIDERATIONS: RAIL SUPPORT FUNCTION

The Amtrak space requirement summary (provided by Amtrak) specifies programmatic functions for the 2023 Phase 2 and the 2030 Phase 3 growth plans. The given areas are multiplied by a 1.3 factor to convert the net square footage (NSF) into gross square footage (GSF) areas.

The program requirements area summarized as the following:

- Passenger / Station Services
- Club Acela
- Commissary
- Police
- Engineering
- Mechanical
- Train and engine (T&E) and on board service (OBS) crew base

The GSF for the 2023 phase 2 is estimated at 190,400, while Phase 3 requires 290,700 GSF. On site available spaces for use include the Bus Terminal level and First Street level. The REA building is potentially available as an off-site space, which includes two levels below and three levels above grade, for a total of 100,000 GSF.

OTHER PROGRAMMATIC CONSIDERATIONS: SERVICE ACCESS & LOADING

Existing station service access and loading operations are located and performed at the food court lower level on the east and west sides of the existing WUS, the former coming from First Street and the latter from the H Street Bridge through a service road by Station Place. The existing loading docks provide combined service for the WUS retail and the tracks. The new loading program proposes to provide a screening facility, a consolidated loading dock, and a distribution network of goods and services to the SEP retail and rail functions. This facility is proposed to be located off site, with service access carefully planned around the urban context and traffic planning. Preliminary planning and coordination found that utilization of the REA lot was untenable due to Threat and Vulnerability Risk Assessment (TVRA) requirements and Amtrak functions.

OTHER PROGRAMMATIC CONSIDERATIONS: SUPPORT SYSTEMS

As noted in the previous section, the Support Systems requirements may be found in Appendix D, Supporting Station Infrastructure (Fire, MEP, and Structural) Information.

4 Concept Development Process

4: Concept Development Process

This Section 4.0 describes the Concept development process. In Section 4.1, the report outlines the methodology and materials presented to date. Next in Section 4.2, the report further describes the underlying design principles and the resulting Design Evaluation Criteria. Then in Section 4.3, the report provides a review of the step-by-step process to establish the current range of Concepts based on the key design principles. Finally, in Section 4.4, the report highlights the main features of each of the Concepts proposed by USRC and Amtrak.

4.1 Overview of Process and Methodology

Based on the programing requirements described in the previous chapter, a wide set of options for each individual Program Element was initially identified. These “Program Element Options” were presented and discussed at the early Partners Workshops. Following on a review against the design and programming criteria, the Partners were able to sift and reduce the options for each Program Element. With this narrower set of options, plausible combinations of different Program Elements were tested to better understand the reasonable range of concepts suitable for further discussion and study. These combinations of different Program Element Options were presented at the later Partners Workshops to elicit USRC and Amtrak feedback.

Over the course of the Concept development process, Design Evaluation Criteria were established based upon the Design Goals and Objectives. The Design Evaluation Criteria prioritized features of the Design Goals and Objectives, in response to the feedback from stakeholders’ meetings and Partners Workshops. Key Drivers were then identified from the Design Evaluation Criteria to reduce the number of combinations of different Program Element Options to only those that best met the design Goals and Objectives.

The Design Evaluation Criteria were used to initially help determine the combinations of different Program Elements. Later in the process, the Design Evaluation Criteria were used to prioritize the Concepts to carry forward. The team then evaluated the combinations of different Program Elements against those identified as the Key Drivers. As a result, only a selected number of Programming Options were carried forward as the proposed Range of Concepts.

In order to provide a better sense of the characteristics of the proposed range of Concepts, this report also includes full reviews of the proposed range of options relative to all the Design Evaluation Criteria, as demonstrated in Section 5.

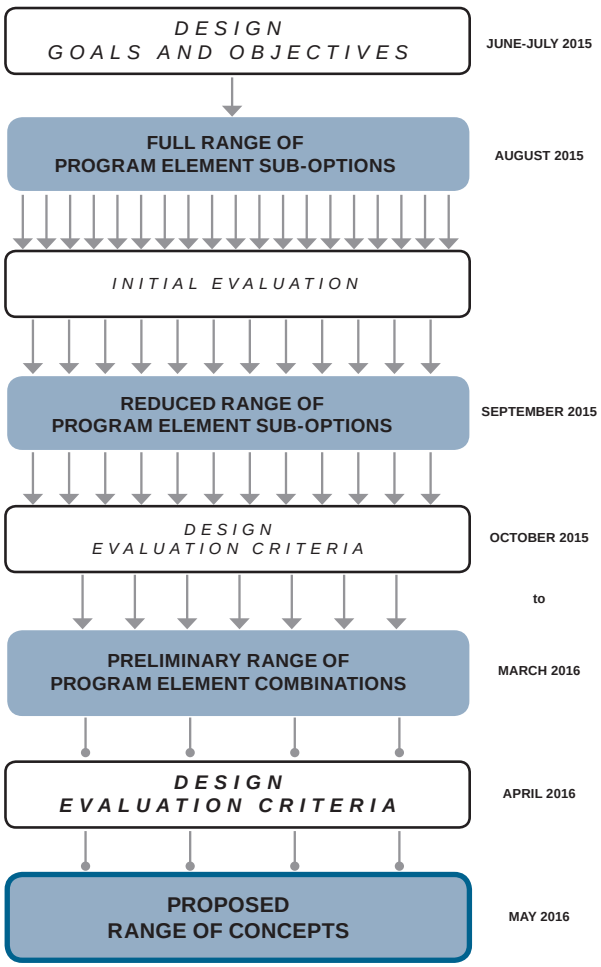


Figure 28. Overview of Concept Development Process

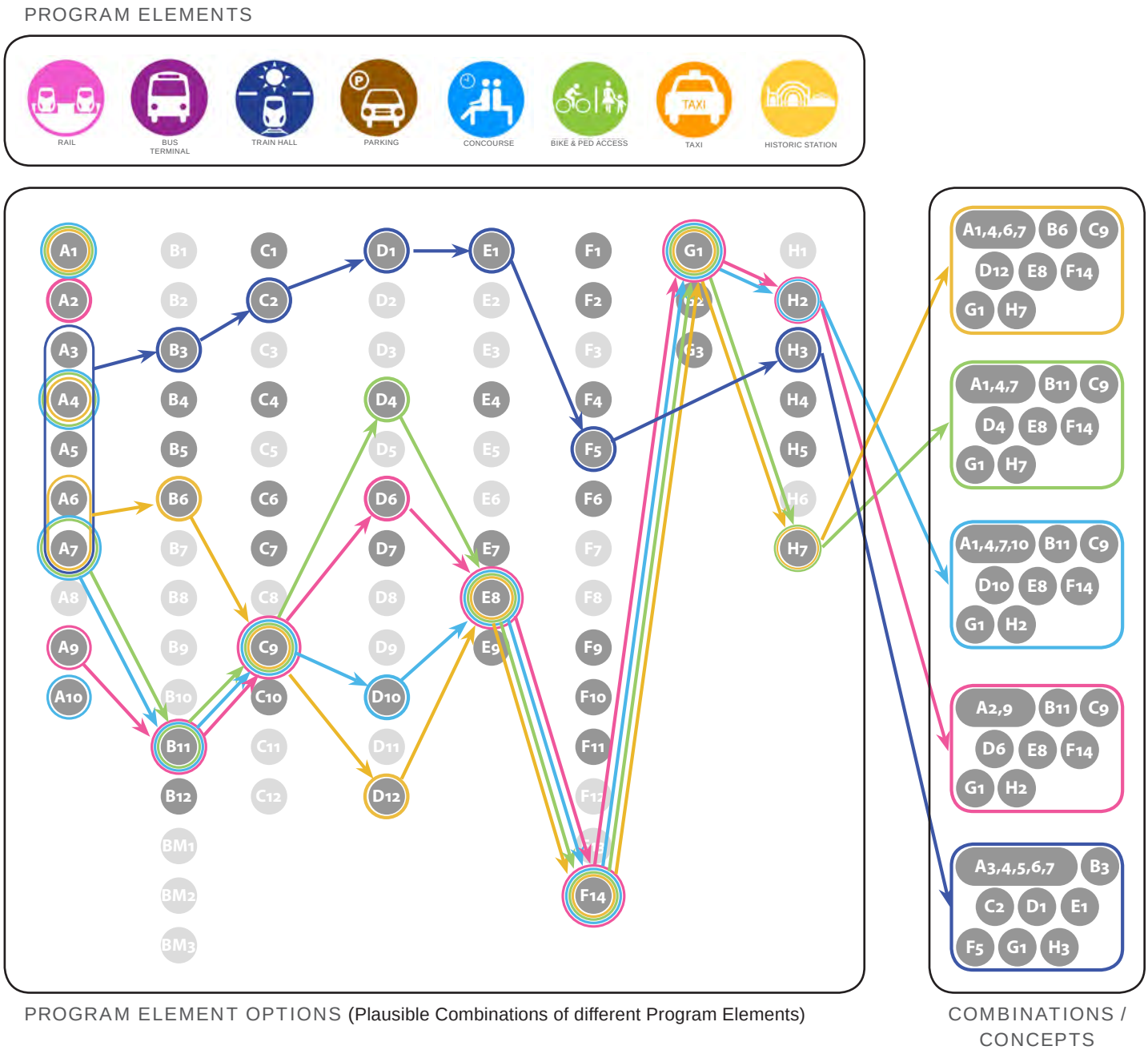


Figure 29. Program Element Combination Process

4.2 Design Evaluation Criteria

The Design Evaluation Criteria established during the Partners Workshops were developed to ensure that any decision making process is consistent and trackable. An overview of the Design Evaluation Criteria is illustrated below (Figure 30).

The Design Evaluation Criteria were established based upon the Design Goals and Objectives, described in Section 2. The Design Goals and Objectives reflected the design team and the Partners' shared vision for the success of the SEP, and were also reflected in the SEP Purpose and Need, as described in the Section 1.2

The Design Evaluation Criteria are organized into four major categories: Transportation, Experience, Urban Context, and Feasibility.

Within the Evaluation Criteria two categories were established: Key Drivers and Considerations. The Key Drivers and Considerations are both pre-requisites for meeting the project Design Goals and Objectives, but the Key Drivers function as initial selective criteria for reducing the number of combinations of different Program Element Options.

The discussion of issues related to the Safety and Security criteria is provided under separate cover as part of the TVRA Report.

Feasibility Items (below in gray) will be provided by the Partners.

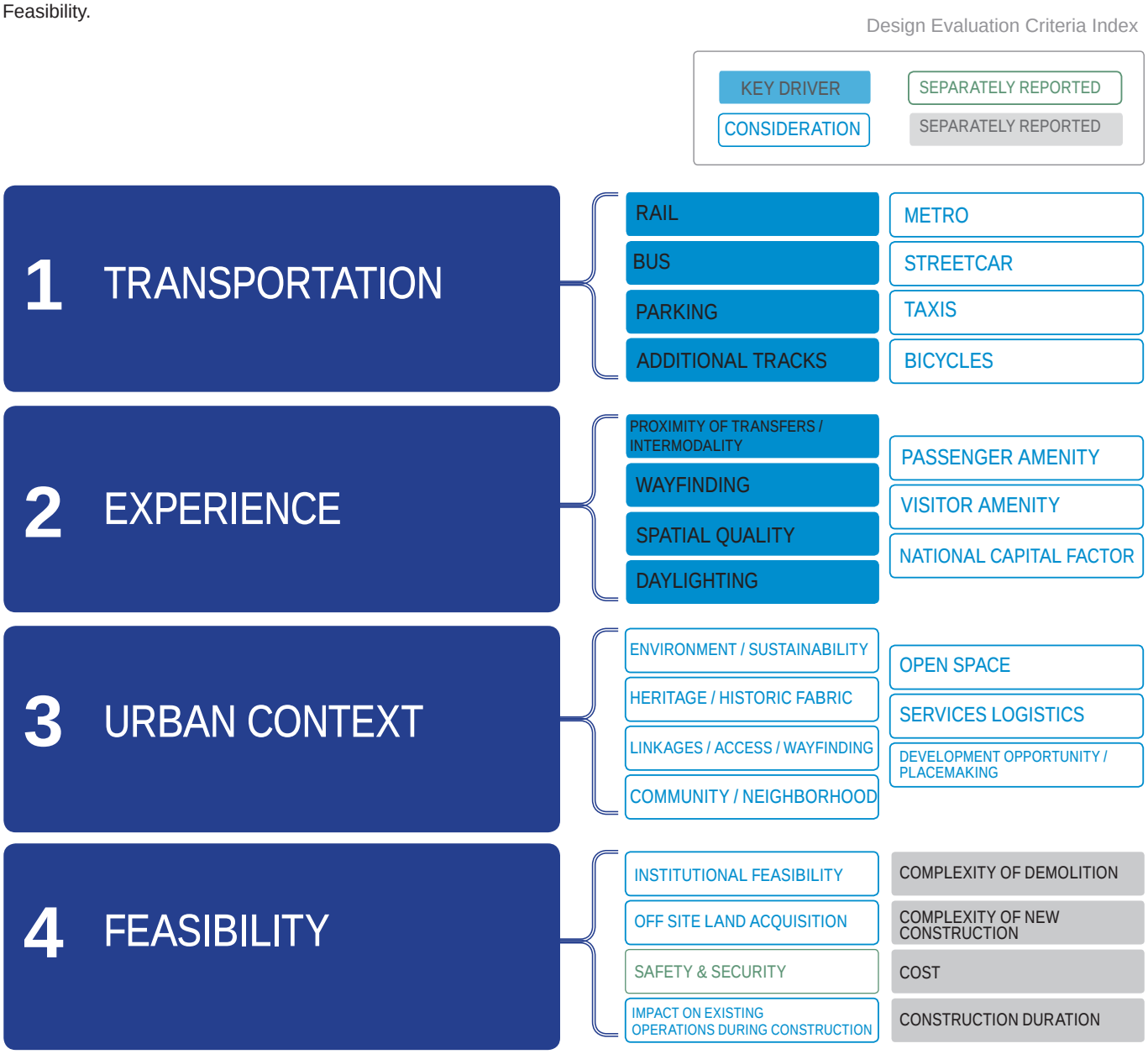


Figure 30. Design Evaluation Criteria

TRANSPORTATION

The Transportation criteria (Figure 31) are based on “Rail Operation” and “Intermodal Travel” in the Design Goals and Objectives. The Transportation criteria include Rail, Bus, Public Parking, Additional Tracks, Metro, Streetcar, Taxis, and Bicycles.

Based on SEP’s critical role as a major regional multimodal transportation hub, the Key Drivers among those criteria are Rail, Bus, Public Parking, and long range consideration for rail growth such as additional tracks. The rest of the criteria are Considerations. Metro, streetcar, parking, and bicycles are all considered important. Due to their smaller scale and/or contingency to the major programming moves, they do not drive the first set of decisions. The Transportation criteria help define the extents of the operational and intermodality requirements to which the options are evaluated in terms of compatibility subject to the hierarchy of Key Drivers and Considerations.

Key Drivers

Rail: Fulfill the requirements for improving rail operation and for compliance with modern Amtrak engineering and design standards (ADA and Life Safety). The rail criterion is one, if not the most critical, for any option to be considered.

Bus: Meet the bus operational parameters.

Parking: Optimize reintegration of the station parking program.

Additional Tracks: Allow for the potential addition of more tracks below-grade.

Considerations

Metro: Improve connections to the existing metro station.

Streetcar: Plan for transfer to the future streetcar alignment.

Taxi & Shared Ride: Incorporate pick-up and drop-off locations around the perimeter of the site.

Bicycles: Include access for bicycles and bicycles parking.

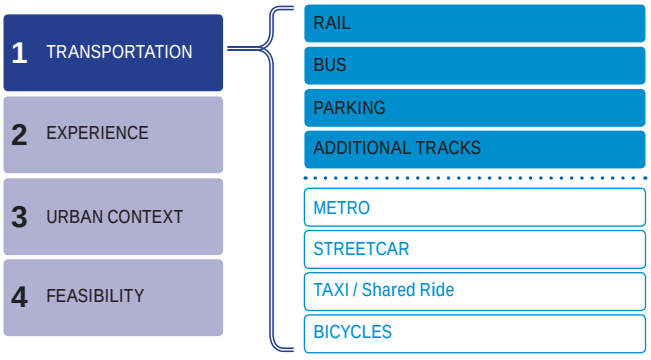


Figure 31. The Transportation Criteria

EXPERIENCE

The Experience criteria (Figure 32) are based on “Positive Customer Experience” and “Intermodal Travel” in the Design Goals and Objectives. The Experience criteria include Proximity of Transfers / Intermodality, Wayfinding, Spatial Quality, Daylighting, Passenger Amenity, Visitor Amenity, National Capital Factor (or level of quality relative to its location and importance).

As all options provide Passenger Amenity, Visitor Amenity, and National Capital Factor, these criteria belong under Considerations. As Proximity of Transfers / Intermodality, Wayfinding, Spatial Quality, and Daylighting differ between Program Element Options, these criteria belong under Key Drivers for reducing the number of options.

Key Drivers

Proximity of Transfers / Intermodality: Integrate various transportation modes listed in the Transportation criteria by providing better access and adjacency.

Wayfinding: Promote intuitive wayfinding and provide clear sight-lines and views between principal destinations.

Spatial Quality: Provide well proportioned and appropriate spatial volumes to enhance passenger experience.

Daylighting: Maximize the amount of natural daylight and control artificial lighting to provide well-lit space.

Considerations

Passenger Amenity: Provide adequate passenger amenity space.

Visitor Amenity: Provide adequate visitor amenity space.

National Capital Factor: Provide a distinctive identity and civic spaces commensurate to the location in Washington, D.C.

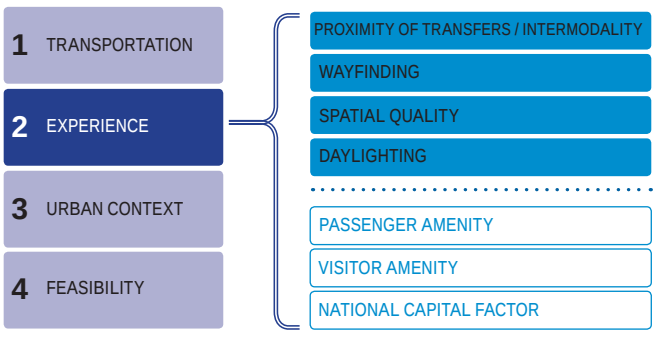


Figure 32. The Experience Criteria

URBAN CONTEXT

The Urban Context criteria (Figure 33) are based on “Integration with Context” and “Continued Preservation” in the Design Goals and Objectives. The Urban Context criteria include Environment / Sustainability, Heritage / Historic Fabric, Linkages / Access / Wayfinding, Community / Neighborhood, Open Space, Services Logistics, Development Opportunity - Placemaking.

Although all Urban Context criteria are important items, they are considered by all options, and therefore, belong under Considerations. Appendix B, Supporting Urban Design and Open Space Information, describes in more detail the way in which these criteria were used to inform the concept design process.

Considerations

Environment / Sustainability: Minimize negative environmental impact and promote sustainable design and operation.

Heritage / Historic Fabric: Integrate with the Historic Station.

Linkages / Access / Wayfinding: Allow for seamless access into WUS and provide multiple entrances from the surrounding neighborhoods.

Community / Neighborhood: Provide positive impact to the culture and the economy of the existing neighborhoods.

Open Space: Provide adequate open space for public use.

Services Logistics: Coordinate truck and service access with the traffic of the surrounding area.

Development Opportunity - Placemaking: Consider the BP development above the rail yard.

FEASIBILITY

The Feasibility criteria (Figure 34) are based on “Economic Viability” in the Design Goals and Objectives. The Feasibility criteria include Institutional Feasibility, Off-site Land Acquisition, Safety & Security, Impact on Existing Operation During Construction, Complexity of Demolition, Complexity of New Construction, Cost, Construction Duration.

Information for Institutional Feasibility, Off-site Land Acquisition, and Impact on Existing Operation During Construction will be developed further by the Partners. Safety and Security issues are reviewed in a separate TVRA study.

Considerations

Institutional Feasibility: Ensure concepts can be implemented within the jurisdictional parameters for the agencies responsible for project review.

Off-site Land Acquisition: Extent to which options require additional property outside of the project limits.

Impact on Existing Operations During Construction: Minimize changes to existing levels of service during project implementation.

Separately Reported

The Safety & Security is addressed separately in the TVRA Report.

Complexity of Demolition, Complexity of New Construction, Cost, and Construction Duration would require further study, to be conducted independently following the preparation of this report. This information will be provided separately by Amtrak.

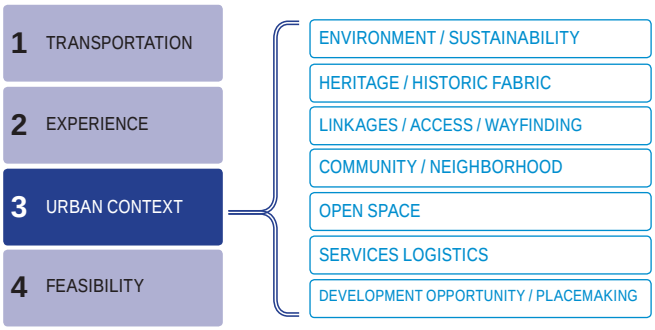


Figure 33. The Urban Context Criteria

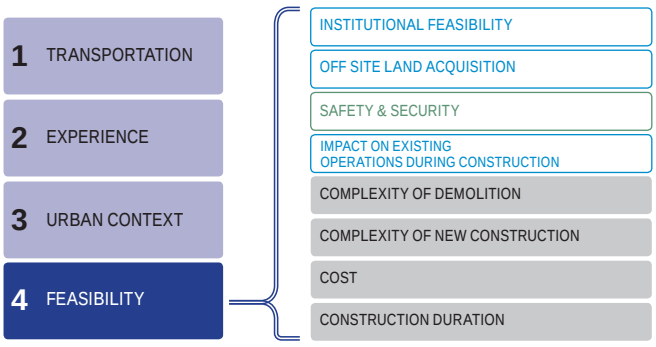


Figure 34. The Feasibility Criteria

4.3 Summary of the Preliminary Range of Concepts

This section provides an overview of the step-by-step process used to establish the proposed range of Concepts, based on the design principles.

Using a systematic decision making process, the Partners were able to generate proposed preliminary range of Concepts that could measurably fulfill the parameters set forth for the project. A total of eighteen (18) Concepts were developed by the end of the process, as represented in the final two Partners Workshops (See Section 4.4 for a full description).

By focusing on the Key Drivers of the Evaluation Criteria, numerous initial options were sifted down to a reasonable range. The high-level framework for the remaining Concepts is as follows:

A set of findings common to all Concepts:

- Full reconstruction of the tracks and platforms as described by the TI project.
- Full reconstruction of Bus Terminal and Union Station Parking Garage (USPG)
- Addition of a new Train Hall
- Full replacement of the existing Claytor Concourse with Concourse A
- A lower concourse level (under the reconstructed tracks and platforms) including H Street Concourse, First Street Concourse, and Central Concourse
- New access Points on First street, Second Street, and potentially from the crest of H Street Bridge.

A set of findings that vary across the options:

- Parking above tracks or below tracks
- Additional rail capacity (Additional below grade tracks, ABGT*)

In organizing the range of Concepts, the design team devised a set of flowchart diagrams for each major programming decision. As shown in the Appendix A, Supporting Technical Backup Information, the flowchart diagrams effectively document and communicate the systematic processes of analysis and collective decision making.

The ABGT is no longer being considered as a project element. Please refer to the Executive Summary for a description of the current status of the ABGT options.

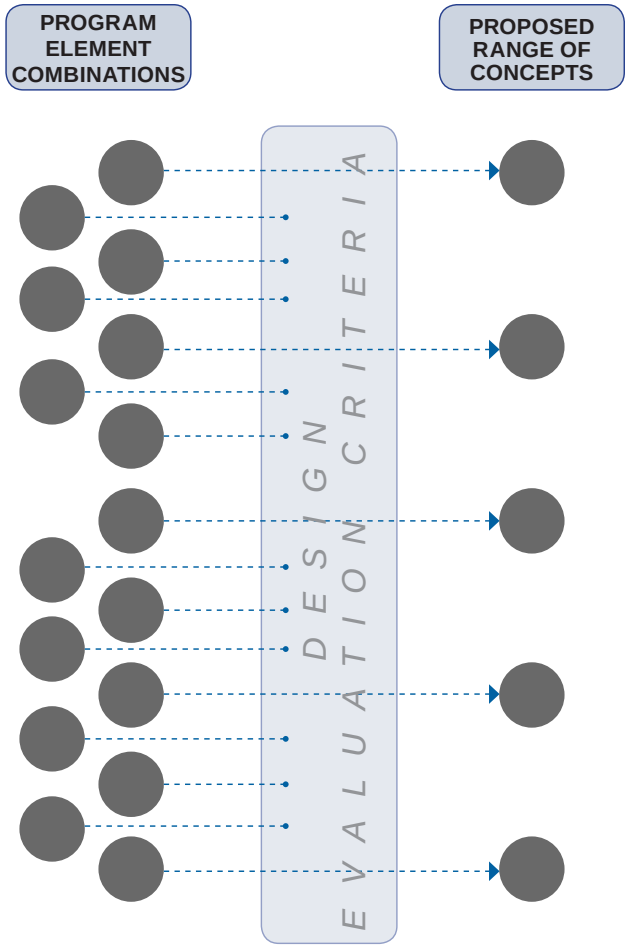


Figure 35. Process Steps to Establish the Range of Concepts

RAIL

Rail is the principal Key Driver. All options include full reconstruction of the tracks and platforms for accommodation of future rail-operational needs. Based on the premise of full reconstruction, Amtrak conducted a thorough study of the rail arrangements, from which the preferred TI Options 14 and 16 are currently being considered for their operational feasibility. The details of the track and platform plans and relevant studies both by Amtrak and the design team are further described in the next section of this report.

BUS TERMINAL AND TRAIN HALL PLACEMENT

Based on the Bus Terminal and Train Hall as Key Drivers, the options are reduced into five (5) categories:

1. *Bus on the South above the East-West Train Hall integrated with Concourse A*
2. *Bus on the South-West with a North-South Train Hall to the South of H street*
3. *Bus on the South-East with a North-South Train Hall to the South of H street*
4. *Bus on the North of H-street with a North-South Train Hall to the South of H street*
5. *Bus on the North of H street with an East-West integrated Train Hall with Concourse A*

As a consequence of rebuilding the tracks and platforms, the review to date has implied recommendation that the existing USPG structure would be removed. The result is that all five categories allow for the full reconstruction of Bus Terminal as a premise to meet future bus operational needs including operations of Intercity, Local/Shuttle, and Tour/Sightseeing/Charter buses. The options vary by the placement of Bus Terminal and the number of bus parking provided. The categories also take into account the potential separation of the Bus Terminal to allow for layover operation in an adjacent lot near the SEP. This requires additional traffic study for correct assessment. At any rate, all options allow the Tour/Sightseeing/Charter buses to be located contiguous to the historic Union Station to enable the passengers' easy access to the historic destination. The details regarding the Bus Terminal planning based upon operations and logistics are described in the next chapter in this report.

All five categories posit the Train Hall above the newly constructed rail yard to enrich the passenger experience, promoted by enhanced spatial quality and a significant amount of daylight. The two scenarios under consideration for the Train Hall layout are: an east-west arrangement, which integrates with the larger Concourse A; and the north-south arrangement, located directly above the center tracks. The first scenario offers visual and physical access between the vertically stacked functional spaces creating a significant new space between the historic and new areas of the project; whereas the latter brings daylight into a limited zone in the middle of the tracks and platforms. The design team conducted supplementary studies of the Train Hall as described in the next chapter in this report.

The five categories are distinguished from each other based on the placement of the Bus program and the Train Hall, as shown in the diagrams below. (Figure 36)

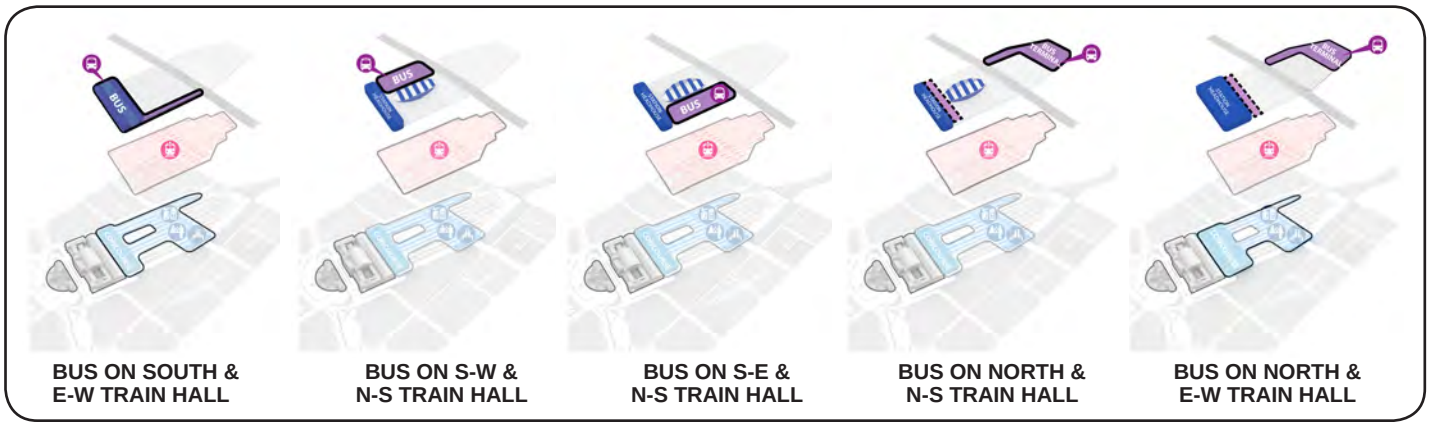


Figure 36. The Range of Concepts with Rail, Bus, and Train Hall Considered

Bus on the South above the East-West Train Hall integrated with Concourse A

The Bus Terminal would be on top of the reconstructed Claytor Concourse, i.e. the new Concourse A. The east-west oriented Train Hall would be integrated with both the Bus Terminal and Concourse A, to allow for atria, civic space, and daylight. Concourse A would be significantly enlarged and expanded in north-south and vertically, compared to the existing Claytor Concourse. It would become a concentrated intermodal passenger area, where passengers from rails, buses, and WMATA are consolidated yet clearly separated for easy circulation by multiple vertical circulation points. Concourse A would be contiguous to the historic Union Station, drawing the visitors for a sequence of spatial experiences, starting from Columbus Circle to the historic station to Concourse A. The access point from the First Street entrance directly leads to the larger passenger concourse area. This option thus provides potential for development of Concourse A as an entirely new place, where multiple transit programming elements are stacked. By consolidating the multiple transit functions into one designated area, this option lessens the issues of coordination caused by multimodal transit facilities in the potential BP development area. Furthermore, this option provides an uninterrupted spaces above the rail yard for potential BP development. With the mix of retail, food service, and cultural destination, the new Concourse A would provide amenities, goods, and services to commuters and visitors alike.

Bus on the South-West with a North-South Train Hall to the South of H Street

The Bus Terminal would be on the south-west corner above the rail yard with the north-south oriented Train Hall directly above the center tracks between Concourse A and H Street. The Bus Terminal would provide direct access to Concourse A through the interstitial mezzanine floor between the tracks and the Bus Terminal that would accommodate passenger amenities, including waiting area and potential retail. However, due to the site geometry and other planning constraints, the option would have diminished bus capacity. The north-south Train Hall located between the south of H Street and Concourse A would bring daylight into some of the platform areas. In addition to the daylight, the center platforms gain visual access to the area of potential BP development above tracks. The Train Hall could also provide a link to the street car stop on H Street.

Bus on the South-East with a North-South Train Hall to the South of H Street

The Bus Terminal would be on the south-east corner above the rail yard with the north-south oriented Train Hall directly above the center tracks between Concourse A and H Street. This option shares its aspects with the *Bus on the South-West with a North-South Train Hall to the South of H Street* option described above, regarding the passengers' access between the Bus Terminal and the WUS as well as the Train Hall placement. This option would provide more bus parking spaces than the Bus on south-west corner option due to the larger boundary, defined by the eastern half of the H Street Bridge and the WUS.

Bus on the North of H Street with a North-South Train Hall to the South of H Street

The Bus Terminal would be on the northern side above the rail yard and the tour and charter bus drop-off area would be at the north of Concourse A. The Bus Terminal on the north would provide direct access to lower concourses through the interstitial mezzanine floor between the tracks and the Bus Terminal or through development areas above deck. Both access points would potentially accommodate passenger amenities, including waiting area and retail. The drop-off area on the north of Concourse A would provide direct access to Concourse A. The north-south oriented train hall would be above some of the center tracks between Concourse A and the H-street. Contrary to the bus on the southern side options, this option separates the multimodal functions into two distinct zones, one on the southern end and the other on the northern end. The lower level H Street concourse would provide a link between these zones, as would the BP development. This option carries through the benefits offered by the presence of the designated Train Hall.

Bus on the North of H Street with an East-West integrated Train Hall with Concourse A

The Bus Terminal would be at the northern side above the rail yard and the tour and charter bus drop-off area would be at the north of Concourse A . The east-west oriented Train Hall would be integrated with the concourse A. Concourse A would be significantly enlarged and expanded in north-south and vertically, compared to the existing Claytor Concourse. This option provides the new larger Concourse A intended solely for station functionality and amenities, and thus differs from *the Bus on the South above the East-West Train Hall Integrated with the Concourse A* option, which integrates the Bus Terminal into the Concourse A. Concourse A contiguous to the historic WUS offers the visitor a sequence of spatial experiences, starting from Columbus Circle to the historic station to Concourse A . The access point from the First Street entrance directly leads to the larger passenger concourse area. This option provides potential for development of Concourse A as a placemaking opportunity. With the mix of retail, food service, and cultural destination, Concourse A provides amenities, goods, and services to commuters and visitors alike. By locating the Bus Terminal to the northern-end of the project boundary, this option also takes the advantages of the uninterrupted space above the rail yard for potential BP development between the two transit facilities. By separating transit modes into two end zones on both sides of the project boundary, this option also lessens the issues of coordination caused by multimodal transit facilities in the potential development area.

PARKING ABOVE OR BELOW-GRADE

Another significant consequence of removing the existing USPG structure to allow for the full reconstruction of the tracks and platforms is that the SEP also considers the replacement of the parking program on site. The parking program can be placed either above or below-grade. Below-grade parking can be paired with any of the Bus/Train Hall combinations. Above grade parking works with the majority of the Bus/Train Hall combinations - though it has significant impacts on the potential scale of any North-South Train Hall. However, placing it above the Bus on South option would undermine the daylighting and public space features of the East-West Train Hall. It would also create too much building bulk next to the WUS. It should be noted that parking above the South-West and South-East Bus options present similar massing challenges. This major variable significantly increases the range of Concepts. As a result, the range of Concepts increases to nine (9) (Figure 37):

PARKING ONLY BELOW TRACK (1 TOTAL)

- *Bus on the South above the East-West Train Hall integrated with Concourse A*

PARKING EITHER ABOVE OR BELOW TRACKS (8 TOTAL)

- *Bus on the South-West with a North-South Train Hall to the South of H Street*
- *Bus on the South-East with a North-South Train Hall to the South of H Street*
- *Bus on the North of H Street with a North-South Train Hall to the South of H Street*
- *Bus on the North of H-street with an East-West integrated Train Hall with Concourse A*

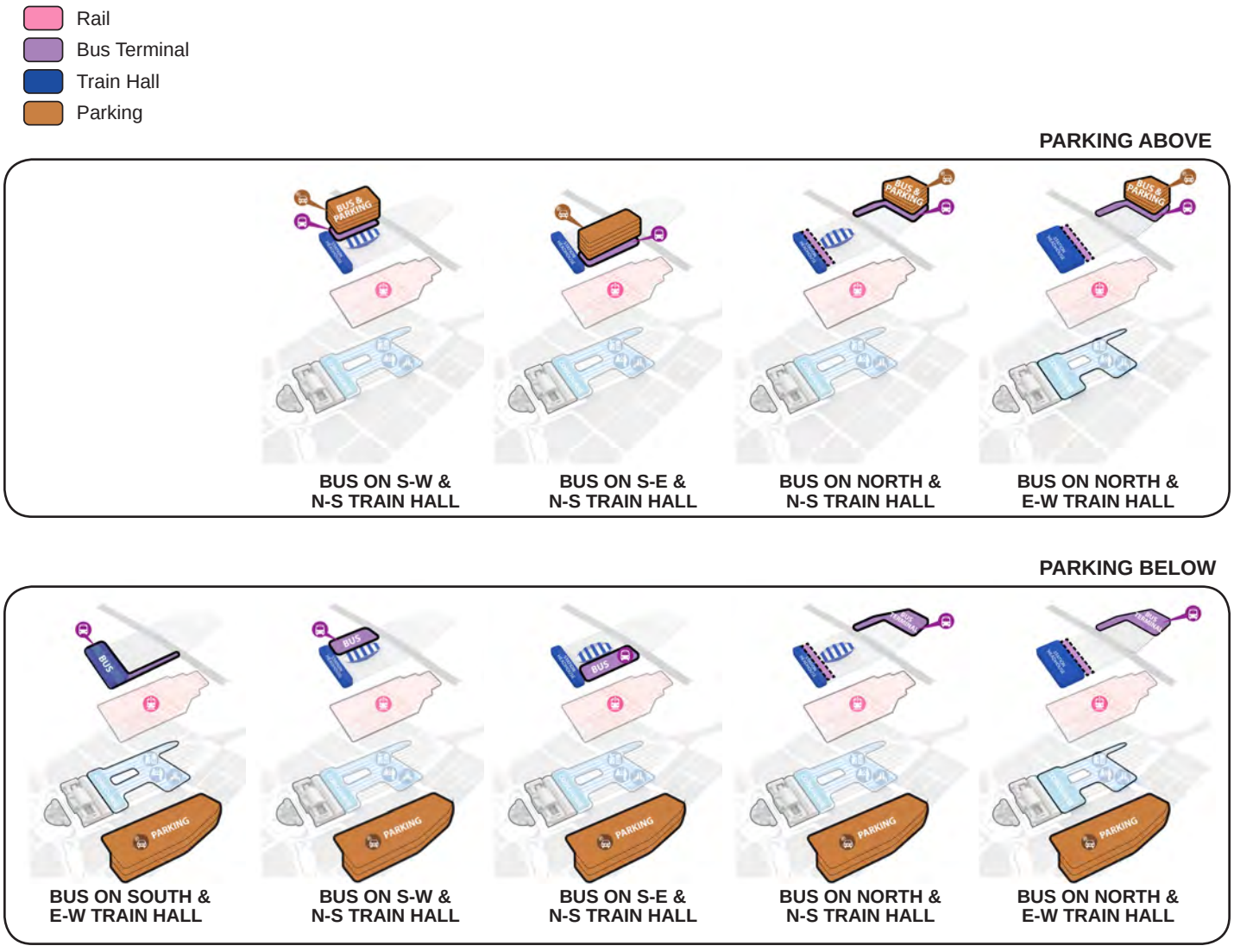


Figure 37. The Range of Concepts with Parking Considered

ADDITIONAL BELOW-GRADE TRACKS*

The ABGT is no longer being considered as a project element. Please refer to the Executive Summary for a description of the current status of the ABGT options.

Based on the more limited accuracy of ridership projections in the long range, the SEP explored options for adding or not precluding additional tracks and platforms below-grade. As a result, the final range of Concepts doubles to eighteen (18) options (Figure 38).

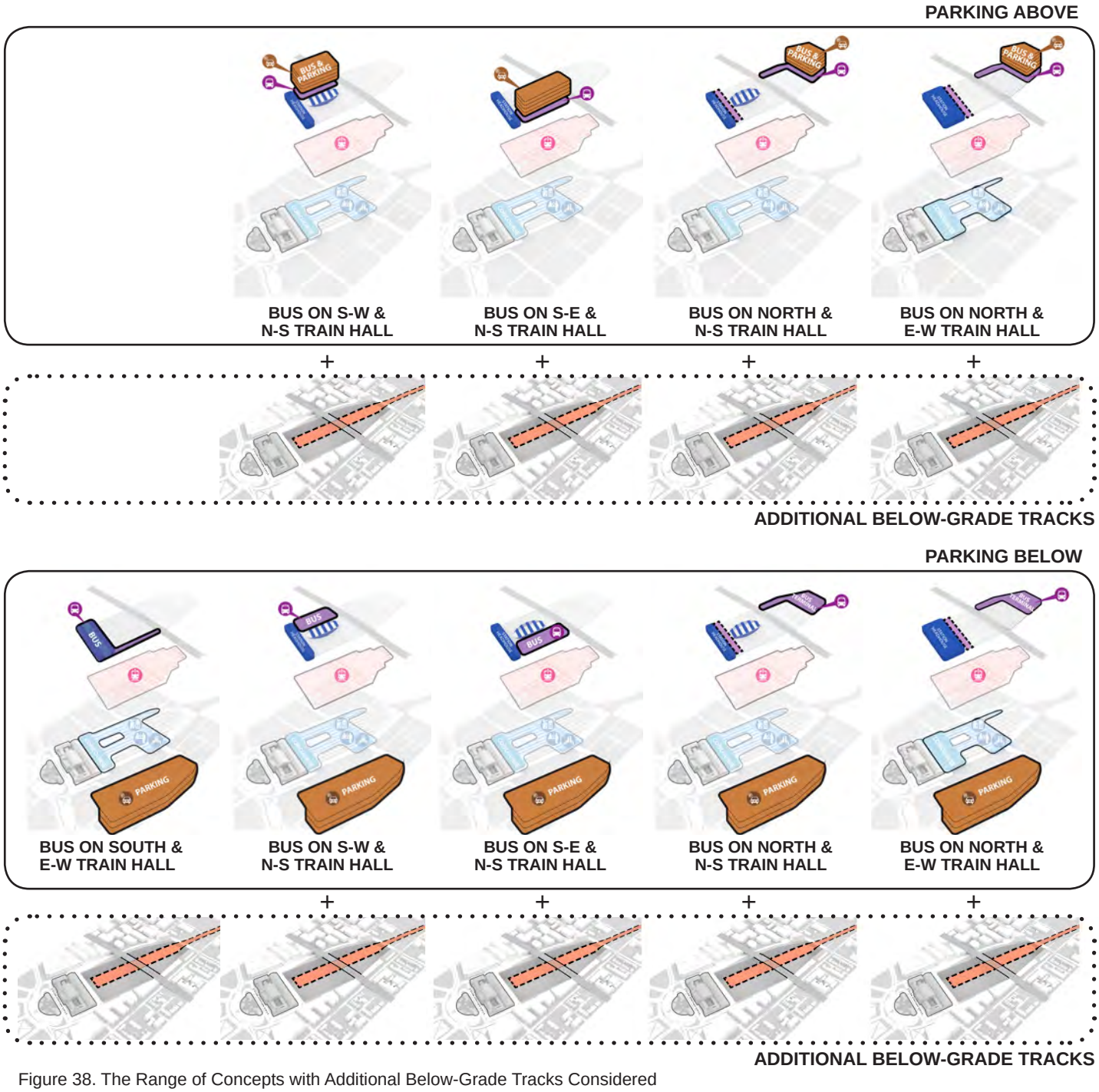


Figure 38. The Range of Concepts with Additional Below-Grade Tracks Considered

CONCOURSE A

One of the benefits of removing the existing USPG structure is that this provides space for the full reconsideration of the existing Claytor Concourse , allowing it to be taller and more expansive, in alignment with its function as the main passenger space used to access trains and make transfers to other modes. A new Concourse A is proposed to be included in all the Concepts.

LOWER LEVEL CONCOURSES

Building a new set of tracks and platforms gives the opportunities to improve access to and from them – to address the growth in ridership, improved rail operations and current design and safety standards. As such, all of the Concepts allow for a new lower level with major public concourses at H Street, First Street, and in the center of the project.

The H Street Concourse links new entrances at First Street and Second Street creating east-west connectivity for passengers and adjoining communities. The SEP proposes major new platform access points and vertical circulation from the H Street concourse to the platforms above. The H Street Concourse also provides vertical links to and from the streetcar stop on the H Street Bridge.

The First Street concourse provides a north-south connection from the H Street concourse to the rest of the station to the south, especially the primary transfer to the Metro.

The other concourse in the middle provides a secondary north-south link from the H Street concourse to the rest of the WUS, as well as a zone to provide vertical links to parking if it is below-grade.

The lower level concourse planning would require coordination with Other Programmatic Considerations, particularly Rail Support Function and Service Access and Loading, to provide adequate space for rail operation and improved service access to the platforms above.

OTHER CONSIDERATIONS

All options consider taxi and private car service drop-off, pick-up, and queuing areas within and around the perimeter of the site. These would connect to the network of concourses at all levels, including the Historic Station, Concourse A, and H Street Concourse.

All options would fulfill the criteria for integration between the Historic Station and the SEP.

Final Range of Concepts

The range of eighteen (18) Concepts are documented with plans and sections that address the critical planning and coordination issues. The drawings are shown in Appendix A, Supporting Technical Backup Information.

The 18 options are summarized below and delineated on the following pages.

WITH ADDITIONAL BELOW-GRADE TRACKS* (9 TOTAL)

PARKING ONLY BELOW TRACK (1 TOTAL)
- *Bus on the South above the East-West Train Hall integrated with Concourse A*

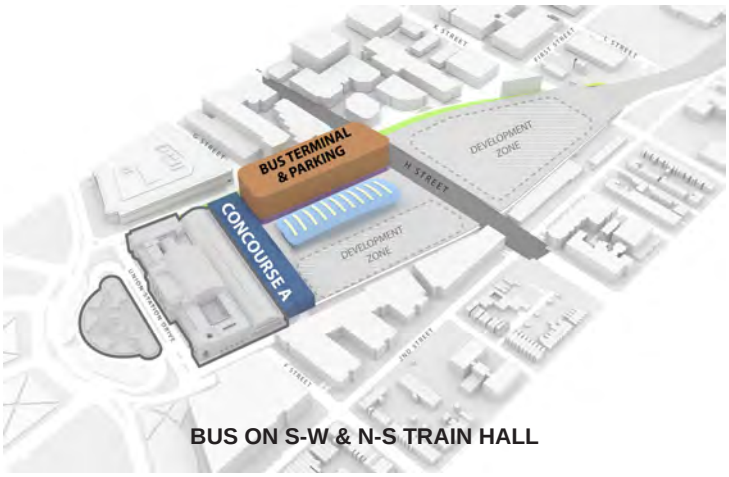
PARKING EITHER ABOVE OR BELOW TRACKS (8 TOTAL)
- *Bus on the South-West with a North-South Train Hall to the South of H Street*
- *Bus on the South-East with a North-South Train Hall to the South of H Street*
- *Bus on the North of H Street with a North-South Train Hall to the South of H Street*
- *Bus on the North of H Street with an East-West integrated Train Hall with Concourse A*

WITHOUT ADDITIONAL BELOW-GRADE TRACKS* (9 TOTAL)

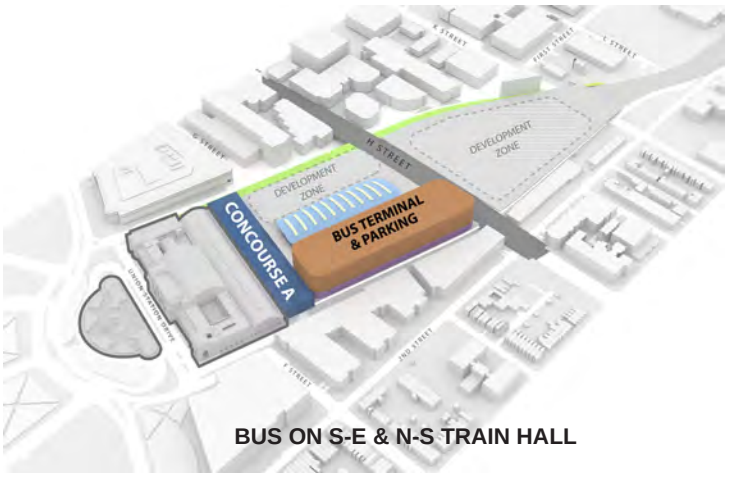
PARKING ONLY BELOW TRACK (1 TOTAL)
- *Bus on the South above the East-West Train Hall integrated with Concourse A*

PARKING EITHER ABOVE OR BELOW TRACKS (8 TOTAL)
- *Bus on the South-West with a North-South Train Hall to the South of H Street*
- *Bus on the South-East with a North-South Train Hall to the South of H Street*
- *Bus on the North of H-street with a North-South Train Hall to the South of H Street*
- *Bus on the North of H Street with an East-West integrated Train Hall with Concourse A*

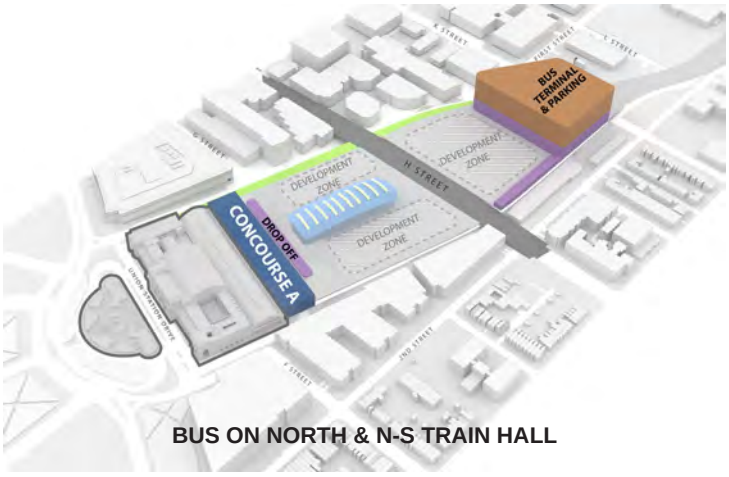
The ABGT is no longer being considered as a project element. Please refer to the Executive Summary for a description of the current status of the ABGT options.



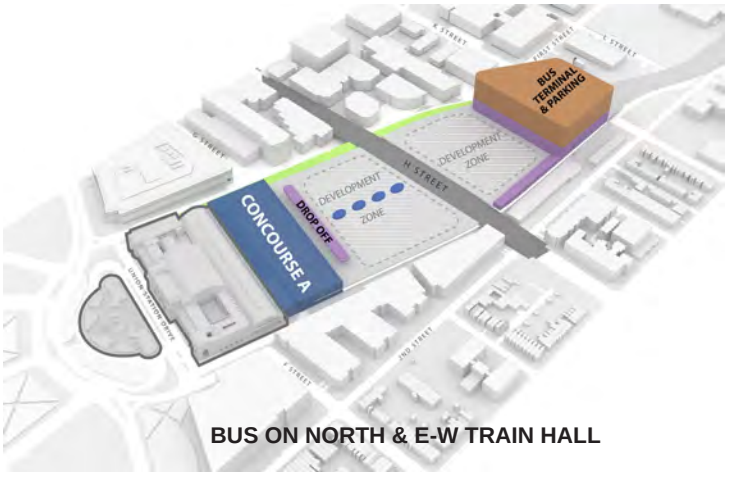
BUS ON S-W & N-S TRAIN HALL



BUS ON S-E & N-S TRAIN HALL

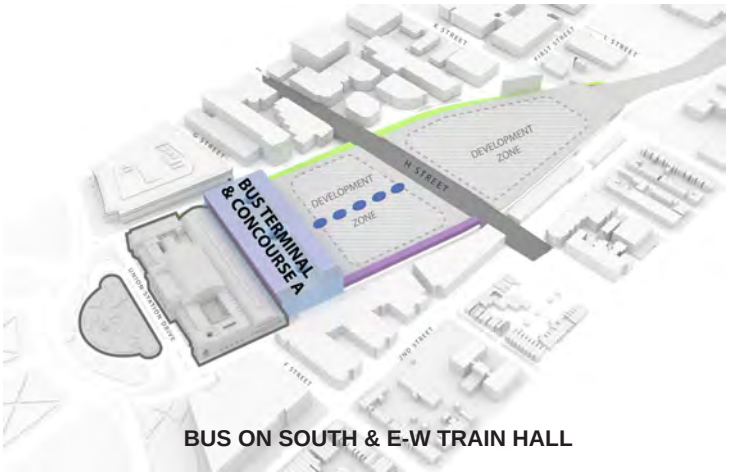


BUS ON NORTH & N-S TRAIN HALL

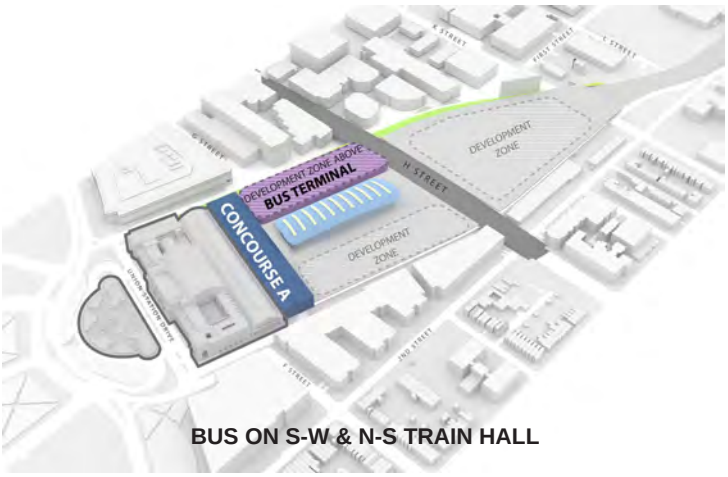


BUS ON NORTH & E-W TRAIN HALL

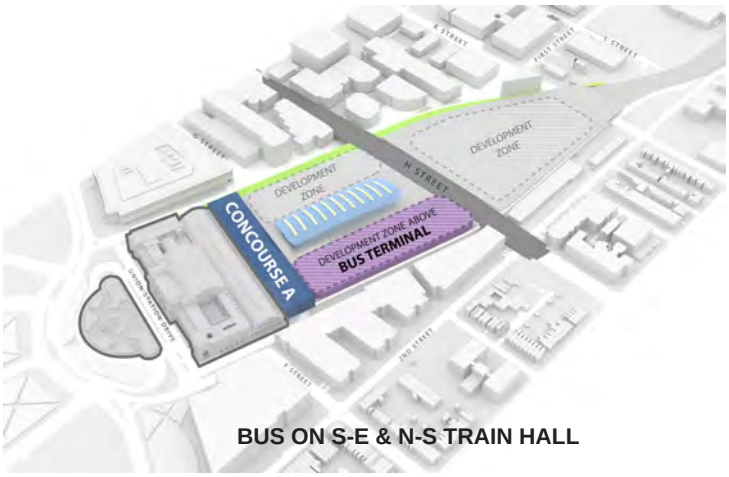
Figure 39. Concept Type Diagrams with Parking Above



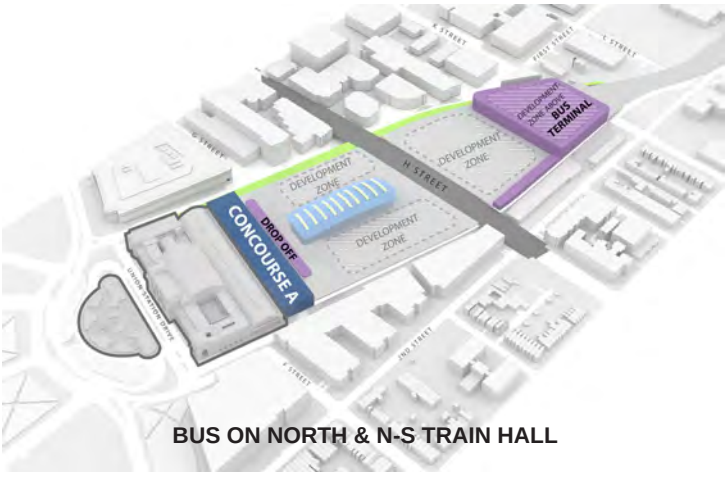
BUS ON SOUTH & E-W TRAIN HALL



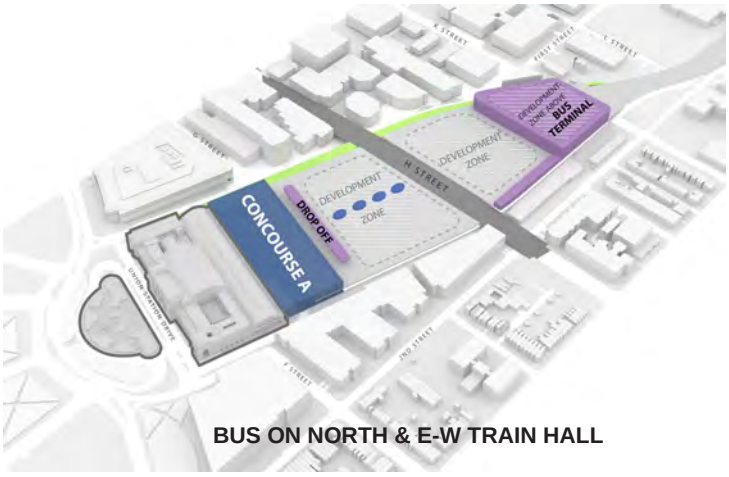
BUS ON S-W & N-S TRAIN HALL



BUS ON S-E & N-S TRAIN HALL



BUS ON NORTH & N-S TRAIN HALL



BUS ON NORTH & E-W TRAIN HALL

Figure 40. Concept Type Diagrams with Parking Below

4.4 Concept Descriptions

This section describes more specific features and layouts of the different concept options related to:

- Rail
- Additional Below Grade Tracks (ABGT)
- Bus Terminal
- Parking
- Taxi/Shared Ride
- Concourses
- Train Hall
- Rail Function & Support Systems
- Service Access and Loading

RAIL

TI has proposed two final options for the platform and track layout: Option 14 and Option 16.

TI Option 14

This option would provide 19 tracks [12 Stub End and seven (7) Run-Through]. In addition, Amtrak is currently exploring adding an east side Stub End track for engine storage/pooling. It entails a tapered opening (51' wide at south end and 19.65' wide at north end) situated between the Stub End and Run-Through tracks that opens to the Central Concourse below, both the opening and the concourse would be off-center relative to the overall Rail terminal. An opening (4'-9" to 19'-1" wide) is also located between the edge of the western track and the face of the western slurry wall. Platforms are typically 30' wide and the one-sided platform on the east side is 20' wide. The Run-Through tracks are angled and slightly curved to allow them to serve the projected VRE train lengths (925') while mostly fitting within the site.

TI Option 16

This option is largely identical to Option 14, except the eastern Stub End platform becomes a tapered mega-platform (89'-6" wide at south end and 20' at north end). Instead of the full central opening of Option 14, large light-wells on the mega-platform provides daylighting and improves wayfinding for pedestrians at the central concourse below. The concourse below would be roughly on-center relative to the overall Rail terminal.

Accessibility and Egress

Both options would include similar assumptions regarding passenger access. Passengers would still be able to move on to and from the platforms at the southern ends near the historic station. Additionally, they would be able to take advantage of a significant set of access points at the middle of the platforms from the H Street Concourse.

Attention was given to platform widths and distances between means of egress to ensure compliance to the ADA Standards for Transportation Facilities and NFPA 130: Standard for Fixed Guideway Transit and Passenger Rail Systems.

In order to provide a 60" accessible route on the platform (ADA 403.5.3), a platform would need to be a minimum of 20' wide if one-sided (half-width) and 30' wide if two-sided. Please note that 23' or more may be needed for a one-sided platform if sufficient space is to be provided for both overbuild structure and two VCEs, though final VCE locations have not been set. The final design of the VCEs may also increase the width of platforms to accommodate adequate offset.

A maximum distance of 650' is proposed to be set between means of egress on each platform in order for maximum travel distance on the platform to a mean of egress to not exceed 325' (NFPA 130 5.3.3.5). A mean of egress is set within 82' from the northern end of each platform, which is the maximum length of a common path of travel.

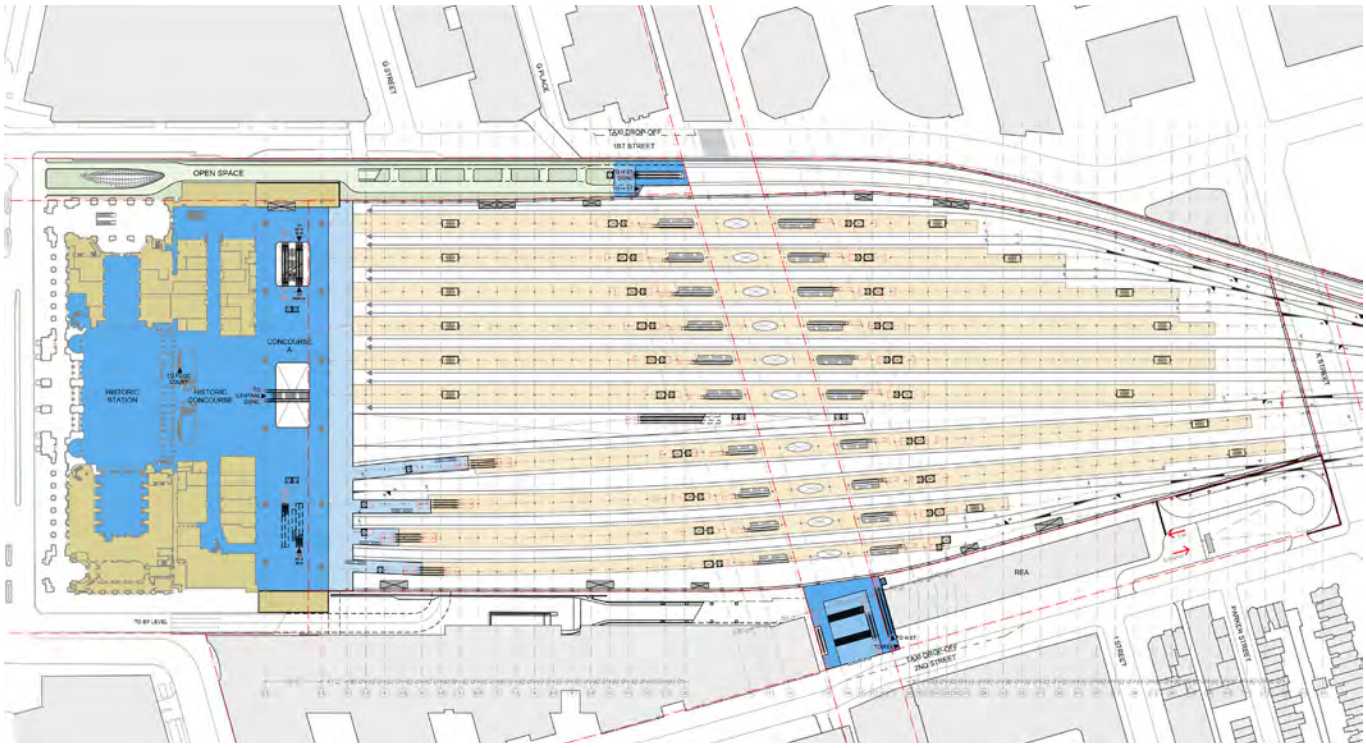


Figure 41. TI Option 14

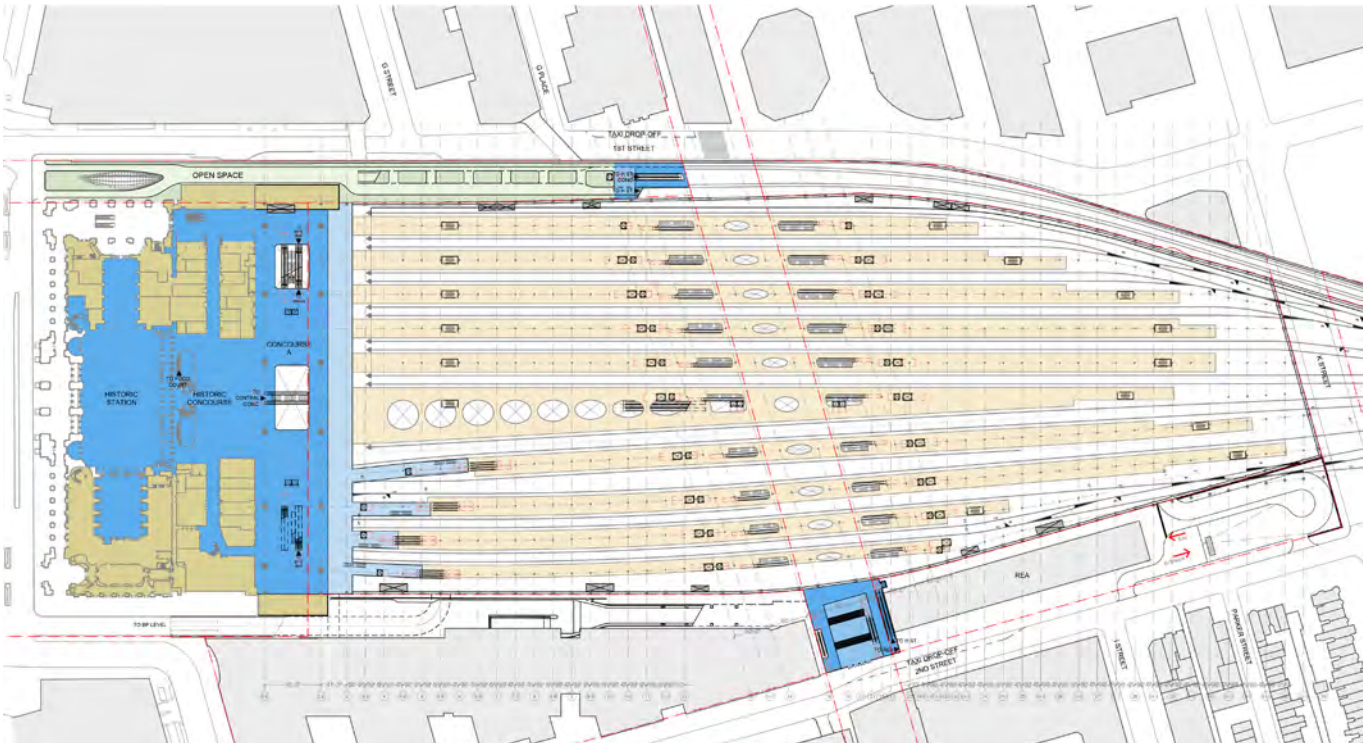


Figure 42. TI Option 16

ADDITIONAL BELOW-GRADE TRACKS*

The ABGT is no longer being considered as a project element. Please refer to the Executive Summary for a description of the current status of the ABGT options.

All of the proposed concepts are capable of accommodating additional below-grade tracks (ABGT) in the future. The ABGT would allow for unforeseen increases in ridership, consisting of six (6) Stub End tracks served by four (4) platforms running north-south at the center of the site. The top of rail would be set around elevation -36', which is approximately 70' below the Second Street elevation. Two mezzanines would be located at Level B2, which serve as access control and waiting areas for the below-grade platforms. They would be accessed by VCEs from the Lower Concourse Level at the Concourse A Lower Extension and behind the Amtrak/MARC waiting area.

In the event that ABGT are not needed in the future, the area allocated tracks and mezzanine would be used for below-grade parking and/or support functions.

Appendix D, Supporting Station Infrastructure Information, provides additional detail on the egress, structural and MEP accommodations required to support ABGT.

It should also be noted that incorporating not-to-preclude features for ABGT presents planning impacts relative to other program elements above. Specifically, there may be limitations on the extent of overbuild and other structures at the deck level. Furthermore, the zone for ABGT is likely to shift north past the project boundary, depending on the length of the platforms.

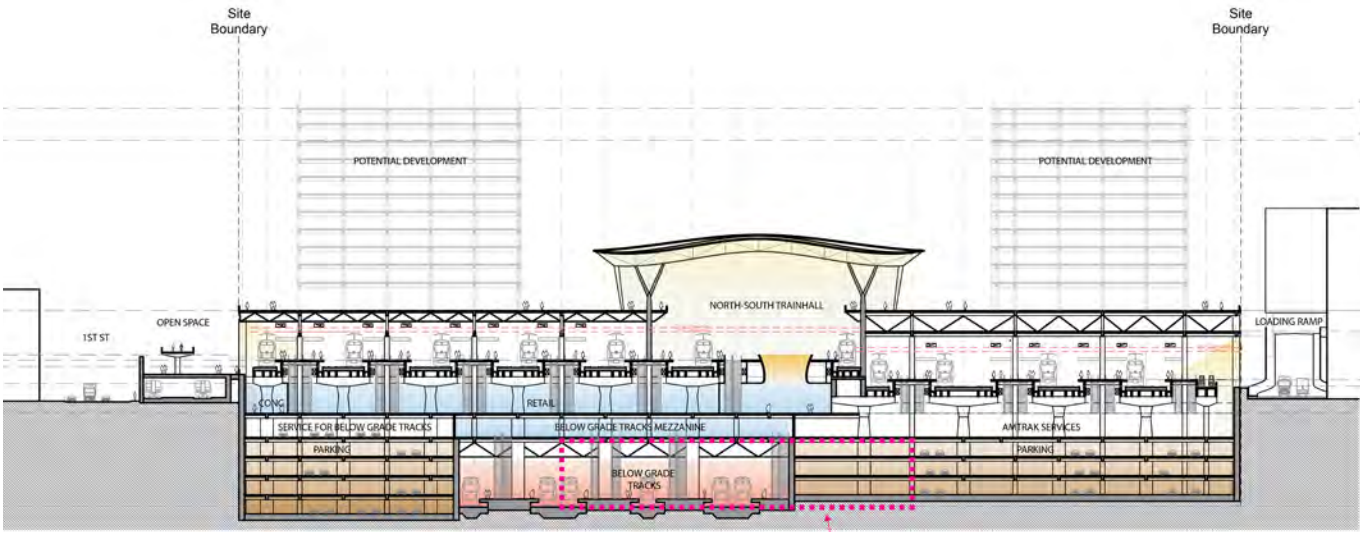


Figure 43. Transverse Section with Additional Below-Grade Tracks

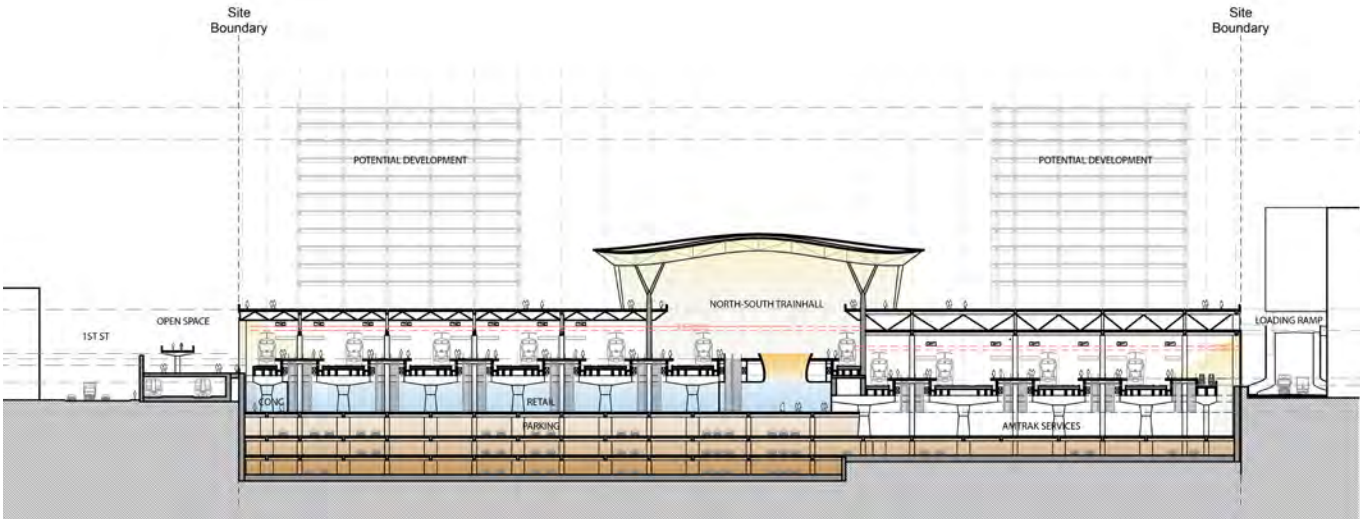


Figure 44. Transverse Section without Additional Below-Grade Tracks

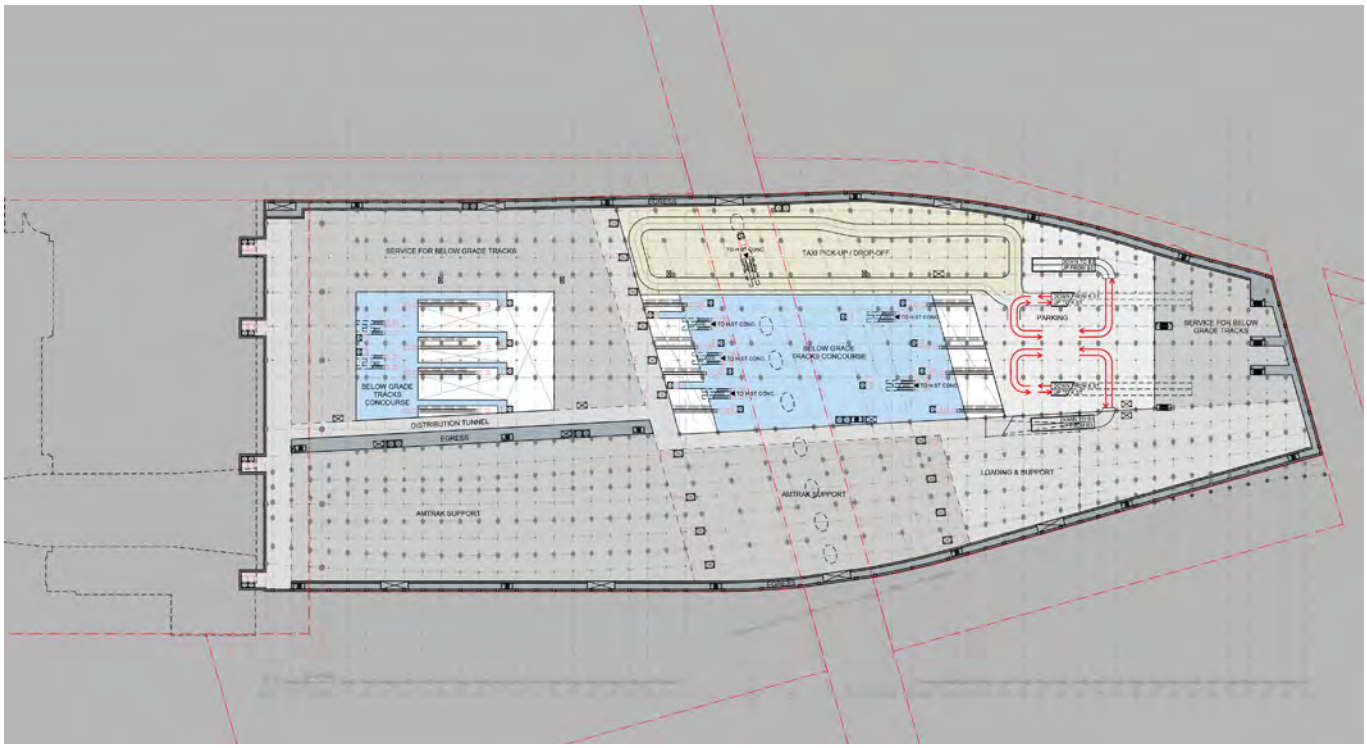


Figure 45. B2 Level Plan with ABGT

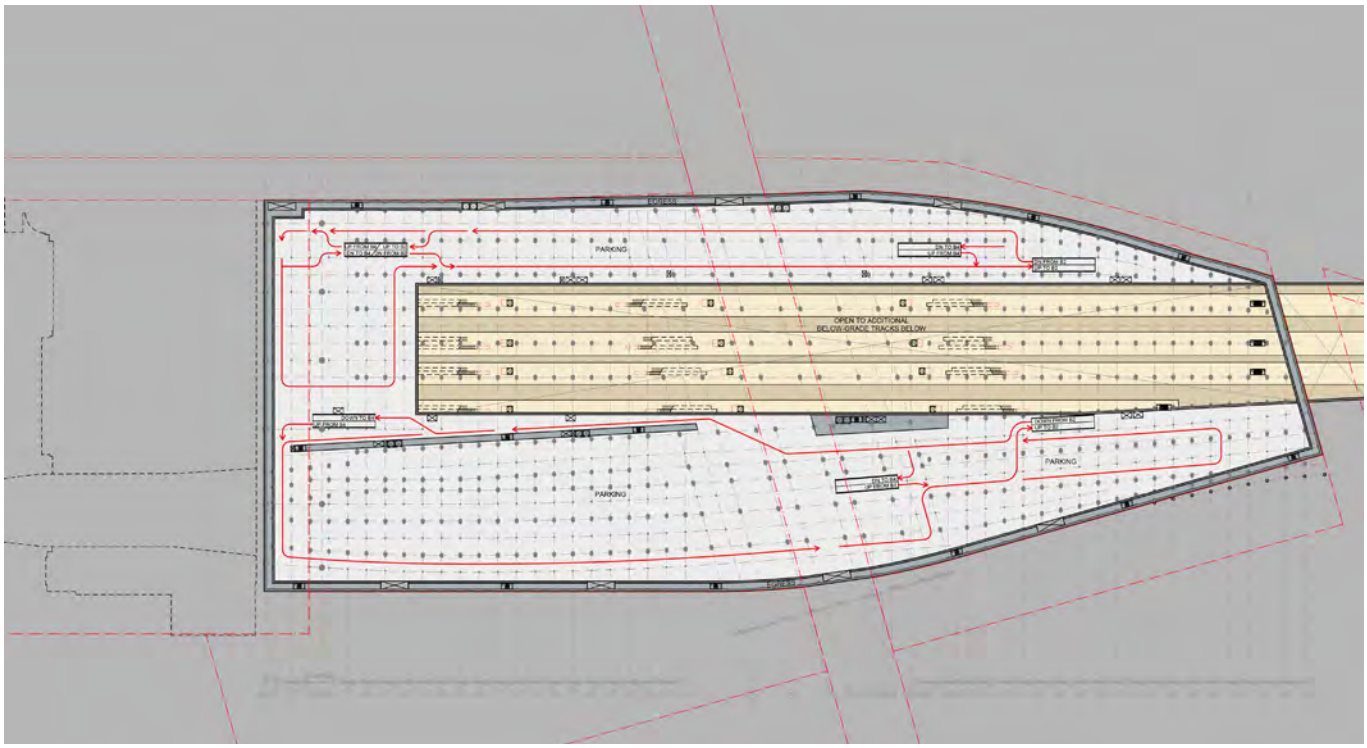


Figure 46. B3 Level Plan with ABGT

BUS TERMINAL

This section presents the range of Bus Terminal layouts that have been developed based on the current program. These layouts are consistent with the concepts delineated in Chapter 4.3, but with more detailed information. Due to the evolving nature of the programming inputs, these bus layouts consider possible variations, or alternates, on the assignment of bus parking bay types. The intent of this range of study for the various bus layouts is to demonstrate the feasible range of active and layover slips that work within the spatial parameters defined within each concept.

The Bus Terminal is currently anticipated to provide for a range of bus pick-up and drop off slips. This range is currently anticipated to be from the low 20s to the mid-40s. In addition, there may also be some amount of layover spaces. In total, the number of bus spaces is anticipated to be similar or less than the current bus terminal facility based on the approach that the future operations will incorporate a more active management to limit underutilized spaces throughout the day.

The majority of bus options developed provide a range of active and layover slips between 40 and 50, in either sawtooth or angle parking configuration depending on the operator, which is generally consistent with the Programming description in Chapter 3. There is one concept that is an exception and would provide only 34 active slips.

The location of the facility in all concepts would be above the tracks either north or south of H Street. Each location would have access to and from H Street that would connect to a signalized intersection. Overall the volume of buses entering and exiting the station is anticipated to be similar to the current volume, therefore H Street would have a similar volume of bus traffic as it does currently. An additional key factor will be the consideration of streetcar facilities and operations on the H Street bridge.

Sawtooth versus Angled Parking

The sawtooth style bus parking provides the safest layout for the Bus Terminal. The configuration allows the bus to pull forward into a parking space adjacent to the pickup and drop-off area to load and unload passengers. Buses can then pull forward to exit the station without having to back up. While this configuration is the safest, it also requires the largest amount of floor area per bus parking space.

The angled parking configuration provides a space that a bus can pull into from the drive aisle and then back out. The concern with this configuration is that it presents risks to safety to have buses backing up into traffic lanes. Therefore, this configuration requires additional personnel to direct the bus back into the drive aisle as to exit the facility, in addition to requiring spacious drive aisles to allow buses to safely back out. The benefit of this configuration is it requires the least amount of floor space per bus parking space.

Should the active bus program increase, sawtooth slips could be replaced by angled parking. This change greatly diminishes the scale of the North-South Train Hall for the South-East and South-West Bus Terminal options given the increased bay depth and drive aisle widths, in addition to creating complications regarding bus traffic circulation and access ramps. While the Bus Above the East-West Train Hall option remains unaffected by the change in configuration, the Bus on North of H Street would require an additional bus level as it does not contain any sawtooth slips. See Appendix H for more detailed information.

BUS ON THE SOUTH ABOVE EAST-WEST TRAIN HALL INTEGRATED WITH THE CONCOURSE A

This bus facility would be located above a reconstructed Concourse A, integrated within the contiguous train hall. This option combines a concourse space, a Train Hall and a Bus Terminal.

This option establishes a clear demise line between transportation infrastructure and overbuild, in addition to facilitating access to various types of transportation within the main concourse area. Located 40 feet above the deck level, the Bus Terminal incorporates three large openings to below allowing for views of the sky for passengers at the historic WUS level. An intuitive circulation scheme is provided for WMATA, rail, and bus passengers at the east and west ends of the Concourse A, which also connects to the deck level.

Capacity

The Bus Terminal design accommodates for 23 active and 27 layover spaces, for a total of 50 bus spaces on one level. Of the 23 active spaces, seven (7) are sawtooth and 16 angled. Due to its flexible design, the seven (7) sawtooth spaces can be reconfigured into 16 angled spaces, for a total of 32 active bays and the originally proposed 27 layovers parked on the perimeter of the terminal. Its maximum capacity becomes 59 buses, all in angled parking configuration.

Current:

- 23 Active at main level [seven (7) sawtooth, 16 angled]
- 27 Layovers also at main level
- 50 TOTAL

Potential Alternate with increased Active Program:

- 32 Active at main level (all angled – not recommended)
- 27 Layovers also at main level (assuming the perimeter areas remain inaccessible to passengers)
- 59 TOTAL

Potential Alternate with increased Active Program and split access to multiple boarding areas:

- 40 Active at main level (all angled in middle – parallel at North side)
- 19 layovers
- 59 TOTAL

Passenger circulation

The bus level would have clear acoustical and fume separation from the rest of the concourse volume. The conditioned area allows for two waiting areas strategically placed for easy passenger flow and distribution to buses and a pedestrian circulation around the entire bus loop. Once outside the conditioned area, passengers have a secondary circulation path that gives access to each individual bus.

Bus circulation

Bus access would be provided through a ramp connecting from the H Street Bridge to the southeast corner of the southern portion of the site. The 30-foot wide ramp provides bus entry and exit into the terminal. This layout allows for an efficient internal vehicular flow and consolidates the exit and entrance on a single curb cut at H Street.

Phasing

This option would be partially available in earlier phases in the SEP implementation and fully available in later phases. A fully functional, smaller loop can be built in an earlier phase incorporating one of the two circulation cores.

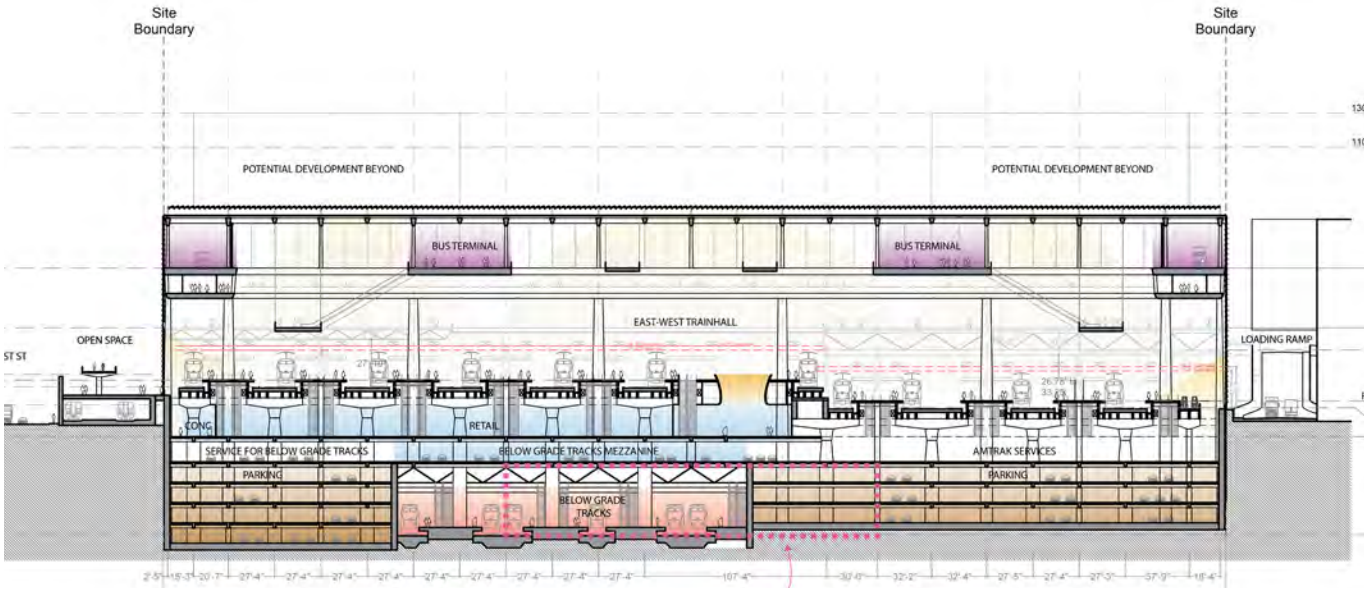


Figure 47. Bus on South: Transverse Section

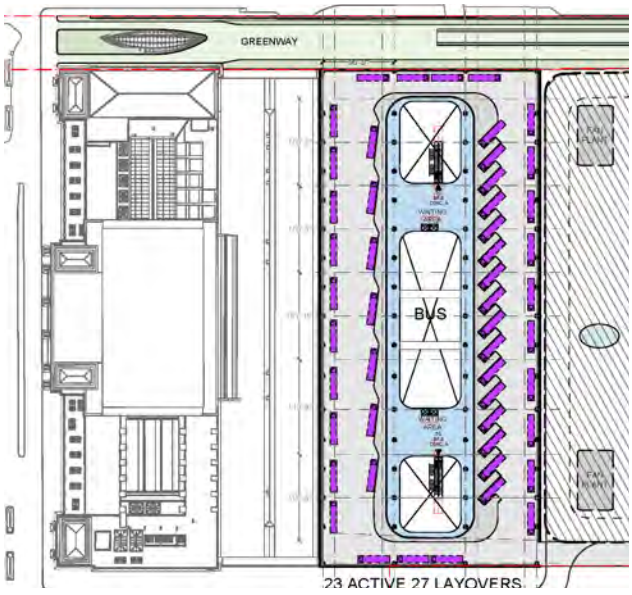


Figure 48. Bus on South: Partial Plan at Bus Deck Level (Concourse A Below)

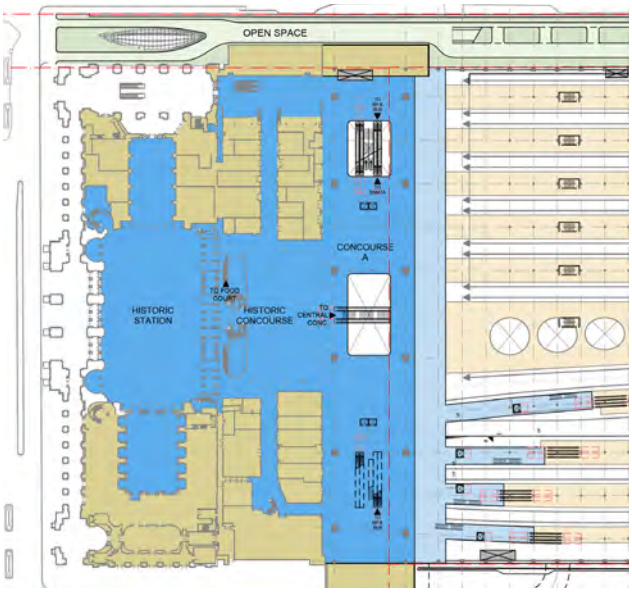


Figure 49. Bus on South: Partial Plan at Main Concourse Level (Bus Terminal Above)

BUS ON SOUTH-EAST OF H STREET

This bus facility would be located on the deck level on the southeast portion of the site and distributed on two levels, the lower for active bays and the upper for layovers.

This option provides a consolidated Bus Terminal with passenger access within the deck structure connecting to Concourse A and H Street. Because of access challenges to overbuild lobbies and service circulation, this option likely hinders the possibility of placing any commercial or residential development above.

Capacity

The Bus Terminal accommodates for 24 active and 32 layover spaces, for a total of 56 bus spaces. Of the 24 active spaces, eight (8) are sawtooth and 16 angled. Due to its double level configuration, the lower level bus layout can be replicated onto the upper level, creating 48 active bays with easy passenger access.

Current:

- 24 active at lower level [seven (7) sawtooth, 17 angled]
- 32 Layovers at upper level
- 56 TOTAL

Potential Alternate with increased Active Program (Two Level Active-Only Layout):

- 24 active at lower level [seven (7) sawtooth, 17 angled]
  24 active at upper level
- 0 Layovers
- 48 TOTAL (ACTIVE ONLY)

Should the active bus program increase and the current bus layout be maintained, an additional bus level is required to accommodate layovers. The extra level creates severe complications regarding bus circulation given compact ramp landings and increased traffic volumes passing through lower levels that can facilitate a means to exit. See Appendix H for more detailed information.

Passenger circulation

A mezzanine for passenger access into the main bus loading island is provided within the deck structure connecting Concourse A, the bus levels and H Street.

Bus circulation

Bus access is provided through a single curb cut at the H Street Bridge at the southeast corner of the site, sharing the traffic light with the service road for the development north of H Street. Special attention needs to be given to ramp traffic control as potential internal flow conflicts may arise due to compact ramp landings.

Phasing

This option would be fully available in the earlier stages of construction.

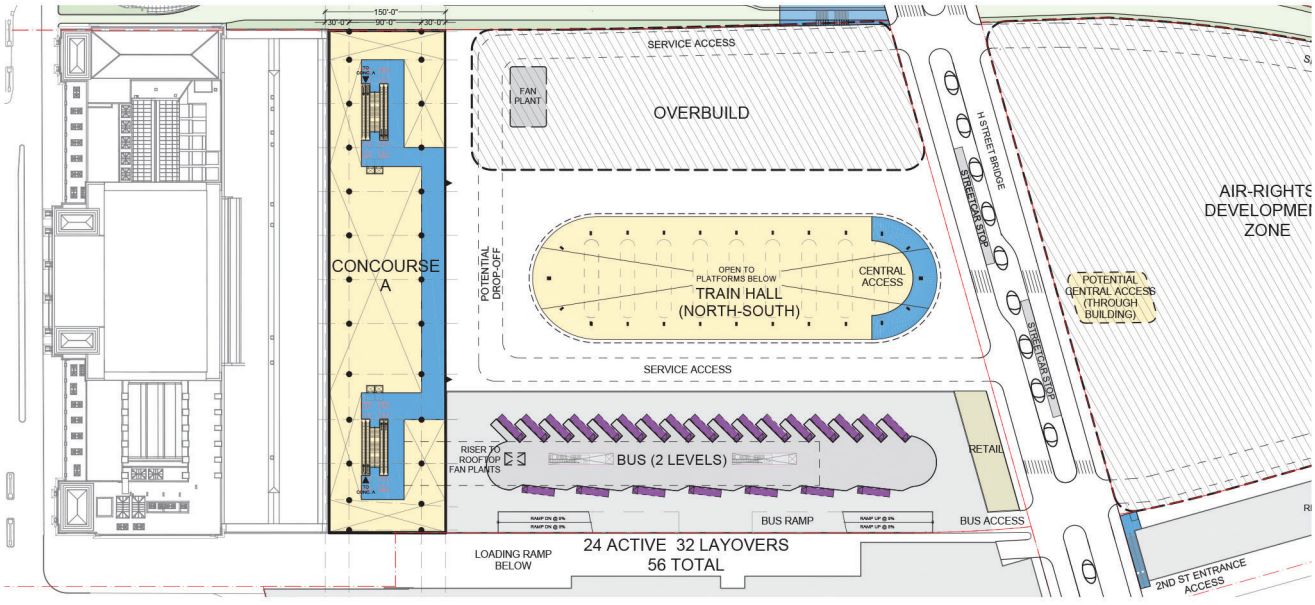


Figure 50. Bus on South-East: Partial Plan at Bus Deck Level

BUS ON SOUTH-WEST OF H STREET

This bus facility is located eight (8) feet above the deck level on the southwest portion of the site and distributed on two levels, the lower for active bays and the upper for layovers. This option offers a consolidated bus facility with passenger access from below connecting to Concourse A and H Street. As a result of access challenges to overbuild lobbies and service circulation, this option hinders the possibility of placing any commercial or residential development above.

Capacity

The Bus Terminal design accommodates for 17 active and 28 layover spaces, for a total of 45 bus spaces. Of the 17 active spaces, five (5) are sawtooth and 12 angled. As with the previous option and due to its double level configuration, the lower level bus layout can be replicated on the upper level, creating 34 active bays with easy passenger access. However, this option does not meet minimum capacity requirements as identified in the Programming section.

Current:

- 17 Active at lower level [five (5) sawtooth, 12 angled]
- 28 Layovers at upper level [or eight (8) active and 20 layover to meet programmatic criteria]
- 45 TOTAL

Potential Alternate with increased Active Program:

- 17 Active at lower level, 17 active at upper level
- 0 Layovers
- 34 TOTAL (ACTIVE ONLY)

Should the active bus program increase and the current bus layout be maintained, an additional bus level would be required to accommodate layovers. The extra level could create severe complications regarding bus circulation given the compact access ramp and increased traffic volumes passing through lower levels in order to exit. See Appendix H for more detailed information.

Passenger circulation

A mezzanine for passenger access into the main bus loading island would be provided within the deck structure connecting Concourse A, the bus levels and H Street. Its full height is partially embedded in the seven foot (7') transfer structure and eight feet (8') above the BP level, raising the bus facility from the main entrance/exit at H Street Bridge. Because of rail clearance requirements from the tracks below, the access mezzanine cannot be fully accommodated at the H Street level, creating an impediment for efficient bus flows entering and exiting the facility.

Bus circulation

Bus access would be provided through a single curb cut at the H Street Bridge at the southwest corner of the site, sharing the traffic light with the service road for the development north of H Street. Because the bus terminal is raised eight feet (8') from the H Street Bridge to accommodate for passenger circulation below, the main access ramp is especially problematic given its tight turning radius for exiting.

Phasing

This option would only be available during later stages of construction. A temporary Bus Terminal would need to be established or built off-site during earlier stages.

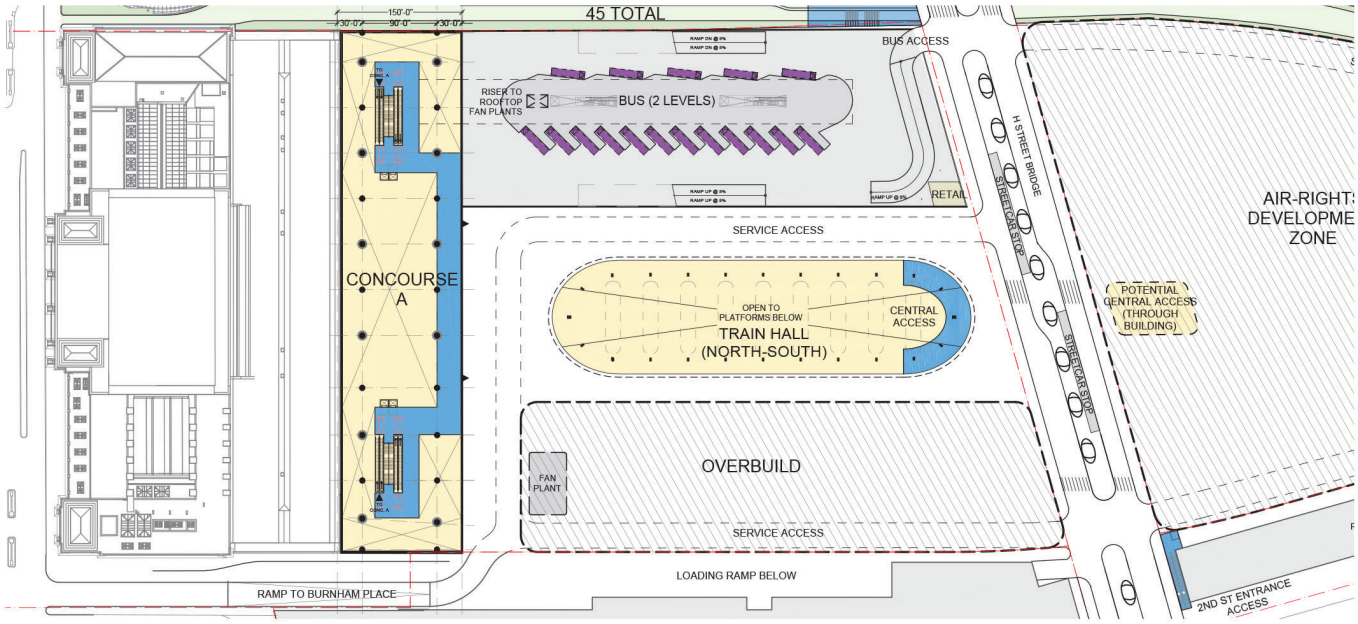


Figure 51. Bus on South-West: Partial Plan at Bus Deck Level

BUS ON NORTH OF H STREET

This split bus facility is located on the northern portion of the site and distributed on two levels.

The lower level accommodates active bays and the upper accommodates layovers, with a tour bus pickup/drop-off loop to the south by Concourse A. This option establishes a clear demise line between transportation and overbuild, occupying the least desirable space on the site for development while keeping tour buses near the historic WUS. The location, however, disconnects intercity buses from the major concourse spaces within WUS.

Capacity

The Bus Terminal accommodates 17 active and 33 layover spaces, in addition to eight (8) tour bus spaces by Concourse A, for a total of 58 bus spaces. All 17 active bus slips on the northern facility are angled, whereas the eight (8) active tour bus slips by Concourse A are parallel. The northern facility's short width hinders any sawtooth configuration design due to low bus capacity. The lower level bus layout can be replicated onto the upper level, creating 34 active bays with a continuous passenger access.

Current:

- 25 active [eight (8) parallel for tour buses beside Concourse A, 17 angled]
- 33 Layovers
- 58 TOTAL

Potential Alternate with increased Active Program:

- 42 active [eight (8) parallel for tour buses by Concourse A, and 17 angled on two (2) levels]
- 0 Layovers
- 42 TOTAL (ACTIVE ONLY)

Should the active bus program increase and the current bus program be maintained, an additional bus level could be added to accommodate additional active or layover bus bays. The extra level could create severe complications regarding bus circulation given increased traffic volumes passing through lower levels in order to exit. Alternatively, the bus capacity could be increased by increasing the footprint of the bus terminal or by expanding the pick-up and drop off lane adjacent to Concourse A by adding more lanes. See Appendix H for more detailed information.

Note: There are other more expansive North bus sub-options with greater footprints that could accommodate more slips or partial sawtooth configurations.

Passenger circulation

A mezzanine for passenger access into the main bus loading island to the north is provided within the deck structure under northern development at the deck level, connecting H Street and the bus levels. A connection to the lower level concourses could be provided depending on the TI plan. Alternatively, there could be access at the deck level through development structures. For tour and charter buses, passengers would go up to BP level within Concourse A to access the bus pickup/drop-off lanes.

Bus circulation

Bus access is provided through one or two curb cuts at the H Street Bridge on the northeast and/or northwest portions of the site, sharing the service road for the development north of H Street. These service roads continue across the H Street Bridge to the south, giving circulation continuity and easy crossover to buses going to the pickup/drop-off area by Concourse A.

Phasing

This option would be partially available during early stages and fully available at later stages of implementation.

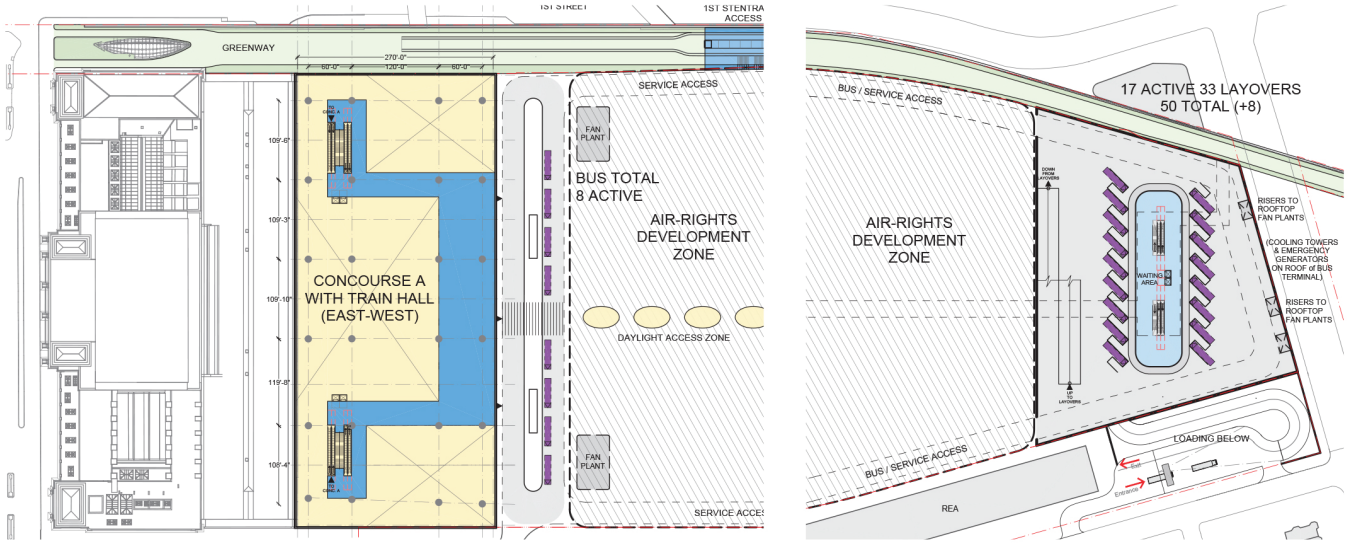


Figure 52. Bus on North (Split): Partial Plan at Bus Deck Level

PROGRAM TYPE	BUS ON SOUTH	BUS ON SOUTH-EAST	BUS ON SOUTH-WEST	BUS ON NORTH
ACTIVE	23	24	17	25
LAYOVERS	27	32	28	33
Total	**50**	**56**	**45**	**58**
INCREASED ACTIVE	32	48	34	42
RESULTANT LAYOVERS	27	0	0	0
Total	**59**	**48**	**34**	**42**

Table 11. SEP - Total Proposed Bus Program Capacity by Option
(Refer to Appendix H, Bus Terminal Capacity Technical Memorandum for additional information)

TRAIN HALL

This section presents the range of Train Hall options and layouts that have been developed. These descriptions are consistent with the concepts delineated in Section 4.3, but provide more detailed information.

To address both existing WUS deficiencies and the Design Goals and Objectives, a series of key drivers were used to promote highly compatible combinations of program elements and eliminate those that are non-compatible. These drivers include wayfinding, spatial quality, daylighting, passenger and visitor amenity, and were all used as criteria to evaluate the legitimacy of each concept element. In addition, the Partners felt strongly that a design goal should reflect the inclusion of a high quality, architecturally compelling feature reflecting the prominence and stature of the SEP and its place within the Nation's Capital. The resulting configurations for Train Halls that are reflected in the current concepts are described below.

North-South Oriented Train Hall

This linear North-South oriented train hall would be located in a zone between H Street and Concourse A. This configuration would allow daylight to be directed into limited platform areas, in the central portion of the rail terminal. In addition to daylight, the center platforms would gain visual access to activity of the BP development above. An activated Train Hall with retail amenity would allow for placemaking opportunities at the entrance into the station from H Street. Additional information on Urban Design Placemaking Opportunities is described in Appendix B.

It is important to note that the placement and density of BP development adjacent to the North-South Train Hall greatly affects the amount and type of light that is captured. In addition, the scale of the North-South Train Hall would be greatly diminished when the South-East and South-West Bus Terminal options are designed to achieve higher capacity through alternative bus layouts. Placing parking above the South-East and South-West bus terminals generates similar effects given the additional access ramps.

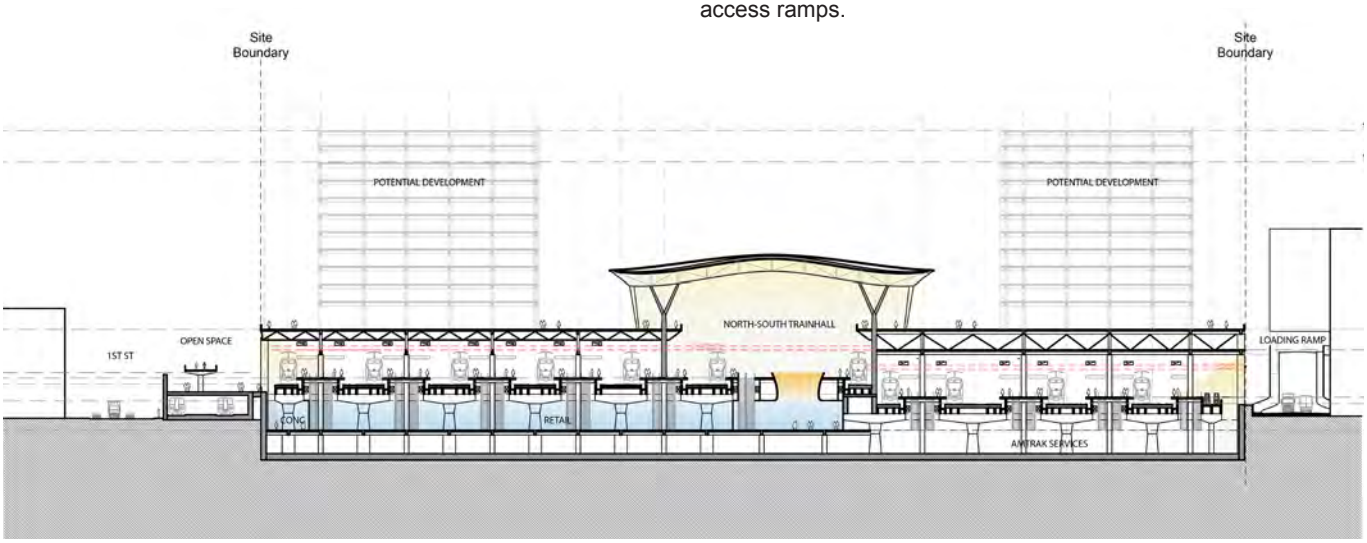


Figure 53. Transverse Section of North-South Oriented Train Hall

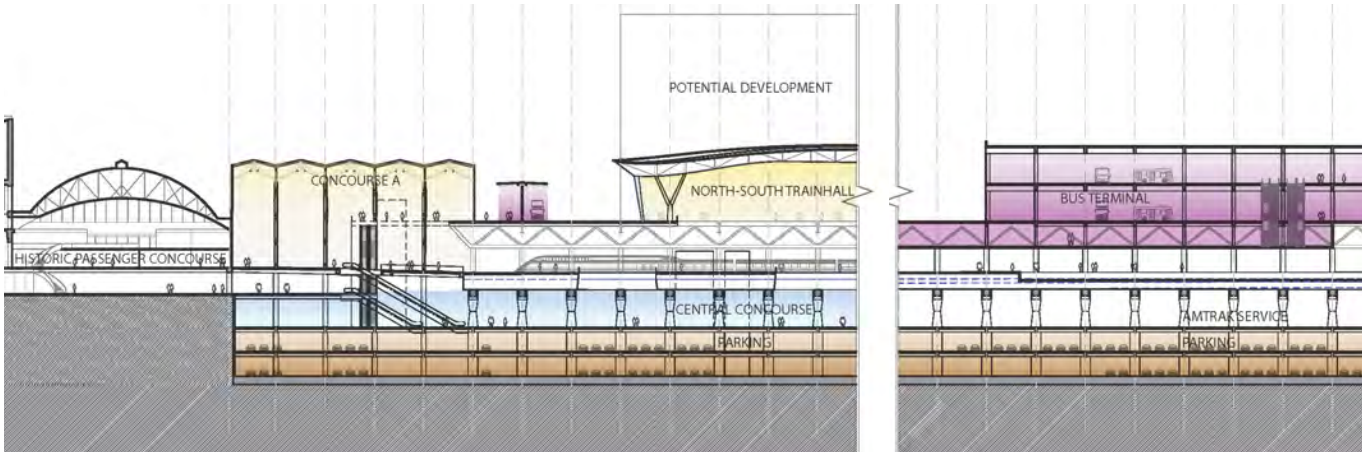


Figure 54. Long Section of North-South Oriented Train Hall

North-South Oriented Train Hall - Without Adjacent Development

Figure 55. Platform Level View (TI Option 14) - Without adjacent BP development

Figure 56. Platform Level View (TI Option 16) - Without adjacent BP development

North-South Oriented Train Hall - With Adjacent Development

Figure 57. Platform Level View (TI Option 14) - With adjacent BP development

Figure 58. Platform Level View (TI Option 16) - With adjacent BP development

East-West Oriented Train Hall

There are two options for east-west oriented Train Halls, both of which would be expanded volumes contiguous with Concourse A.

One option would integrate a Bus Terminal within the Train Hall volume. The second option would remain an open volume with nothing above. Both configurations would enlarge the extents of what is now the northern wall of Claytor Concourse to include all southern track ends within the volume of the proposed Train Hall.

In the first option, the Train Hall would be optimized as a complex, multi-level vertical circulation and transit feature with intermodal adjacencies that minimize travel distance and provide intuitive wayfinding. This option would incorporate a series of atria designed in relationship to the historic station and Bus Terminal layout in order to provide civic space and to bring desirable levels of daylight to below.

Transfer distances from a full bus facility above would be minimized while still allowing daylight to penetrate down to passengers below in Concourse A.

Additionally, this option would provide the opportunity to place program in the mezzanine structure that supports the buses.

In the second option, an expanded Concourse A would be dedicated to station functionality and amenities which would enhance the passenger experience, with increased uninterrupted volume and accessible daylight.

Both options provide potential for development of the Concourse A as a placemaking opportunity, providing a dynamic mix of amenity and activation.

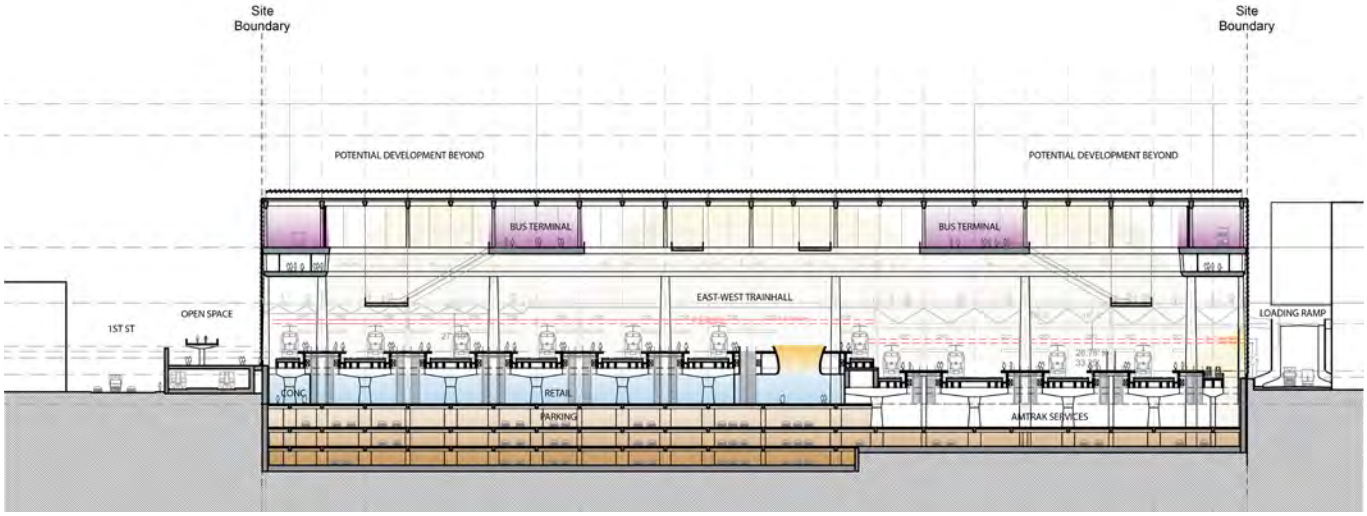


Figure 59. Transverse Section of East-West Oriented Train Hall with Bus Terminal Above

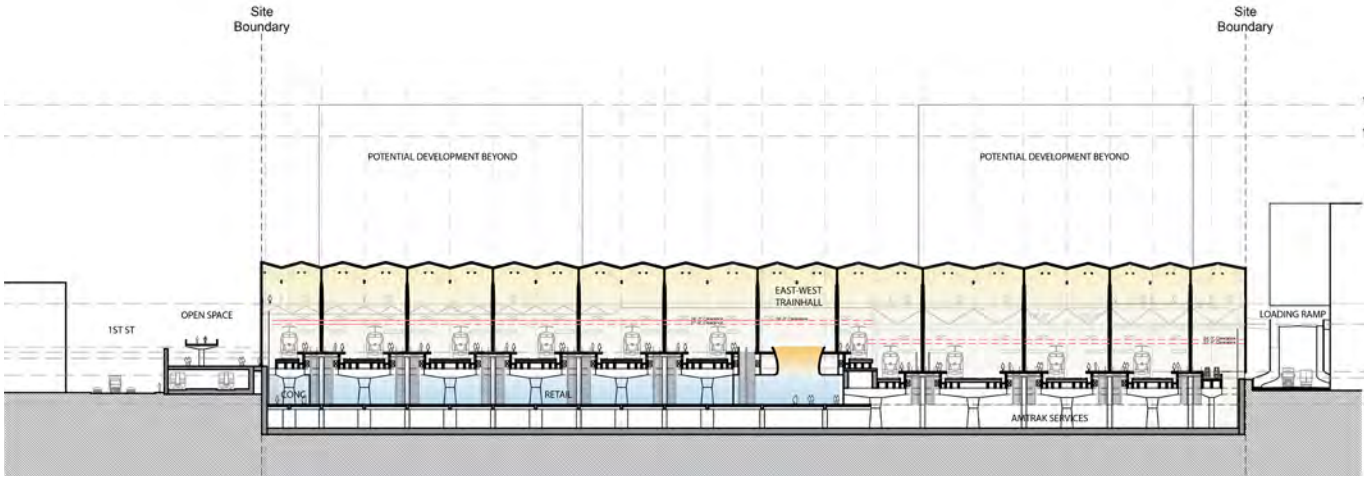


Figure 60. Transverse Section of East-West Oriented Train Hall with No Bus Terminal Above

East-West Train Hall with South Bus Terminal (Uninhabited Structure)

Figure 61. Main Level View

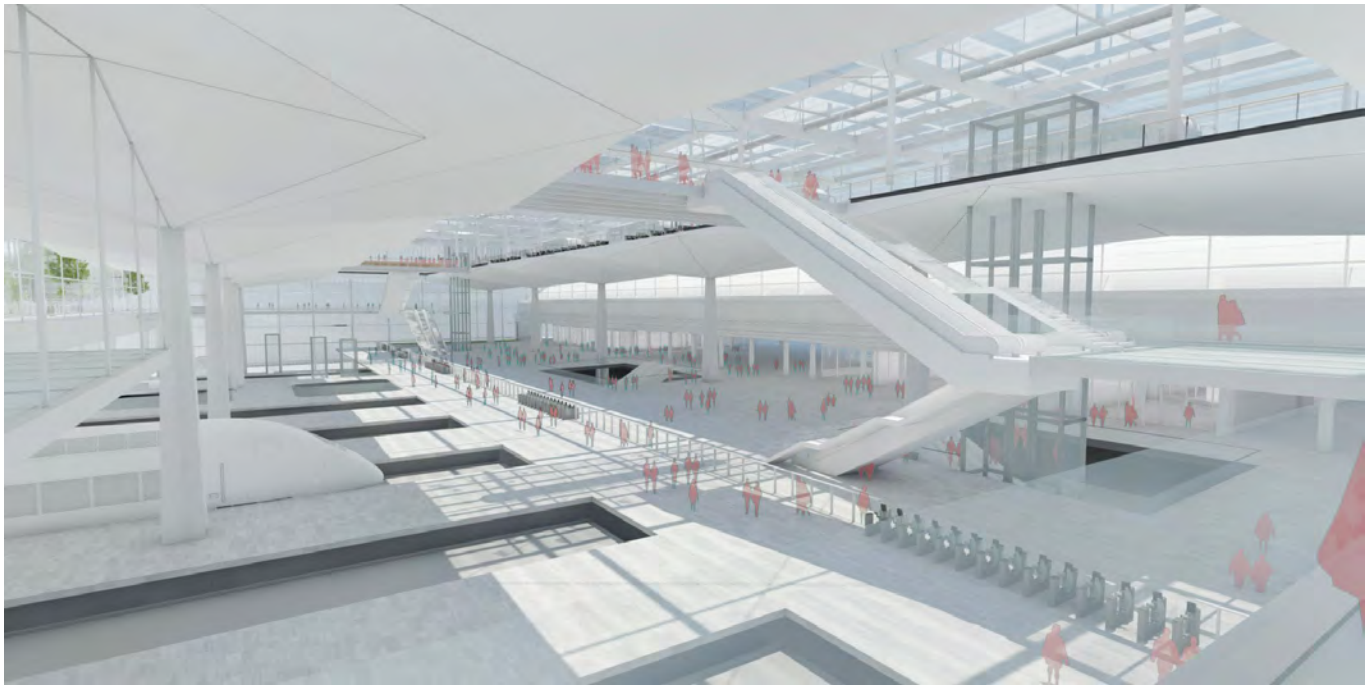


Figure 62. BP development Level View

East-West Train Hall with South Bus Terminal (Inhabited Mezzanine Structure)

Figure 63. Main Level View

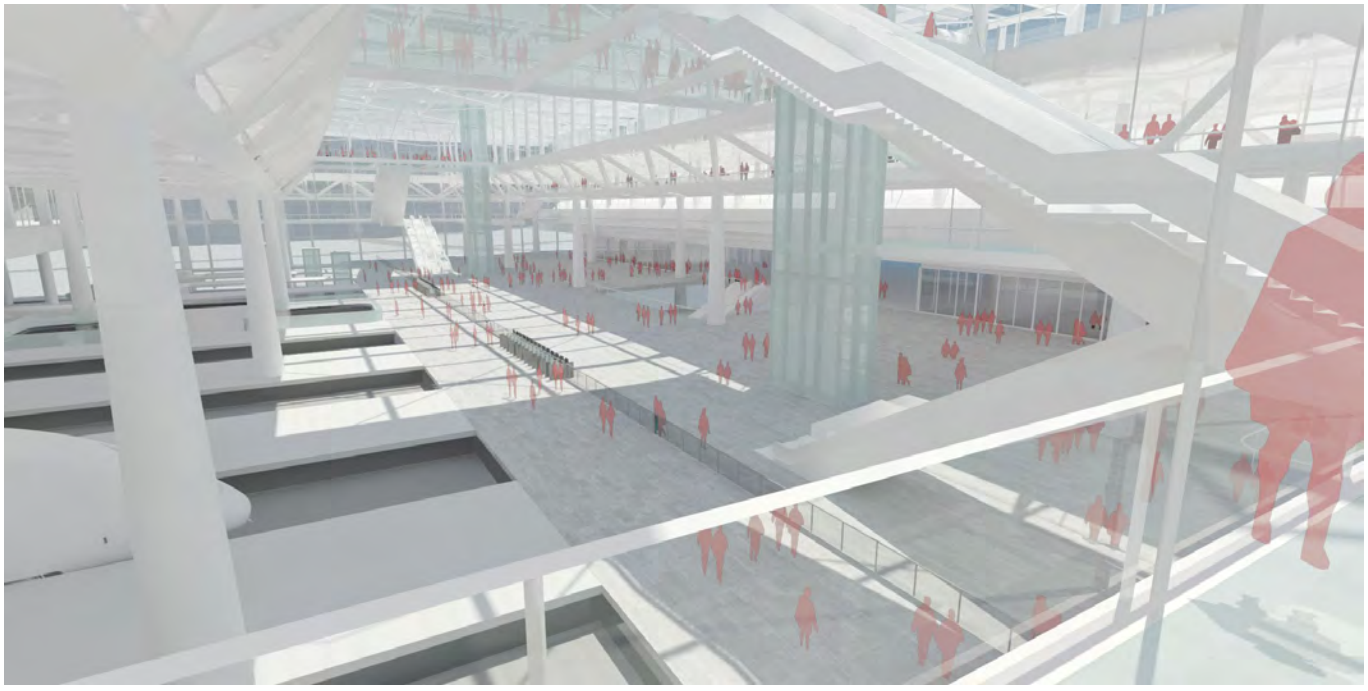


Figure 64. BP development Level View

East-West Train Hall with South Bus Terminal (Inhabited Mezzanine Structure)

Figure 65. Bus Terminal Level View

Figure 66. View from Inhabited Mezzanine Structure

East-West Train Hall With No Bus Terminal Above

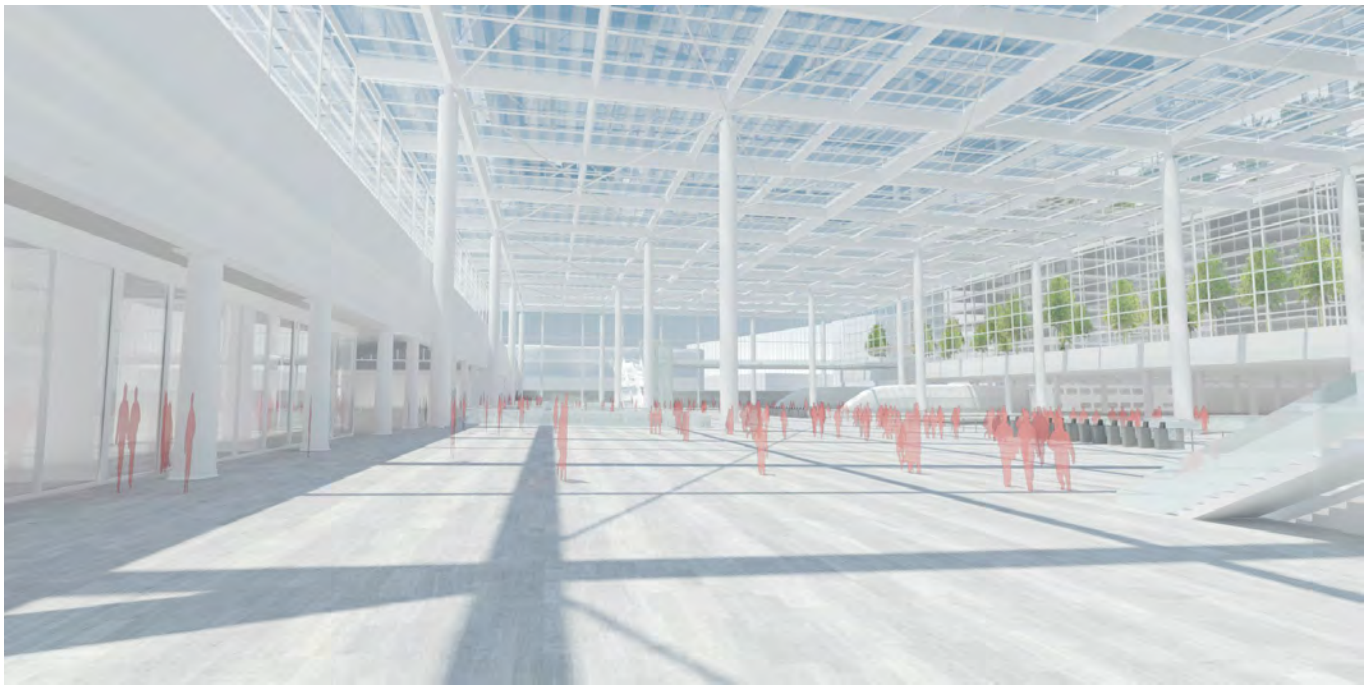


Figure 67. Main Level View

Figure 68. BP development Level View

UNDER-CROFT OF OVERBUILD

While the Train Hall options would allow for a compelling and dynamic space for portions of the SEP and some platform areas, the majority of other areas on the platforms would inhabit the under-croft of the BP development. These areas would have limited vertical loft and be subject to a myriad of constraints due to the cross sectional complexity of the various elements above and below.

Figure 69. View from Stub End platform with deck level at 86.25’ and soffit at 70.25’ (14.5’ clear at platform)

Figure 70. View from Stub End platform with deck level at 96’ and soffit at 80’ (24.5’ clear at platform)

Figure 71. View from run-through platform with deck level at 86.25’ and soffit at 70.25’ (27’ clear at platform)

PARKING

With the demolition of the USPG, public station parking would be relocated either above or below ground.

The anticipated parking program for the SEP is approximately 20-25% larger than the existing parking provided. This amount of parking growth is based on an approach that plans to shift some of the existing parking use from the leased parking to primarily WUS parking. By focusing the long term parking toward supporting the SEP functions, the total overall number of parking spaces increases a modest amount from the current number of parking spaces at the Station. This main growth area is related to the increase in Amtrak rail services with the SEP.

The location options for the parking would be either above or below the tracks and platforms. The above tracks options could either be south or north of H Street.

Above ground parking can be accommodated on top of the bus terminal structured on a nominally 60' x 60' grid located on the southeast, southwest, or northern portion of the site. According to the understanding of zoning height limits for overbuild development, the available zoning envelope constrains the ability to meet the programmatic requirements for public parking. Considerations for additional height for overbuild structures should be taken into account to address the parking number yields.

Access to the parking levels would be provided through ramps adjacent to the bus access. Pedestrian vertical circulation would be located so as to provide access to a centralized bus island from a shared mezzanine level that connects to both the concourse network and to H Street Bridge within the transfer structure above the tracks. The above ground parking would increase the footprint of the bus volumes.

Locating the parking above the deck in a garage facility would generally create a similar traffic load to the current USPG on H Street. Several other key factors will need to be considered as part of the detailed analysis including the existing and planned Streetcar operations and location and configuration of the planned intersections on H Street. As shown in the Concept Plans, it is anticipated that H Street would include at least two four way signalized intersections that would provide access to parking, pick-up / drop-off areas and service areas within the project site area north and south of H Street.

Below ground parking would be located below the concourse level either on a nominally 30'x30' or 30'x60' grid, depending on the presence of overbuild structure. On the lower levels, parking is proposed adjacent to the Amtrak service areas and any additional below-grade tracks. Access to below-grade parking is proposed to be located at K Street, beneath the bridge, on the concourse level. Vehicles then proceed to ramps leading down to levels B2, B3, and B4. Depending on the final parking program, the lowest level may be smaller than the entire site footprint. This is to be addressed in the next design phase if the concept moves forward.

This scenario would increase traffic on K Street since no WUS traffic currently uses K Street. The intersections along K Street including North Capitol Street, First Street and Second Street, operate at LOS ranging from A to F. The areas that operate at E and F are the first segments heading north and south at K Street. The concepts that shift the access to K Street will be analyzed as part of the EIS process to determine the impacts to the existing road network.

Structure Spacing	All Parking	Add Loading & Amtrak Service on B2	Add Taxi on B2	Add ABGT on B3/B4/B5/B6
Below Track Structure Only	B2 1,361 Spaces B3 1,510 Spaces **2 Floors: 2,871 Spaces**	B2 793 Spaces B3 1,510 Spaces B4 753 Spaces **2.5 Floors: 3,056 Spaces**	B2 646 Spaces B3 1,510 Spaces B4 753 Spaces **2.5 Floors: 2,909 Spaces**	B2 124 Spaces B3/B4/B5 1,001 Spaces **4 Floors: 3,127 Spaces**
Below Track and Overbuild Structure	B2 1,183 Spaces B3 1,304 Spaces B4 678 Spaces **2.5 Floors: 3,165 Spaces**	B2 713 Spaces B3 1,304 Spaces B4 678 (+62) Spaces **2.5 Floors: 2,757 Spaces**	B2 581 Spaces B3 1,304 Spaces B4 678 (+194) Spaces **2.5 Floors: 2,757 Spaces**	B2 112 Spaces B3/B4/B5 855 Spaces B6 336 Spaces **4.5 Floors: 3,013 Spaces**

Figure 72. Parking Capacity Estimates for Below Ground Parking (enlarged version of table is available in Appendix A)

ABOVE BUS TERMINAL AT SOUTHEAST

Seven (7) levels of parking above the southeast Bus Terminal would be sufficient for the program area requirements. Each level contains 121,000 GSF, for a total of 847,000 GSF. The resulting height required to achieve parking count would be in excess of the current USPG, as well as the previously established height limits on the site.

Capacity

At 375 SF per parking space on a 60'x60' grid, the parking facility above the southeast Bus Terminal could accommodate 2,258 cars. If the height limits are considered, then the parking facility above the southeast Bus Terminal could only accommodate 1,936 cars over six (6) floors. Should the active bus program increase, three levels would be dedicated to the Bus Terminal and four levels to parking, for a total of 1,290 cars.

ABOVE BUS TERMINAL AT SOUTHWEST

Eight (8) levels of parking above the southwest bus terminal would be sufficient for the program area requirements. Each level contains 104,000 GSF, for a total of 832,000 GSF. The resulting height required to achieve parking count would be in excess of the current USPG, as well as the previously established height limits on the site.

Capacity

At 375 SF per parking space on a 60'x60' grid, the parking facility above the southwest bus terminal could accommodate 2,218 cars. If the height limits are considered, then the parking facility above the southwest Bus Terminal could only accommodate 1,664 cars over six (6) floors. Should the active bus program increase, three levels would be dedicated to the Bus Terminal and four levels to parking, for a total of 1,109 cars.

ABOVE BUS TERMINAL AT NORTH

Seven (7) levels of parking above the southeast bus terminal would be sufficient for the program area requirements. Each level contains 114,200 GSF, for a total of 799,400 GSF. The resulting height required to achieve parking count would be in excess of the current USPG, as well as the previously established height limits on the site.

Capacity

At 375 SF per parking space on a 60'x60' grid, the parking facility above the north Bus Terminal could accommodate 2,131 cars. If the height limits are considered, the parking facility above the north Bus Terminal could only accommodate 1,827 cars over six (6) floors. Should the active bus program increase, three levels would be dedicated to the Bus Terminal and four levels to parking, for a total of 1,218 cars.

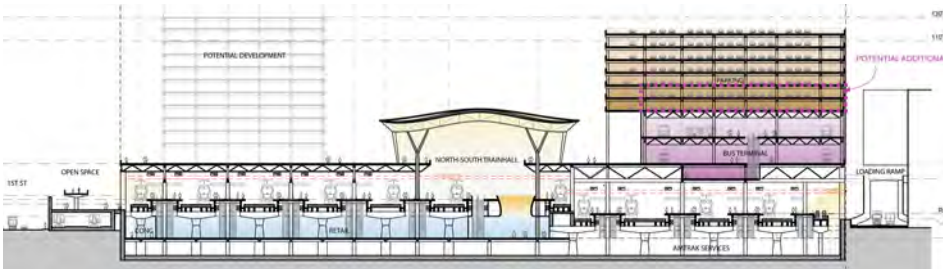


Figure 73. Section - Parking Above Bus Terminal at Southeast

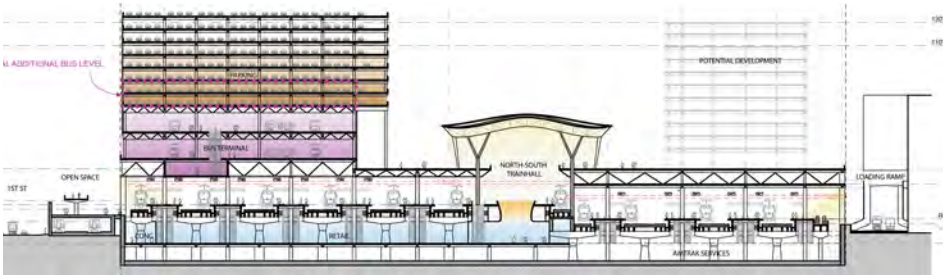


Figure 74. Section - Parking Above Bus Terminal at Southwest

Figure 75. Section - Parking Above Bus Terminal at North

BELOW CONCOURSE LEVEL WITHOUT ADDITIONAL BELOW-GRADE TRACKS

Two-and-a-half (2.5) levels of parking could be accommodated below the concourse level. B2 contains 182,300 GSF available for parking, while B3 contains 703,220 GSF and B4 373,700 GSF, for a total of 1,279,220 GSF.

Capacity

With structure on a 30'x30' grid, the parking layout efficiency is at 500 SF per parking space below stub-end tracks and 550 SF for run-through, the parking facility below the concourse level can accommodate 2,497 cars.

BELOW CONCOURSE LEVEL WITH ADDITIONAL BELOW-GRADE TRACKS

Four (4) levels of parking can be accommodated below the concourse level with additional below-grade tracks. B2 contains 182,300 GSF available for parking, while B3, B4, and B5 contain 427,620 GSF each, for a total of 1,465,160 GSF.

Capacity

With structure on a 30'x30' grid, the parking layout efficiency is at 500 SF per parking space below stub-end tracks and 550 SF for run-through, the parking facility below the concourse level can accommodate 2,747 cars.

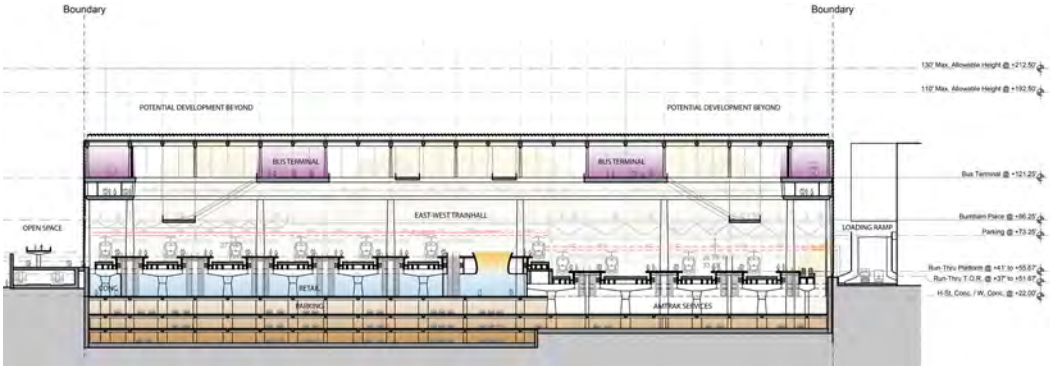


Figure 76. Section - Parking Below Without ABGT

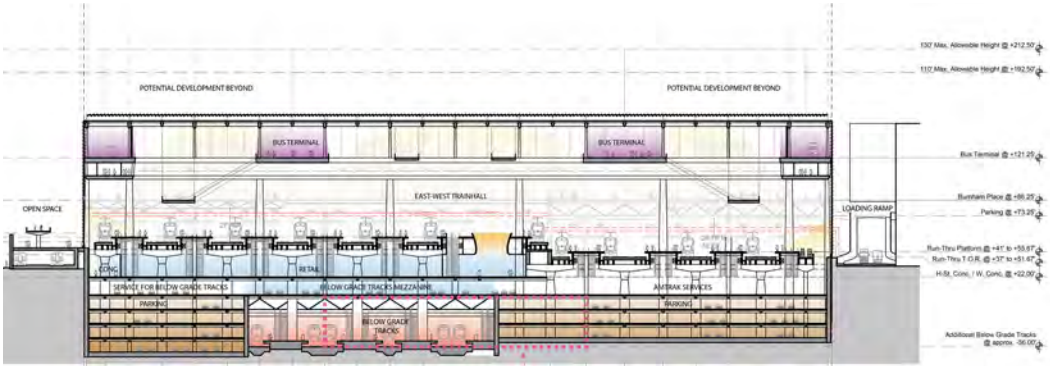


Figure 77. Section - Parking Below With ABGT

YIELDS BASED ON NUMBER OF FLOORS	PARKING ABOVE DECK			PARKING BELOW GROUND	
	ABOVE BUS ON SOUTHEAST	ABOVE BUS ON SOUTH-WEST	ABOVE BUS ON NORTH	WITHOUT ADD. BELOW-GRADE TRACKS	WITH ADD. BELOW-GRADE TRACKS
TOTAL AREA (GSF) OVER 7-8 FLOORS	847,000	832,000	799,400	1,279,220*	1,465,160**
TOTAL NUMBER OF PARKING SPACES	**2,258**	**2,218**	**2,131**	**2,497**	**2,747**
TOTAL AREA (GSF) OVER 6 FLOORS	726,000	624,000	685,200	N/A	N/A
TOTAL NUMBER OF PARKING SPACES	**1,936**	**1,664**	**1,827**	**N/A**	**N/A**

Table 12. SEP - Total Proposed Public Parking Program Capacity by Option

* Over 2.5 Floors

** Over 4 Floors

CONCOURSES

A network of concourses has been proposed to effectively connect the SEP's different transportation modes and improve pedestrian access to adjacent neighborhoods and future development. These concourses are designed to accommodate projected pedestrian flow, enhance wayfinding and improve customer experience.

In all concepts, the network of proposed concourses consists of four interconnected components, which includes:

- Concourse A at both the main (+57') and lower concourse levels (+22),
- H Street Concourse (+22),
- First Street Concourse (+22), and
- Central Concourse at the lower concourse level (+22).

The base case for the lower concourse level presumes no additional below-grade tracks. However, if additional track capacity is located beneath the lower concourse level, access points from this level will have to be created to the tracks and platforms below (see Lower Concourse Level Plan at bottom).

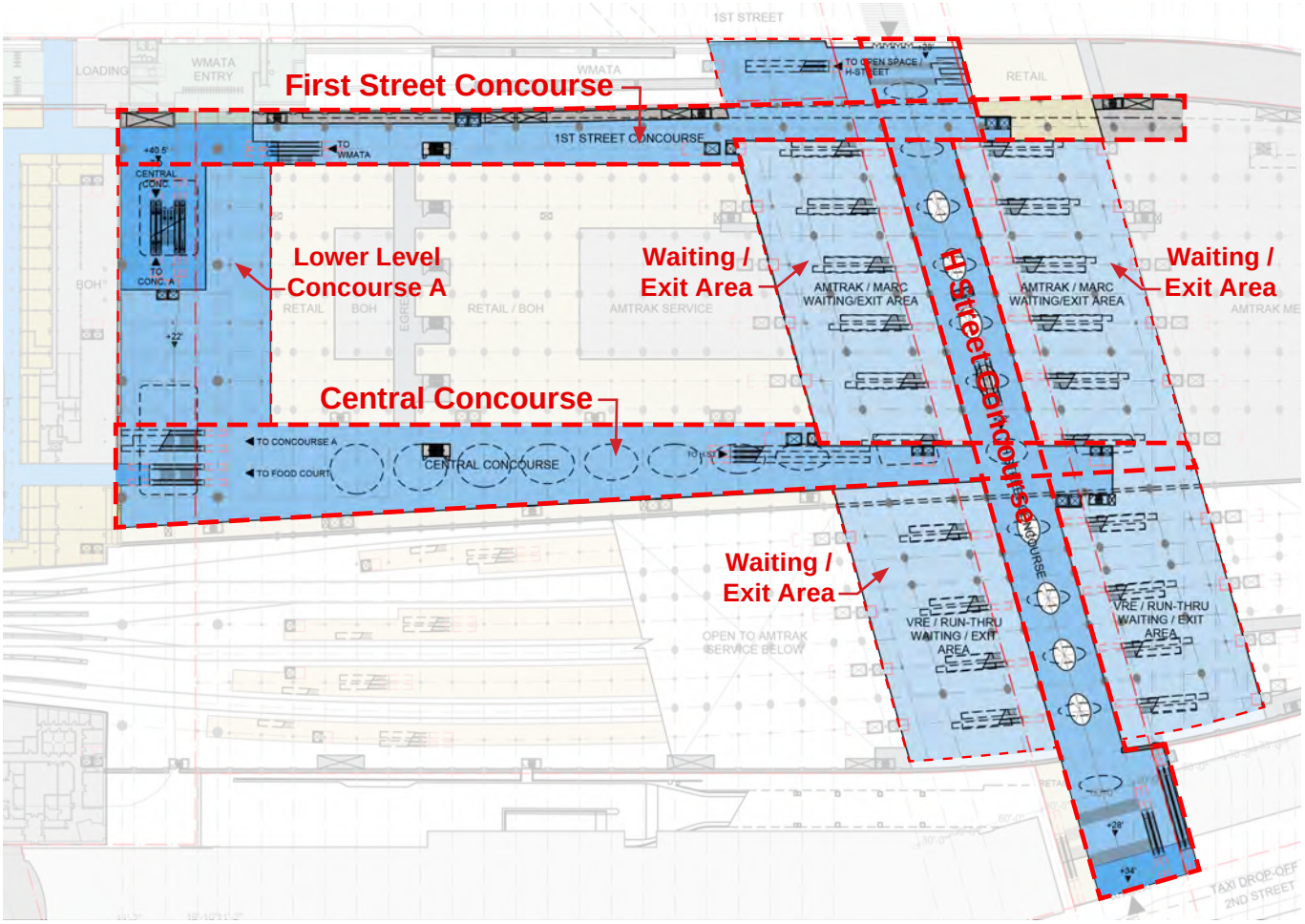


Figure 78. Lower Concourse Level Plan (without additional below-grade tracks)

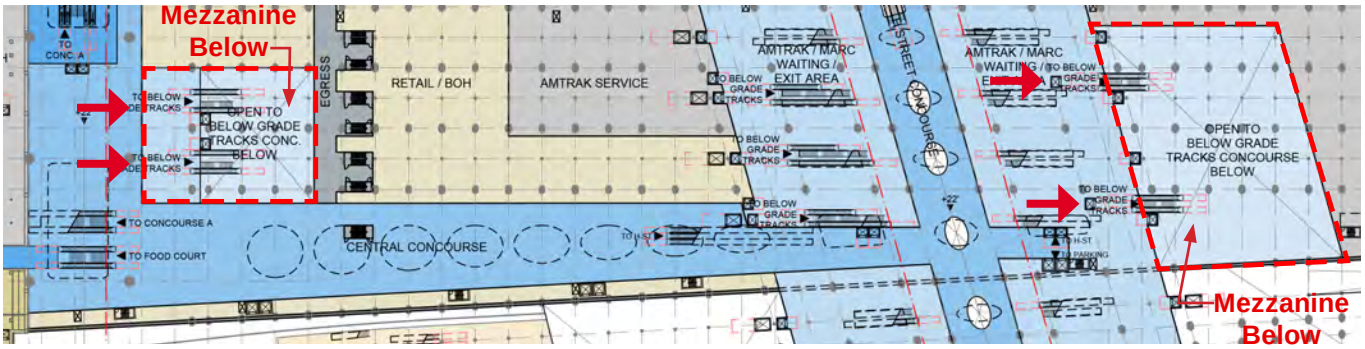


Figure 79. Lower Concourse Level Plan (with additional below-grade tracks)

Concourse A

The proposed Concourse A is designed to be a northern extension of the Historic WUS buildings that acts as a connecting piece between multiple modes of transportation, the lower concourse level, and the BP development above. Pedestrians arrive at Concourse A through the Historic WUS and the Historic Concourse, and proceed through an architecturally grand space that provides access to the rail platforms at the north.

Vertical circulation elements (VCE's) would be located on the concourse's east and west sides to bring pedestrians up to the BP development and the bus terminal (if it is situated on the south side of the site). The western VCE's also would provide access to the WMATA entrance below. Furthermore, a central set of VCE's would connect down to the Central Concourse, through which pedestrians could access the lower level retail, as well as the H Street Concourse for taxi, parking, below-grade platforms and streetcar connection.

For clear wayfinding and enhanced customer experience, Concourse A would be designed as a high volume space with maximum daylight that affords visitors and travelers a myriad of amenities and linkages to and from their destinations. An expansive entrance between the Historic Concourse and Concourse A permits large amounts of pedestrian traffic to and from the main WUS entry, and encourages clear direct access to the platform gates. The space of Concourse A would allow sufficient floor space for retail pods, passenger amenities and ticketing stations, and large light-wells down to the concourse below. The porosity between levels further creates a concourse system that is easily navigated, visually intuitive, and spatially uplifting.

As a consequence of expanding Concourse A, certain improvements to the Historic Concourse could be considered, allowing for partial restoration and better circulation. Combined with technological and operational advances, it would be possible to clear the center of the existing ticketing functions, amongst other functions.

Figure 80. Entry Sequence into Concourse A

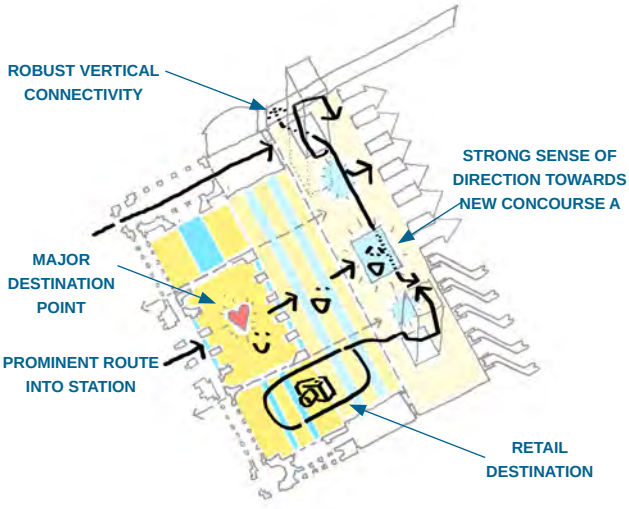


Figure 81. Major Circulation Routes

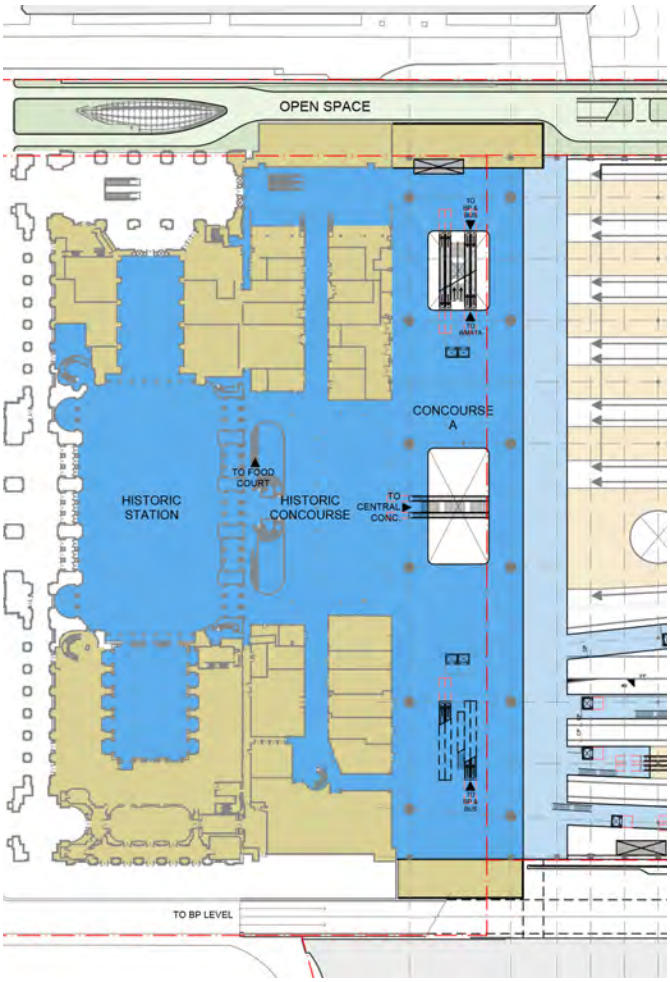


Figure 82. Plan of Historic WUS and Concourse A

Typical Base Case Concourse A Without Expansion for East-West Train Hall

Figure 83. Main Level View

Figure 84. BP Development Level View

H-Street Concourse

The H Street concourse would be located below the tracks directly under the H Street Bridge, providing a convenient centrally-located access to the rail platforms. The concourse would dynamically connect rail passengers to multiple levels, including the adjacent neighborhoods via First and Second Streets on grade, taxi and parking below, and H Street Bridge and streetcar above.

Arriving by rail, passengers on the platforms would access the H Street Concourse via banks of escalators, elevators and stairs, which would be located within the waiting/exit zones flanking the edges of the concourse. Generous light-wells on the platforms above would be co-located with the VCE's to allow natural light to attract and direct station users to nodes of circulation and enhancing intuitive wayfinding. From the H Street Concourse, pedestrians could access NoMA or the neighborhoods to the east via entrances on First and Second Streets, which would be designated taxi drop-off locations. These entrances would be equipped with additional VCE's that connect up to the H Street Bridge and the streetcar. The concourse would be linked to both the First Street and Central concourses, which are north-south corridors linking pedestrians to WMATA and the historic WUS. These concourses could include vertical links to parking and taxi facilities, whether below or above grade.

The H Street Concourse, H Street Bridge and the publicly accessible open space (greenway) would be designed in an integrated manner to establish a holistic wayfinding strategy for pedestrians moving between the Lower Level Concourse and the BP development. The goal is to create a sequence of activated and day-lit spaces that intuitively guide pedestrians to their destinations, to reduce the reliance on signage.

To achieve well lit spaces in the H Street Concourse, sculptural light funnels are proposed on the H Street Bridge, which bring daylight through the platform level down to the H Street Concourse. At the bridge level, the funnels could be architecturally compelling forms and visually identify the presence of SEP functions below. Coordination of the proposed light funnels is an ongoing effort with DDOT with respect to the H Street Bridge design.

At the concourse level, the quality of space would be enhanced by the consistent rhythm of light from above that would guide east-west pedestrian movements. The brightly-lit First and Second Street entrances would visually mark the nodes where pedestrians can exit the station or ascend up to the H Street Bridge, which would be a fully-landscaped, retail-rich destination with access to the streetcar.

The VCE's at First Street could potentially be integrated with a publicly accessible open space (greenway), providing pedestrians the opportunity to access a recreational civic amenity.

Vertical connections at Second Street could connect to the REA property. Pending further coordination with Amtrak, the property could support SEP functions in the future.

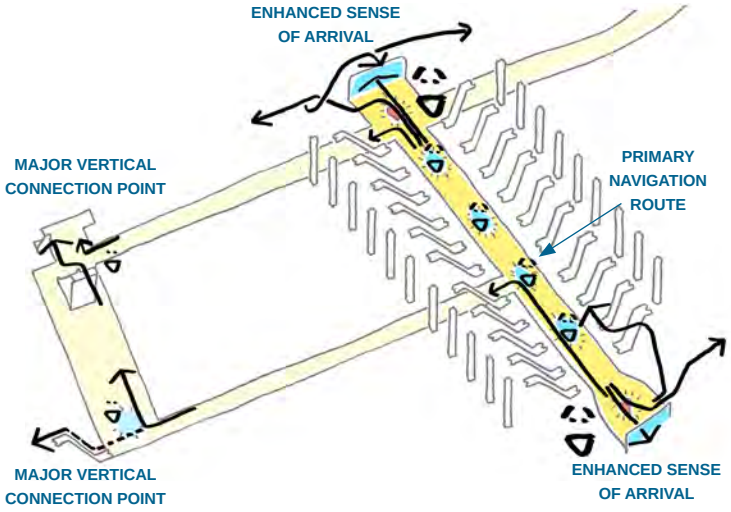


Figure 85. Lower Concourse Level Wayfinding

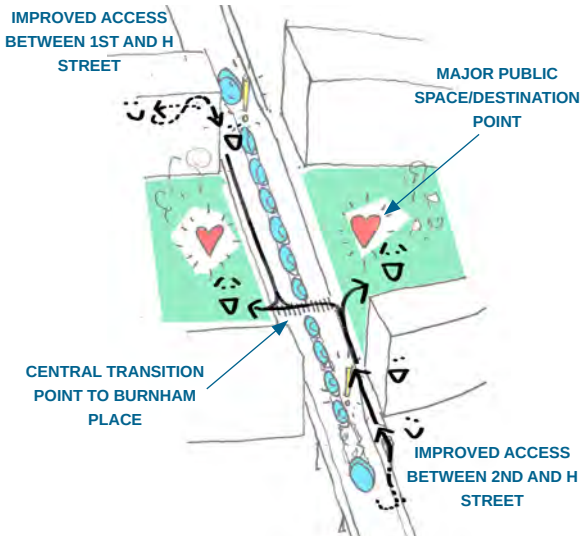


Figure 86. H Street Level Wayfinding

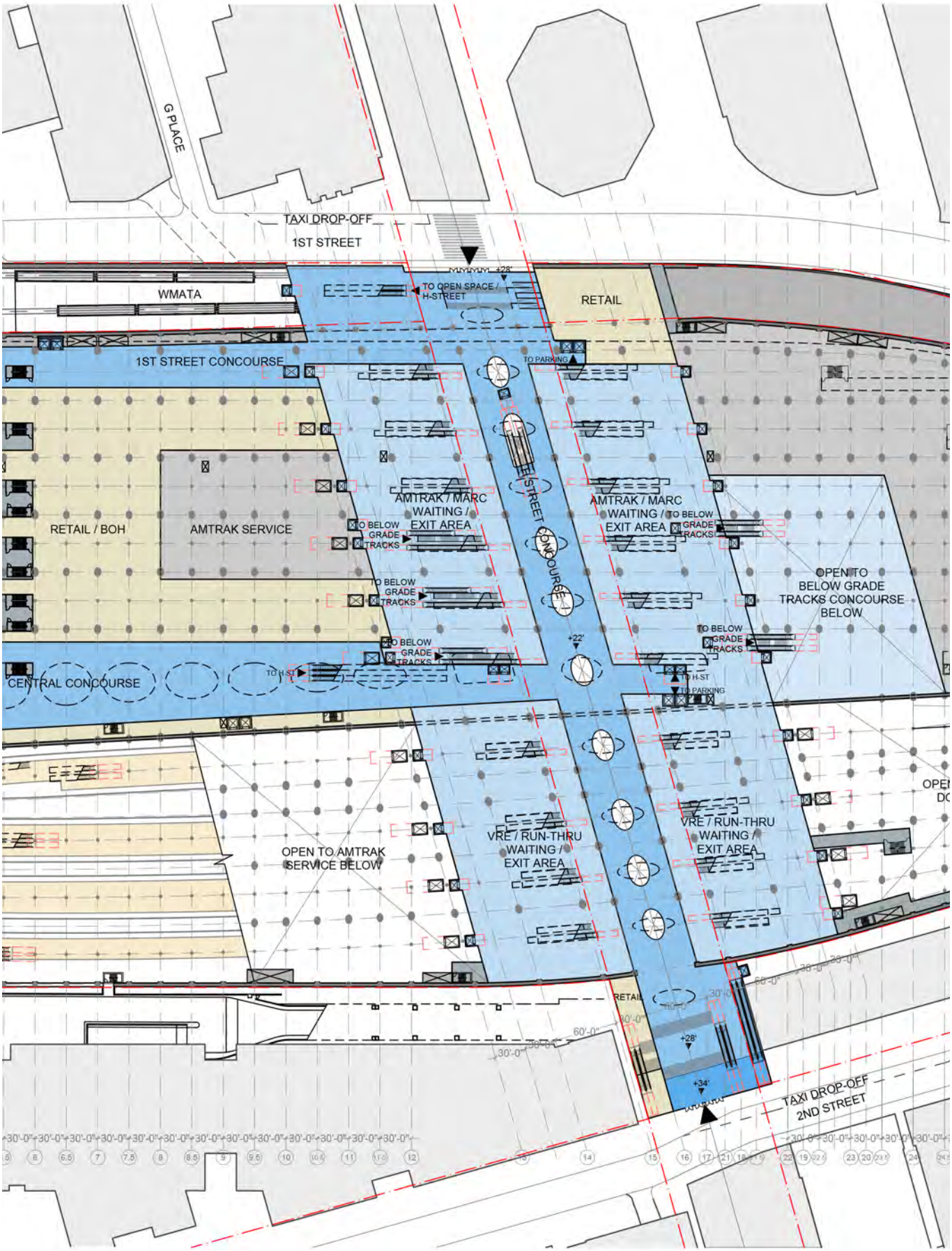


Figure 87. Plan of H Street Concourse

H Street Concourse

Axonometric Diagrams

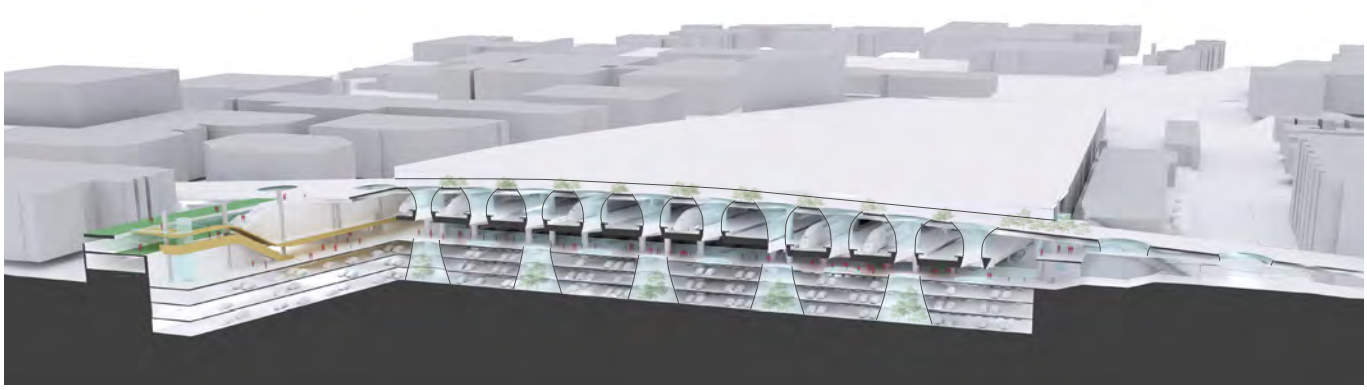


Figure 88. Axonometric Section along H Street Concourse

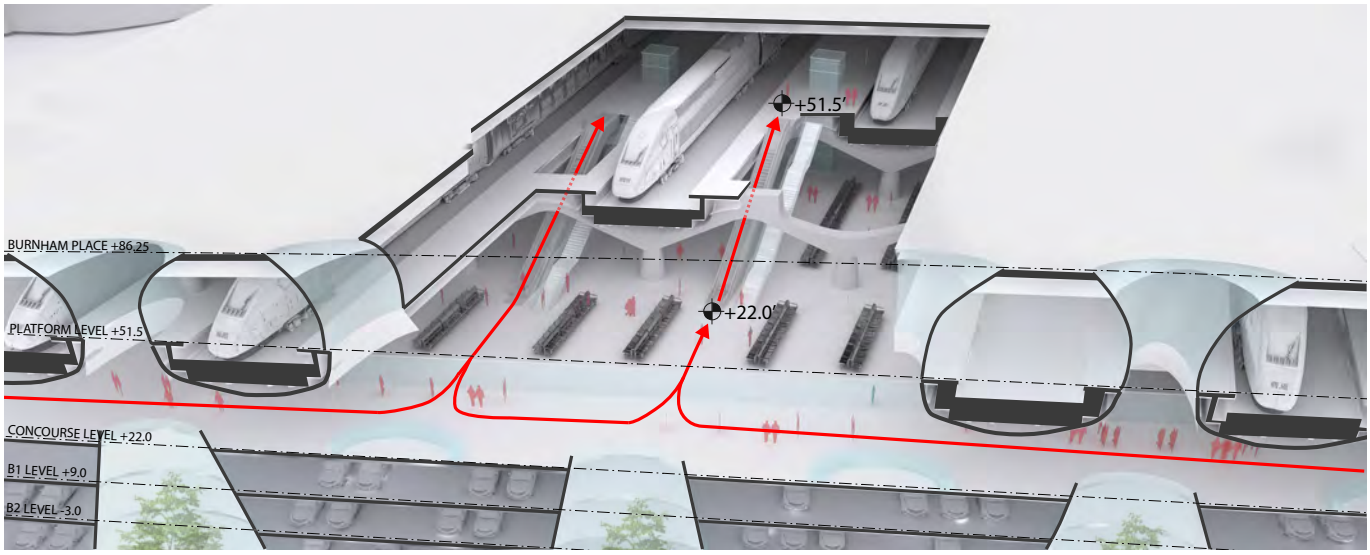


Figure 89. Circulation Diagram of H Street Concourse, Waiting/Exit Area and Platforms

H Street Concourse

Axonometric Diagrams

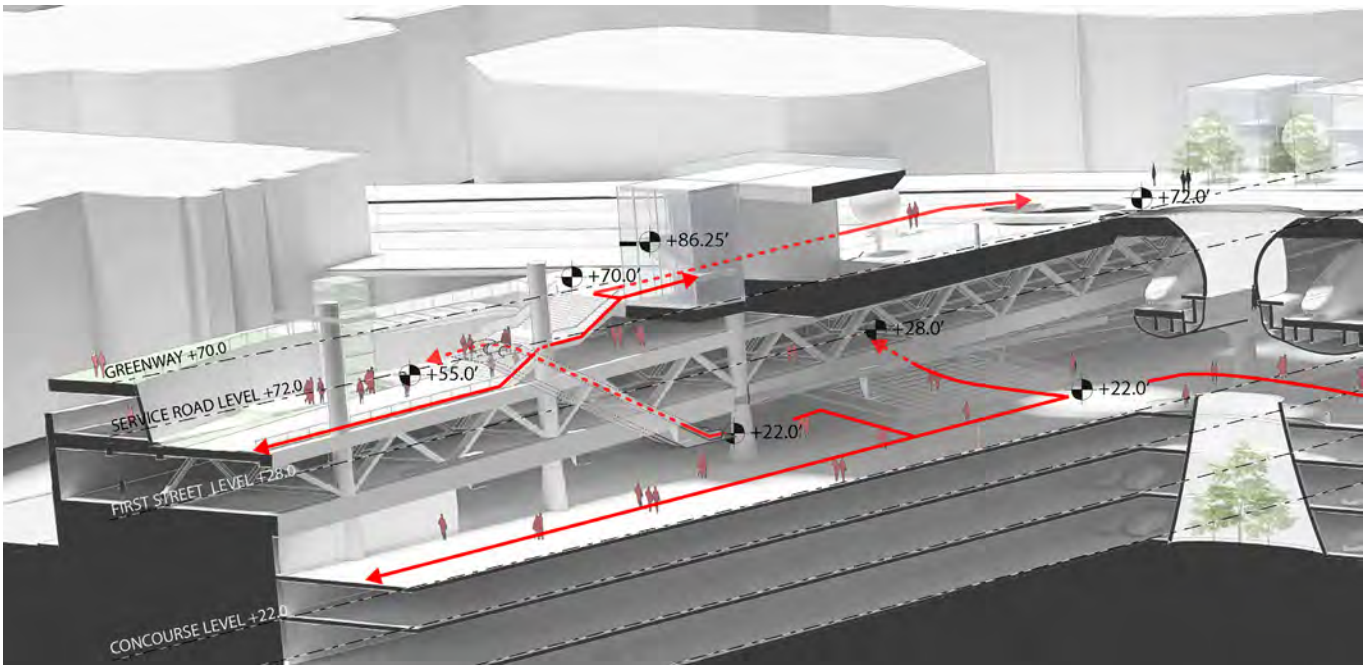


Figure 90. First Street Entrance Circulation

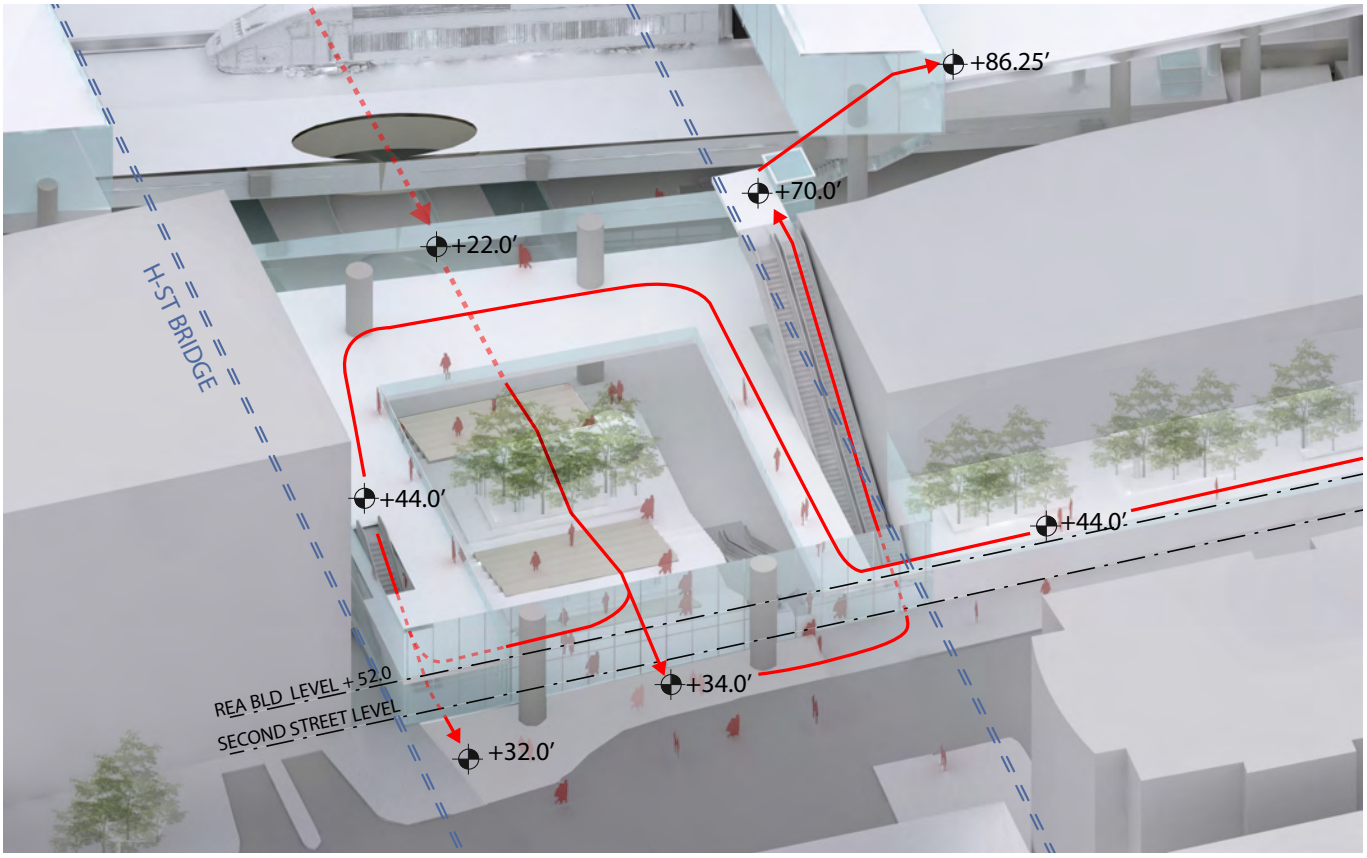


Figure 91. Second Street Entrance Circulation

H Street Concourse

Sequential Views of First Street Entry

Figure 92. View towards First Street entrance as a pedestrian is transported down from a platform to the H Street Concourse.

Figure 93. At the intersection of First Street and H Street Concourse, pedestrians have the choice of going out to First Street, ascending up to H Street via VCE's under the WMATA tunnel, or accessing the WMATA via the First Street Concourse.

Figure 94. At the midpoint of the journey up to H Street, pedestrians have the opportunity to access the regional publicly accessible open space (greenway), which is designed for both pedestrians and cyclists.

Figure 95. Turning north, pedestrians can go up to the H Street Bridge level to access BP development and streetcars.

Figure 96. The First Street entrance is developed as an important node for WUS entry, with supporting retail across and skylight overhead.

H Street Concourse

Sequential Views of Second Street Entry

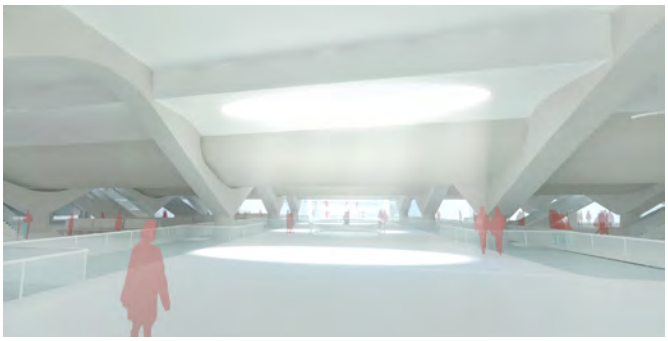


Figure 97. View looking east along H Street Concourse towards the Second Street entry.

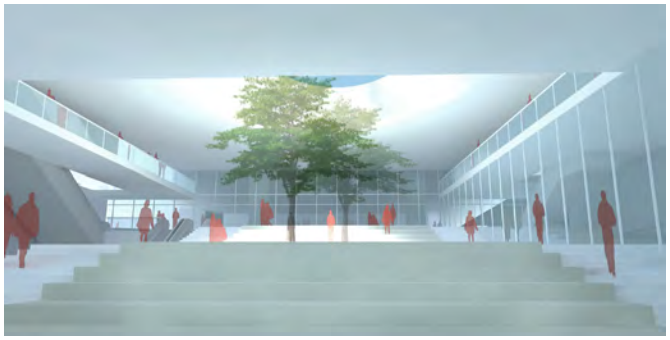


Figure 98. View toward the Second Street entry lobby at the east end of H Street Concourse, where pedestrians ascend to the street level via a grand circulatory space.

Figure 99. View at street level looking northwest toward vertical circulation up to the top of H Street Bridge alongside the REA building.

Figure 100. The Second Street entrance is developed as an important node for WUS entry, with clear connection to the bridge level and supporting retail across.

First Street Concourse

The First Street Concourse would extend north-south along the western edge of the site, providing a direct link from the H Street concourse to the WMATA Metrorail entrance. The concourse would be lined with retail and support functions to the east side, which would enhance the station user experience. Vertical connections to the below-grade parking facility would be located along the west side, which would potentially receive a small amount of day light from a narrow skylight above (4'-9" to 11' wide) between the western-most track and the edge structure. A set of VCE's would be located near the southern end, to transport station users to the WMATA entrance one floor above.

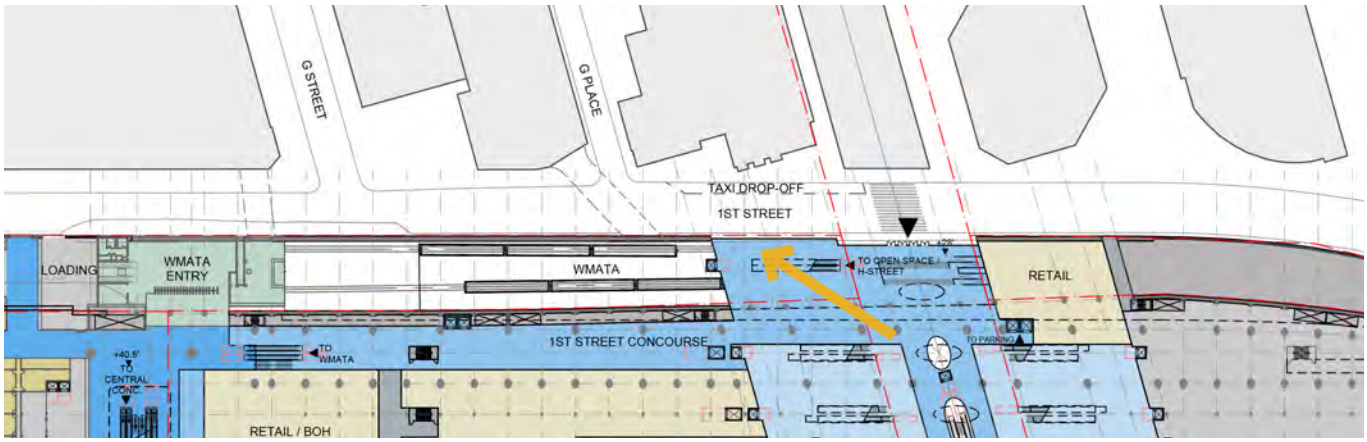


Figure 101. Plan of the First Street Concourse

Figure 102. View down the First Street Concourse from the H Street Concourse

Central Concourse

The Central Concourse would be an additional north-south connector at the center of the site, situated immediately west of the Run-Through tracks. It would provide a direct connection between the H Street Concourse, the Food Court and Concourse A via VCE's at its southern end. It also has vertical connections to parking above or below.

The southern end of the concourse is connected to the First Street concourse by a lower level extension of Concourse A that includes a mezzanine serving the WMATA entrance. This concourse link is a second means to access WMATA Metrorail and provides extra retail amenity for pedestrians.

In addition to the First and Second Street connections to H Street Bridge, a potential vertical connection to the BP development could be added at the intersection of the Central Concourse and H Street, especially if additional connections to the streetcar are required or if the Bus Terminal is situated at the north needs connection.

The Central Concourse is the only concourse that is greatly influenced by the preferred platform and track option (Option 14 or 16). The Option 14 track and platform layout entails a full opening between Stub End and Run-Through tracks (51' wide at south end and 19.65' wide at north end) that provides daylight to the Central Concourse. However, due to the limited headroom under the Run-Through tracks, retail can only be placed along its west side under the Stub End track. The concourse would be narrower and shifted to the east

In contrast, the Option 16 Tracks and Platforms layout entails a mega-platform to be situated above the Central Concourse. Daylighting and wayfinding would greatly benefit from large light-wells through the mega-platform. The Option 16 scheme would allow for additional retail on both sides of the concourse, due to adequate headroom on the east side under the last Stub End track. The concourse would be wider and better aligned to the overall rail terminal geometry.

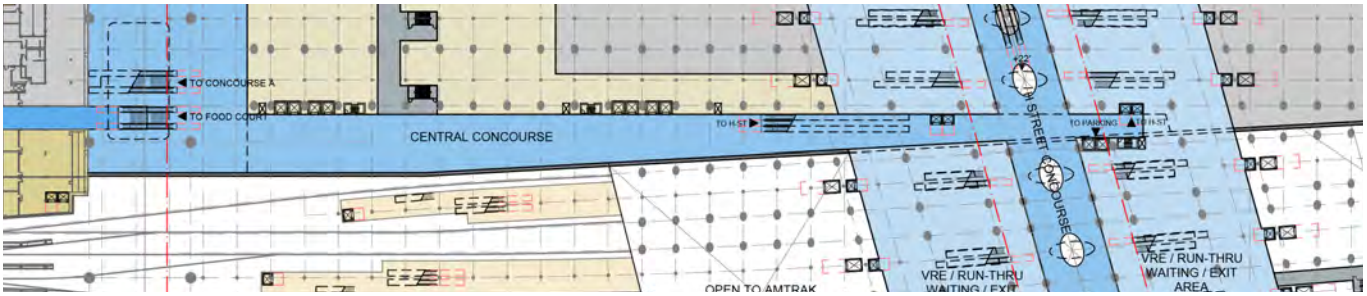


Figure 103. Plan of the Central Concourse with TI Option 14

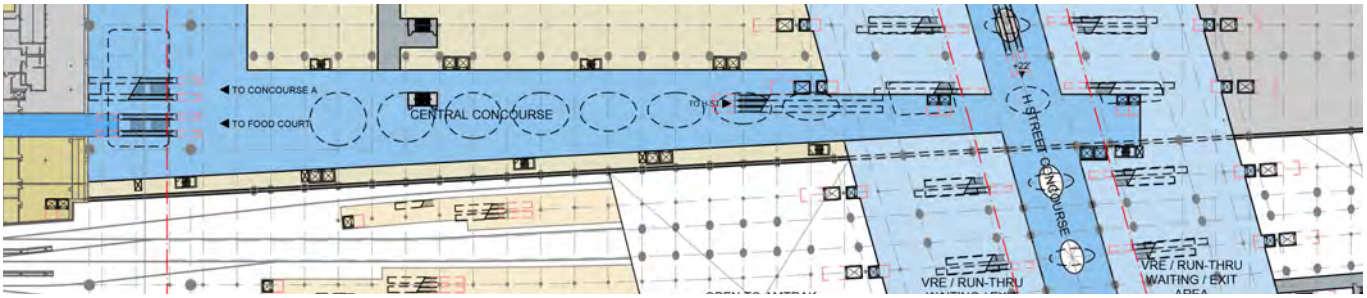


Figure 104. Plan of the Central Concourse with TI Option 16

Central Concourse

Views looking north on Central Concourse

Figure 105. TI Option 14

Figure 106. TI Option 16

Level of Concourse

Due to limited height clearance under the run-through tracks, a study was conducted to determine the appropriate spatial level, or datum, of the H Street Concourse. Initial studies indicated concourse at +25'-0"; however, this would entail a below Run-Through track floor to ceiling height of approximately 10' at the concourse and approximately 8'-4" at the southern extent of the waiting area.

This would result in a concourse space with very limited headroom. The concern is this compressed, linear space would resemble the concourse's spatial quality of New York Penn Station. Therefore, the proposed concourse datum is lowered to +22', to provide approximately a 13' height clearance under the Run-Through tracks and 20' under the Stub End tracks.

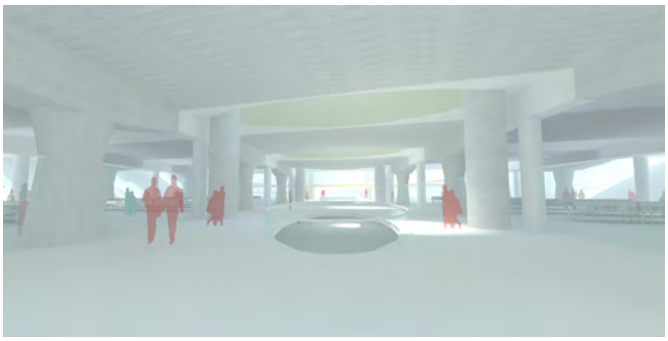


Figure 107. Below Stub End Tracks (Concourse at +25')

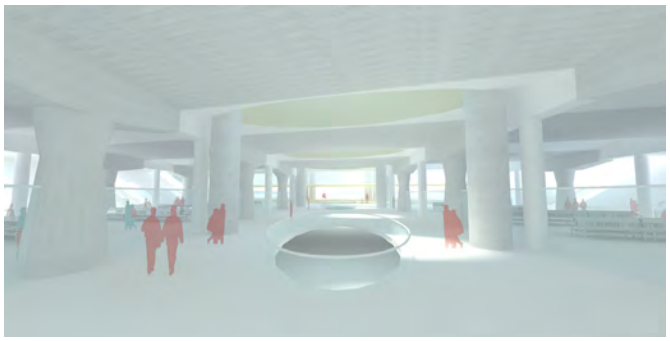


Figure 108. Below Stub End Tracks (Concourse at +22')

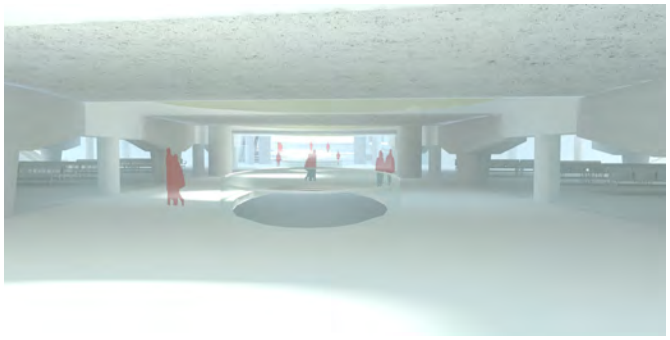


Figure 109. Below Run-Through Tracks (Concourse at +25')

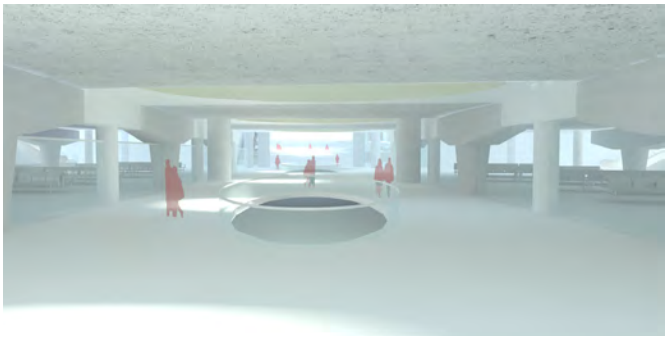


Figure 110. Below Run-Through Tracks (Concourse at +22')

Modified Below-Track Structure

To create a high quality concourse experience, arched transfer structures are proposed within the H Street and First Street concourses, decreasing the visual density of structural members. These transfer structures would span between the track-supporting columns and centered on platforms, supporting the H Street Bridge and the BP overbuild above. By transferring the loads above to fewer columns, the quality of space would be enhanced, allowing clearer wayfinding and a more open floorplan for waiting areas and amenities. This structural enhancement would require close coordination with the independent H Street Bridge project.

Figure 111. H Street Concourse looking west with uncoordinated bridge piers

Figure 112. H Street Concourse looking west with coordinated bridge piers

Figure 113. H Street Concourse looking east with uncoordinated bridge piers

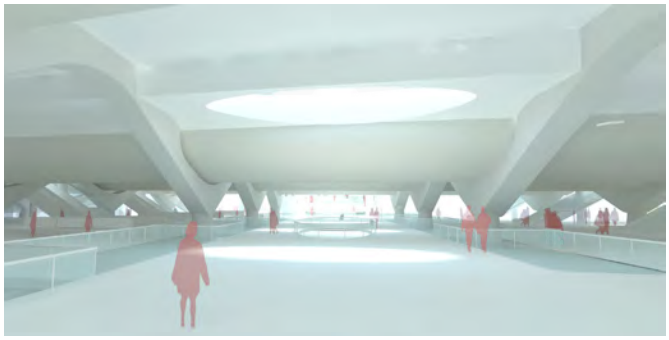


Figure 114. H Street Concourse looking east with coordinated bridge piers

TAXIS / SHARED RIDE

The SEP concepts include pick-up and drop off taxi locations near all major concourses, including an additional location on BP Level adjacent to Concourse A. Providing a second location will increase the throughput capacity of cabs/shared services to pick-up and drop off passengers. There would also be increased pick up and drop off capacity provided near the First and Second Street entrances to the H Street Concourse. The diagram below shows taxi pick-up and drop off locations at the Main Level.

To the extent possible, the existing sightseeing buses that pick up and drop off in front of the WUS would be shifted to the new bus terminal or potential location accessed from H Street. This would allow for additional flexibility in operations of the pick-up and drop off area in front of the WUS. These changes would increase the capacity of taxi/shared services to support the SEP.

The following options address the required accommodation of the existing queue for 125 taxis to a dedicated waiting and storage area. The current taxi pick up and drop off is limited to a portion of the lanes in Columbus Circle.

The diagram for the first queue option is shown on Page 89, the remaining options are delineated in Appendix A.

TAXI QUEUE BELOW H STREET CONCOURSE AT B2 LEVEL (EL +7.0')

Taxis would enter from K Street through a shared garage access point and descend one level to a taxi loop positioned below the H Street Concourse. There taxis would loop around the projection of the light funnels from above, where VCE's would be located to bring passengers down from the concourse level to the level B2. This option integrates taxi queuing and passenger pickup/drop-off at the same location. In addition, taxis would be conveniently placed in proximity to a major concourse area where passengers exiting the rail platforms go straight down to taxis through the H Street Concourse.

TAXI QUEUE ALONG H ST, THE DECK, AND SERVICE RAMP TO HISTORIC WUS

In this option taxis queue outside along H Street, the deck, and along the service ramp leading up to the front of the historic WUS. Taxis would share the service road with the development south of H Street. The main pickup/drop-off points become the deck and the historic WUS.

TAXI QUEUE ABOVE THE BUS TERMINAL AT SOUTHEAST

Taxis would queue on the third level of the southeast Bus Terminal building, entering from the H Street Bridge along with cars parked at the levels above. No passenger pickup/drop-off can be accommodated at the same location. Taxis are then distributed to the front of the historic WUS through the service ramp, the deck level, and to the H Street concourse exits at First and Second Streets.

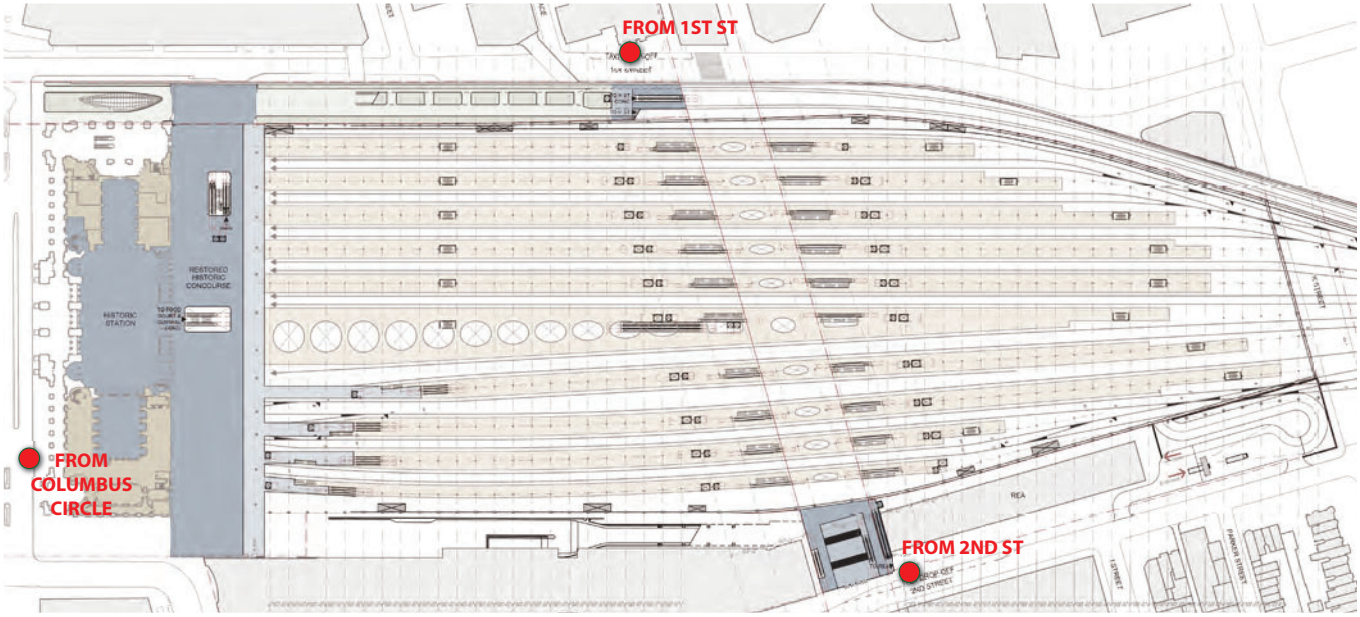


Figure 115. Plan Diagram with Taxi Pick-Up and Drop Off Locations at the Main Level

TAXI QUEUE ABOVE THE BUS TERMINAL AT SOUTHWEST

Taxis queue on the forth level of the southwest bus terminal building, as the first level contains passenger circulation to the bus levels and the following two levels accommodates the buses. Taxis enter from the H Street bridge along with cars parked at the levels above. No passenger pickup/drop-off can be accommodated at the same location. Taxis are then distributed to the front of the historic WUS through the service ramp, the deck level, and to the H Street Concourse exits at First and Second Streets.

TAXI QUEUE ABOVE THE BUS TERMINAL AT NORTH

Taxis queue on the third level of the northern Bus Terminal building, entering from the H Street Bridge along with cars parked at the levels above. No passenger pickup/drop-off can be accommodated at the same location. Taxis are then distributed to the front of the historic WUS through the service ramp, the deck level, and to the H Street Concourse exits at First and Second Streets.

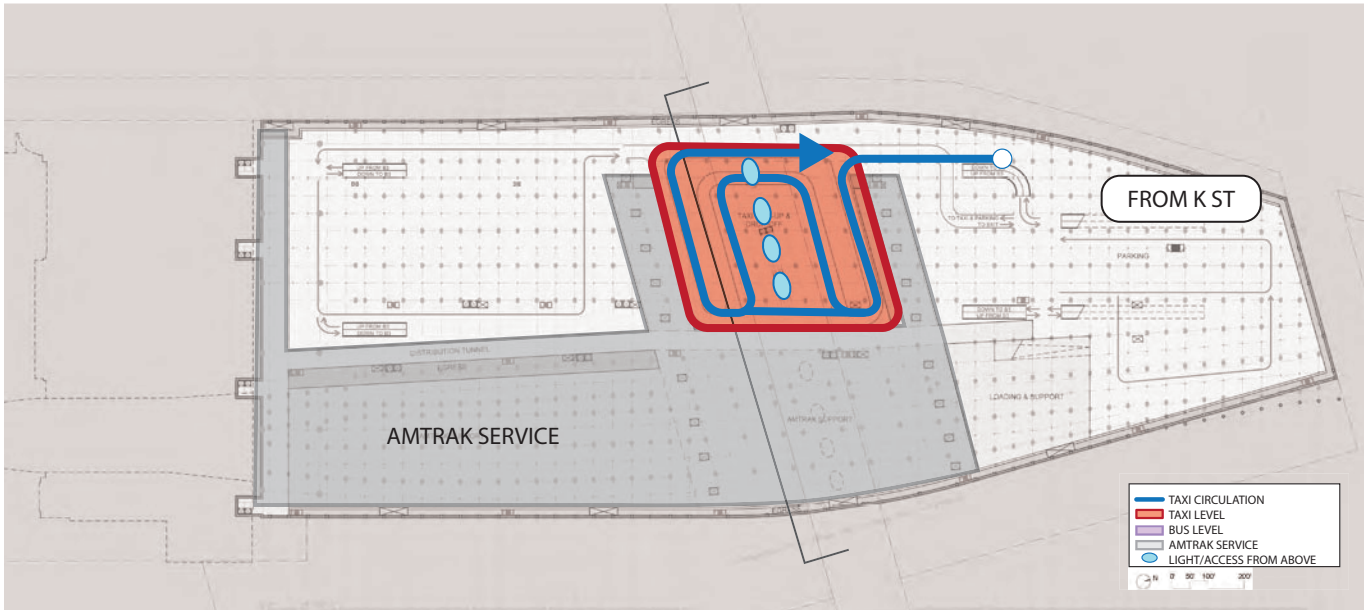


Figure 116. Plan Diagram with Below-Grade Taxi Queue

FUNCTION & SUPPORT SYSTEMS

Support functions include back of house (BOH) services and distribution network for Amtrak operational needs and are proposed at the concourse level. The distribution network would connect to the loading dock at level B2. Both levels would allow for growth requirements during phasing.

The diagrammatic plan of level B2 (Figures below) illustrates Amtrak commissary areas coordinated with the service circulation to the loading dock and distribution paths to the platforms. Forklifts or other small vehicles/carts would be required to pick up loads and transport them to the rail and retail service areas, which would then distributed to each respective platform. Distribution of retail goods continues to the south, reaching the central concourse and WUS service cores.

At the concourse level, mechanical and engineering spaces would be placed on the northwest portion of the plan. Located between K Street and the H Street Concourse, the mechanical and engineering areas would have direct access to street level for larger equipment transportation. In addition, personnel allowed to enter restricted mechanical areas would have direct access to the WUS through the central and First Street concourses.

When loading is located off-site, the crew base and police functions could be located adjacent to the mechanical and engineering spaces, between K Street and the H Street Concourse. The strategic placement of these areas would allow the police to have direct access to street level, required for the safety of the station in case of an emergency event. Once inside, emergency responders would have direct access to all below grade concourse areas, being able to efficiently access all levels of the SEP. Crew base would also have direct access to the H Street Concourse, to easily access every platform.

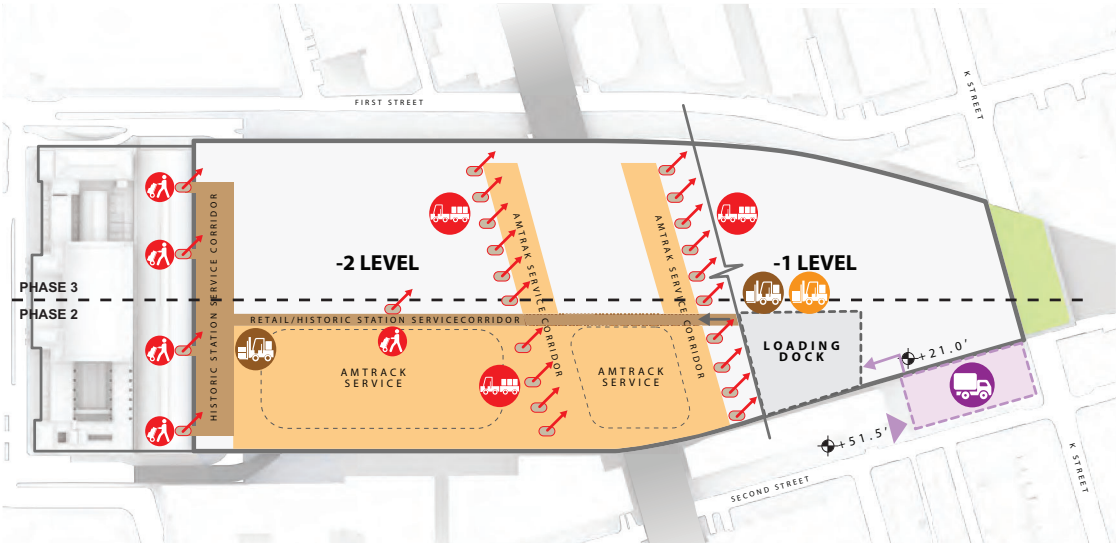


Figure 117. Support Function Plan Diagram - On-Site

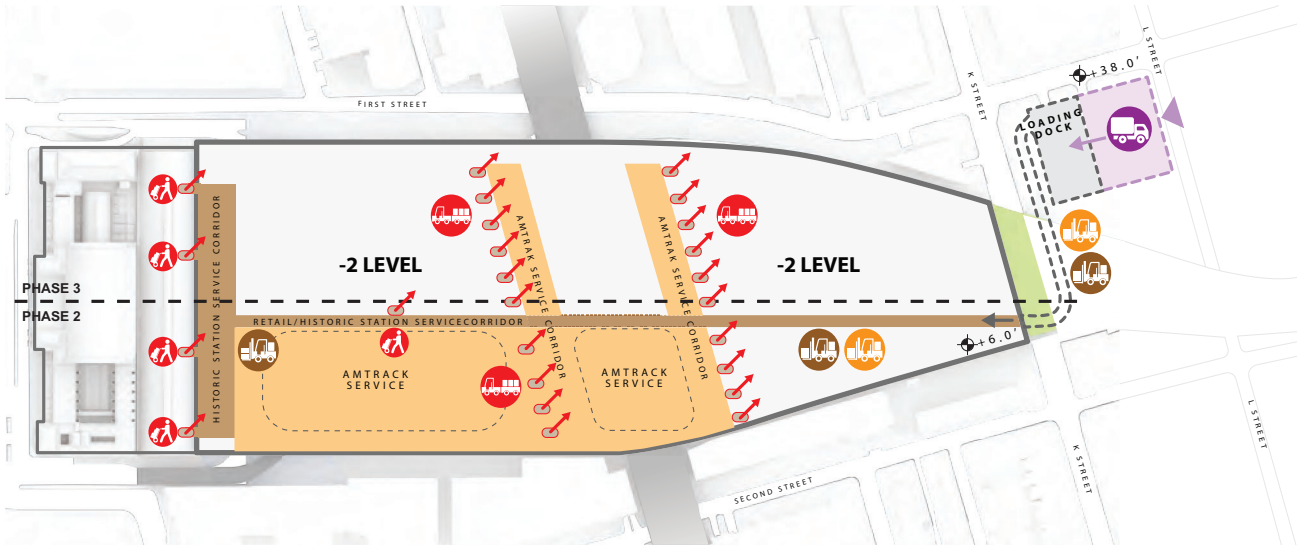


Figure 118. Support Function Plan Diagram - Off-site

SERVICE ACCESS AND LOADING

A series of options were developed that explored both on-site and off-site options for the accommodation of service access, screening, and loading docks. The options have varying degrees of efficiency and feasibility, but they all service both retail and rail-based loading operations.

For on site loading options, in principle, after entering the screening facility, trucks would be screened and then proceed to the loading dock. Alternatively, trucks could be rejected after screening and quickly redirected away from the premises.

Smaller trucks that can be visually screened could utilize the existing east and west loading docks, to the extent that they remain in place.

For off-site options, large trucks would be screened away from the tracks and platforms. Smaller vehicles would be required to pick up loads and transport them to the service and retail areas.

To evaluate the different access and loading options, several criteria were applied to determine the strength of each option:

- Sufficient clearance available to gain access from the site edges to the below-track areas
- Ease of vehicle rejection to surrounding streets
- Operational compliance for vehicle maneuvers
- Minimal traffic planning impacts

A likely on-site screening and loading facility option is shown below. Other options are included in Appendix A.

Existing Loading Facilities

While large trucks are screened off-site, smaller trucks may continue to operate in a limited fashion at the existing east and west loading docks if screening can be performed. The existing east and west loading docks service the historic station retail and Amtrak services for both Run-Through and Stub End tracks, respectively.

A reconfigured western loading dock may be considered to accommodate removals only. Direct access to a back-of-house corridor behind the food court could be maintained. A visual screening would continue to be performed prior to pulling into the loading dock. This configuration would depend on which version of the WMATA Metrorail mezzanine improvement plan is implemented.

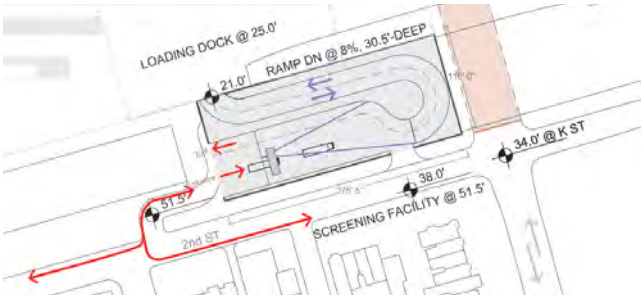
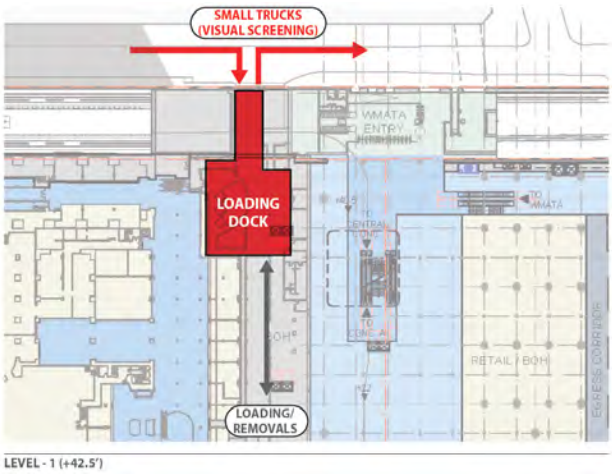


Figure 119. Screening and loading at corner of K and 2nd Streets



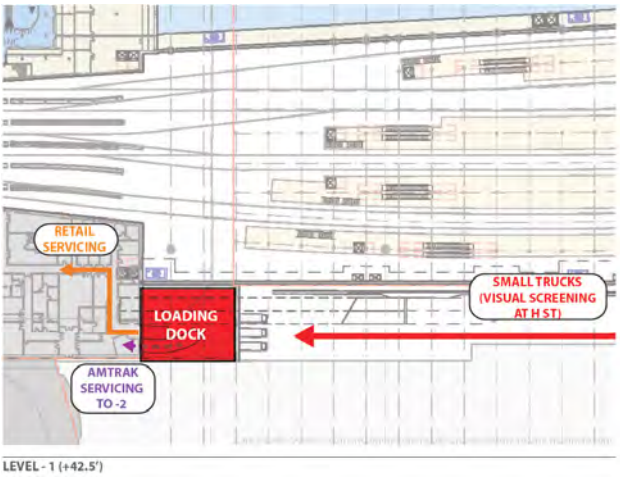


Figure 120. Existing east and west loading docks

ADJACENT ELEMENTS

ACCESS TO H STREET BRIDGE

A series of considerations were developed to demonstrate the importance of the H Street Bridge design in relation to the proposed concourse below, as well as other adjacent elements, such as the BP development.

The bridge design should ideally respond to the new context and the various urban elements at BP while giving the right-of-way a comfortable human scale.

The concepts include multiple pedestrian connections between the SEP and the streetcar platforms. These connections occur at both First and Second Street where there are planned vertical egress between the Concourse level and H Street at these locations. In addition, it is anticipated that there would be a connection between the Concourse and H Street at the center of the bridge, servicing either a center running or a curb running streetcar configuration. This connection would likely include escalators, stairs and elevators. These connections would provide significant capacity for pedestrian connections to the streetcar system.

The intent is to:

- Coordinate opportunities to maintain a traffic-efficient and pedestrian-friendly H Street Bridge,
- Link to the H Street Concourse access nodes at First and Second Streets,
- Reinforce connections to either side of the BP development either north or south of the bridge, and
- Utilize the H Street Bridge median to channel daylight to the concourse below.

The introduction of skylights on the bridge level could be addressed by creating two identical bridge structures supporting up to three lanes in each direction. The separation allows for skylights and sidewalks to be appropriated by the WUS and the surrounding development, respectively.

In addition to introducing daylight down to the concourse below, an expanded median in the bridge gives the opportunity to create a vertical connection from the H Street Concourse to the H Street Bridge and streetcar station within the center of the bridge. Some options for this additional vertical connection are included in Appendix A.

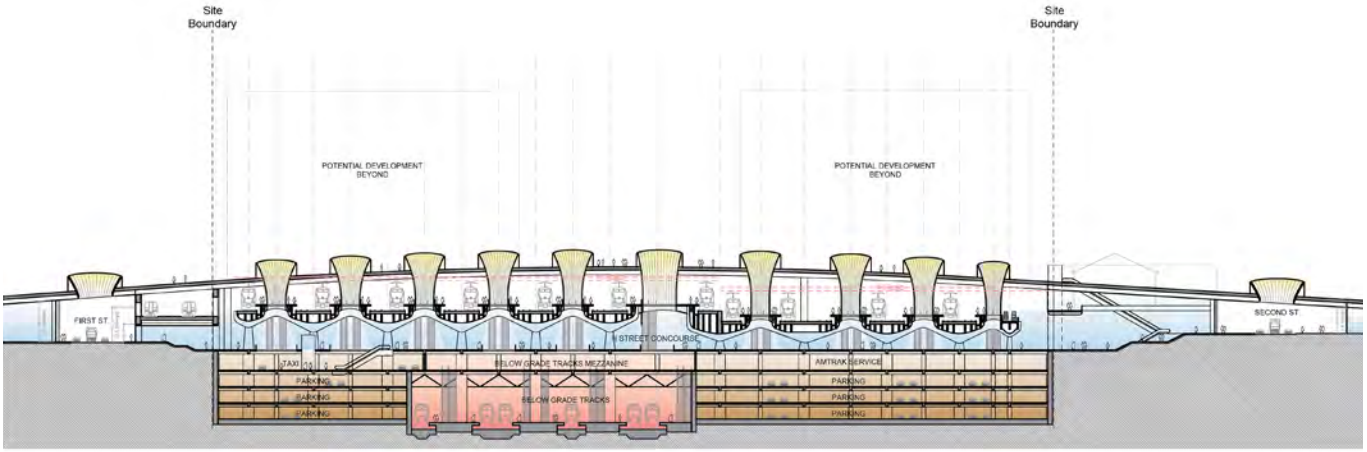


Figure 121. Transverse Section of H Street Bridge with Integrated light-wells within the central median

Figure 122. Overhead View of H Street Bridge with Integrated light-wells within the central median

Figure 123. View along H Street Bridge with planters in lieu of light-wells

Figure 124. Bird’s-eye from above H Street looking east

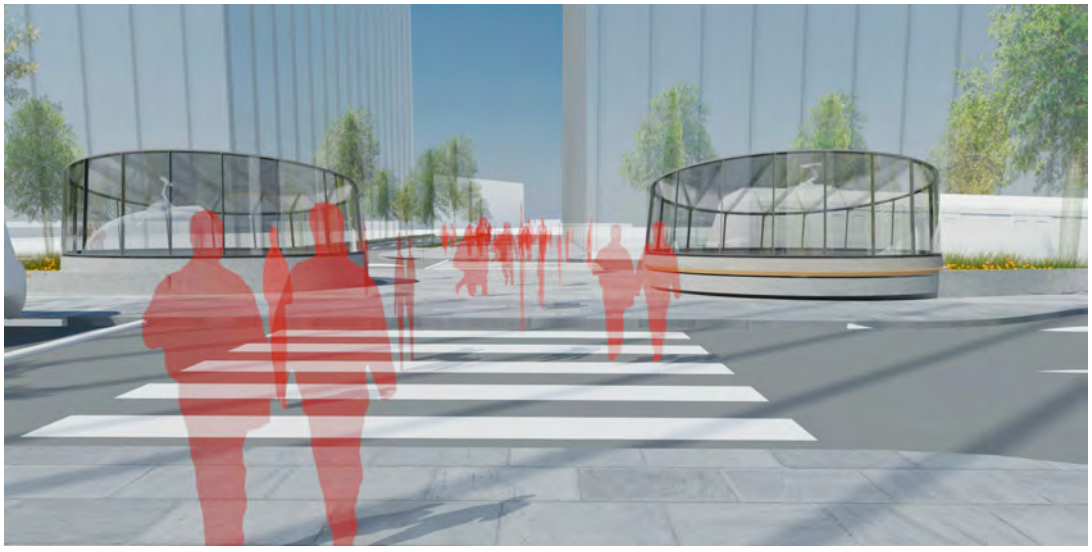


Figure 125. H Street crossing mid-block looking north

5 Concept Evaluation

5: Concept Evaluation

The evaluation process concluded with a range of Concepts that were deemed compatible with the Design Goals and Objectives. The foundation of the full range of Concepts is framed by a series of configurations that were generated chiefly by key decisions related to: Rail, Additional Below-Grade Tracks (ABGT), Bus, Train Hall, and Parking.

While the combinations of these elements yield a range of 18 concept options, a number of them share similar characteristics. As such, this preliminary design evaluations focuses on the distinguishing characteristics, by element.

RAIL

The project rail element assumes that a full reconstruction of the existing tracks and platforms would take place in order to accommodate future rail-operational needs. Based on the premise of full TI reconstruction, Amtrak conducted a thorough study of the TI schemes, from which the schemes of the options 14 and 16 were recommended for development.

At the request of Amtrak and USRC, the SEP team completed a preliminary evaluation of the TI options that was submitted on March 25, 2016. The purpose of the Preliminary TI Evaluation was to identify potential coordination issues and design implications arising from Amtrak's three currently preferred TI options 14, 15, and 16 relative to the passenger concourse planning below the tracks as well as other elements and goals of the WUS expansion project. The evaluation analyzed the compatibility and connectivity of the TI options in general and specifically with pedestrian/ passenger circulation spaces, connections and spatial quality/ daylighting, the arrangement of passenger access and control areas, and the capacity of building system and service areas. The evaluation also attempted to highlight additional coordination issues relative to the integration of the not-to-preclude provisions for the structure and utilities of any potential future BP development over the WUS expansion project, relative to the proposed TI options.

Of the three (3) TI options, there are two (2) that have been carried forward for further evaluation, Options 14 and 16. Since these options are still under development as part of the TI Project, the review here is provisional based on the progress to date:

OPTION 14:

Option 14 provides a total of 19 revenue tracks, with 12 Stub End tracks and seven (7) Run-Through tracks. In addition, Amtrak is currently exploring adding an east side Stub End track for engine storage/pooling. All platforms are 30' wide, with the exception of one 20' Platform at the western-most side of the Rail terminal, and a variable-width central opening between the Stub End and Run-Through tracks.

Pros:
- 30' Platforms
- Additional passenger access from H Street Concourse
- Variable-width, tapered Central Concourse
- All platforms reach required lengths
- All platforms are ADA and life-safety compliant

Cons:
- REA parking lot impacts
- Central Concourse is asymmetric and not aligned with North-South Train Hall options
- Central Concourse is narrower with amenity on one side only and somewhat limited space for vertical circulation
- MARC waiting areas intrude into First Street Concourse, constricting North-South transfers to WMATA
- Track structure is in the middle of the First Street Concourse, with implications for sight-lines and passenger movement
- Narrow space between the western-most track and structure provide marginal daylighting for the First Street Concourse
- Does not include provisions for SEP systems and risers, on the East or West

OPTION 16:

Option 16 provides a total of 19 revenue tracks, with 12 Stub End tracks and seven (7) Run-Through tracks. In addition, Amtrak is currently exploring adding an east side Stub End track for engine storage/pooling. All platforms are 30' wide, with the exception of one 20' Platform at the western-most side of the Rail terminal,

and a variable-width central mega platform between the two last eastern-most Stub End tracks. Openings are distributed on the central mega platform to provide daylight down to the central concourse below. The effective passage width between platform edges and the openings would equal to the minimum passage with of regular platforms.

Pros:
- 30' Platforms
- Additional passenger access from H Street Concourse
- Wide, triangular mega platform with concourse below
- Daylight openings in mega platform
- All platforms reach required lengths
- All platforms are ADA and life-safety compliant
- Central Concourse is relatively symmetric and aligned with North-South Train Hall options
- Central Concourse is wider with amenity on two sides and more space for vertical circulation
- More width for potential vertical circulation to BP
- Width of mega-platform may allow for some flexibility to accommodate systems at yard edges

Cons:
- REA parking lot impacts
- MARC waiting areas intrude into First Street Concourse, constricting North-South transfers to WMATA
- Track structure is in the middle of the First Street Concourse, with implications for sight-lines and passenger movement
- Does not include provisions for SEP systems and risers, on the East or West
- Coordination of passenger flow with daylight openings

Note: Additional pros and cons related to the track planning and rail operational criteria may be found under separate cover, as provided by the TI project.

ADDITIONAL BELOW-GRADE TRACKS*

The ABGT is no longer being considered as a project element. Please refer to the Executive Summary for a description of the current status of the ABGT options.

The concept design process studied scenarios for whether ABGT are present or not present. For reference purposes, each concept includes a variation that allows for below-grade tracks. Additional detail in Appendix D substantiates these variations from a MEP and structural perspective. Although each concept can accommodate below-grade tracks, there are a great number of technical and construction challenges associated with not precluding them. These include important changes to the planning of the lower floors to allow for the dramatically greater systems requirements in this configuration.

Pros:
- Allows track capacity to be added in later phases
- Physical access to vertically stacked transit spaces

Cons:
- Net loss in parking capacity if additional track box not planned and built in early phases
- Considerable cost and complexity of construction (assessed based on design team's previous experience)
- Very deep excavation required
- Shoring and support of the historic K Street Bridge
- Coordination with excavation and below-grade provision for ABGT construction and tunneling north of SEP project boundary
- Coordination with structures above
- High number of passengers underground
- High volume of ventilation

BUS

The bus options themselves are predicated on the full reconstruction of Bus Terminal as a consequence of realizing the full reconstruction of the Rail terminal and also to meet future bus operational needs. The capacity required for projected bus operations are broken down by types: Intercity, Local/Shuttle/Commuter, and Tour/Sightseeing/Charter buses. As drawn, most of the options show the full bus program on site (generally on two levels). However, the concepts maintain a provisional allowance for the potential separation of the bus terminal into two parts, one located above the Rail terminal and the other off-site in an adjacent lot near the SEP project. The latter would be dedicated to additional layover capacity.

BUS AT SOUTH

Pros:
- Bus capacity is met within single one-story footprint
- Operational flexibility and efficiency
- Buses enter and exit at one point on H Street
- Clear demise line between transit and WUS infrastructure and adjacent BP development
- Increases space available for Train Hall options
- Bus loop naturally creates a large area at its center that can be used to carry daylight to the concourse below and creates a significant public space
- Clear wayfinding for inter-modal passengers
- Close proximity to other modes and historic WUS functions

Cons:
- Smaller bus loop available during earlier phases of SEP implementation
- Adjacency to historic buildings may require more extensive review

- Relies on quality of design to achieve daylighting and public space when integrated with the expanded Concourse A

BUS AT SOUTHEAST

Pros:
- Passenger connectivity to Concourse A
- Fully available in earlier phases of SEP implementation
- Close proximity to other modes and historic WUS functions

Cons:
- Capacity met by creating at least a two-level terminal
- Limits BP development feasibility
- Adjacency to historic buildings may require more extensive review
- Limits space available for Train Hall options

BUS AT SOUTHWEST

Pros:
- Passenger connectivity to Concourse A
- Close proximity to other modes and historic WUS functions

Cons:
- Minimum bus capacity is not met by cramped site, even by creating a two-level terminal
- Rail clearances push Concourse A connection upwards requiring bus deck to be raised 8' from top of deck level and thus internal ramping from H Street that highly complicates bus circulation
- Footprint available only in later phases of SEP implementation
- Requires the construction of a temporary bus terminal off-site
- Limits BP development feasibility
- Limits space available for Train Hall options
- Adjacency to historic buildings may require more extensive review

BUS AT NORTH (SPLIT)

Pros:
- Close adjacency to Historic WUS for limited tour bus drop-off
- Potential expansion of bus program
- Distance of bus volume from historic WUS features
- Increases space available for Train Hall options
- Proximity to H Street Concourse and First and Second Street Entries

Cons:
- Capacity met by creating at least a two-level terminal
- Intercity bus further from inter-modal transfers
- Small footprint available in earlier phases of SEP implementation
- Limits BP development feasibility

TRAIN HALL

Every concept posits the existence of a Train Hall above portions of the newly constructed Rail terminal. Its primary purpose will be to enrich positive passenger experience, promoted by enhanced spatial quality and a significant amount of daylight. The two scenarios under consideration for the Train Hall layout are: the East-West oriented, which integrates with the larger Concourse A; and the North-South oriented, located directly above some of the center tracks. The first scenario offers visual and physical access to the vertically stacked functional spaces at the core of WUS; whereas the latter shifts the volume further towards the Central Concourse underneath the tracks and the platforms. Both scenarios introduce daylight into different areas of the Rail terminal and the concourses.

EAST-WEST ORIENTED

Pros:
- Extends the series of public spaces from historic WUS
- Creates "courtyard" or public space between old and new areas of WUS
- Place-making opportunity within SEP and adjacent to BP development
- Reduces overlaps with BP development footprint
- Daylights and provides vertical loft at ends of all tracks and platforms evenly, including south end of the Central Concourse
- Visual and physical access to vertically stacked transit spaces
- Significant public spaces proximate to most modes
- Daylight to Central Concourse beneath tracks and platforms through supplementary skylights
- Less chance of shadowing from deck level structures

Cons:
- Adjacency to historic WUS requires high quality design commensurate to its location
- North ends of tracks and platforms in under-croft of the BP deck

NORTH-SOUTH ORIENTED

Pros:
- Creates transit and WUS presence closer to H street
- Place-making opportunity framed by BP development for full southern block
- Daylight potential to central concourse beneath tracks and platforms
- Visual connection to BP from central platforms

Cons:
- Encumbers/splits BP footprint
- Daylight and main vertical loft at only middle 3-4 tracks
- Visual connection to BP from only the central platforms
- Majority of tracks and platforms left in under-croft of the BP deck
- Primary public space extends away and is disconnected from main passenger and visitor areas

PARKING

The base range of Concepts is defined by two main families where the WUS parking program is located either above or below tracks. The only exception to the inherent flexibility of parking locations is the concept that places the bus terminal on the south above the integrated Train Hall and Concourse A – this particular configuration was deemed not viable for placement of the parking above due to the proximity to the historic WUS.

PARKING ABOVE

Pros:
- Shallower and less extensive excavation zone beneath tracks
- More compact footprint over multiple floors
- Less cost associated with conventional above-grade structures
- Access to H Street

Cons:
- The resulting height required to meet the program requirement for capacity would be in excess of the current USPG, as well as the previously established height limits on the site.
- Depending on the extent of the bus program, the parking capacity may be limited
- Recreates existing garage in new location but requiring more height due to the smaller footprint
- Potentially diminishes commercial attractiveness of adjacent BP development
- Options adjacent to historic WUS will present issues for the historic view-sheds (especially for the Southeast and Southwest bus options)
- Additional traffic on H Street

PARKING BELOW

Pros:
- Connectivity to concourses and transfers above
- Liberates transit functions, as well as adjacent BP above
- Places functional program further from the view-shed of the historic WUS
- Reduced traffic on H Street and improved streetcar operation
- Less shadowing of Train Halls
- Larger parking levels minimizing vertical ramps

Cons:
- Deep and extensive excavation zone beneath tracks
- Density of column grid beneath tracks
- Limited access from site edges
- Complexity of below-grade systems
- More implementation implications associated with below-grade structures
- Additional traffic volume on K Street

CONCOURSES

All Concepts provide the passenger circulation areas required to accommodate the future ridership and operational improvements. It would be composed of multiple areas that allow for access to and transfers between the transportation modes at or adjacent to WUS, such as Rail, Bus, Metro and Streetcar.

NEW LOWER LEVEL CONCOURSES

Pros:
- Provide additional circulation to and from the center of the reconstructed tracks and platforms
- Expand passenger circulation areas
- Allow for east west movement across site as well as access to new entrances at First Street and Second Street
- Increase options for transfers between modes

Cons:
- Below-track concourses create a challenge to effectively access natural light
- H Street Concourse connection to First Street requires new structure to support Metro tubes above
- H Street Concourse connections to First Street and Second Street are lower than the street levels
- Complex coordination of track support and H Street bridge structure in public circulation areas
- Limited head room under tracks
- Extensive below-grade construction

CONCOURSE A

Pros:
- Significant new passenger space between historic station and other new SEP elements
- Centralized zone for transfer between most modes on site
- Expanded access to rail platforms
- Visual access between all levels and program areas
- Reduced footprint available for tracks and platforms

Cons:
- For expanded lower level, below-grade construction adjacent to historic structure
- Limits lengths of tracks and platforms

TAXI / SHARED RIDE

All SEP Concepts include additional pick-up and drop-off locations at the new access points on H Street at the intersection of First Street and Second Street, on the north side of the WUS between Concourse A and H Street, as well as maintaining and improving the drop-off and pick-up at the front of the historic WUS. Distributed locations at a variety of locations increase the throughput capacity of cabs/shared services to pick-up and drop-off passengers.

DISTRIBUTED TAXIS / SHARED RIDE

Pros:

- Flexible approach responds to evolving market for decentralized ride sharing
- Every entry and exit point will provide taxi drop-off and pick-up

Cons:

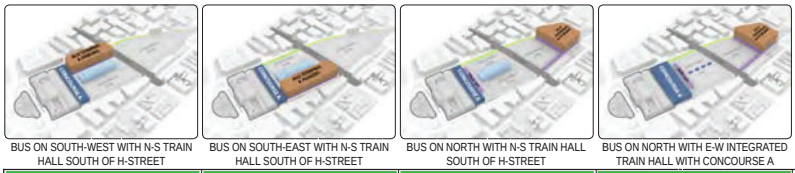
- Traffic implications for surrounding streets requires further study

BIKE AND PEDESTRIAN ACCESS

All Concepts would meet the need for increased access to and from the existing street context and the surrounding neighborhoods. Consideration could be given in all Concepts for the inclusion of additional bicycle accommodation and storage. Refer to the Bike & Pedestrian Access element described in the Appendix B, Supporting Urban Design and Open Space Information.

CONCEPT EVALUATION MATRIX

The following facing page features the Evaluation Matrices for the Concepts separated into the two (2) parking-location families of Concepts: those relating to either parking above-tracks or parking below-tracks. The matrices provide an overview to the extent that the options meet the evaluation criteria as defined in Section 4.2 of the report.



BUS ON SOUTH-WEST WITH N-S TRAIN HALL SOUTH OF H-STREET | BUS ON SOUTH-EAST WITH N-S TRAIN HALL SOUTH OF H-STREET | BUS ON NORTH WITH N-S TRAIN HALL SOUTH OF H-STREET | BUS ON NORTH WITH E-W INTEGRATED TRAIN HALL WITH CONCOURSE A

HIGH COMPATIBILITY
LIMITED COMPATIBILITY
INSUFFICIENT COMPATIBILITY

				RAIL	TRANSPORTATION
				BUS	
				PUBLIC PARKING	
				ADDITIONAL BELOW-GRADE TRACKS	
				METRO	
				STREETCAR	
				TAXIS	
				BICYCLES	
				PROXIMITY OF TRANSFERS - INTERMODALITY	EXPERIENCE
				WAYFINDING	
				SPATIAL QUALITY	
				DAYLIGHTING	
				PASSENGER AMENITY	
				VISITOR AMENITY	
				NATIONAL CAPITAL FACTOR	
				ENVIRONMENT / SUSTAINABILITY	URBAN CONTEXT
				HERITAGE / HISTORIC FABRIC	
				LINKAGES / ACCESS / WAYFINDING	
				COMMUNITY / NEIGHBORHOOD	
				OPEN SPACE	
				SERVICES LOGISTICS	
				DEVELOPMENT OPPORTUNITY - PLACEMAKING	
				INSTITUTIONAL FEASIBILITY	FEASIBILITY
				OFF SITE LAND ACQUISITION	
				SAFETY & SECURITY	
				IMPACT ON EXISTING OPERATION DURING CONSTRUCTION	
				COMPLEXITY OF DEMOLITION	
				COMPLEXITY OF NEW CONSTRUCTION	
				COST	
				CONSTRUCTION DURATION	

Figure 126. Evaluation Matrix for Parking Above Family

BUS ON SOUTH ABOVE E-W TRAIN HALL INTEGRATED WITH CONCOURSE A | BUS ON SOUTH-WEST WITH N-S TRAIN HALL SOUTH OF H-STREET | BUS ON SOUTH-EAST WITH N-S TRAIN HALL SOUTH OF H-STREET | BUS ON NORTH WITH N-S TRAIN HALL SOUTH OF H-STREET | BUS ON NORTH WITH E-W INTEGRATED TRAIN HALL WITH CONCOURSE A

HIGH COMPATIBILITY
LIMITED COMPATIBILITY
INSUFFICIENT COMPATIBILITY

				RAIL	TRANSPORTATION
				BUS	
				PUBLIC PARKING	
				ADDITIONAL BELOW-GRADE TRACKS	
				METRO	
				STREETCAR	
				TAXIS	
				BICYCLES	
				PROXIMITY OF TRANSFERS - INTERMODALITY	EXPERIENCE
				WAYFINDING	
				SPATIAL QUALITY	
				DAYLIGHTING	
				PASSENGER AMENITY	
				VISITOR AMENITY	
				NATIONAL CAPITAL FACTOR	
				ENVIRONMENT / SUSTAINABILITY	URBAN CONTEXT
				HERITAGE / HISTORIC FABRIC	
				LINKAGES / ACCESS / WAYFINDING	
				COMMUNITY / NEIGHBORHOOD	
				OPEN SPACE	
				SERVICES LOGISTICS	
				DEVELOPMENT OPPORTUNITY - PLACEMAKING	
				INSTITUTIONAL FEASIBILITY	FEASIBILITY
				OFF SITE LAND ACQUISITION	
				SAFETY & SECURITY	
				IMPACT ON EXISTING OPERATION DURING CONSTRUCTION	
				COMPLEXITY OF DEMOLITION	
				COMPLEXITY OF NEW CONSTRUCTION	
				COST	
				CONSTRUCTION DURATION	

Figure 127. Evaluation Matrix for Parking Below Family

6 Options Considered But Dismissed

6: Options Considered But Dismissed

6.1 Concept Options Considered But Dismissed

This Section revisits the specific set of Concept Options that were considered but dismissed while selecting the range of Concepts. The development of the proposed range of Concepts is described in detail in the Section 4. Additional diagrams and drawings are included in Appendix A, Supporting Technical Backup Information.

The dismissal of options was based on a number of factors including:

- The inability of the option to meet the Design Goals and Objectives
- The inability of the option to satisfy the program
- The complexity of a structural system or jurisdictional transaction required to accommodate the design intent
- Incompatibility of an option with TVRA or BoD requirements

A detailed description is provided below.

Essentially, there were seven option types that were fully dismissed:

1) Any option that does not allow for the complete reconstruction of the tracks and platforms

2) Any option that retains the existing USPG.

3) Any option that does not accommodate the Bus program on site.

4) Any option that does not consider the required proximity between tour buses and the historic WUS.

5) Any option that does not include a Train Hall.

6) Any option that does not allow for the presence of new below-track concourses.

7) Any option that does not include a full replacement of the Claytor Concourse by Concourse A.

The dismissal of these seven options was based on the following rationales (1-6):

1) To meet future ridership projections and operational requirements, the terminal Run-Through tracks must be replaced completely. Any option which only considers replacing only some of those tracks would fail to meet the SEP program.

2) The existing USPG structure creates severe constraints on the planning of the Rail terminal. As discussed in the Supporting Station Infrastructure (Fire, MEP, and Structural) Information (Appendix D), options for altering the structure were determined to be unreasonable due to the magnitude of structural complexity required to maintain or repair the structure in place. Therefore, all options rely on the removal of the USPG and the consequent relocation of the bus and parking program elsewhere on site.

3) WUS is a multimodal facility. Pursuant to the enabling legislation of the USRC, buses are required to remain a part of WUS. Since dedicated bus facilities were a relatively recent addition to the WUS complex, the exact nature of the program is evolving. The precise number and distribution of active and layover bays will be based on a number of factors (some layover in particular may move off site). However, options that do not allow for buses at SEP were dismissed.

4) The success of tour and charter buses relies upon their adjacency to the historic WUS. With the expansion of the WUS and the increases in amenity, the location of these types of buses is more flexible. Yet, no option considers placing them in a remote location or off-site.

5) Every concept posits the existence of a Train Hall above portions of the newly reconstructed Rail terminal. Its primary purpose will be to enrich passenger experience, promoted by enhanced spatial quality and a significant amount of daylight. The lack of inclusion of an architecturally compelling feature such as a Train Hall was perceived by the Partners as a failure to meet the Design Goals and Objectives.

6) WUS currently operates as a terminal station, where passengers can only access trains from one end of the platforms. With the increase of passengers based on future ridership projections as well as the continued use of long trains and/or double-berthing (two trains at one platform side), additional

means of providing access to the platforms is required. This can be done from a concourse above or below the tracks. There would be insufficient space above due to the presence of an overbuild deck. Therefore all the options allow for additional passenger access from concourses below the tracks and platforms primarily along H Street.

7) Even with the addition of below-grade concourses, the majority of the passengers will continue to move on and off the ends of platforms, to get to the historic WUS and WMATA Metrorail, amongst other destinations. Again, based on future ridership projections, a significantly scaled concourse at the end of the platforms is required to provide access to and from trains as well as a means to transfer to other modes, since the historic passenger concourse is not available for this purpose. As a result, the new expanded Concourse A is a main feature of any option.

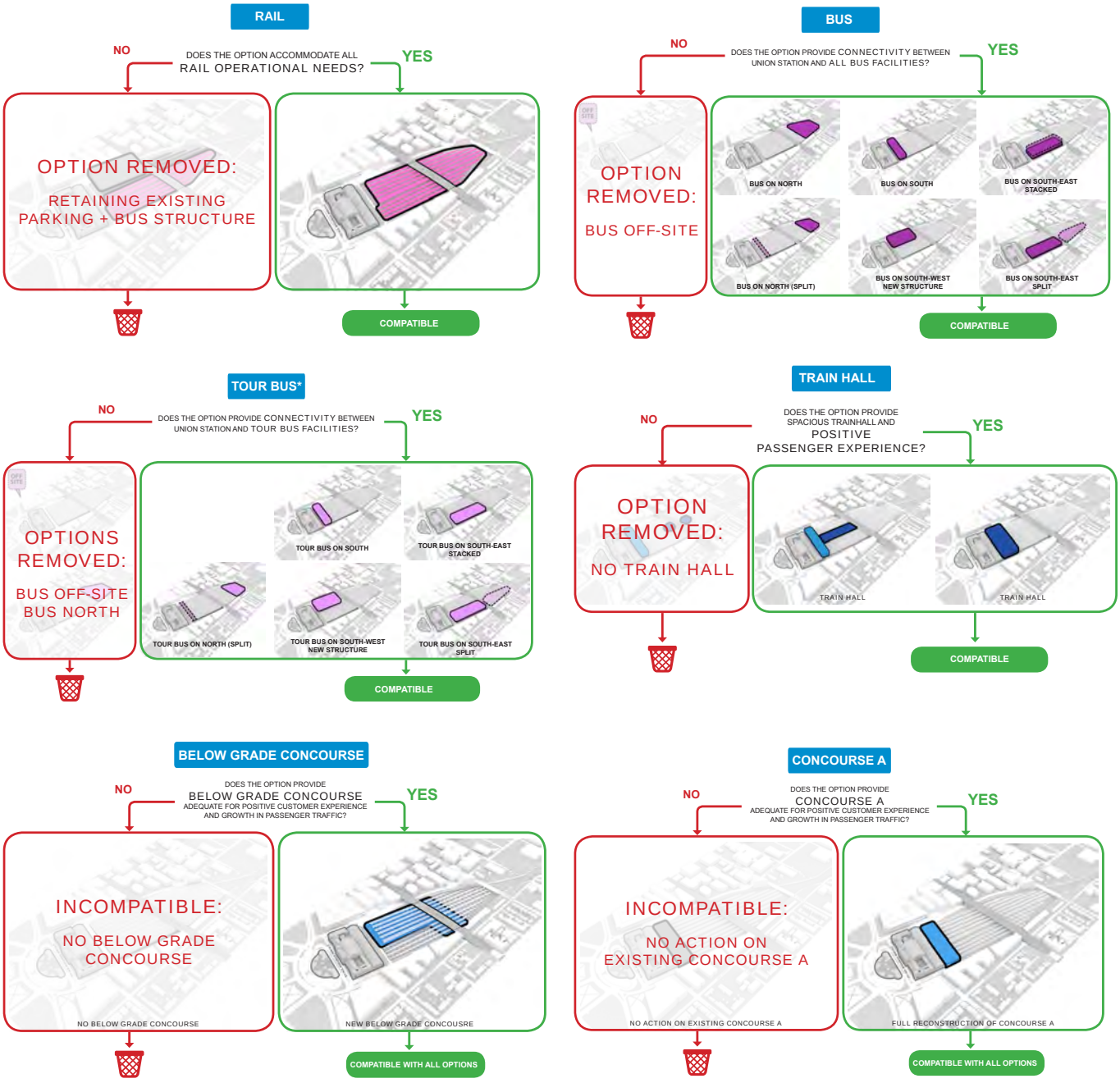


Figure 128. Programming Decision Flowchart Diagrams (Above)

6.2 Program Element Sub-Options Considered But Dismissed

Due to the intensity and range of study undertaken for the SEP concept development process, Appendix A includes additional detail on all the numerous variations on program element sub-options that were considered but not carried forward for more detailed development.

RAIL

1) Maximize tracks on single level using adjacent property

Rationale for dismissal:

The use of either the REA building and its property, or the acquisition of WMATA land, to extend Rail terminal eastward or westward respectively, would require the demolition of the historically significant (contributing) REA building. In addition, it would require relocating and reconstructing WMATA Metrorail tracks, resulting in a long outage of service for the busiest line in the system.

2) Extra tracks at current Rail terminal **level or elevated above at deck**

Rationale for dismissal:

The arrangement of additional tracks at the current Rail terminal level does not accommodate overall capacity requirements. An elevated at deck level arrangement would require the full re-alignment of the H Street Bridge as well as extensive elevated sections of railway infrastructure north of WUS, making it overall a complex and costly solution.

3) Extend Tracks (and Platforms) to Historic Southern Limit

Rationale for dismissal:

The original configuration of the Rail terminal included Tracks and Platforms that extended to the Historic Passenger Concourse. These were shortened when the existing Claytor Concourse was built. This option was dismissed because it would not allow for the construction of Concourse A.

BUS

1) Retrofit and Utilization of the Existing USPG

Rationale for dismissal:

As stated in Section 6.1, retention of the USPG to accommodate expanded rail operations is problematic due to structural considerations. As it is related to bus, if the USPG could be retained structurally, the limited footprint would not allow for an efficient bus facility to be planned that is compliant with contemporary safety standards.

2) Entire Bus Program off-site (under Columbus Circle and Columbus Plaza; Vacant lot at First and L Street; GPO)

Rationale for dismissal:

A number of off-site options were considered but ultimately dismissed due to jurisdictional encumbrances. In addition, some adjacent parcels were too limited in size to accommodate an efficient Bus Terminal

3) Below-track

Rationale for dismissal:

Options for a below grade bus facility were considered but dismissed for several reasons. The density of requisite column grids was not compatible with a feasible bus layout that adequately accommodated turning radii.

4) Tour/Charter Bus Drop-Off north of Concourse A, with remaining Active and Layover Bus Terminal off-site

Rationale for dismissal:

This option was dismissed because it would not support the multimodal program of the SEP.

PARKING

1) All off-site (under Columbus Circle and Columbus Plaza; Vacant lot at First and L Street)

Rationale for dismissal:

A number of off-site options were considered but ultimately dismissed due to either jurisdictional encumbrances, limits in the size of the property in order to accommodate an efficient parking garage, or costly site requirements, e.g. underground parking elsewhere. An inordinately far distance from the station was also grounds for disqualification.

2) Standalone structure north of H Street without Bus Terminal below

Rationale for dismissal:

This option entailed a standalone parking structure without Bus Terminal below that has a similar footprint as the North Bus option. The 10-story parking structure would provide sufficient parking capacity for the SEP and some excess capacity for future BP development. The option would only be compatible with the South Bus option. However, this option was dismissed due to the large footprints of the South Bus Terminal and the North parking structure that could leave too little space for a feasible BP development.

TAXI/SHARED RIDE

1) Along outer perimeter of or below Columbus Circle and Columbus Plaza

Rationale for dismissal:

The dismissal of these options was based on either clear operational infeasibility (perimeter circulation), or the difficulty of achieving stakeholder agreement with the breadth of the impact on Columbus Circle and Columbus Plaza.

2) Below-tracks at H Street Bridge

Rationale for dismissal:

This option is not feasible due to extremely limited clearance under run-through tracks and the higher grade at potential entry/exit on Second Street. It also makes the H Street Concourse infeasible.

CONCOURSES

1) Above-track concourses (within or on deck)

Rationale for dismissal:

The dismissal of this option was that the configuration creates an indirect path that does not work with primary desire lines to the historic WUS, WMATA Metrorail and the surrounding streets.

2) Additional below-track E-W & N-S oriented concourses

Rationale for dismissal:

The main reason for dismissing this particular option was to avoid clutter and the “rabbit warren” effect of multiple concourses serving a similar purpose. A preference for a clear and simple layout that focuses on main transfers and access routes with limited choices to make wayfinding intuitive was highlighted. And finally, the clearance issue beneath the run-through tracks prohibits additional concourses on the east side.

3) Reinstate full extent of the Historic Passenger Concourse, including wings

Rationale for dismissal:

The option was considered as a means of restoring the full extent of the Historic Passenger Concourse to its original historical condition. The restored western wing in particular could also enhance the station’s connectivity with the adjacent public open space. The option was dismissed due to the implications for existing retail, which is the existing major revenue source for station maintenance and operations. The option would also conflict with any roadway from Columbus Circle up to the deck level especially on the east side.

TRAIN HALL

1) Mega Hall south of H Street at BP/Deck Level

Rationale for dismissal:

This option was dismissed because of the competition with overbuild development volumes and program at deck level. There are also a myriad of technical challenges associated with the proximity between private development and public space.

RAIL AND SERVICE SUPPORT

1) Immediately over tracks and platforms

Rationale for dismissal:

This option was dismissed because it was deemed that an elevator only connection between loading and Amtrak service spaces is not recommended.