APPENDIX E2

MODIFICATIONS TO ALTERNATIVE A-C

Opportunities Enabled Through Modifications to Alternative A-C

This document describes Preferred Alternative A-C and suggests the positive transformation that would occur if station parking and PUDO were moved below grade, and the bus facility was reconfigured. A viable planning framework emerges when Alternative A-C is modified.

WASHINGTON UNION STATION EXPANSION PROJECT

OPPORTUNITIES ENABLED THROUGH MODIFICATIONS TO ALTERNATIVE A-C

SEPTEMBER, 2020

AKRIDGE
Invested.

IAB
Laboratory for Architecture + Building

shalom baranes associates | architects

Transformation from Alternative A-C to A-C Modified

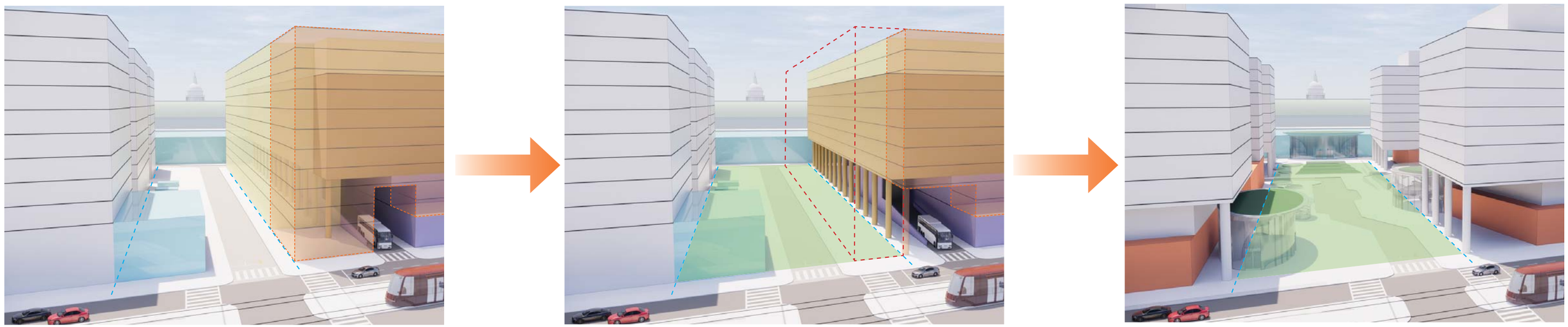
- The FRA's Design Evaluation Criteria are organized into four major categories: Transportation, Experience, Urban Context, and Feasibility (see Section 4.2 of the DEIS)

- Within the Evaluation Criteria two subcategories are established: Key Drivers or Considerations

- None of the Urban Context subcategories, including Heritage/Historic Fabric, Open Space, Development Opportunity/Placemaking, and Community/Neighborhood, are considered Key Drivers in evaluating DEIS Alternatives

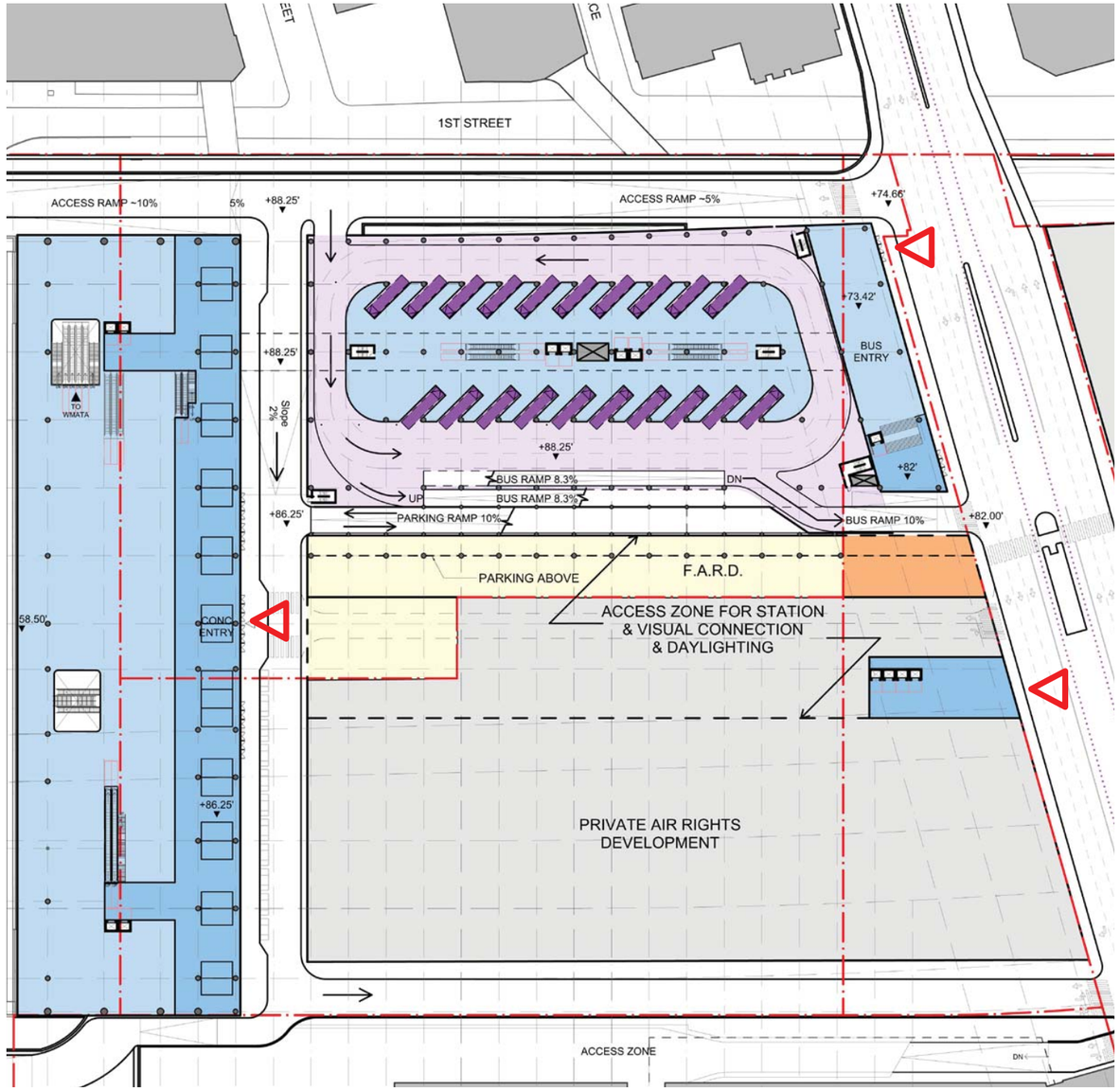
This document describes Preferred Alternative A-C and suggests the positive transformation that would occur if Station Parking and PUDO were moved below grade, the Bus Facility was reconfigured, and the Urban Context evaluation category was appropriately considered a Key Driver in evaluating the Alternative.

ALTERNATIVE A-C

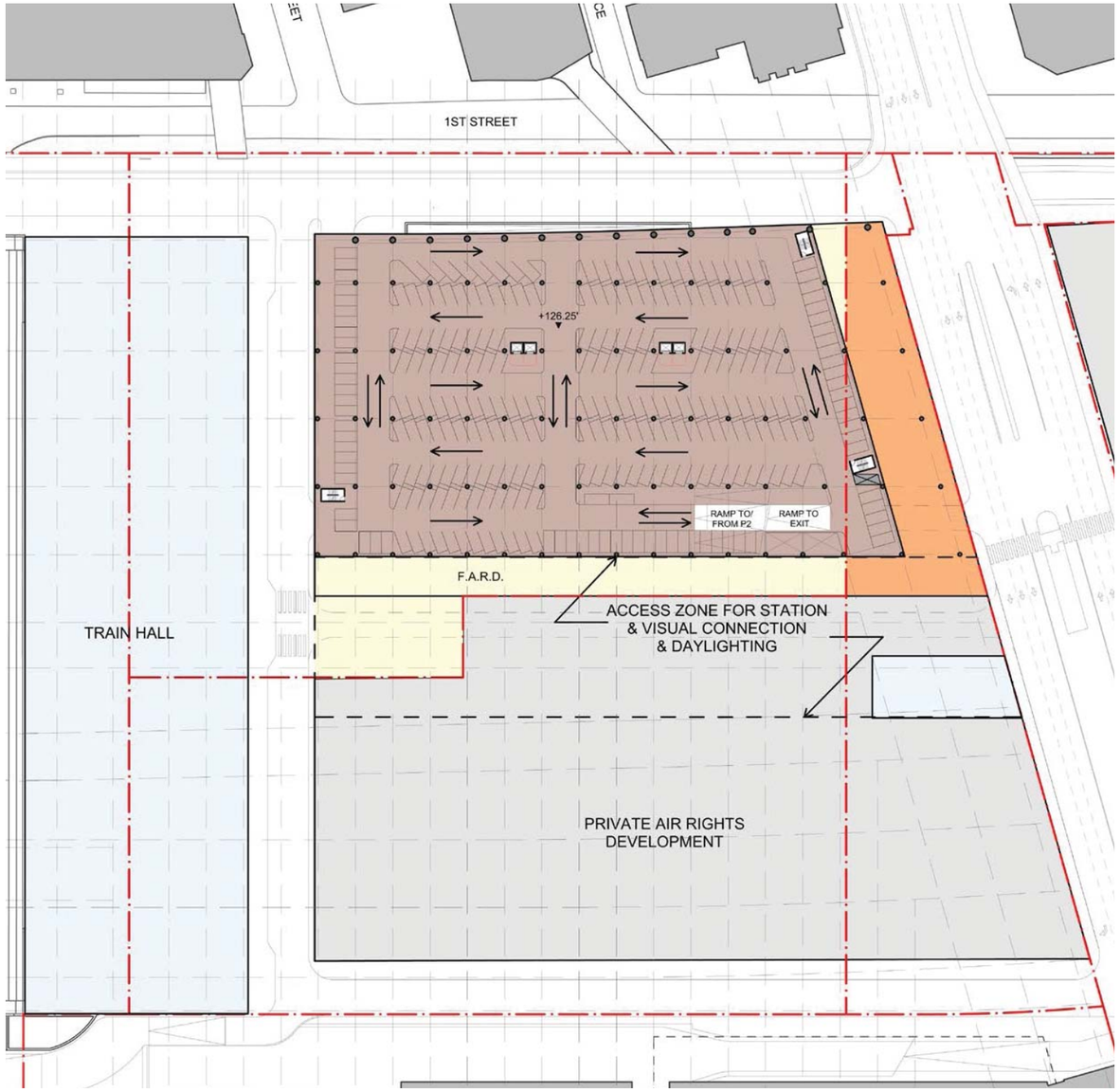


A-C MODIFIED

DEIS Diagram of Preferred Alternative A-C



Deck Level Plan

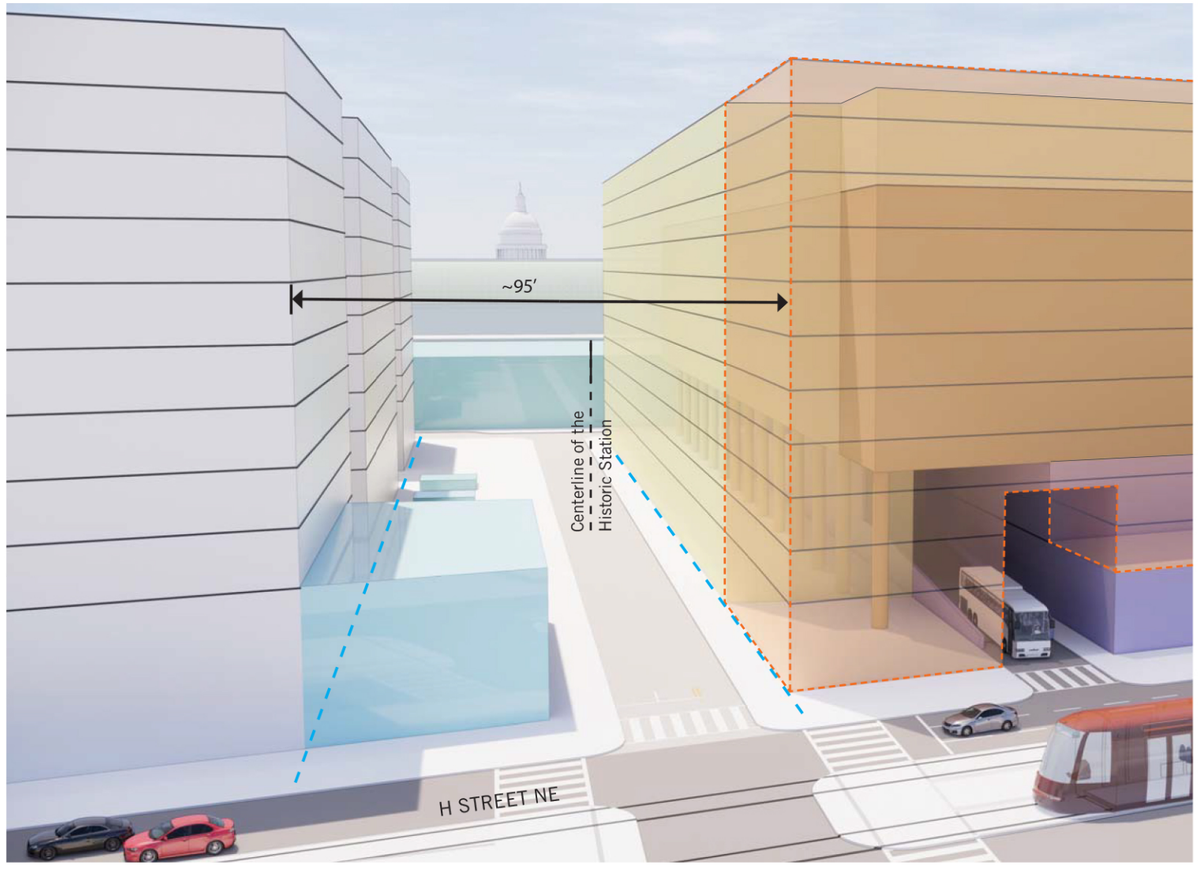


Parking Level Plan

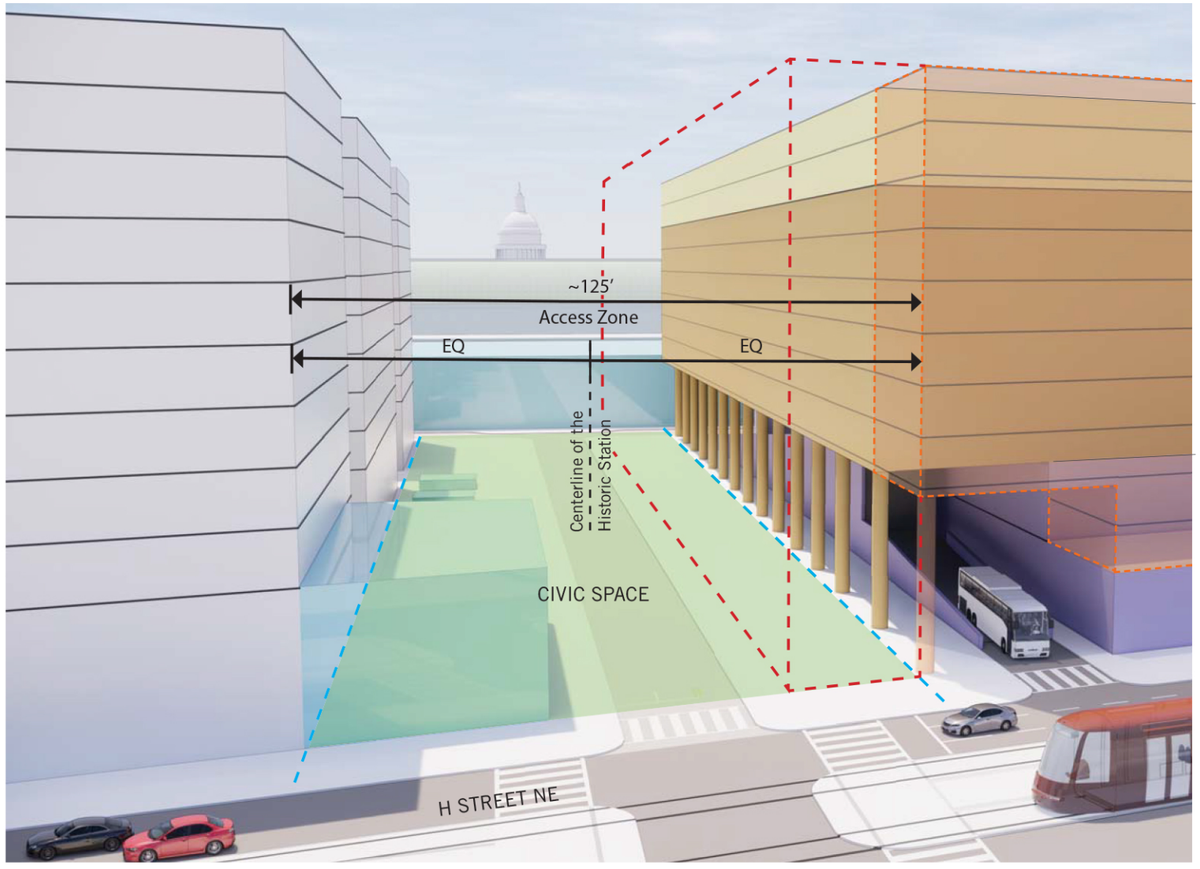
CREDIT: DEIS Alternative A-C (Preferred Alternative) (June 2020): https://railroads.dot.gov/current-environmental-reviews/washington-union-station-expansion-project/alternative-c-preferred

Framing a View and Creating a Civic Space

PREFERRED ALTERNATIVE A-C



A-C MODIFIED MASSING - Forgoing Potential Federal Air-Rights East of Parking



Private Air-Rights Development
(West facades determined by rail structure below)

Potential Federal Air-Rights Development
(Behind Potential Development and above the Parking Facility)

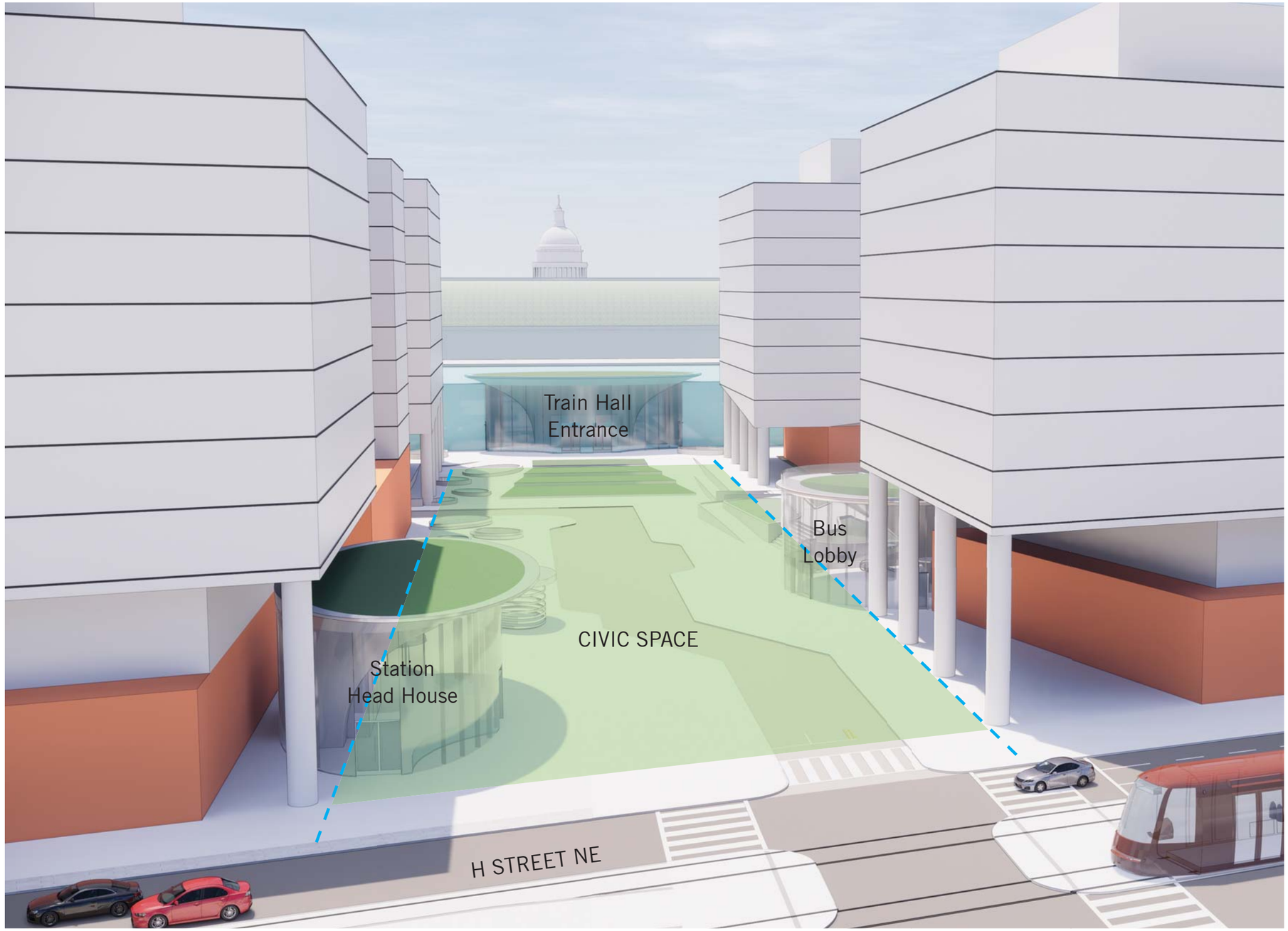
Above-Ground Parking Facility
(Behind Potential Development)

Potential Development
(Fronting on H Street above Bus Facility)

Train Hall
(Train Hall beyond; headhouse in the foreground)

Bus Facility
(First level fronts H Street; second level behind Potential Development)

Vision for A-C Modified Made Possible with Parking & PUDO Relocated and Bus Reconfigured



If parking is right-sized and moved below grade with PUDO, a bus facility can be integrated into an important civic space and within a vital mixed-use neighborhood.

Transportation entrances feature prominently in a new civic space:

- An important entrance to a world-class train hall with the historic station's main vault visible beyond are a central focus to the south

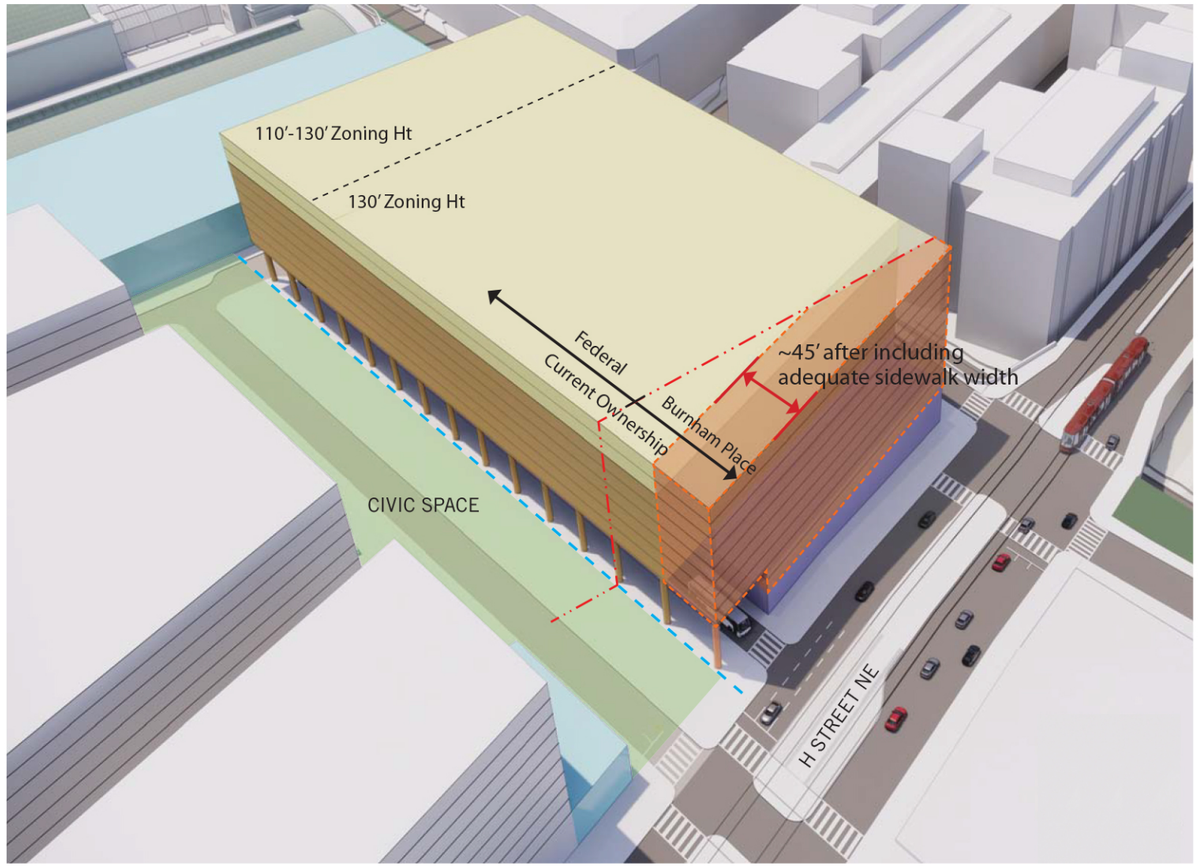
- The H Street head house, providing prominent and convenient access down to below-track station concourses, announces the station along H Street

- A light-filled bus lobby with covered connections to the Station and Metrorail fronts a civic space with active adjacent uses

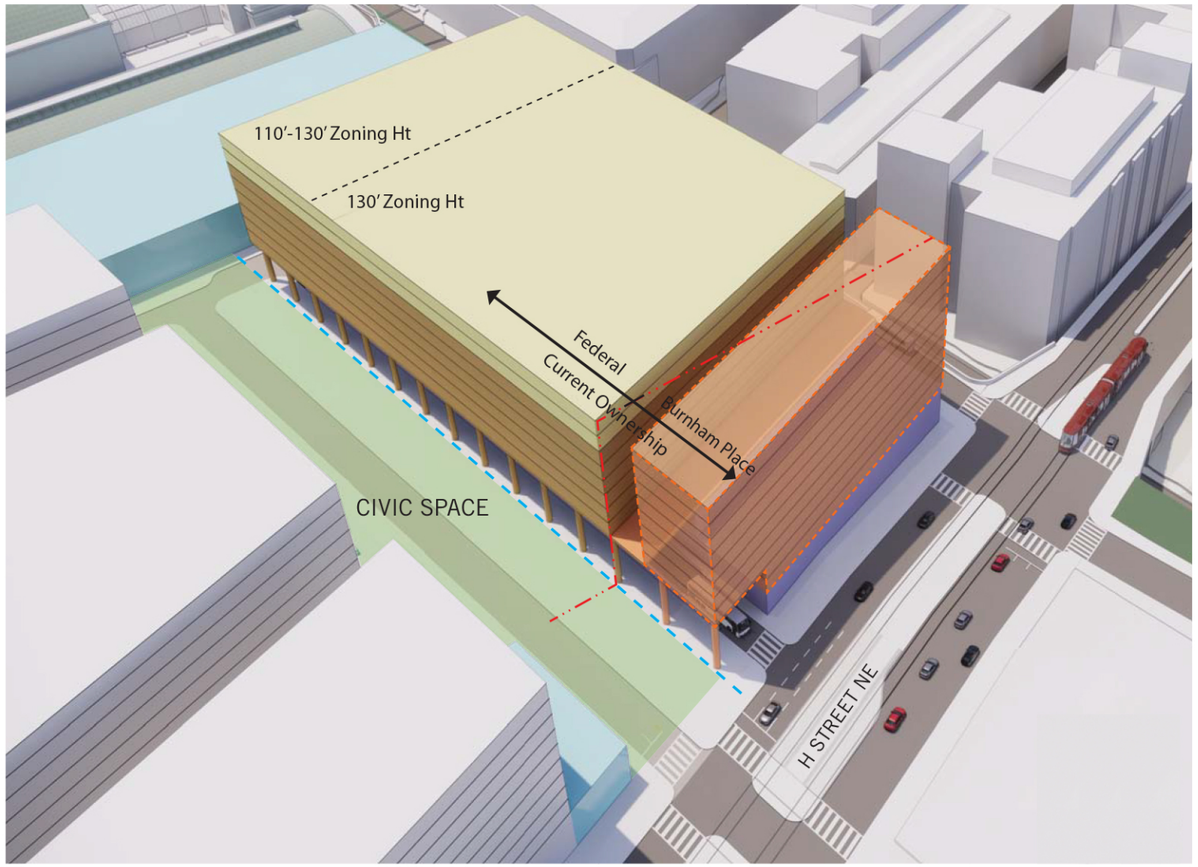
Air-rights massing and transportation entrances are shown for illustrative purposes

Creating Viable Potential Development

PREFERRED ALTERNATIVE A-C



ADJUSTED A-C MASSING - Viable Potential Development Screens Parking



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(West facades determined by rail structure below)

Potential Federal Air-Rights Development
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Above-Ground Parking Facility
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(Train Hall beyond; headhouse in the foreground)

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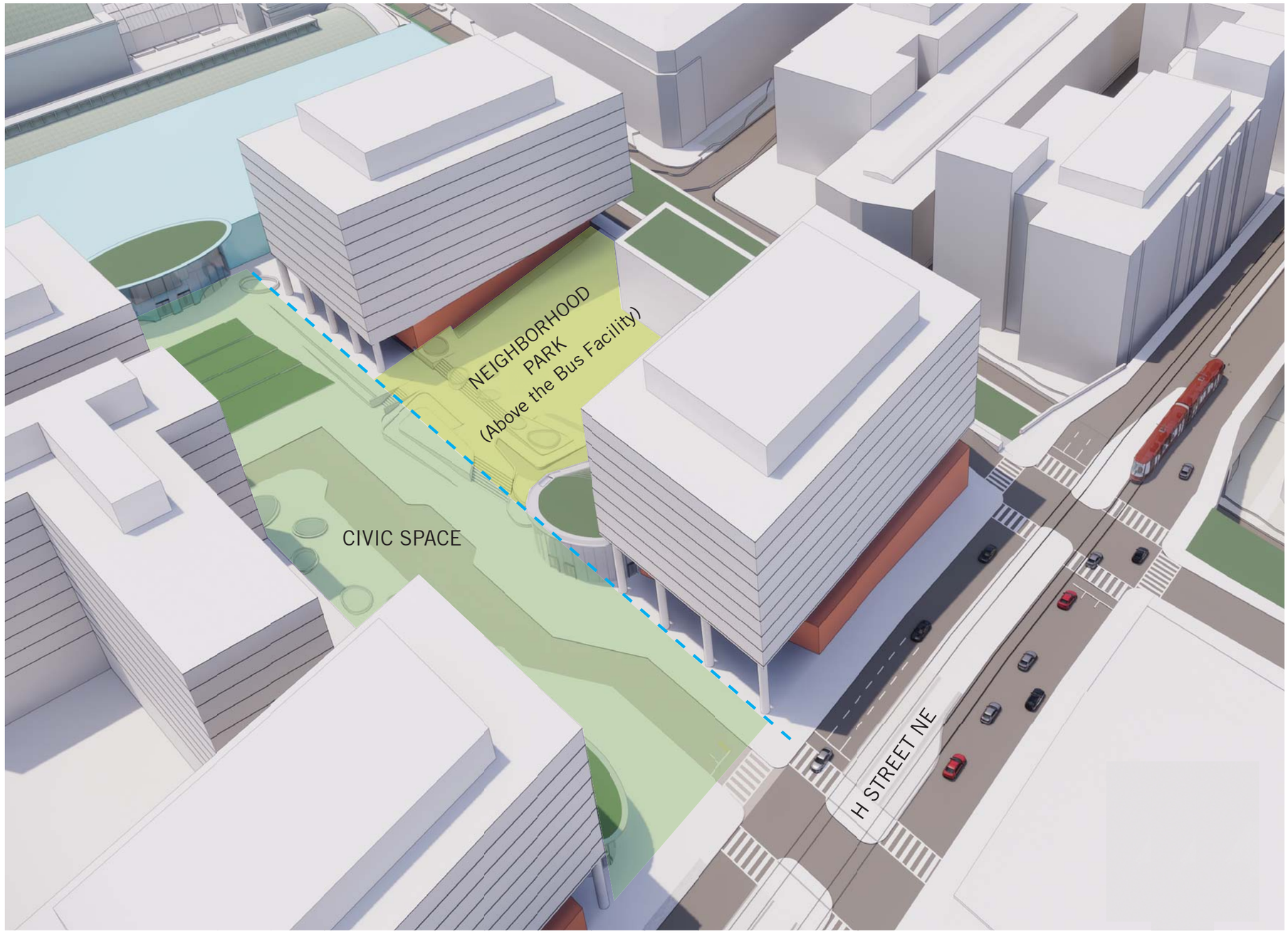
Vision for A-C Modified Made Possible with Parking & PUDO Relocated and Bus Reconfigured



Air-rights massing and transportation entrances are shown for illustrative purposes

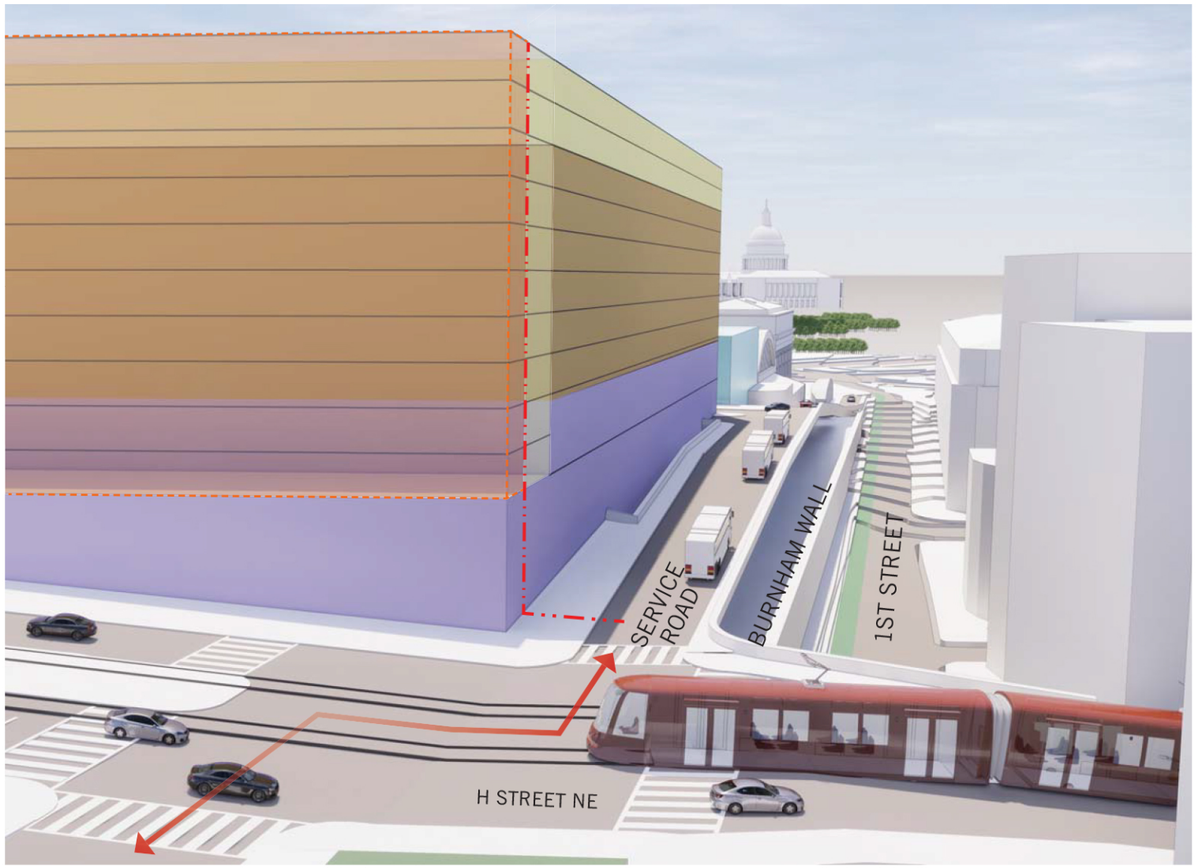
A reconfigured bus facility is embedded in viable and valuable air-rights development.

A new neighborhood park located above a bus facility would:

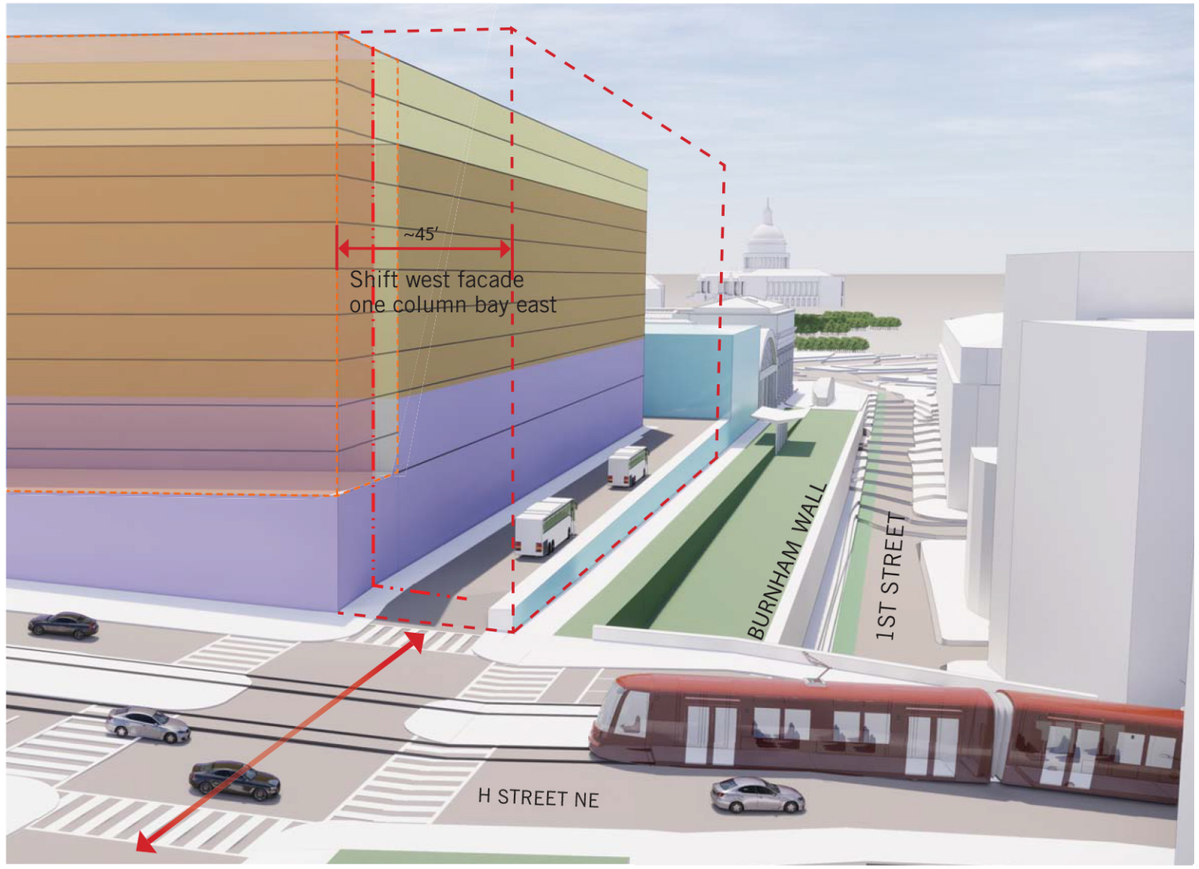
- Provide a park amenity available to transportation users and surrounding neighborhoods
- Provide opportunities to deliver natural light to the bus lobby and waiting areas through skylights integrated into the landscape
- Sponsor adjacent active ground floor uses including neighborhood-serving amenities below viable air-rights development

Extending the Metropolitan Branch Trail

PREFERRED ALTERNATIVE A-C



ADJUSTED A-C MASSING - Greenway introduced and service road intersection aligned



Above-Ground Parking Facility
(Behind Potential Development)

Train Hall
(Train Hall beyond; headhouse in the foreground)

Potential Federal Air-Rights Development
(Behind Potential Development and above the Parking Facility)

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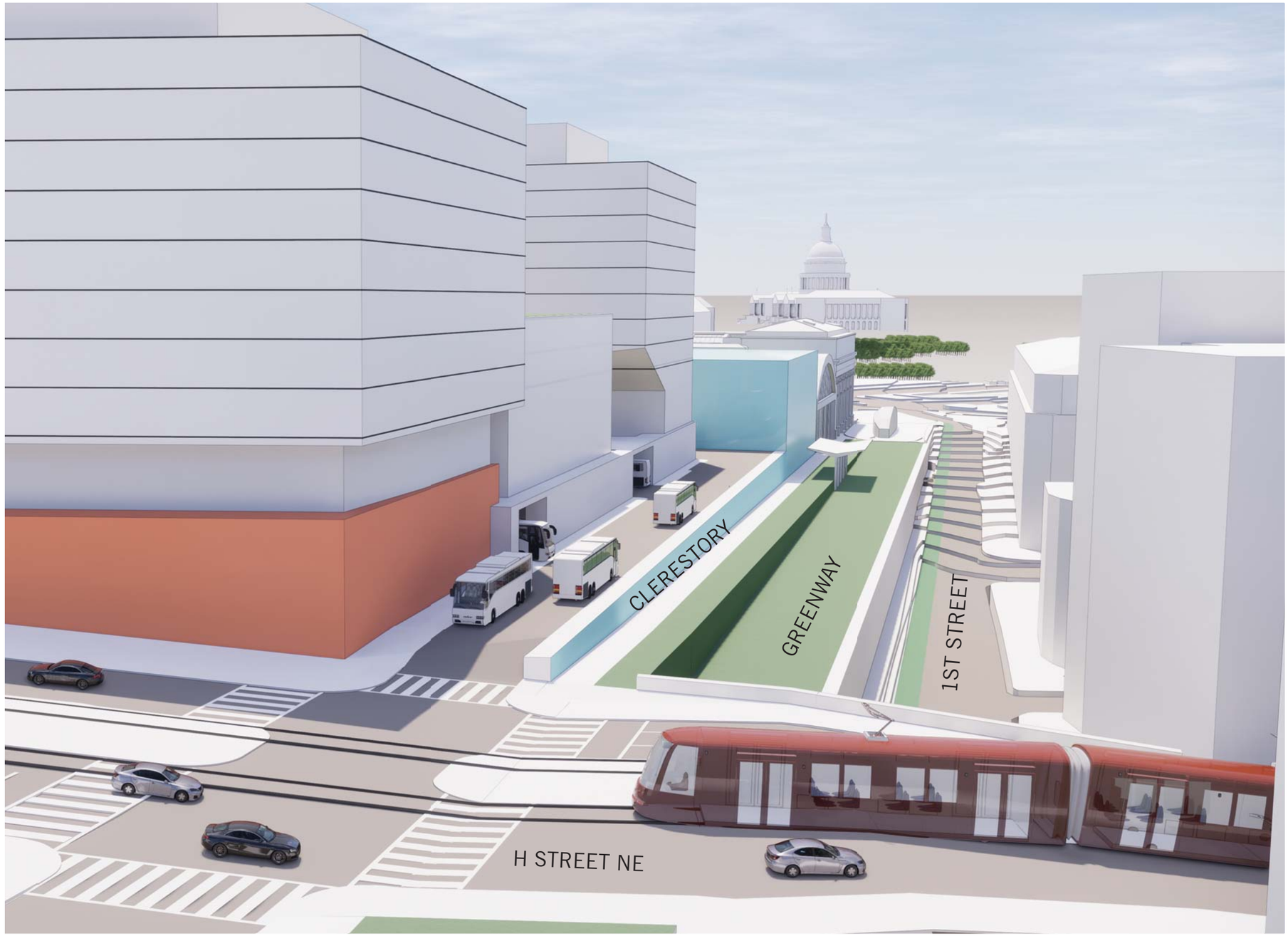
Vision for a A-C Modified Made Possible with Parking & PUDO Relocated and Bus Reconfigured



Shifting the west service road enables:

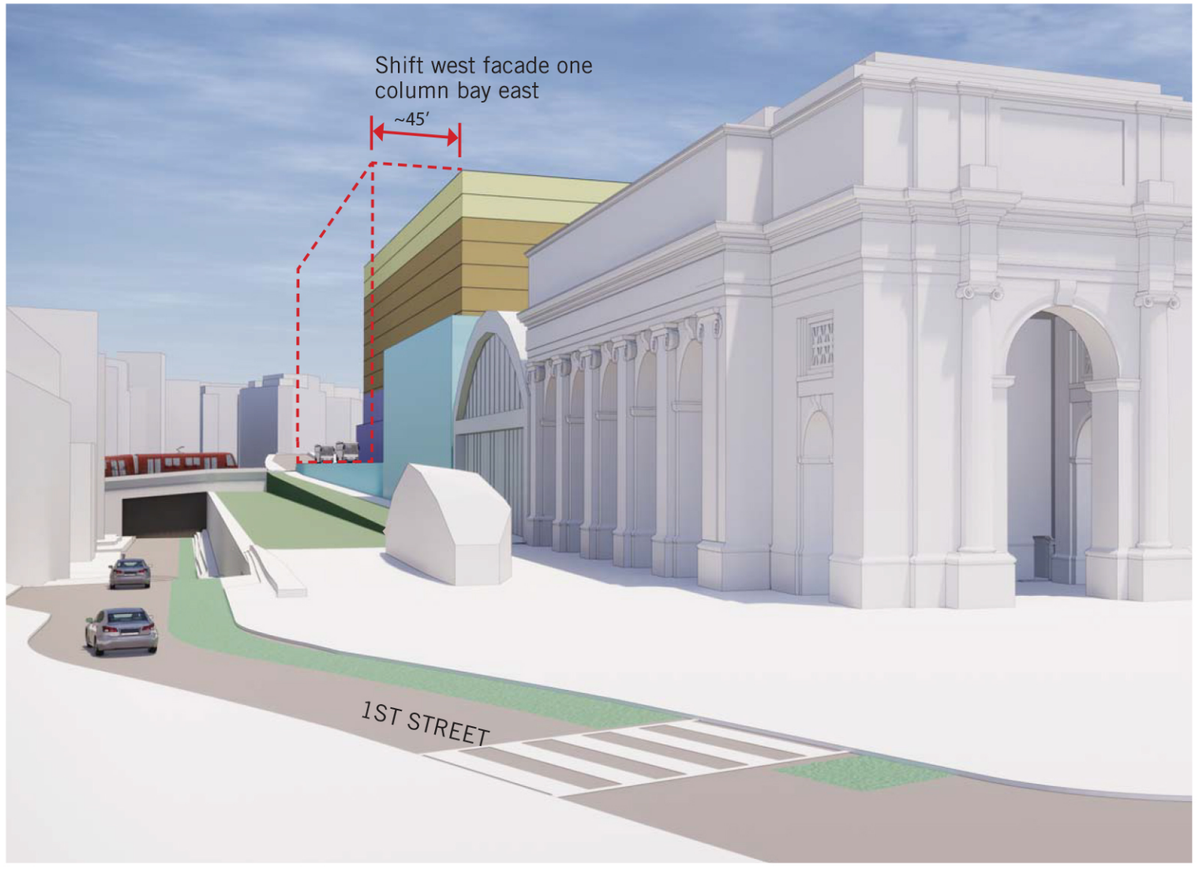
- A linear greenway park
- Bus egress (as well as ingress) to the west
- Restoration of the original Burnham wall height along 1st Street
- Clerestory windows to track and concourse levels below

Air-rights massing and transportation entrances are shown for illustrative purposes

Prioritizing Pedestrians, Cyclists and Preservation

PREFERRED ALTERNATIVE A-C

ADJUSTED A-C MASSING - Metropolitan Branch Trail greenway extended to Columbus Circle



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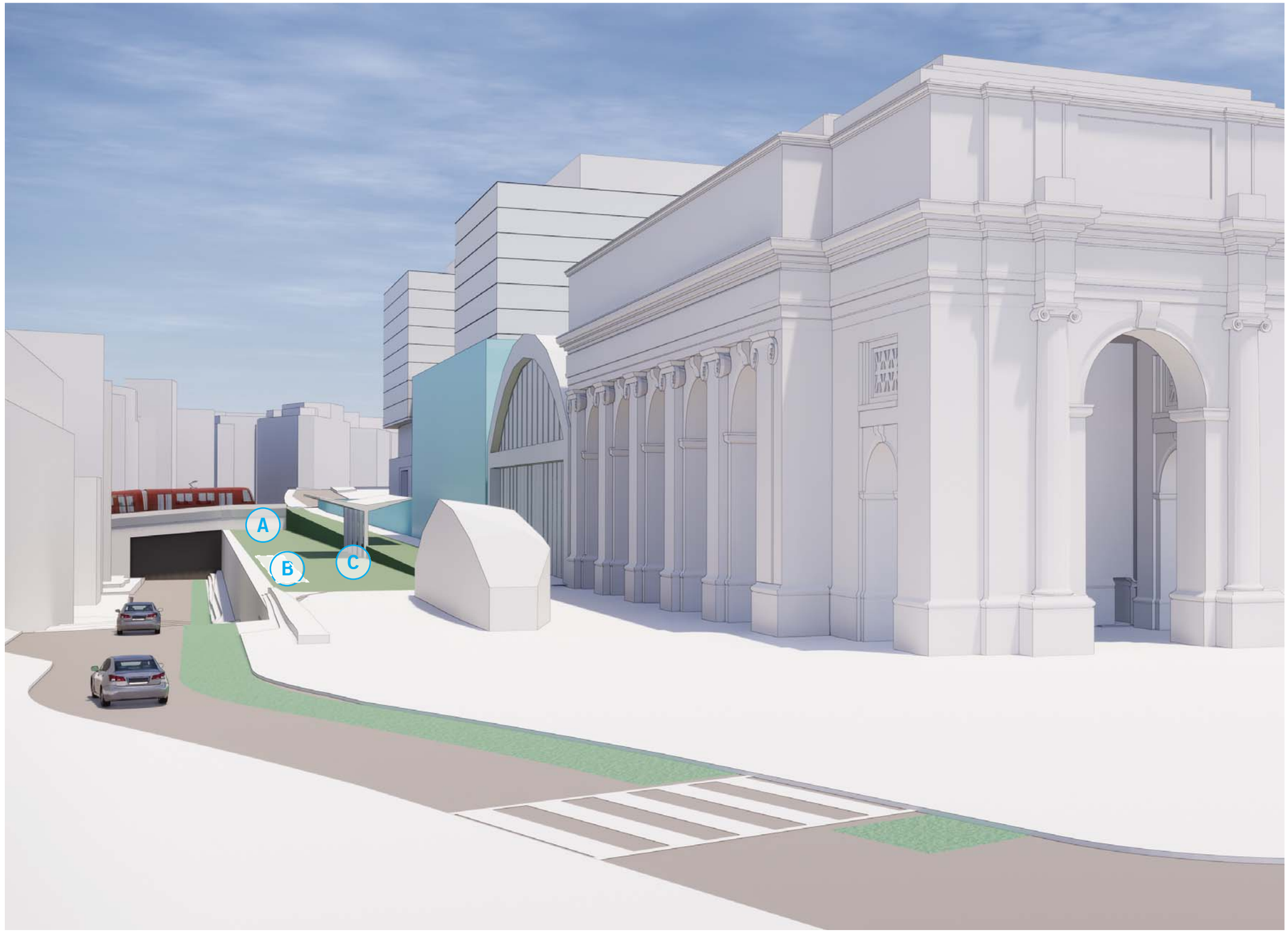


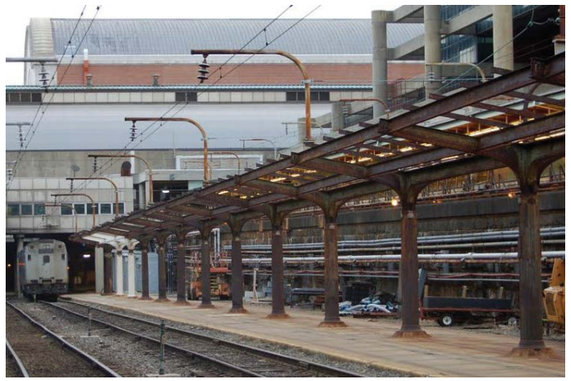
Air-rights massing and transportation entrances are shown for illustrative purposes

By extending the Metropolitan Branch Trail:

A Linear park replaces a service road

B Natural light introduced to Metro's north mezzanine

C Historic rail platform canopy featured



Canopy for relocation and restoration

Q&A and Discussion

Akridge_0928

View from the Greenway Overlook looking south towards the Historic Station

APPENDIX F

FISCAL AND ECONOMIC IMPACT ANALYSIS

RCLCO
REAL ESTATE ADVISORS

FISCAL AND ECONOMIC IMPACT ANALYSIS

WASHINGTON UNION STATION EXPANSION PROJECT & BURNHAM PLACE

Washington, D.C.

ABOUT RCLCO

Since 1967, RCLCO has been the "first call" for real estate developers, investors, the public sector, and non-real estate companies and organizations seeking strategic and tactical advice regarding property investment, planning, and development.

RCLCO leverages quantitative analytics and a strategic planning framework to provide end-to-end business planning and implementation solutions at an entity, portfolio, or project level. With the insights and experience gained over 50 years and thousands of projects–touching over $5B of real estate activity each year–RCLCO brings success to all product types across the United States and around the world.

Learn more about RCLCO at www.RCLCO.com.

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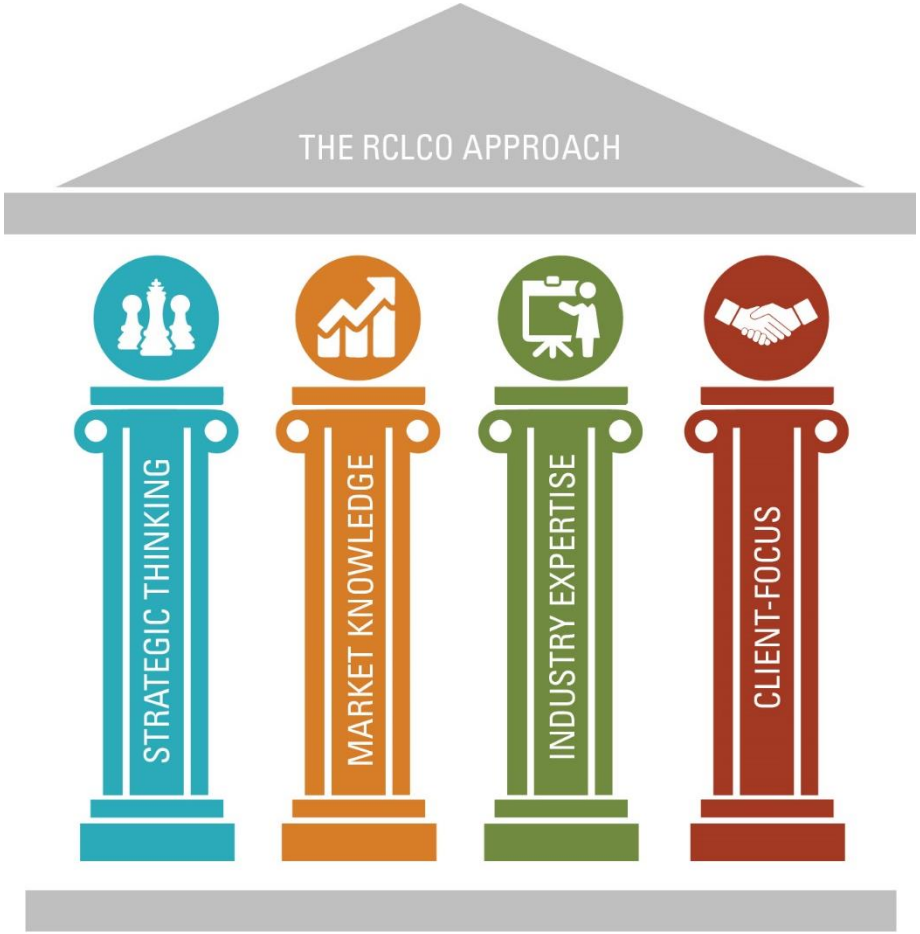

CONTENTS

Architectural Renderings, August 2020;
Burnham Place and Adjacent Federal Property

Image Source: Akridge; Shalom Baranes Associates

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REAL ESTATE ADVISORS

OBJECTIVES & KEY FINDINGS

PROJECT OVERVIEW

The Union Station Redevelopment Corporation (USRC), in coordination with Amtrak, proposes to expand and modernize Washington Union Station. The expansion project is necessary to improve rail capacity, reliability, safety, efficiency, accessibility, and security, for both current and future railroad operations at the historic station. Many station facilities are currently at or exceed their practical capacity, and additional growth in rail service and ridership will quickly push Union Station beyond its capacity unless substantial efforts are made to accommodate projected growth. The proposed expansion project includes reconstruction and realignment of tracks and platforms, development of new passenger concourses, and improvement to multimodal transportation facilities. As a part of this work, the existing parking garage at Union Station must be removed to accommodate the essential reconstruction/realignment of tracks and platforms. As a result, a "blank slate" exists relative to what is constructed above the new train facilities, in the location of the current parking garage.

Headquartered in Washington, D.C., Akridge is a real estate investor, developer, and operator that purchased the adjacent air rights above the train tracks in 2006 to develop Burnham Place, a mixed-use development project that, upon completion, will include up to a dozen buildings that together comprise approximately three million square feet of space. Located atop the railyard of Union Station, Burnham Place will fill a gap in the urban fabric of Washington, D.C., by creating an entirely new commercial center at the intersection of the Downtown Washington, Capitol Hill, NoMa, and H Street submarkets. In addition to an expanded multi-modal station, Burnham Place is planned to include a mix of first-class office, residential, retail, and hotel space, right at the gateway of the nation's capital.

As part of the SEP Environmental Impact Statement, the Federal Railroad Administration (FRA) created a Preferred Alternative that would entail rebuilding a large, aboveground parking structure in essentially the same location as the current parking garage. In the majority of the alternatives studied by FRA, the new parking facility was placed below the renovated and rebuilt track/concourse facilities. The decision to pursue underground parking and other transportation elements instead of the currently proposed above-ground structure would free up valuable space for an additional 563,000 square feet of space, along with priceless gathering spaces and public parks for the surrounding neighborhood. For more information on the location of and plans for this site, please refer to the site plan and rendering to the right.

Site Plan Vision, August 2020;
Burnham Place and Adjacent Federal Property

Rendered Vision, August 2020;
Burnham Place and Adjacent Federal Property

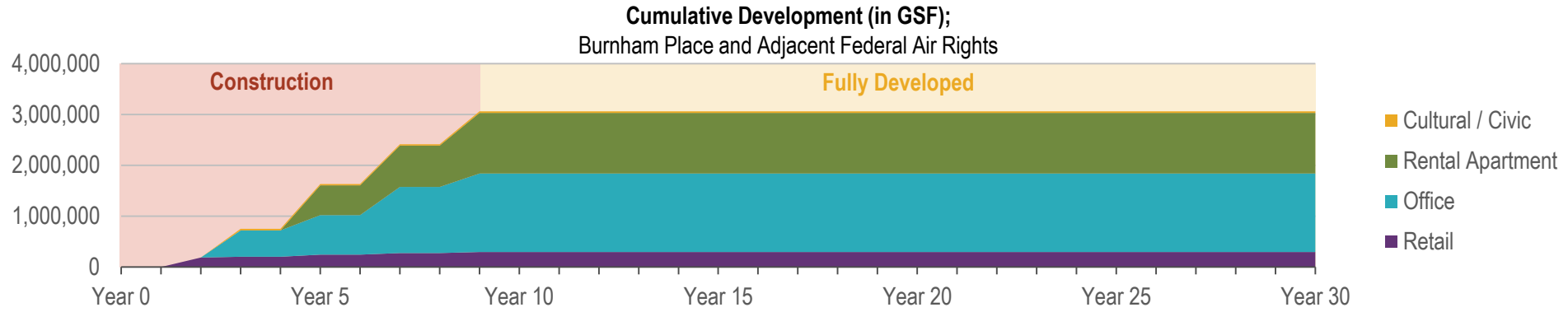
Proposed vision for vibrant community space and revenue-generating land use on FRA property

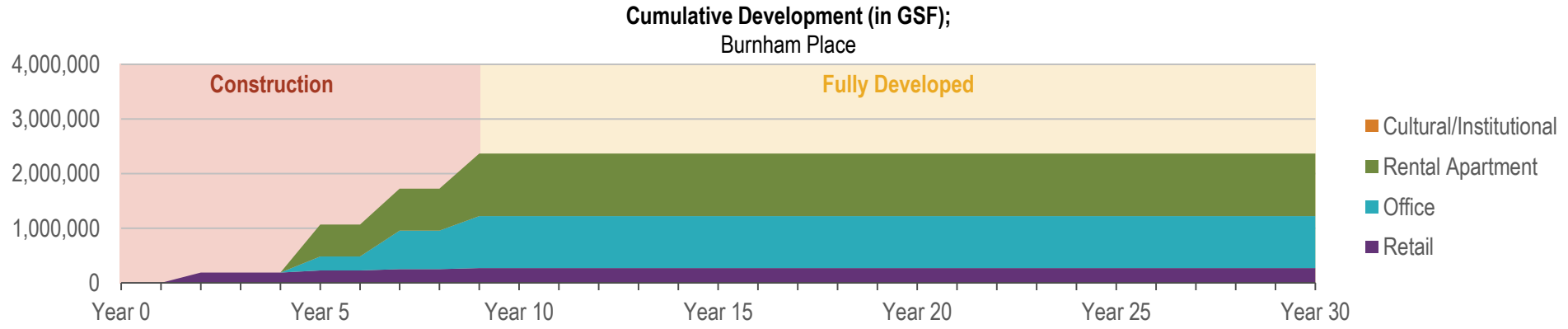
Image Source: Akridge; Shalom Baranes Associates

OBJECTIVES OF ANALYSIS

The following report highlights the public benefits of moving parking underground and incorporating additional mixed-use development atop the federal air rights. This decision, the analysis suggests, would yield innumerous benefits to the District, the Washington-Baltimore region, and the federal government, as well as the thousands of people who live and work nearby or pass through the station daily.

To measure the public benefit of mixed-use development in Burnham Place and on the adjacent federal air rights, this analysis relies on potential development programs provided by Akridge and Shalom Baranes Associates. These programs contemplate nearly 3.1 million square feet of space in the scenario in which the federal air rights are developed, versus just under 2.4 million square feet of space in the scenario in which they are reserved for an aboveground parking structure. The analysis covers the 30-year time period following the beginning of construction on above-ground structures. This time period includes roughly 10 years during which construction is still ongoing, followed by 20 years during which the development is complete. For more information on the distribution of space and timing of development, please see below:





Source: Akridge; Shalom Baranes Associates; RCLCO

KEY HEADLINES

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The federal air rights parcel has the potential to transform Burnham Place and the broader Union Station area in a variety of ways. While current plans for the federal air rights parcel feature an aboveground parking structure, there are numerous social, economic, and environmental advantages of moving this parking underground and freeing up room for additional private development. If developed in collaboration with Burnham Place, these air rights would add invaluable public and private spaces to the project and its surrounding neighborhood, unlocking meaningful economic benefits to the District and the federal government in the process.

The following report highlights the benefits of this change. Key headlines from the analysis include the following:

- The creation of a vibrant, pedestrian-focused environment atop the federal air rights parcel would yield immediate and direct financial benefits, which could help USRC preserve, maintain, and operate Washington Union Station. Underground parking produces an opportunity for the federal government to sell these air rights, potentially worth up to **$113 million** based on the amount of supportable development.
- The federal air-rights parcel at Union Station has the potential to yield significant fiscal benefits to the District. The placement of transportation elements below the deck frees the federal property for private development, which would contribute an additional **$415 million** in revenues to the District's General Fund in the 30 years following the start of above-grade construction.
- The replacement of aboveground parking with stronger placemaking elements included in a mixed-use development of the federal air rights is likely to increase the value and efficiency of other buildings, resulting in another **$168 million** in tax revenue to the District in the 30 years following the beginning of construction on above-grade development.
- Given the location relative to local and national transportation networks, a cohesive pedestrian-friendly program for Washington Union Station, Burnham Place, and the federal air rights parcel would be a centerpiece of the neighborhood and a critical connection to NoMa and Capitol Hill. High-quality public spaces therefore have the potential to increase surrounding property tax revenue by **$14 million per year**.
- The dedication of the federal air rights parcel to aboveground parking takes valuable economic potential away from the District and the greater Washington-Baltimore region. If the federal air rights parcel was instead developed into a mixed-use environment, it and Burnham Place together would produce a direct economic output of $1.5 billion, 50% higher than the $1.0 billion that Burnham Place alone would generate.

In total, the decision to move parking underground to free up the federal air rights for private development would produce

more than $1.0 billion in additional revenue

to the District and federal government in the 30 years following construction on above-grade structures. While Burnham Place alone would generate $1.4 billion in revenues to the District's General Fund during this time, the federal air rights have the potential to increase this number to almost $2.5 billion.

REVENUE PRODUCED OVER 30 YEARS:	
Baseline Tax Revenue Generated by Burnham Place	$1,359,000,000
Revenue Generated from Sale of Federal Air Rights	$113,000,000
Additional Tax Revenue Generated by Development of Federal Air Rights	$415,000,000
Additional Revenue from Federal Air Rights	**$528,000,000**
Additional Revenue from Burnham Place	**$168,000,000**
Additional Revenue from Surrounding Properties	**$391,000,000**
TOTAL ADDITIONAL REVENUE UNLOCKED BY BUILDING FEDERAL AIR RIGHTS	**$1,087,000,000**

Note: All revenue is expressed in 2020 dollars. Timing is expressed from the beginning of construction on above-grade structures.

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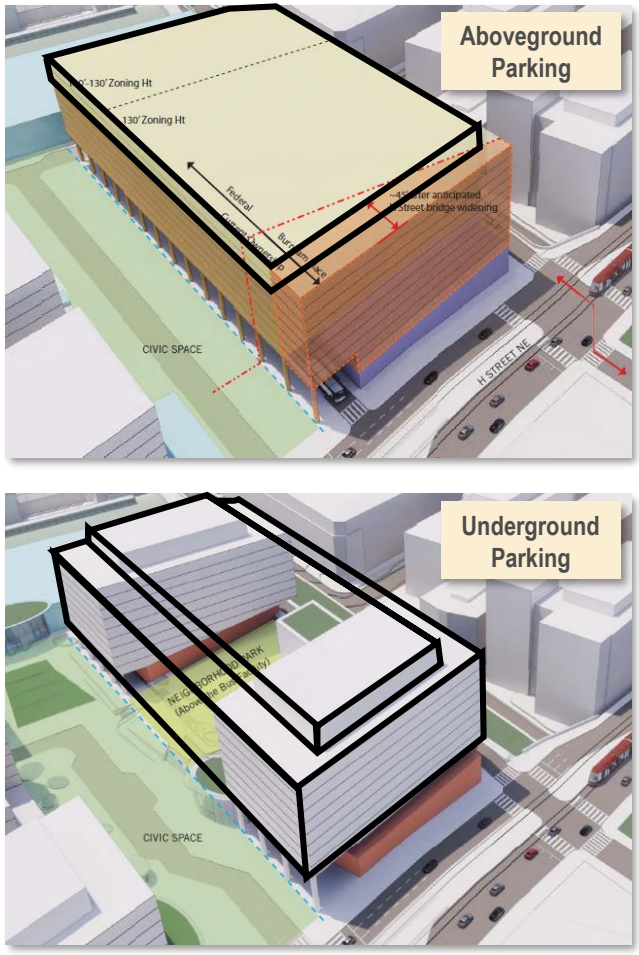
PRIMARY TAKEAWAYS

BENEFIT TO FEDERAL GOVERNMENT

The creation of a vibrant, pedestrian-focused environment atop the federal air rights parcel would yield immediate and direct financial benefits, which could help USRC preserve, maintain, and operate Washington Union Station. Underground parking produces an opportunity for the federal government to sell these air rights, potentially worth up to $113 million based on the amount of supportable development.

- Right-sizing and moving transportation elements such as parking, bus slips, and pick-up and drop-off facilities underground creates an opportunity to serve riders, residents, and visitors to Union Station in an urban, pedestrian-friendly environment. Shalom Baranes Associates estimates that the federal air rights would support an additional 563,000 square feet of development. This amount of development would suggest the air rights are worth up to $113 million, assuming a value of $200 per square foot based on recent transactions that Akridge has observed for other mixed-use development projects[1]. The sale of the air rights would therefore represent an immediate and direct benefit to the federal government.
- While the existing FRA plan suggests some private development potential above the parking structure, the space as shown by FRA is likely undevelopable as currently envisioned. In existing plans, the parking structure does not accommodate sufficient lobby access or mechanical/service space for a Class A office building, and the air rights only include 20' of vertical area for private development, which is unlikely to be sufficient to support two floors of space. In addition, it is often difficult to construct private uses above public parking, because the gridded layouts and structures of parking garages require changes to accommodate uses on top, thereby creating inefficiencies and conflicts on the floors below. For this reason, it is unlikely that any practical private development could occur on top of the proposed 110-foot federal garage.
- In keeping with modern trends towards pedestrian and bicyclist prioritization, the surrounding NoMA neighborhood has seen significant value in utilizing underground parking to maximize aboveground building area as it has evolved over the past decade, and there is little reason to believe the economic fundamentals of the federal air rights will be any different. As currently envisioned, the Union Station garage would be one of the only—if not the only—aboveground parking structures in the entire neighborhood, if it were to be developed that way.

Illustration of Federal Air Rights;
Adjacent Federal Property



[1] *This estimate is based on recent transactions that Akridge has observed across the District. However, it is important to note that development plans for Burnham Place are still evolving, and the complexity of the project may produce different values than that which the market would yield on a typical, standalone site. For example, if the overall development allocates a lower amount of parking to this particular site than that which a private developer would typically provide, Akridge estimates the air rights could fetch a slightly lower value of roughly $175 per square foot (or $97 million overall), if that developer determines additional parking infrastructure or lower rents would be necessary to attract tenants.*

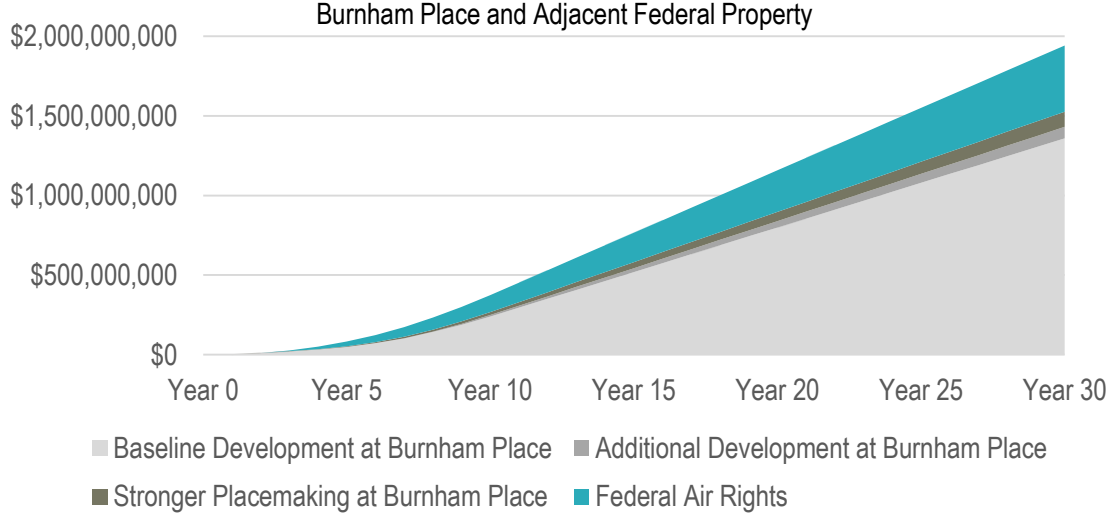
Image Source: Shalom Baranes Associates
Source: Akridge; Shalom Baranes Associates; RCLCO

INCREASED TAX REVENUE TO DISTRICT

The federal air-rights parcel at Union Station has the potential to yield significant fiscal benefits to the District. The placement of transportation elements below the deck frees the federal property for private development, which would contribute an additional $415 million in revenues to the District's General Fund in the 30 years following the start of above-grade construction.

- If market-based development were to occur on the federal air-rights parcel on which the aboveground parking garage is currently planned, it would introduce new, mixed-use development that would increase the household, employment, and tax bases of the District. Assuming the development of underground parking, the market-based potential for the federal parcel could feature 517,600 square feet of office, 28,200 square feet of cultural space, and 17,500 square feet of retail. RCLCO projects that this space would add 2,160 employees to the District based on the estimated program.
- This urban, mixed-use development would also unlock additional tax revenue to the District. In the 30 years following the beginning of above-grade construction, the planned development for the federal air rights would contribute $415 million in tax revenue to the District's General Fund, including:
  - $139 million in additional real property taxes from the new, private development;
  - $168 million in additional income taxes from office, institutional, and retail employees living in the District;
  - $24 million in sales and meals taxes from the additional retail and restaurant spaces; and
  - $84 million in other revenues, including but not limited to personal property taxes, corporate franchise income taxes, and licenses or permits.

Cumulative Tax Revenue (in 2020 Dollars);
Burnham Place and Adjacent Federal Property



Cumulative Tax Revenue Generated (in 2020 Dollars);
Federal Air Rights Parcel

TOTAL REVENUES	20 YEAR	30 YEAR
Real Property Tax	$87,500,000	$138,700,000
Personal Property Tax	$12,700,000	$20,100,000
Sales Tax	$3,800,000	$5,700,000
Meals Tax	$11,900,000	$18,600,000
Income Tax	$104,400,000	$168,500,000
Miscellaneous Revenues	$40,600,000	$63,700,000
TOTAL	**$260,900,000**	**$415,300,000**

Source: FY 2020 Approved Budget and Financial Plan for Washington, D.C.; Akridge; Shalom Baranes Associates; RCLCO

PLACEMAKING WITHIN BURNHAM PLACE

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The replacement of aboveground parking with stronger placemaking elements included in a mixed-use development of the federal air rights is likely to increase the value and efficiency of other buildings, resulting in another $168 million in tax revenue to the District in the 30 years following the beginning of construction on above-grade development.

- Subterranean transportation elements would create the opportunity for civic space, neighborhood park, and double-sided retail immediately outside Union Station and its new train hall. The additional foot traffic in a cohesive and complimentary space is likely to increase retail sales (as well as train and bus ridership) for all retailers at Union Station and Burnham Place. This atmosphere would strengthen other uses as well. For example, the stronger retail environment and overall placemaking at Burnham Place—coupled with the fact that it is one of the most accessible locations in the District—would enhance its ability to attract premier office tenants from across the region.
- Nationally, RCLCO has observed that strong placemaking and mixed-use environments command significant premiums for a variety of property types. In the District, the Wharf is commanding office rents between $60 and $70, well-above the $50 to $52 rents being achieved nearby at The Portal. Likewise, strong placemaking also yields meaningful apartment premiums, which have exceeded 10% in such locations as the Domain in Austin, the Seaport District in Boston, and the Wharf in Washington, D.C. The relationship between placemaking and value is closely intertwined; higher values allow for more placemaking, and more placemaking creates higher values.
- In addition, stronger placemaking would allow for better circulation throughout the development, which would improve the efficiency of other buildings. Together, these premiums and benefits translate to significantly more tax revenue to the District. Specifically, RCLCO projects the development of the federal air rights adjacent to Burnham Place would unlock an additional $168 million in tax revenue within the rest of the project in the 30 years following the beginning of above-grade construction, including more than $96 million from the stronger placemaking and $71 million from the more efficient development.

Revenue Created in Burnham Place by Developing Federal Air Rights, August 2020;
Burnham Place

	30 YEARS FROM INITIAL ABOVE-GRADE CONSTRUCTION		
TOTAL REVENUES	STRONGER PLACEMAKING	ADDITIONAL DEVELOPMENT	TOTAL REVENUE UNLOCKED
Real Property Tax	$28,600,000	$21,600,000	**$50,200,000**
Personal Property Tax	$3,100,000	$2,500,000	**$5,600,000**
Sales Tax	$8,700,000	$2,300,000	**$11,000,000**
Meals Tax	$31,900,000	$5,500,000	**$37,400,000**
Income Tax	$24,100,000	$29,400,000	**$53,500,000**
Miscellaneous Revenues	$0	$10,100,000	**$10,100,000**
TOTAL	**$96,400,000**	**$71,400,000**	**$167,800,000**

Double-Sided Retail Street, August 2020;
Burnham Place and Adjacent Federal Property

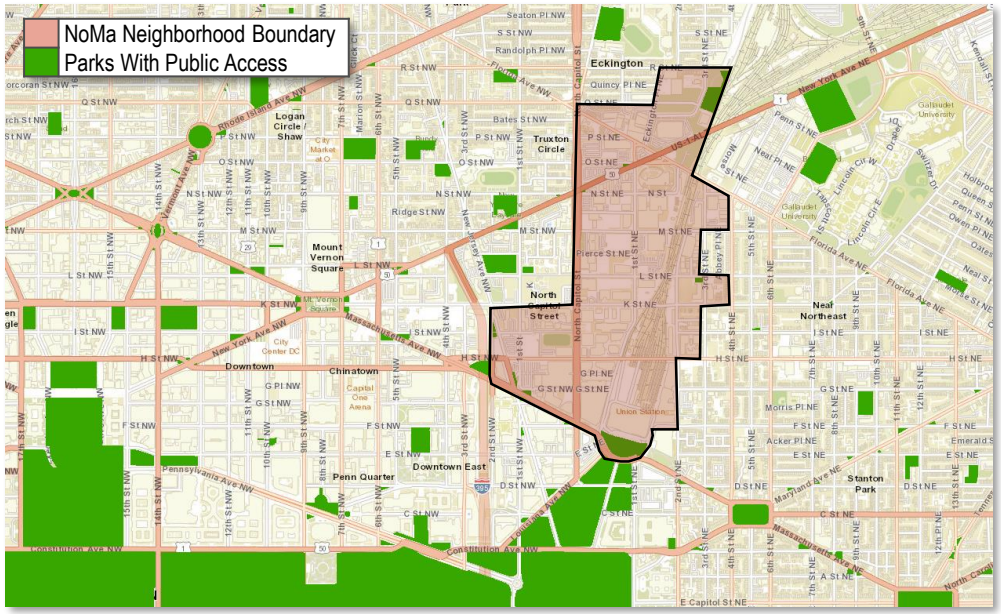
Source: FY 2020 Approved Budget and Financial Plan for Washington, D.C.; Akridge; Shalom Baranes Associates; RCLCO

PLACEMAKING IN NEIGHBORHOOD

Given the location relative to local and national transportation networks, a cohesive pedestrian-friendly program for Washington Union Station, Burnham Place, and the federal air rights parcel would be a centerpiece of the neighborhood and a critical connection to NoMa and Capitol Hill. High-quality public spaces therefore have the potential to increase surrounding property tax revenue by $14 million per year.

- Research from the Urban Land Institute suggests that parks and open spaces improve community health, boost economic development, and enhance long-term value by strengthening the overall sense of community in a place. Across the country, there are examples of high-quality parks and open spaces that have generated tremendous social and economic benefits to the communities in which they are located, including:
  - New York's High Line is an invaluable gathering place for residents, employees, and visitors that is projected to generate $900 million in tax revenue over 20 years, far exceeding initial projections of just $250 million and underscoring the extent to which parks can transform the areas in which they are located.
  - Dallas's Klyde Warren Park offers 5.2 acres of public space over Woodall Rodgers Freeway, where it bridges the gap between the Downtown and Uptown neighborhoods. Since opening in 2012, the park has attracted more than 10 million visitors, having a $2.5 billion economic impact on Dallas.
- These impacts are particularly meaningful in areas without access to existing parks. The NoMa neighborhood recognized too late it missed an opportunity to plan for parks and public spaces, and—given the lack of remaining land—the federal air-rights property represents an invaluable opportunity to create a public space for the entire neighborhood that celebrates and connects to the immediate multi-mobility uses of its surroundings.
- Nationally, RCLCO has observed that high-quality public spaces generate 8% to 10% more value for surrounding properties. If realized, this benefit would create an additional $1.2 to $1.5 billion in property values and unlock another $12.4 to $15.5 million in annual property taxes within 0.3 miles of the project. This incremental increase in property tax revenue translates to an additional $391 million to the District over the 30-year period following the beginning of above-grade development

Map of Parks with Public Access, August 2020;
NoMa and Other Surrounding Neighborhoods



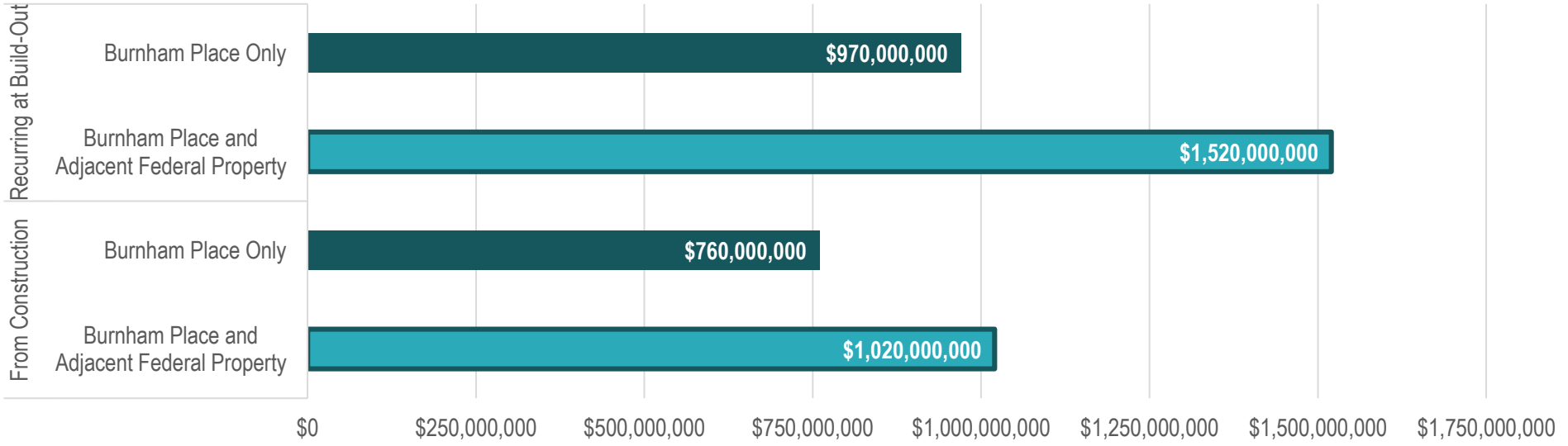
Source: The Trust for Public Land; StreetEasy; Klyde Warren Park; FY 2020 Approved Budget and Financial Plan for Washington, D.C.; RCLCO

OVERALL ECONOMIC IMPACT

The dedication of the federal air rights parcel to aboveground parking takes valuable economic potential away from the District and the greater Washington-Baltimore region. If the federal air rights parcel was instead developed into a mixed-use environment, it and Burnham Place together would produce a direct economic output of $1.5 billion, 50% higher than the $1.0 billion that Burnham Place alone would generate.

- An urban, pedestrian-friendly development on the federal air rights parcel would generate a much greater economic impact than a suburban, vehicular dominant parking garage. Together, Burnham Place and the adjacent federal property would generate $1.5 billion of direct economic output, along with $1.0 billion of direct investment into construction. These figures are significantly higher than they would be if only a portion of the site were open to development.
- One reason for this difference is that the federal air rights parcel would generate a substantial amount of employment if it was developed as a mixed-use environment rather than an aboveground parking garage. Together, Burnham Place and the adjacent federal air rights would create nearly 7,700 full-time jobs and 4,200 full-time equivalent ("FTE") construction jobs, much higher than the 5,200 full-time jobs and 3,100 FTE construction jobs that would be generated by Burnham Place alone. Importantly, many of these jobs translate to additional tax revenue beyond that which has already been listed in this report, given that a large number of employees commute into the District from Maryland and Virginia, the income taxes from which are not counted in the analyses on the prior pages.

Direct Economic Impact, August 2020;
Burnham Place and Adjacent Federal Property



Note: All values expressed in constant 2020 dollars.
Source: IMPLAN; RCLCO

RCLCO
REAL ESTATE ADVISORS

DISCLAIMERS

CRITICAL ASSUMPTIONS

Our conclusions are based on our analysis of the information available from our own sources and from the client as of the date of this report. We assume that the information is correct, complete, and reliable.

We made certain assumptions about the future performance of the global, national, and local economy and real estate market, and on other factors similarly outside either our control or that of the client. We analyzed trends and the information available to us in drawing these conclusions. However, given the fluid and dynamic nature of the economy and real estate markets, as well as the uncertainty surrounding particularly the near-term future, it is critical to monitor the economy and real estate markets continuously and to revisit the aforementioned conclusions periodically to ensure that they are reflective of changing market conditions.

It has become increasingly clear that the U.S. economy is in a recession, and yet the extent of the damage to the economy and the ability to rebound from a still unfolding disruption are unknown. These events underscore the notion that stable and moderate growth patterns are historically not sustainable over extended periods of time, the economy is cyclical, and real estate markets are typically highly sensitive to business cycles. Further, it is particularly difficult to predict inflection points, including when economic and real estate expansions will end, and when downturn conditions return to expansion.

Our analysis and recommendations are based on information available to us at the time of the writing of this report, including the likelihood of a downturn, length and duration, but it does not consider the potential impact of additional/future shocks on the national and/or local economy, and does not consider the potential benefits from major "booms" that may occur. Similarly, the analysis does not reflect the residual impact on the real estate market and the competitive environment of such a shock or boom. Also, it is important to note that it is difficult to predict changing consumer and market psychology. As such, we recommend the close monitoring of the economy and the marketplace, and updating this analysis as appropriate.

Further, any project and investment economics included in our analysis and reports should be “stress tested” to ensure that potential fluctuations in revenue and cost assumptions resulting from alternative scenarios regarding the economy and real estate market conditions will not cause unacceptable levels of risk or failure.

In addition, and unless stated otherwise in our analysis and reports, we assume that the following will occur in accordance with current expectations by market participants:

- Tax laws (i.e., property and income tax rates, deductibility of mortgage interest, and so forth)
- Availability and cost of capital and mortgage financing for real estate developers, owners and buyers
- Competitive supply (both active and future) will be delivered to the market as planned, and that a reasonable stream of supply offerings will satisfy real estate demand
- Major public works projects occur and are completed as planned

Should any of the above change, this analysis should be updated, with the conclusions reviewed accordingly (and possibly revised).

GENERAL LIMITING CONDITIONS

RCLCO REAL ESTATE ADVISORS

Reasonable efforts have been made to ensure that the data contained in this study reflect accurate and timely information and are believed to be reliable. This study is based on estimates, assumptions, and other information developed by RCLCO from its independent research effort, general knowledge of the industry, and consultations with the client and its representatives. No responsibility is assumed for inaccuracies in reporting by the client, its agent, and representatives or in any other data source used in preparing or presenting this study. This report is based on information that to our knowledge was current as of the date of this report, and RCLCO has not undertaken any update of its research effort since such date.

Our report may contain prospective financial information, estimates, or opinions that represent our view of reasonable expectations at a particular time, but such information, estimates, or opinions are not offered as predictions or assurances that a particular level of income or profit will be achieved, that particular events will occur, or that a particular price will be offered or accepted. Actual results achieved during the period covered by our prospective financial analysis may vary from those described in our report, and the variations may be material. Therefore, no warranty or representation is made by RCLCO that any of the projected values or results contained in this study will be achieved.

Possession of this study does not carry with it the right of publication thereof or to use the name of "Robert Charles Lesser & Co." or "RCLCO" in any manner without first obtaining the prior written consent of RCLCO. No abstracting, excerpting, or summarization of this study may be made without first obtaining the prior written consent of RCLCO. This report is not to be used in conjunction with any public or private offering of securities or other similar purpose where it may be relied upon to any degree by any person other than the client without first obtaining the prior written consent of RCLCO. This study may not be used for any purpose other than that for which it is prepared or for which prior written consent has first been obtained from RCLCO.

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APPENDIX G

VIEW SHED ANALYSIS

Analysis of DEIS Appendix C3a – Aesthetics and Visual Quality: Visual Assessment

The massing used in DEIS Appendix C3a to describe the “Private Air-Rights” is the maximum buildable volume, including penthouses. This is unrealistic and unachievable. Using realistic “Private Air-Rights” massing that considers zoning height and density limits, while conforming to reasonable internal open space/ road network, structural and use constraints, results in multiple building masses and considerably reduced overall volume.

This document critiques the findings of DEIS Appendix C3a and illustrates how realistic “Private Air-Rights” massing materially alters the visibility of Alternative A-C and the FRA’s assessment of its impacts.

WASHINGTON UNION STATION AND BURNHAM PLACE

ANALYSIS OF DEIS APPENDIX C3a
AESTHETICS AND VISUAL QUALITY: VISUAL ASSESSMENT

SEPTEMBER 28, 2020

AKRIDGE Invested.

LAB Laboratory for Architecture + Building

shalom baranes associates | architects

Summary

- The DEIS massing used to describe the “Private Air-Rights” is the maximum buildable volume including penthouses.

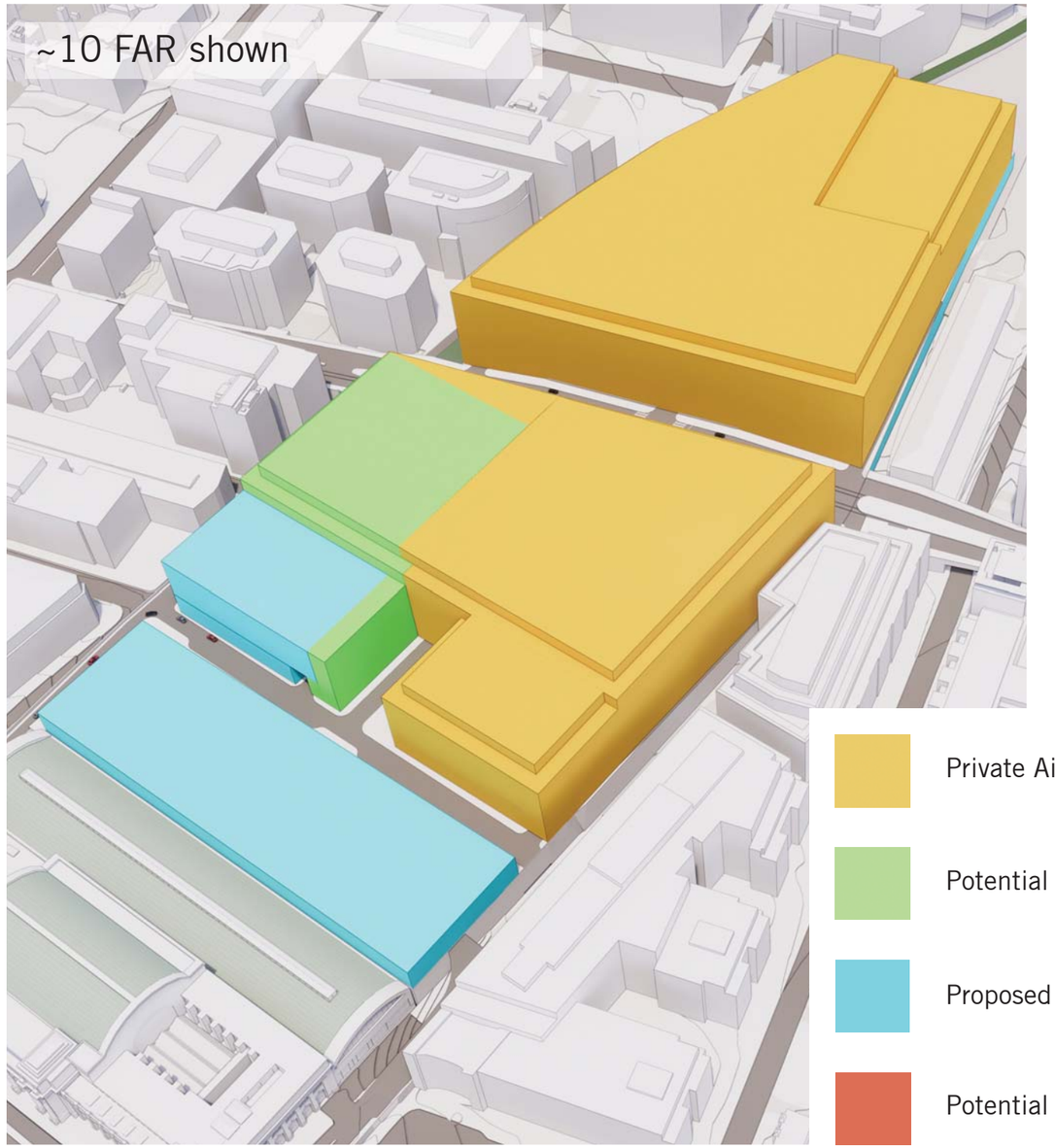
- Using realistic “Private Air-Rights” massing that considers not only zoning height limits, but also legally permissible density limits, and also conforms to reasonable internal open space/road network, structural and use constraints results in multiple building masses and considerably reduced overall volume.

- This analysis depicts realistic “Private Air-Rights” which, in the case of some views, bring DEIS impact conclusions into question.

This document includes views identified in the DEIS where using realistic “Private Air-Rights” massing materially alters the visibility of Alternative A-C and the FRA’s assessment of impacts.

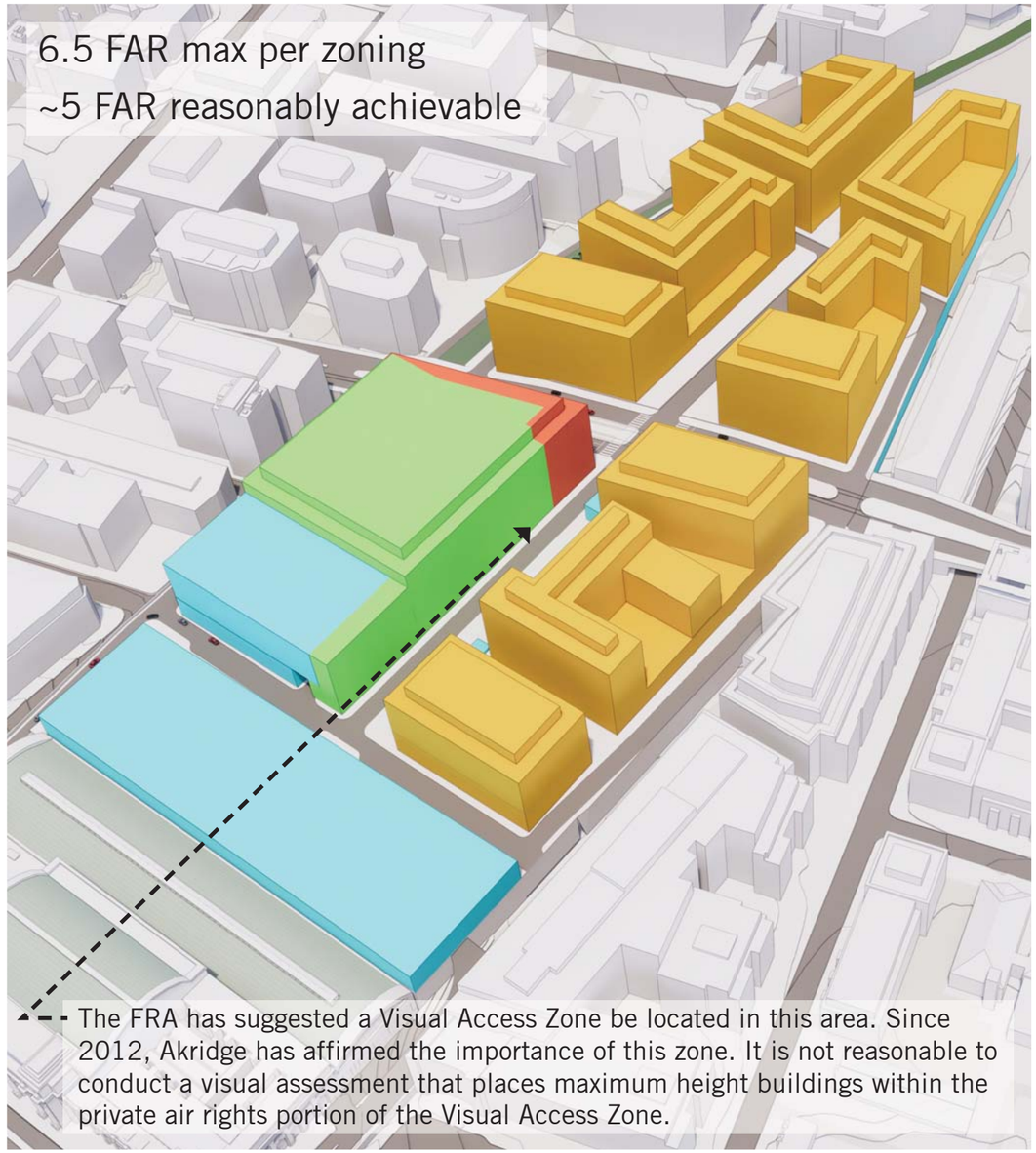
Massing Comparison

Hypothetical massing used in the DEIS Visual Assessment*
(maximum buildable volume including penthouses)



versus

Hypothetical massing that conforms with reasonable open space, structural and use constraints



* Burnham Place Team's construction of assumed DEIS massing based on a review of all view assessments provided

Summary of findings

View	DEIS Appendix C3a Page #	Description of View	DEIS Assessment of A-C Adverse Impacts		Findings of this Analysis of the DEIS Visual Assessments
			Compared to Existing Conditions	Compared to No-Action	
1	140	First Street, NE, view looking north	Major	Minor	The minor impact assessment of A-C compared to the No-Action Alternative is flawed. The visibility of A-C is unaltered by reasonable Private Air Rights massing and would be a backdrop to the historic station's central vault.
2	141	Delaware Ave, NE, view looking northeast	Major	Moderate	The moderate impact assessment of A-C compared to the No-Action Alternative is flawed. The visibility of A-C is unaltered by reasonable Private Air Rights massing and would be wider and misaligned - not creating visual symmetry behind the historic station as noted.
3	142	Louisiana Ave, NE, view looking northeast	Moderate	Minor	The minor impact assessment of A-C compared to the No-Action Alternative is flawed. The visibility of A-C is unaltered by reasonable Private Air Rights massing.
8	146	H Street, NW, view looking east	Negligible	No	The no impact assessment of A-C compared to the No-Action Alternative is flawed. The visibility of A-C, particularly when viewed from the north side of H Street, is unaltered by reasonable Private Air Rights massing.
10	148	First Street, NE, view looking south	Moderate	Negligible	The negligible assessment of A-C compared to the No-Action Alternative is flawed. A-C is visibly distinct from reasonable Private Air Rights massing by extending closer to the Burnham wall.
11	149	New York Ave Bridge, NE, view looking south	Major	No	The no impact assessment of A-C compared to the No-Action Alternative is flawed. A-C is visually distinct from reasonable Private Air Rights massing, extending into a view corridor to the back if the historic station.
15	153	H Street, NE, view looking west	Minor	No	The no impact assessment of A-C compared to the No-Action Alternative is flawed. A-C is visually distinct from reasonable Private Air Rights massing.
20	157	From Columbus Circle Drive, east side	Minor	No	The no impact assessment of A-C compared to the No-Action Alternative is flawed. The visibility of A-C is unaltered by reasonable Private Air Rights massing and would be visually distinct.
24	161	View from US Capitol Dome	Moderate	No	The no impact assessment of A-C compared to the No-Action Alternative is flawed. The visibility of A-C is unaltered by reasonable Private Air Rights massing and would be visually distinct.
28	163	H Street Bridge, view looking south	Moderate	No	The no impact assessment of A-C compared to the No-Action Alternative is flawed. The visibility of A-C is unaltered by reasonable Private Air Rights massing.

Preferred Alternative A-C visual assessment: First Street, NE, view looking north

View	Description and Assessment	View of No-Action
1. First Street NE, view looking north:	**First Street NE, view looking north:** In the distance, especially from Independence Avenue, only the WUS headhouse roof is visible; however, as one approaches Columbus Plaza the entire south elevation of WUS can be seen. As such, the aesthetic and visual impact of the No-Action Alternative changes as one approaches WUS. *Compared to existing conditions*, the alternative **would have a major adverse impact** on this view. The visual assessment indicates that the alternative is highly visible above the headhouse, interrupting the silhouette of the barrel-vaulted roof. There would be high sensitivity as the alternative **would change** the perception of open space behind the Station, altering the character of the view. *Compared to the No-Action Alternative,* the alternative **would have a minor adverse impact** on this view. The visual assessment indicates that the alternative has moderate visibility above the headhouse because the building volume is visually compatible with the maximum volume of the private air-rights development. Therefore, there would be low sensitivity and the alternative **would not noticeably change** the character of the view established by the No-Action Alternative.	 **Alternative A-C and Existing Conditions**  **Alternative A-C and No-Action**

Private Air-Rights

Potential Federal Air-Rights

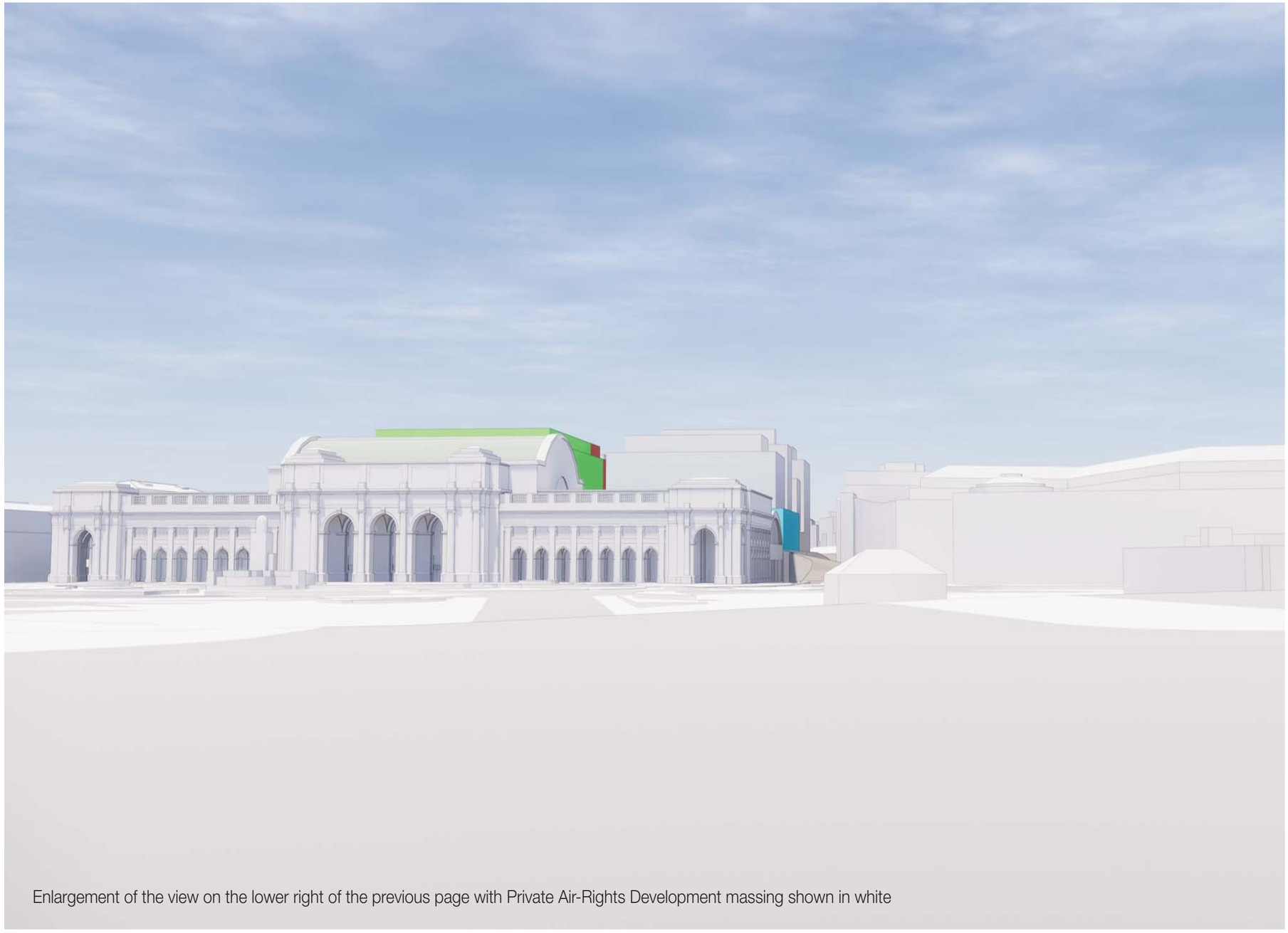
Proposed Alternative

Alternative A-C and Burnham Place Massing

CREDIT: Burnham Place Team

CREDIT: Draft Environmental Impact Statement for Washington Union Station Expansion Project: Appendix C3a Aesthetics and Visual Quality: Visual Assessment

Preferred Alternative A-C visual assessment: First Street, NE, view looking north



Enlargement of the view on the lower right of the previous page with Private Air-Rights Development massing shown in white

The **minor adverse impact** assessment of Alternative A-C compared to the No-Action Alternative is flawed.

The visibility of Alternative A-C is unaltered by reasonable Private Air Rights massing and would be a backdrop to the historic station's central vault.

Existing Context Buildings and Private Air-Rights Development

Potential Federal Air-Rights

Proposed Alternative

Potential Development

Preferred Alternative A-C visual assessment: Delaware Avenue NE, view looking northeast

View	Description and Assessment	View of No-Action
2. Delaware Avenue NE, view looking northeast	**Delaware Avenue NE, view looking northeast:** From Constitution Avenue NE, C Street NE, and D Street NE only the center three bays of the WUS headhouse are visible; however, as one approaches Columbus Plaza, the entire south elevation of WUS can be seen. The aesthetic and visual impact of the alternative changes as one approaches WUS. *Compared to existing conditions*, the alternative **would have a major adverse impact** on this view as the Project would be highly visible. The buildable volume would change the silhouette of this view, one of the primary views of the L'Enfant and McMillan Plans connecting the U.S. Capitol Grounds with WUS. The barrel vault of the WUS headhouse would be interrupted by the massing of the development on the west and what was once perceived as open space behind the station would be built up. The symmetrical composition of the view, established by the symmetry of the Beaux Arts design of the Station, would also change. There would be moderate to high sensitivity and the alternative **would noticeably change** the character of the view. *Compared to the No-Action Alternative,* the alternative **would have a moderate adverse impact** on this view. While it is highly visible,	 **Alternative A-C and Existing Conditions**  **Alternative A-C and No-Action**

..(continued)

	it would create a visual symmetry with the private air-rights development on the east by visually complementing its height. Therefore, there would be moderate sensitivity. The alternative **would moderately change** the character of the view, established by the No-Action Alternative.

Potential Federal Air-Rights

Proposed Alternative

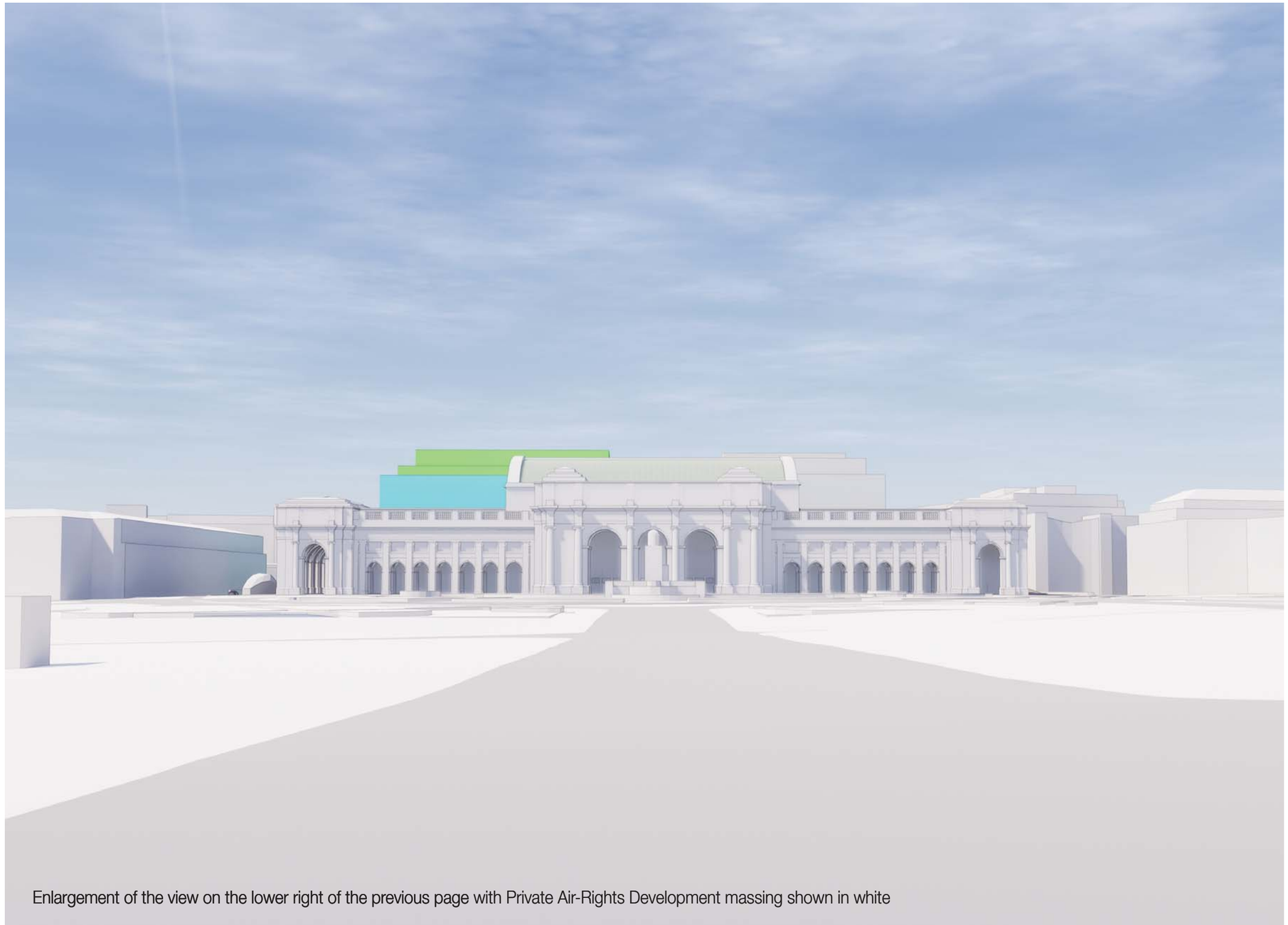
Private Air-Rights

Alternative A-C and Burnham Place Massing

CREDIT: Burnham Place Team

CREDIT: Draft Environmental Impact Statement for Washington Union Station Expansion Project: Appendix C3a Aesthetics and Visual Quality: Visual Assessment

Preferred Alternative A-C visual assessment: Delaware Avenue NE, view looking northeast



Enlargement of the view on the lower right of the previous page with Private Air-Rights Development massing shown in white

The **moderate adverse impact** assessment of Alternative A-C compared to the No-Action Alternative is flawed.

The visibility of Alternative A-C is unaltered by reasonable Private Air Rights massing and would be wider and misaligned - not creating visual symmetry behind the historic station as notedin the DEIS.

Existing Context Buildings and Private Air-Rights Development

Potential Federal Air-Rights

Proposed Alternative

Potential Development

Preferred Alternative A-C visual assessment: Louisiana Avenue NE, view looking northeast

View	Description and Assessment	View of No-Action
3. Louisiana Avenue NE, view looking northeast:	**Louisiana Avenue NE, view looking northeast:** Along Louisiana Avenue NE only the center pavilion of the WUS headhouse are visible; however, as one approaches Columbus Plaza, the entire south elevation of WUS and the far west portion of the WUS parking facility can be seen. As such the visual impact of the No-Action Alternative changes as one approaches WUS. *Compared to existing conditions*, the alternative **would have a moderate adverse impact** on this view as the development would be highly visible. However, the development is sufficiently set back from the historic headhouse to appear as part of the urban context north of the station. There would be moderate sensitivity as the alternative **would moderately change** the character of the view. *Compared to the No-Action Alternative,* the alternative **would have a minor adverse impact** on this view as its presence is de minimis in comparison with the No-Action Alternative. The alternative would be in keeping with the height and massing of the private air-rights development on the east. There would be low sensitivity and the alternative **would not change** the character of the view established by the No-Action Alternative.	 **Alternative A-C and Existing Conditions**  **Alternative A-C and No-Action**

Private Air-Rights

Potential Federal Air-Rights

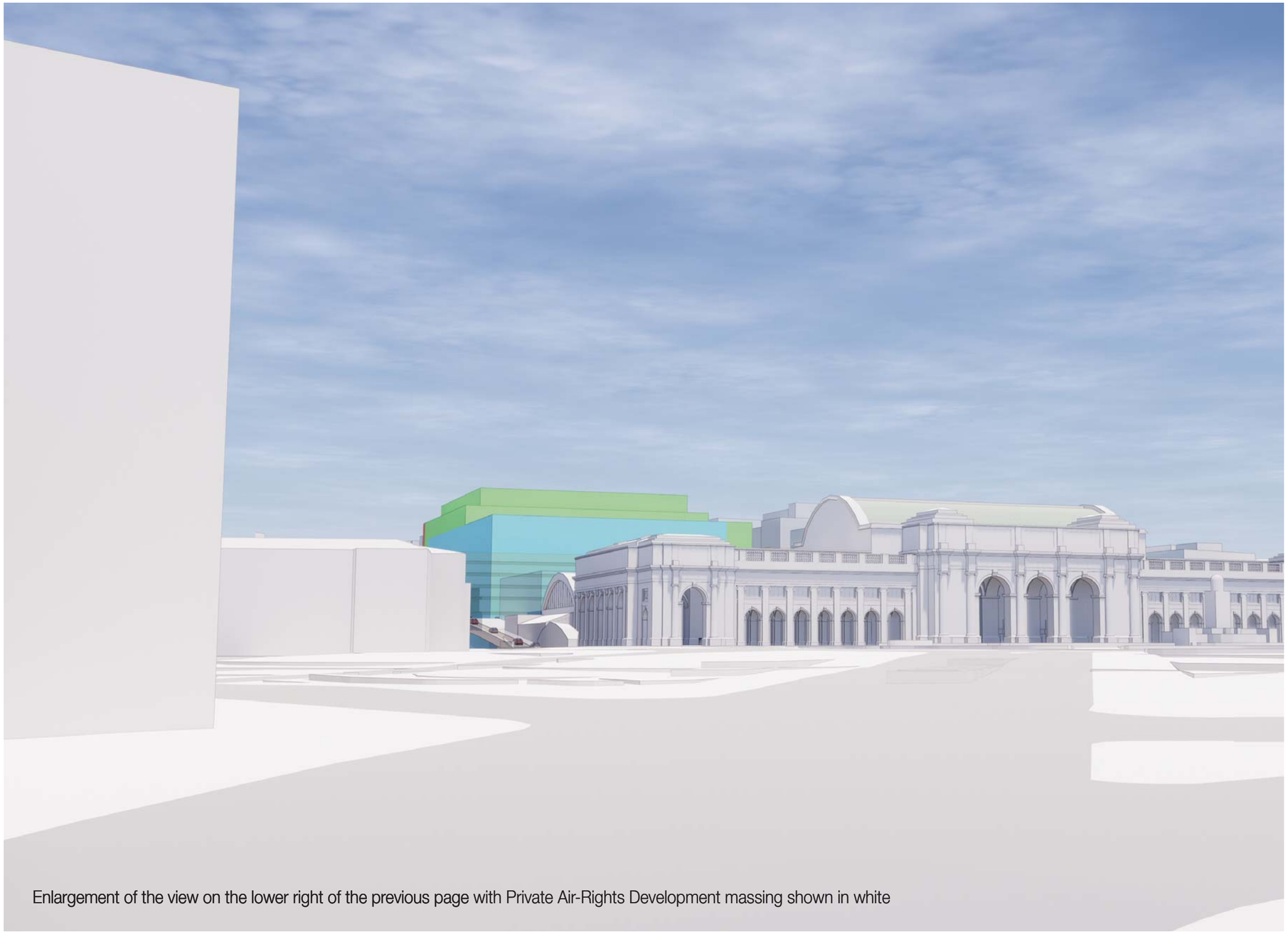
Proposed Alternative

Alternative A-C and Burnham Place Massing

CREDIT: Burnham Place Team

CREDIT: Draft Environmental Impact Statement for Washington Union Station Expansion Project: Appendix C3a Aesthetics and Visual Quality: Visual Assessment

Preferred Alternative A-C visual assessment: Louisiana Avenue NE, view looking northeast



Enlargement of the view on the lower right of the previous page with Private Air-Rights Development massing shown in white

The **minor adverse impact** assessment of Alternative A-C compared to the No-Action Alternative is flawed.

The visibility of Alternative A-C is unaltered by reasonable Private Air Rights massing.

Existing Context Buildings and Private Air-Rights Development

Potential Federal Air-Rights

Proposed Alternative

Potential Development

Preferred Alternative A-C visual assessment: H Street, NW, view looking east

View	Description and Assessment	View of No-Action
8. H Street NW, view looking east:	**H Street NW, view looking east:** The H Street Bridge and WUS parking facility is visible from First Street NW looking east towards the Project Area. The view is characterized by the commercial and institutional buildings flanking the street west of the bridge. From the H Street Bridge, the WUS parking facility is visible. The WUS headhouse and Terminal Rail Yard are not visible to pedestrians due to the height of the bridge barrier walls. *Compared to existing conditions*, the alternative **would have a negligible adverse impact** on this view as there would be low visibility. There would also be low sensitivity as the alternative **would not change** the character of the view, defined by the bridge and the multi-story commercial and residential buildings. *Compared to the No-Action Alternative*, the alternative would have **no impact** on this view as it would not be visually distinct from the private air rights.	 **Alternative A-C and Existing Conditions**  **Alternative A-C and No-Action**

Private Air-Rights

Potential Federal Air-Rights

Proposed Alternative

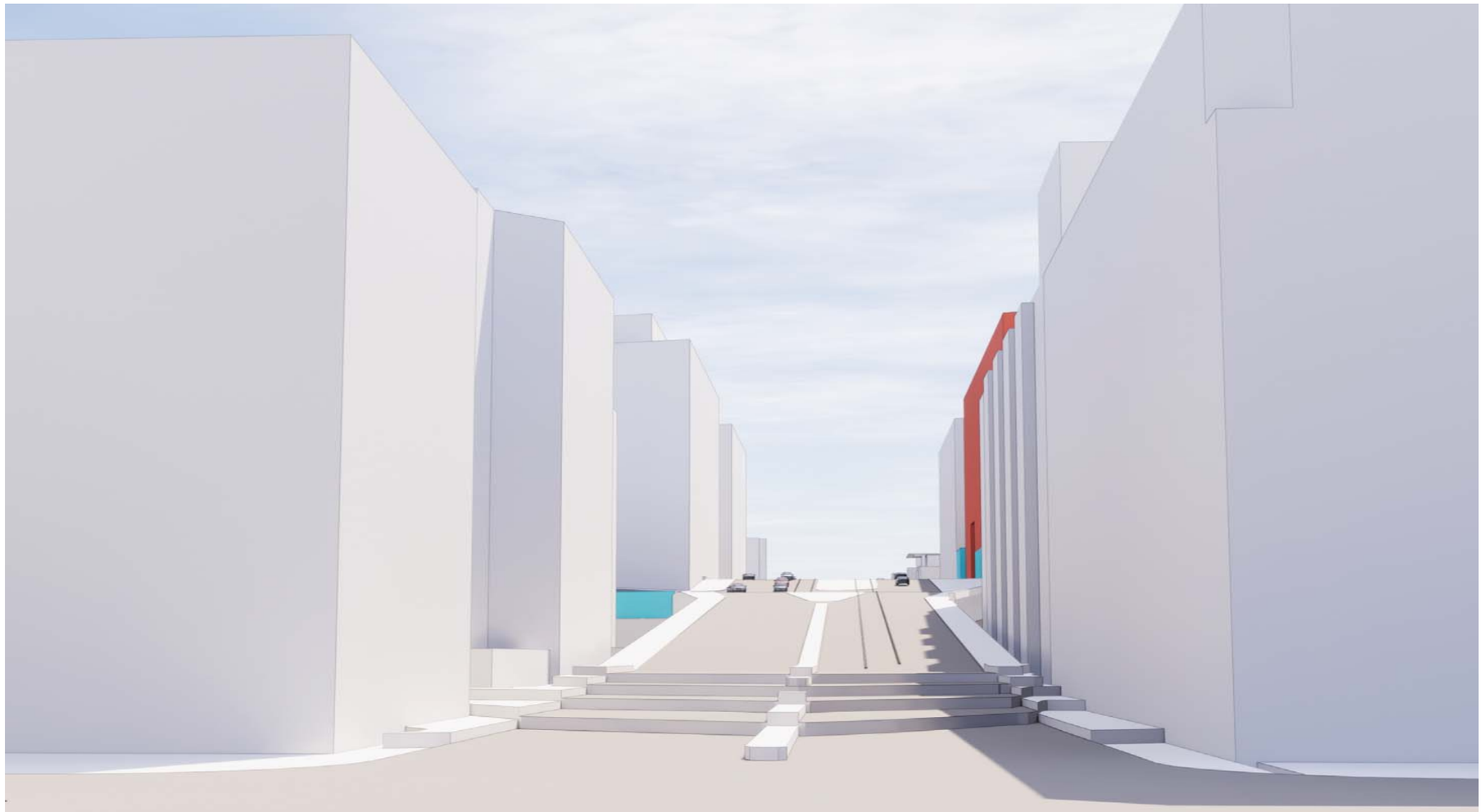
Proposed Alternative

Alternative A-C and Burnham Place Massing

CREDIT: Burnham Place Team

CREDIT: Draft Environmental Impact Statement for Washington Union Station Expansion Project: Appendix C3a Aesthetics and Visual Quality: Visual Assessment

Preferred Alternative A-C visual assessment: H Street, NW, view looking east



Enlargement of the view on the lower right of the previous page with Private Air-Rights Development massing shown in white

The **no adverse impact** assessment of Alternative A-C compared to the No-Action Alternative is flawed.

The visibility of Alternative A-C, particularly when viewed from the north side of H Street, is unaltered by reasonable Private Air Rights massing.

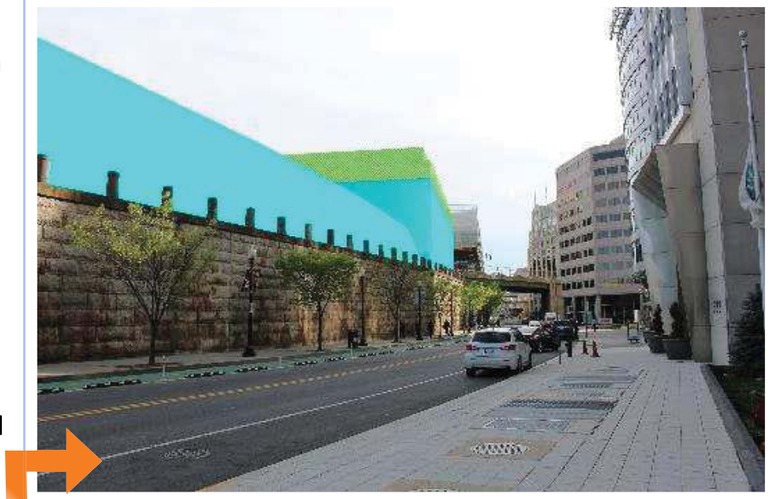
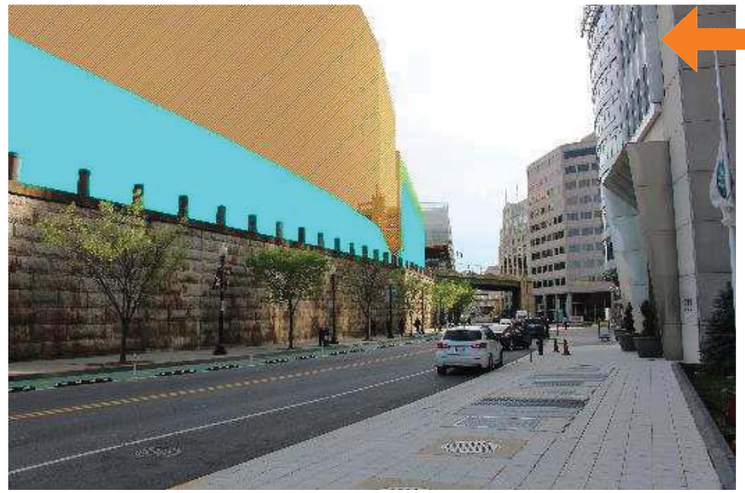
Existing Context Buildings and Private Air-Rights Development

Potential Federal Air-Rights

Proposed Alternative

Potential Development

Preferred Alternative A-C visual assessment: First Street, NE, view looking north

View	Description and Assessment	View of No-Action
10. First Street NE, view looking south:	**First Street NE, view looking south:** The WUS Burnham Walls are visible looking south towards the Project Area from the intersection with K Street, while the WUS parking facility is visible from New York Avenue. The street is characterized by the Metropolitan Branch Trail that runs beside it as well as many multi-story commercial and multi-family residential buildings. The grade change of the existing street and presence of the Burnham Walls prevents a view of the rail yard, and the view towards WUS is blocked by the existing parking garage. *Compared to existing conditions*, the alternative would **have a moderate adverse impact** on this view as it would be highly visible, filling in what is perceived as open space above the Burnham Walls with development. The existing parking garage would be removed in this alternative, further opening the view south along First Street. There would be moderate sensitivity as the alternatives **would moderately change** the character of the cultural environment, which is already defined by the existing commercial and institutional buildings on the west side of the street.	 **Alternative A-C and Existing Conditions**  **Alternative A-C and No-Action**

CREDIT: Draft Environmental Impact Statement for Washington Union Station Expansion Project: Appendix C3a Aesthetics and Visual Quality: Visual Assessment

..(continued)

Compared to the No-Action Alternative, the alternative **would have a negligible adverse impact** on this view as the alternative is visually consistent with the No-Action Alternative. There would be low visibility and low sensitivity as the alternative **would not change** the character of the view compared to the No-Action Alternative.

Potential Federal Air-Rights

Potential Development

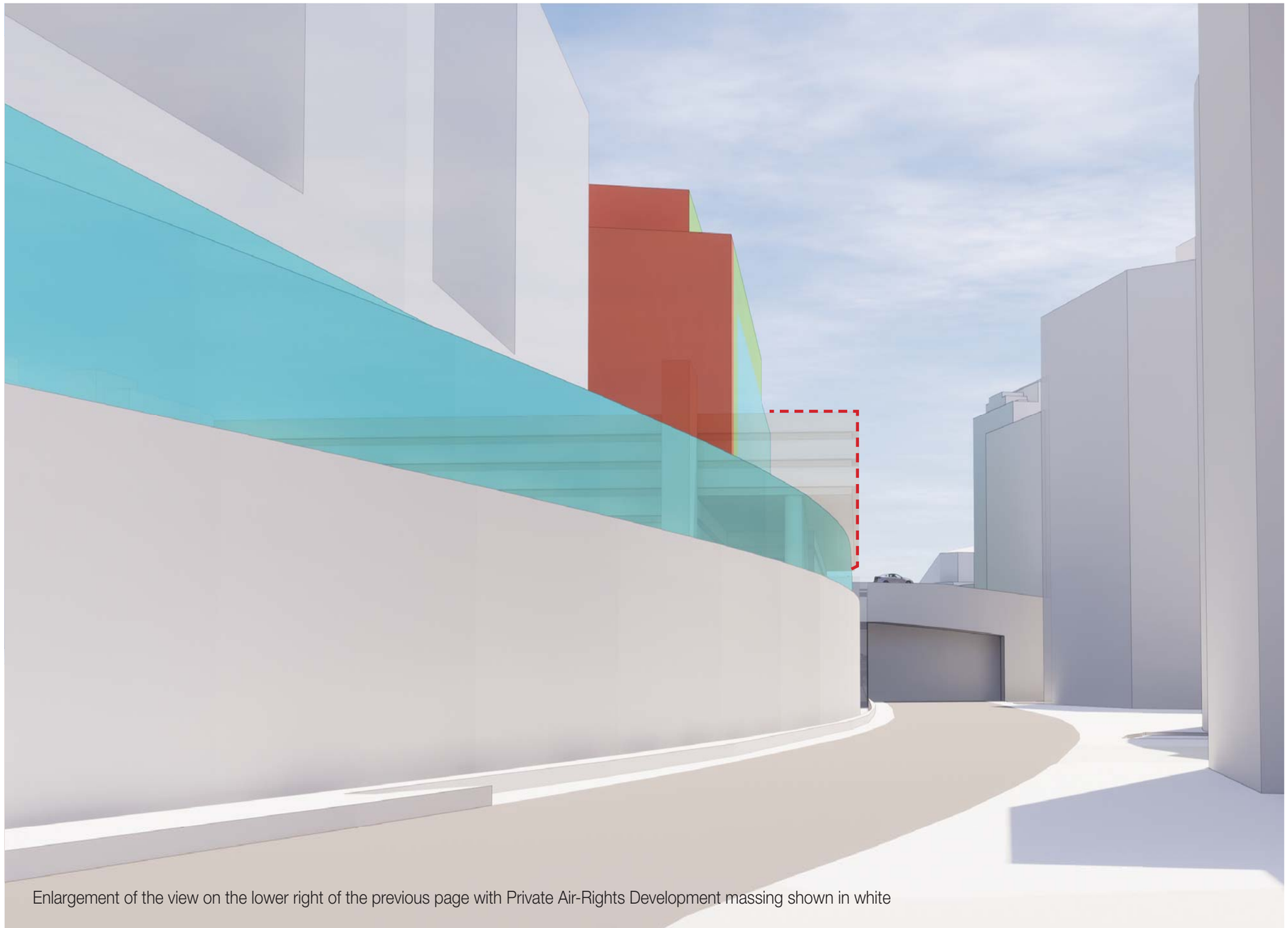
Proposed Alternative

Private Air-Rights

Alternative A-C and Burnham Place Massing

CREDIT: Burnham Place Team

Preferred Alternative A-C visual assessment: First Street, NE, view looking north



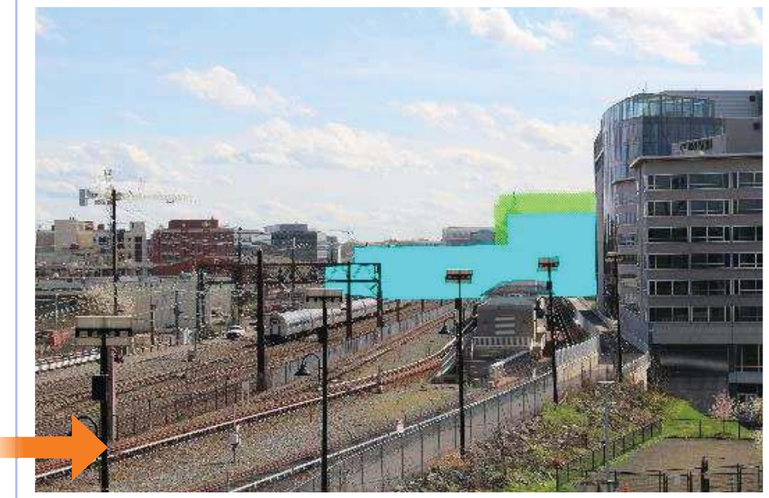
Enlargement of the view on the lower right of the previous page with Private Air-Rights Development massing shown in white

The **negligible adverse impact** assessment of Alternative A-C compared to the No-Action Alternative is flawed.

Alternative A-C is visibly distinct from reasonable Private Air Rights massing by extending closer to the Burnham wall.

- Outline of Existing Parking Garage
- Existing Context Buildings and Private Air-Rights Development
- Potential Federal Air-Rights
- Proposed Alternative
- Potential Development

Preferred Alternative A-C visual assessment: New York Avenue, NE, view looking south

View	Description and Assessment	View of No-Action
11. New York Avenue Bridge NE, view looking south:	**New York Avenue Bridge NE, view looking south:** From the New York Avenue NE Bridge, the Terminal Rail Yard, WUS, and WUS parking facility are visible. The U.S. Capitol is also visible beyond. *Compared to existing conditions*, the alternative **would have a major adverse impact** on this view as it would be highly visible. There would be high sensitivity as the No-Action Alternative **would noticeably change** the character of the built environment and the vista, obscuring the view of the U.S. Capitol. *Compared to the No-Action Alternative*, the alternative would have **no impact** on this view as it would not be visually distinct from the private air rights.	 **Alternative A-C and Existing Conditions**  **Alternative A-C and No-Action**

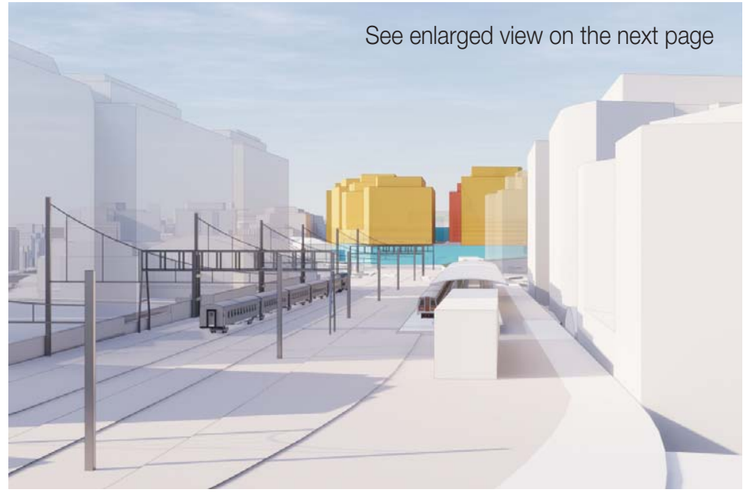

Private Air-Rights


Potential Federal Air-Rights


Proposed Alternative


Proposed Alternative

See enlarged view on the next page



Alternative A-C and Burnham Place Massing

CREDIT: Burnham Place Team

CREDIT: Draft Environmental Impact Statement for Washington Union Station Expansion Project: Appendix C3a Aesthetics and Visual Quality: Visual Assessment

Preferred Alternative A-C visual assessment: New York Avenue, NE, view looking south

Enlargement of the view on the lower right of the previous page with Private Air-Rights Development massing shown in white

The **no impact** assessment of Alternative A-C compared to the No-Action Alternative is flawed.

Alternative A-C is visibly distinct from reasonable Private Air Rights massing, extending into a view corridor to the back of the historic station.

- Transparent: Upcoming Context Development
- Existing Context Buildings and Private Air-Rights Development
- Potential Federal Air-Rights
- Proposed Alternative
- Potential Development

Preferred Alternative A-C visual assessment: H Street, NE, view looking west

View	Description and Assessment	View of No-Action
15. H Street NE, view looking west:	**H Street NE, view looking west:** Looking west along the H Street NE commercial corridor, the H Street Bridge and WUS parking facility are visible. From the H Street Bridge, portions of the Terminal Rail Yard are also visible, including the REA Building and K Tower. The roof of the WUS headhouse is also visible. H Street is a busy commercial corridor and features many multi-story commercial buildings, residences, and mixed-use buildings of various styles and ages. *Compared to existing conditions*, the alternative **would have a minor adverse impact** on this view. There would be moderate visibility and low sensitivity as the alternative **would not change** the character of the view looking east along H Street, which is defined by the existing commercial and institutional buildings. *Compared to the No-Action Alternative*, the alternative would have **no impact** on this view as it would not be visually distinct from the private air rights.	 **Alternative A-C and Existing Conditions**  **Alternative A-C and No-Action**

CREDIT: Draft Environmental Impact Statement for Washington Union Station Expansion Project: Appendix C3a Aesthetics and Visual Quality: Visual Assessment

Private Air-Rights

Potential Federal Air-Rights

Proposed Alternative

Potential Development

Alternative A-C and Burnham Place Massing

CREDIT: Burnham Place Team

Preferred Alternative A-C visual assessment: H Street, NE, view looking west

Enlargement of the view on the lower right of the previous page with Private Air-Rights Development massing shown in white

The **no impact** assessment of Alternative A-C compared to the No-Action Alternative is flawed.

Alternative A-C is visibly distinct from reasonable Private Air Rights massing.

Existing Context Buildings and Private Air-Rights Development

Potential Federal Air-Rights

Proposed Alternative

Potential Development

Preferred Alternative A-C visual assessment: View from Columbus Circle Drive - East Side

View	Description and Assessment	View of No-Action
20. View from Columbus Circle Drive – East Side:	**View from Columbus Circle Drive – East Side:** Columbus Circle Drive NE is the roadway surrounding Columbus Plaza with direct connections to E Street, Louisiana Avenue, Delaware Avenue, First Street, and Massachusetts Avenue NE. *Compared to existing conditions and the No-Action*, the alternative **would have a minor adverse impact** on this view. There would be low visibility and moderate sensitivity because the alternative would take a similar form as the massing of the ramps that exist today and only a small portion of the Federal air rights would be visible to the right of the barrel vault roof. The view, characterized by the perceived openness behind the station, **would be slightly altered**. *Compared to the No-Action Alternative*, the alternative would have **no impact** on this view as it would not be visually distinct from the private air rights.	 **Alternative A-C and Existing Conditions**  **Alternative A-C and No-Action**

Private Air-Rights

Potential Federal Air-Rights

Proposed Alternative

Alternative A-C and Burnham Place Massing

CREDIT: Burnham Place Team

CREDIT: Draft Environmental Impact Statement for Washington Union Station Expansion Project: Appendix C3a Aesthetics and Visual Quality: Visual Assessment

Preferred Alternative A-C visual assessment: View from Colimbus Circle Drive - East Side

Enlargement of the view on the lower right of the previous page with Private Air-Rights Development massing shown in white

The **no impact** assessment of Alternative A-C compared to the No-Action Alternative is flawed.

The visibility of Alternative A-C is unaltered by reasonable Private Air Rights massing and would be visually distinct.

Existing Context Buildings and Private Air-Rights Development

Potential Federal Air-Rights

Proposed Alternative

Potential Development

Preferred Alternative A-C visual assessment: View from U.S. Capitol Dome

View	Description and Assessment	View of No-Action
24. View from U.S. Capitol Dome:	**View from U.S. Capitol Dome:** Looking northeast from the dome of the U.S. Capitol, the entire headhouse and portions of the railyard are visible. *Compared to existing conditions,* the alternative is moderately to greatly noticeable and **would have a moderate adverse impact** on this view. The Alternative would have high visibility and moderate sensitivity, **moderately changing** the view by obstructing the view of the Terminal Rail Yard. The alternative would visually bridge the commercial, institutional, and residential development surrounding the station, creating a cultural environment that is more uniform from east to west. Views to WUS and the Senate Office Buildings as well as the view along North Capitol Street would remain unchanged. *Compared to the No-Action Alternative*, the alternative would have **no impact** on this view as it would not be visually distinct from the private air rights.	 **Alternative A-C and Existing Conditions**  **Alternative A-C and No-Action**

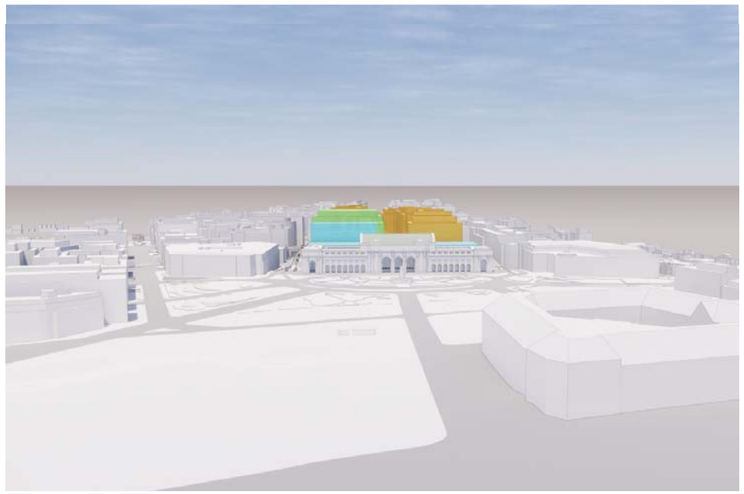
CREDIT: Draft Environmental Impact Statement for Washington Union Station Expansion Project: Appendix C3a Aesthetics and Visual Quality: Visual Assessment

Private Air-Rights

Potential Federal Air-Rights

Proposed Alternative

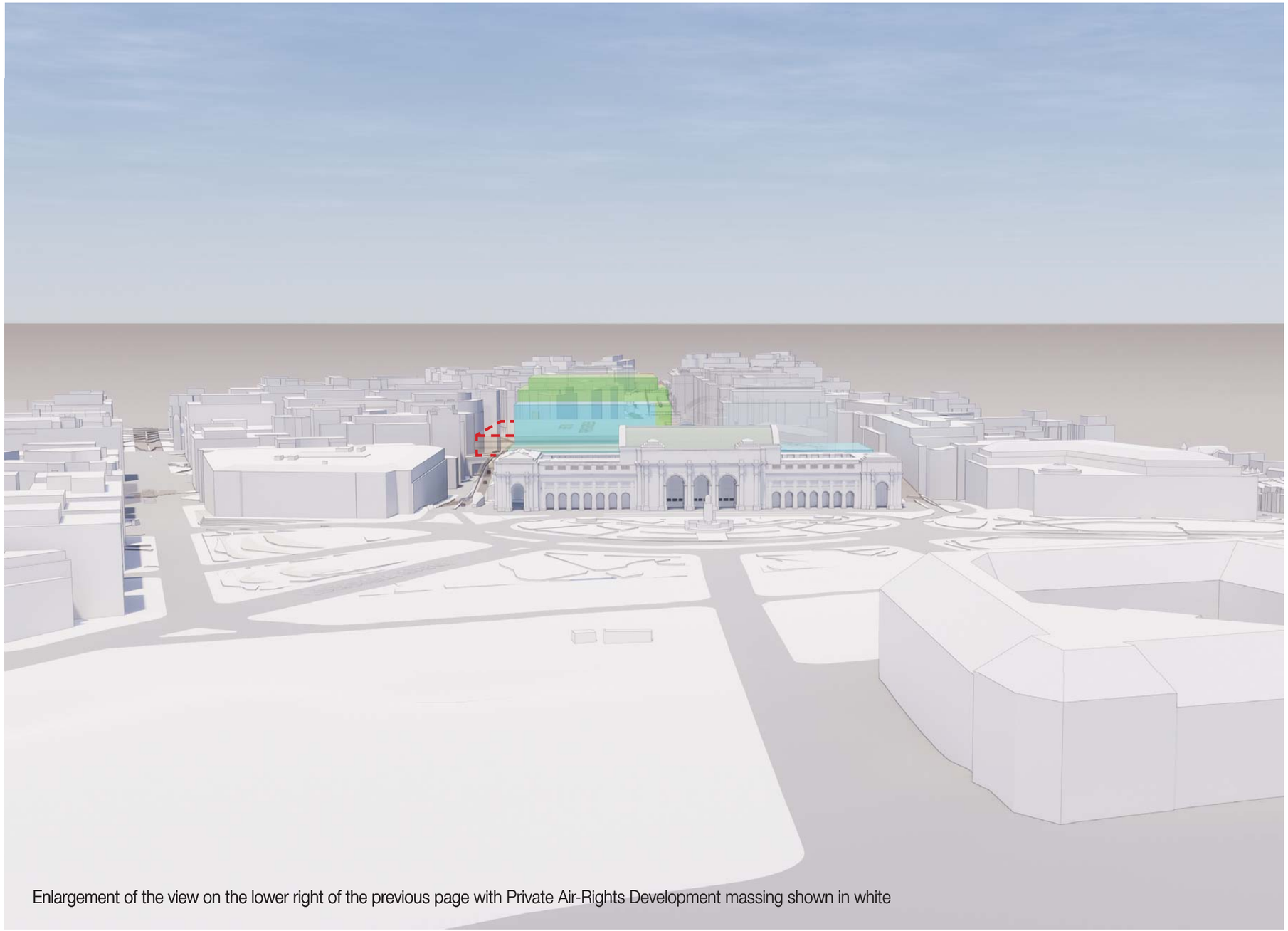
Potential Development



Alternative A-C and Burnham Place Massing

CREDIT: Burnham Place Team

Preferred Alternative A-C visual assessment: View from U.S. Capitol Dome



Enlargement of the view on the lower right of the previous page with Private Air-Rights Development massing shown in white

The **no impact** assessment of Alternative A-C compared to the No-Action Alternative is flawed.

The visibility of Alternative A-C is unaltered by reasonable Private Air Rights massing and would be visually distinct.

Outline of Existing Parking Garage

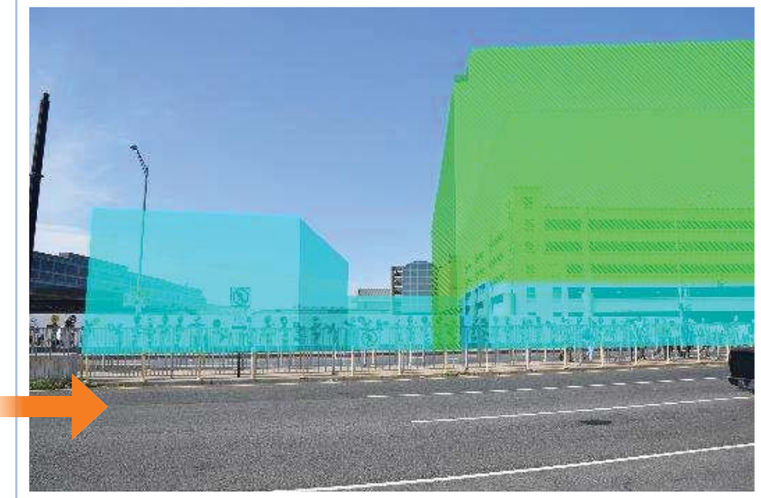
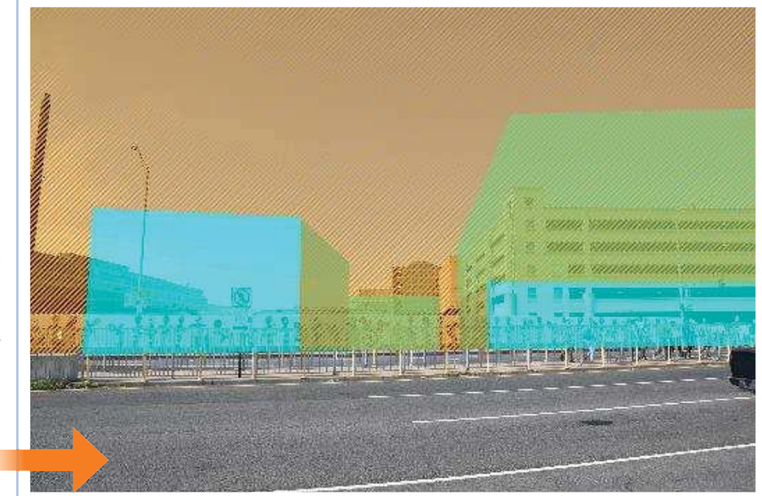
Existing Context Buildings and Private Air-Rights Development

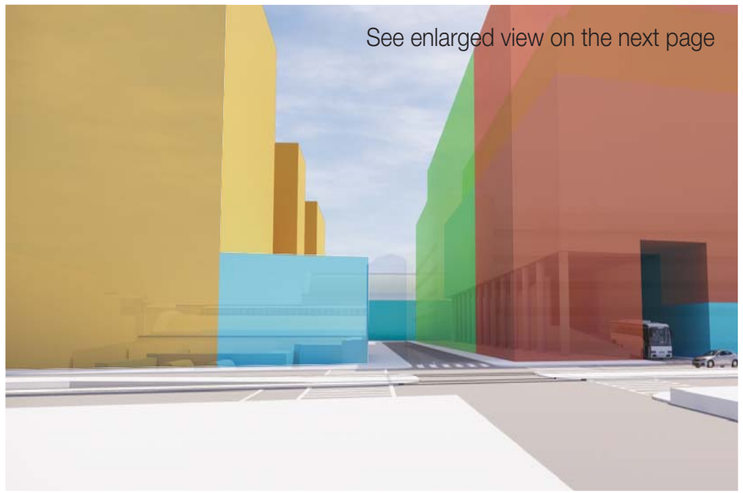
Potential Federal Air-Rights

Proposed Alternative

Potential Development

Preferred Alternative A-C visual assessment: H Street Bridge, view looking south

View	Description and Assessment	View of No-Action
28. View from H Street Bridge	**H Street Bridge, view looking south:** Looking south, the view of the rail yard and much of the station building is obscured by the H Street Bridge barrier wall. The existing station parking garage dominates the view to the right (west) while elsewhere the view is characterized by the openness above the rail yard and views to the sky. Compared to the existing conditions, the alternative **would have a moderate adverse impact** on this view as it would be highly noticeable. Dense commercial and residential development would occupy what is characterized as the open space beyond the bridge. There would be moderate sensitivity as the No-Action Alternative would moderately change the scale and character of development along the bridge. The diminishing scale of the H Street headhouse and the east-west train hall beyond interrupts the heavy presence of the north-south train hall, which dominates the view in Alternatives A and B. *Compared to the No-Action Alternative*, the alternative would have **no impact** on this view as it would not be visually distinct from the private air rights.	 **Alternative A-C and Existing Conditions**  **Alternative A-C and No-Action**

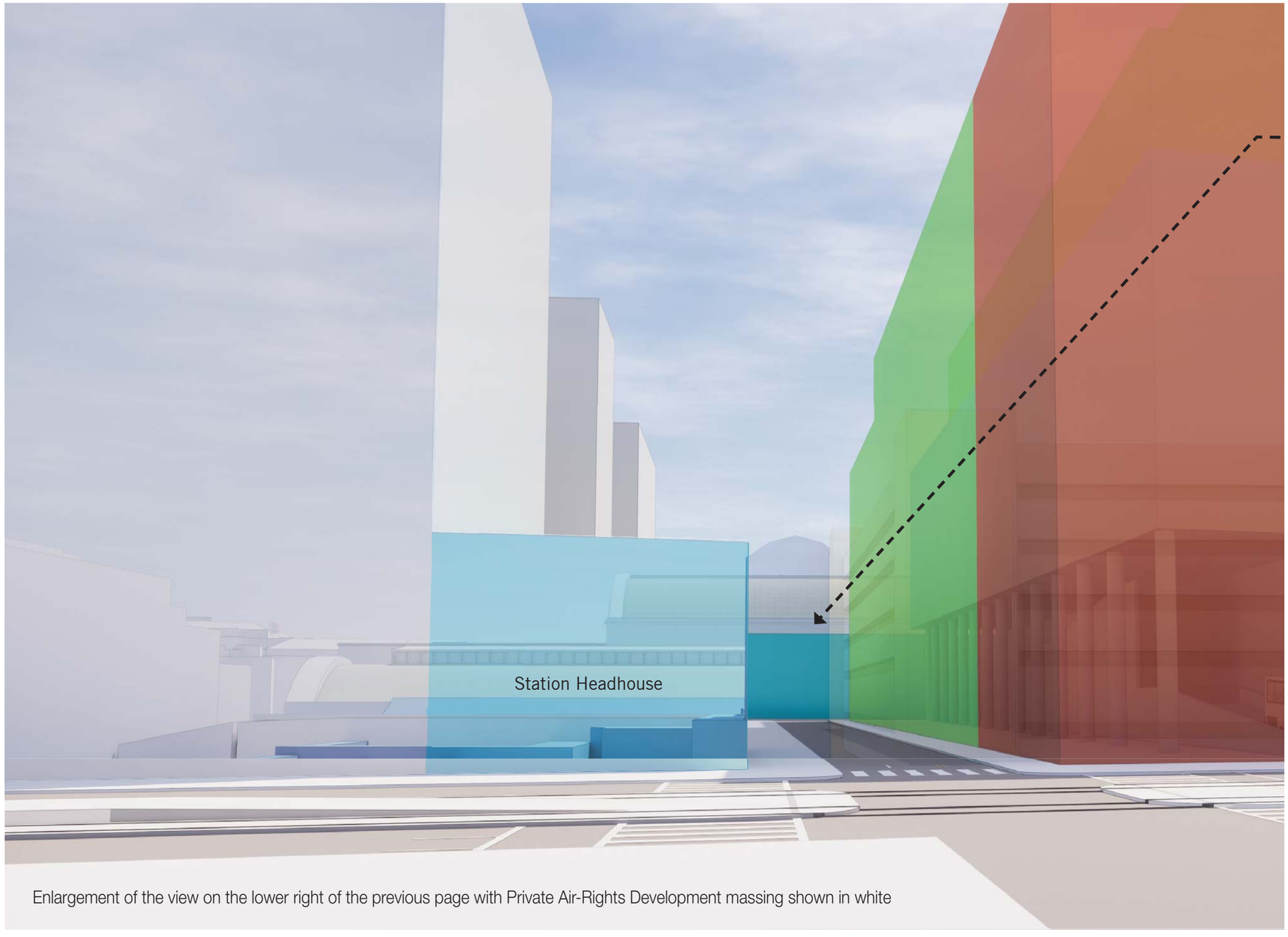


Alternative A-C and Burnham Place Massing

CREDIT: Burnham Place Team

CREDIT: Draft Environmental Impact Statement for Washington Union Station Expansion Project: Appendix C3a Aesthetics and Visual Quality: Visual Assessment

Preferred Alternative A-C visual assessment: H Street Bridge, view looking south



Enlargement of the view on the lower right of the previous page with Private Air-Rights Development massing shown in white

The **no impact** assessment of Alternative A-C compared to the No-Action Alternative is flawed.

The FRA has suggested a Visual Access Zone be located in this area. Since 2012, Akridge has affirmed the importance of this zone. It is not reasonable to conduct a visual assessment that places maximum height buildings within the private air rights portion of the Visual Access

The visibility of Alternative A-C is unaltered by reasonable Private Air Rights massing.

- Existing Context Buildings and Private Air-Rights Development
- Potential Federal Air-Rights
- Proposed Alternative
- Potential Development

APPENDIX H

CONSTRUCTABILITY AND PHASING

APPENDIX H1

WEST-TO-EAST PHASING

BURNHAM PLACE
&
WASHINGTON UNION STATION

WEST TO EAST PHASING STUDY

FEBRUARY 09, 2018

SEPTEMBER 12, 2018 UPDATE

Purpose of Study

Current constructability analysis yields significant challenges to the success of Burnham Place:

- Length of time needed to deliver first phase of BP Buildings estimated to be: 15+ years
- Constrained footprint east of Central Concourse limits building configurations and ability to achieve central street at the end of Phase 2
- Long duration of Phase 0 precedent work required before Phase 1 BP and rail construction can begin

\+ Is there an alternative approach to project phasing that could better meet BP and Amtrak goals?

Project Changes which Impact Phasing

Since completion of the 2012 Master Plan, key changes have impacted phasing:

- Track plan finalized
- “Angled” run-through tracks have different geometric relationship to existing tracks
- Central Concourse shifted east - reduced east BP parcel size
- SEP parking and bus programs significantly reduced from 2012 estimates
- EIS Alternatives located BP development opportunities in different areas as compared to those in the 2012 Master Plan and subsequent Test Fits
- Substantial track realignment and interlocking re-configuration required north of K Street
- TI team identified creative operational strategies to utilize during construction of run-through tracks

Alignment of Goals

Burnham Place Phasing Goals

- Development delivery at earliest possible date
- Critical mass for BP placemaking: mixed use development, open space, street system, parking, retail, transportation access
- Cost effective
- Later phases of development minimize disruption to completed phases
- Rail and station amenities also delivered at earliest possible date for use by BP tenants

Rail / Transportation Phasing Goals

- Delivery of high-value and high-capacity Amtrak services at earliest possible date
- Critical mass of transportation elements/ experience: new platforms, daylight, concourses, retail
- Cost effective
- Later phases of station construction minimize disruption to completed phases
- Provide new multi-modal facilities in early phases: taxi, parking, Metro access, pick-up and drop-off, streetcar connections

West Phasing Advantages

- Earlier and larger BP development footprint and density
- Earlier delivery of rail passenger capacity and station amenities
- Earlier and more efficient delivery of multi-modal elements (parking, bus, taxi) including more effective temporary conditions. Some of these requirements do not yet have solutions in East phasing scheme
- Larger podium delivery in earlier phases facilitates better open spaces, station pick-up/drop-off, and streetcar connections
- Opportunity to combine construction of Phase “0” C-K components with new Phase 1 and/or combine the far east and far west track construction phases for time and cost savings and reductions in disruption

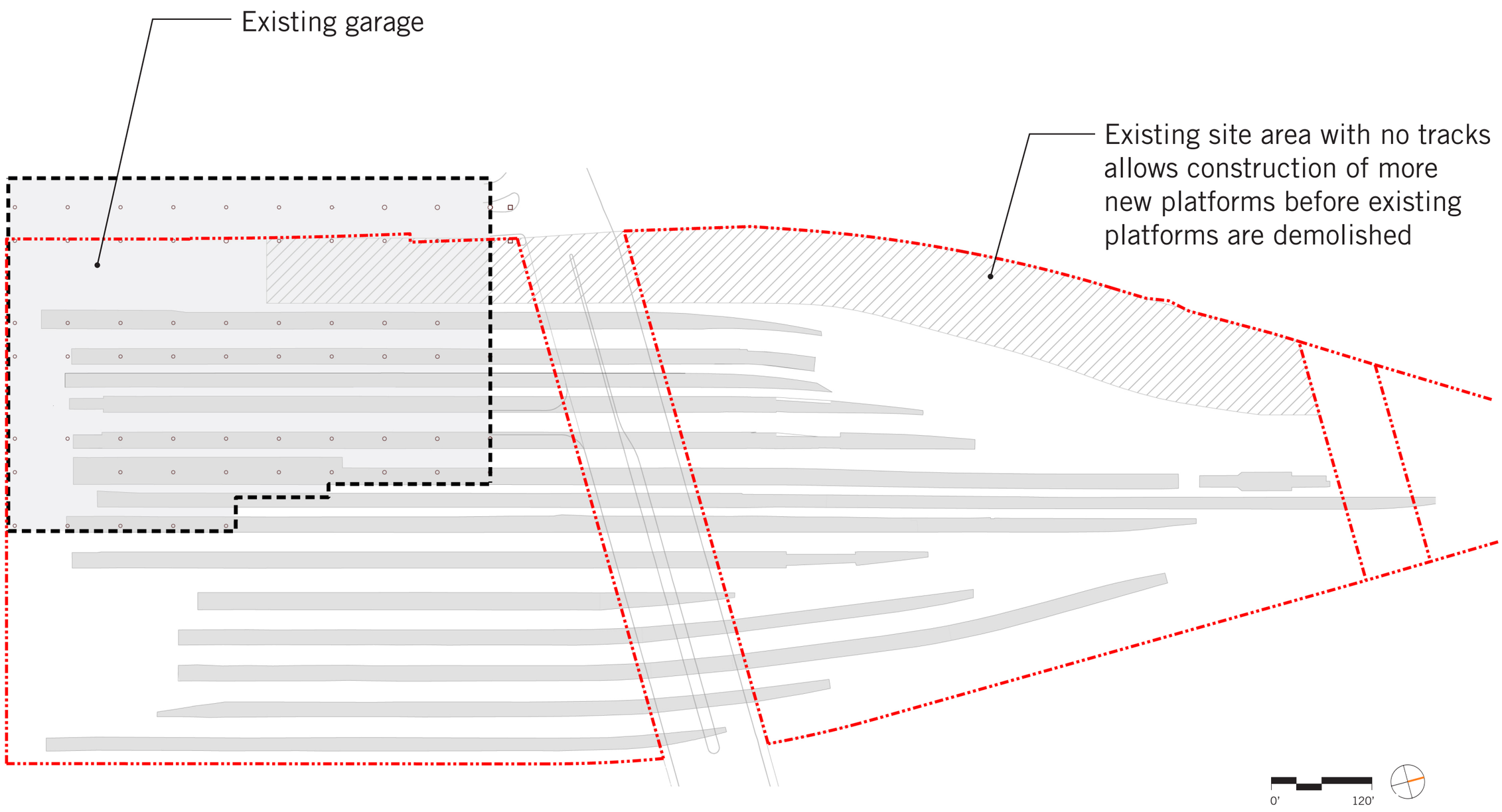
Caveats and Areas Requiring Further Study

- Level of analysis is sufficient for initial proof of concept, but requires further study to demonstrate feasibility
- Crew base relocation and construction lay-down and staging require new strategies and further study
- Rail operations, potential new temporary switching plan and other rail elements would require adjustment to facilitate West Phasing
- We believe the potential benefits of this alternative phasing scheme are so significant for all parties that it warrants these types of considerations

CONCEPT INTRODUCTION

West Phasing Concept

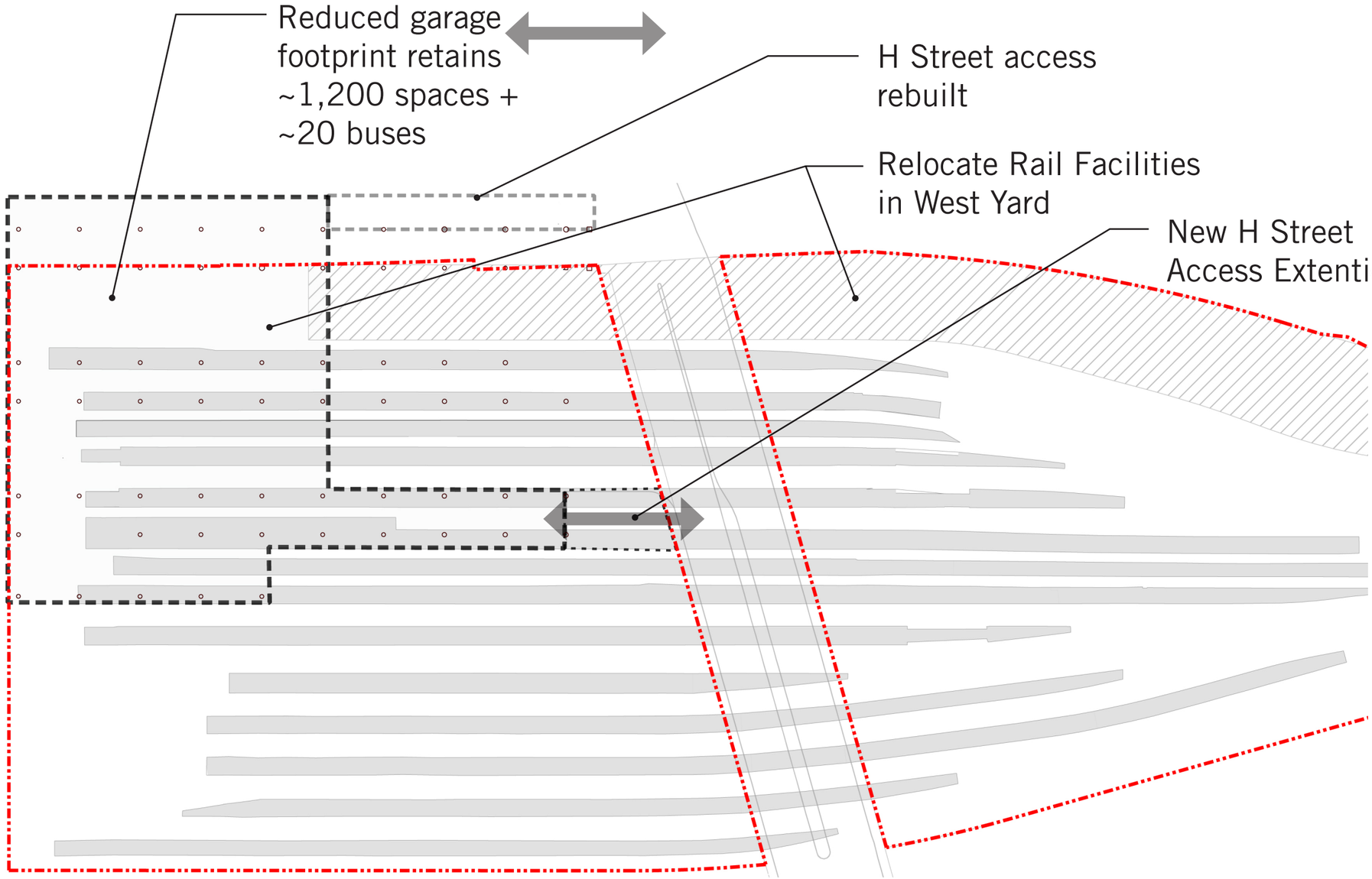
Existing Conditions

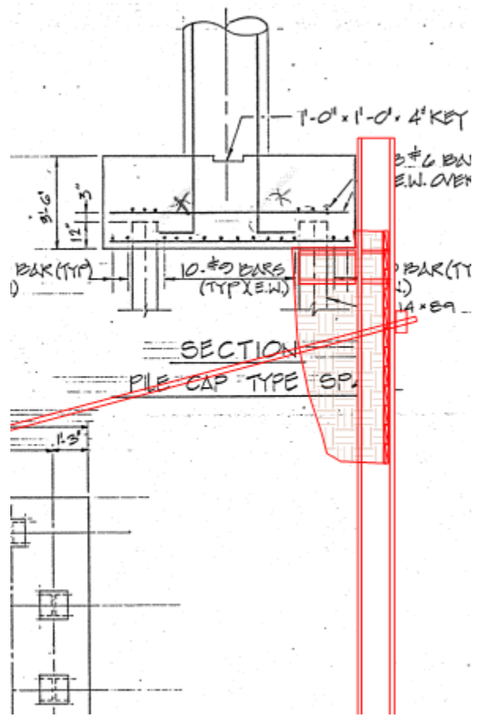


West Phasing Concept

Existing Conditions

Parking Garage Reduced





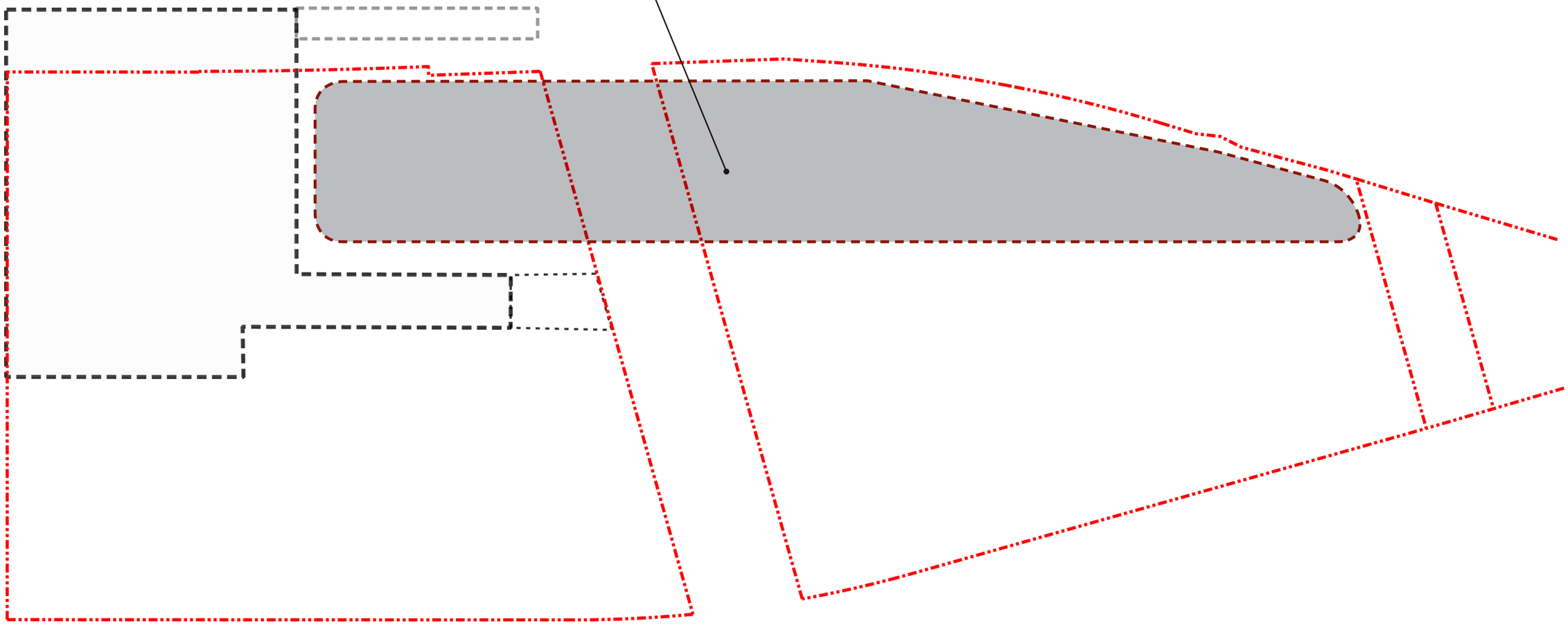
Bracket pile concept with traditional soldier pile and lagging

West Phasing Concept

Existing Conditions

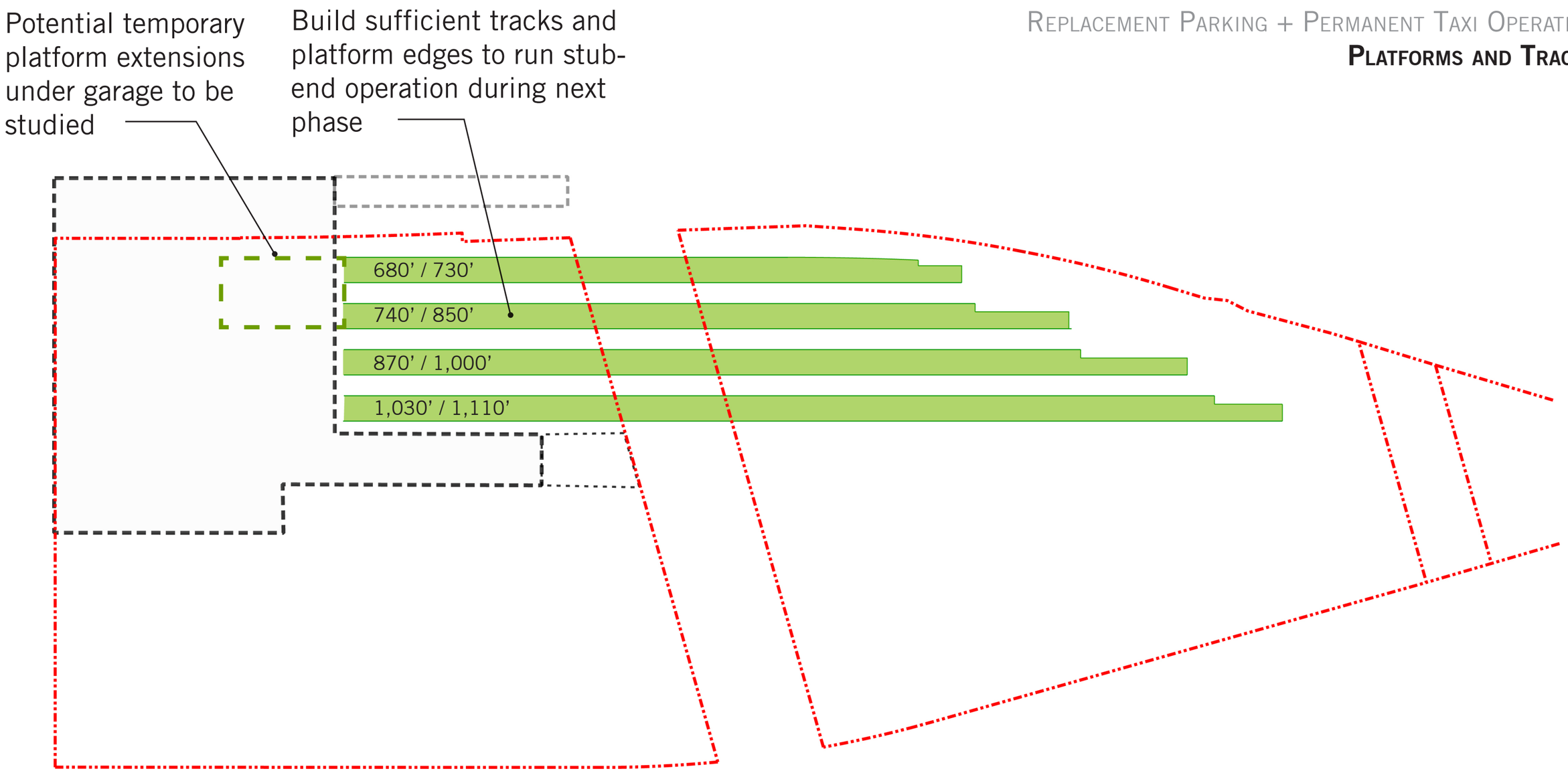
Parking Garage Reduced

Replacement Parking + Permanent Taxi Operation



West Phasing Concept

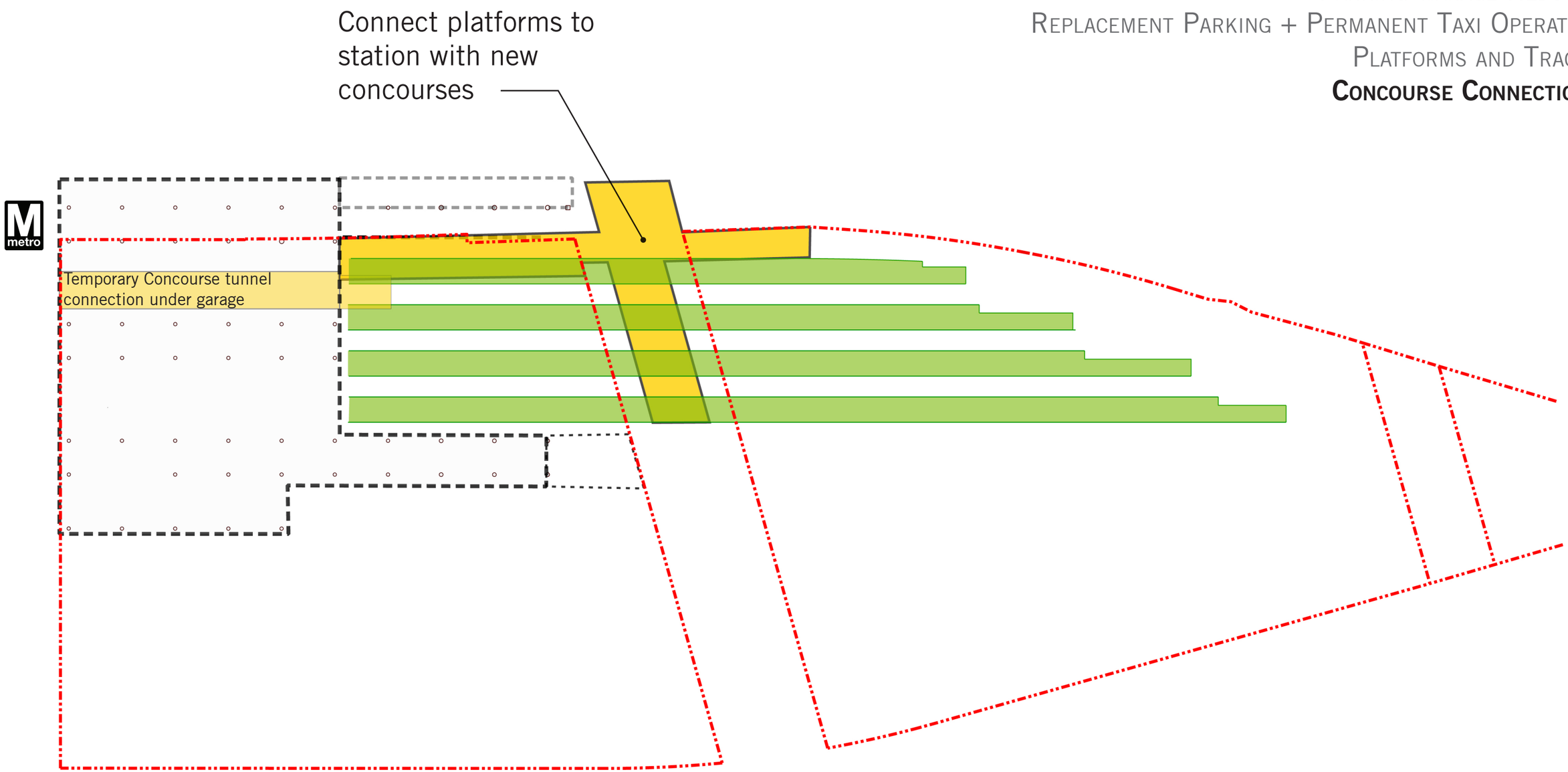
Existing Conditions
Parking Garage Reduced
Replacement Parking + Permanent Taxi Operation
Platforms and Tracks



AKRIDGE Invested.

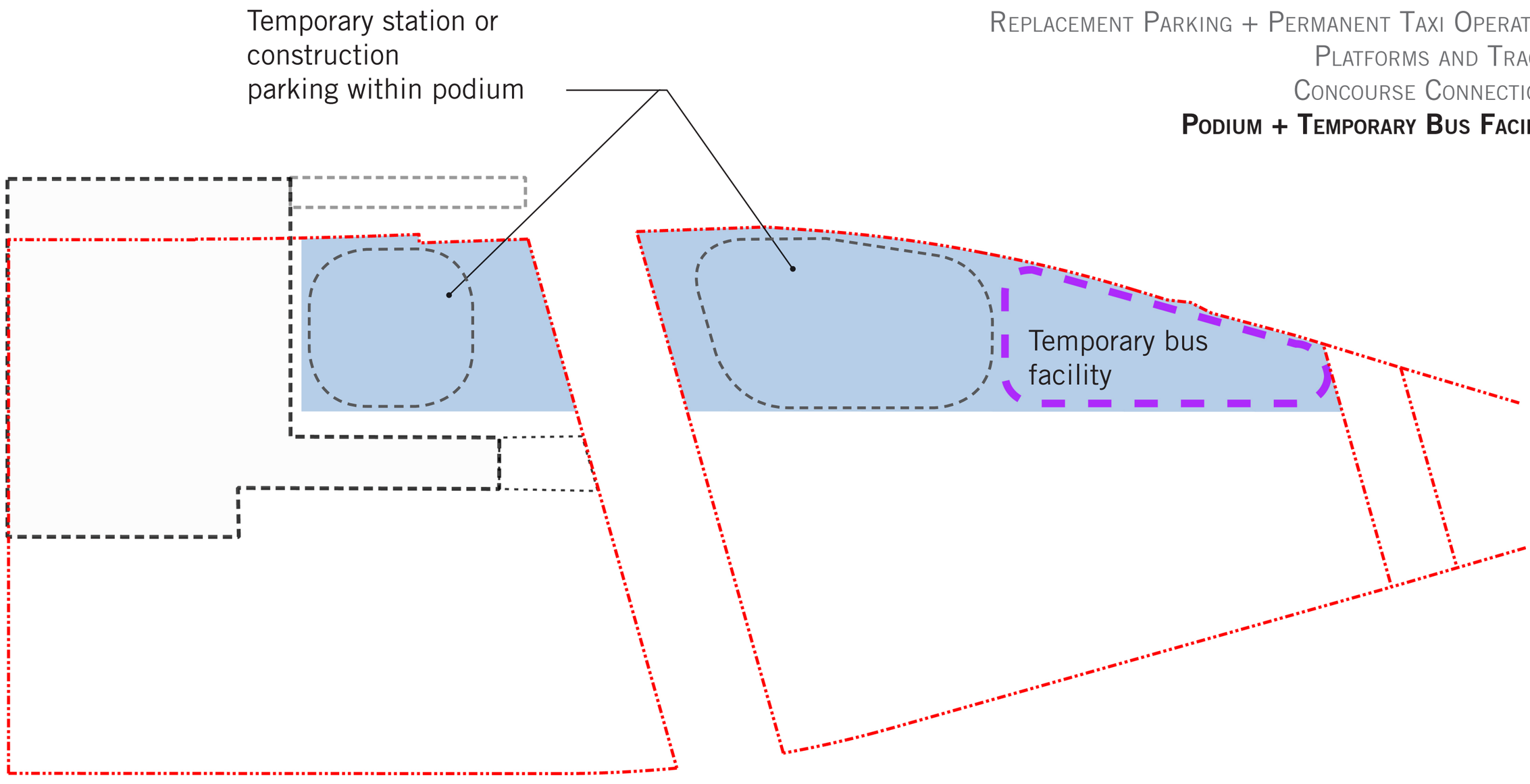
West Phasing Concept

Existing Conditions
Parking Garage Reduced
Replacement Parking + Permanent Taxi Operation
Platforms and Tracks
Concourse Connections



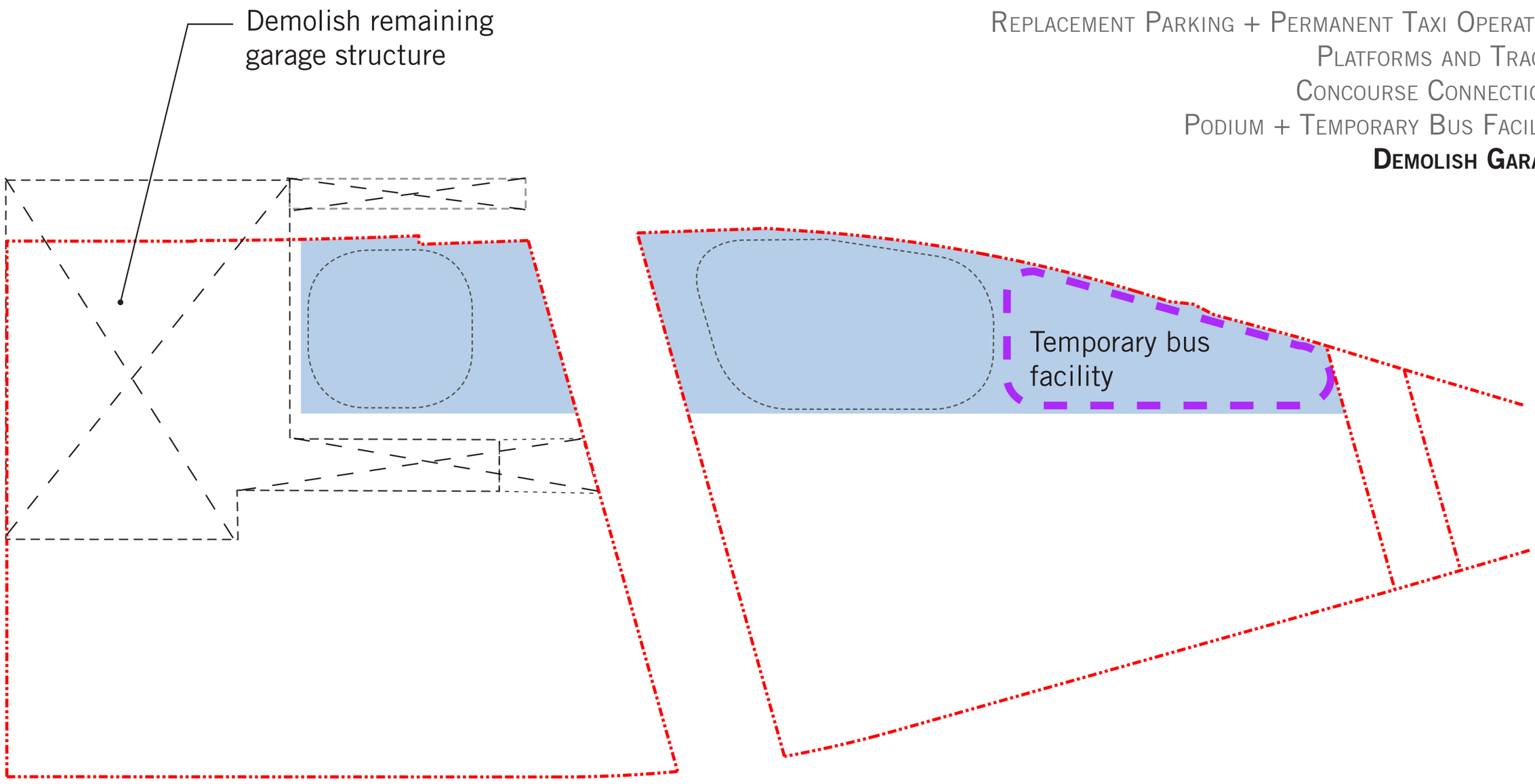
West Phasing Concept

Existing Conditions
Parking Garage Reduced
Replacement Parking + Permanent Taxi Operation
Platforms and Tracks
Concourse Connections
Podium + Temporary Bus Facility



West Phasing Concept

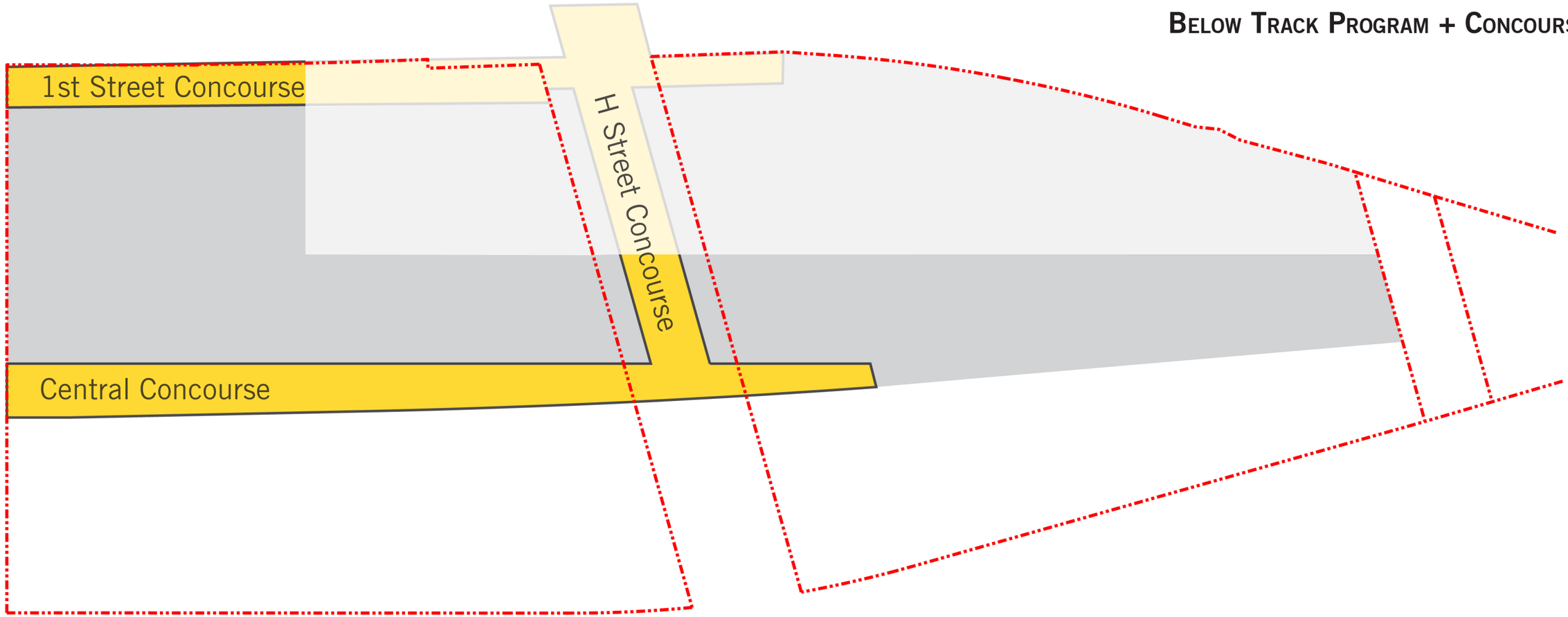
Existing Conditions
Parking Garage Reduced
Replacement Parking + Permanent Taxi Operation
Platforms and Tracks
Concourse Connections
Podium + Temporary Bus Facility
Demolish Garage



West Phasing Concept

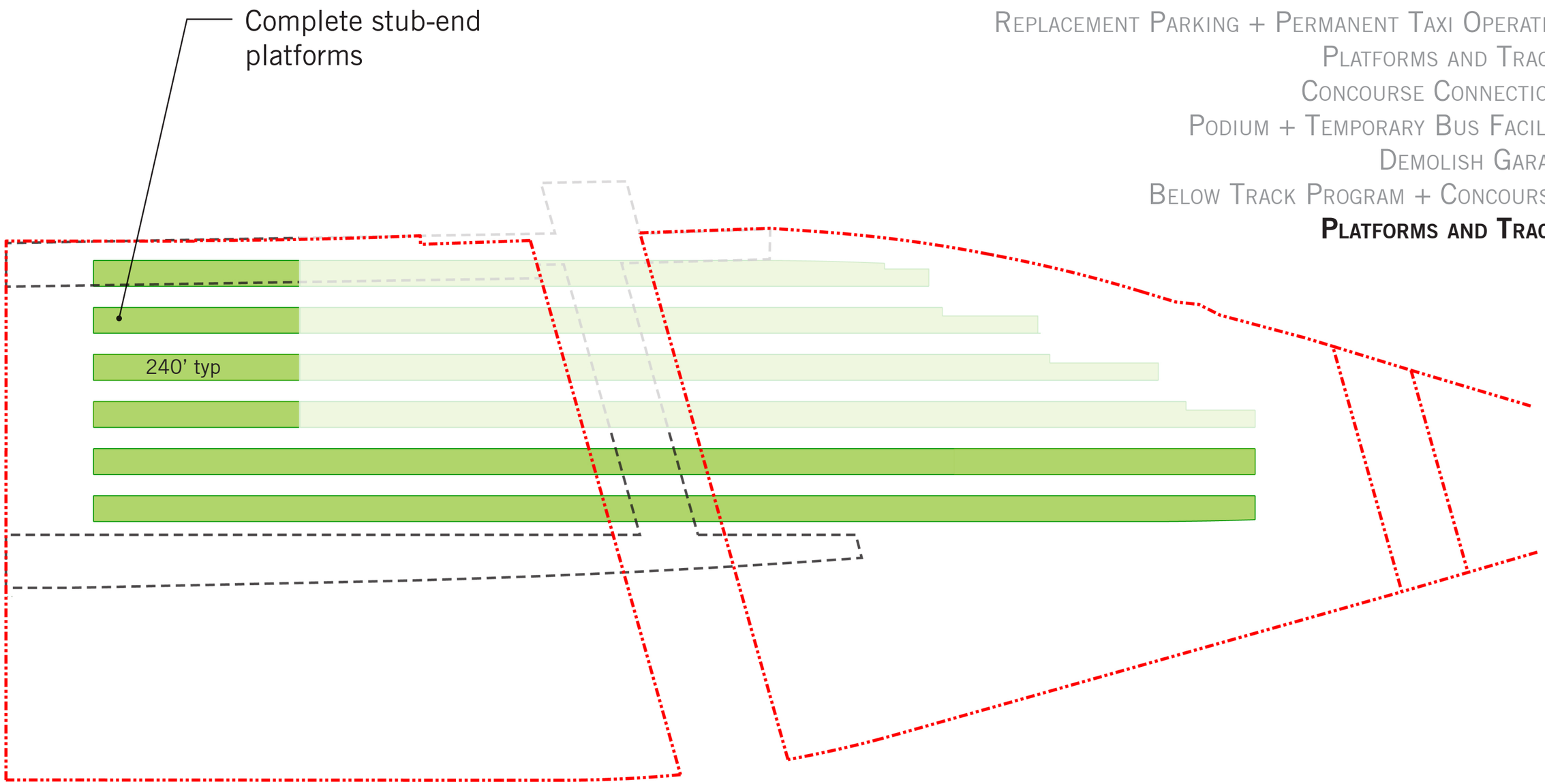
Existing Conditions
Parking Garage Reduced
Replacement Parking + Permanent Taxi Operation
Platforms and Tracks
Concourse Connections
Podium + Temporary Bus Facility
Demolish Garage

Below Track Program + Concourses



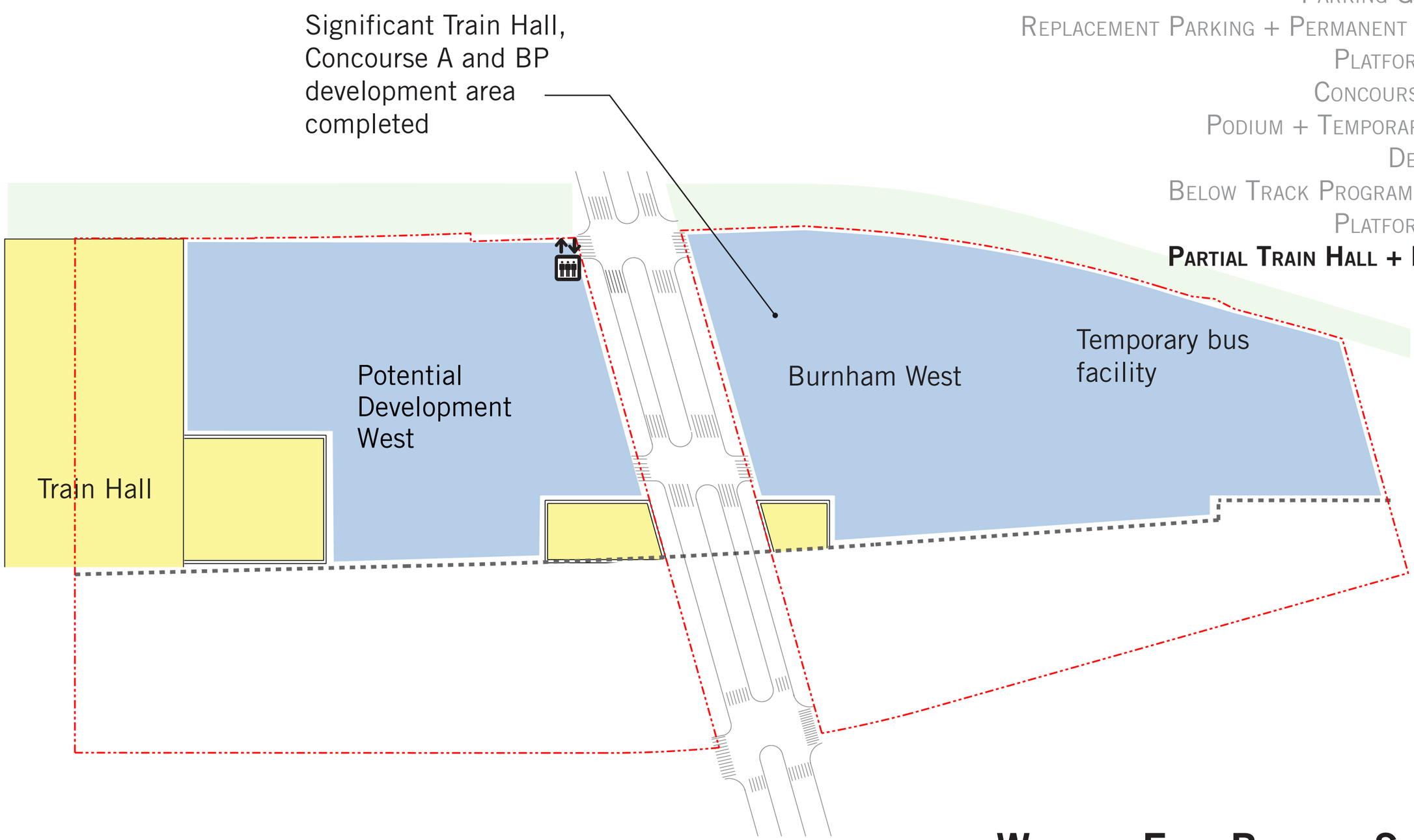
West Phasing Concept

Existing Conditions
Parking Garage Reduced
Replacement Parking + Permanent Taxi Operation
Platforms and Tracks
Concourse Connections
Podium + Temporary Bus Facility
Demolish Garage
Below Track Program + Concourses
Platforms and Tracks



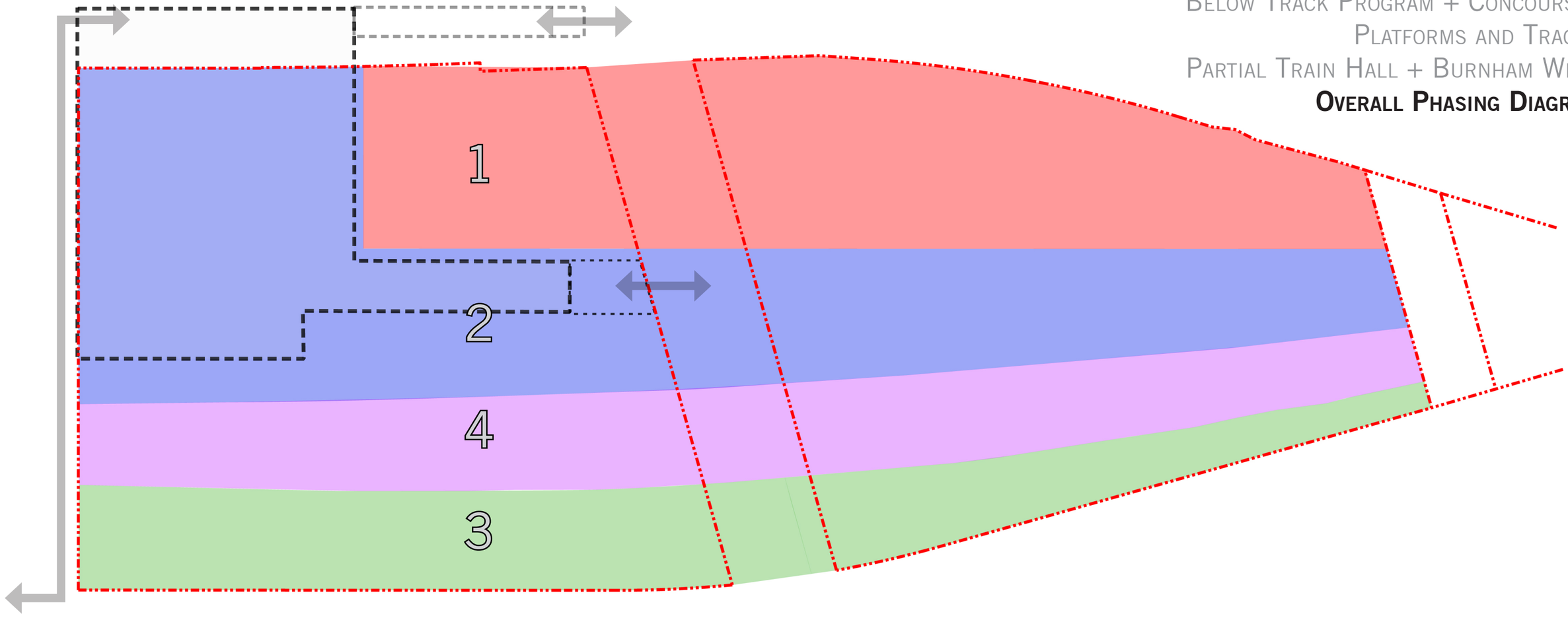
West Phasing Concept

Existing Conditions
Parking Garage Reduced
Replacement Parking + Permanent Taxi Operation
Platforms and Tracks
Concourse Connections
Podium + Temporary Bus Facility
Demolish Garage
Below Track Program + Concourses
Platforms and Tracks
Partial Train Hall + Burnham West



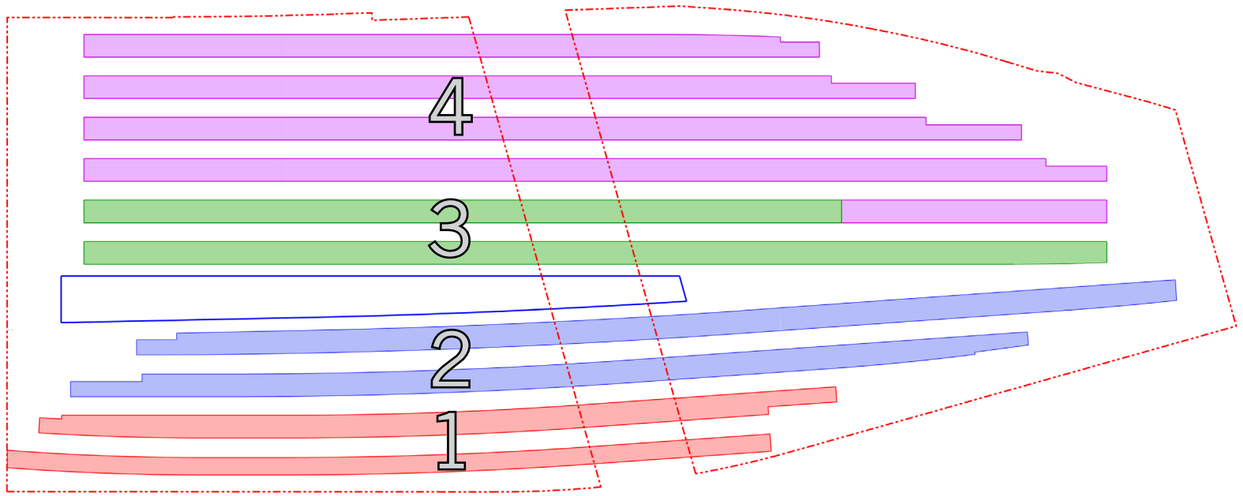
West Phasing Concept

Existing Conditions
Parking Garage Reduced
Replacement Parking + Permanent Taxi Operation
Platforms and Tracks
Concourse Connections
Podium + Temporary Bus Facility
Demolish Garage
Below Track Program + Concourses
Platforms and Tracks
Partial Train Hall + Burnham West
Overall Phasing Diagram

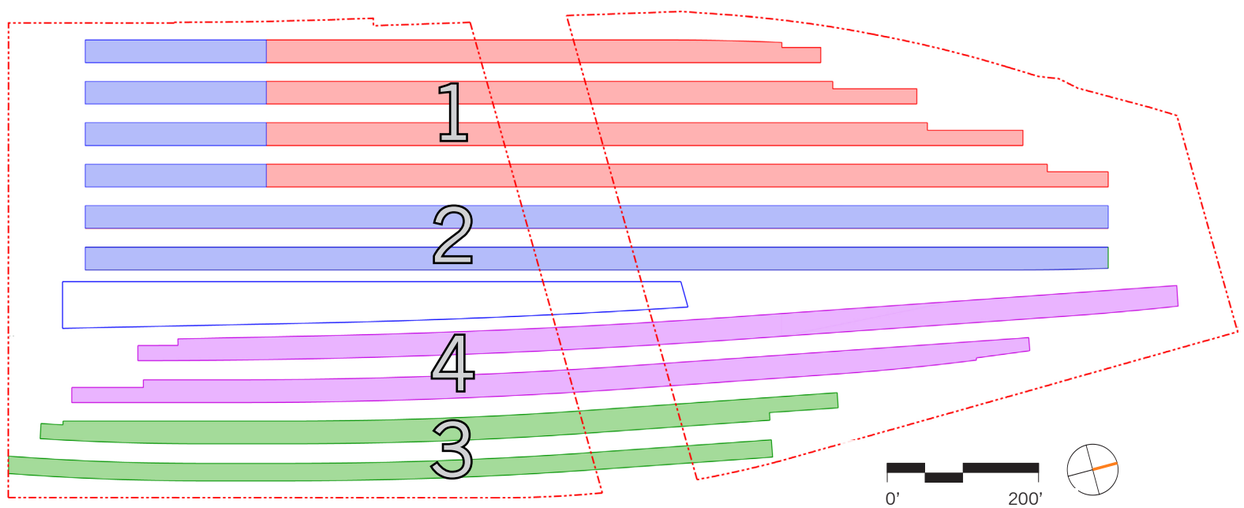


West vs. East Phasing: Overview

EAST TO WEST



WEST TO EAST



To test the concept:

- Initial delineation of phases developed here was used to analyze track counts, platform availability, station elements, and BP development opportunity
- Analysis in this presentation assumes each of the phasing concepts begin construction in the same calendar year
- While not studied here, there may be an opportunity to begin construction of the West phasing concept earlier than the East phasing scenario, during completion of the C-K interlocking Phase "0" projects

WEST TO EAST PHASING - OFF-SITE TEMPORARY PARKING AND BUS OPTION

West Phasing Advantages

Off-site Temporary Parking and Bus Option:

Providing off-site parking and bus facilities could allow full removal of the parking garage in Phase 1, with the following benefits:

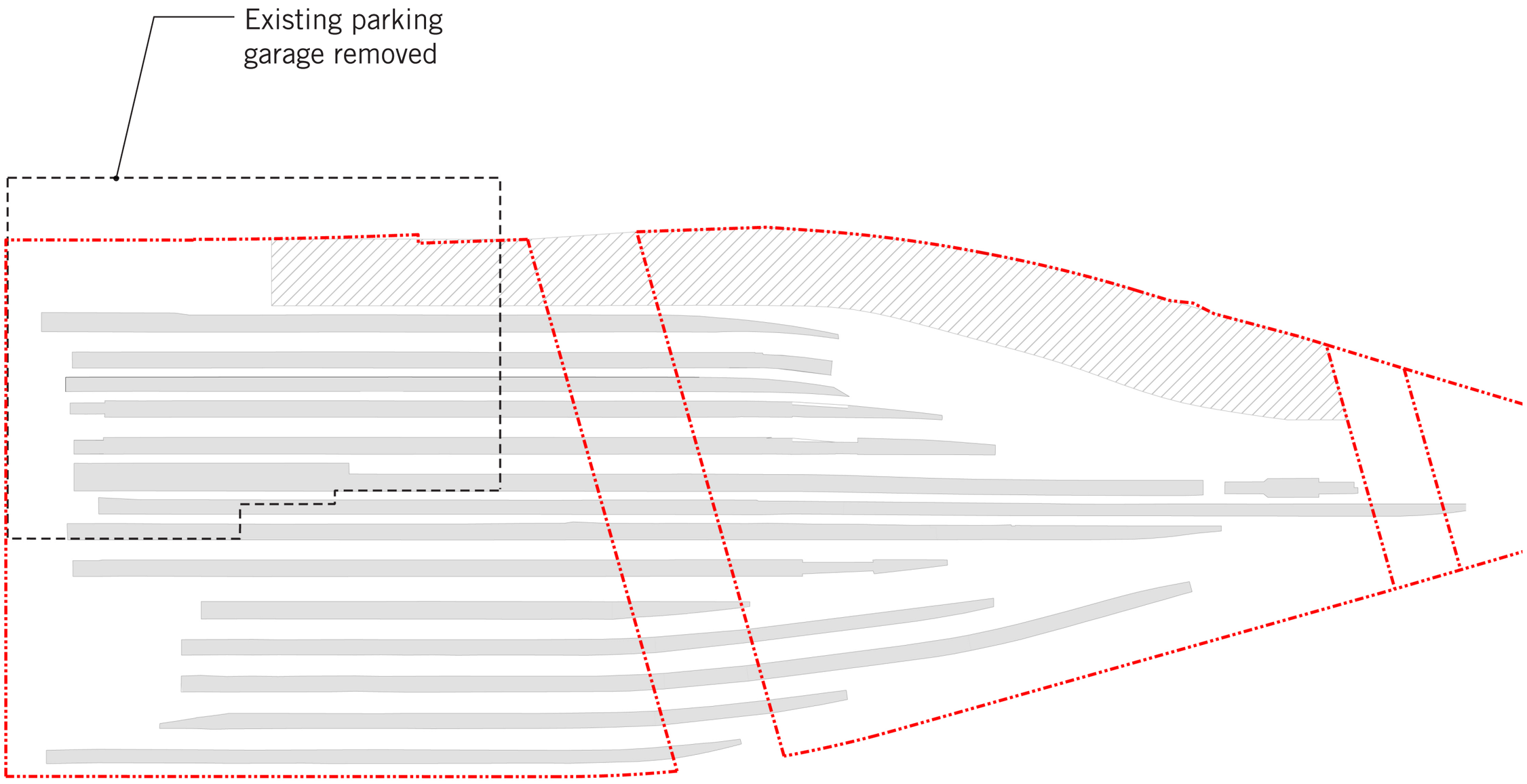
- Ability to construct full length platforms at tracks 1 through 7 in Phase 1
- Facilitation of passenger access to Concourse A
- Completion of full length of First Street Concourse in its permanent configuration
- Larger number of parking spaces completed and available at the end of Phase 1
- All other advantages of West-to-East phasing as noted earlier are still applicable

West Phasing Concept

Off-site Temporary Parking and Bus Option:

Existing Conditions

Parking Garage Removed



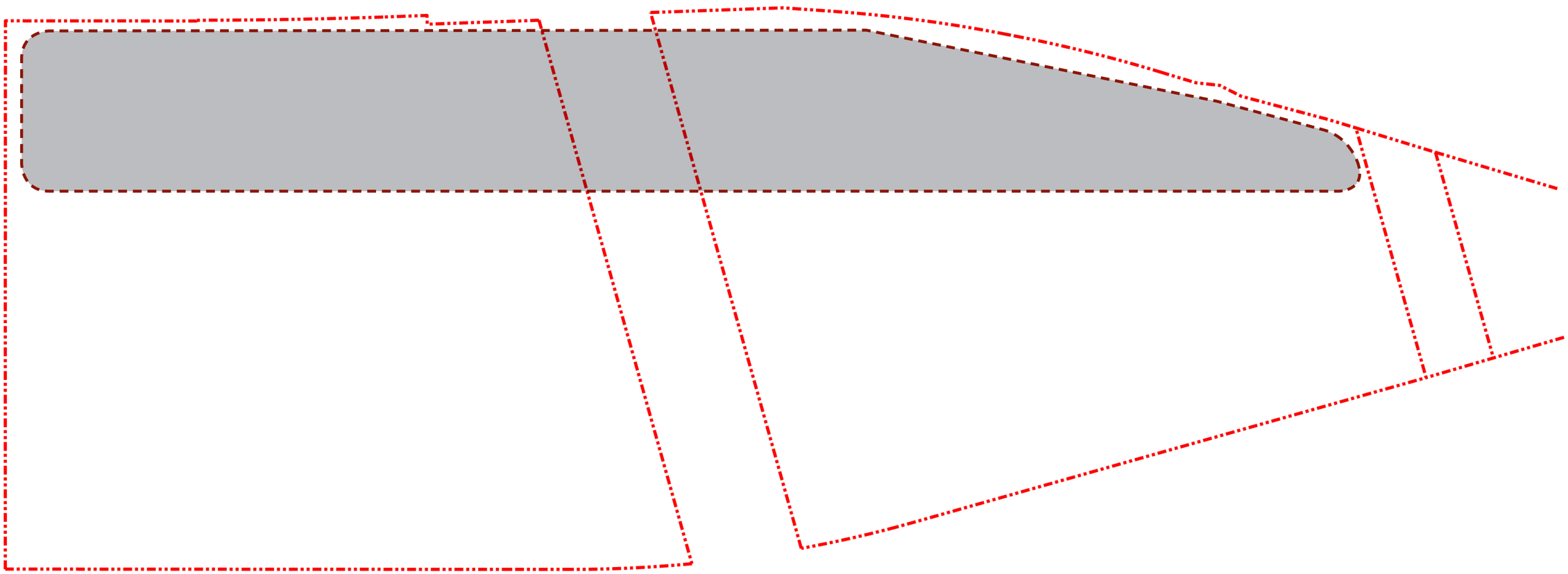
West Phasing Concept

Off-site Temporary Parking and Bus Option:

Existing Conditions

Parking Garage Reduced

Replacement Parking + Permanent Taxi Operation



West Phasing Concept

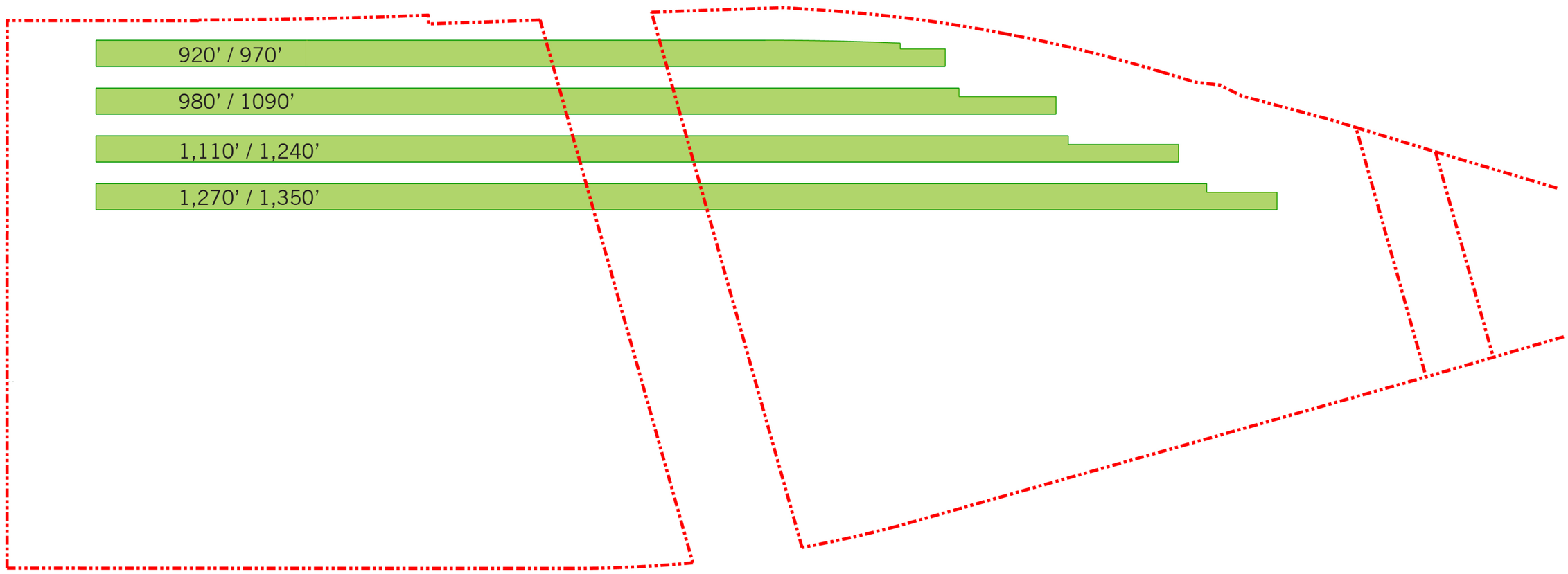
Off-site Temporary Parking and Bus Option:

Existing Conditions

Parking Garage Reduced

Replacement Parking + Permanent Taxi Operation

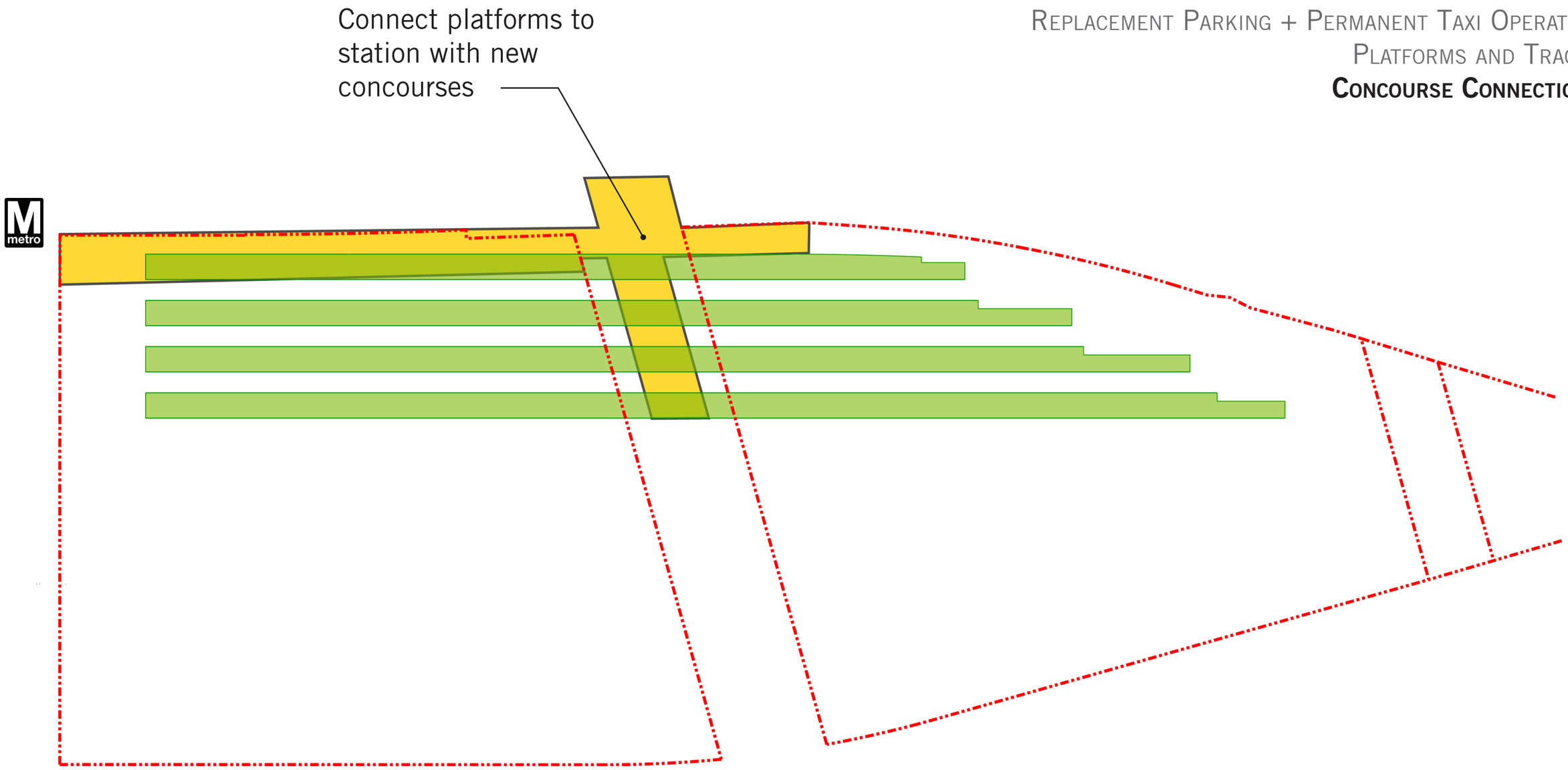
Platforms and Tracks



West Phasing Concept

Off-site Temporary Parking and Bus Option:

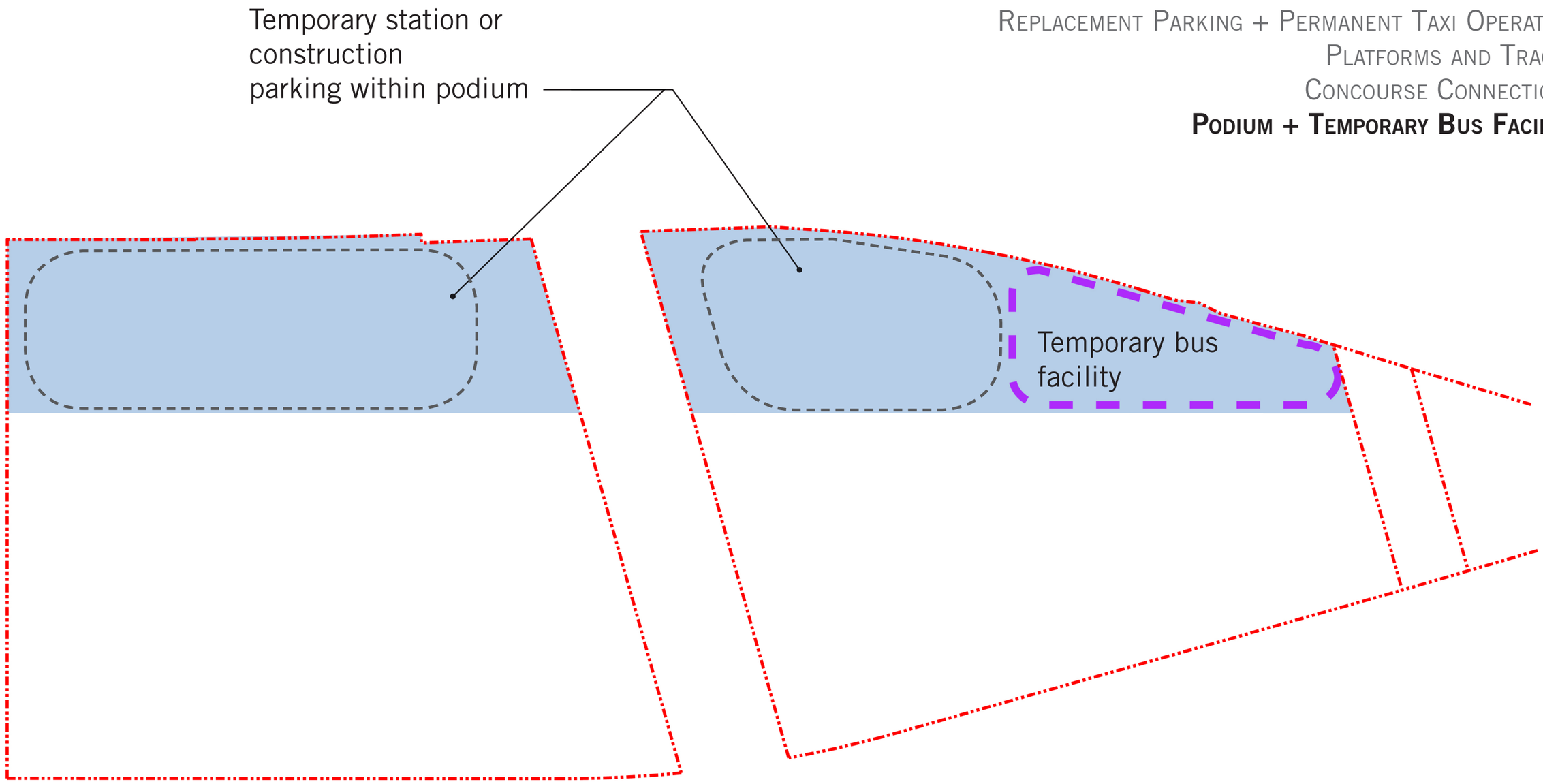
Existing Conditions
Parking Garage Reduced
Replacement Parking + Permanent Taxi Operation
Platforms and Tracks
Concourse Connections



West Phasing Concept

Off-site Temporary Parking and Bus Option:

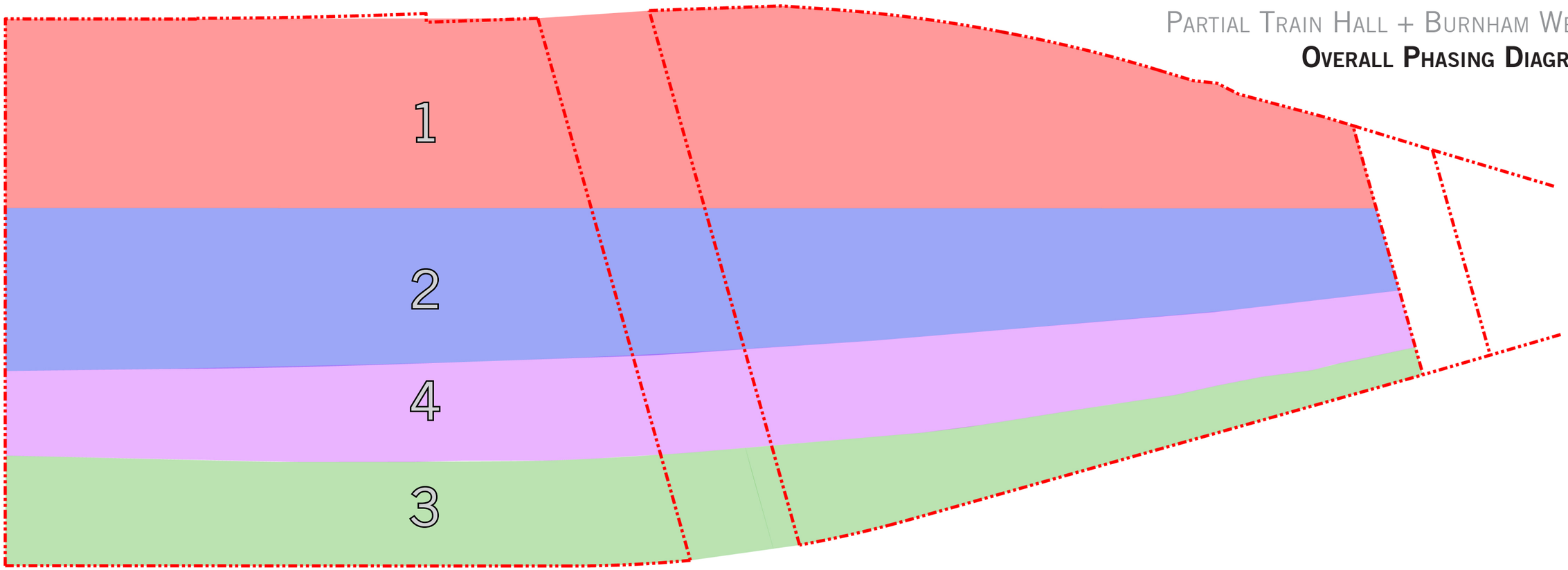
Existing Conditions
Parking Garage Reduced
Replacement Parking + Permanent Taxi Operation
Platforms and Tracks
Concourse Connections
Podium + Temporary Bus Facility



West Phasing Concept

Off-site Temporary Parking and Bus Option:

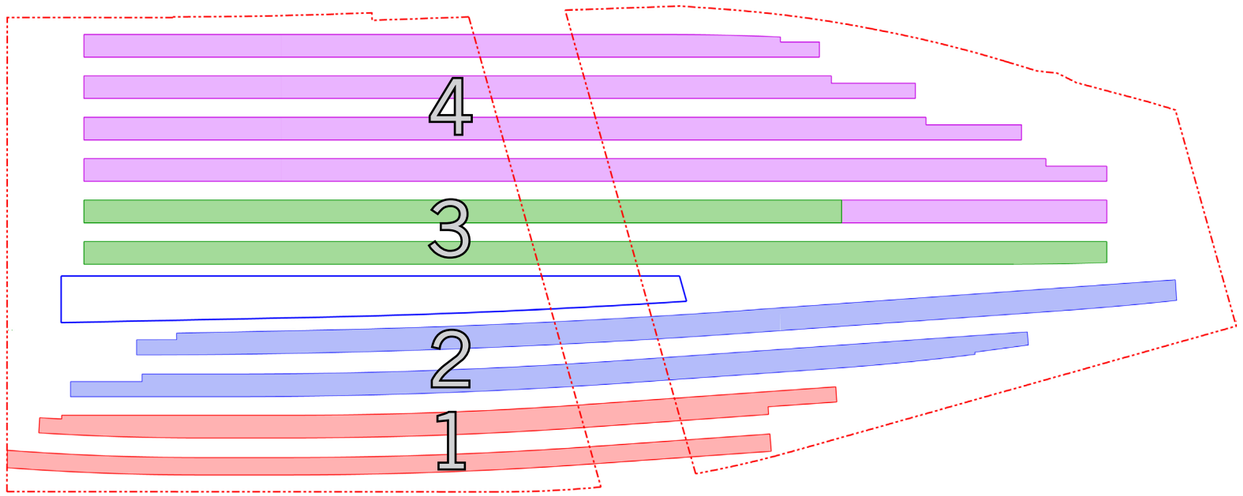
Existing Conditions
Parking Garage Reduced
Replacement Parking + Permanent Taxi Operation
Platforms and Tracks
Concourse Connections
Podium + Temporary Bus Facility
Demolish Garage
Below Track Program + Concourses
Platforms and Tracks
Partial Train Hall + Burnham West
Overall Phasing Diagram



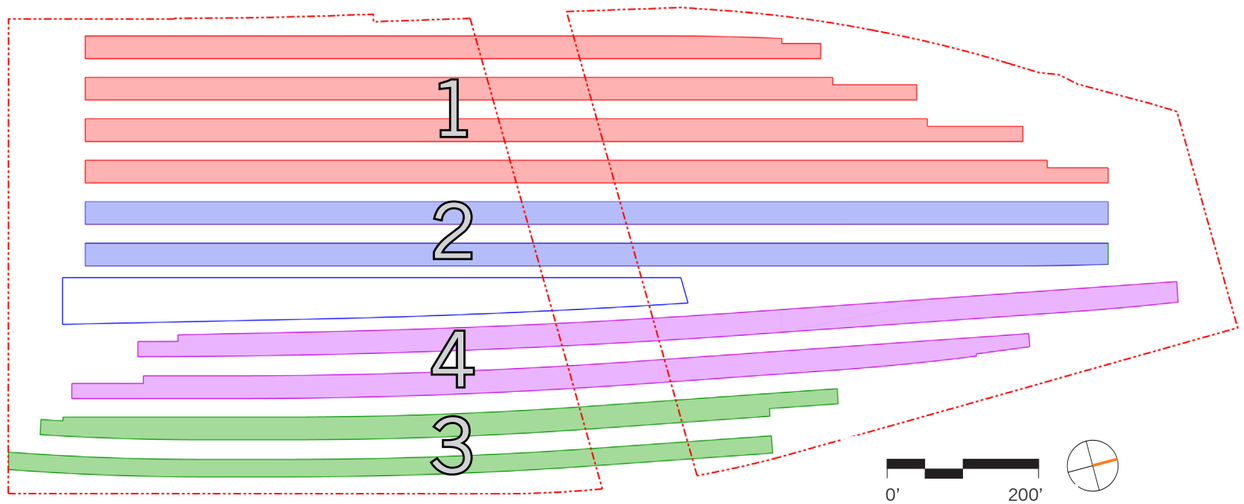
West vs. East Phasing: Overview

Off-site Temporary Parking and Bus Option:

EAST TO WEST



WEST TO EAST



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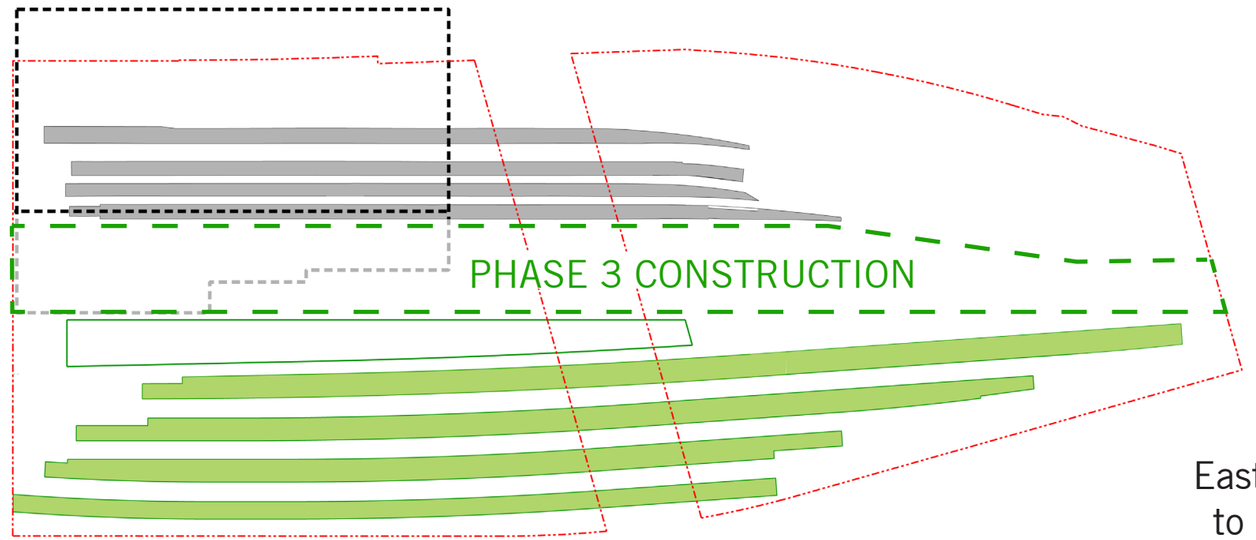
EAST TO WEST vs WEST TO EAST PHASING - TRACK & PLATFORM CAPACITY COMPARISON

Sample Comparison

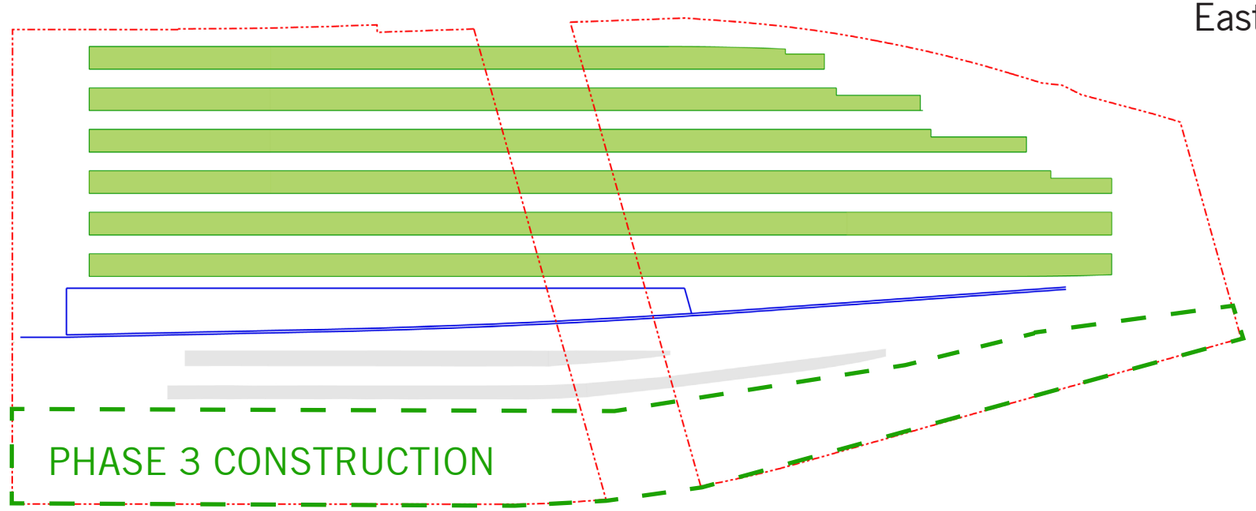
Platform Edge Availability During Phase 3 Construction

(see Appendix for detail on all phases)

EAST TO WEST



WEST TO EAST



	Stub-End	Run-Through	Total
East to West	6	7	13
West to East	12	3	15

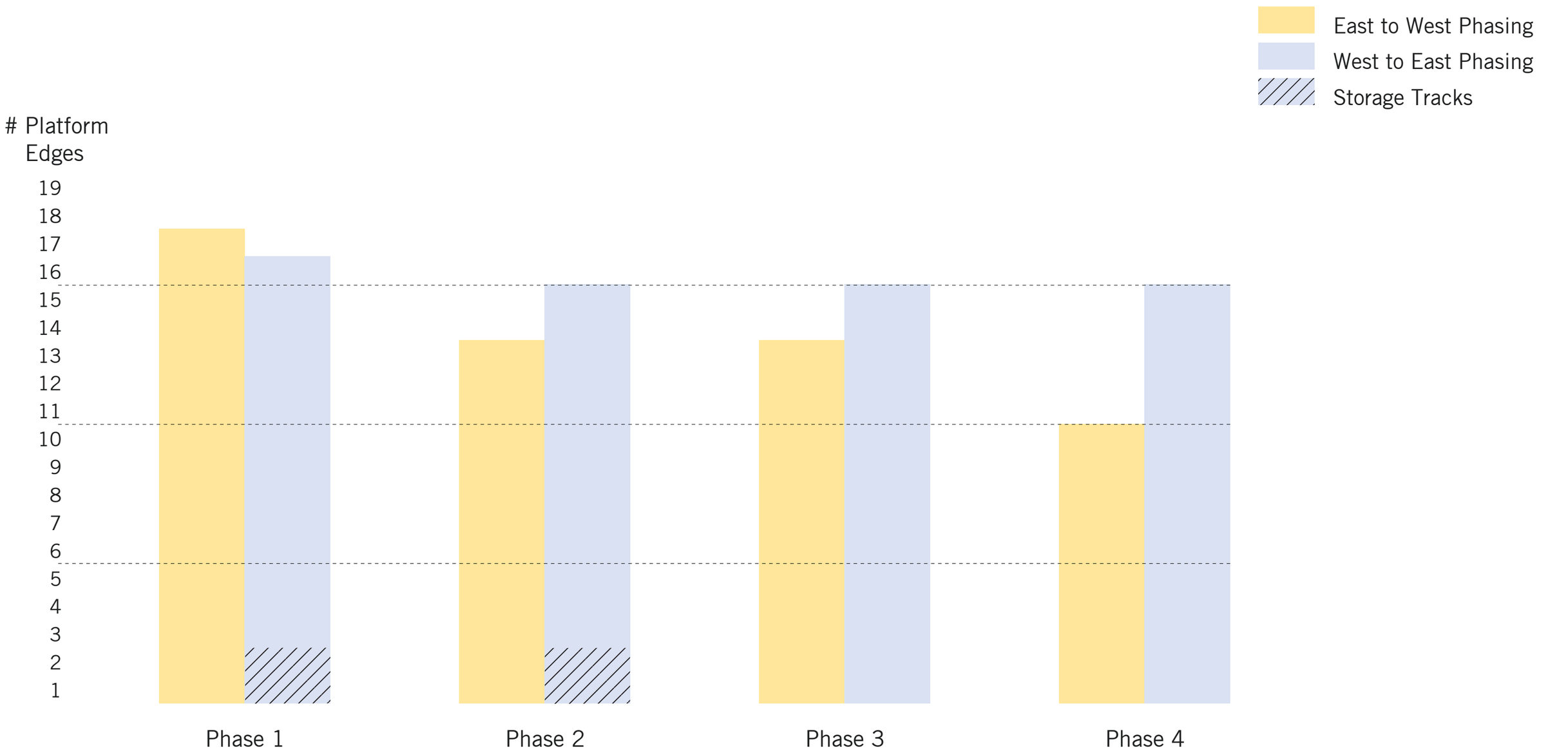
New Platform in Service

Existing Platform in Service

Akridge_0928

Number of Platform Edges Available During Construction

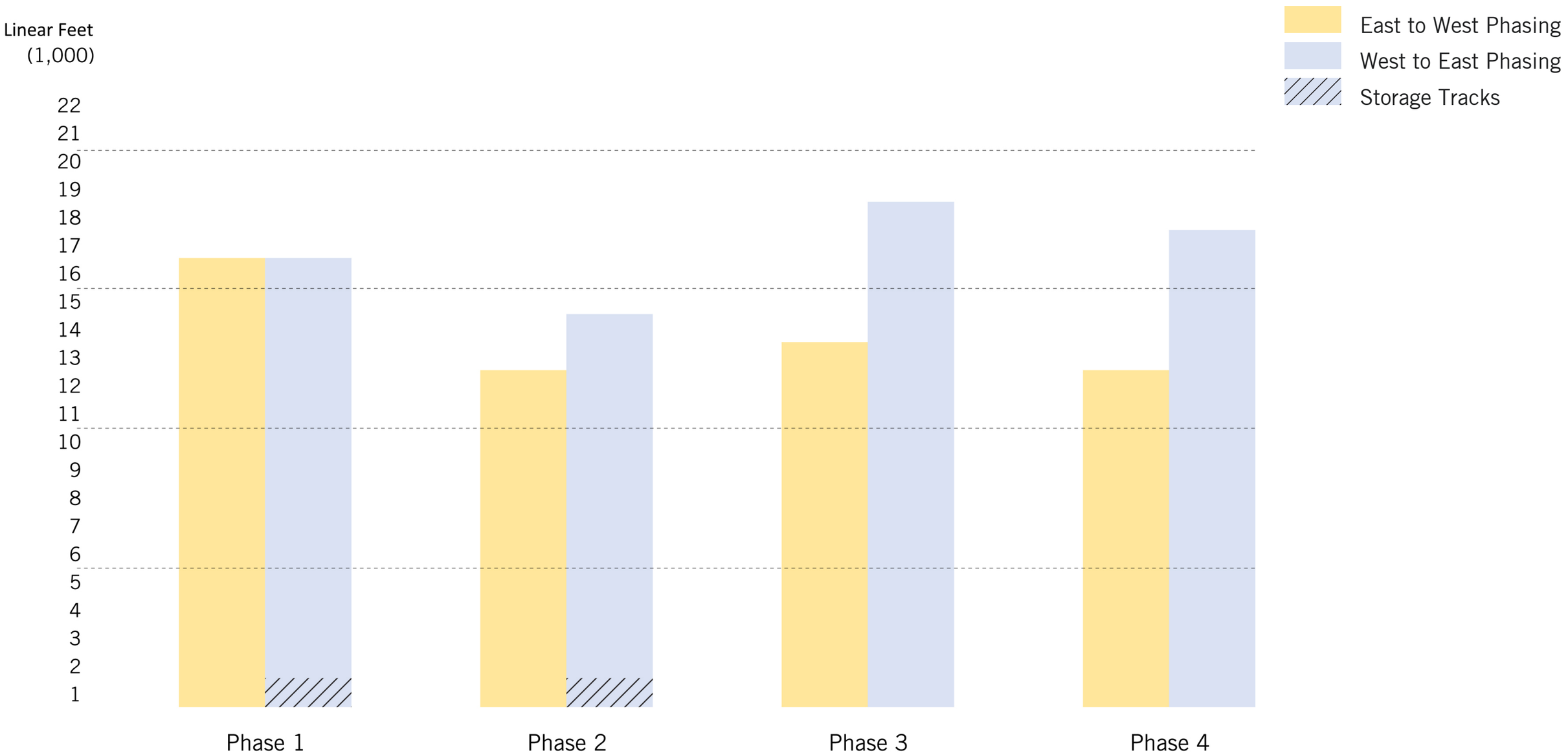
Existing and new platform edges included



* Numbers not yet updated
* East to West Phasing data per “WUS TI Construction Schedule DRAFT 08212017”

Length of Platform Edges Available During Construction

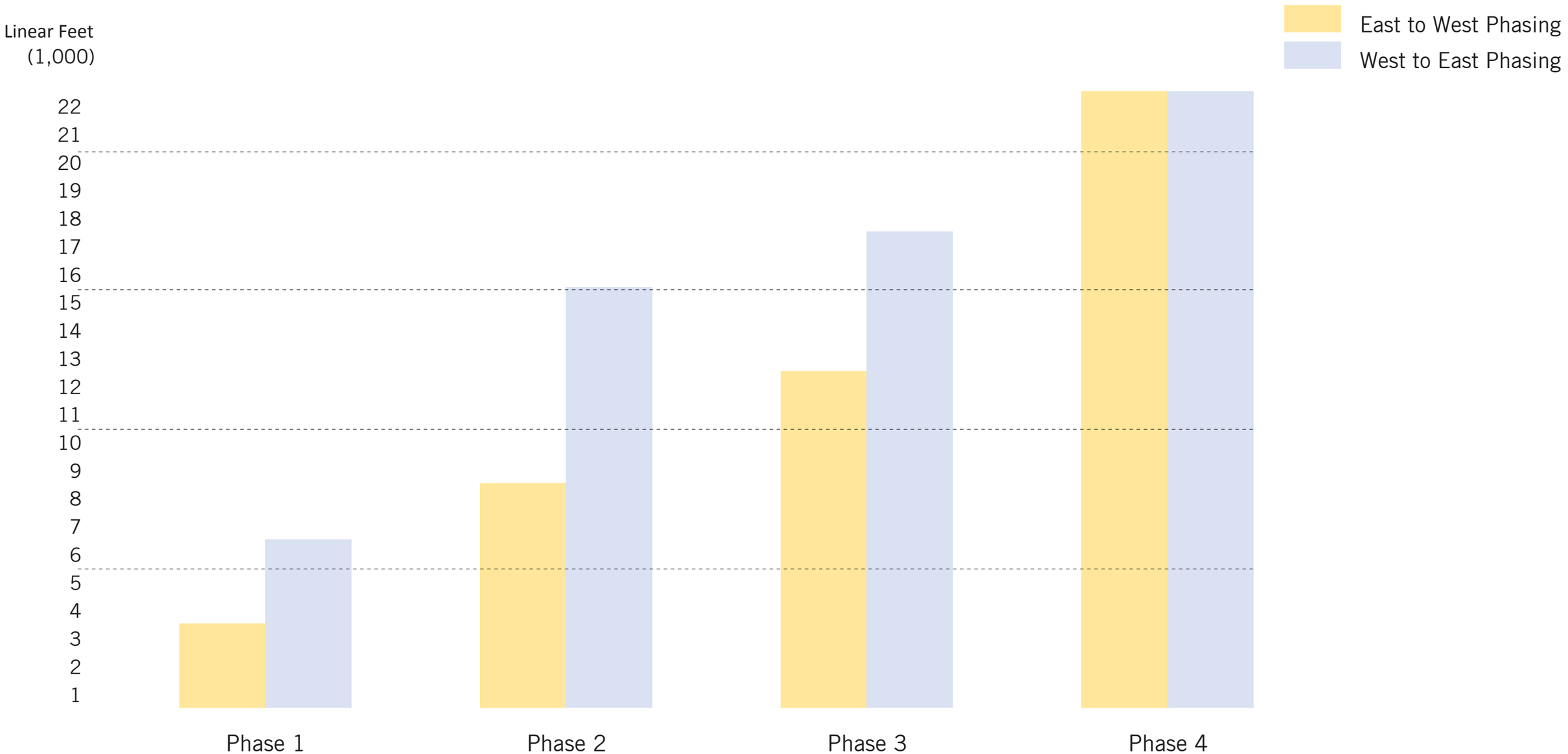
Existing and new platform edges included



* Numbers not yet updated
* East to West Phasing data per “WUS TI Construction Schedule DRAFT 08212017”

New Platform Edges at Completion of Each Phase

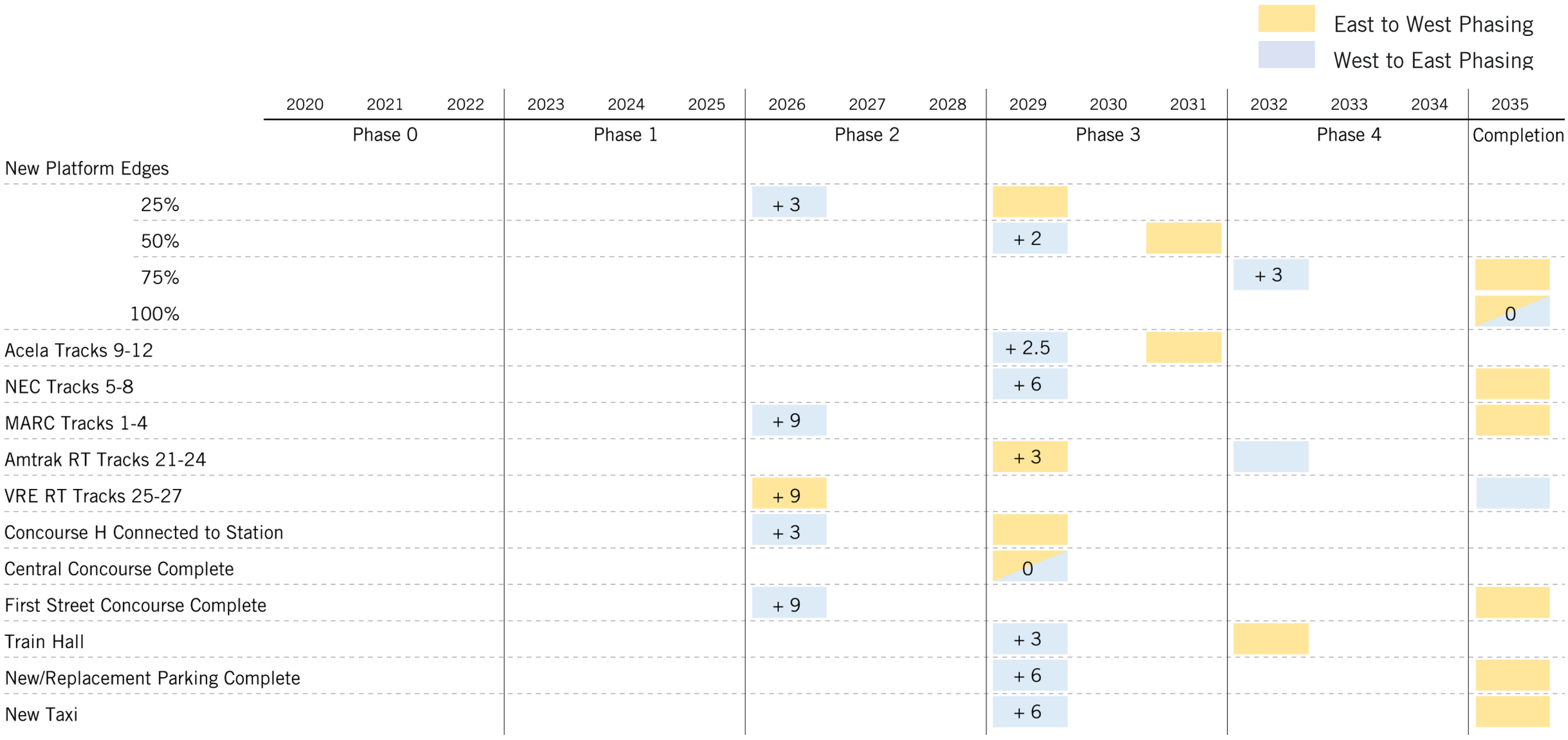
Cumulative total of new platform edges



* Numbers not yet updated

* East to West Phasing data per “WUS TI Construction Schedule DRAFT 08212017”

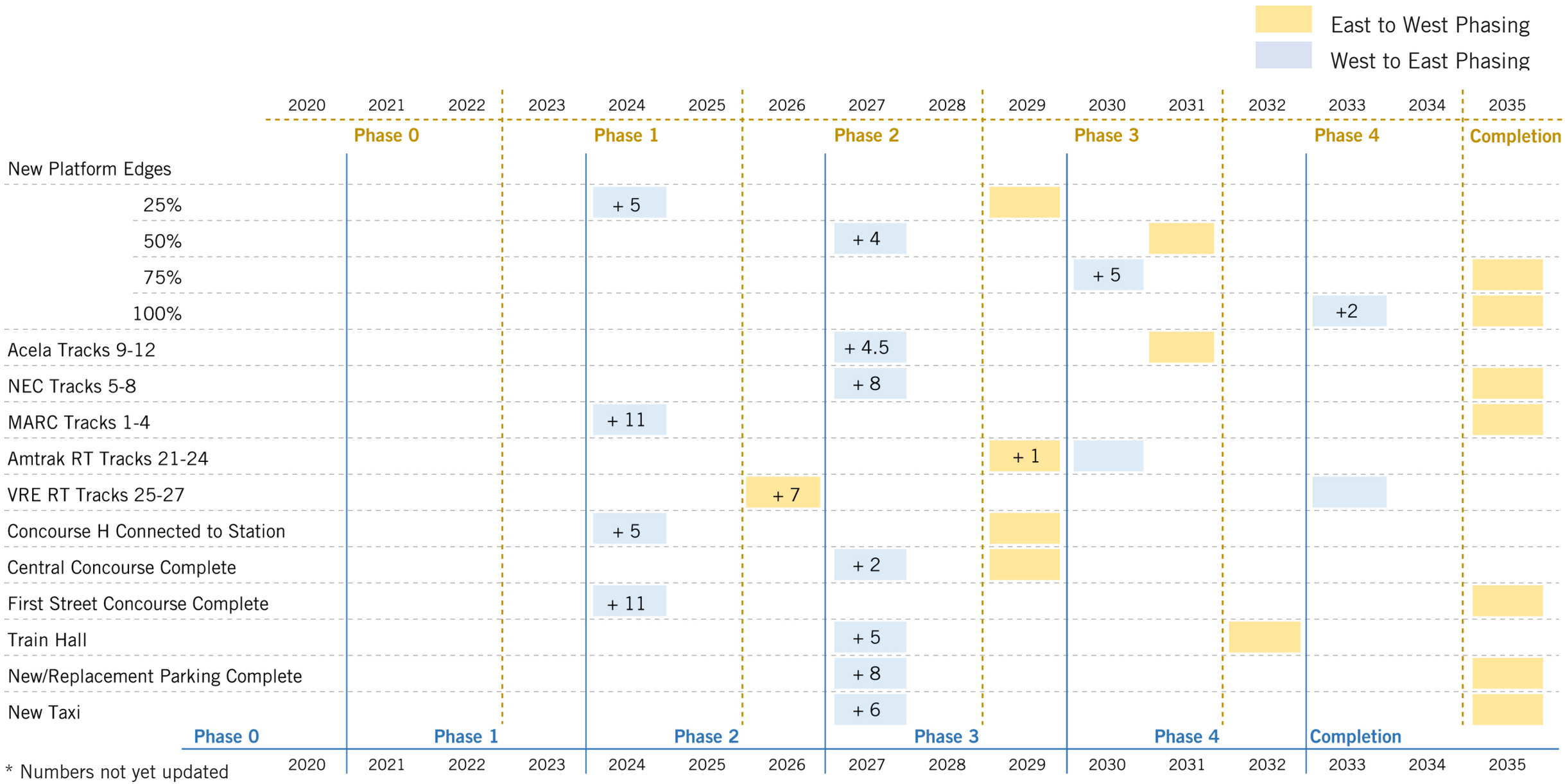
Timeline Comparison with Identical Start Years



* + X means number of years sooner a particular element is completed

* Numbers not yet updated
* Length of each phase rounded to 3 years per phase
* East to West Phasing data per “WUS TI Construction Schedule_DRAFT 08212017”

Timeline Comparison with 2 years Earlier Start for West Phasing



* Numbers not yet updated
* Length of each phase rounded to 3 years per phase
* East to West Phasing data per “WUS TI Construction Schedule_DRAFT 08212017”

BURNHAM PLACE

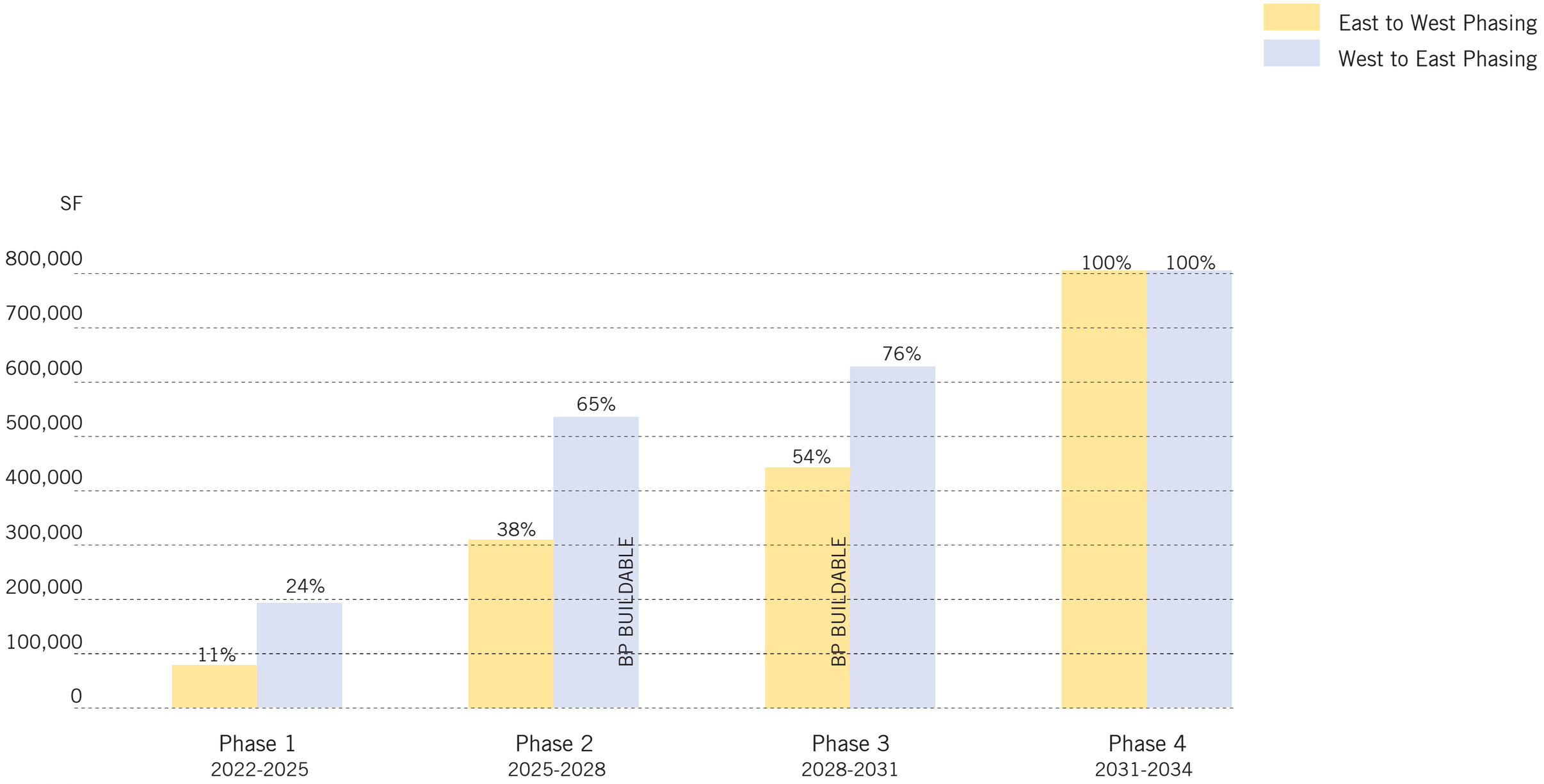
WASHINGTON, D.C. | 02/09/2018 |

AKRIDGE Invested.

West to East Phasing Study

shalom baranes associates | architects

BP Podium Area Completed by Phase

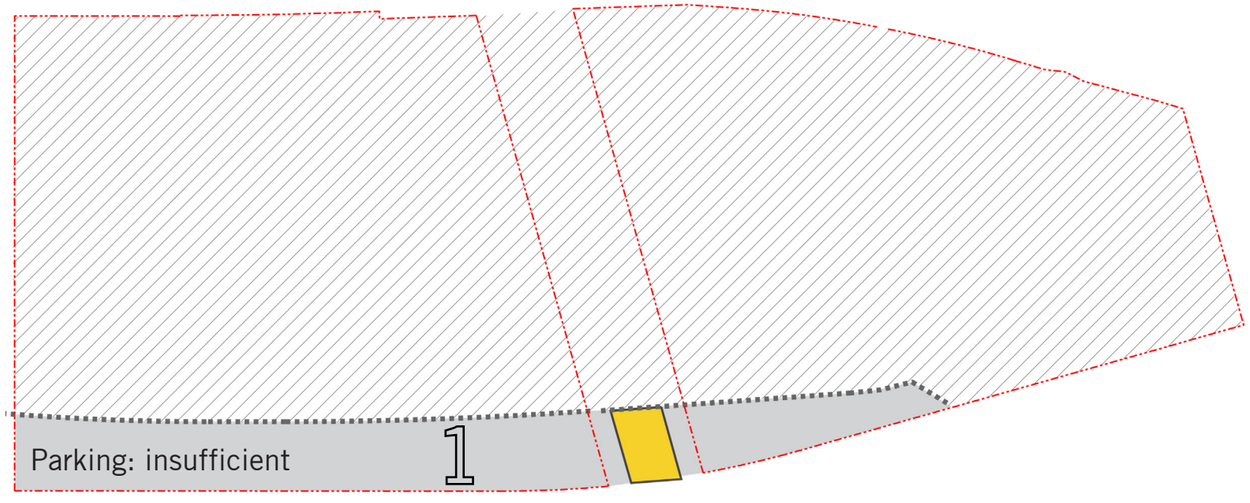


* BP development timeline with identical start years
* East to West Phasing data per “WUS TI Construction Schedule DRAFT 08212017”

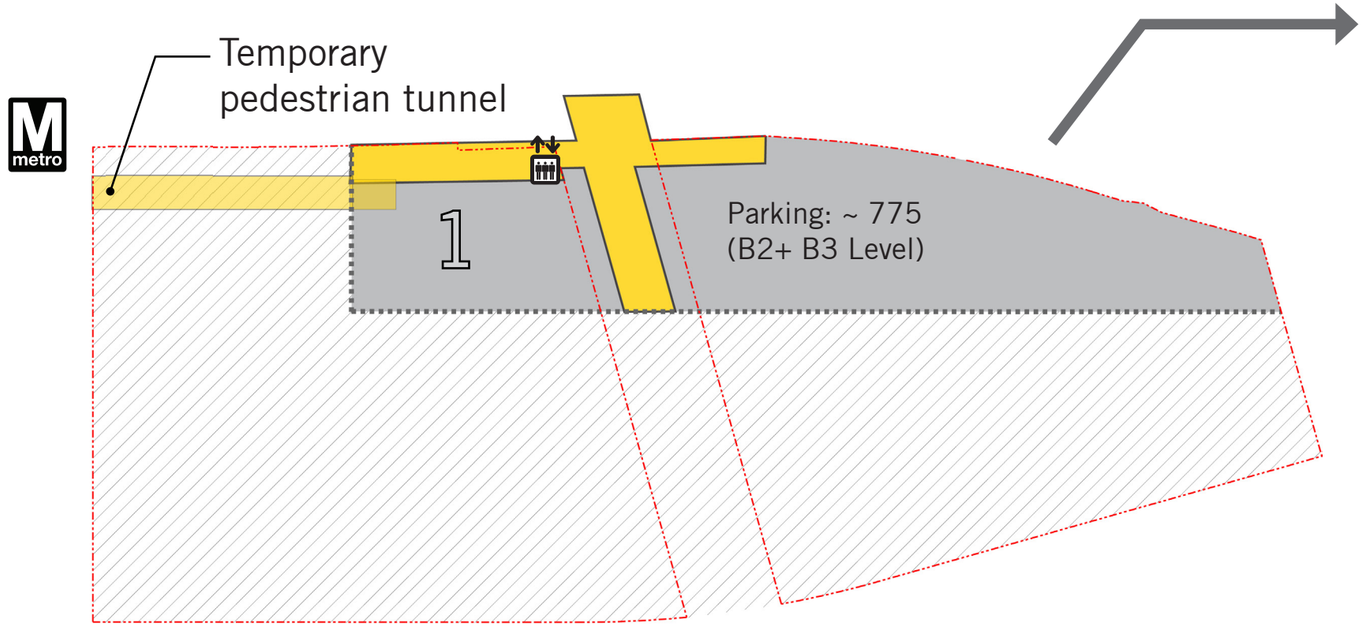
EAST TO WEST vs WEST TO EAST PHASING - PLAN COMPARISON BY PHASE

Phase 1 Completed - Concourse Level & Below

EAST TO WEST

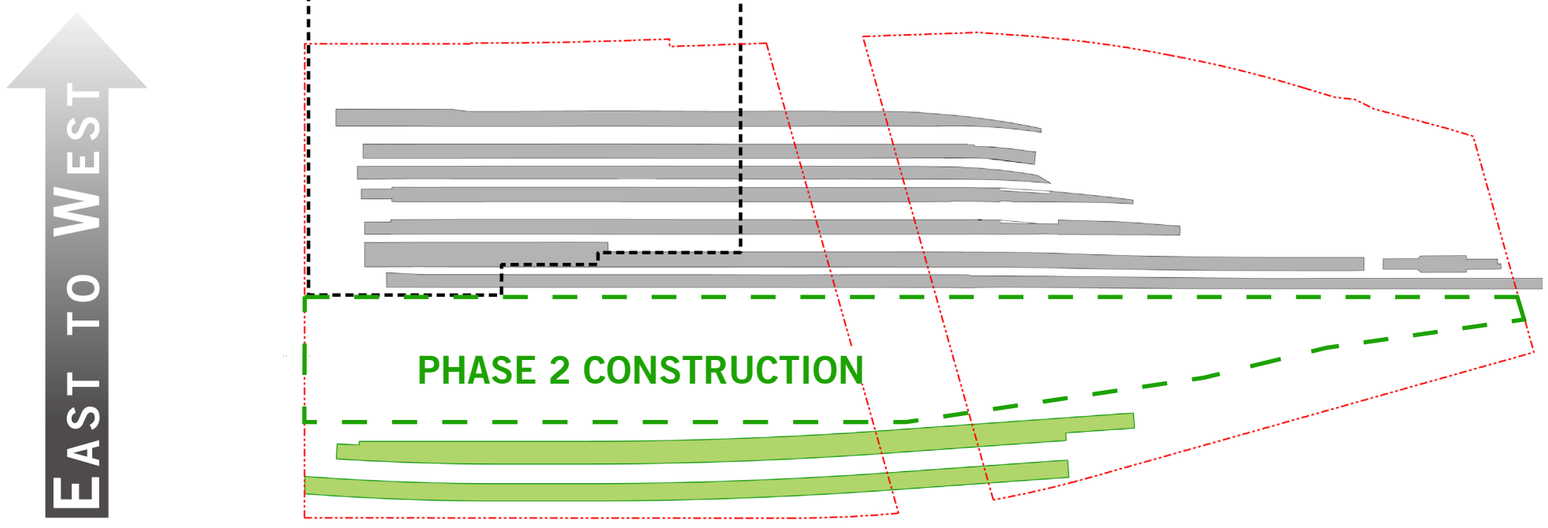


WEST TO EAST



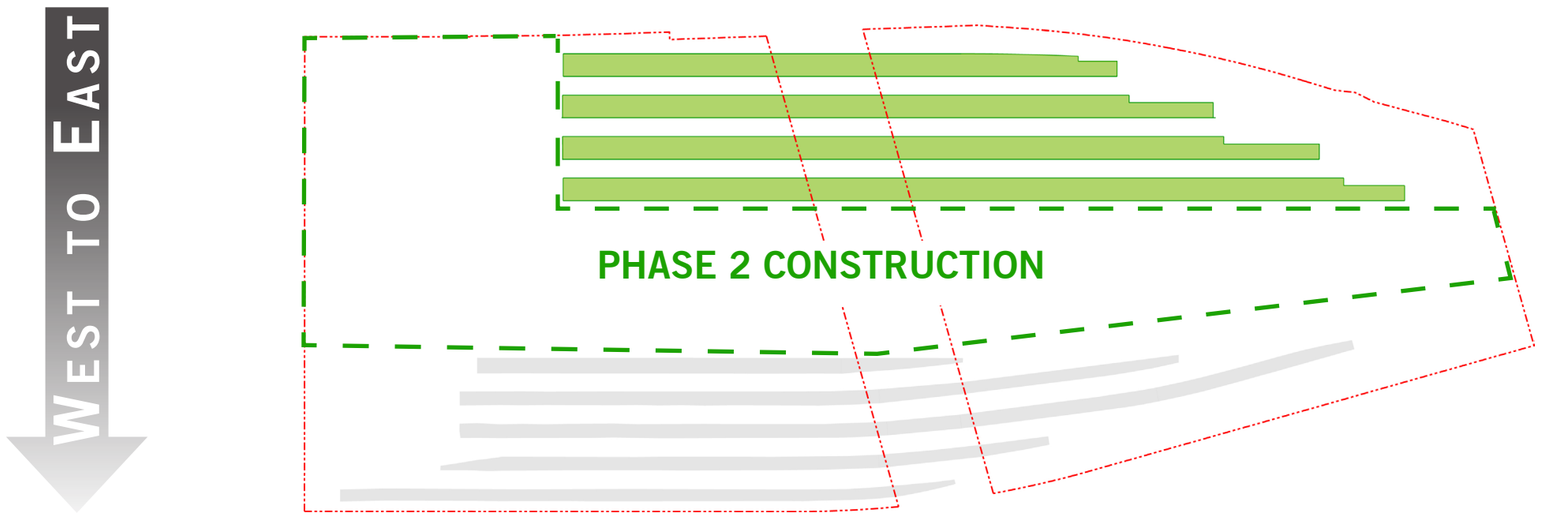
- H Street and 1st Street Concourse connections to station and Metro
- Streetcar connection to station and Metro
- Usable Amtrak support spaces, parking areas, and taxi
- Parking access from K Street complete

PHASE 1 COMPLETED - PLATFORM LEVEL

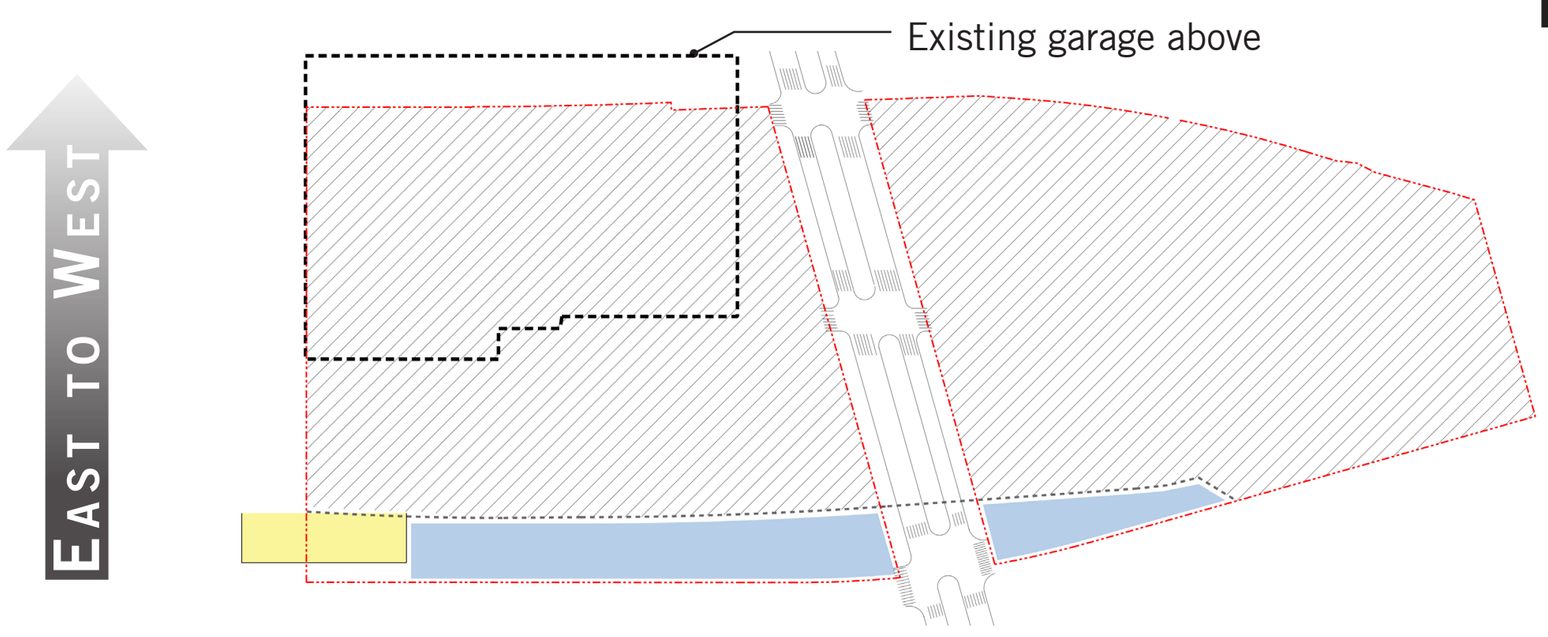


New Platform in Service

Existing Platform in Service



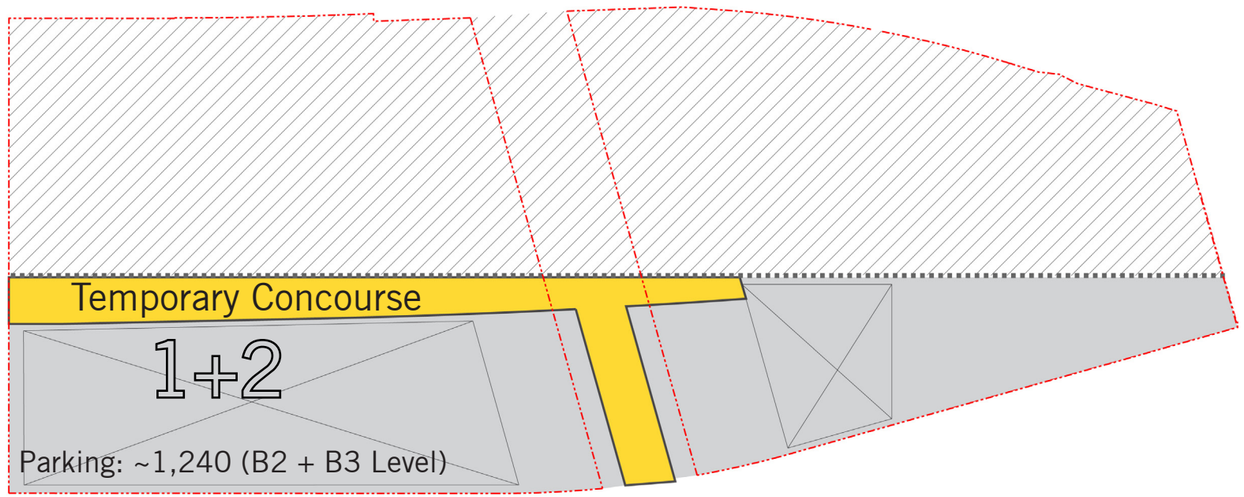
Phase 1 Completed - Podium Level



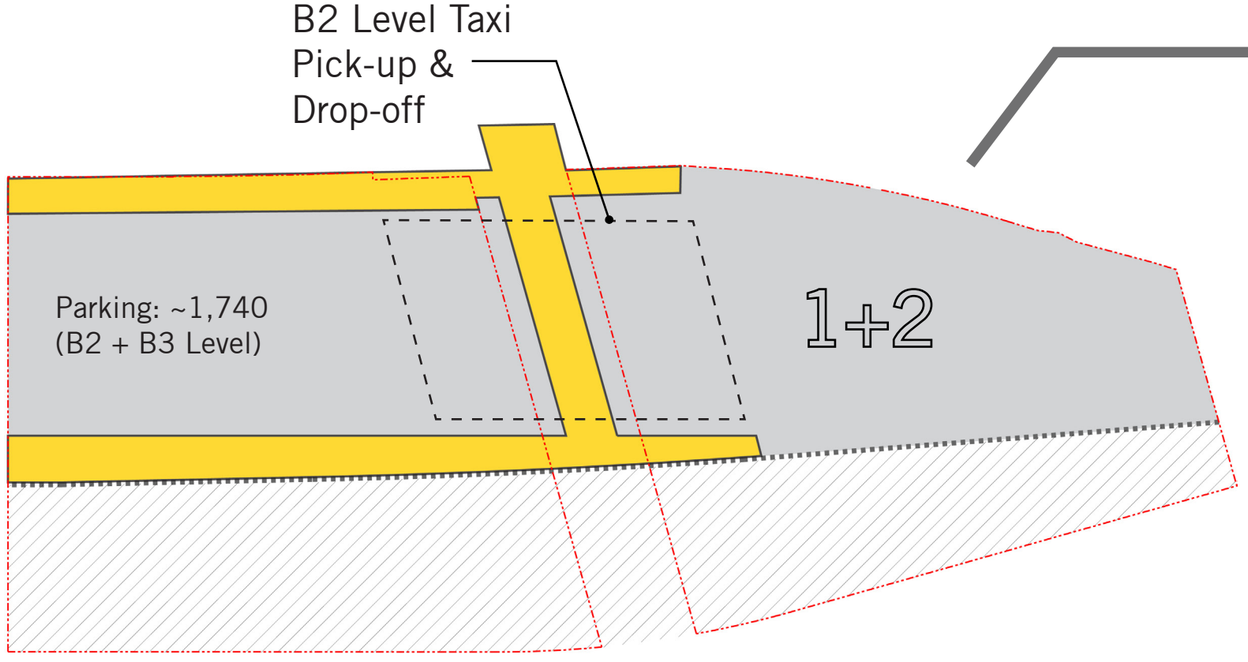
- Effective construction staging area for Phase 2 and Greenway construction
- BP podium usable for construction staging, temporary bus facility, and parking
- Greenway partially completed

Phase 2 Completed - Concourse Level & Below

EAST TO WEST

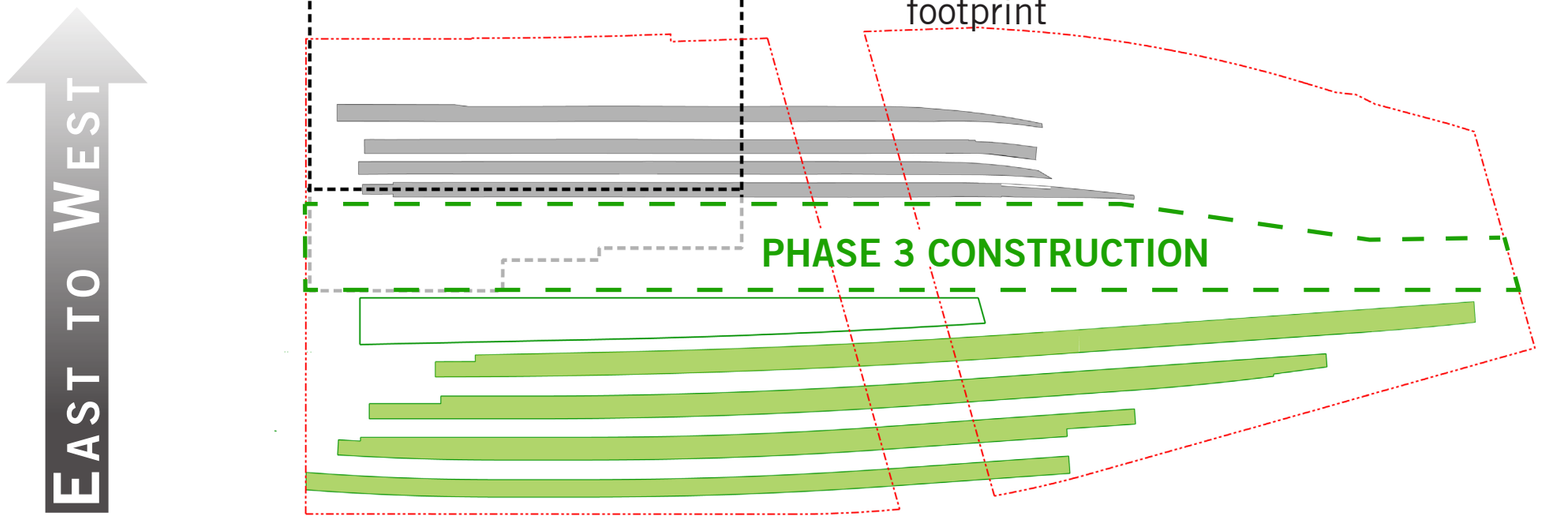


WEST TO EAST



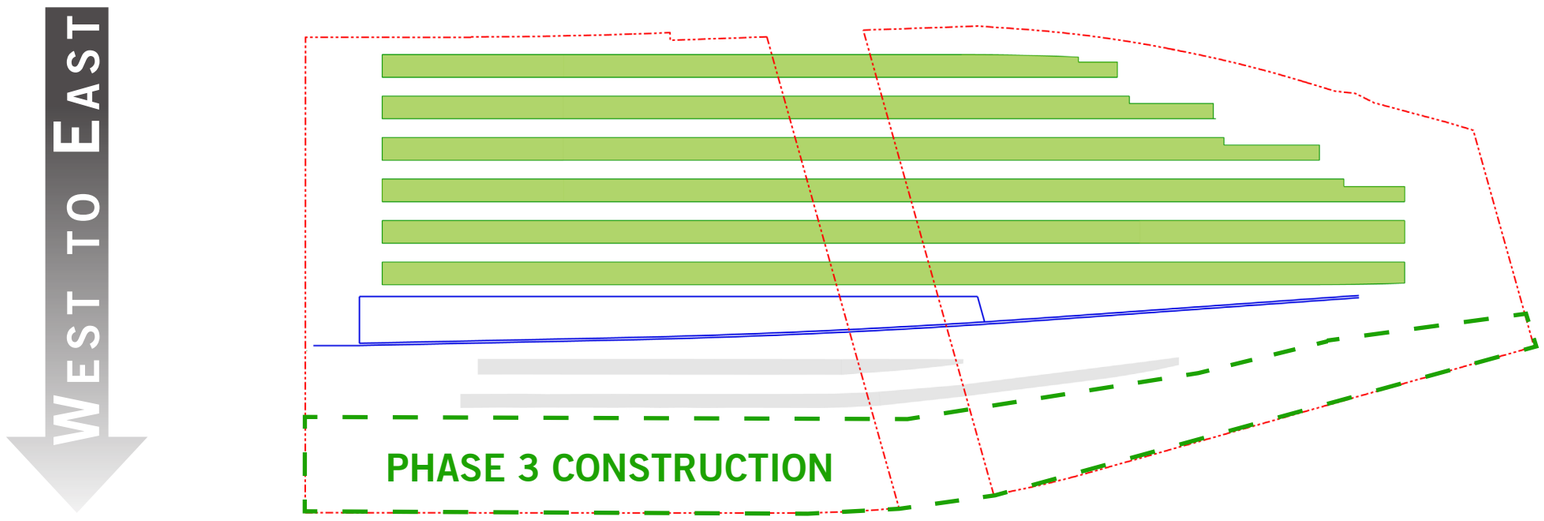
- Functional new Concourse loop to station
- Passenger amenity and Amtrak support spaces accessible to both Central and 1st Street Concourses
- Full parking program and taxi operation complete

PHASE 2 COMPLETED - PLATFORM LEVEL

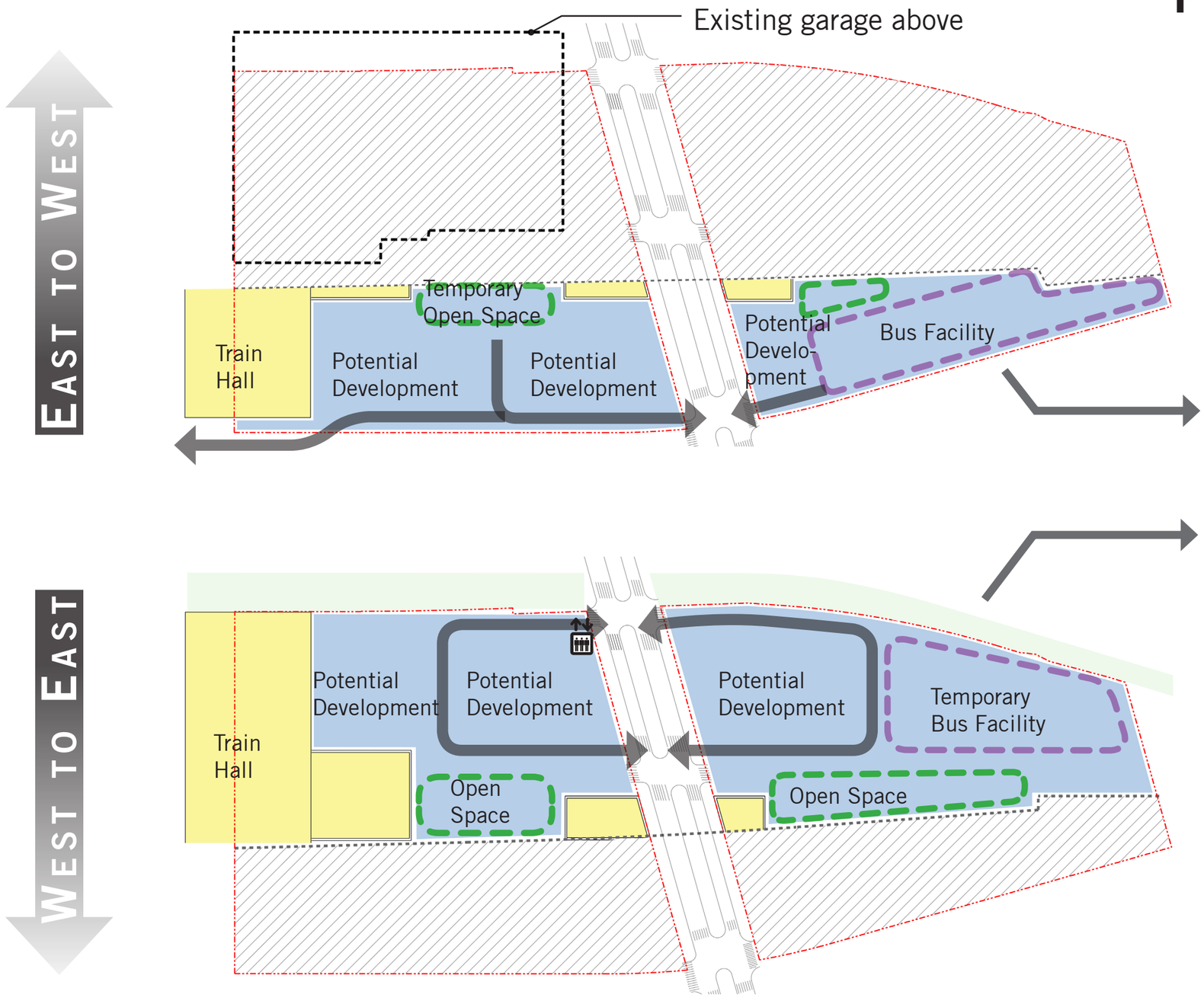


New Platform in Service

Existing Platform in Service



Phase 2 Completed - Podium Level



- No road opportunity - BP development potentially not feasible

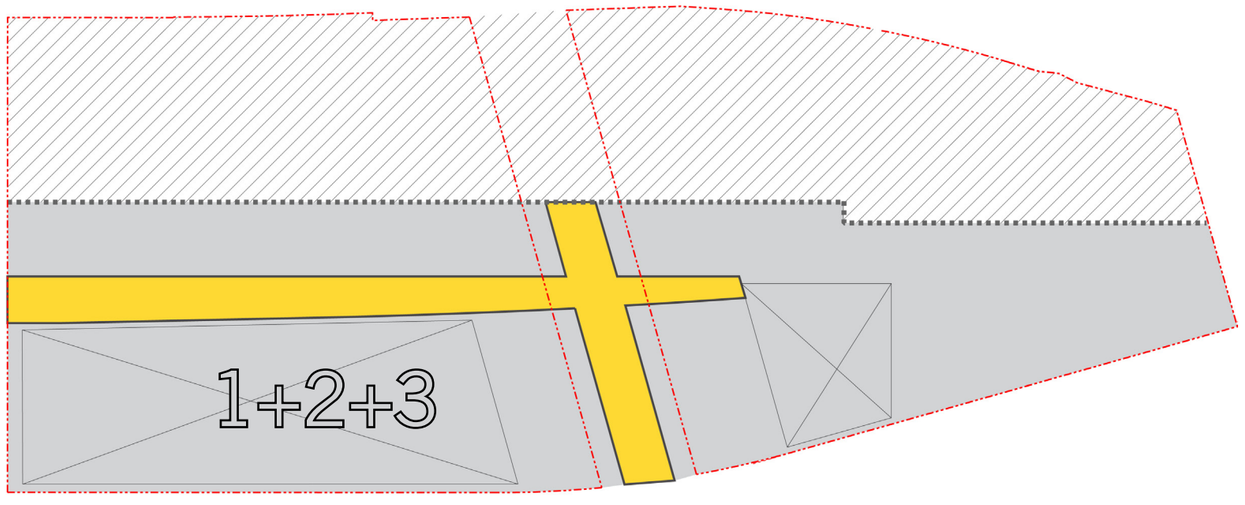
- Large Train Hall connected to Metro and Historic Station

- Greenway Complete

- BP development feasible
  + Adequate development opportunity
  + Functional circulation network
  + Strategically positioned open spaces
  + Adequate light, air, and views in key locations
  + Harmonized public and private projects

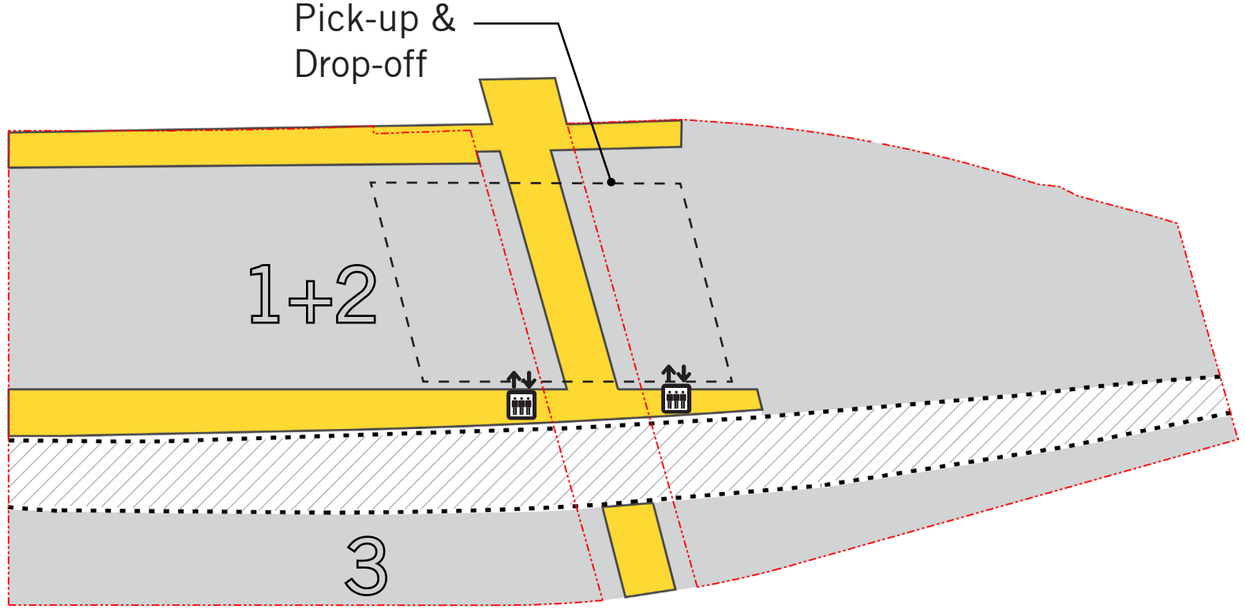
Phase 3 Completed - Concourse Level & Below

EAST TO WEST



B2 Level Taxi

WEST TO EAST



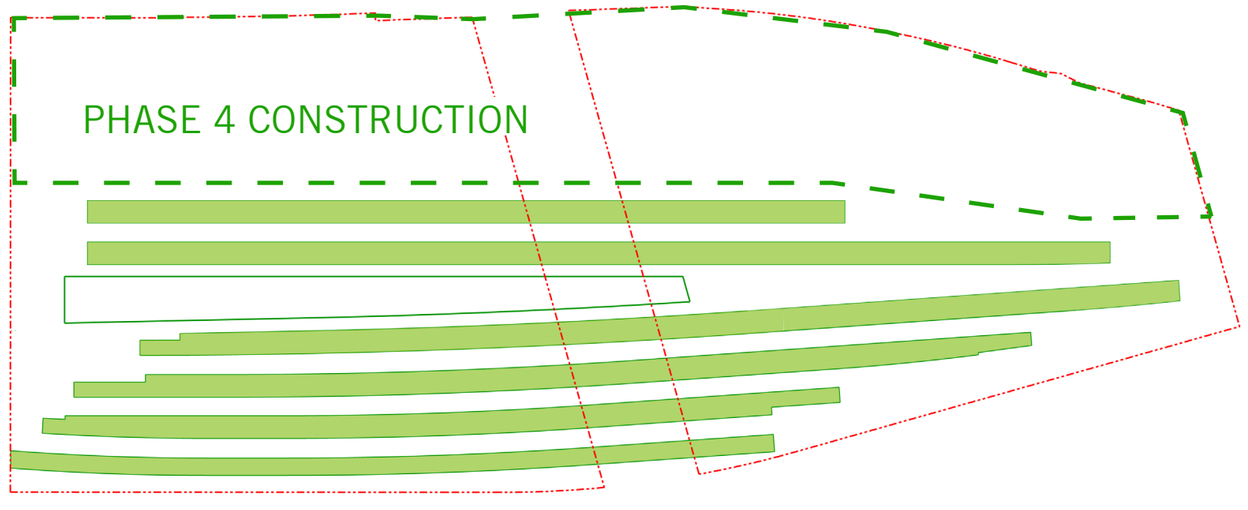
AKRIDGE Invested.

PHASE 3 COMPLETED - PLATFORM LEVEL

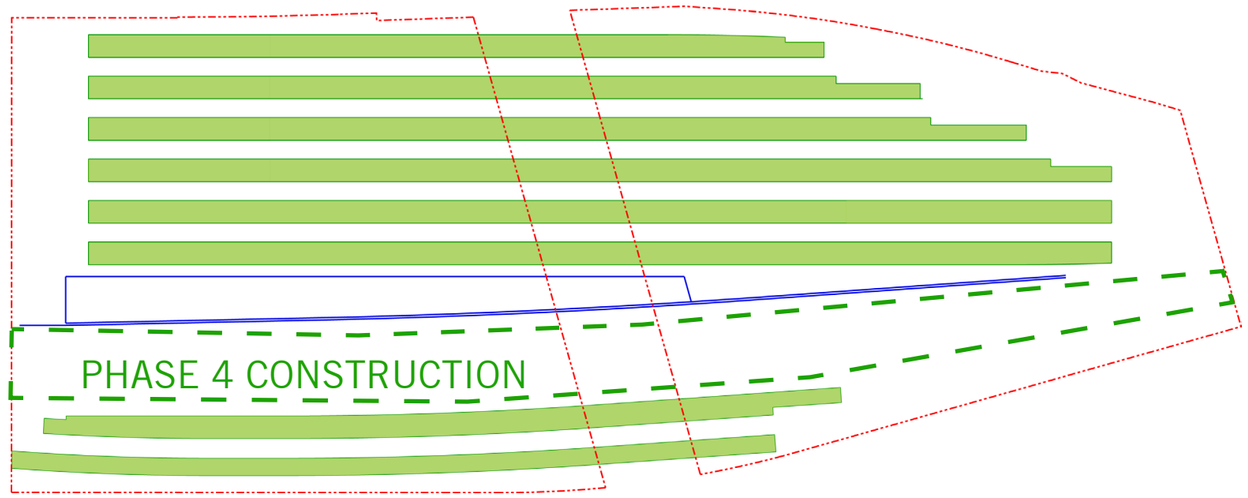
New Platform in Service

Existing Platform in Service

EAST TO WEST

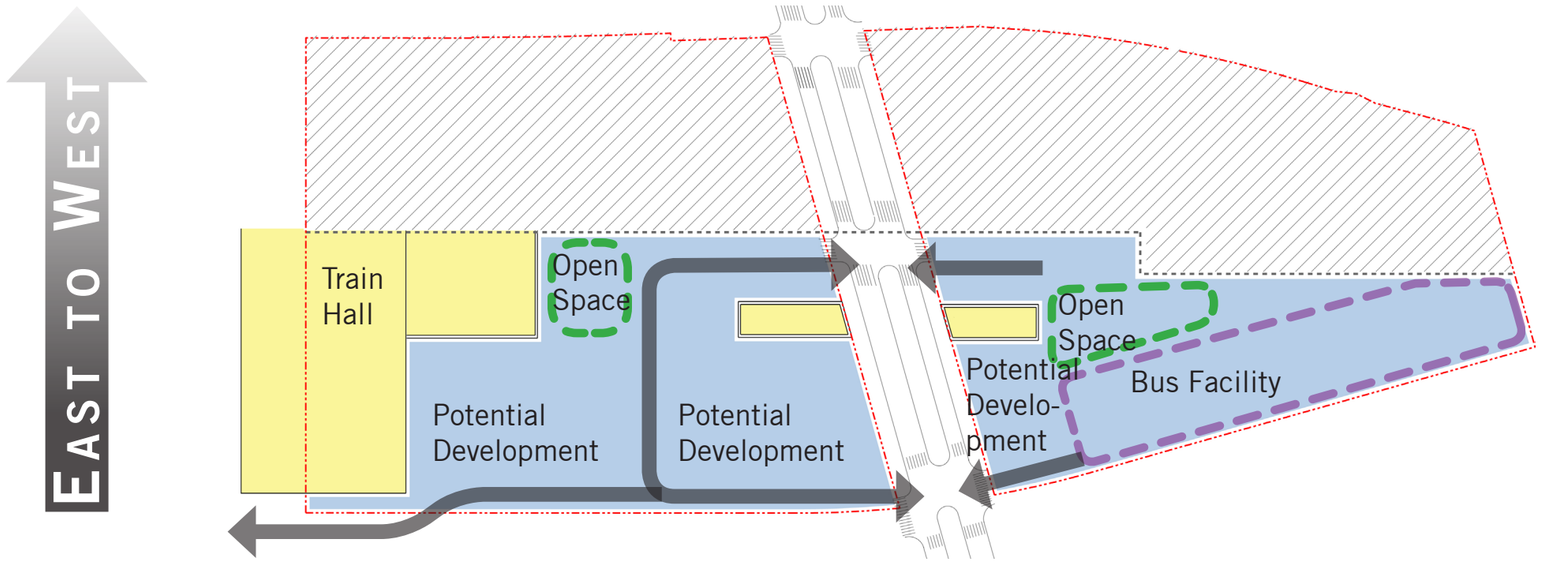


WEST TO EAST



AKRIDGE Invested.

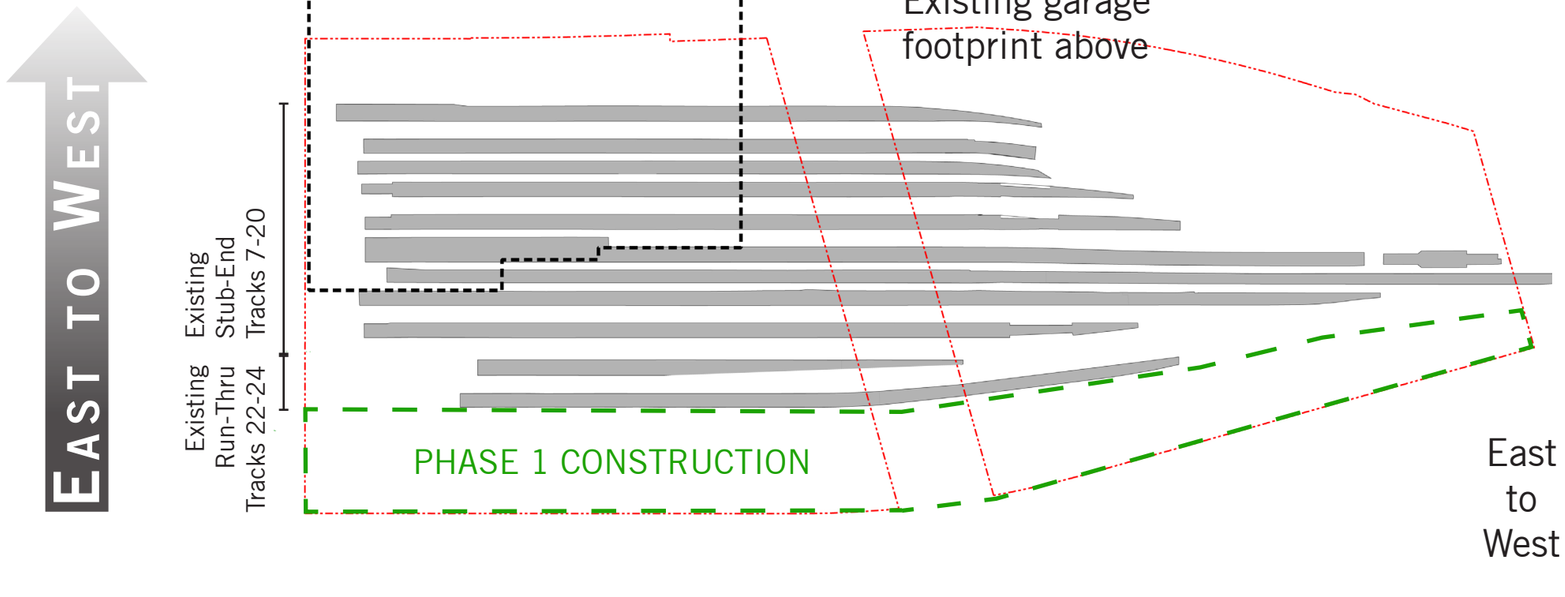
Phase 3 Completed - Podium Level



NEXT STEPS AND DISCUSSION

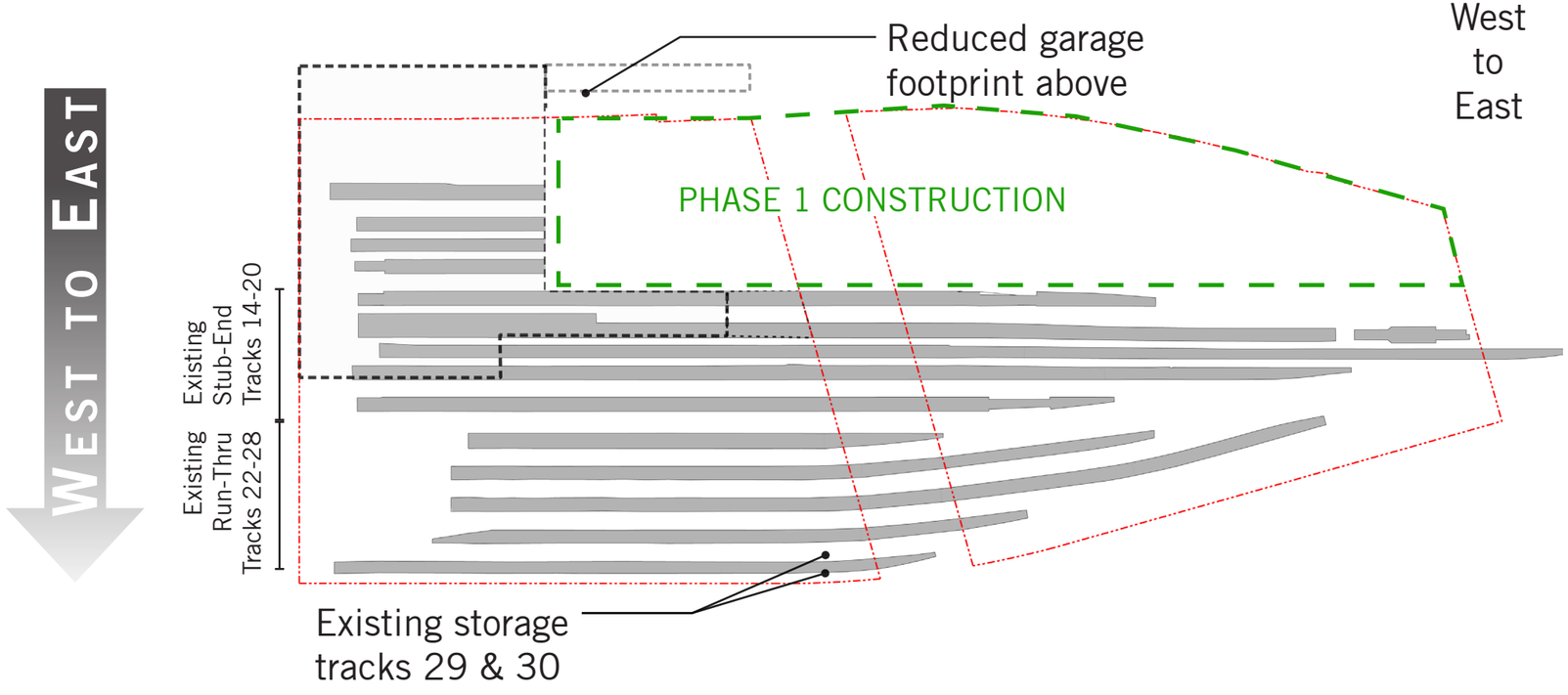
APPENDIX

Platform Edge Availability During Phase 1 Construction



East to West

Stub-End	Run-Through	Storage	Total
14	3	0	17



West to East

Stub-End	Run-Through	Storage	Total
7	7	2	16

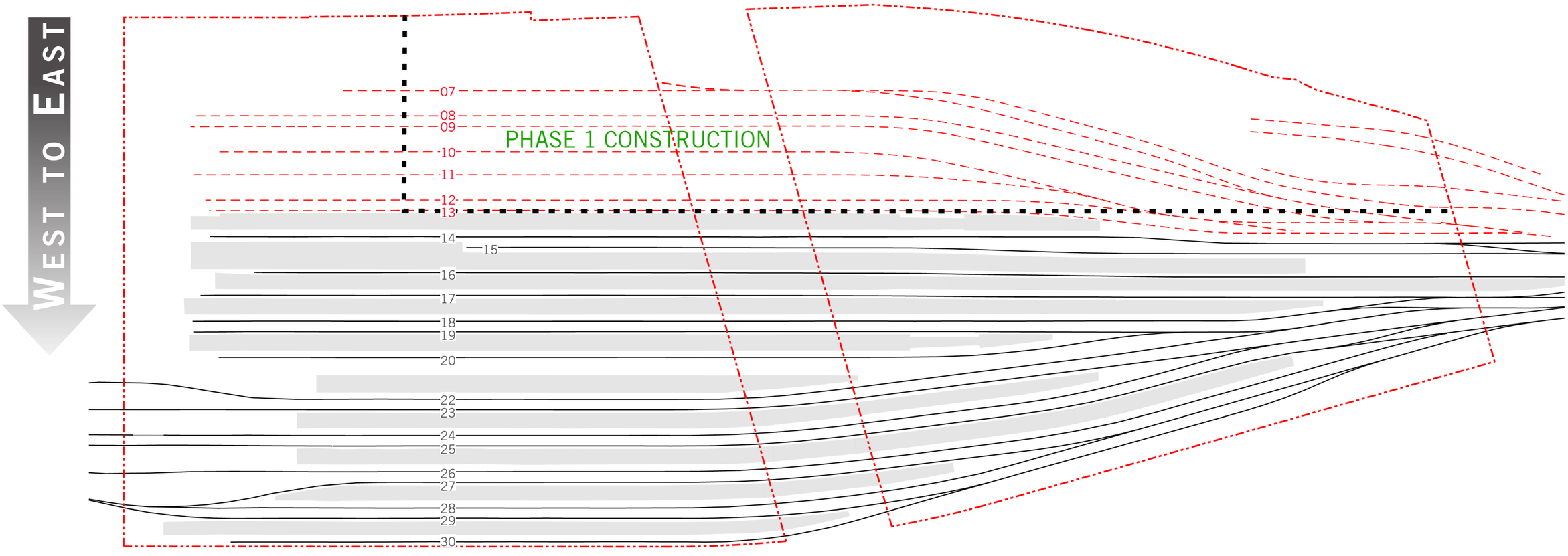
New Platform in Service

Existing Platform in Service

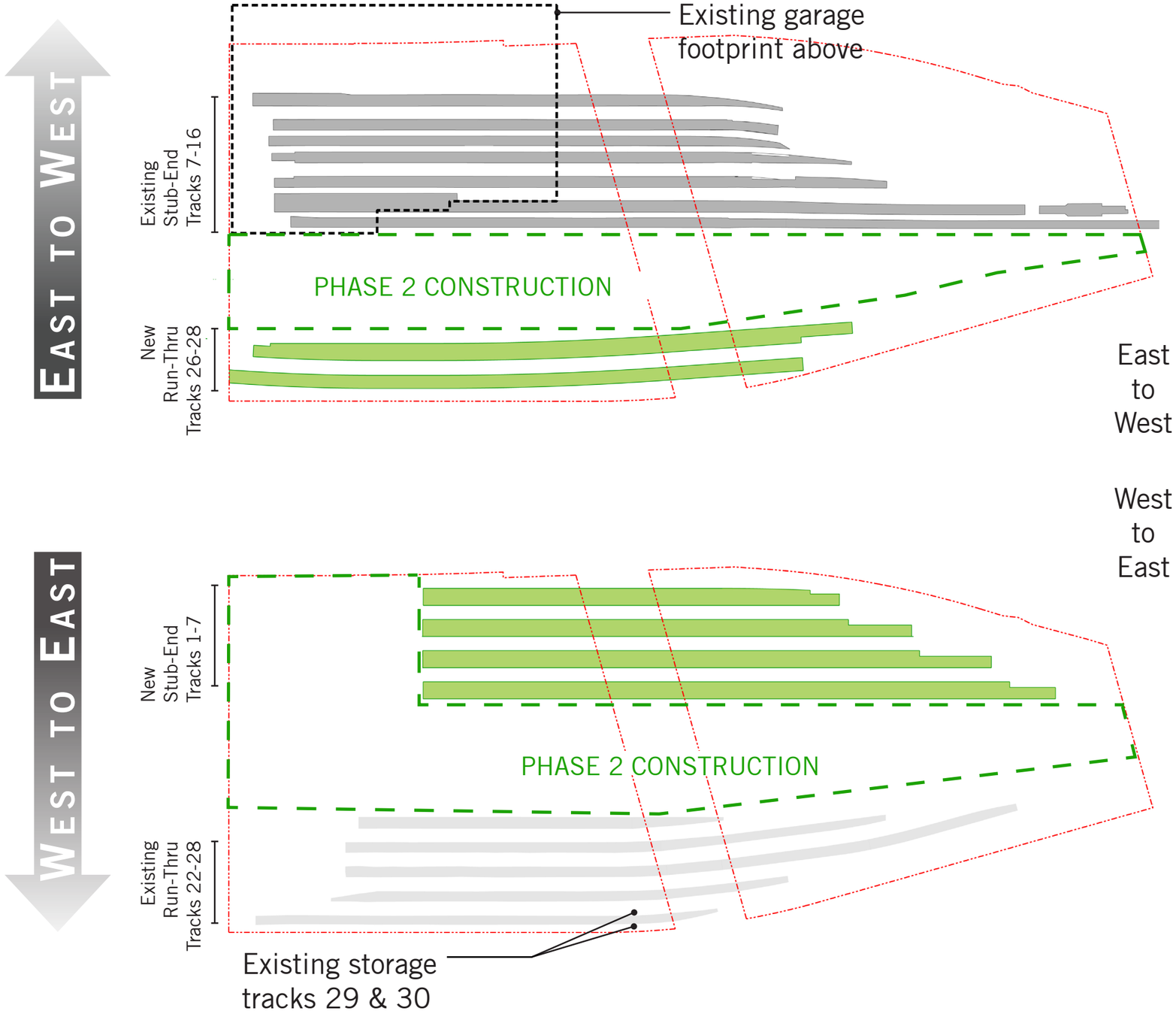
Track Availability During Phase 1 Construction

	Stub-End	Run-Through	Storage	Total
East to West	14	3	0	17
West to East	7	7	2	16

- New Platform in Service
- New Track in Service
- Existing Platform in Service
- Existing Track in Service
- Existing Track Demo/ Removed from Service
- SOE line



Platform Edge Availability During Phase 2 Construction



New Platform in Service

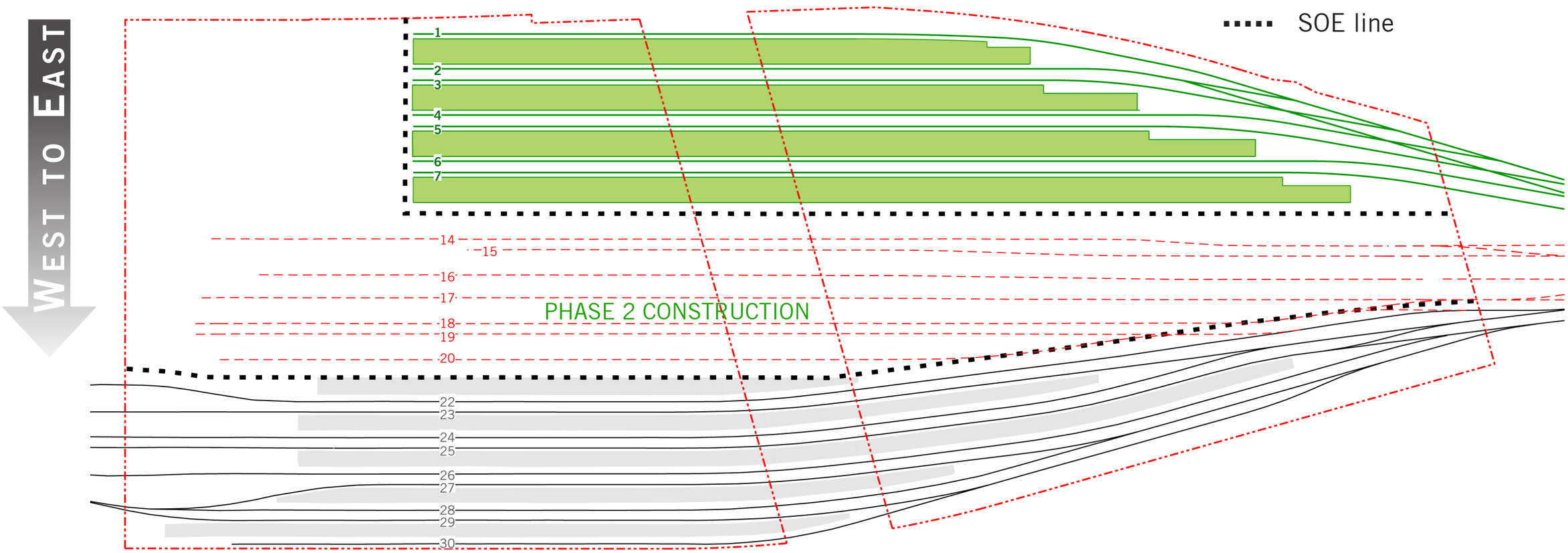
Existing Platform in Service

	Stub-End	Run-Through	Storage	Total
East to West	10	3	0	13
West to East	7	7	2	16

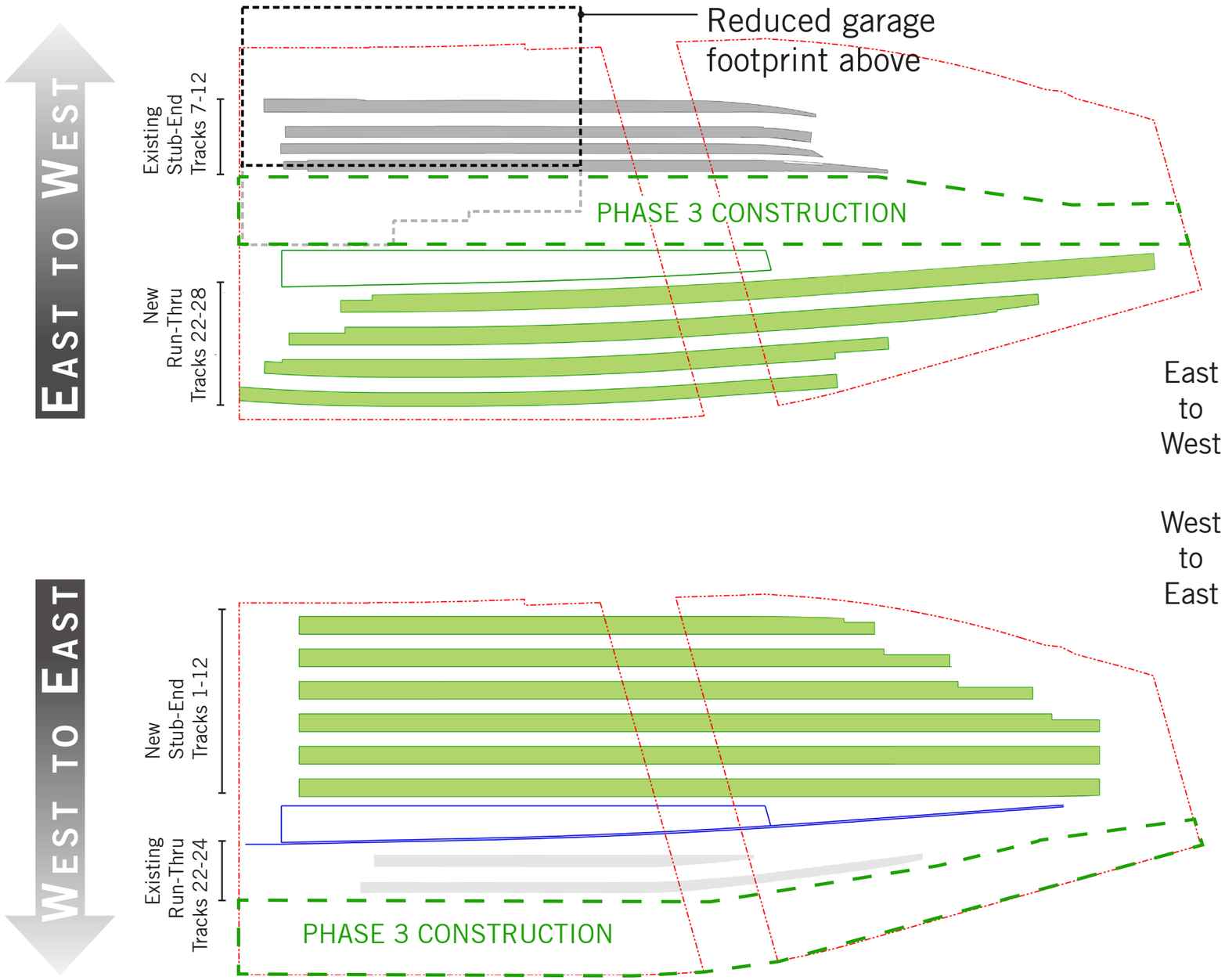
Track Availability During Phase 2 Construction

	Stub-End	Run-Through	Storage	Total
East to West	10	3	0	13
West to East	7	7	2	16

- New Platform in Service
- New Track in Service
- New Concourse
- Existing Platform in Service
- Existing Track in Service
- Existing Track Demo/ Removed from Service
- SOE line



Platform Edge Availability During Phase 3 Construction



New Platform in Service

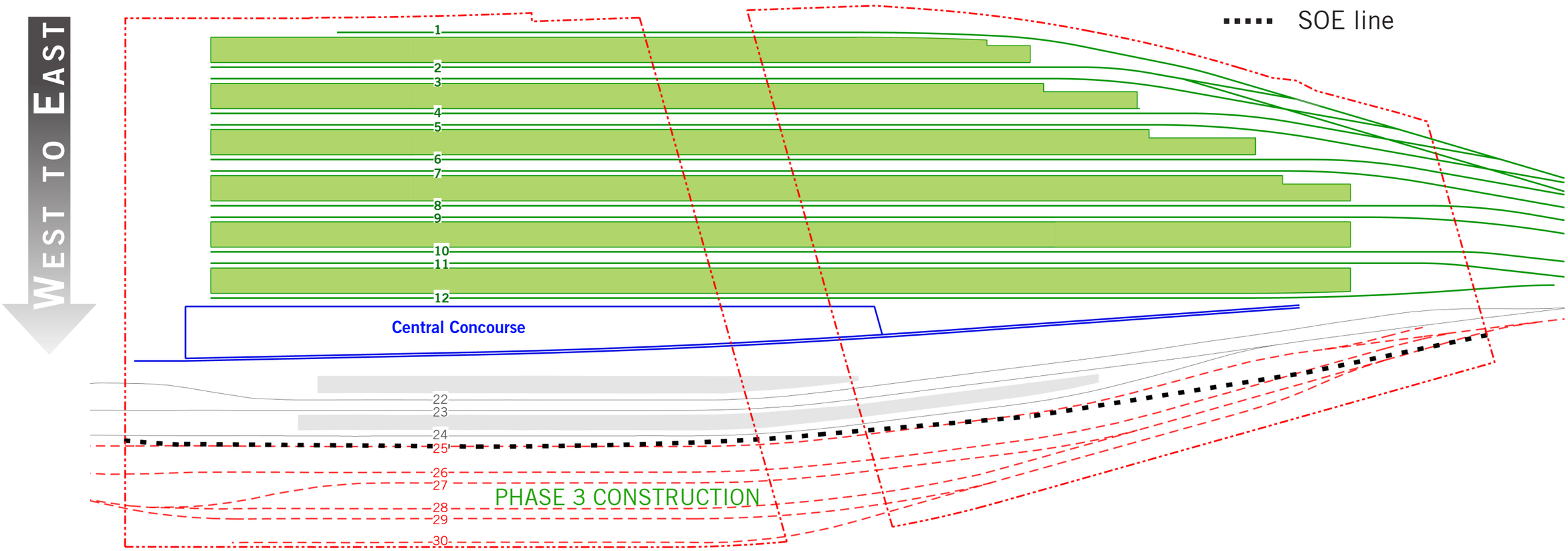
Existing Platform in Service

	Stub-End	Run-Through	Total
East to West	6	7	13
West to East	12	3	15

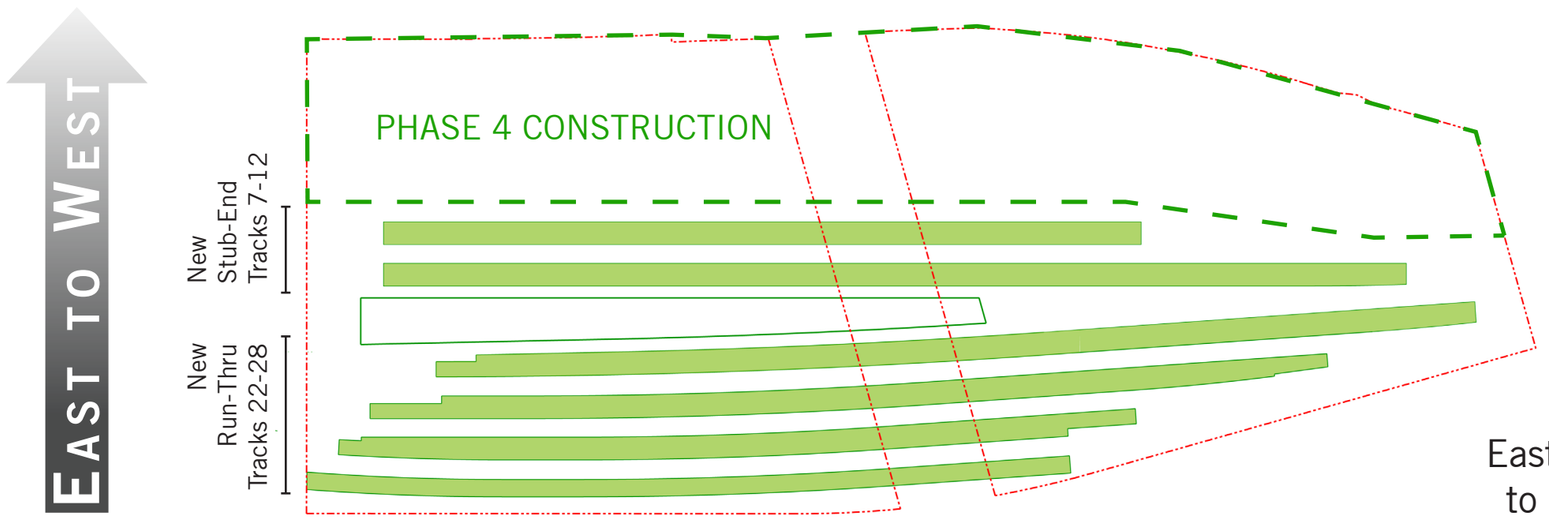
Track Availability During Phase 3 Construction

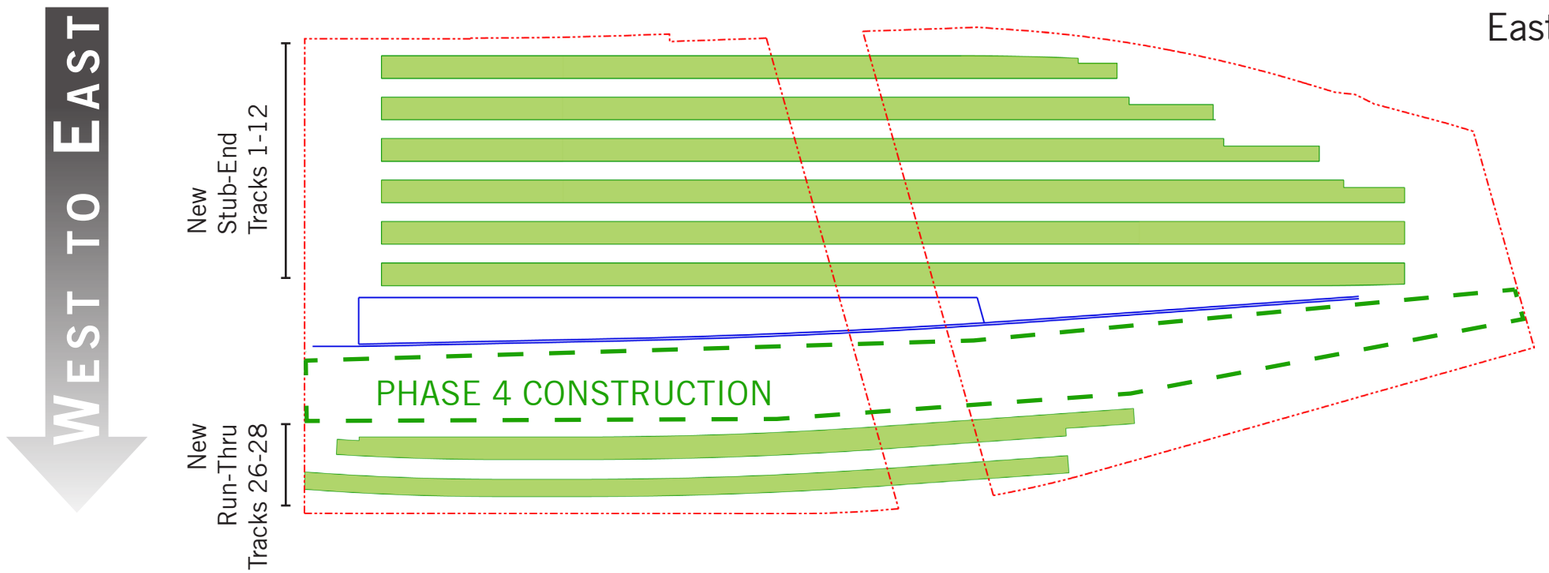
	Stub-End	Run-Through	Total
East to West	6	7	13
West to East	12	3	15

New Platform in Service
New Track in Service
New Concourse
Existing Platform in Service
Existing Track in Service
Existing Track Demo/ Removed from Service
SOE line



Platform Edge Availability During Phase 4 Construction





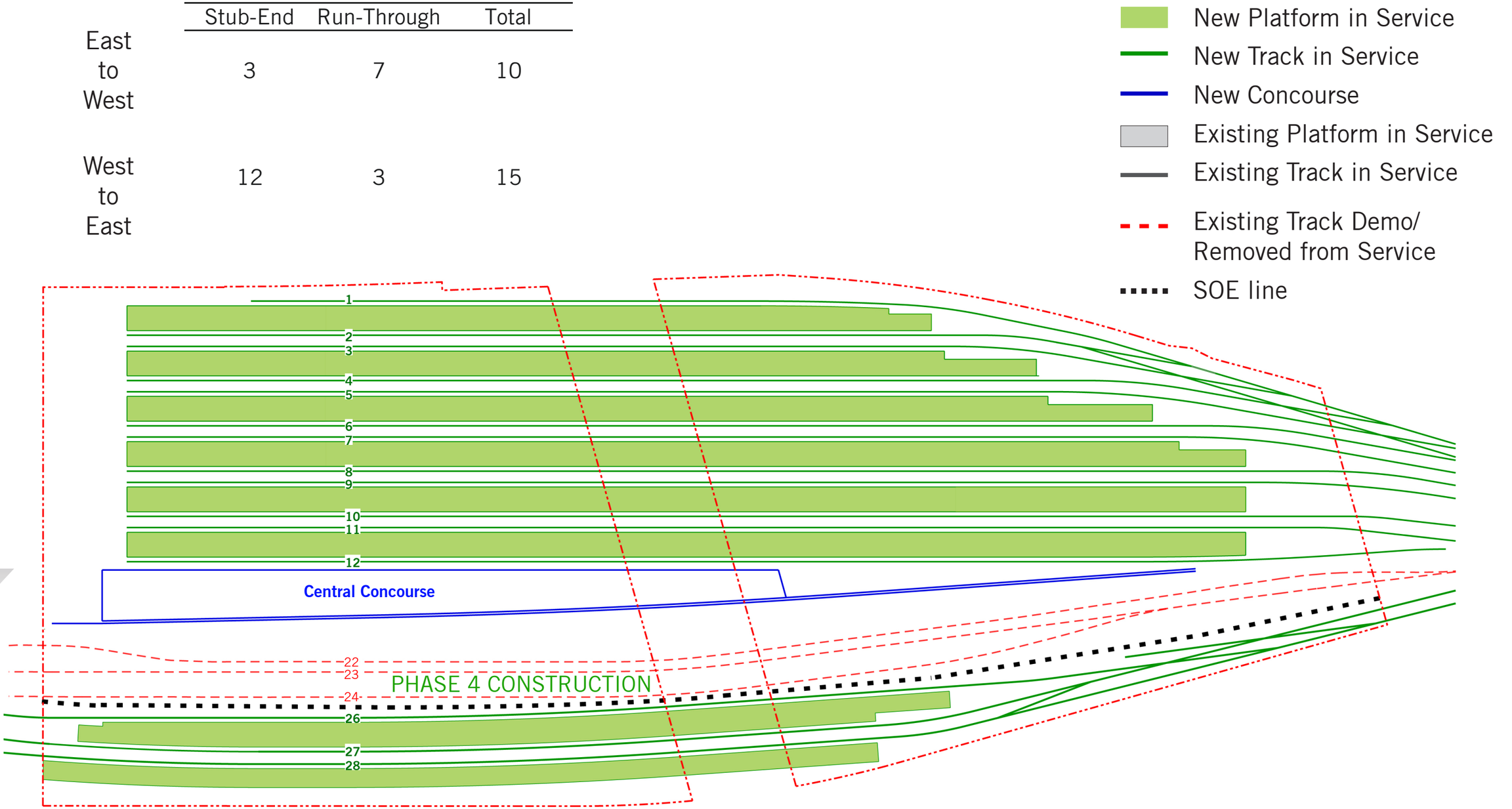
New Platform in Service

Existing Platform in Service

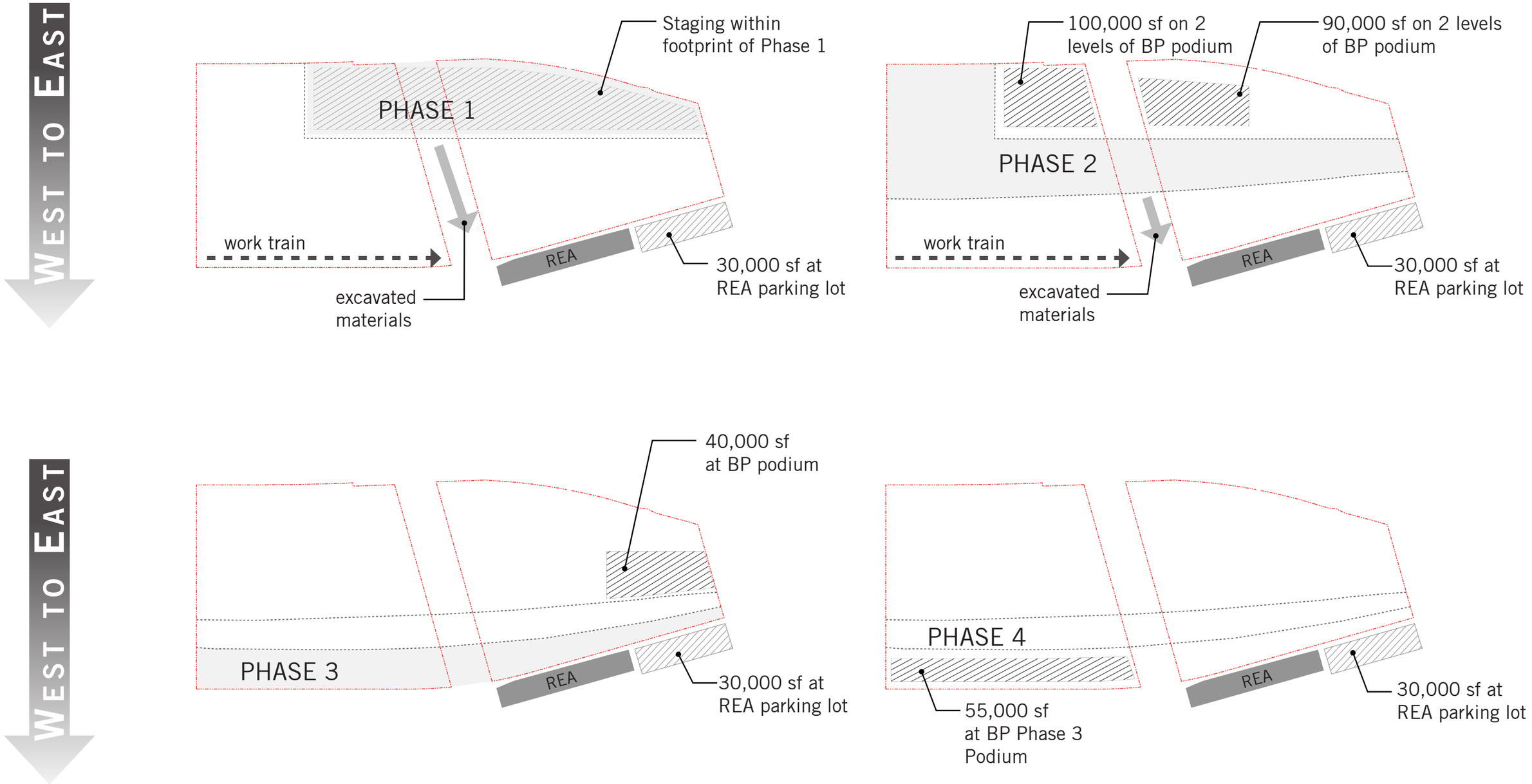
	Stub-End	Run-Through	Total
East to West	3	7	10
West to East	12	3	15

Track Availability During Phase 4 Construction

	Stub-End	Run-Through	Total
East to West	3	7	10
West to East	12	3	15



Construction Staging, Laydown, and Site Access



APPENDIX H2

SINGLE PHASE CONSTRUCTION

B U R N H A M P L A C E
&
W A S H I N G T O N U N I O N S T A T I O N

Single Phase Construction

APRIL 17, 2019

CONTENTS

A. EXECUTIVE SUMMARY

BASELINE Concept

FOUR-PHASE CONSTRUCTION EAST TO WEST

DURATION TOO LONG RESULTING IN:

1. Station / Neighborhood impacts too great
2. High construction cost escalation and risk
3. Station elements deliver in later phases
4. Burnham Place initial building deliveries occur after 11 years

AMTRAK CONSTRUCTABILITY REPORT

Extensive information, analysis and findings, including:

- Construction steps and operations defined
- Rates of production quantified
- Detailed schedules and costs reported

PROPOSED Concept

SINGLE PHASE CONSTRUCTION WEST TO EAST

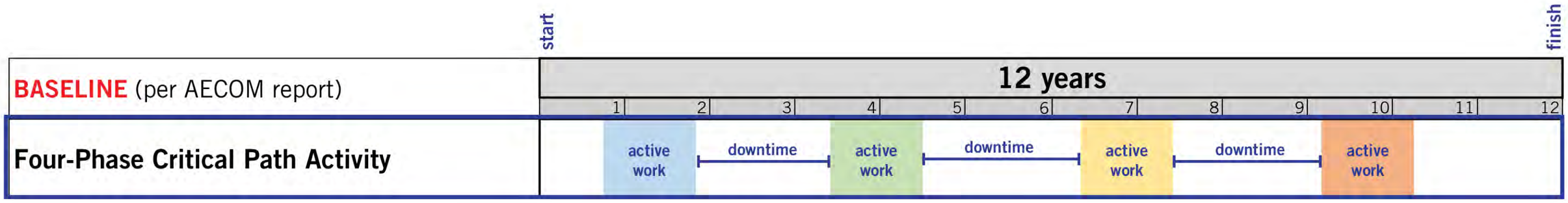
SIGNIFICANTLY REDUCED CONSTRUCTION DURATION RESULTING IN:

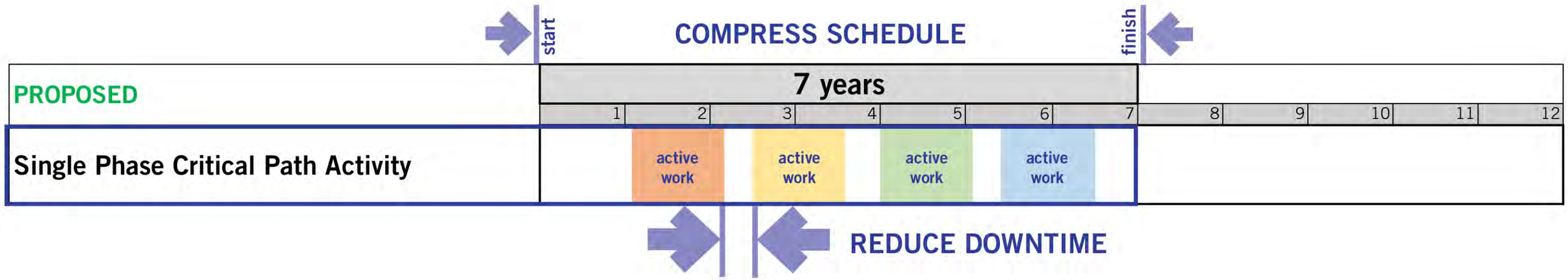
1. Station / Neighborhood impacts minimized
2. Construction cost risk diminished avoiding multiple billion dollar escalation
3. Station elements delivered dramatically earlier than East to West
4. Burnham Place buildings delivered 4-5 years earlier

SINGLE PHASE CONSTRUCTION WEST TO EAST PROPOSAL:

Reconstruct the terminal and build the Burnham Place deck in one SINGLE PHASE by drilling and excavating continuously

Single Phase Construction would reduce downtime - cutting the Station Expansion Project schedule by 5 years



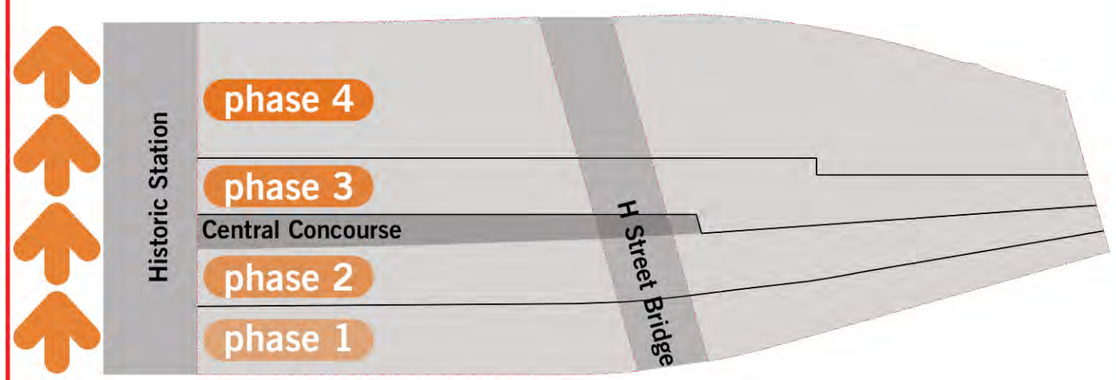


* East to West Phasing data per Amtrak's "WUS TI Construction Schedule_DRAFT 08212017"

Four separate construction projects transformed into one

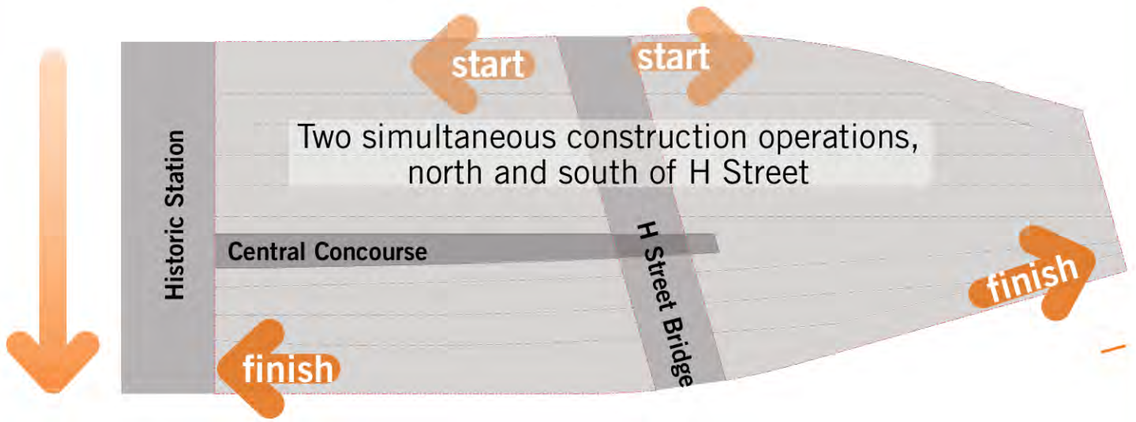
BASELINE

Four separate phases with no overlap



PROPOSED

One Continuous Phase



Benefits of the PROPOSED vs BASELINE concept:

Earlier Deliveries:

Years earlier	Program completed, operational and revenue-producing
5 years	All Tracks and Platforms
2 years	Acela Tracks 9-12 and Central Concourse
10 years	First Street Concourse
5 years	Main Concourse, H Street Concourse and Train Hall
5 years	Parking, Taxi and Bus

Project Advantages:

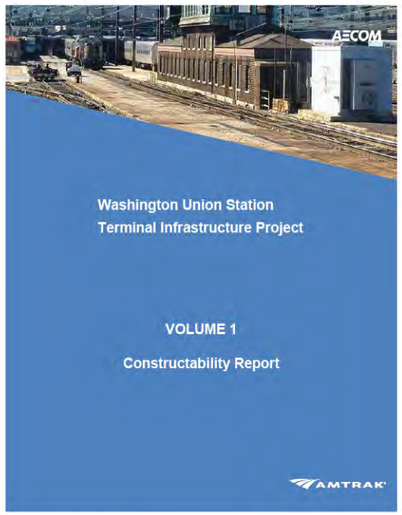
- Dramatically reduced passenger inconvenience and neighborhood impacts
- Political and financial feasibility increased
- Proposed concept maintains similar or greater number of tracks in service during construction

* East to West Phasing data per Amtrak's "WUS TI Construction Schedule_DRAFT 08212017"

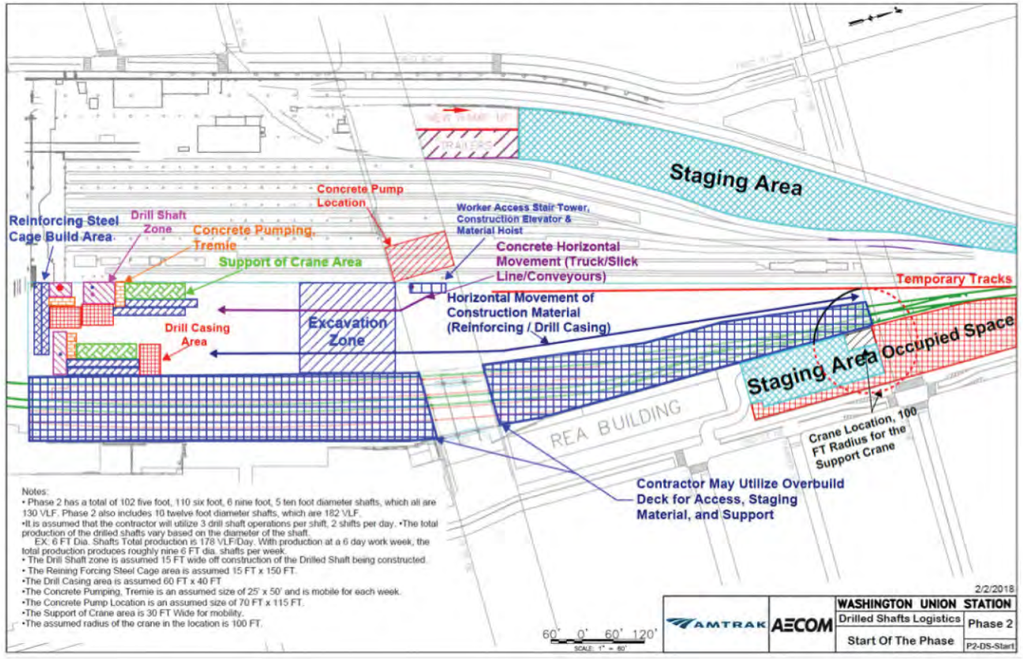
B. REVIEW

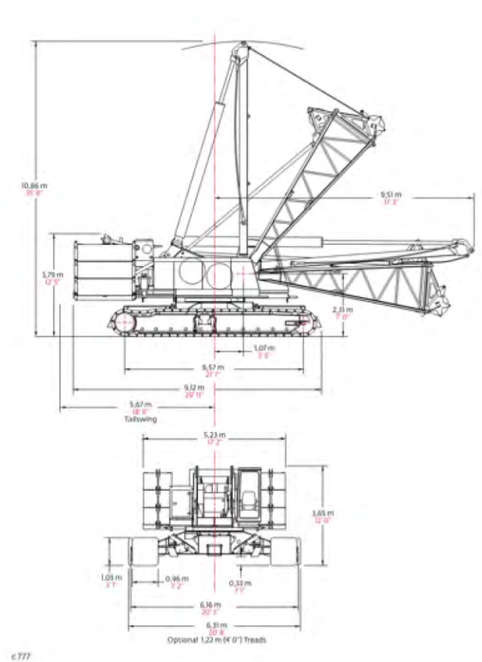
December 2018 Constructability Report provides extensive information, analysis, and findings:

- Construction steps and operations
- Equipment specifications
- Site utilization
- Rates of production
- Detailed schedules and costs
- Neighborhood impacts
- Temporary conditions and station operations



Equipment and Processes - Example:" Drilled Shafts





Constructability Report identifies a number of key and innovative construction techniques and methods:

1. Use of overbuild deck (p. IV-6)

The overbuild deck could simplify both construction and staging, and can be used for:

- Construction and assembly of reinforcing cages
- Crane support to lift in materials
- Concrete trucks and pumping equipment

2. Work trains (p. V-26)

- Offer a means of removing a large volume of excavation spoils
- Do not increase traffic, congestion, noise, or dust during construction
- More economical means of removing large quantities of soil and transporting long distances

3. Conveyor removal of spoils (p. V-13)

- Spoils can be removed to the H Street tunnel via high-speed, high-capacity conveyor belts

4. Precast construction components (p. V-27)

- Track girders and slabs could be prefabricated off-site in up to 60-foot long pieces

Constructability Report also Identifies Key Construction Challenges

1. Top-down construction drawbacks identified as (p. V-16)

- Low-profile equipment required for mining
- Excavation access through deck will conflict with train operations
- No concourse available for emergency egress

2. Crane sizes relative to construction zone areas in each phase (p. V-6, V-7)

- Large crane size (Manitowoc 16000) for slurry wall and drilled shaft rebar cages, sheet piles, and Burnham Place superstructure with boom lengths of up to 269' required in many cases
- Width of work zones can determine maximum crane sizes and pick radii, possibly eliminating use of large precast concrete elements

3. Conditions below H Street bridge require alternative SOE (p. V-27)

- Very limited vertical clearance available for driving sheet piles

C. SCHEDULE ANALYSIS

Table VI-19: Comparison of Alternative C & D Schedules

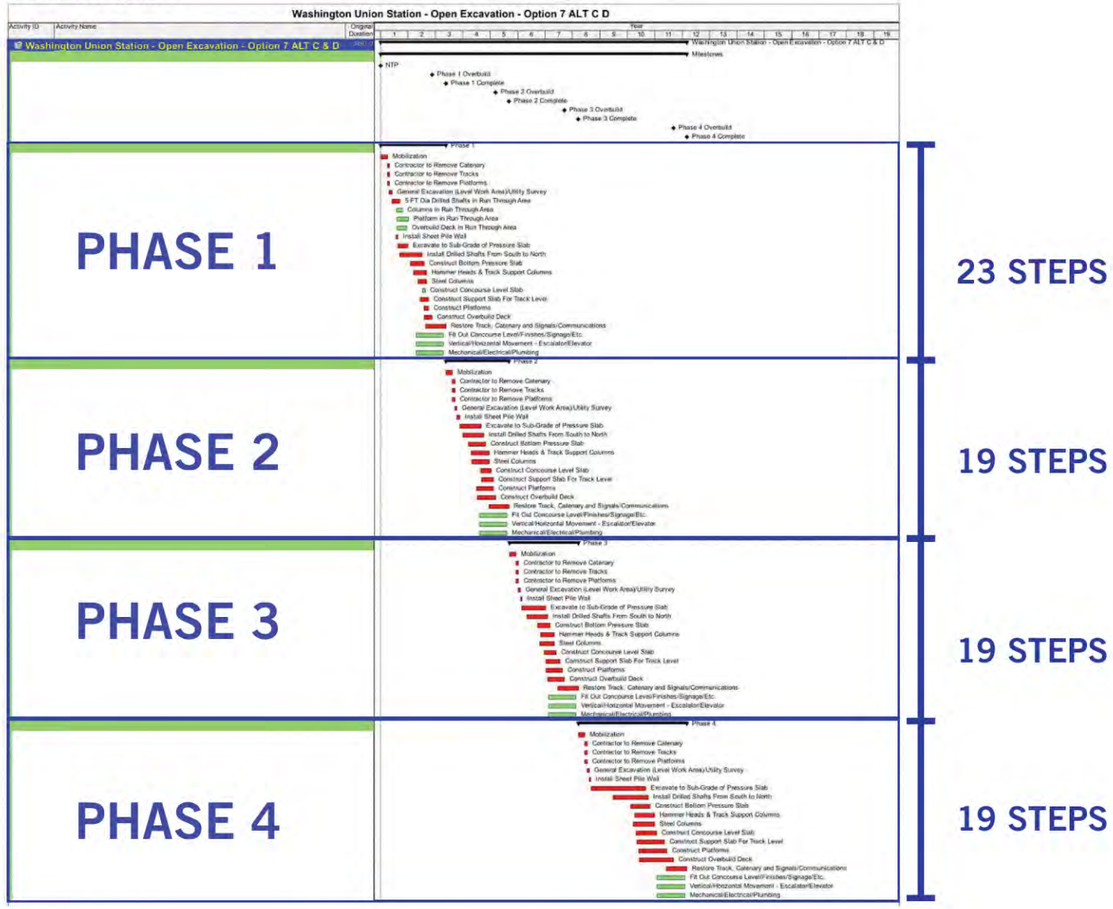
Phase	SOE Option 1	SOE Option 4	SOE Option 5	SOE Option 7	SOE Option 1	SOE Option 4	SOE Option 5	SOE Option 7
	Open Excavation				Top-Down Excavation			
Phase 1	2 yr., 5 mo.	2 yr., 5 mo.	2 yr., 5 mo.	2 yr., 5 mo.	2 yr., 5 mo.	2 yr., 5 mo.	2 yr., 5 mo.	2 yr., 5 mo.
Phase 2	2 yr., 9 mo.	2 yr., 6 mo.	2 yr., 4 mo.	2 yr., 3 mo.	2 yr., 9 mo.	2 yr., 6 mo.	2 yr., 4 mo.	2 yr., 3 mo.
Phase 3	2 yr., 7 mo.	2 yr., 7 mo.	2 yr., 6 mo.	2 yr., 6 mo.	2 yr., 4 mo.*	2 yr., 4 mo.*	2 yr., 4 mo.*	2 yr., 4 mo.*
Phase 4	4 yr., 2 mo.	4 yr., 0 mo.	4 yr., 0 mo.	4 yr., 0 mo.	3 yr., 5 mo.*	3 yr., 3 mo.*	3 yr., 2 mo.*	3 yr., 2 mo.*
Work after revenue service	n/a	n/a	n/a	n/a	2 yr., 8 mo.	2 yr., 8 mo.	2 yr., 8 mo.	2 yr., 8 mo.
Total Project Completion	11 yr., 11 mo.	11 yr., 6 mo.	11 yr.,3 mo.	11 yr., 2 mo.	14 yr., 5 mo.	13 yr., 2 mo.	12 yr., 11 mo.	12 yr., 10 mo.
Midpoint	5 yr., 11.5 mo.	5 yr., 9 mo.	5 yr., 7.5 mo.	5 yr., 7 mo.	7 yr., 2.5 mo.	6 yr., 7 mo.	6 yr., 5.5 mo.	6 yr., 5 mo.

*Track restored to service while levels below the track slab are still under construction

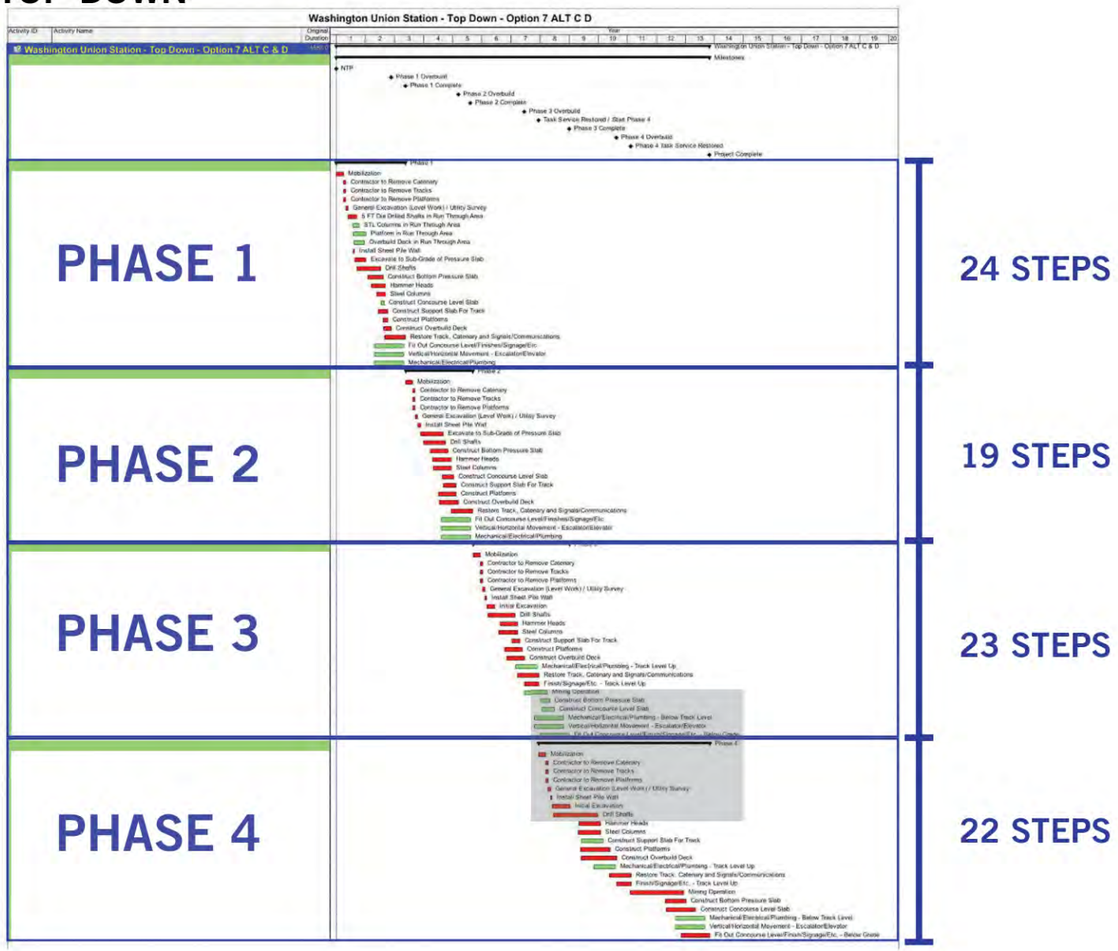
- Individual construction schedules were created for the five EIS Alternatives
- Open cut and top-down methods analyzed
- Schedule durations primarily dependent on overall extent of excavation
- Alternatives C&D utilized for baseline in this analysis

Alternatives C/D Schedule in Constructability Report

OPEN CUT



TOP-DOWN



- Repetitive construction activities
- Minimal overlap

Construction Stage Descriptions

Construction Activity per Constructability Report	Consolidated Construction Steps
1 Mobilization 2 Contractor to Remove Catenary 3 Contractor to Remove Tracks 4 Contractor to Remove Platforms 5 General Excavation (Level Work Area)/Utility Survey 6 Install Slurry & Secant Wall	1 Mobilization, Demolition, and Slurry Walls
7 Install Sheet Pile Wall 8 Initial Excavation	2 Initial Excavation and Support of Excavation
9 Drilled Shafts	3 Drilled Shafts
10 Hammer-heads 11 Steel Columns 12 Construct Support Slab for Track 13 Construct Platforms	4 Hammer-heads, Track and Platform Support Columns
14 Construct Overbuild Deck	5 Air rights Structure and Deck Slab
15 MEP - Track Level Up 16 Restore Track, Catenary and Signals 17 Fit Out Track Level Up	6 Catenary, Track, and Signals
18 Mining Operation 19 Construct Bottom Pressure Slab 20 Construct Concourse Level Slab	7 Mining Operation and Below-track Construction
21 MEP - Below Track Level 22 VCE's 23 Fit Out Concourse Level	8 Remainder of below-track spaces finish and fit-out
	9 Concourse H (Special Condition)

Constructability Report Schedule for Alternatives C/D Open-cut East to West

Open Cut E/W (EIS Alternatives C and D) per AECOM Report

12 YEARS

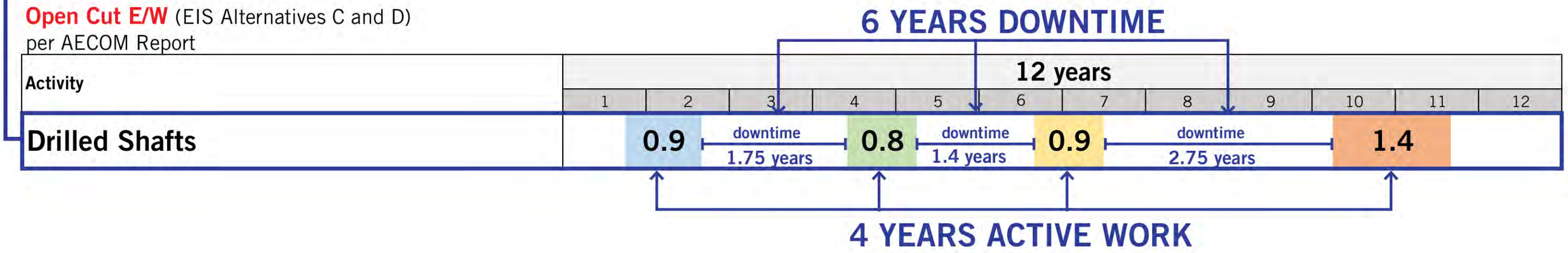
	1	2	3	4	5	6	7	8	9	10	11	12
Activity - Phase 1	PHASE 1											
Mobilization and Demolition / Slurry Wall / SOE / Sheet Pile Wall	0.7											
Excavation	0.4											
Drilled Shafts and Bottom Pressure Slab	0.9											
Hammerheads/Track Support Columns/Steel Columns	0.5											
Concourse Level Slab, Platforms & Track Support Slab	0.3											
Air Rights Deck	0.3											
Track, Catenary, and Signals	0.7											
Concourse Fit-out/VCEs/MEP	1.0											
Activity - Phase 2			PHASE 2									
Mobilization and Demolition / Slurry Wall / SOE / Sheet Pile Wall			0.8									
Excavation				0.8								
Drilled Shafts and Bottom Pressure Slab				0.8								
Hammerheads/Track Support Columns/Steel Columns				0.6								
Concourse Level Slab, Platforms & Track Support Slab				0.6								
Air Rights Deck				0.7								
Track, Catenary, and Signals				0.7								
Concourse Fit-out/VCEs/MEP				1.0								
Activity - Phase 3						PHASE 3						
Mobilization and Demolition / Slurry Wall / SOE / Sheet Pile Wall						0.5						
Excavation						0.9						
Drilled Shafts and Bottom Pressure Slab						0.9						
Hammerheads/Track Support Columns/Steel Columns						0.5						
Concourse Level Slab, Platforms & Track Support Slab						0.7						
Air Rights Deck						0.6						
Track, Catenary, and Signals						0.7						
Concourse Fit-out/VCEs/MEP						1.0						
Activity - Phase 4									PHASE 4			
Mobilization and Demolition / Slurry Wall / SOE / Sheet Pile Wall									0.9			
Excavation										2.0		
Drilled Shafts and Bottom Pressure Slab										1.4		
Hammerheads/Track Support Columns/Steel Columns										0.8		
Concourse Level Slab, Platforms & Track Support Slab										1.2		
Air Rights Deck										1.2		
Track, Catenary, and Signals											0.7	
Concourse Fit-out/VCEs/MEP											1.0	

Constructability Report Schedule for Alternatives C/D Open-cut East to West

Open Cut E/W (EIS Alternatives C and D)
per AECOM Report

Activity	12 years											
	1	2	3	4	5	6	7	8	9	10	11	12
Mobilization and Demolition / Slurry Wall / SOE	0.7		0.8			0.5			0.9			
Excavation		0.4		0.8			0.9			2.0		
Drilled Shafts and Bottom Pressure Slab		0.9		0.8			0.9			1.4		
Hammerheads/Track Support Columns/Steel Columns		0.5			0.6			0.5			0.8	
Concourse Level Slab, Platforms & Track Support Slab		0.3			0.6			0.7			1.2	
Air Rights Deck		0.3			0.7			0.6			1.2	
Track, Catenary, and Signals		0.7			0.7			0.7				0.7
Concourse Fit-out/VCEs/MEP		1.0			1.0			1.0				1.0

Open Cut E/W (EIS Alternatives C and D)
per AECOM Report



* Calendar graphically reorganized to highlight durations of individual operations; overall durations for combined operations match constructability report

Proposed Schedule for Alternatives C/D Single Phase Construction (West to East)

Single Phase W/E (EIS Alternatives C and D)

Activity	7 years											
	1	2	3	4	5	6	7	8	9	10	11	12
Mobilization and Demolition / Slurry Wall / SOE	0.9		0.5									
Excavation	1.3		1.0		0.6		0.3					
Drilled Shafts, Concourse Level Slab		0.8	1.2		1.1		0.9					
Hammerheads / Track Support and Steel Columns		1.1	1.3		1.3		1.0					
Air Rights Deck		1.0	1.3		1.3		1.1					
Track, Catenary, and Signals		0.8	1.3		1.3		1.0					
Mining Operation						1.3						
Parking Level Fit-out						1.3						

1 YEAR DOWNTIME

Single Phase W/E (EIS Alternatives C and D)

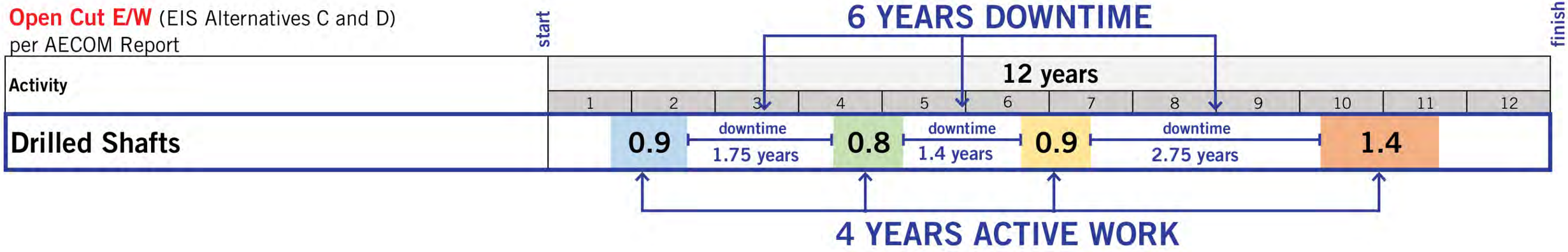
Activity	7 years											
	1	2	3	4	5	6	7	8	9	10	11	12
Drilled Shafts		**0.8**	**1.2**		**1.1**		**0.9**					

4 YEARS ACTIVE WORK

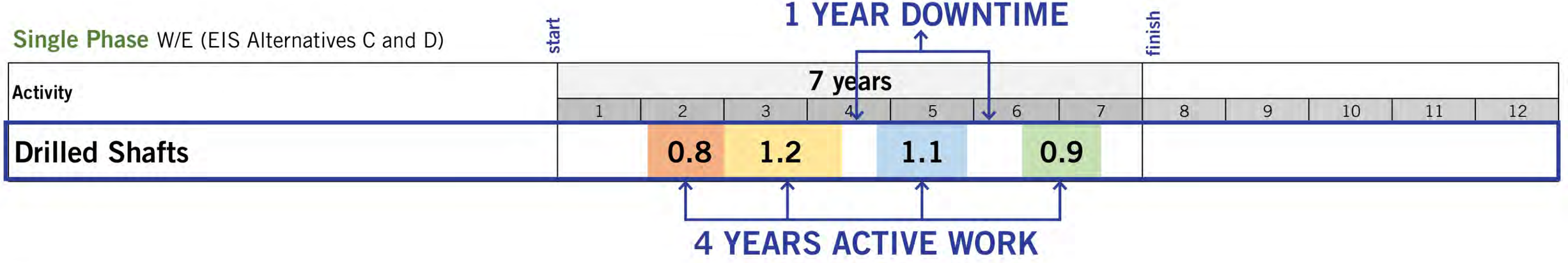
C. SCHEDULE ANALYSIS

DRILLED SHAFTS SCHEDULE COMPARISON

Open Cut E/W (EIS Alternatives C and D)
per AECOM Report



Single Phase W/E (EIS Alternatives C and D)



ADVANTAGES:

- Continuous production of critical path components and increased production rates can shorten the project schedule
- Eliminating mobilization and demobilization activities would speed construction and improve efficiency

D. PROPOSAL

Proposal:

Reconstruct the terminal and build the Burnham Place deck in one SINGLE PHASE by drilling and excavating continuously

1. Key Concepts
2. Steps in the Construction Process
3. Site Application
4. Additional Construction Considerations

WHAT

1. Utilize “assembly line” construction concept to achieve continuous production of all project components for: demolition, excavation, drilled shafts, tracks and platforms, etc.
2. Complete First Street Concourse at beginning and H Street Concourse incrementally for passenger egress

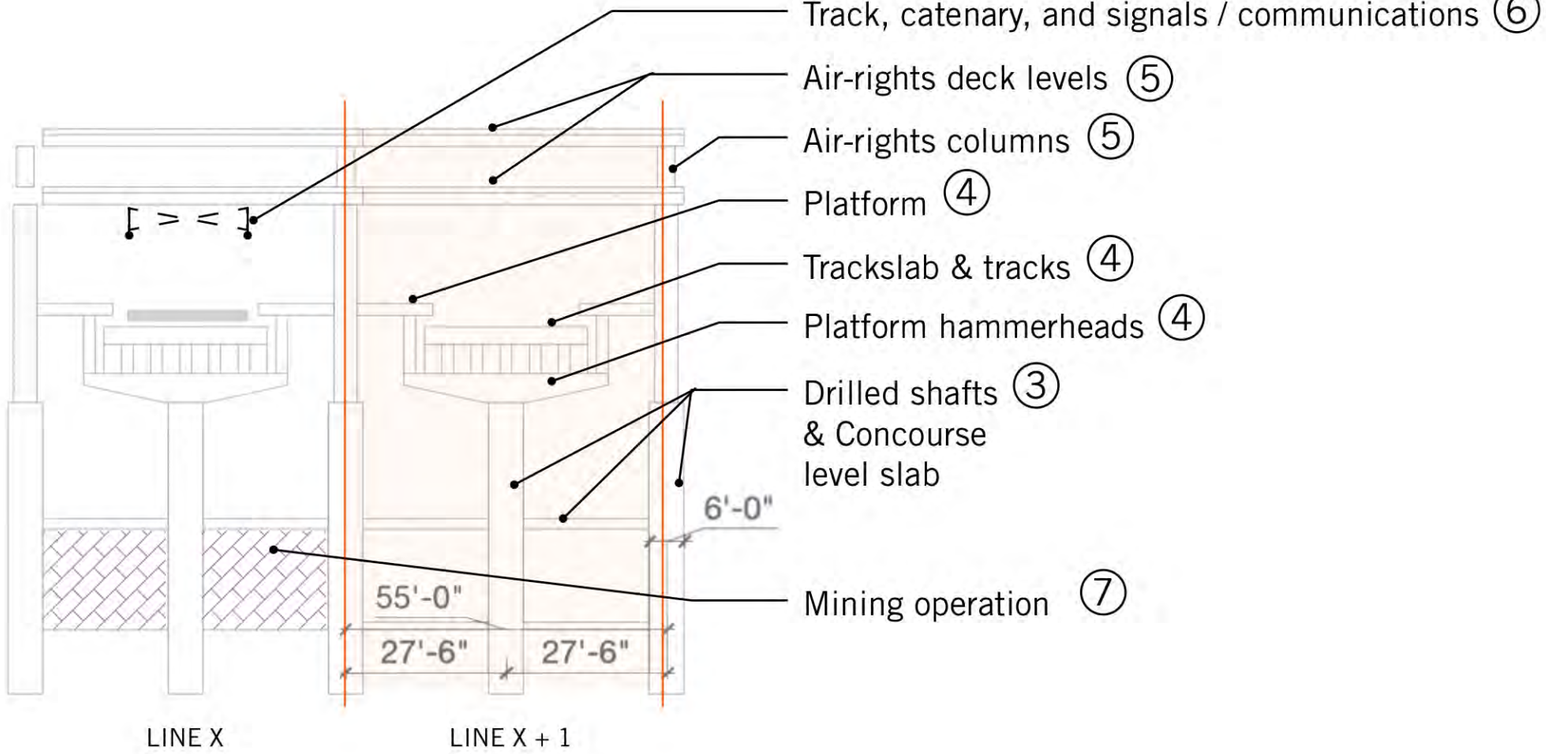
HOW

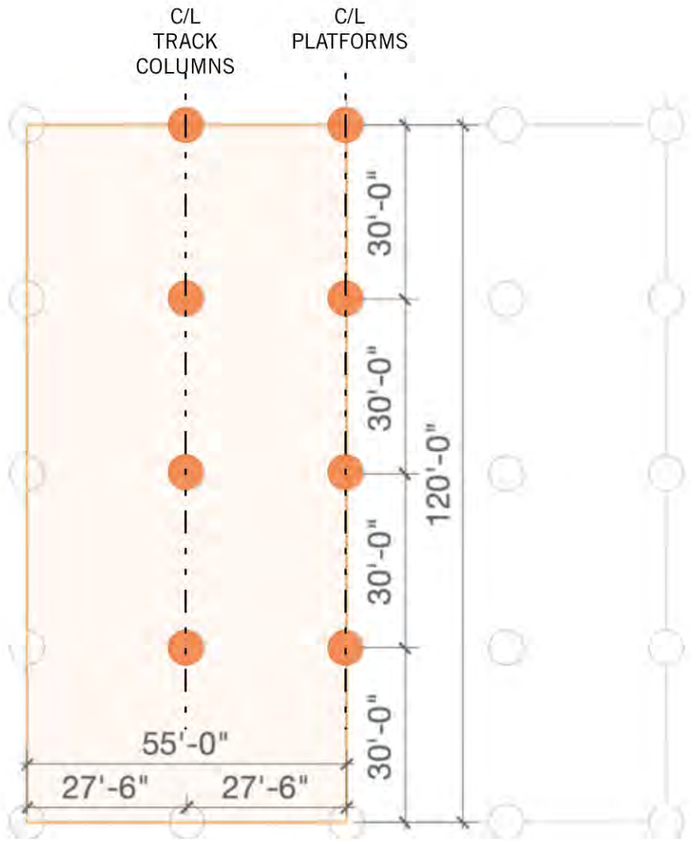
1. Employ open cut to concourse level and Top-down/”Side-out” for below parking level(s)
2. Remove spoils to the side (laterally), not up through rail platforms
3. Work concurrently and in parallel north and south of H Street to maximize rates of production
4. Utilize BP deck for construction staging and lay-down, materials delivery, crane operations, slurry operation, and concrete deliveries
5. Place two new tracks/one platform in service at a time, and remove two existing tracks correspondingly

2. Steps in the Construction Process

	Construction Activity per Constructability Report		Consolidated Construction Steps	Deviations from Constructability Report Sequence Assumptions
1	Mobilization			
2	Contractor to Remove Catenary			
3	Contractor to Remove Tracks	→	1 Mobilization, Demolition, and Slurry Walls	Slurry wall construction staged and located to occur simultaneously with drilled shaft production.
4	Contractor to Remove Platforms			
5	General Excavation (Level Work Area)/Utility Survey			
6	Install Slurry & Secant Wall			
7	Install Sheet Pile Wall	→	2 Initial Excavation and Support of Excavation	SOE minimized or eliminated by using lay-back in many locations, depending on depth of excavation and location of work trains
8	Initial Excavation			
9	Drilled Shafts	→	3 Drilled Shafts	Continuous operation of four drill rigs
10	Hammer-heads			
11	Steel Columns	→	4 Hammer-heads, Track and Platform Support Columns	Sequencing organized to facilitate initiating air rights deck construction and track installation
12	Construct Support Slab for Track			
13	Construct Platforms			
14	Construct Overbuild Deck	→	5 Air rights Structure and Deck Slab	Structural capacity of air-rights deck enhanced to support large cranes - or use of temporary crane supports
15	MEP - Track Level Up			
16	Restore Track, Catenary and Signals	→	6 Catenary, Track, and Signals	Critical path item requires study for use in single-phase concept
17	Fit Out Track Level Up			
18	Mining Operation			
19	Construct Bottom Pressure Slab	→	7 Mining Operation and Below-track Construction	Spoils extraction to be accomplished laterally, utilizing existing portions of H Street underpass, and removing spoils by truck or conveyor from west to east
20	Construct Concourse Level Slab			
21	MEP - Below Track Level			
22	VCE's	→	8 Remainder of below-track spaces finish and fit-out	Remainder of non-concourse below-track spaces including parking, retail, Amtrak support spaces constructed during/upon completion of mining operation
23	Fit Out Concourse Level			
			9 Concourse H (Special Condition)	H Street Concourse constructed using open cut construction simultaneously with Steps 1 through 6 above

2. Steps in the Construction Process
Unit of Production - Modular Component



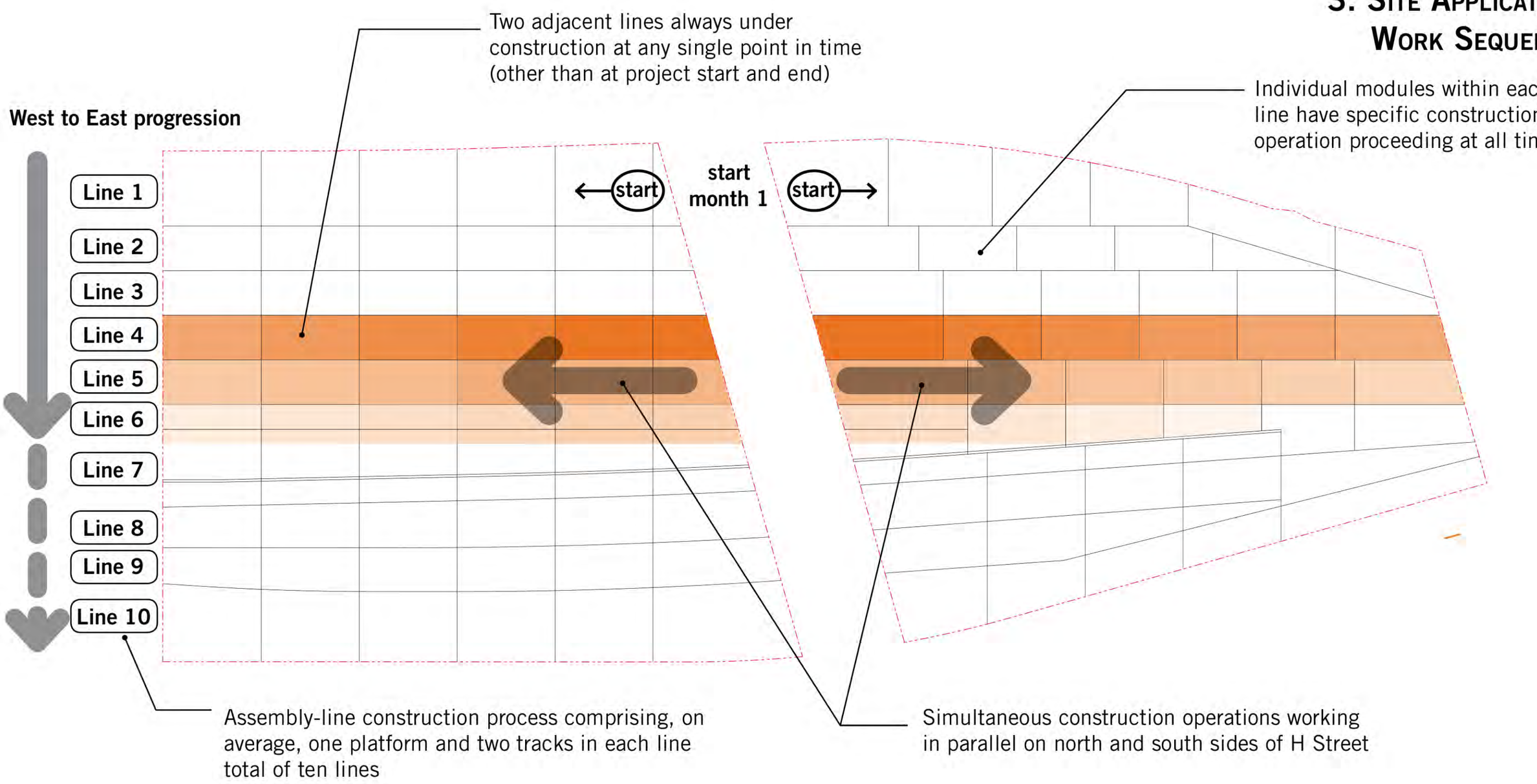


- Initial concept organizes all construction activities to a one-month rate of production
- Rate of production for drilled shafts determines critical path
- On average, eight drilled shafts can be completed in one month per Constructability Report - but higher production rate is potentially feasible
- Remaining construction processes scheduled to follow drilled shaft rate of production
- Two 55’ x 120’ modules completed per month, one each on north and south sides of H Street

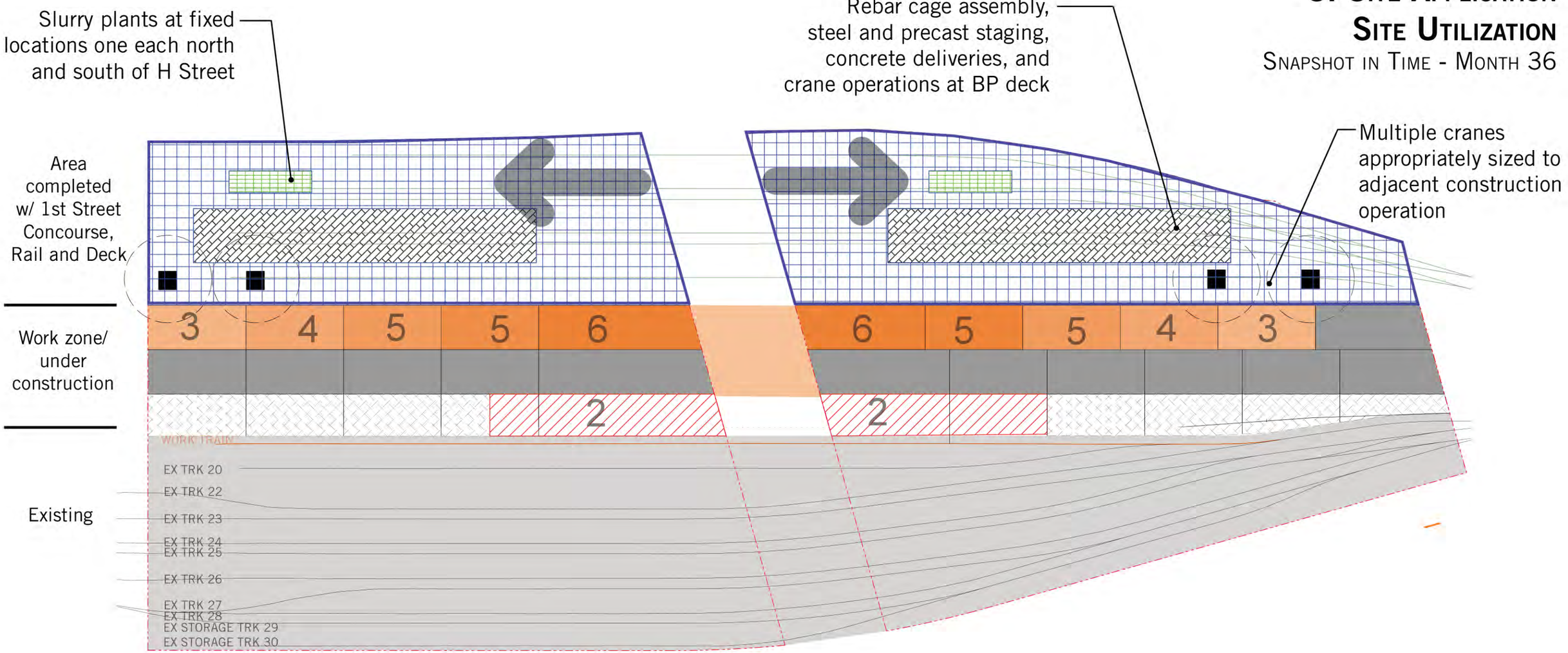
Animation Pt. 1

Single Phase - Typical Construction Steps

3. SITE APPLICATION WORK SEQUENCE



3. Site Application
Site Utilization
Snapshot in Time - Month 36



Construction steps

Zone excavated to el. 20'

Excavation zone

Mobilization/Demolition

Existing conditions

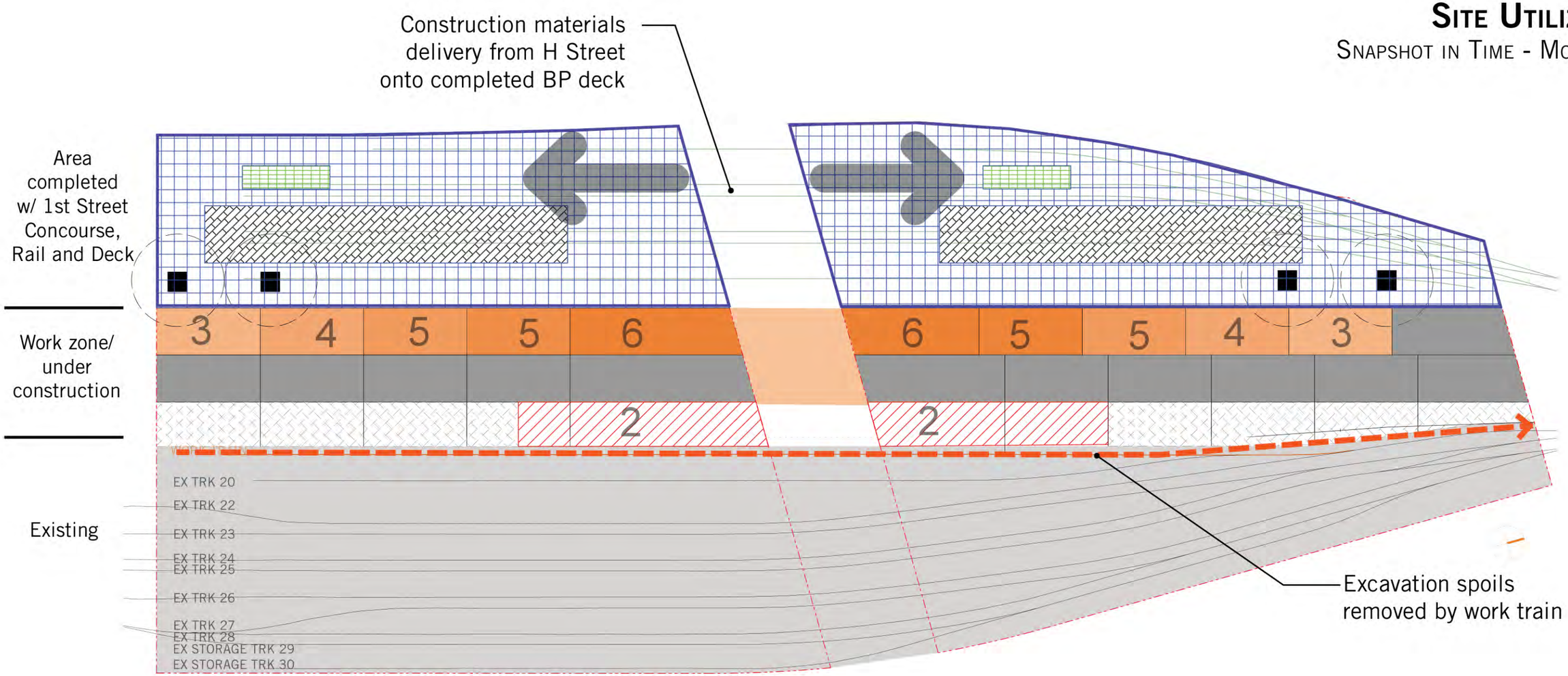
Crane location, 100 FT radius for the support crane

Reinforcing steel cage build area

BP overbuild deck

Slurry plant

* BP parking level (below deck) available for construction offices, construction parking, slurry plant, etc.



Construction steps

Zone excavated to el. 20'

Excavation zone

Mobilization/Demolition

Existing conditions

Crane location, 100 FT radius for the support crane

Reinforcing steel cage build area

BP overbuild deck

Slurry plant

* BP parking level (below deck) available for construction offices, construction parking, slurry plant, etc.

Animation Pt. 2

Single Phase - Project Sequence

Constructability Report Assumptions Consistent with Single Phase Concept:

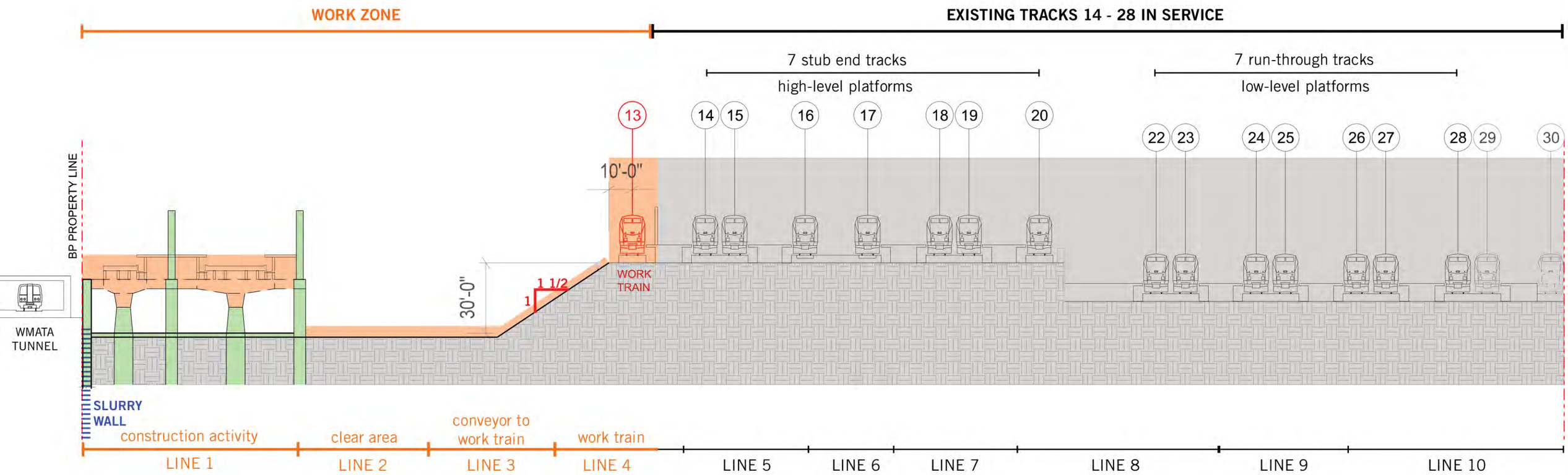
- Use of precast concrete hammerheads and track support girders
- Rates of production for excavation, slurry and secant walls, drilled shafts, and structural slabs
- Assumed rates of production for remaining elements per Constructability Report detailed schedules
- Crane and drill rig sizes
- Slurry wall and drilled shafts dimensions and depths
- Slurry wall and drilled shafts rebar cage sizes and potential for vertical splicing
- Minimum 10’ offset from centerline of track to SOE
- 1-1/2 horizontal to 1 vertical layback
- Minimum 18’ offset from centerline of track to centerline drilled shaft

Deviations from Constructability Report:

- Construction sequence
- Top-down mining sequence and spoils extraction routes
- Use of rakers to brace west slurry wall SOE as opposed to tie-backs
- Work train locations
- Construction staging and lay-down locations
- 30’ depth of initial excavation to top of drilled shafts

D. PROPOSAL

3. SITE APPLICATION: PROGRESSION ACROSS SITE
LINES 1/2/3/4 - MONTH 17



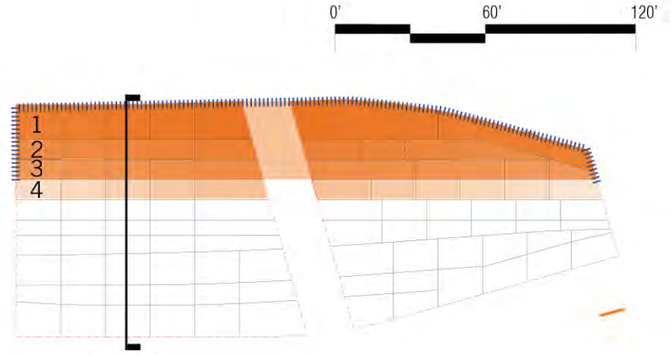
Existing conditions

Mining operation

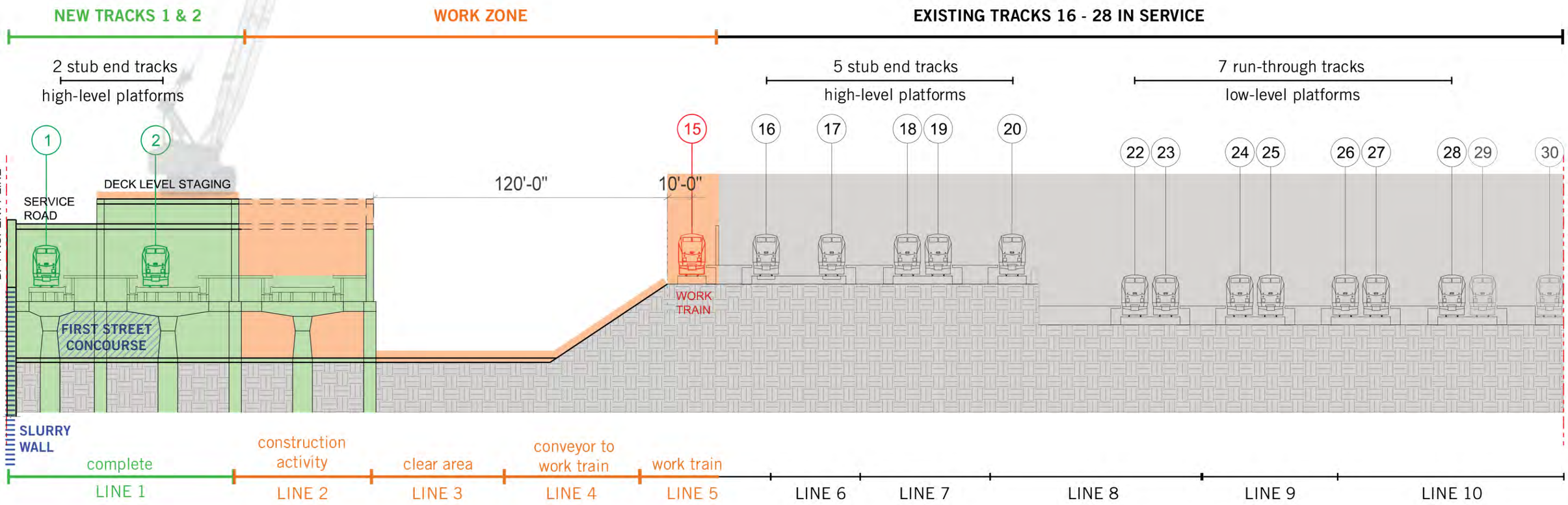
Work zone

Completed

* Spoils removed by work train by means of conveyor system.



3. SITE APPLICATION: PROGRESSION ACROSS SITE
LINES 2/3/4/5 - MONTH 24

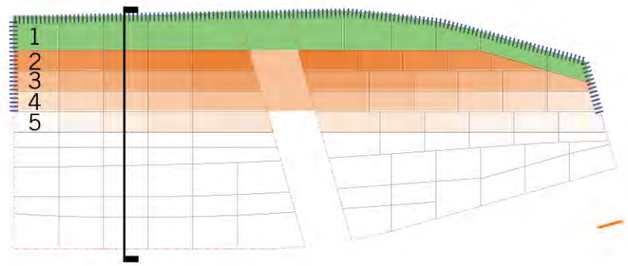


Existing conditions

Mining operation

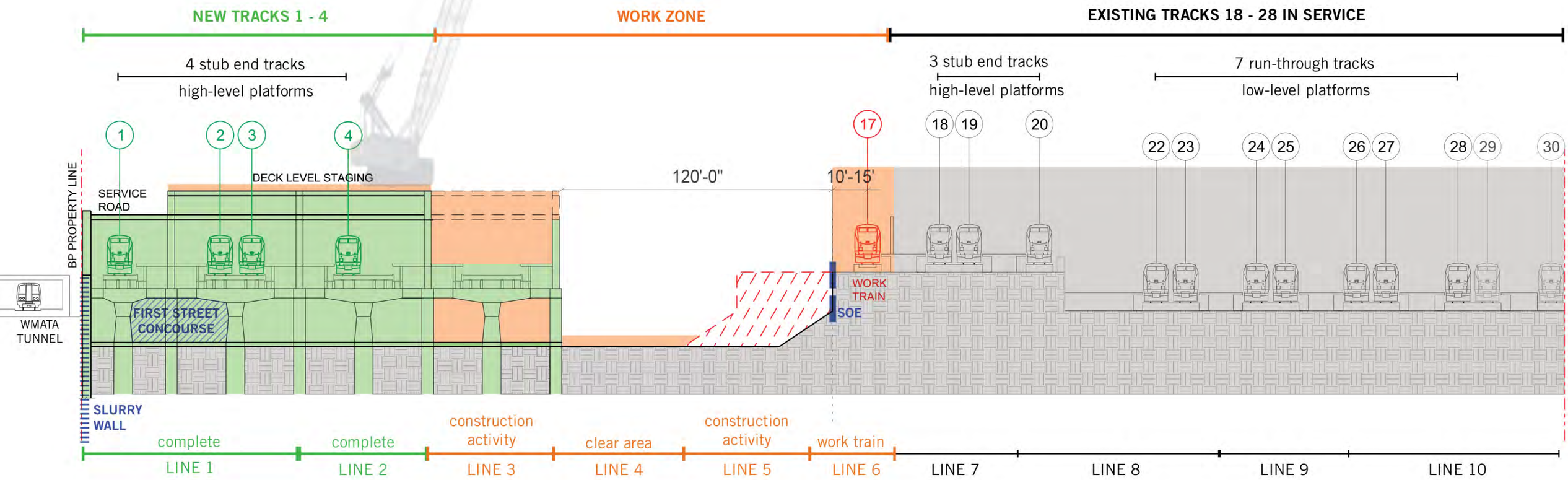
Work zone

Completed



D. PROPOSAL

3. SITE APPLICATION: PROGRESSION ACROSS SITE
LINES 3/4/5/6 - MONTH 30

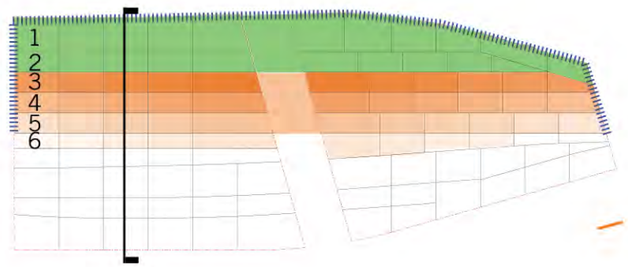


Existing conditions

Mining operation

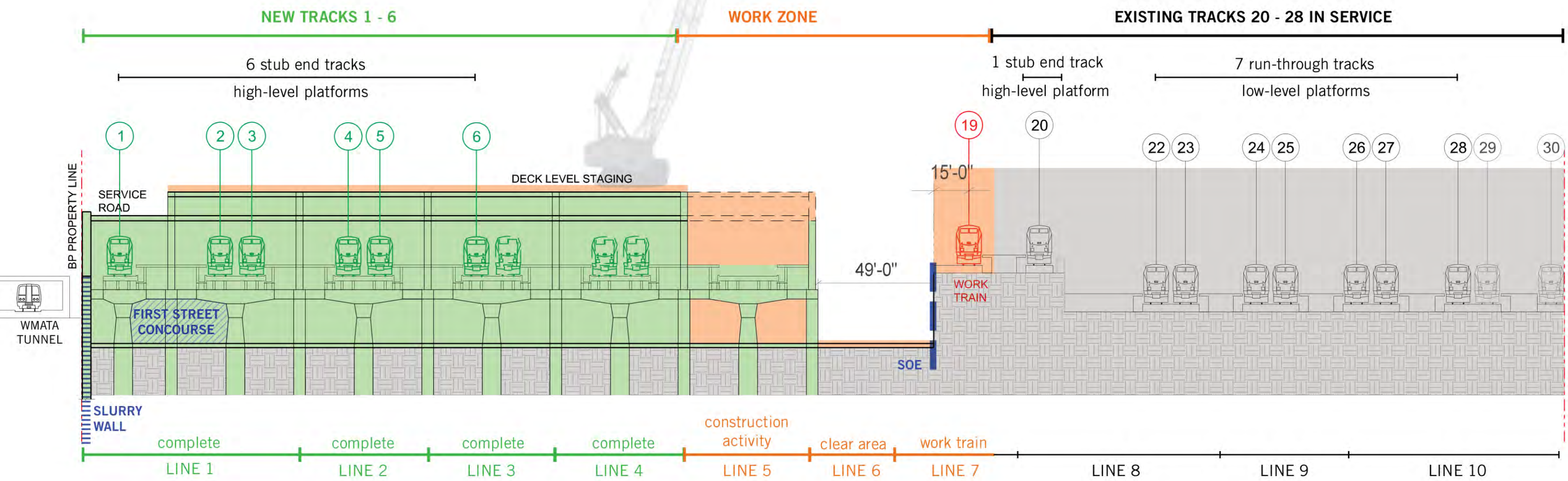
Work zone

Completed



D. PROPOSAL

3. SITE APPLICATION: PROGRESSION ACROSS SITE
LINES 5/6/7 - MONTH 39

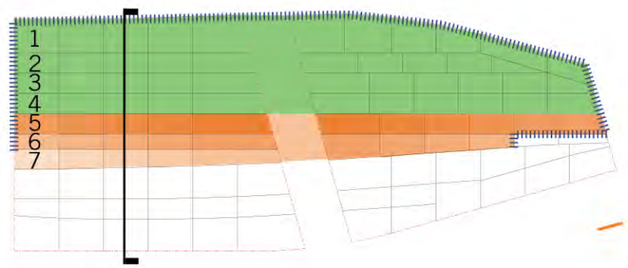


Existing conditions

Mining operation

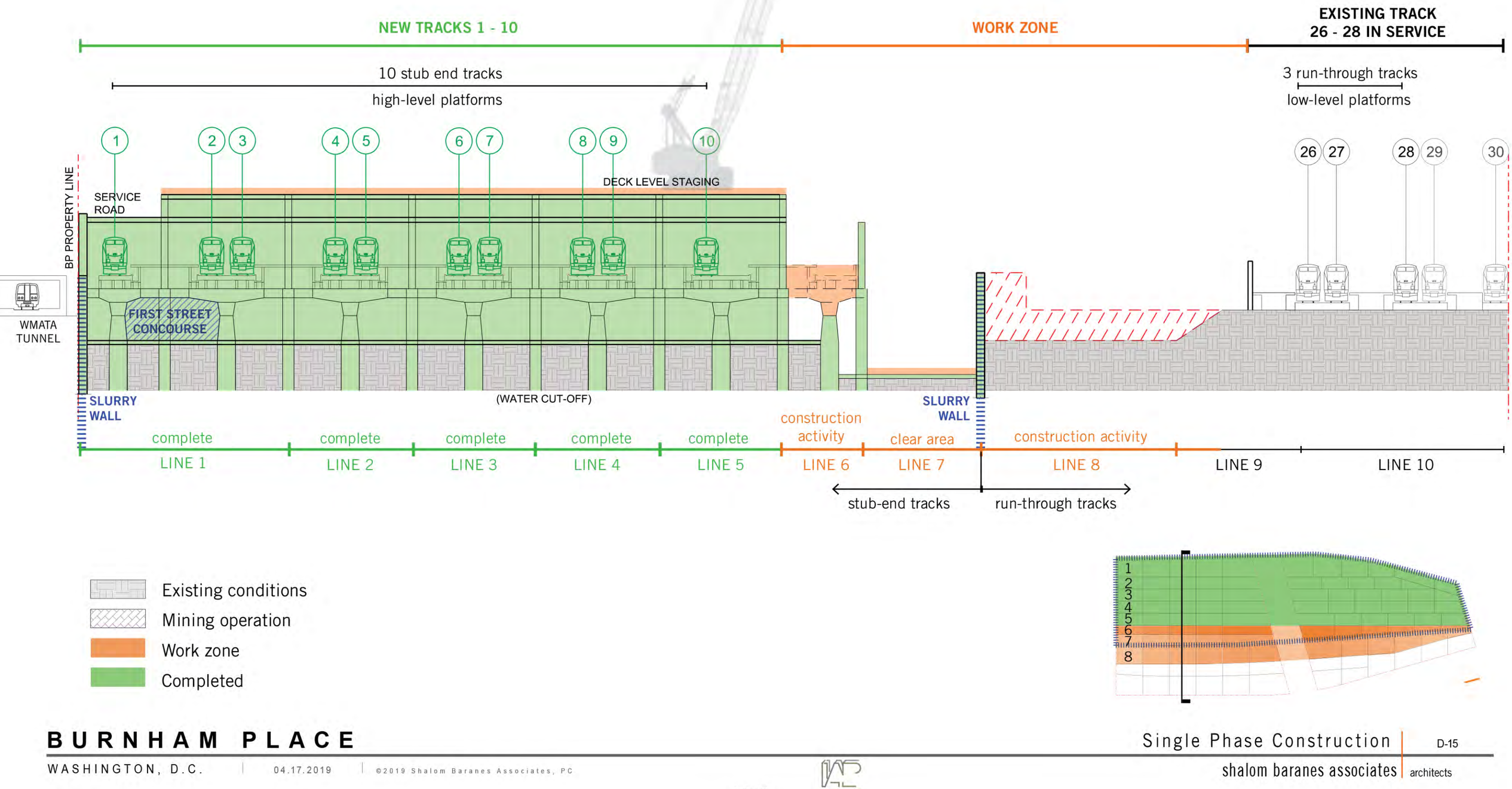
Work zone

Completed



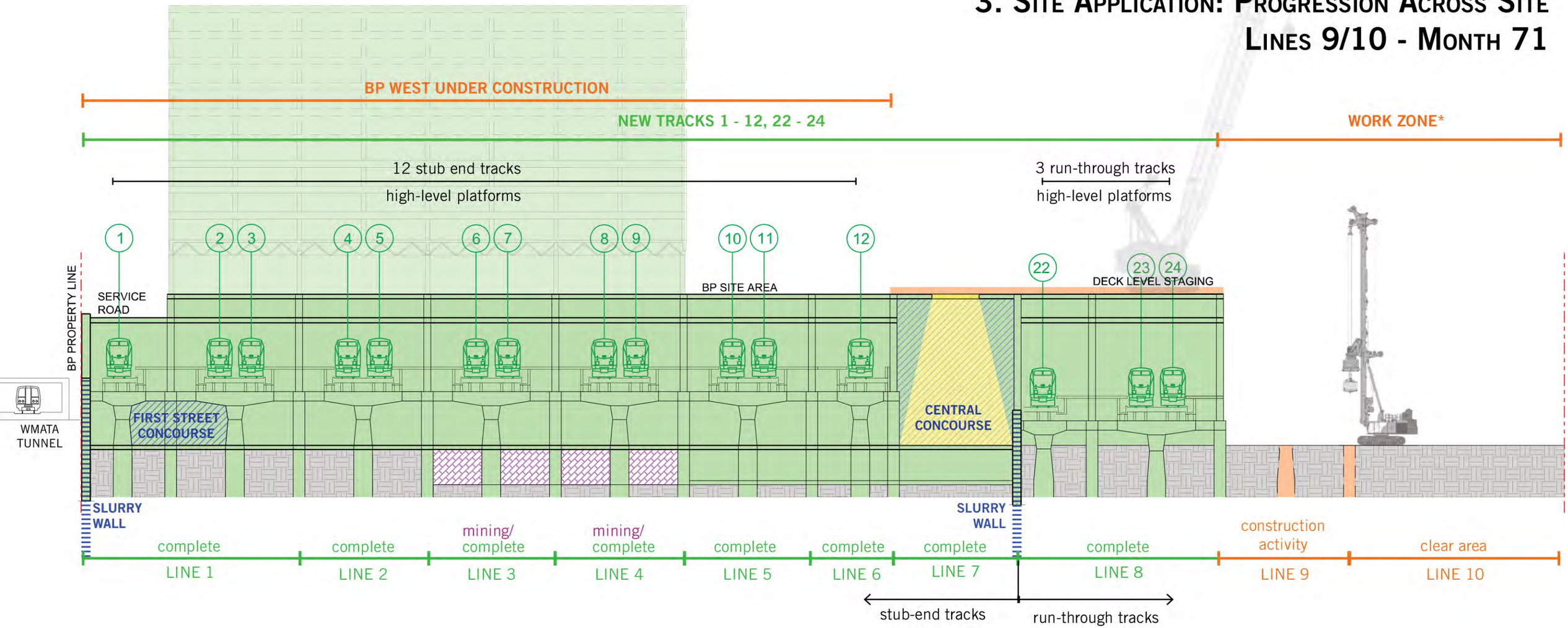
D. PROPOSAL

3. SITE APPLICATION: PROGRESSION ACROSS SITE
LINES 6/7/8 - MONTH 51



D. PROPOSAL

3. SITE APPLICATION: PROGRESSION ACROSS SITE
LINES 9/10 - MONTH 71



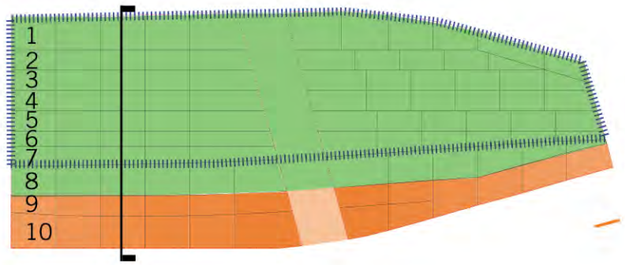
Existing conditions

Mining operation

Work zone

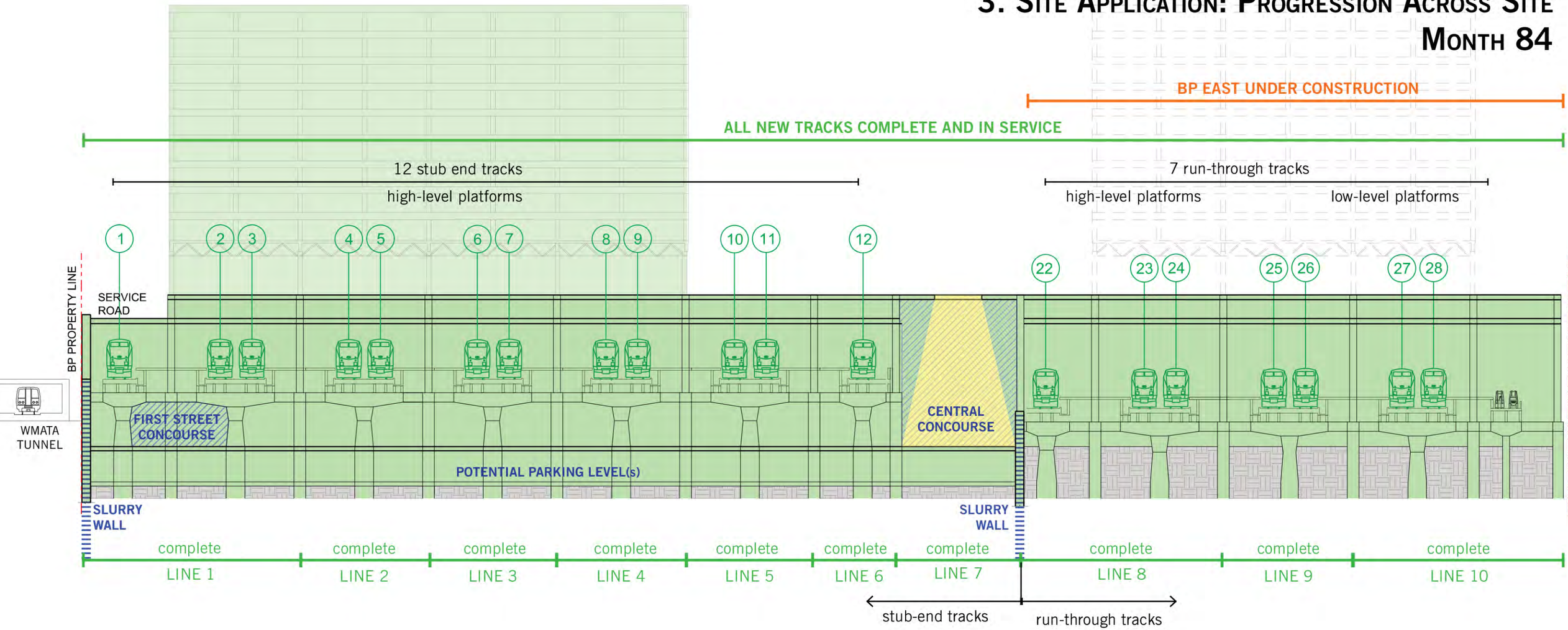
Complete

*** Mining operation shown to illustrate approximate extraction rate of 2 modules / month each north and south of H Street**



D. PROPOSAL

3. SITE APPLICATION: PROGRESSION ACROSS SITE
MONTH 84



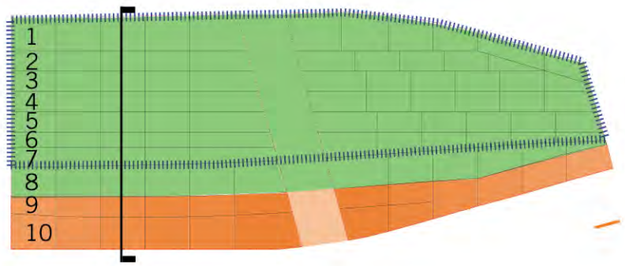
Existing conditions

Mining operation

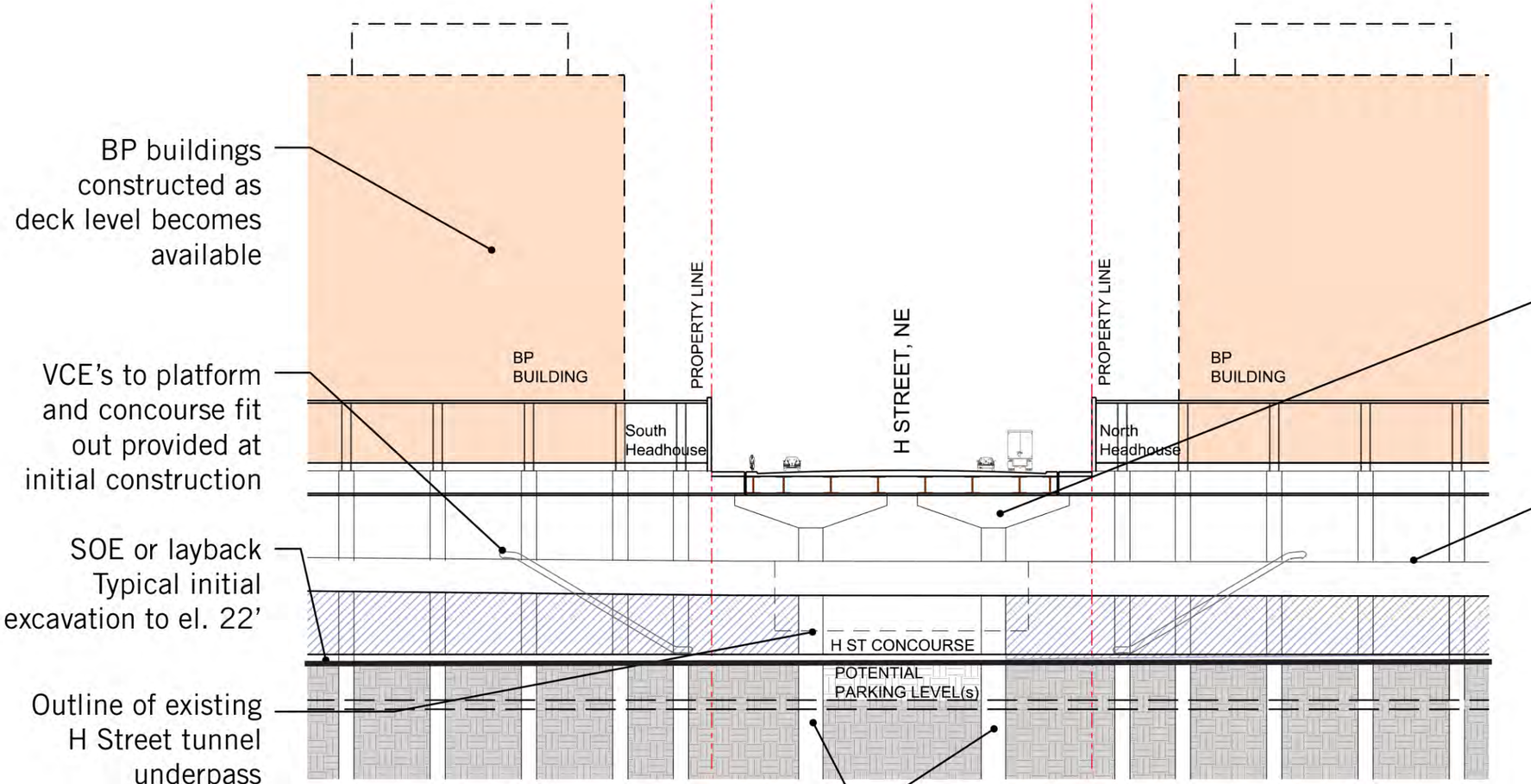
Work zone

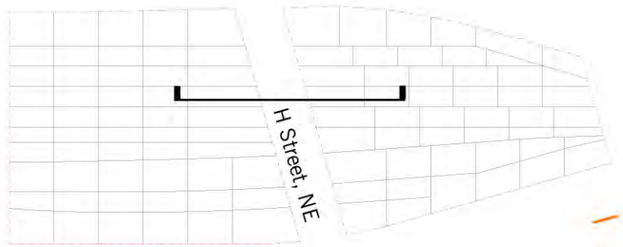
Complete

*** Total schedule to rail completion = 84 months / 7 years**



4. ADDITIONAL CONSIDERATIONS: H STREET CONCOURSE CONSTRUCTION AND MINING OPERATION





N-S Section through Concourse H
showing extent of construction at each line prior to extent of full mining

Animation Pt. 3

Construction Sequence at Stub End Tracks

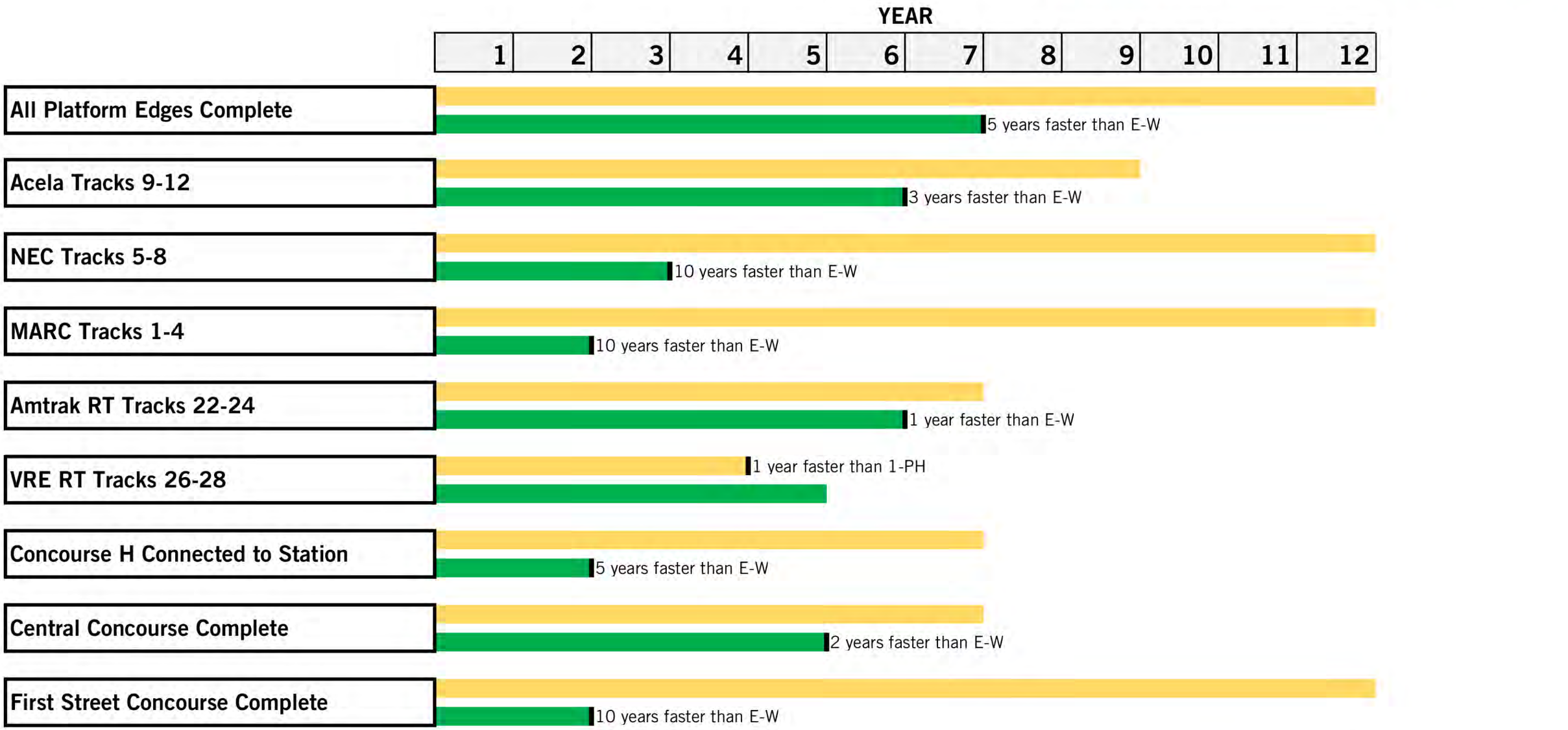
E. SUMMARY AND CONCLUSIONS

Single Phase Construction Concept Advantages

- Overall construction duration reduced from 12 to 7 years
- More tracks and platforms in service throughout construction period than currently conceived in 4-phase East to West concept
- Reduced construction duration improves project economics and delivers revenue producing assets earlier
- Railroads can expand train and passenger capacity and reduce schedule delay risk by delivering new rail assets 10+ years sooner
- Decreased duration, construction and financing risk increase project's political feasibility
- Four separate construction projects transformed to one - allows continuous utilization of equipment and crews with expected efficiencies and cost reductions
- Dramatic reduction in neighborhood impacts and passenger inconvenience
- Schedule may be able to be reduced further with faster production rates for drilled shafts. However, other construction considerations may require more time as concept is studied further

Timeline Comparison with Identical Start Years

E-W Open Cut vs Single Phase Construction (W-E)



* Length of each phase rounded to 3 years per phase

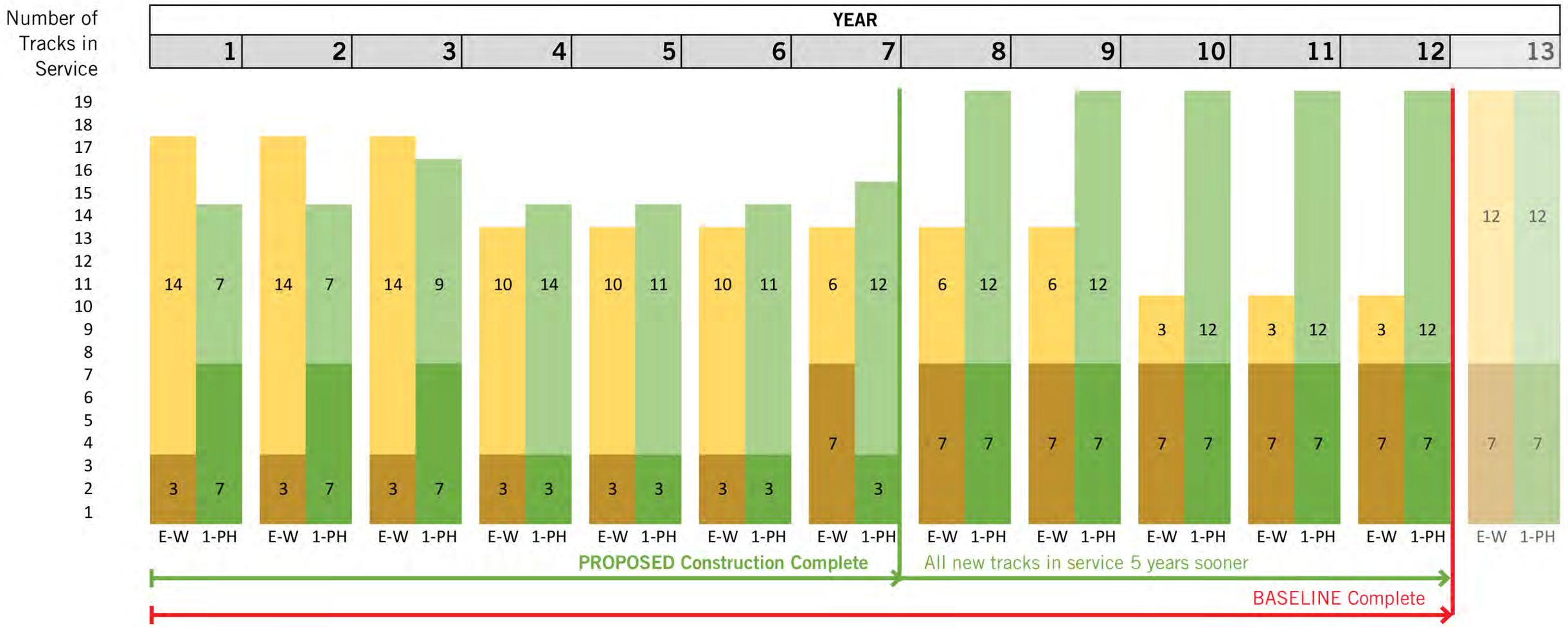
* East to West Phasing data per Amtrak's "WUS TI Construction Schedule_DRAFT 08212017"

East to West Phasing (E-W)

Single Phase Construction (1-PH)

Number of Tracks in Service During Construction

E-W Open Cut vs Single Phase Construction (W-E)



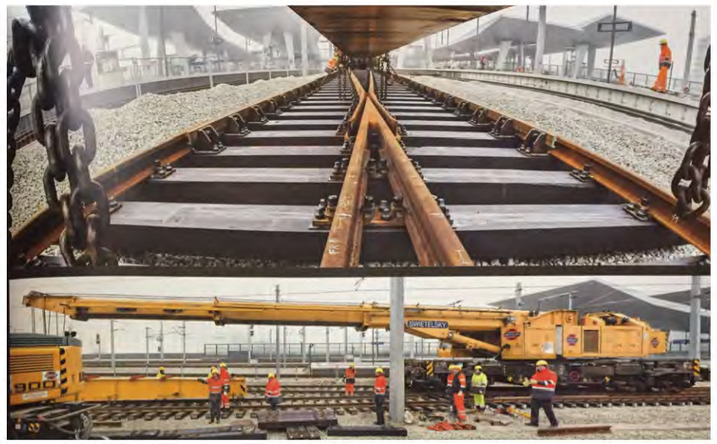
East to West Phasing (E-W)
- stub-end tracks
- run-through tracks

Single Phase Construction (1-PH)
- stub-end tracks
- run-through tracks

* Existing and new tracks included

* East to West Phasing data per Amtrak's "WUS TI Construction Schedule DRAFT 08212017"

Preliminary List of Key Elements for Proof of Concept



- Area of construction available within each zone and maneuverability of equipment
- Slurry plant locations
- Rail operations (C-K interlockings, Amtrak, Marc, VRE Operations, mid-day storage, berthing plan)
- Crane placement and operations from air rights deck
- Materials delivery by truck/ street and use of air rights deck for “clean” operations
- Conveyor removal of excavation spoils and work train location
- Top-down / side-out mining techniques to minimize S.O.E.
- Optimal depth of initial excavation
- Temporary / replacement parking and bus facilities

Construction Efficiency

- Concept lends itself to off-site pre-fabrication and on-site mechanization
- Because construction of each key element is continuous, equipment and crews can be contracted for one project with uninterrupted use of machinery - cranes, drill rigs, excavation equipment are all used continuously and do not vary in overall load
- Single contract rather than four separate construction projects
- Training of labor force, refinement of construction processes during ramp-up carry forward throughout entire project

"Innovative Top-Down Construction Method with Channel-Type Excavation" at West Shanghai Railway Station

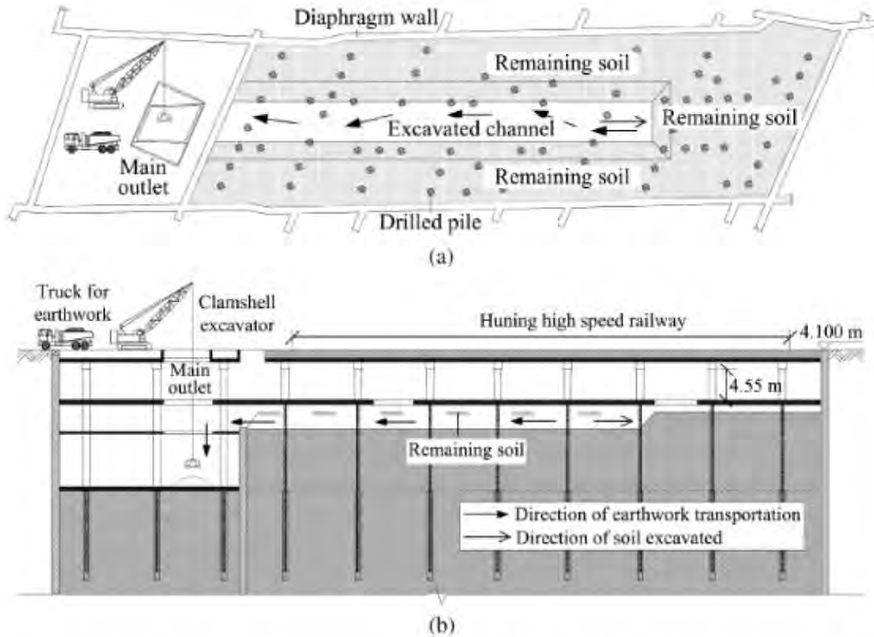


Fig. 6. Excavating channel in the middle of excavation: (a) plan view of channel excavated; (b) profile of channel excavated

https://www.researchgate.net/publication/267574693_Case_Study_of_Innovative_Top-Down_Construction_Method_with_Channel-Type_Excavation

"Jacking large tunnels beneath active rail tracks", Boston MA

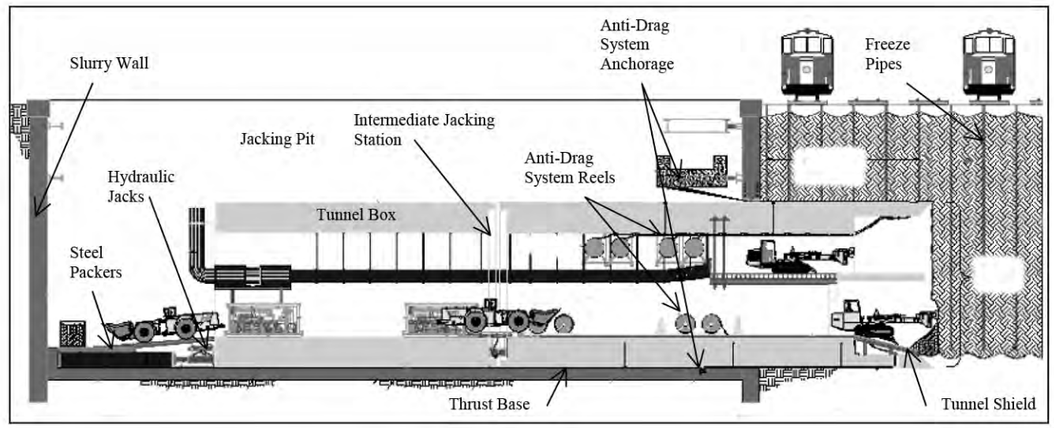


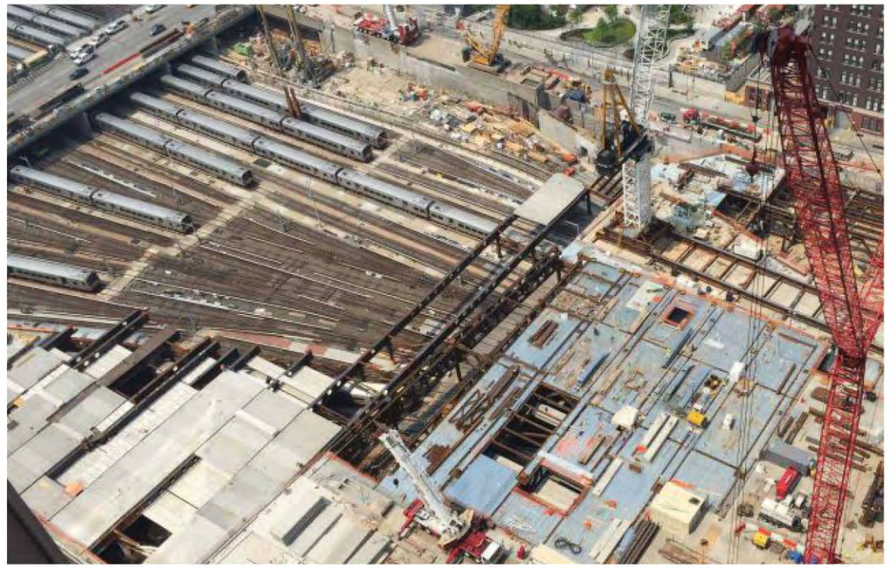
Figure 2. Schematic of Tunnel Jacking Operation

https://www.arema.org/files/library/2002_Conference_Proceedings/00030.pdf

Precedents

Hudson Yards - Construction Above Active Tracks

Hudson Yards East Platform

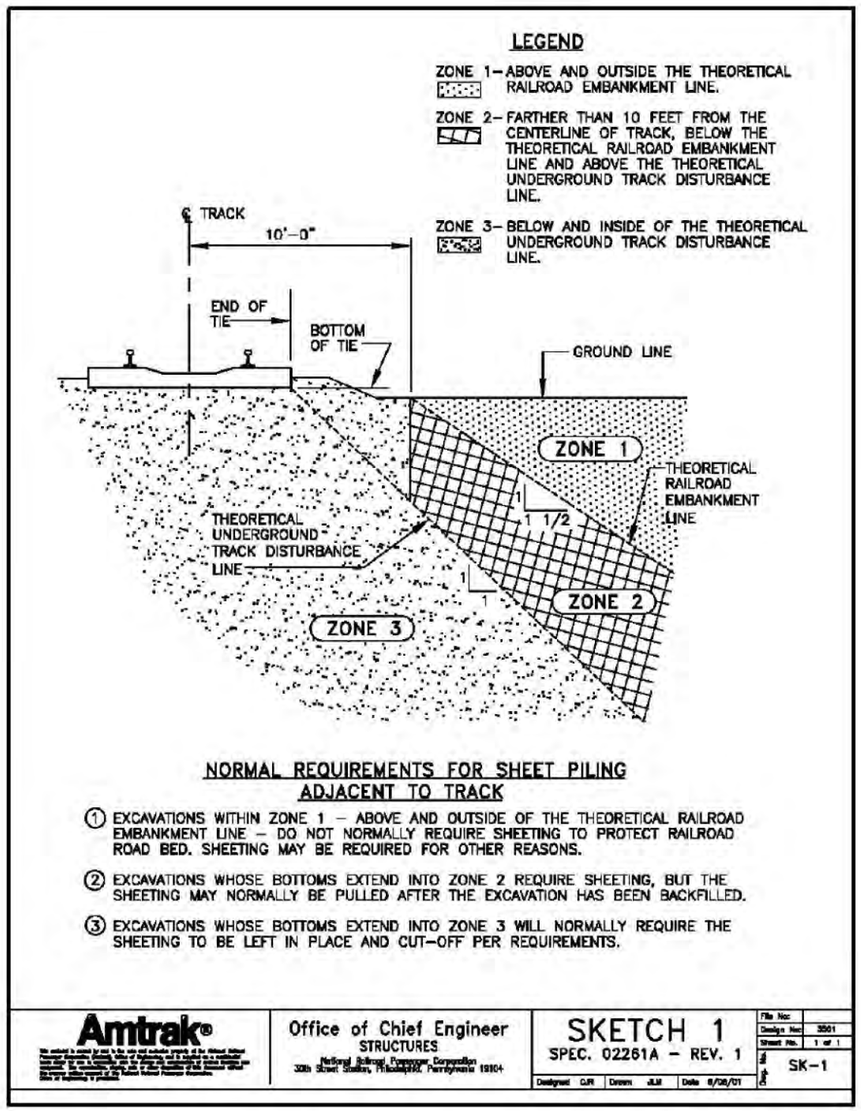


Platform trusses set west of the throat platform support the plaza

Staging area - Crane location adjacent/above active tracks

Work trains / Crane location adjacent/above active tracks

F. APPENDIX & REFERENCE MATERIAL



- Area of construction available within each zone and maneuverability of equipment
- Slurry plant locations
- Conveyor removal of excavation spoils and work train location
- Crane placement and operations from air rights deck
- Materials delivery by truck/ street and use of air rights deck for “clean” operations
- Rail operations
- Temporary/ replacement parking and bus facilities
- Top-down mining techniques to minimize S.O.E.

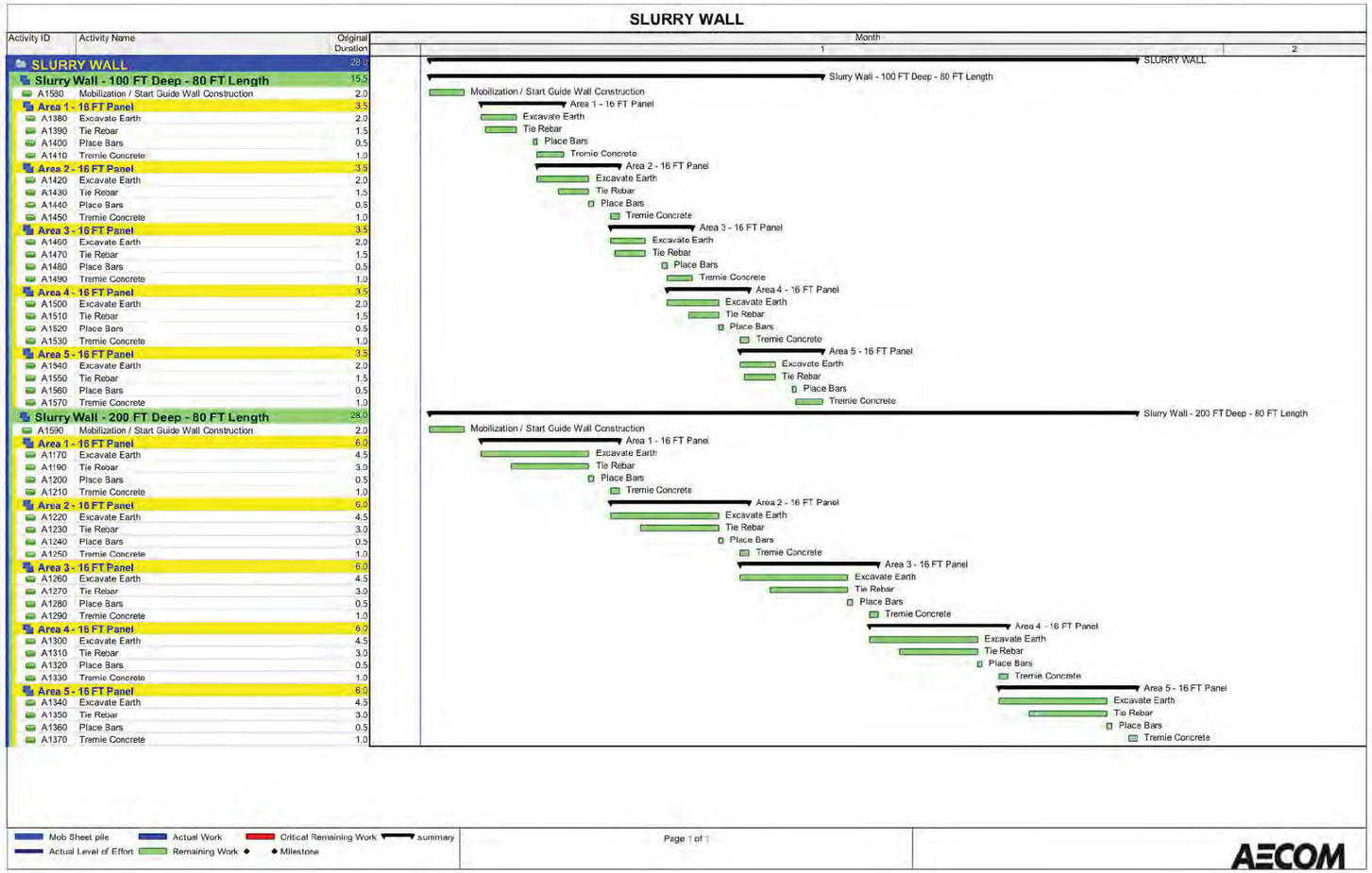


Figure VI-1: Slurry Wall Construction Duration

Table VI-7 - Estimated Drilled Shafts

K*-3 '/)L	%2/- + M<- 0/*/= NAOP	O*/5O M<- 0/*/= N\HER\	O*/, 5Q R K S9' 0 A@- >- /*20 M<- 0/*/= N\HER\	O*/, 5Q R K %29#K2: 0 M<- 0/*/= N\HER\	O*/, 5T R A S9' 0 A@- >- /*20 M<- 0/*/= N\HER\	O*/, 5T R A %29#K2: 0 M<- 0/*/= N\HER\
4 ./5	GB$	468G4F	BI 8B7C	4B874B	BB8C$7	4G84G$
F ./5	B6C	FI 864B	FG8G6B	I C8B7C	FC8CFB	F$8UUI
$ ./5	7F	G8 6U	G8 6U	B86$B	G846C	B86FU
6C ./5	4C	I 8$4C	I 8B4B	U8GGU	I 866F	U8GGU
67 ./5	I G	648BCG	6B8BI 4	6F8G66	6G8 76	6F874$
%2/- +	$CU	6B484U6	6GF8GU6	64G846I	67U84CG	64786$6

Constructability Report provides essential information on rates of production:

- Excavation
- Slurry and secant pile walls
- Drilled shafts
- Bottom pressure and intermediate slabs

Table VI-1: Estimated Slurry Wall Construction Duration for Option 1 – 200 Ft. Deep

Slurry Wall Item	Phase				
	1	2	3	4	Total
Length (LF)	0	1,810	160	1,910	3,880
Production LF per Shift per Operation	2.86	2.86	2.86	2.86	
No. of Shifts	2	2	2	2	
No. of Operations	2	2	2	4	
Total Production (LF/Day)	11.43	11.43	11.43	11.43	
Working Days	0	159	14	84	257
Consecutive Calendar days	0	186	17	98	301

Table VI-3 - Estimated Sheet Pile Wall Construction Duration for Option 3

Sheet Pile Wall Item	64 ft. Deep per Phase					100 ft. Deep per Phase				
	1	2	3	4	64 ft. Total	1	2	3	4	100 ft. Total
Length (LF)	450	2,825	500	575	4,350	1,930	2,250	1,520	1,825	7,525
Production LF per Shift per Operation	17.24	17.24	17.24	17.24		12.05	12.05	12.05	12.05	
No. of Shifts	2	2	2	2		2	2	2	2	
No. of Operations / Shift	4	4	4	4		4	4	4	4	
Total Production (LF/Day)	137.93	137.83	137.93	137.93		96.39	96.39	96.39	96.39	
Working Days	5	30	6	6	47	14	17	12	14	57
Consecutive Calendar days	6	35	7	7	55	17	20	14	17	68

Table VI-6 - Estimated Secant Pile Wall Construction Duration for Option 2

Secant Pile Wall Item	Phase				
	1	2	3	4	Total
Length (LF)	1,130	900	170	1,825	3,925
Production LF per Shift per Operation	7.90	7.90	7.90	7.90	
No. of Shifts	2	2	2	2	
No. of Operations	2	2	2	2	
Total Production (LF/Day)	31.61	31.61	31.61	31.61	
Working Days	33	29	6	58	126
Consecutive Calendar days	39	34	7	68	148

Table VI-10 - Estimated 3.5 ft.-thick Pressure Slab Construction Duration by Phase

3.5 ft. Pressure Slab	Phase				
	1	2	3	4	Total
Area (SF)	188,123	226,354	53,367	109,113	576,957
Production SF / day / operation	532.67	532.67	532.67	532.67	
No. of Shifts	2	2	2	2	
No. of Operations	2	2	2	2	
Total Production SF / day	2,130.67	2,130.67	2,130.67	2,130.67	
Working Days	89	107	26	52	274
Consecutive Calendar days	104	125	31	61	321

Intermediate-level Floor Slab	Phase				
	1	2	3	4	Total
Area (SF)	188,123	239,231	151,193	352,890	931,437
Production SF / day / operation	756.51	756.51	756.51	756.51	
No. of Shifts	2	2	2	2	
No. of Operations	2	2	2	2	
Total Production SF / day	3,026.05	3,026.05	3,026.05	3,026.05	
Working Days	63	80	50	117	310
Consecutive Calendar days	74	94	59	137	364
Months	1	4	2	5	12
Years	0.21	0.26	0.17	0.38	1.02

Table VI-7 - Estimated Intermediate Level Floor Slab Construction Duration by Phase (pg VI-15)

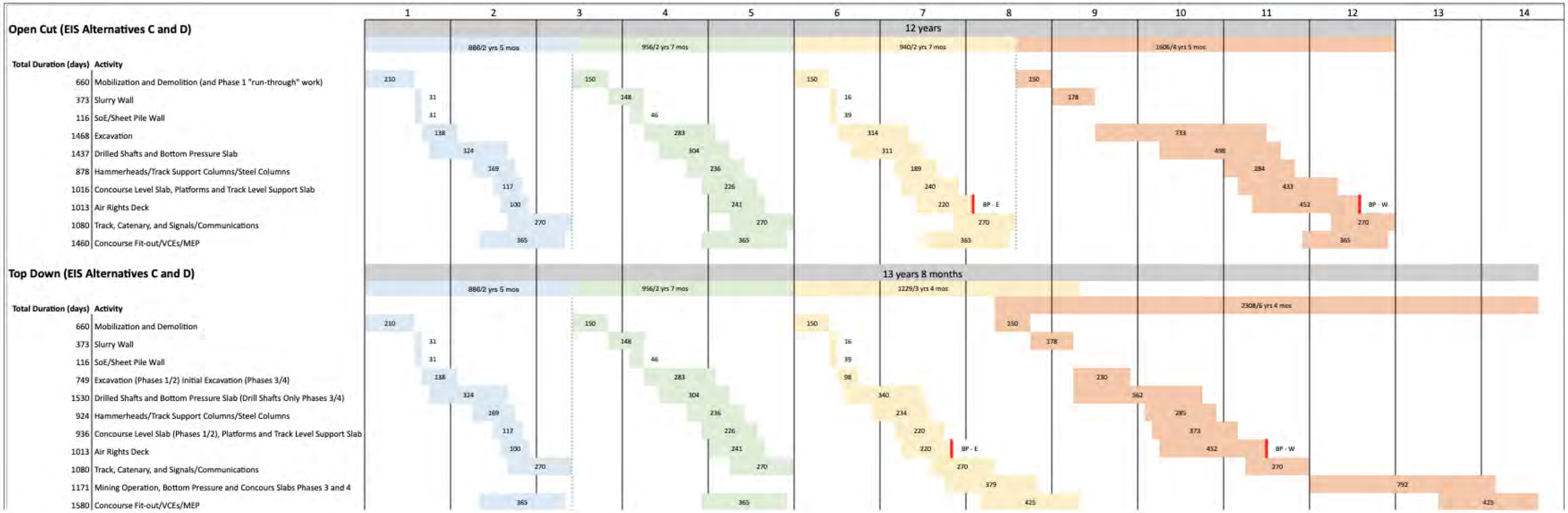
Concourse-level Floor Slab	Phase				
	1	2	3	4	Total
Area (SF)	94,781	172,670	151,193	352,890	771,534
Production SF / day / operation	756.51	756.51	756.51	756.51	
No. of Shifts	2	2	2	2	
No. of Operations	2	2	2	2	
Total Production SF / day	3,026.05	3,026.05	3,026.05	3,026.05	
Working Days	32	58	50	117	257
Consecutive Calendar days	38	68	59	137	302
Months	1	2	2	5	10
Years	0.11	0.19	0.17	0.38	0.85

Table VI-8 - Estimated Concourse Level Floor Slab Construction Duration by Phase (pg VI-15)

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

Table VI-9: Quantity of Excavation (in Cubic Yards) (pg VI-17)

Constructability Report Schedule for Alternatives C/D Open Cut and Top-Down



- East to West phasing dones not take advantage of top-down efficiencies
- BP platform delivered slightly earlier using top-down construction
- Long idle periods between critical path operations remain

Site Plan Progress Per Month

CONSTRUCTION STEPS:

1. Un-excavated: mobilization, demolition, slurry walls
2. Initial excavation and support of excavation
3. Drilled shafts
4. Hammer-head, track and platform support columns
5. Air rights structure and deck slab, track installation
6. Air rights deck working surface
   Catenary, track, and signals/communication installation

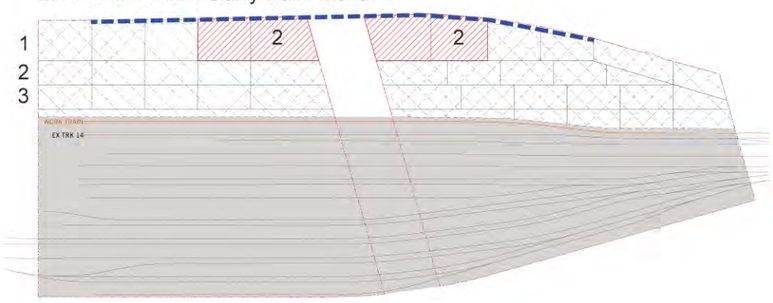
Air rights deck working surface

Clear working area

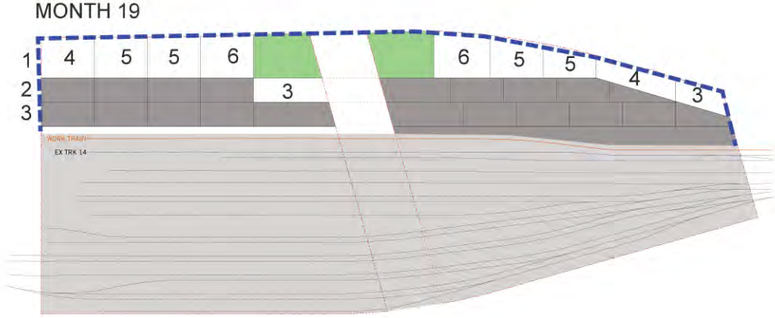
New track in service
New track installation
Work train
Existing track in service
Slurry wall

* These drawings illustrate an initial sequencing of the construction steps required to build the project from beginning to end. Further study is needed to determine compatibility of sequences, individual construction steps, special conditions, and rates of production, which will more accurately determine the overall schedule.

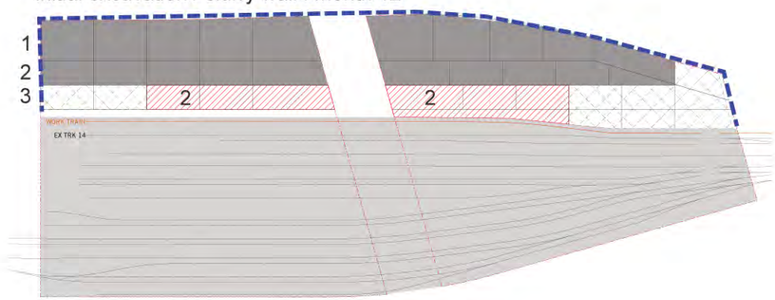
initial excavation / slurry wall : month 4



MONTH 19



initial excavation / slurry wall : month 12



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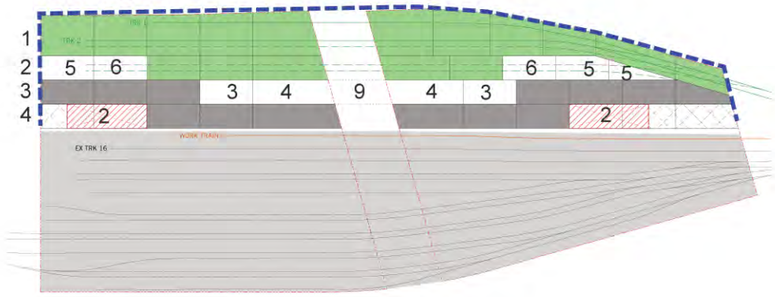
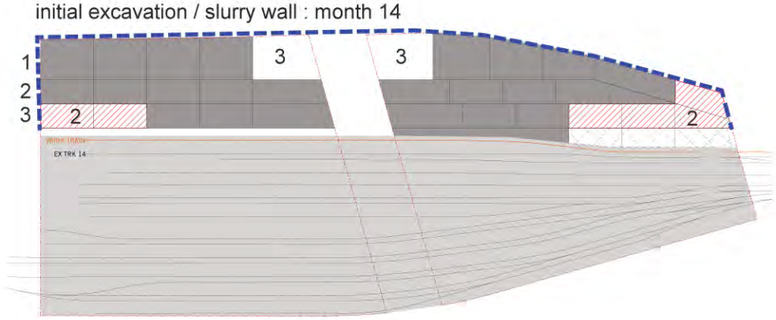


initial excavation / slurry wall : month 14



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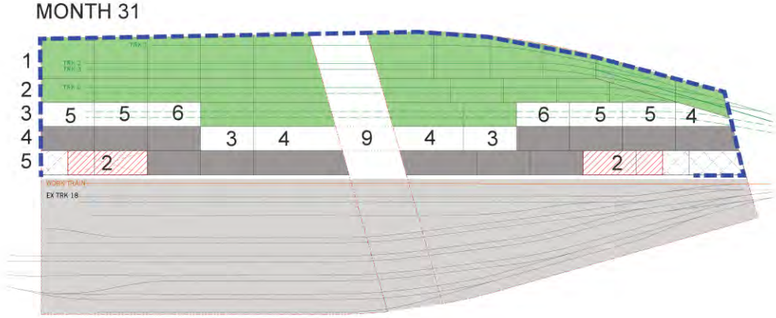
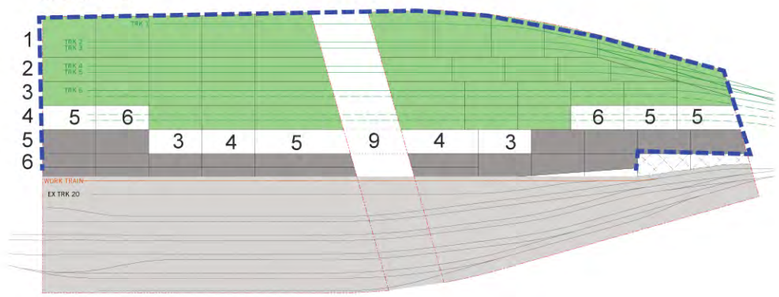


Site Plan Progress Per Month

MONTH 37



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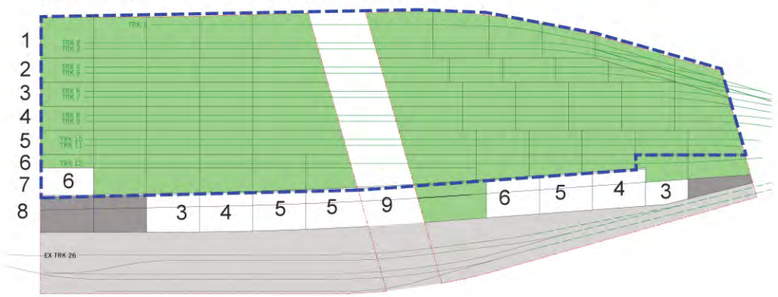

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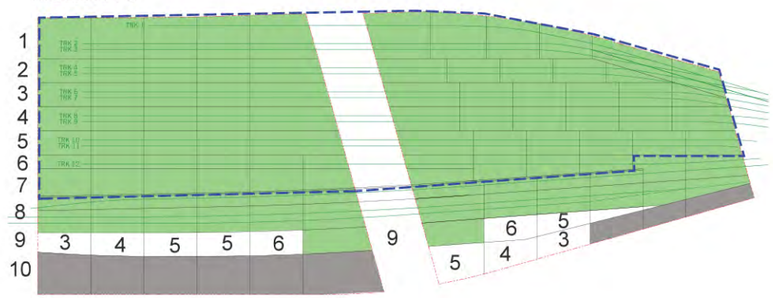

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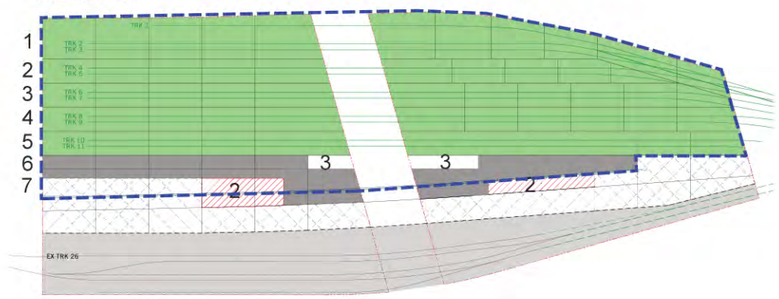

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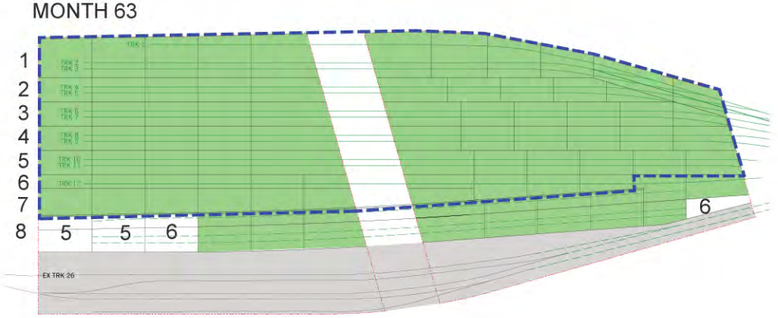

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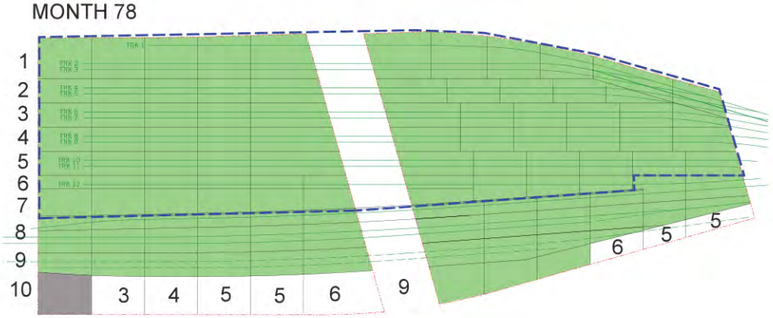

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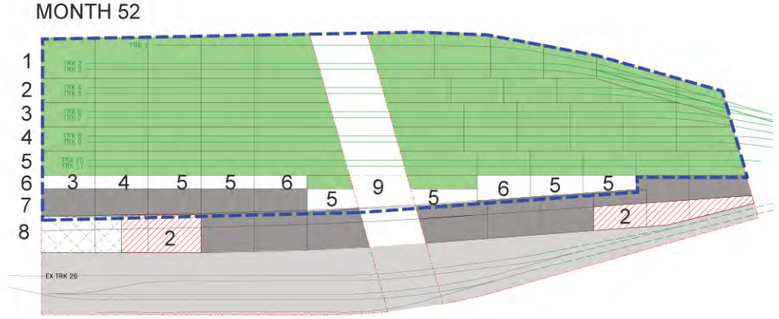

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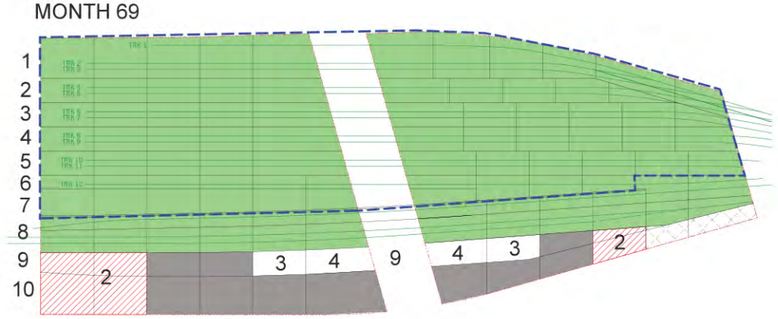

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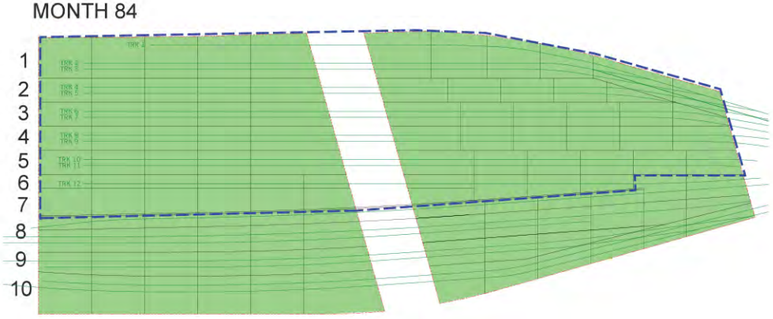


APPENDIX I

INTERSECTION ANALYSIS

AKRIDGE
Invested.

WASHINGTON UNION STATION
STATION EXPANSION

Project Memorandum

DATE: October 25, 2018

REFERENCE: Washington Union Station Expansion

TO: DDOT

FROM: FRA, USRC, Amtrak, Akridge

SUBJECT: H Street Bridge Intersection Placement and Turning Movement Needs

As requested by DDOT, the Washington Union Station Expansion Project (SEP) team (FRA, USRC, and Amtrak) and Akridge hereby submit the two parties' requirements for curb cut locations and accommodation of vehicular left turning movements on the H Street Bridge. The attached drawings indicate 1) the location and width of driveways and roadways that will intersect the H Street Bridge, and 2) the location of dedicated left-turn lanes on the bridge and on intersecting roadways. The drawings indicate cross street locations and the central concourse location relative to property lines and indicate the variations among the SEP Action Alternatives.

These drawings and this memo convey the needs for vehicle movement and capacity that will provide convenient and clear wayfinding. The accommodation of left-turn movements on H Street is essential to the success of both the SEP Project and Burnham Place, in addition to achieving overarching goals DDOT has expressed for both projects and their integration into the broader network. The SEP team is working to accommodate equitably the demands for Washington Union Station pick-up and drop-off on both public and private roadways as the city's rail hub is transformed. Akridge is working to create a Burnham Place project that creates a well-functioning and integrated urban place. These goals align with DDOT's objectives for a transportation network that accommodates this positive growth in the city. Achieving these goals shared among the three parties is dependent on getting the appropriate turning movements, capacity, and access on H Street.

Note: the information conveyed in these drawings regarding the location of the central concourse is intended to supplement information provided previously on the central concourse: to-scale plan backgrounds of the concourse and track level that indicated the extents of the central concourse provided in May 2018, and essential vertical connections from the deck level adjacent to H Street down to the central concourse provided in January 2018.

H Street Curb Cuts and Roadway Widths

- The drawings show the general location envelope within which the central road can be situated and note the needed roadway width.
- Roadway widths for the east and west roads are shown as a range to allow for a 3- lane or 4-lane cross-section, with the exception of the bus access/parking ramp in Alternatives C East and C West, for which a specific width is identified.
- In locations where separate but adjacent roadways/driveways are shown, a minimum 6'0" offset has been included to account for a pedestrian refuge between the adjacent roadways/driveways.
- These drawings make no assumptions for turning radii. Incorporation of street design geometry and bridge structural considerations at a future date may lead to changes to the widths shown in the drawings.

Dedicated Left-Turn Lane Requirements

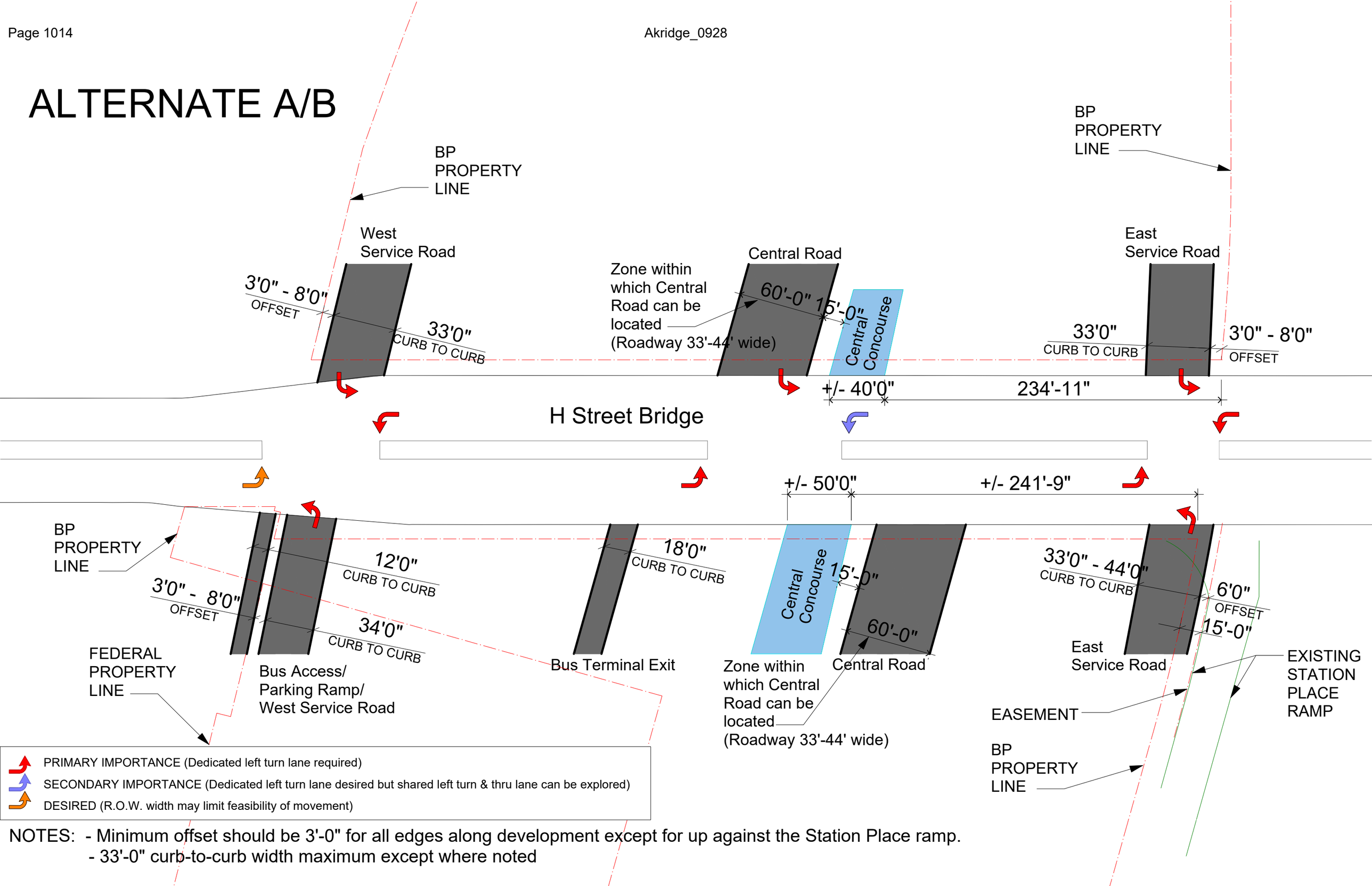
Each drawing shows the parties' prioritization of left-turn movements on the bridge, with movements placed into one of three categories: left-turn movements that require a dedicated left-turn lane (red); left-turn movements for which a dedicated left-turn lane is desired but not required (blue); and left-turn movements for which off-peak accommodation is desired but a dedicated left-turn lane is not required (orange).

If all the desired dedicated left-turn lanes on H Street cannot be accommodated, U-turns at the remaining left turns at the downstream intersection will be essential to accommodate access to roads or driveways not served by left-turn movements. It is also assumed that north-south through movements will be permitted at all intersections, with the exception of the central intersection in Alternatives A and B.

The SEP team and Akridge acknowledge that DDOT's indication that both a westbound left-turn pocket at the west intersection and an eastbound left-turn pocket at the central intersection are unlikely to be accommodated given DDOT's focus on Option 2 for the streetcar alignment on the H Street Bridge. However, both of these two left-turn pockets are critical to the success of the two projects and our submission identifies dedicated left-turn lanes at both locations. The SEP team and Akridge request that DDOT conduct additional analysis to investigate bridge and streetcar designs that incorporate both left-turn pockets, including a renewed focus on streetcar Option 5 that requires less roadway width and is more accommodating of the needs of both the SEP and Burnham Place projects.

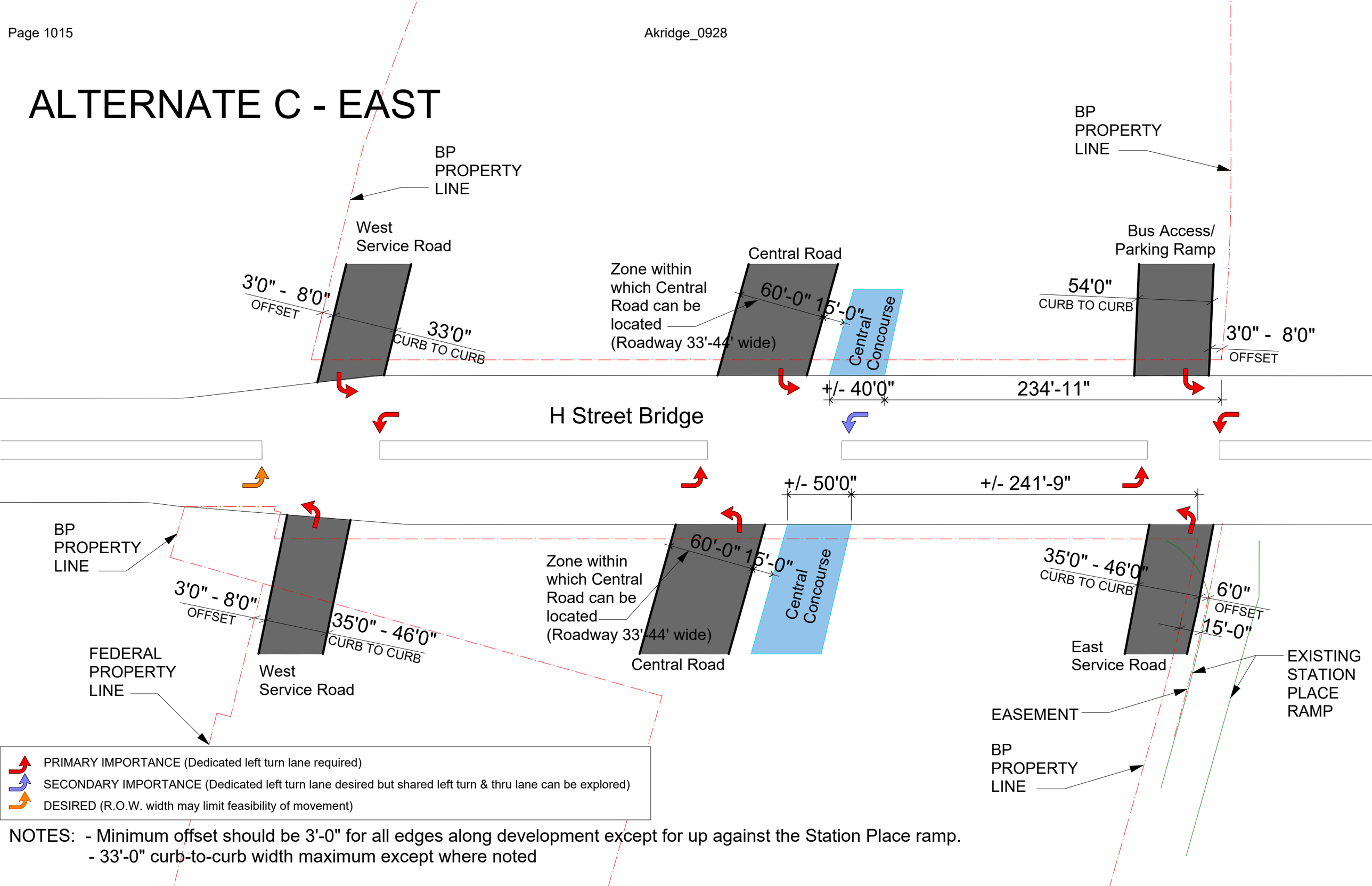
Under some conditions, Akridge is willing to explore agreements with DDOT which would allow for the use of portions of Burnham Place property adjacent to the bridge for sidewalk functions. These agreements could facilitate enhanced turning movements, longer turn pockets, wider sidewalks, and/or bicycle accommodations while allowing for center-running streetcar service.

ALTERNATE A/B



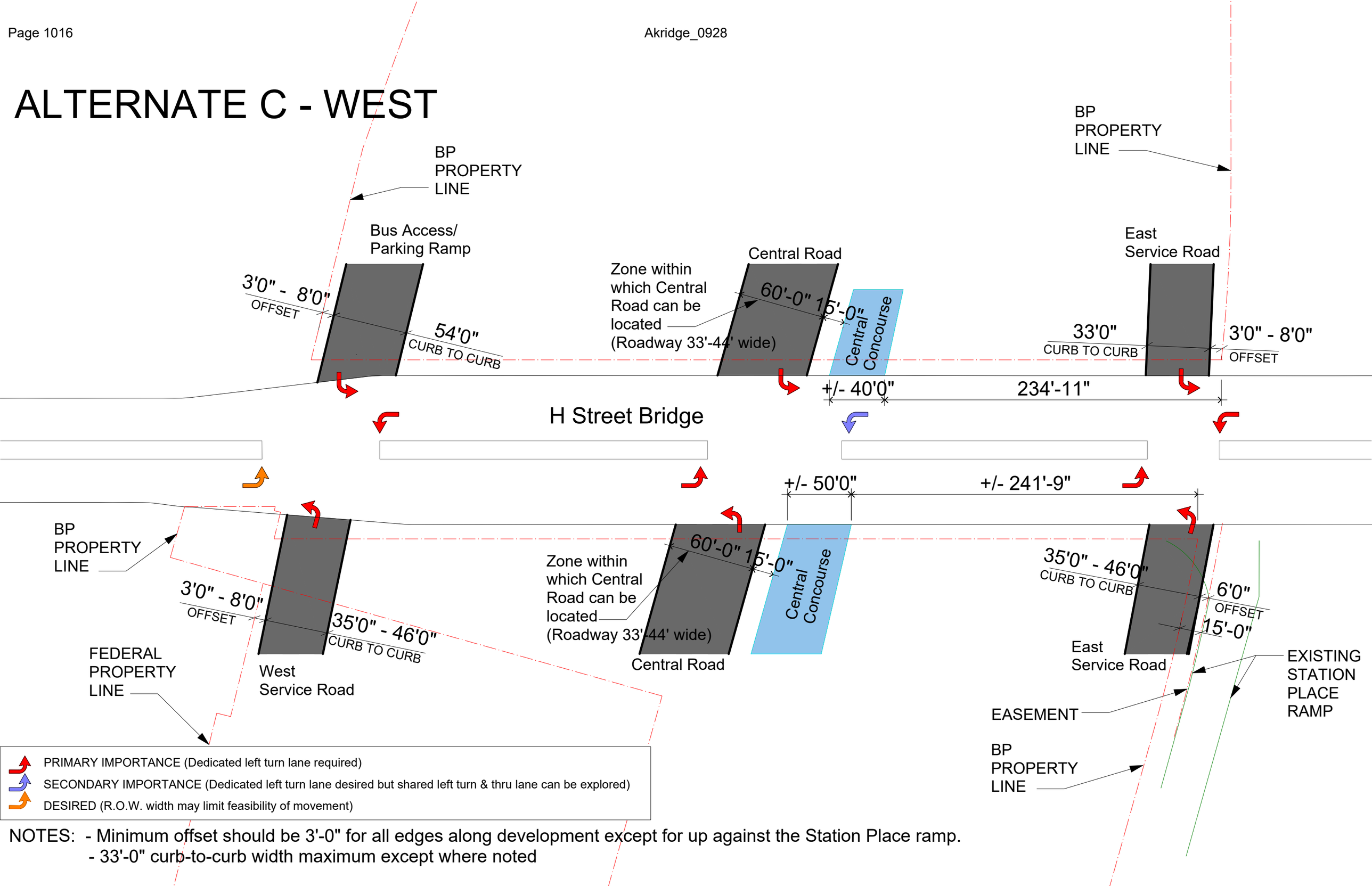
NOTES: - Minimum offset should be 3'-0" for all edges along development except for up against the Station Place ramp.
- 33'-0" curb-to-curb width maximum except where noted

ALTERNATE C - EAST



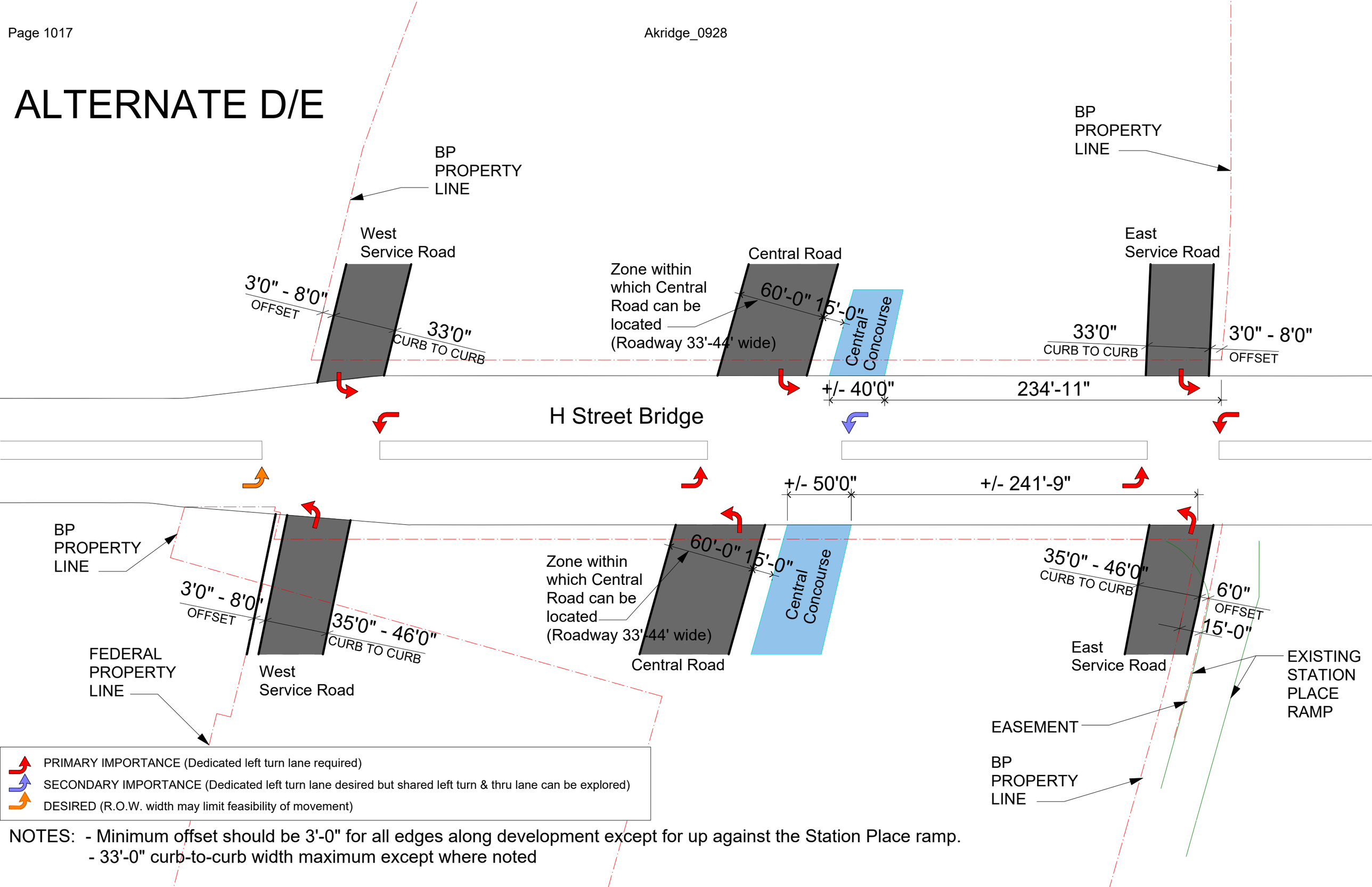
NOTES: - Minimum offset should be 3'-0" for all edges along development except for up against the Station Place ramp.
- 33'-0" curb-to-curb width maximum except where noted

ALTERNATE C - WEST



NOTES: - Minimum offset should be 3'-0" for all edges along development except for up against the Station Place ramp.
- 33'-0" curb-to-curb width maximum except where noted

ALTERNATE D/E



NOTES: - Minimum offset should be 3'-0" for all edges along development except for up against the Station Place ramp.
- 33'-0" curb-to-curb width maximum except where noted

APPENDIX K

IMPACTS OF ALTERNATIVES A-E

BURNHAM PLACE
&
WASHINGTON UNION STATION

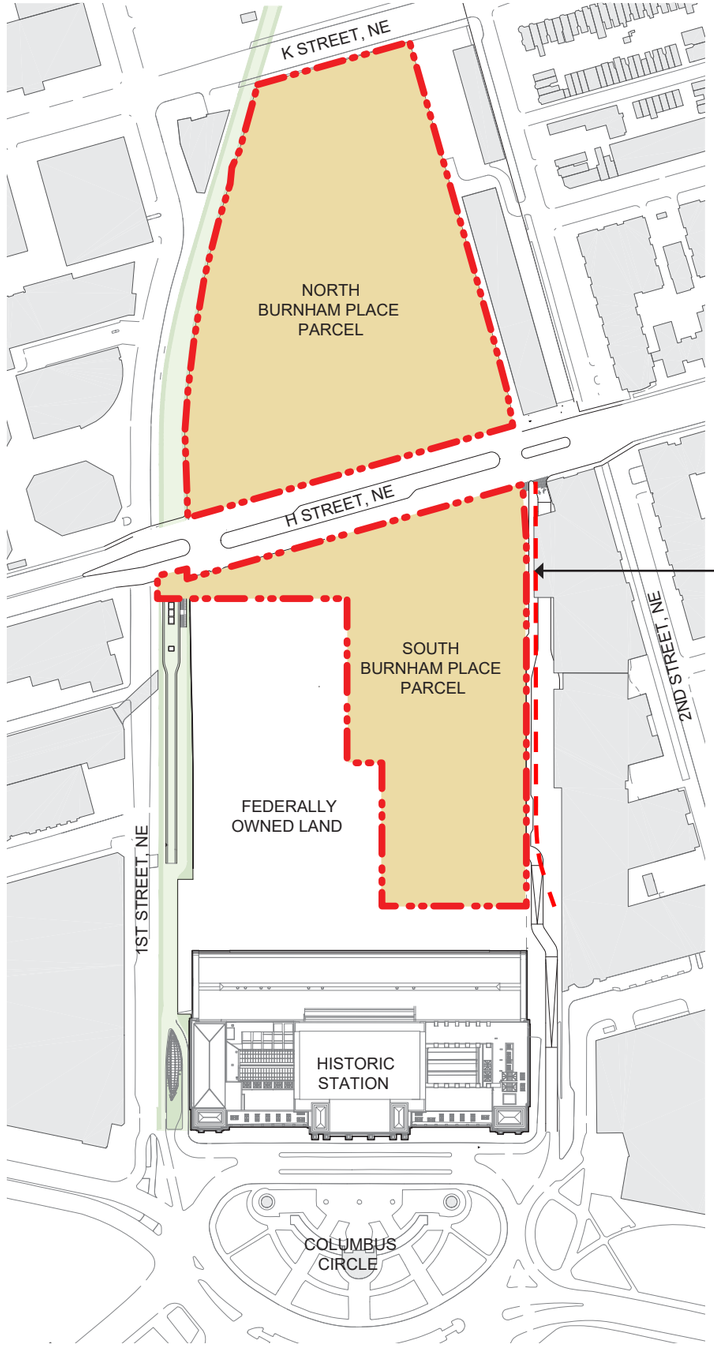
IMPACTS OF WASHINGTON UNION STATION EXPANSION PROJECT EIS ALTERNATIVES ON BURNHAM PLACE

JULY 23, 2018

TABLE OF CONTENTS:

INTRODUCTION

BURNHAM PLACE EXISTING PROPERTY:



ASSUMPTIONS:

- **Road Width**

  - When Burnham Place shares a circulation route with Station functions, roads would need to be larger to accommodate both Station and Burnham Place uses

- **Phased Development**

  - 2012 east to west phase line is used
  - East-to-west phasing sequence assumed
  - Alternative phasing sequence can affect individual impacts

- **The Threat and Vulnerability Risk Assessment (TVRA) Offset**
  (all offsets are preliminary and subject to change)

  - 15’-0” offset between Burnham Place building and public (unscreened) roads
  - 30’-0” offset between Burnham Place building and public (unscreened) structured parking

- **Private Development Area**

  - All areas labeled by the SEP team as private or potential air rights development are assumed to be part of Burnham Place development

- **Basis of Analysis**

  - Impacts documented here are based on the WUSEP drawings, presented at the Public Meeting #4, dated 03/22/2018 and Alternatives Site Plans, dated 03/30/2018

DESIGN REQUIREMENTS:

The five essential elements which must be achieved for Burnham Place to be successful

1. Adequate development opportunity

- Sufficient and high-quality overall density
- Efficient scale BP building pads
- Distribute density throughout BP and achieve effective phased development
- Maximize H Street frontage

2. Functional circulation network

- Circulation network and turning movements at acceptable levels of service
- Primary central street connecting north and south parcels
- Vehicular access to front doors, service, and parking areas
- Safe, active and interconnected pedestrian areas

3. Strategically positioned open spaces

- Distribute north and south of H Street
- World class placemaking

4. Adequate light, air, and views in key locations

- Maximize views to the Capitol and historic Station
- Building separation, solar access, and sight-lines compatible with high-quality mixed-use development

5. Harmonized public and private projects

- World class BP and Station components complement one another
- Multiple and gracious pedestrian connections between BP, Station, and surrounding neighborhoods
- Easy-to-find entrances to BP buildings and Station

* Design Principles and Requirements first presented to FRA on 08/02/2017

SECTION A

EIS ALTERNATIVES IMPACTS ON BURNHAM PLACE

Impacted BP Design Requirement

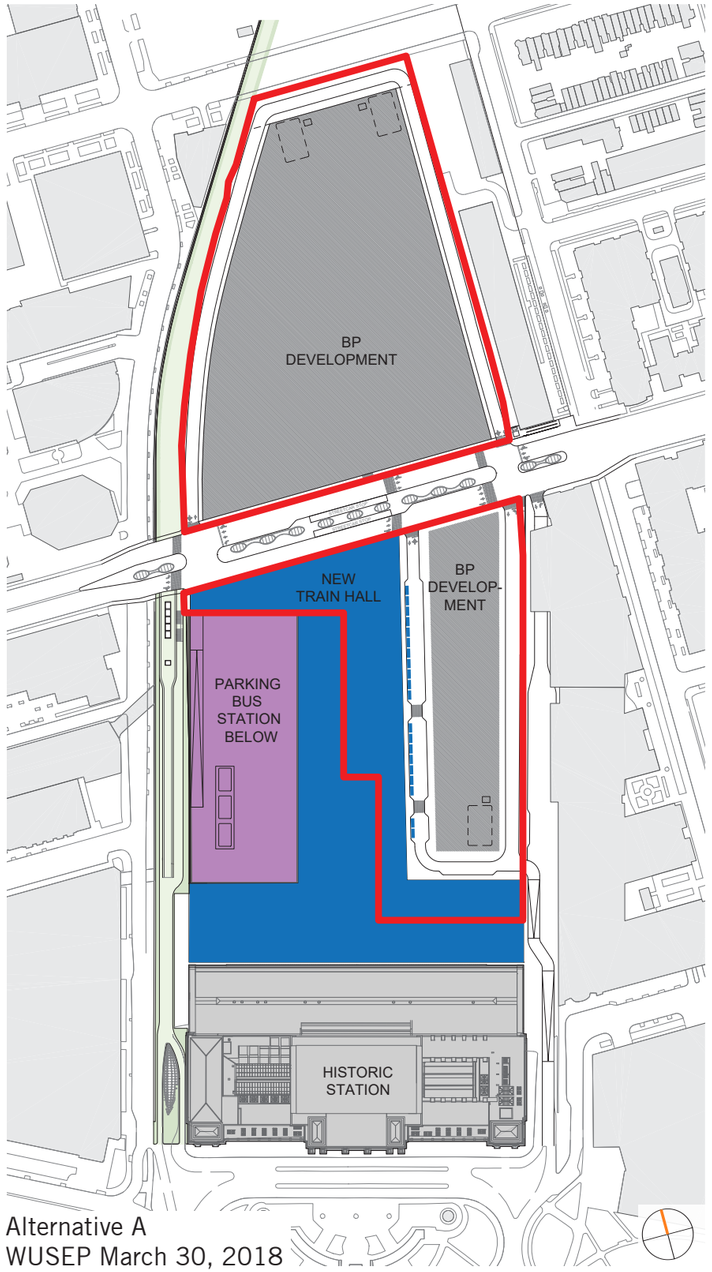
Summary of Impacts for All EIS Alternatives

Design Requirements	Sub-requirements	ALTERNATIVE A & B	ALTERNATIVE C	ALTERNATIVE D	ALTERNATIVE E
1. ADEQUATE DEVELOPMENT OPPORTUNITY	Sufficient and high-quality overall density				
	Efficient scale BP building pads				
	Distribute density throughout BP and achieve effective phased development				
	Maximize H Street frontage				
2. FUNCTIONAL CIRCULATION NETWORK	Circulation network and turning movements at acceptable levels of service				
	Primary central street connecting north and south parcels				
	Vehicular access to front doors, service, and parking areas				
	Safe, active and interconnected pedestrian areas				
3. STRATEGICALLY POSITIONED OPEN SPACES	Distribute north and south of H Street				
	World-class placemaking				
4. ADEQUATE LIGHT, AIR, AND VIEWS IN KEY LOCATIONS	Maximize views to the Capitol and historic Station				
	Building separation, solar access, and sight-lines compatible with high-quality mixed-use development				
5. HARMONIZED PUBLIC AND PRIVATE PROJECTS	World-class BP and Station components complement one another				
	Multiple and gracious pedestrian connections between BP, Station, and surrounding neighborhoods	Insufficient information to evaluate	Insufficient information to evaluate	Insufficient information to evaluate	Insufficient information to evaluate
	Easy-to-find entrances to BP buildings and Station				

- Insufficient information to evaluate
- Potentially compatible
- Moderate impact
- Severe impact

ALTERNATIVES A & B

Summary of Impacts
ALTERNATIVES A & B
(Preliminary Alternative 1A/B)



Alternative A
WUSEP March 30, 2018

Impacted BP Design Requirements

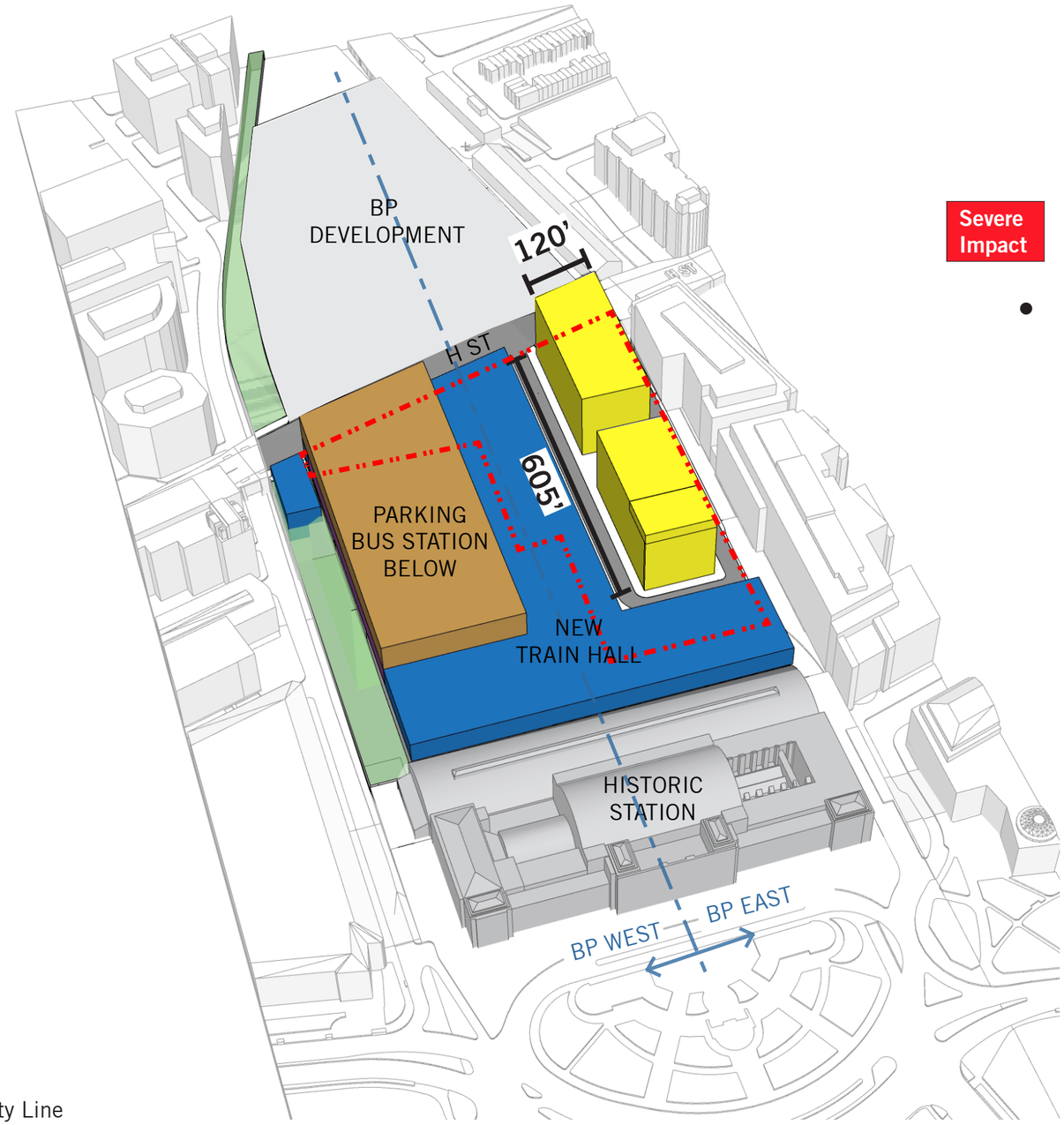
Design Requirements	Sub-requirements	
1. ADEQUATE DEVELOPMENT OPPORTUNITY	Sufficient and high-quality overall density	
	Efficient scale BP building pads	
	Distribute density throughout BP and achieve effective phased development	
	Maximize H Street frontage	
2. FUNCTIONAL CIRCULATION NETWORK	Circulation network and turning movements at acceptable levels of service	
	Primary central street connecting north and south parcels	
	Vehicular access to front doors, service, and parking areas	
	Safe, active and interconnected pedestrian areas	
3. STRATEGICALLY POSITIONED OPEN SPACES	Distribute north and south of H Street	
	World-class placemaking	
4. ADEQUATE LIGHT, AIR, AND VIEWS IN KEY LOCATIONS	Maximize views to the Capitol and historic Station	
	Building separation, solar access, and sight-lines compatible with high-quality mixed-use development	
5. HARMONIZED PUBLIC AND PRIVATE PROJECTS	World-class BP and Station components complement one another	
	Multiple and gracious pedestrian connections between BP, Station, and surrounding neighborhoods	Insufficient information to evaluate
	Easy-to-find entrances to BP buildings and Station	

BP Property Line

- Insufficient information to evaluate
- Potentially compatible
- Moderate impact
- Severe impact

AKRIDGE Invested.

Design Requirement 1 - Adequate development opportunity



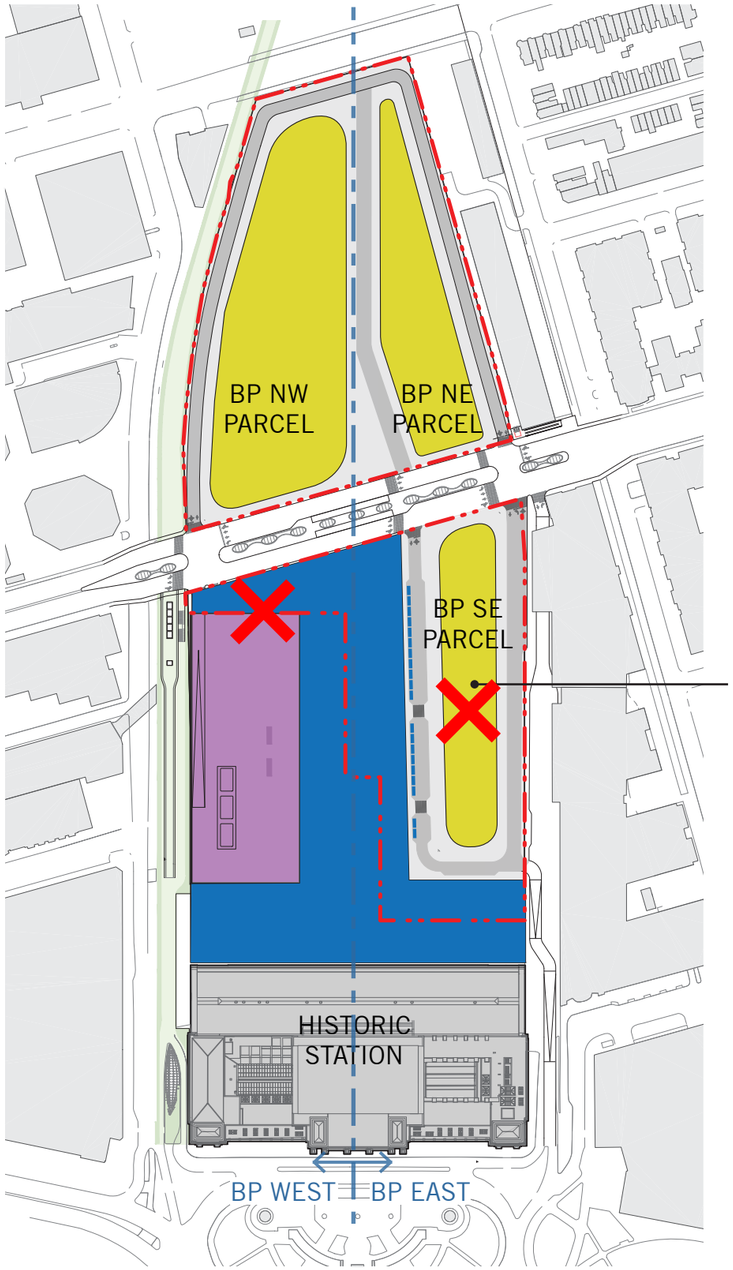
BP Property Line

Severe Impact

Efficient scale BP building pads

- **Developable site area and parcel proportions south of H Street restrict BP building sizes, configurations, access and design flexibility**

Design Requirement 1 - Adequate development opportunity



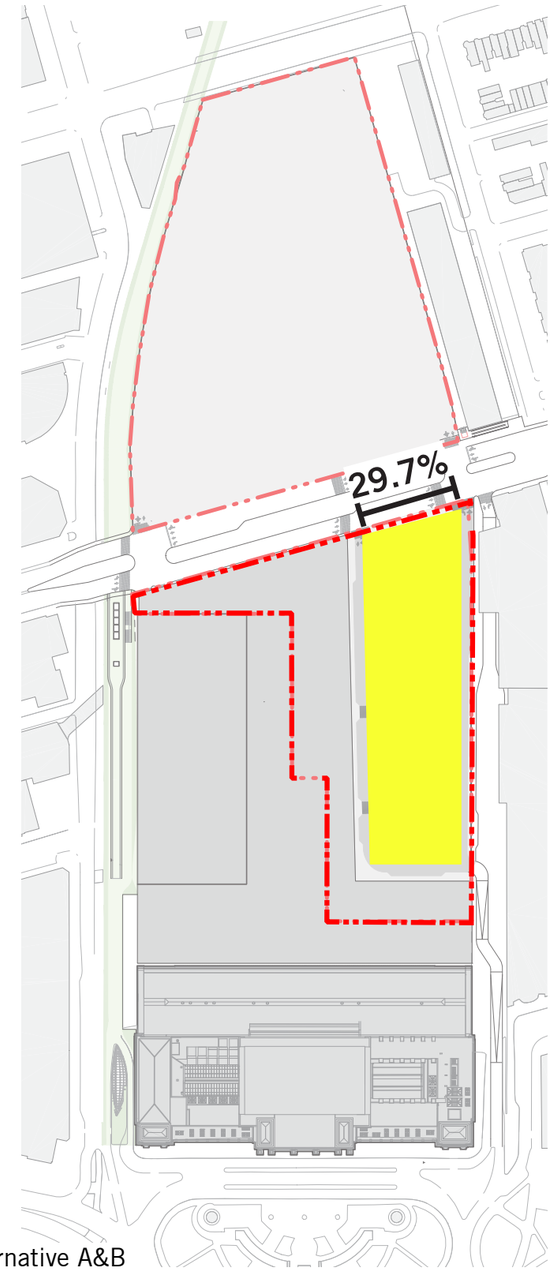
Severe Impact

Distribute density throughout BP to achieve effective, phased development

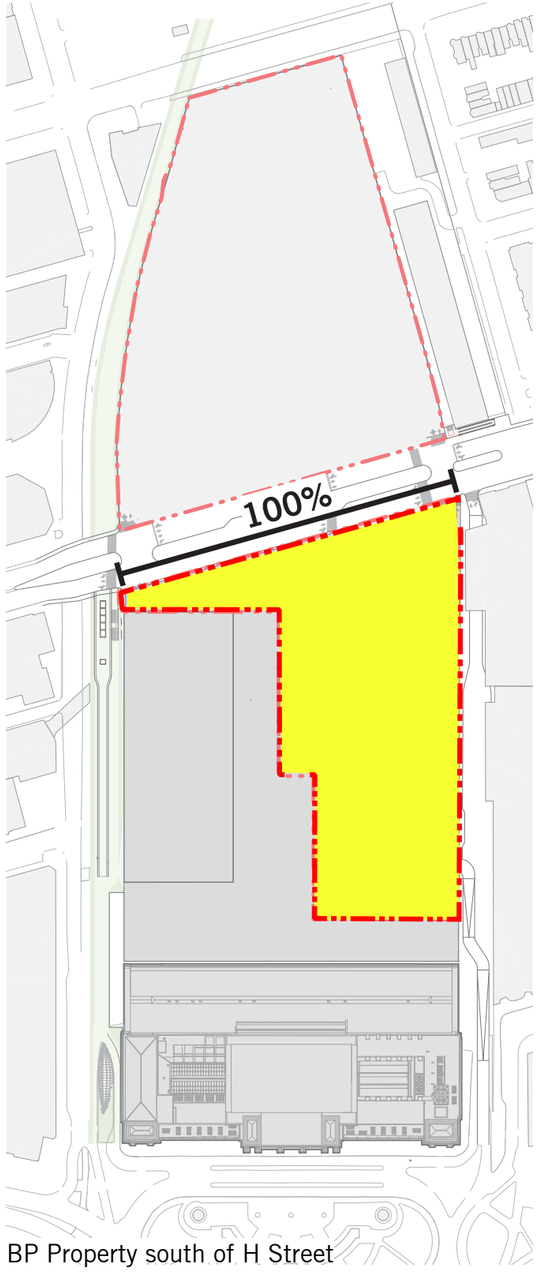
- **Inadequate development density in BP east, the first phase of BP construction**
- **BP development density in SW quadrant eliminated**
- **Only 20% of overall south area between H Street and Historic Station is left for development, insufficient to balance BP and Station uses**

Impacted Design Requirement
ALTERNATIVES A & B

Design Requirement 1 - Adequate development opportunity



Alternative A&B



BP Property south of H Street

Severe Impact

Maximize H Street frontage

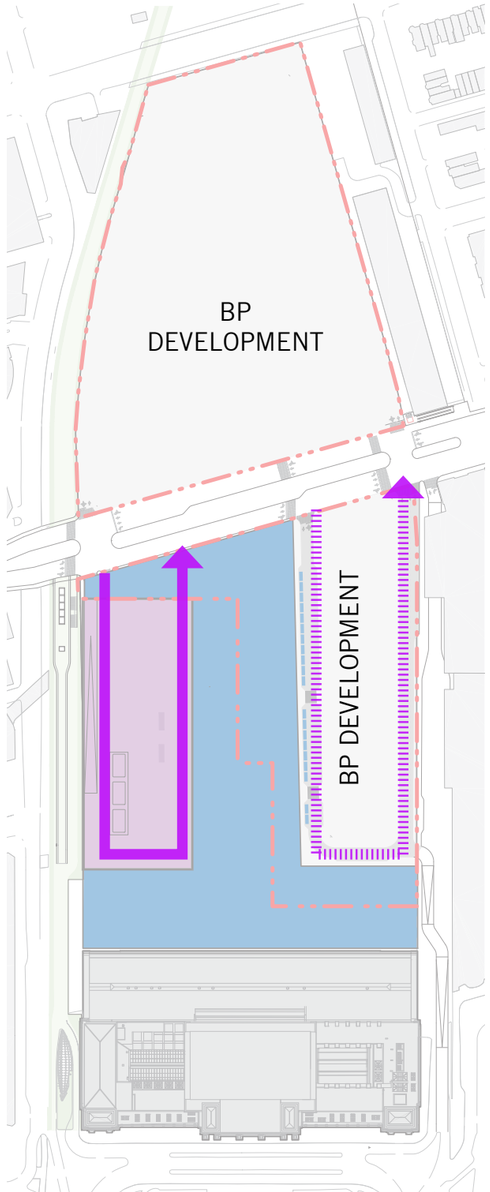
- BP frontage reduced by over 70% on south side of H Street
- Reduced frontage results in inadequate BP identity on its one public street frontage

BP Property Line

Impacted Design Requirement
ALTERNATIVES A & B

Design Requirement 2 - Functional circulation network

For illustrative clarity, BP parking and loading access, and BP pick-up/drop-off zones are not shown in these diagrams



Bus and bus passenger pick-up/drop-off circulation

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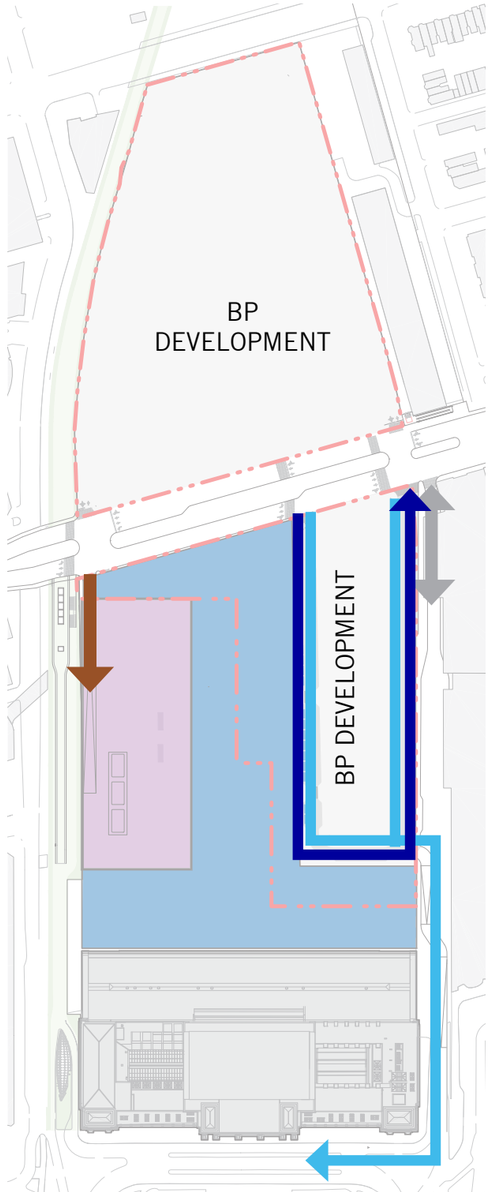
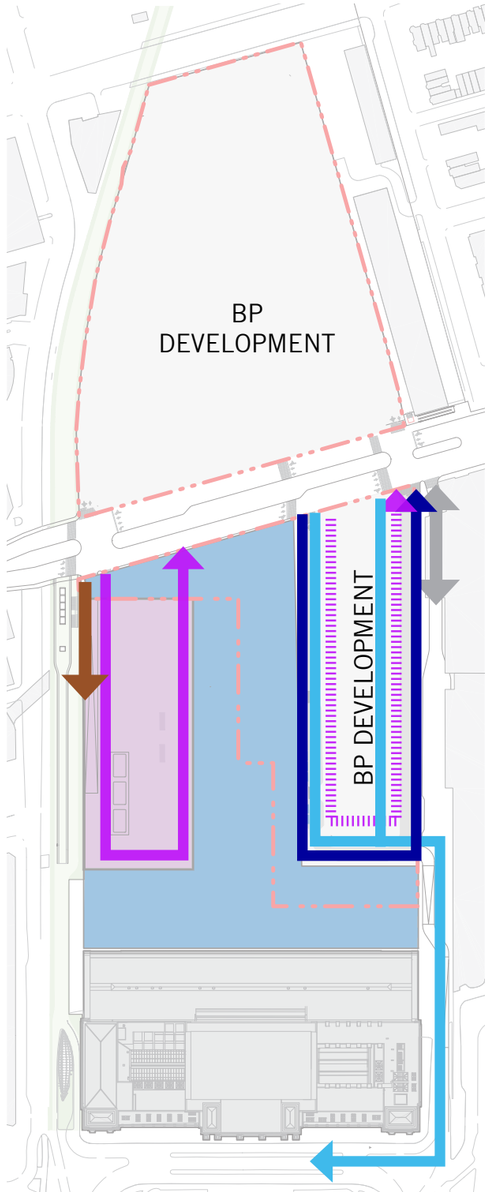


Station parking and pick-up/drop-off circulation

=



Combined circulation

Severe Impact

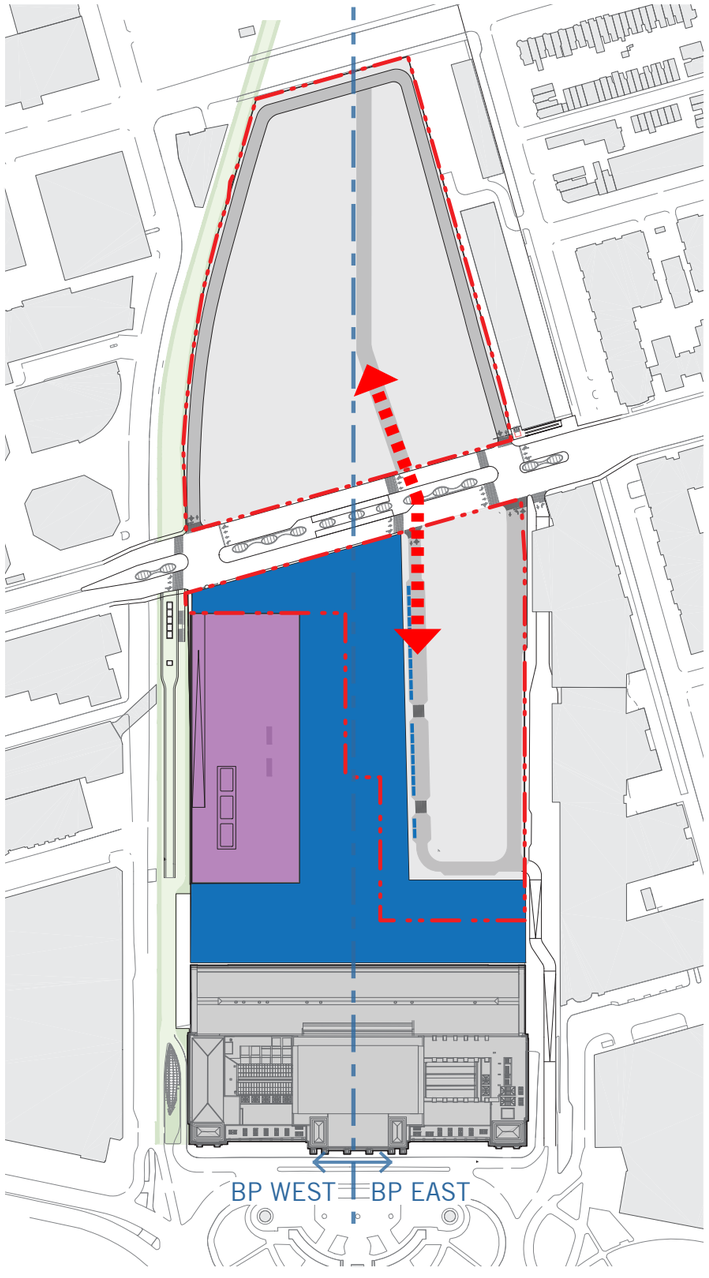
Circulation network and turning movements at acceptable levels of service

- **Intersections potentially infeasible**
- **Unsafe and undesirable pedestrian environment**
- **Pick-up/drop-off circulation overwhelms the SE parcel**
- **Station parking in/out and bus circulation overwhelm the SW parcel**
- **BP parking access, pick-up/ drop-off and loading activities, if depicted, would further demonstrate station circulation impacts**

- Bus in/out
- Bus passenger pick-up/drop-off
- Columbus Circle pick-up/drop-off
- Train Hall pick-up/drop-off
- Station parking in/out
- Station east loading dock access

AKRIDGE Invested.

Design Requirement 2 - Functional circulation network



BP Property Line

Severe Impact

Primary central street connecting north and south parcels

- **Central street located too far east, limiting BP parcel size and density distribution on the east**
- **Removed from the apex of H Street**
- **Too close to the east service road intersection**
- **Median break at H Street allowing full access to BP is not provided**

Design Requirement 2 - Functional circulation network

Severe Impact

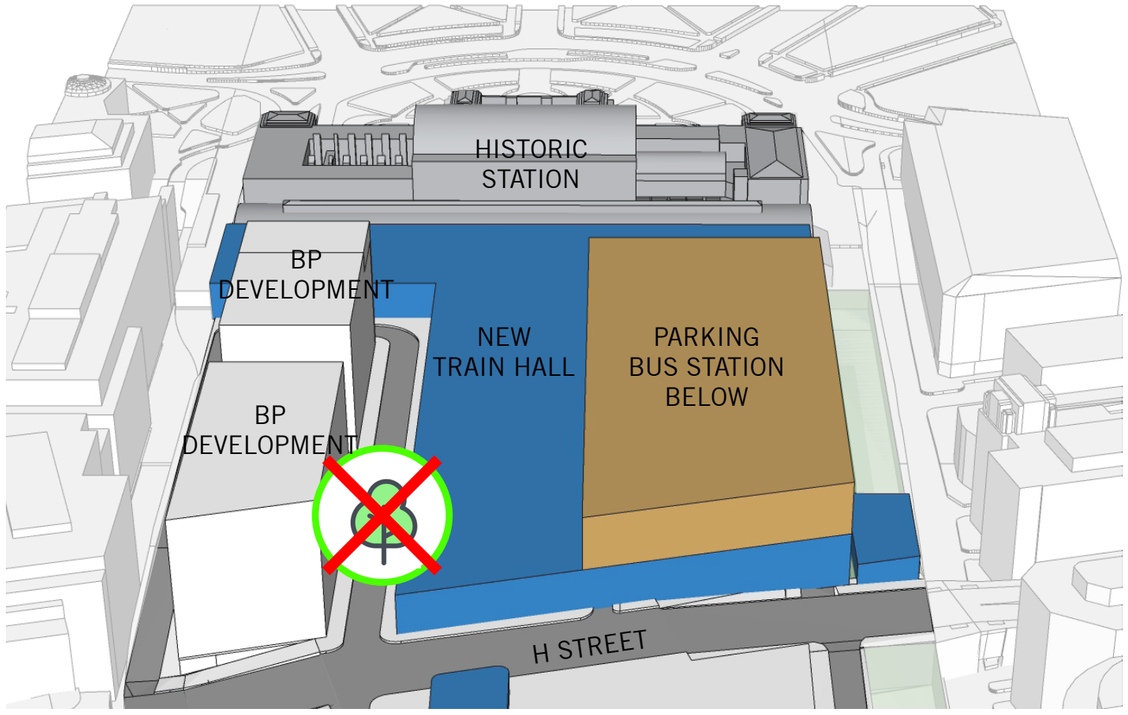
Safe, active and interconnected pedestrian areas

- Inactivated 660’ of Train Hall facade, adjacent to major vehicular dominated zone
- Unsafe and undesirable pedestrian environment resembling airport style pick-up/drop-off zone
- Pedestrian circulation routes diminished by Train Hall, bus station, and vehicular pick-up/drop-off

Ronald Reagan National Airport drop-off zone

New H Street Entrance, Alternative A & B view looking south towards historic Station
*with color enhancements
WUSEP March 22, 2018

Design Requirement 3 - Strategically positioned open spaces



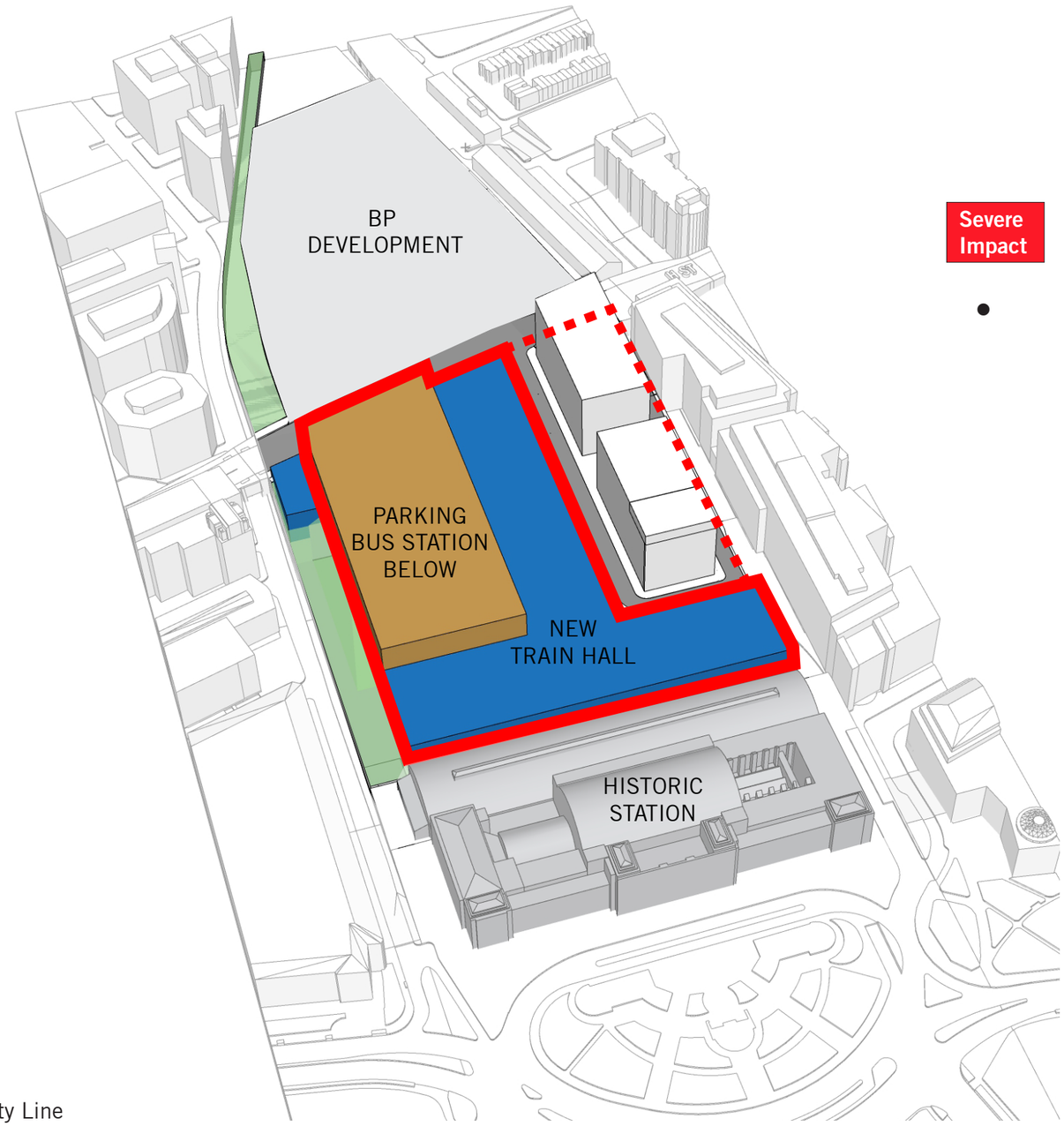
View looking south

Severe Impact

Distribute open spaces north and south of H Street

- **Opportunity for BP open space and placemaking eliminated south of H Street**

Design Requirement 3 - Strategically positioned open spaces



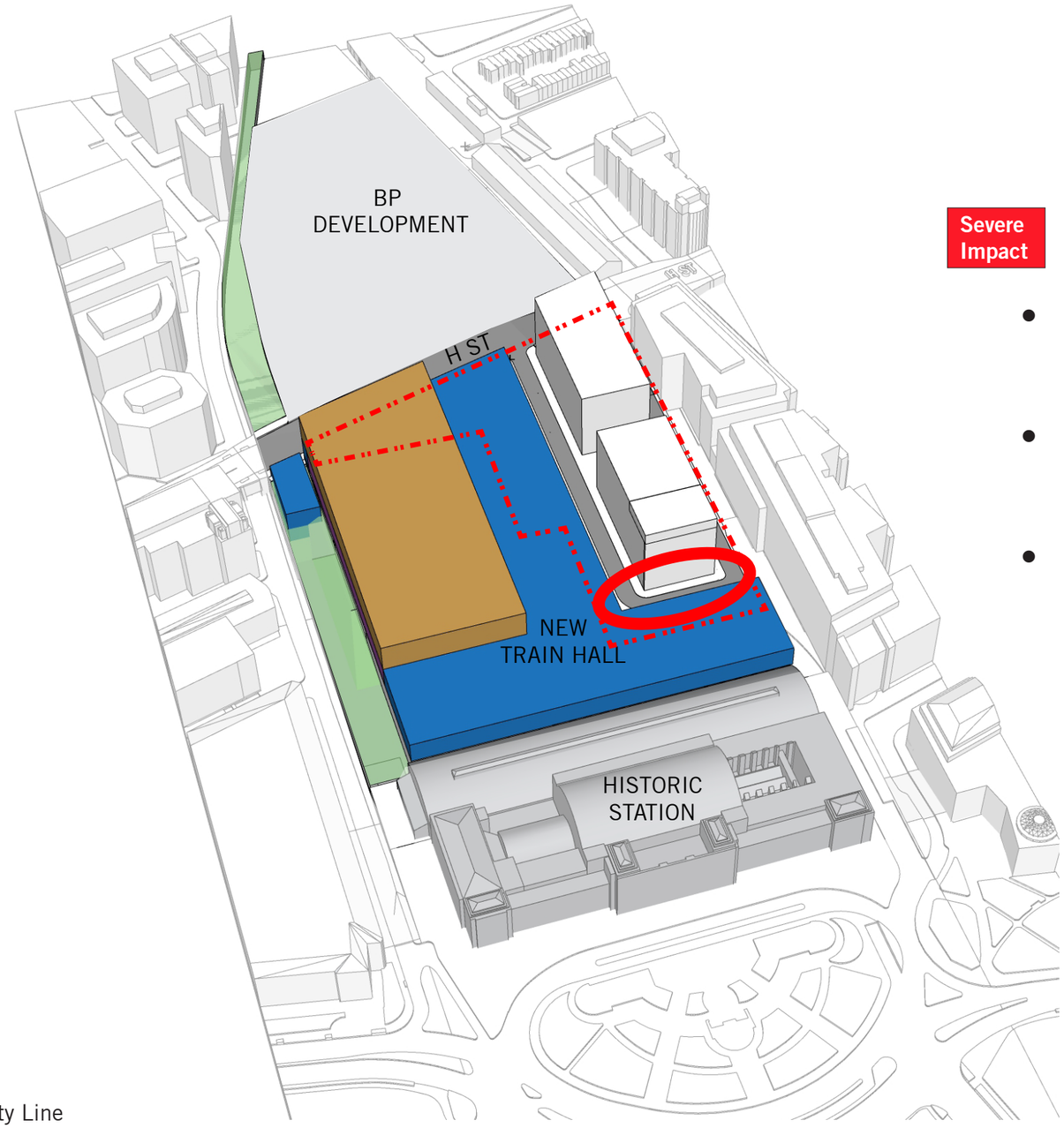
BP Property Line

Severe Impact

World-class placemaking

- **Station function covers 73% of area between H Street and the historic Station, overwhelming the south parcel**

Design Requirement 4 - Adequate light, air, and views in key locations



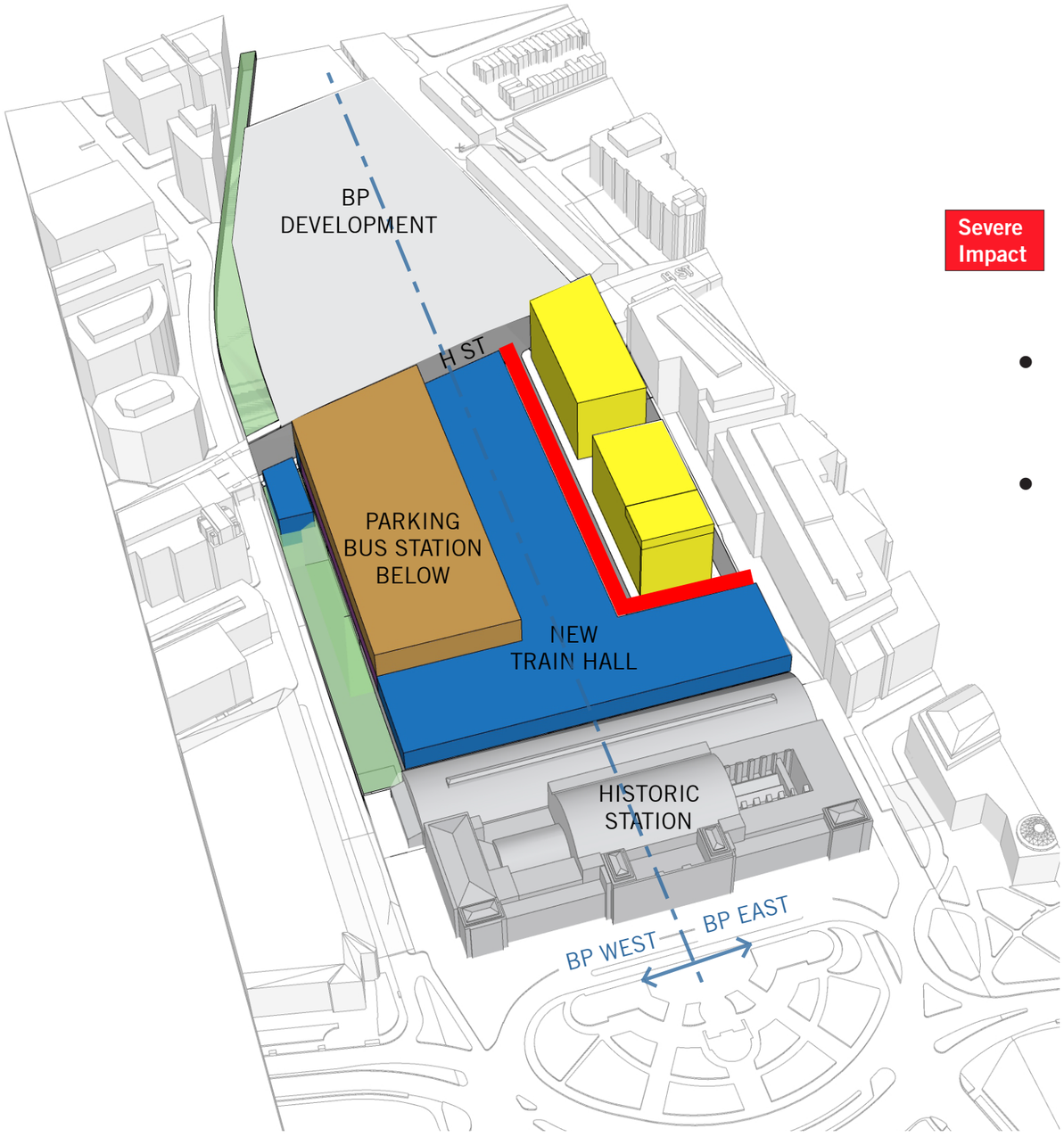
BP Property Line

Severe Impact

Maximize views to the Capitol and historic Station

- **Diminished footprint area and south exposure of BP development reduces views in key locations**
- **Size and scale of Train Hall significantly impact ground level, public views of Station and Capitol**
- **BP south exposure reduced by over 75%**

Design Requirement 5 - Harmonious public and private projects

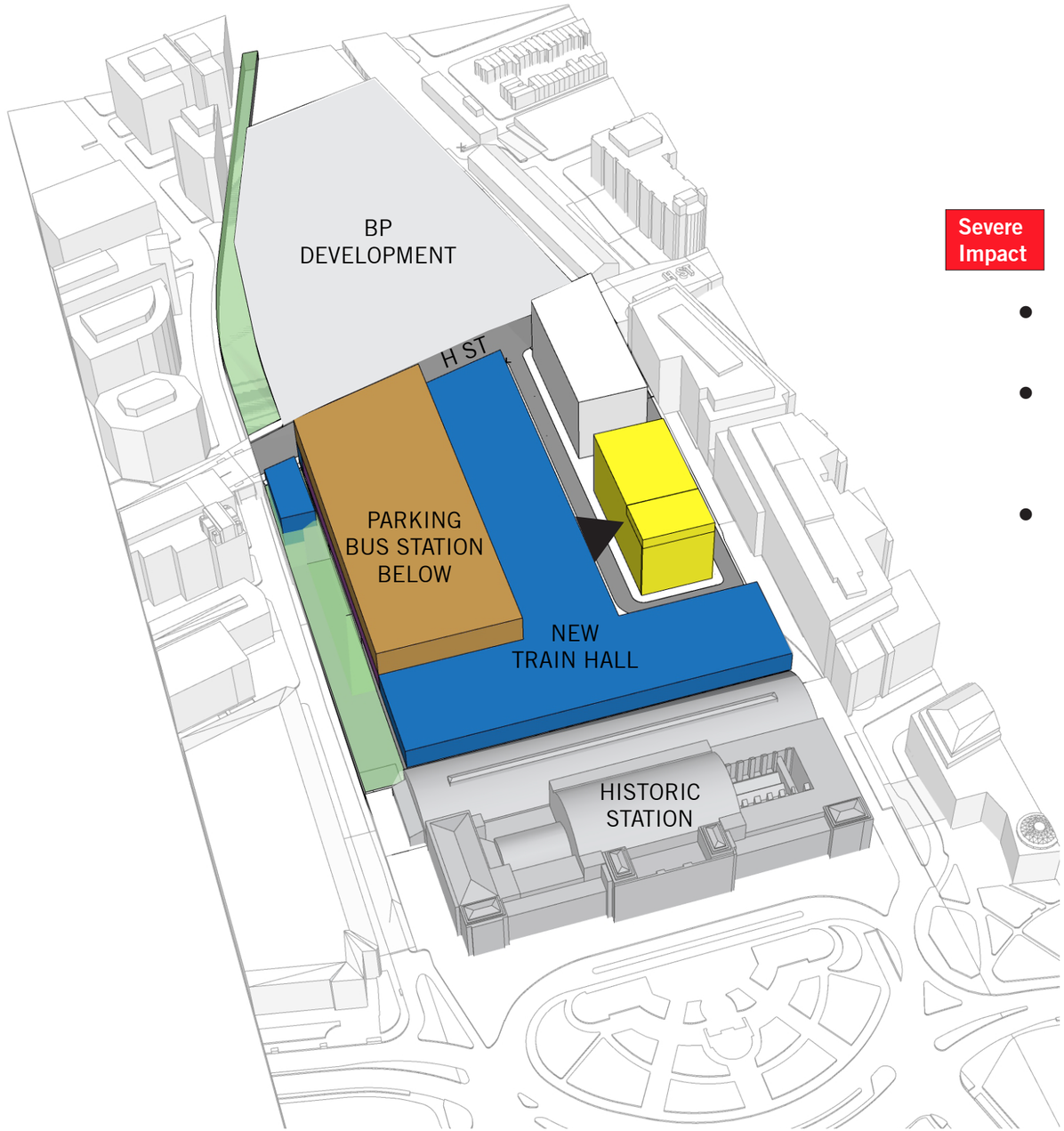


Severe Impact

World-class BP and Station projects complement one another

- **BP development and Station confined to separate precincts with no symbiotic relationship**
- **Balanced integration of BP development and Station not possible due to size, scale, location, orientation, and access to Train Hall and bus station**

Design Requirement 5 - Harmonious public and private projects



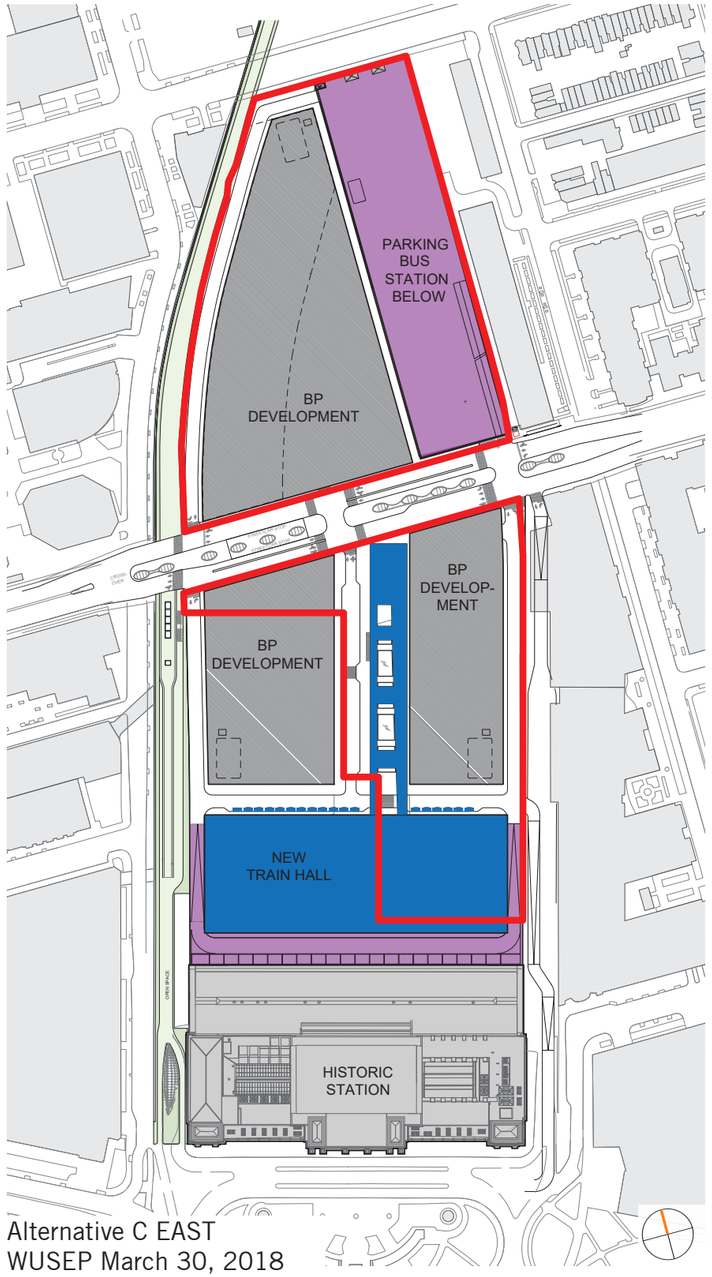
Severe Impact

Easy-to-find entrances to BP buildings and Station

- **BP south parcel lacks identity from H Street**
- **BP buildings isolated and screened by major vehicular dominated zone**
- **Key sight-lines to south BP parcel eliminated**

ALTERNATIVE C EAST/WEST

Summary of Impacts
ALTERNATIVE C EAST (WEST similar)
(Preliminary Alternative 4B)



Alternative C EAST
WUSEP March 30, 2018

Impacted BP Design Requirements

Design Requirements	Sub-requirements	
1. ADEQUATE DEVELOPMENT OPPORTUNITY	Sufficient and high-quality overall density	
	Efficient scale BP building pads	
	Distribute density throughout BP and achieve effective phased development	
	Maximize H Street frontage	
2. FUNCTIONAL CIRCULATION NETWORK	Circulation network and turning movements at acceptable levels of service	
	Primary central street connecting north and south parcels	
	Vehicular access to front doors, service, and parking areas	
	Safe, active and interconnected pedestrian areas	
3. STRATEGICALLY POSITIONED OPEN SPACES	Distribute north and south of H Street	
	World-class placemaking	
4. ADEQUATE LIGHT, AIR, AND VIEWS IN KEY LOCATIONS	Maximize views to the Capitol and historic Station	
	Building separation, solar access, and sight-lines compatible with high-quality mixed-use development	
5. HARMONIZED PUBLIC AND PRIVATE PROJECTS	World-class BP and Station components complement one another	
	Multiple and gracious pedestrian connections between BP, Station, and surrounding neighborhoods	Insufficient information to evaluate
	Easy-to-find entrances to BP buildings and Station	

BP Property Line

- Insufficient information to evaluate
- Potentially compatible
- Moderate impact
- Severe impact

BURNHAM PLACE

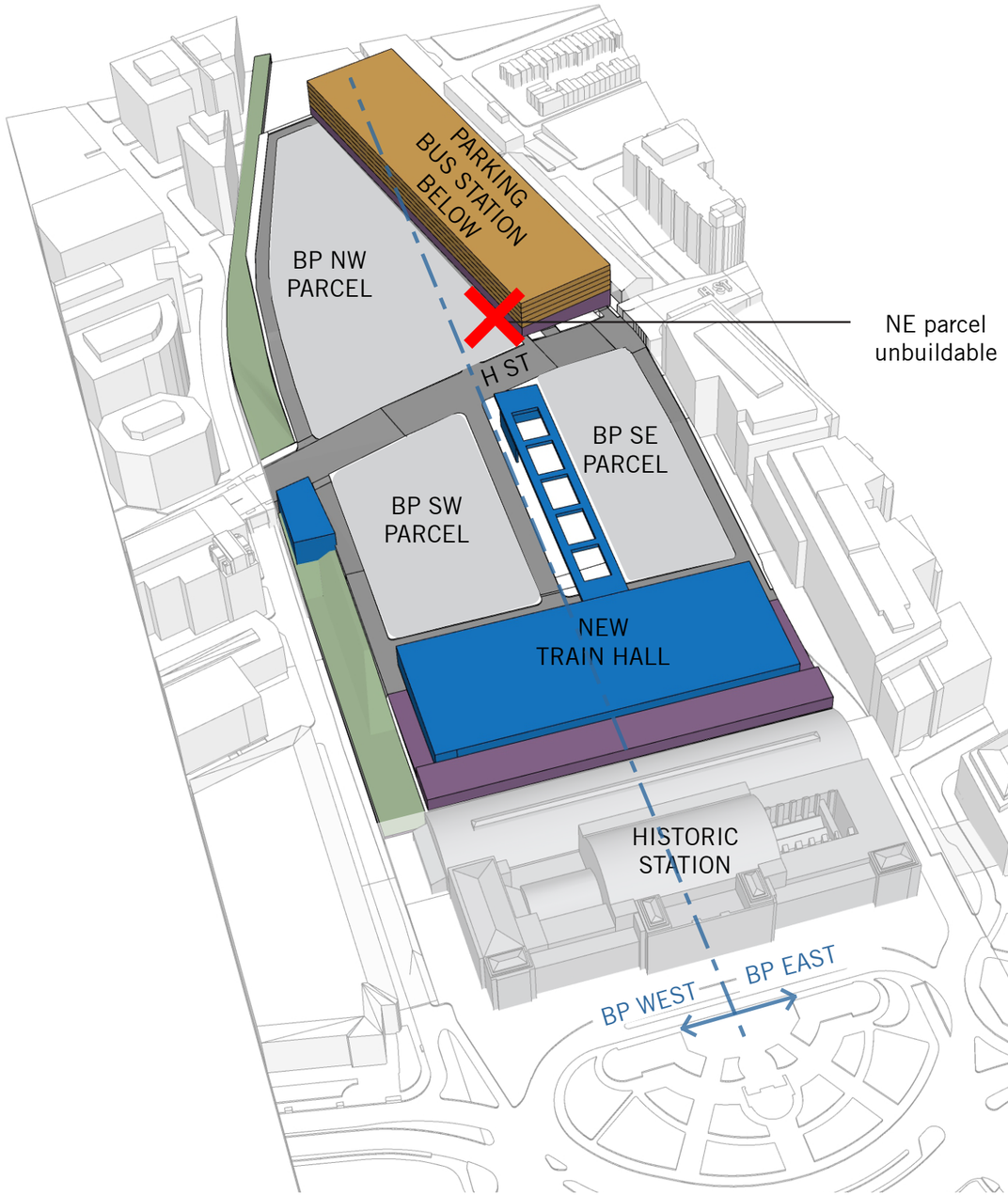
WASHINGTON, D.C. | 07/23/2018 |

AKRIDGE Invested.

shalom baranes associates | architects

Impacted Design Requirement
ALTERNATIVE C EAST (WEST similar)

Design Requirement 1 - Adequate development opportunity



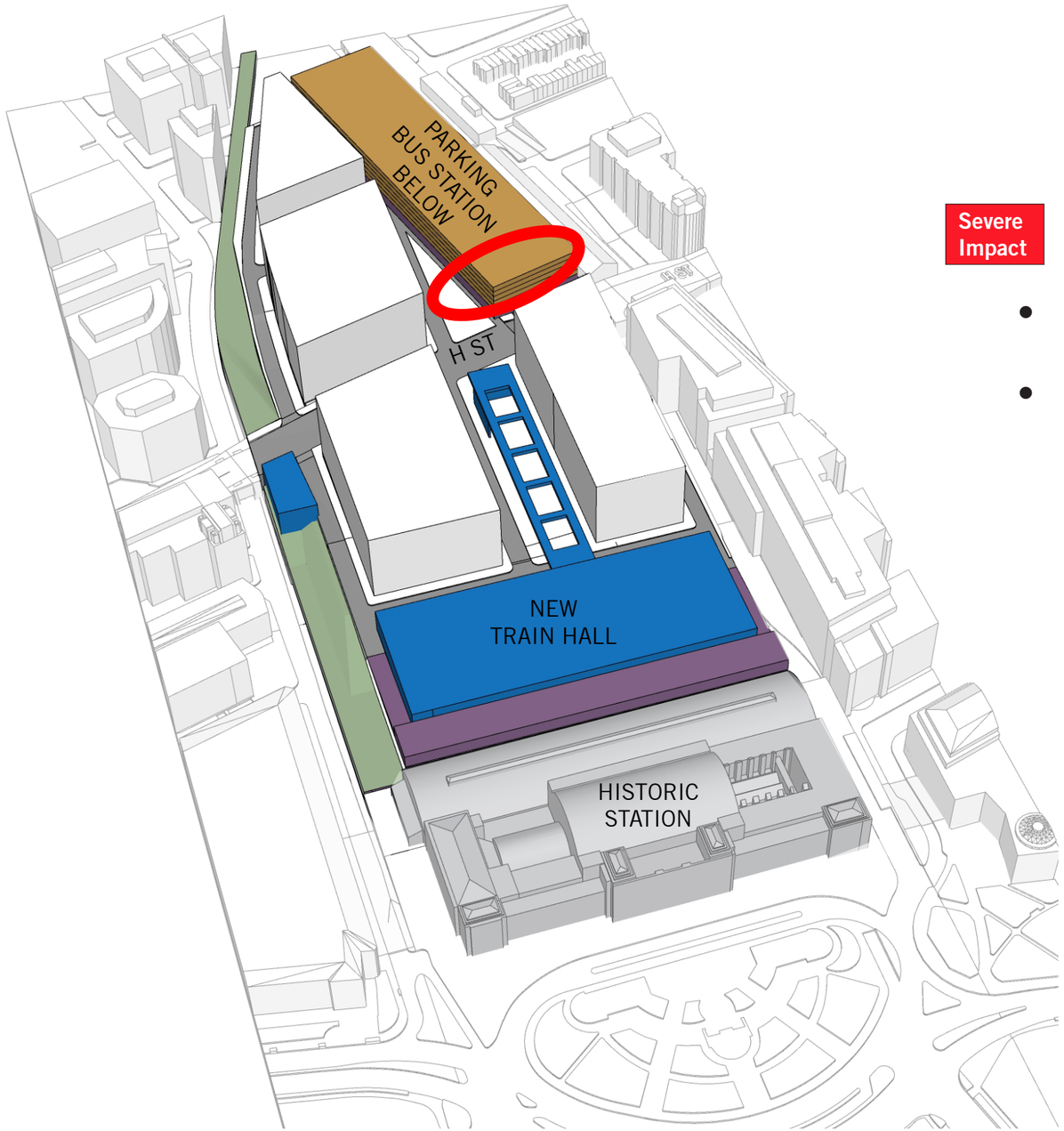
Severe Impact

Distribute density throughout BP to achieve effective, phased development

- **Ineffective density in BP east, the first phase of BP construction**
- **Insufficient developable site area, BP density in NE quadrant eliminated**

Impacted Design Requirement
ALTERNATIVE C EAST (WEST similar)

Design Requirement 1 - Adequate development opportunity



Severe Impact

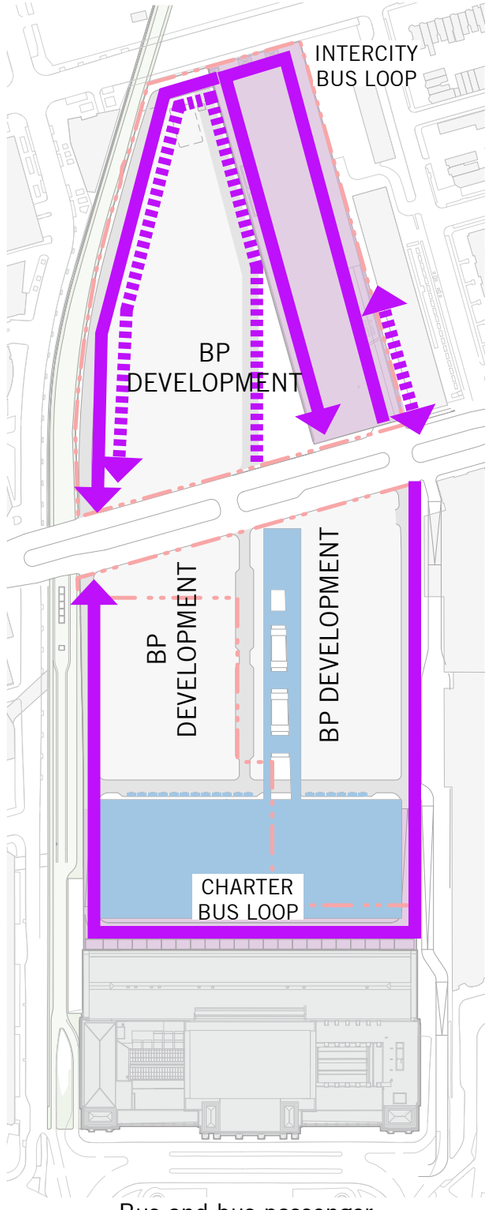
Maximize H Street frontage

- Insufficient BP frontage along the north side of H Street
- Inadequate BP identity on its one public street frontage

Impacted Design Requirement
ALTERNATIVE C EAST (WEST similar)

Design Requirement 2 - Functional circulation network

For illustrative clarity, BP parking and loading access, and BP pick-up/drop-off zones are not shown in these diagrams



Bus and bus passenger pick-up/drop-off circulation

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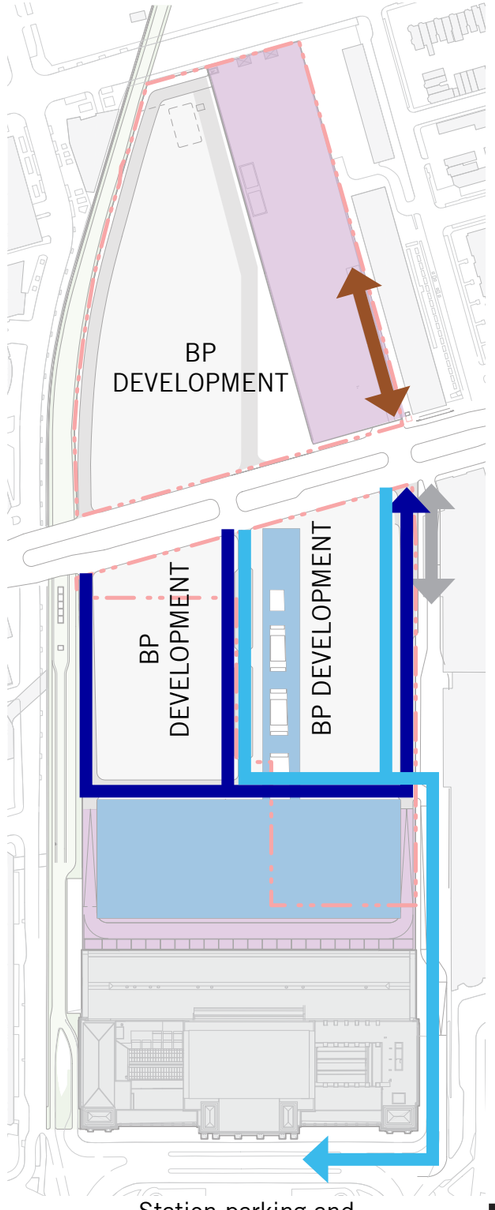

Station parking and pick-up/drop-off circulation

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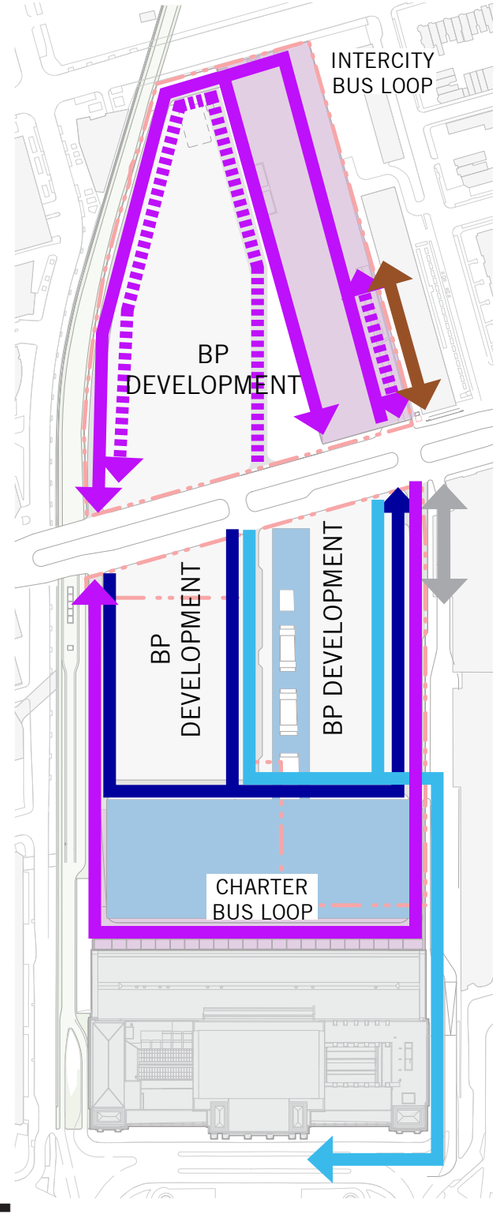


Combined circulation

Severe Impact

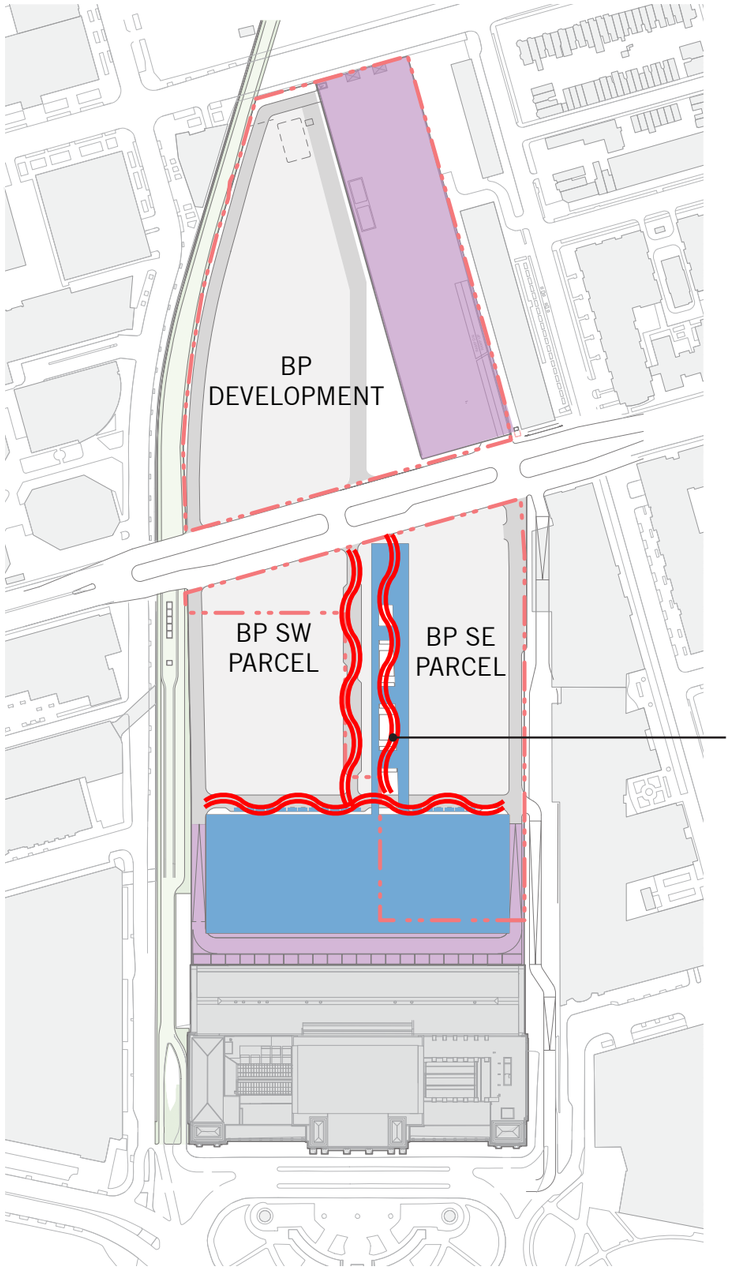
Circulation network and turning movements at acceptable levels of service

- **Intersections infeasible**
- **Unsafe and undesirable pedestrian environment**
- **Pick-up/drop-off circulation overwhelms the south parcel**
- **Station parking overwhelms the NE parcel**
- **Bus circulation overwhelms all four BP quadrants**
- **BP parking access, pick-up/ drop-off and loading activities, if depicted, would further demonstrate station circulation impacts**

- Bus in/out
- Bus passenger pick-up/drop-off
- Columbus Circle pick-up/drop-off
- Train Hall pick-up/drop-off
- Station parking in/out
- Station east loading dock access

AKRIDGE Invested.

Design Requirement 2 - Functional circulation network

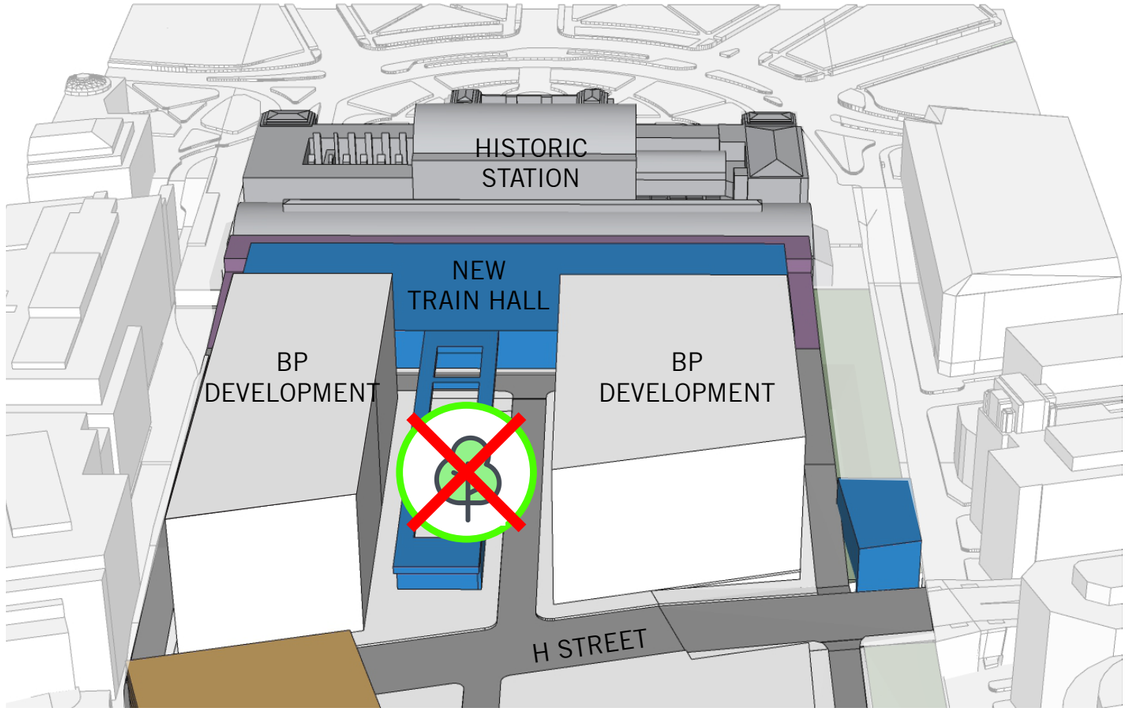


Moderate Impact

Safe, active and interconnected pedestrian areas

- **Train Hall pick-up/drop-off and elevated N-S circulation route separate BP SW and SE quadrants and separate BP from the Train Hall**

Design Requirement 3 - Strategically positioned open spaces



View looking south

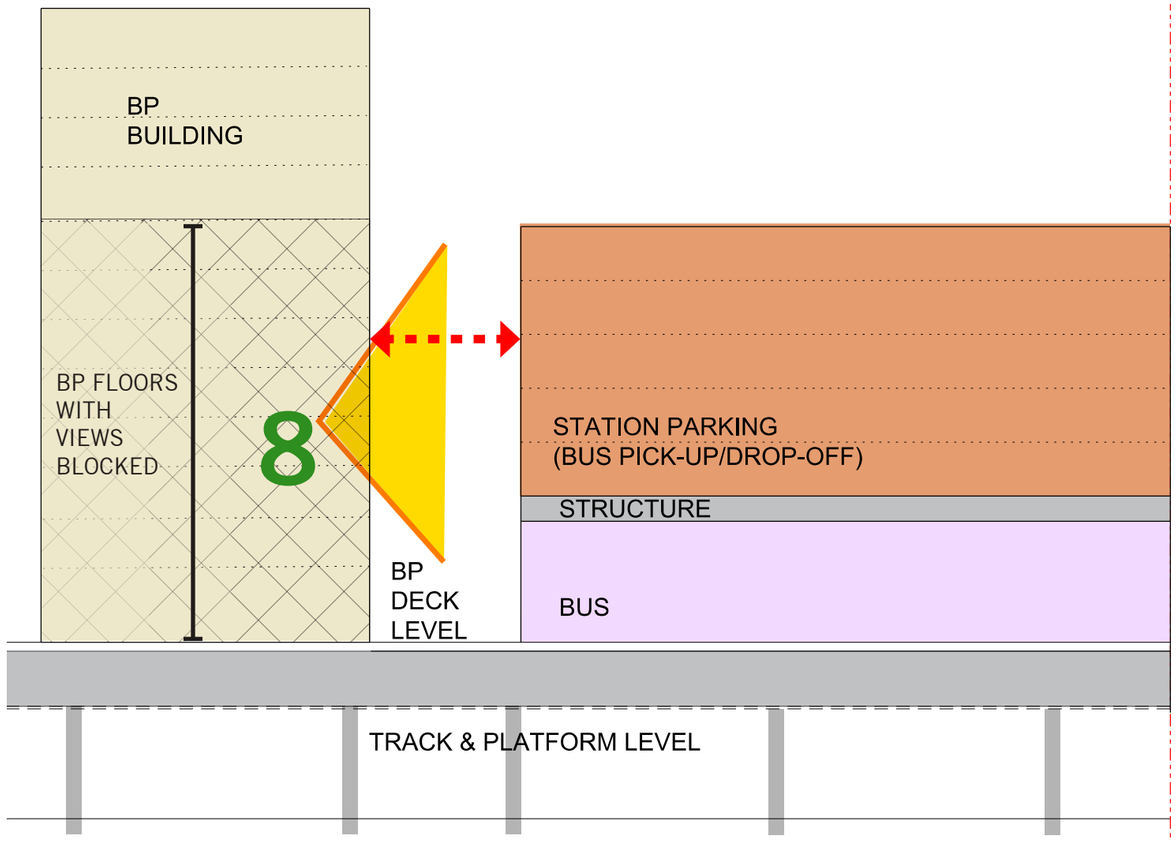
*Impact is similar for Alternatives C, D, E

Moderate Impact

Distribute open spaces north and south of H Street

- **Opportunity for BP open space and placemaking diminished south of H Street**

Design Requirement 4 - Adequate light, air, and views in key locations

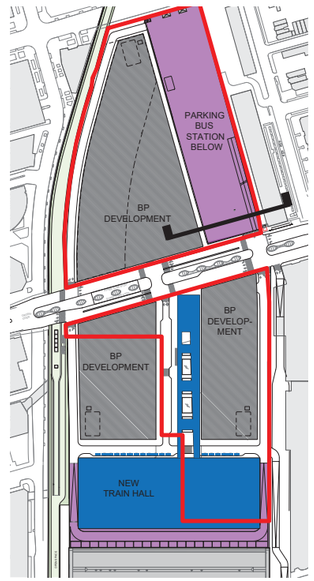


Alternative C E-W Section

Severe Impact

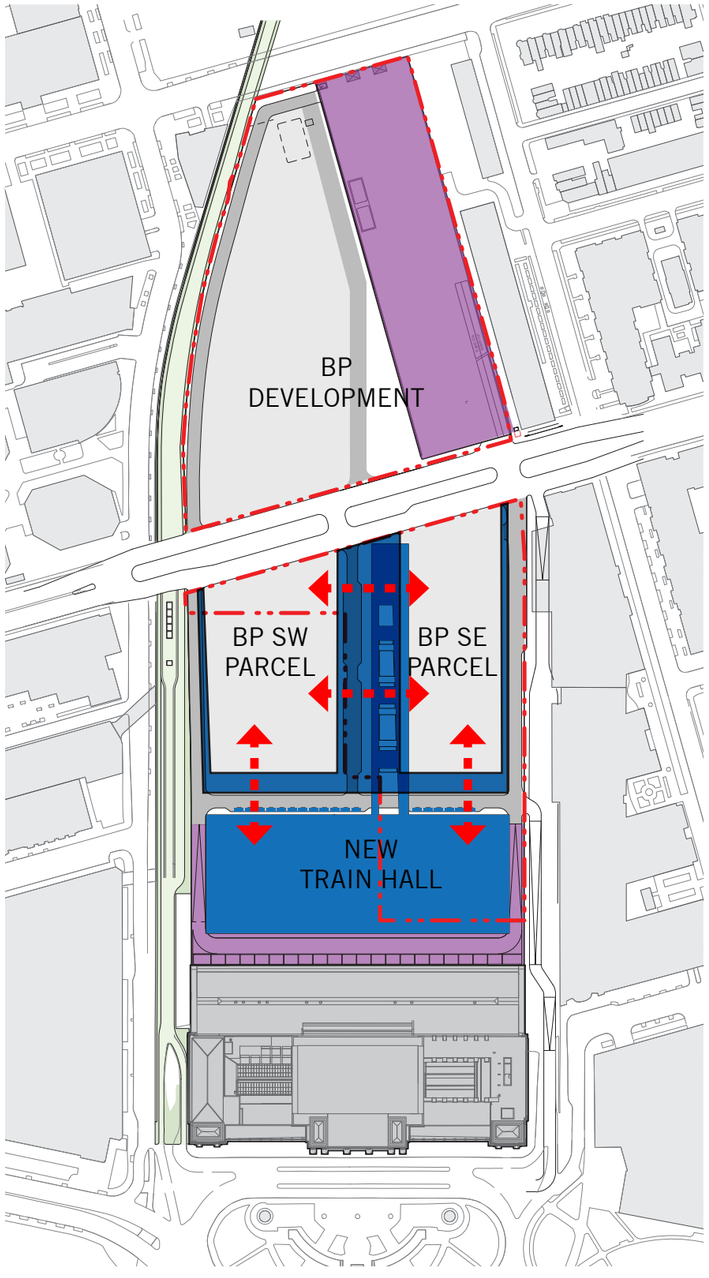
Building separation, solar access, and sight-lines compatible with high-quality mixed-use development

- **Size, scale, and location of bus and parking facility dominate BP north, and interrupt sight-lines to and from BP buildings**
- **BP development would require offset from the bus and parking facility for TVRA and light/air separation requirements**



Key Plan

Design Requirement 5 - Harmonious public and private projects



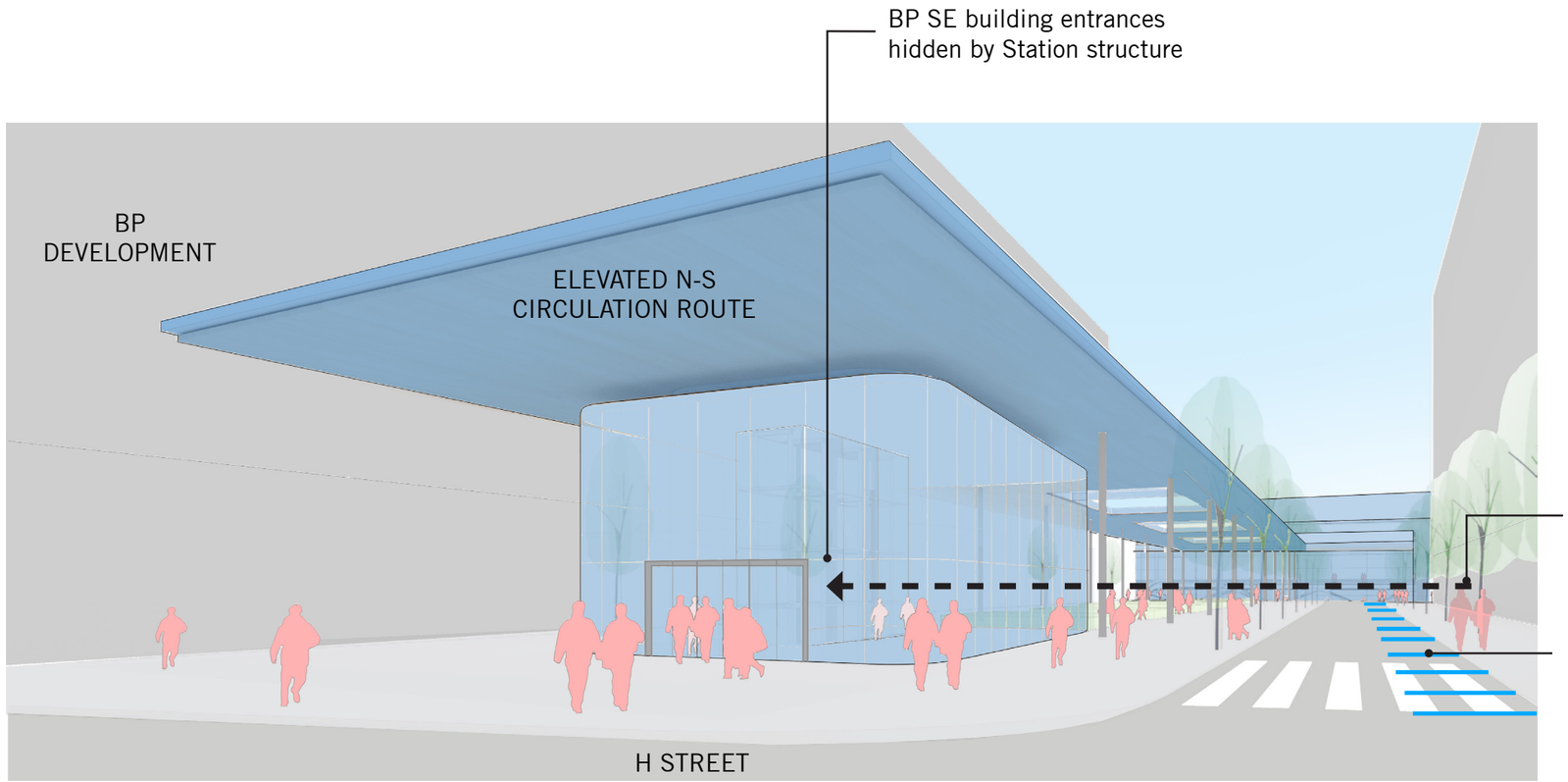
BP Property Line

Moderate Impact

World-class BP and Station projects complement one another

- **Train Hall, bus pick-up/drop-off and elevated N-S circulation route separate BP SW and SE quadrants and separate BP from the Train Hall, preventing effective integration of the public and private projects**

Design Requirement 5 - Harmonious public and private projects



View looking south toward the headhouse from H Street
*with color enhancements
WUSEP March 22, 2018

*Impact is similar for Alternatives C, D, E

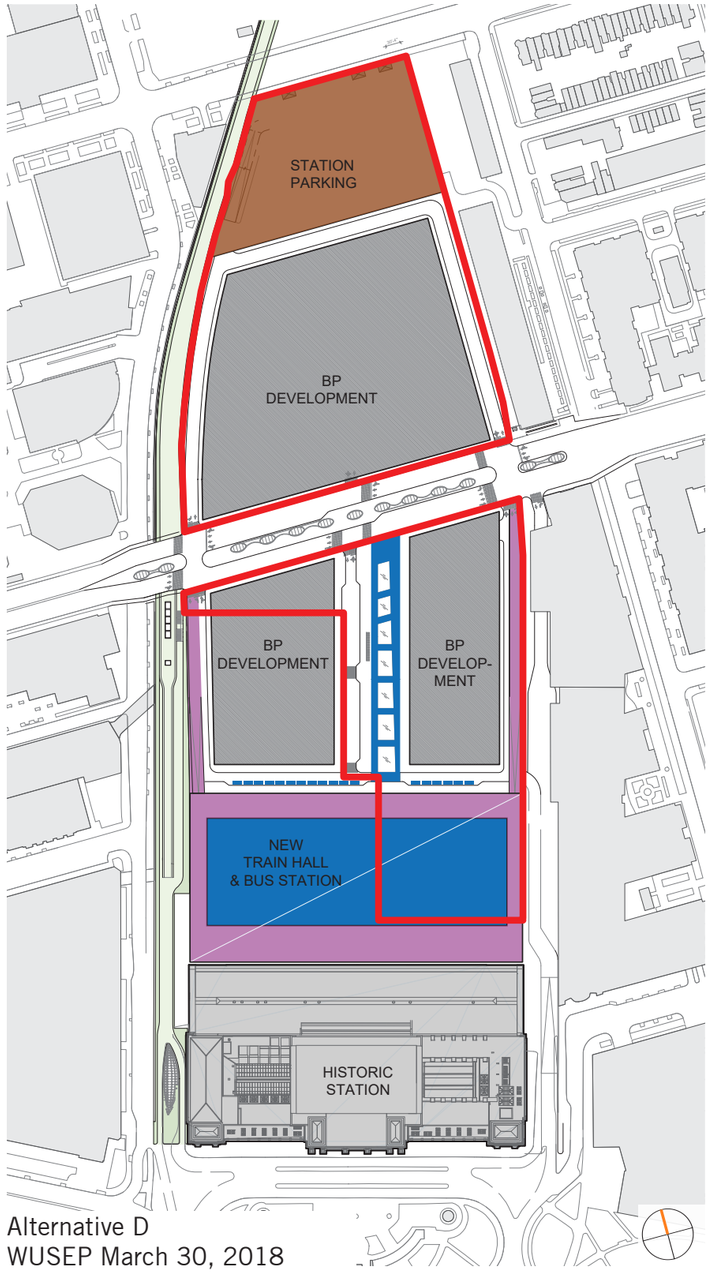
Moderate Impact

Easy-to-find entrances to BP buildings and Station

- **Vehicular and visual access to BP buildings south of H Street compromised by continuous elevated N-S circulation route**
- **Access to BP building front doors in SE parcel separated by elevated N-S circulation route**

ALTERNATIVE D

Summary of Impacts
ALTERNATIVE D



Alternative D
WUSEP March 30, 2018

Impacted BP Design Requirements

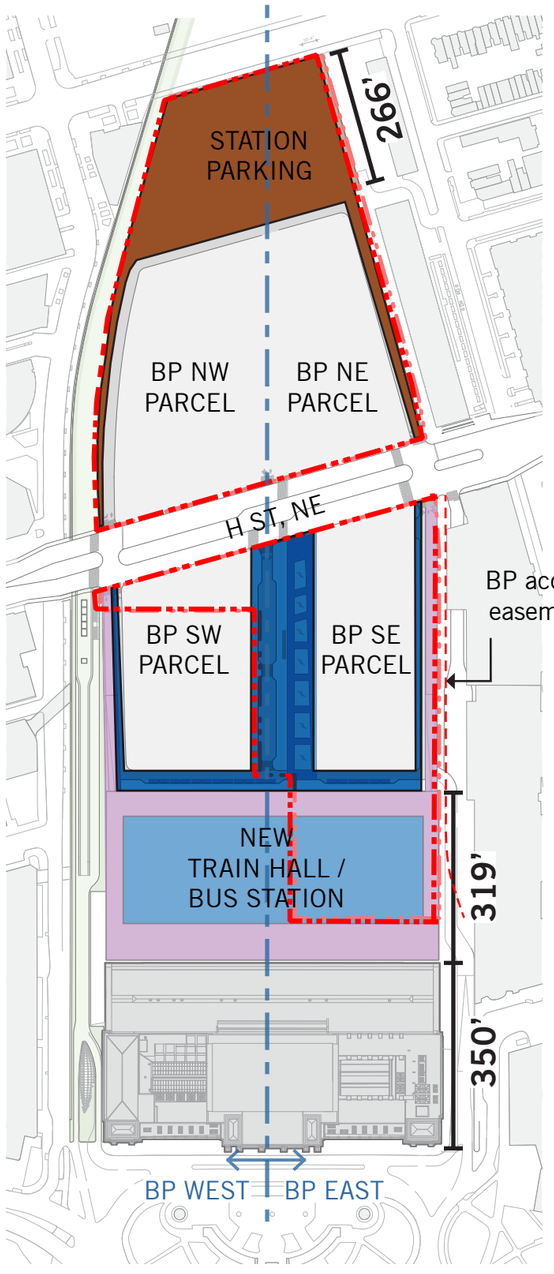
Design Requirements	Sub-requirements	
1. ADEQUATE DEVELOPMENT OPPORTUNITY	Sufficient and high-quality overall density	
	Efficient scale BP building pads	
	Distribute density throughout BP and achieve effective phased development	
	Maximize H Street frontage	
2. FUNCTIONAL CIRCULATION NETWORK	Circulation network and turning movements at acceptable levels of service	
	Primary central street connecting north and south parcels	
	Vehicular access to front doors, service, and parking areas	
	Safe, active and interconnected pedestrian areas	
3. STRATEGICALLY POSITIONED OPEN SPACES	Distribute north and south of H Street	
	World-class placemaking	
4. ADEQUATE LIGHT, AIR, AND VIEWS IN KEY LOCATIONS	Maximize views to the Capitol and historic Station	
	Building separation, solar access, and sight-lines compatible with high-quality mixed-use development	
5. HARMONIZED PUBLIC AND PRIVATE PROJECTS	World-class BP and Station components complement one another	
	Multiple and gracious pedestrian connections between BP, Station, and surrounding neighborhoods	Insufficient information to evaluate
	Easy-to-find entrances to BP buildings and Station	

BP Property Line

Insufficient information to evaluate
Potentially compatible
Moderate impact
Severe impact

AKRIDGE Invested.

Design Requirement 1 - Adequate development opportunity

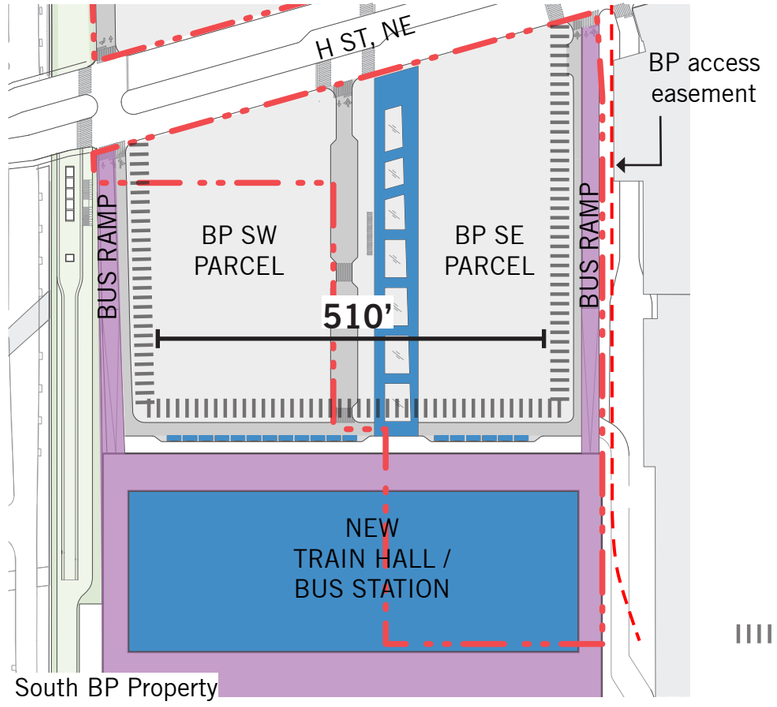


BP Property Line

Severe Impact

Sufficient and high-quality overall density

- **Station parking size in addition to bus/Train Hall size diminish overall development density and quality**
- **Expansive bus ramps on east and west diminish development opportunity/density**
- **Bus ramp on east eliminates use of BP access easement and results in loss of BP development**

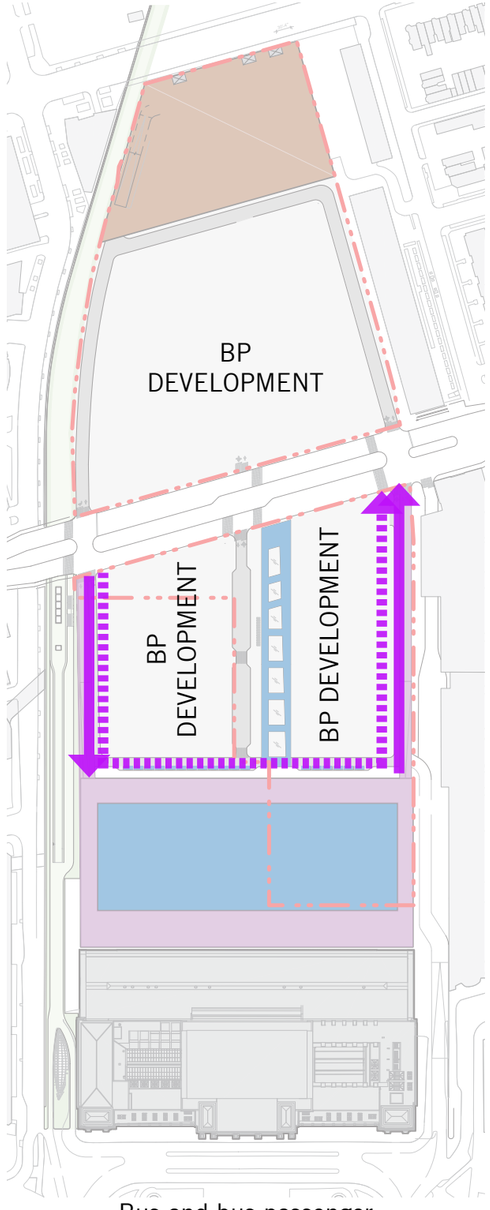


BP Road Network

Impacted Design Requirement
ALTERNATIVE D

Design Requirement 2 - Functional circulation network

For illustrative clarity, BP parking and loading access, and BP pick-up/drop-off zones are not shown in these diagrams



Bus and bus passenger pick-up/drop-off circulation

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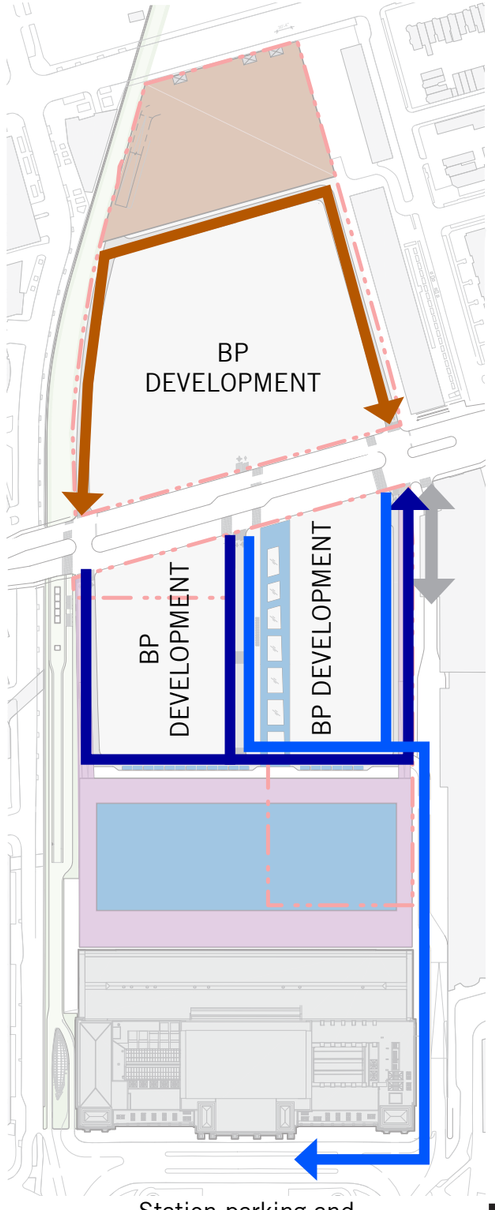

Station parking and pick-up/drop-off circulation

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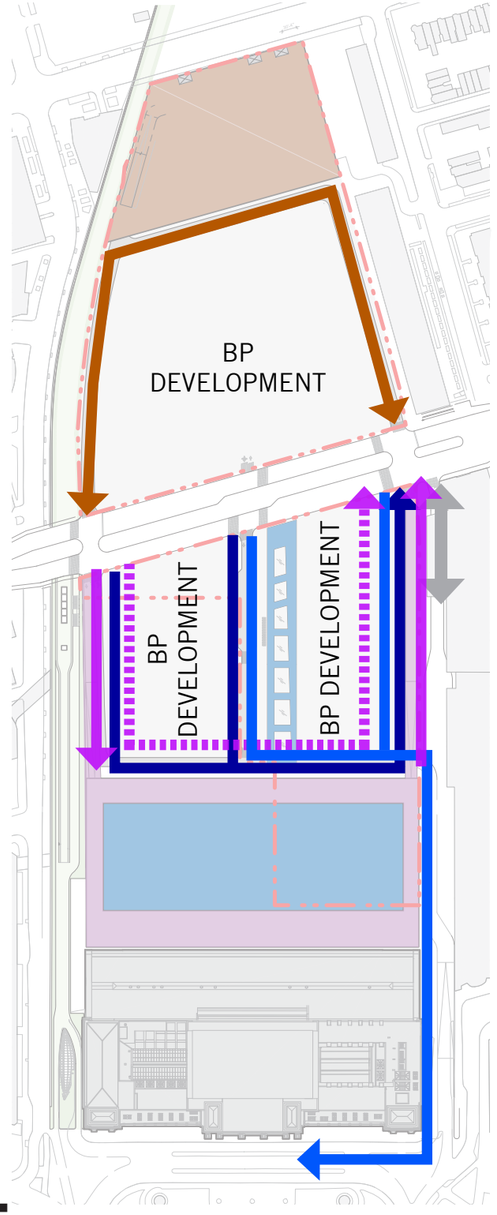


Combined circulation

Severe Impact

Circulation network and turning movements at acceptable levels of service

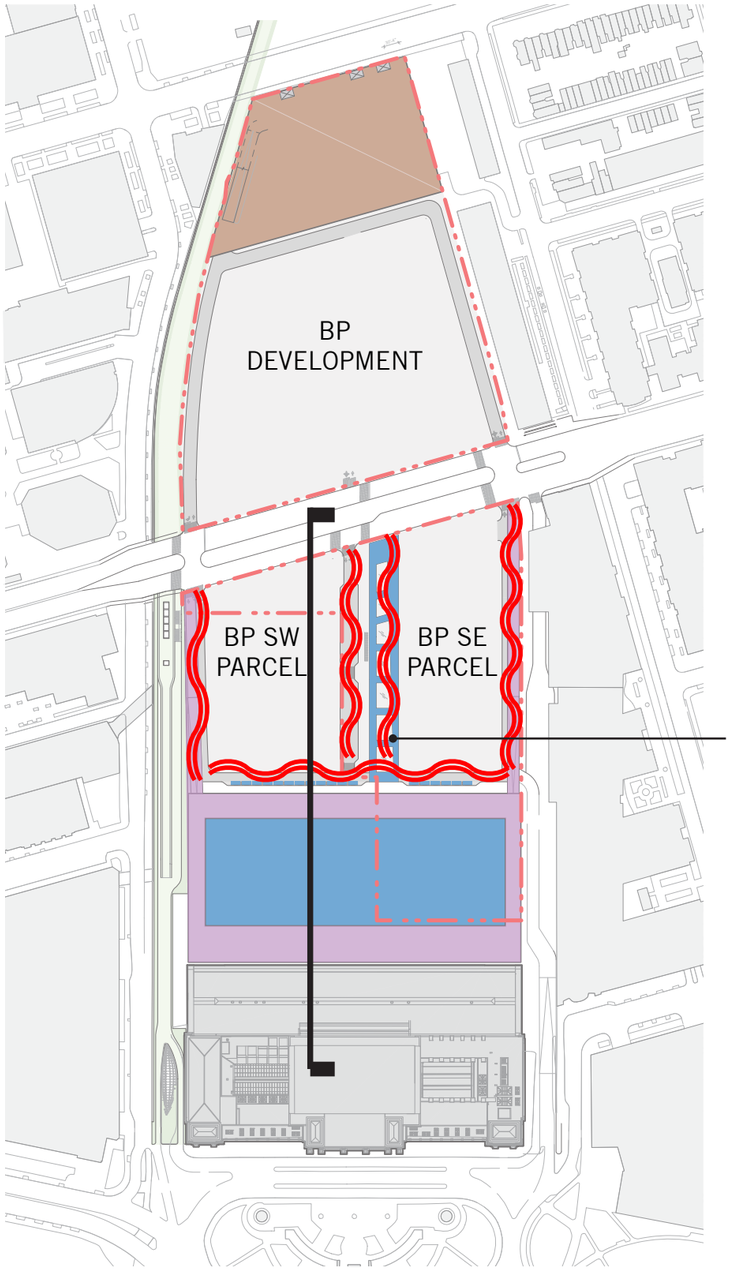
- **Intersections infeasible**
- **Median break at H Street allowing full access to BP is not provided**
- **Unsafe and undesirable pedestrian environment**
- **Expansive bus ramps, pick-up/drop-off overwhelm circulation south of H Street**
- **Station parking in/out overwhelms circulation north of H Street**
- **BP parking access, pick-up/ drop-off and loading activities, if depicted, would further demonstrate station circulation impacts**

- Bus in/out
- Bus passenger pick-up/drop-off
- Columbus Circle pick-up/drop-off
- Train Hall pick-up/drop-off
- Station parking in/out
- Station east loading dock access

AKRIDGE Invested.

Impacted Design Requirement
ALTERNATIVE D

Design Requirement 2 - Functional circulation network



*Impact is similar for Alternatives D and E

Moderate Impact

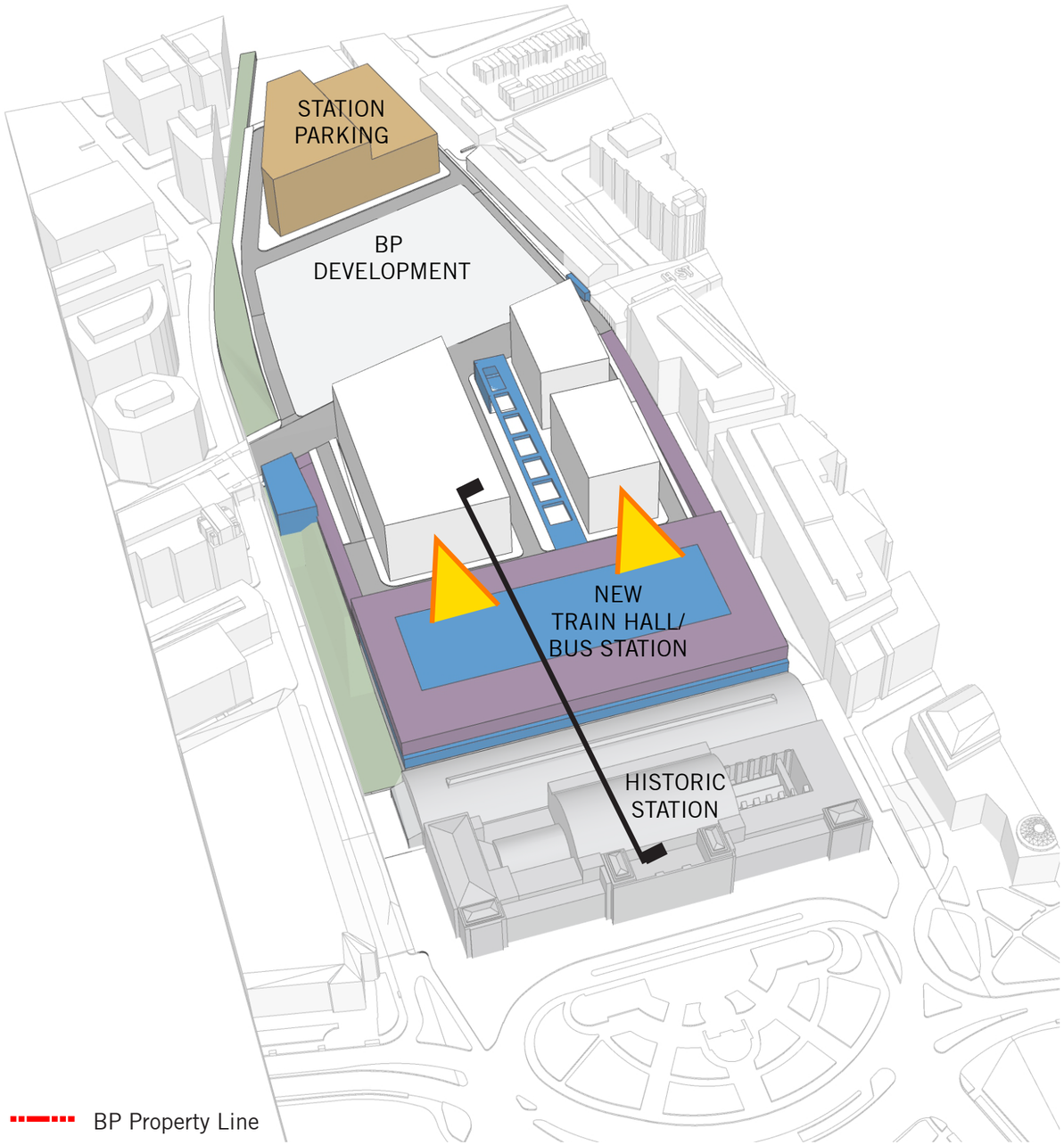
Safe, active and interconnected pedestrian areas

- **Train Hall pick-up/drop-off and elevated N-S circulation route separate BP SW and SE quadrants and separate BP from the Train Hall**

- **Expansive bus ramps separate BP from Greenway on the west, and BP from open space between Station Place on the east**

Impacted Design Requirement
ALTERNATIVE D

Design Requirement 4 - Adequate light, air, and views in key locations



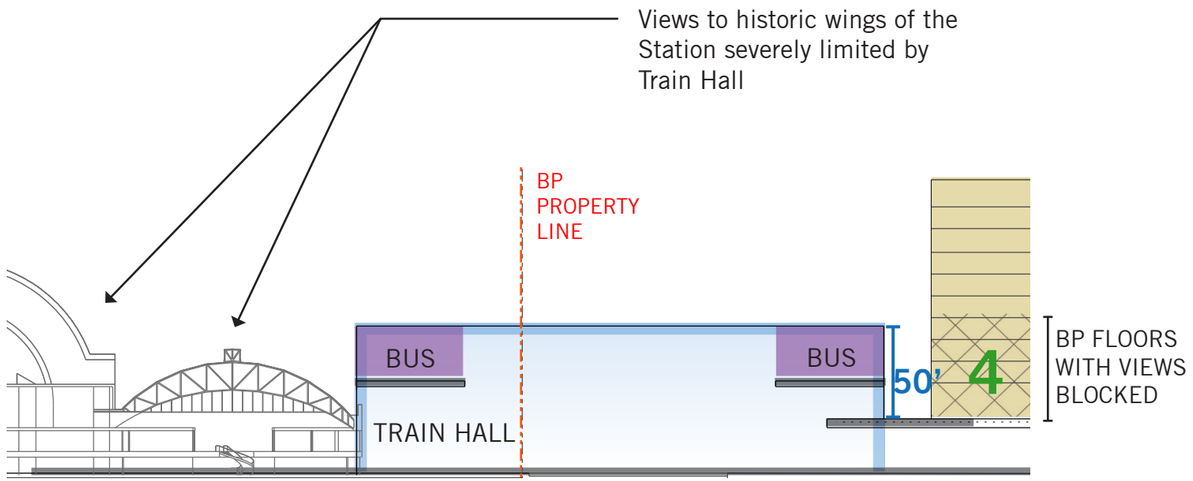
BP Property Line

*Impact is similar for Alternatives D and E

Severe Impact

Maximize views to Capitol and historic Station

- **Bus terminal constrains Train Hall design**
  - **Northern station facade characterized by buses**
  - **Increased height blocks views to south**



Alternative D N-S Section

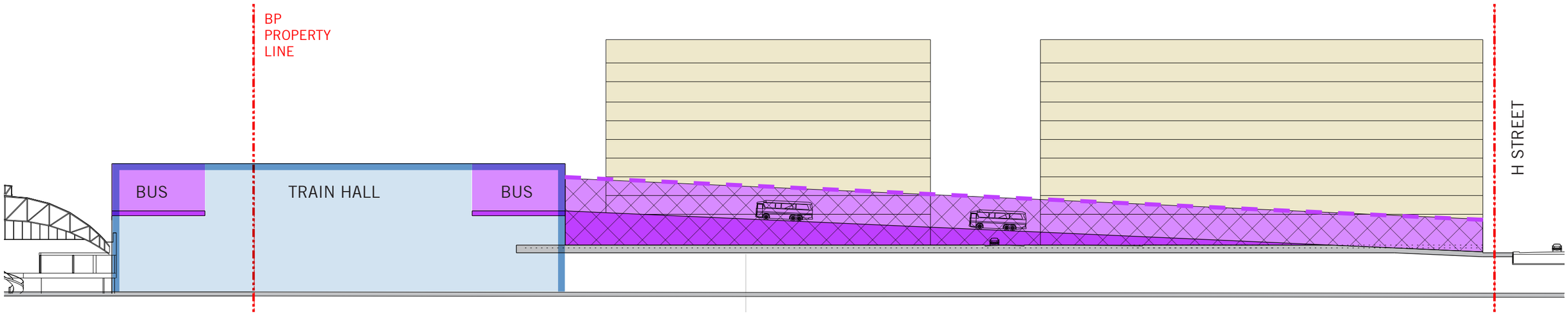
Design Requirement 4 - Adequate light, air, and views in key locations

*Impact is similar for Alternatives D and E

Severe Impact

Building separation, solar access, and sight-lines compatible with high-quality mixed-use development

- **Expansive bus ramps separate BP from Greenway on the west, and BP from open space between Station Place on the east**



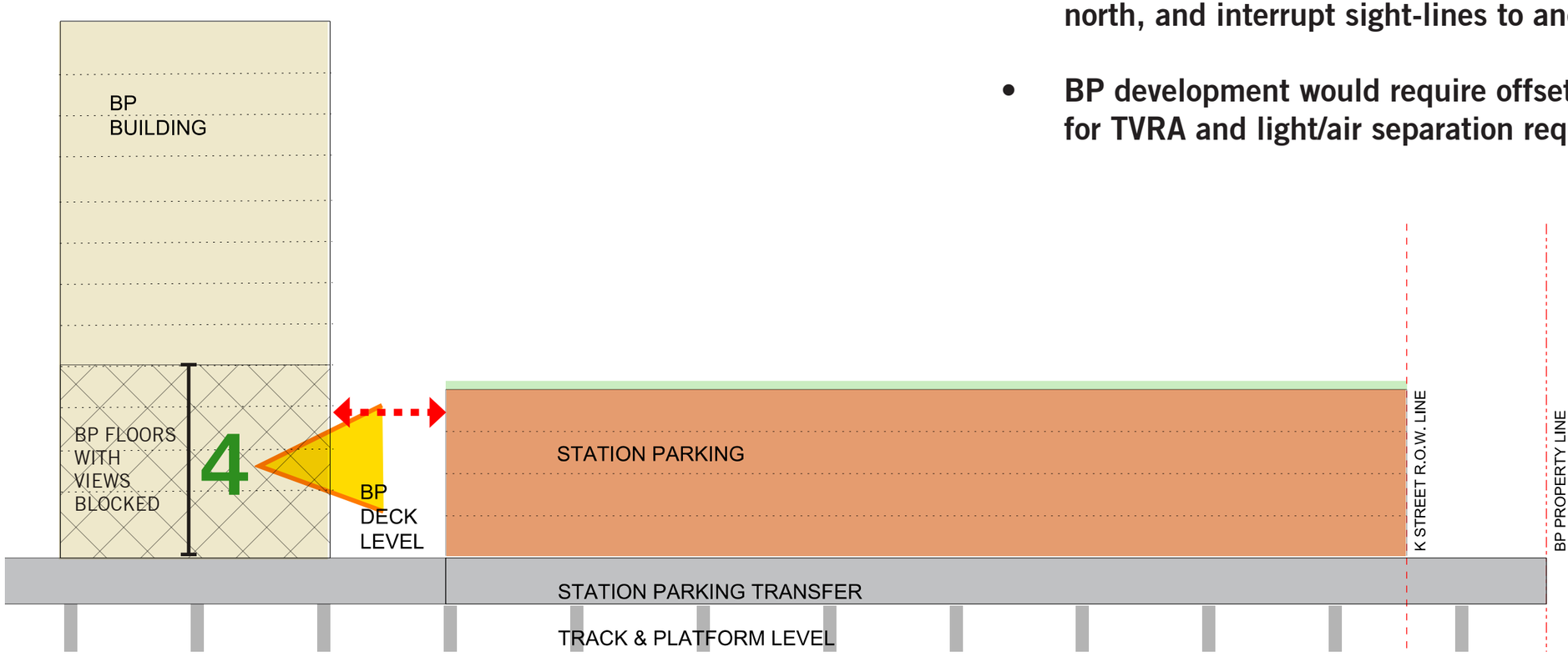
Alternative E N-S Section

Design Requirement 4 - Adequate light, air, and views in key locations

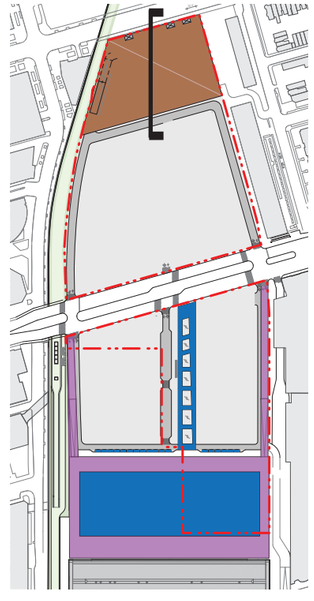
Severe Impact

Building separation, solar access, and sight-lines compatible with high-quality mixed-use development

- **Size, scale, and location of bus and parking facility dominate BP north, and interrupt sight-lines to and from BP buildings**
- **BP development would require offset from the Station parking facility for TVRA and light/air separation requirements**



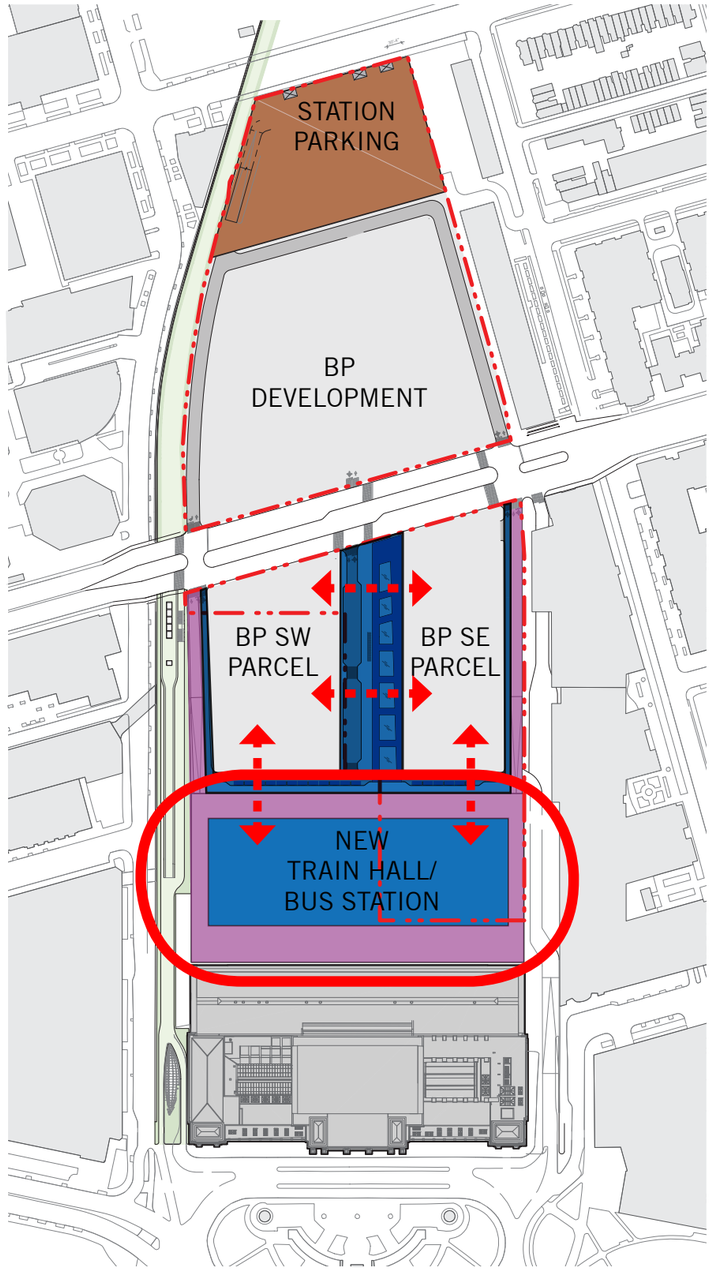
Alternative D N-S Section



Key Plan

Impacted Design Requirement
ALTERNATIVE D

Design Requirement 5 - Harmonious public and private projects



BP Property Line

*Impact is similar for Alternatives D and E

Severe Impact

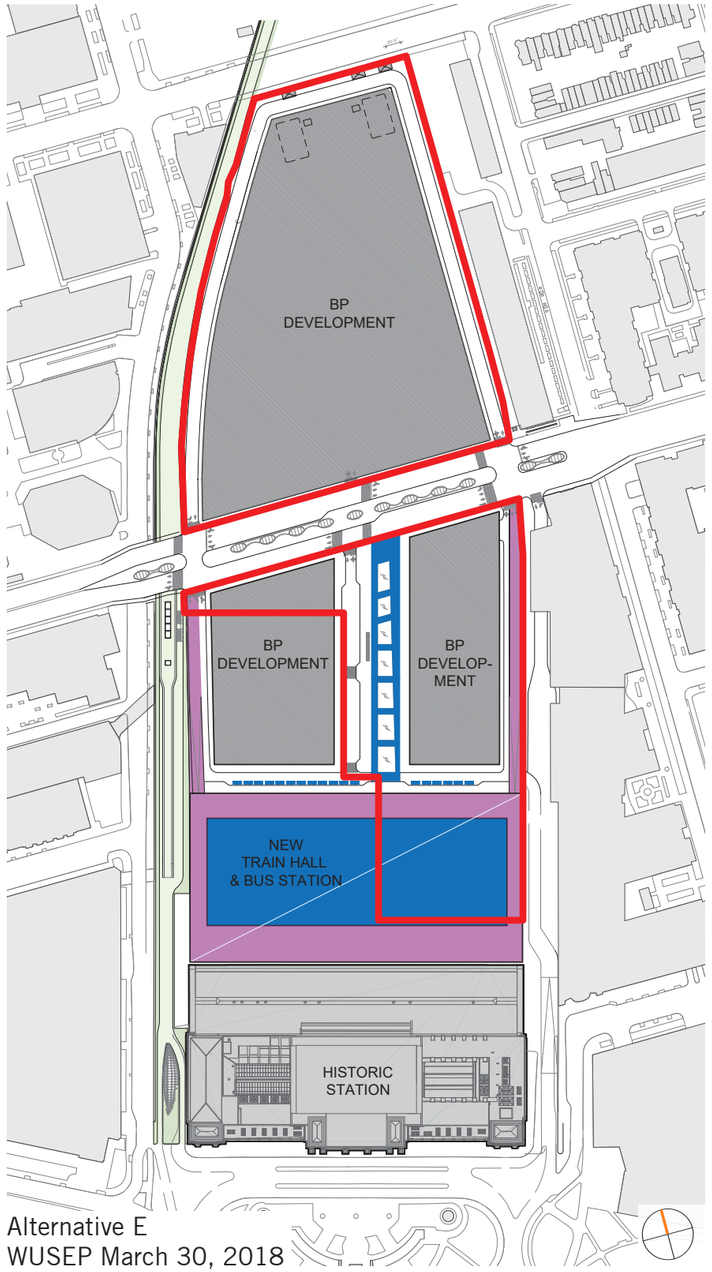
World-class BP and Station projects complement one another

- **Train Hall, bus pick-up/drop-off and elevated N-S circulation route separate BP SW and SE quadrants and separate BP from the Train Hall, preventing effective integration of the public and private projects**

- **While Alternatives D and E have far fewer severe impacts on BP as compared to A, B and C, the integrated bus station and Train Hall do not provide a world-class Station experience, which is a pre-requisite for the success of this project**

ALTERNATIVE E

Summary of Impacts
ALTERNATIVE E
(Preliminary Alternative 5)



Alternative E
WUSEP March 30, 2018

Impacted BP Design Requirements

Design Requirements	Sub-requirements	
1. ADEQUATE DEVELOPMENT OPPORTUNITY	Sufficient and high-quality overall density	
	Efficient scale BP building pads	
	Distribute density throughout BP and achieve effective phased development	
	Maximize H Street frontage	
2. FUNCTIONAL CIRCULATION NETWORK	Circulation network and turning movements at acceptable levels of service	
	Primary central street connecting north and south parcels	
	Vehicular access to front doors, service, and parking areas	
	Safe, active and interconnected pedestrian areas	
3. STRATEGICALLY POSITIONED OPEN SPACES	Distribute north and south of H Street	
	World-class placemaking	
4. ADEQUATE LIGHT, AIR, AND VIEWS IN KEY LOCATIONS	Maximize views to the Capitol and historic Station	
	Building separation, solar access, and sight-lines compatible with high-quality mixed-use development	
5. HARMONIZED PUBLIC AND PRIVATE PROJECTS	World-class BP and Station components complement one another	
	Multiple and gracious pedestrian connections between BP, Station, and surrounding neighborhoods	Insufficient information to evaluate
	Easy-to-find entrances to BP buildings and Station	

BP Property Line

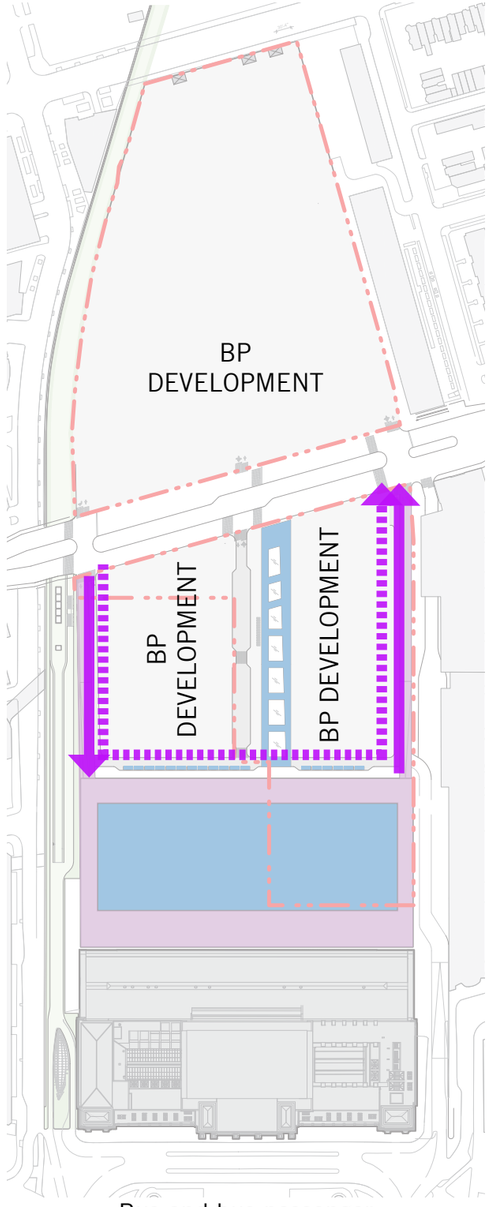
- Insufficient information to evaluate
- Potentially compatible
- Moderate impact
- Severe impact

AKRIDGE Invested.

Impacted Design Requirement
ALTERNATIVE E

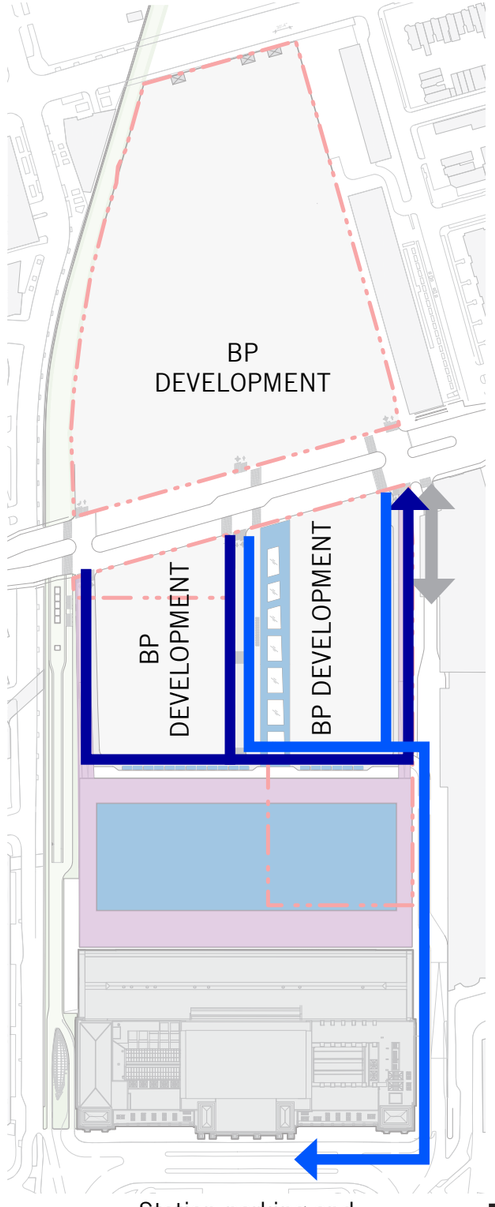
Design Requirement 2 - Functional Circulation Network

For illustrative clarity, BP parking and loading access, and BP pick-up/drop-off zones are not shown in these diagrams



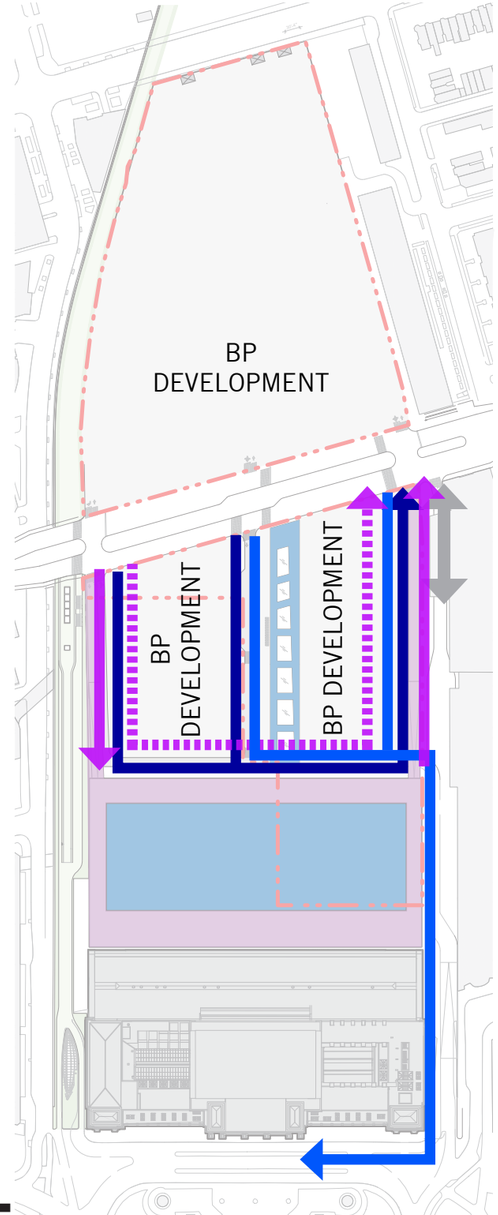
Bus and bus passenger pick-up/drop-off circulation

+



Station parking and pick-up/drop-off circulation

=



Combined circulation

Severe Impact

Circulation network and turning movements at acceptable levels of service

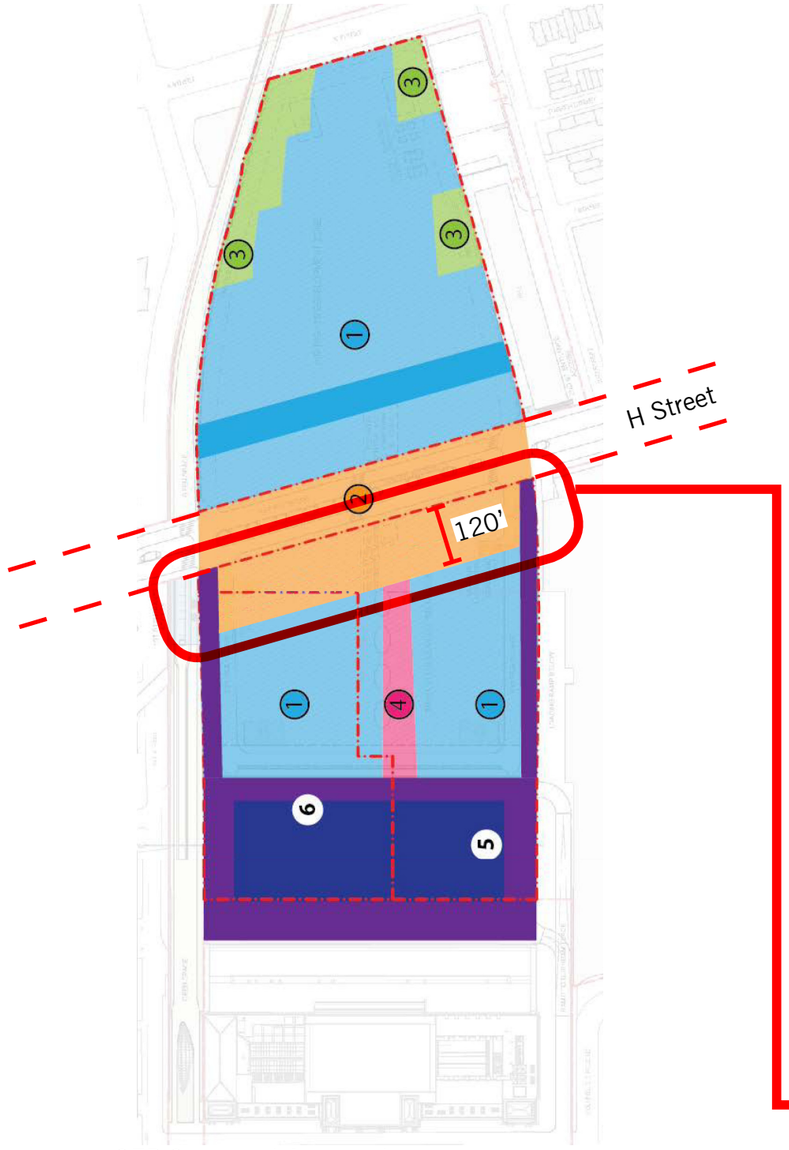
- **Intersections infeasible**
- **Median break at H Street allowing full access to BP is not provided**
- **Unsafe and undesirable pedestrian environment**
- **Expansive bus ramps, pick-up/drop-off overwhelm circulation south of H Street**
- **BP parking access, pick-up/ drop-off and loading activities, if depicted, would further demonstrate station circulation impacts**

- Bus in/out
- Bus passenger pick-up/drop-off
- Columbus Circle pick-up/drop-off
- Train Hall pick-up/drop-off
- Station parking in/out
- Station east loading dock access

SECTION B

IMPACTS ON BURNHAM PLACE COMMON TO ALL ALTERNATIVES

H Street Concourse



SEP Structural Assumptions
*with adjustments for updated long span zone
WUSEP August 02, 2017

The H Street Concourse column grid shown in the EIS Alternatives would limit Burnham Place overbuild, imposing a negative impact on Burnham Place.

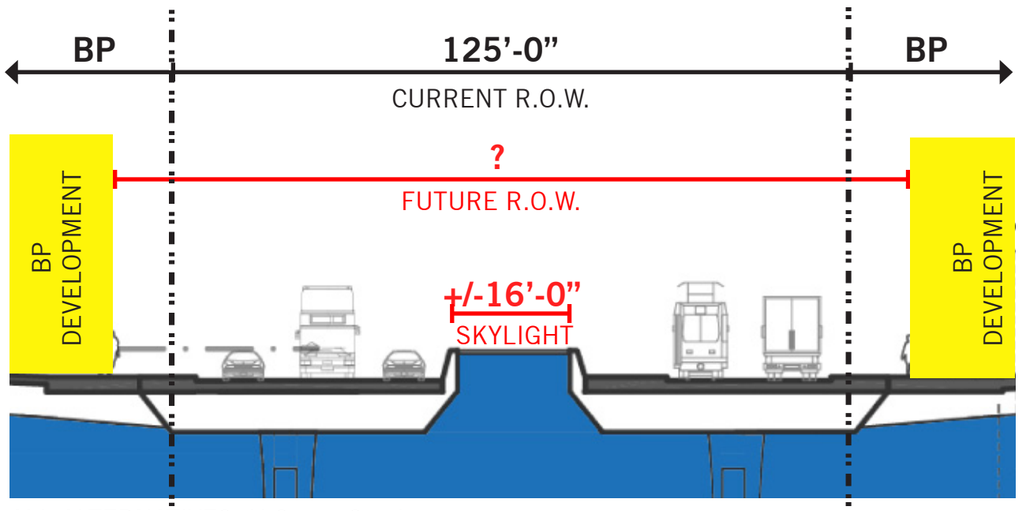
In order to achieve commercially viable construction techniques, this expanded column grid imposes limitations on the size of drilled shafts. This parameter limits the development along the south side of H Street, BP's one public street frontage, to lower density buildings.

Based on preliminary study, the maximum weight of structure that can be reasonably carried by the EIS-proposed structural support system would limit BP to 3-story buildings. 11-story office buildings and 13-story residential structures would otherwise be permitted by zoning. This would result in a density reduction of over 70% in this location.

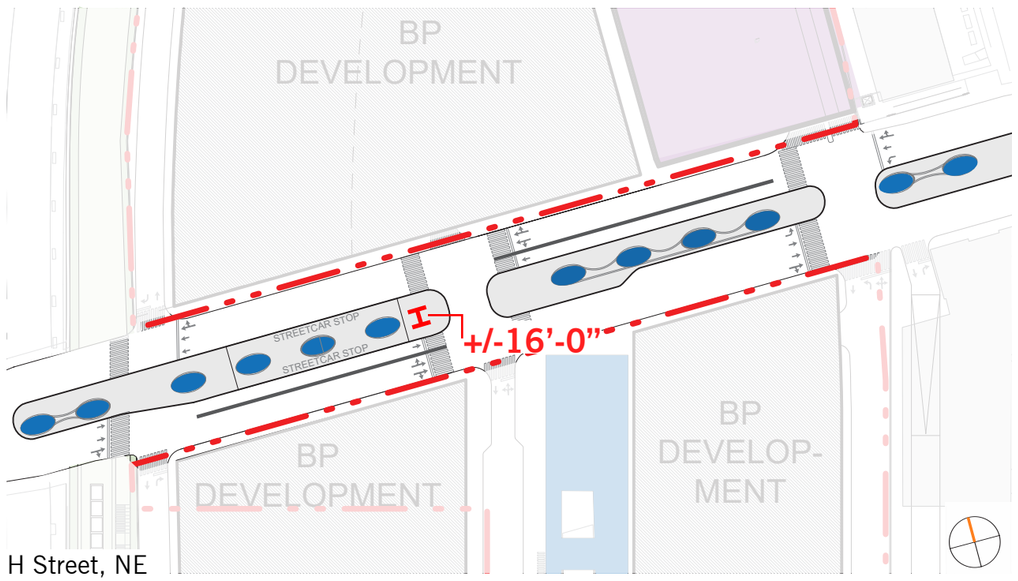
1. 30x60 GRID
2. 60x60 GRID, *Limited High-Density/Multi-Story Overbuild*
3. LONG SPAN FRAMING, *Limited High-Density/Multi-Story Overbuild*
4. SPECIAL ARRANGEMENT
5. TRAIN HALL STRUCTURE
6. BUS STRUCTURE

PROPERTY DELINEATION

H Street Bridge Skylight Zone



ALL ALTERNATIVES, H Street Section
WUSEP March 30, 2018



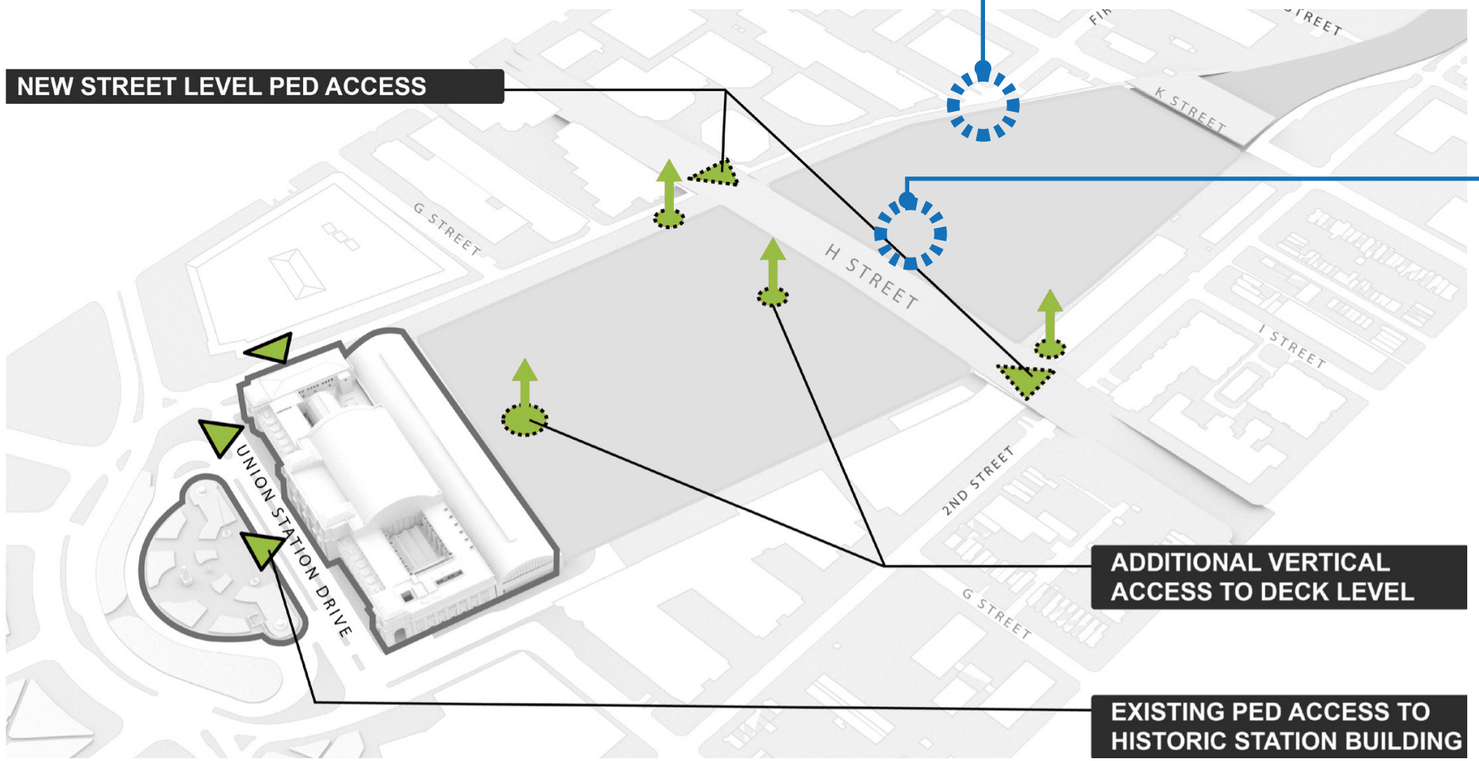
H Street, NE

The H Street bridge skylights shown in the EIS Alternatives would increase the width of a redesigned H Street bridge, imposing a negative impact on Burnham Place.

H Street, in this location, is currently 125' wide, and has many competing demands for the available width. Even without the skylights, DDOT has indicated the width may need to increase in order to accommodate vehicular, streetcar and bicycle lanes and movements, as well as public sidewalks. With the skylights, the new bridge width would encroach into Burnham Place, reducing private development opportunity.

Any increase in the width would also diminish the quality of H Street by pushing Burnham Place buildings flanking the street further apart. The resulting width would be out of character with the H Street corridor, more similar to the widths of some of DC's monumental streets and avenues, and further removed from the historic width of H Street that still exists to the west and east of Burnham Place.

Pedestrian Access



NOMA - Burnham Place Access

Key vertical circulation and Station to neighborhood connection from 2012 vision eliminated

North of H Street Pedestrian Access

North of H Street, a 1.5 million-square-foot development with thousands of people commuting daily, requires a strong VCE connection

Pedestrian Access
*with color enhancements
WUSEP March 22, 2018

Items in blue not included in the WUSEP drawings

APPENDIX L

BUS - NORTH OF H STREET PROPOSAL

Bus - North of H Street Proposal

This study explored the inclusion of a world-class train hall on Burnham Place north of H Street. It was developed in response to Preliminary Alternatives C-East and C-West which also located the bus facility north of H Street.

This study demonstrates the Burnham Place team's early willingness to accommodate a right-size and optimally configured bus facility with private air-rights property, and to embrace the bus facility with mixed-use development and feature it within a new public space.

WASHINGTON UNION STATION EXPANSION PROJECT

PROPOSED MODIFIED ALTERNATIVE C-1
BUS - NORTH OF H STREET PROPOSAL

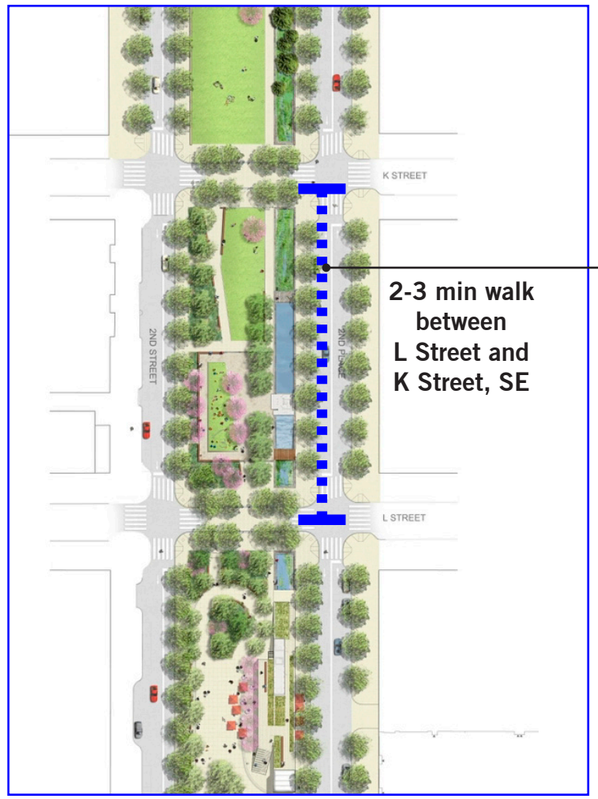
SEPTEMBER, 2019

AKRIDGE
Invested.

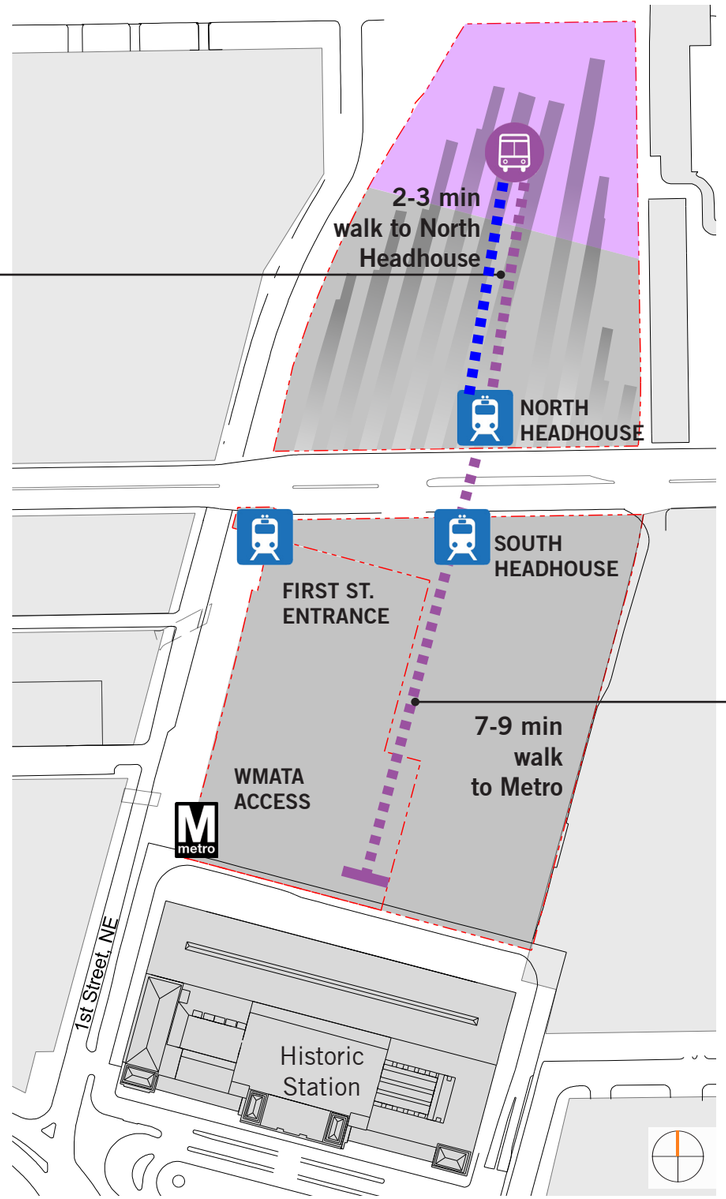
IAB
Laboratory for Architecture & Building

shalom baranes associates | architects

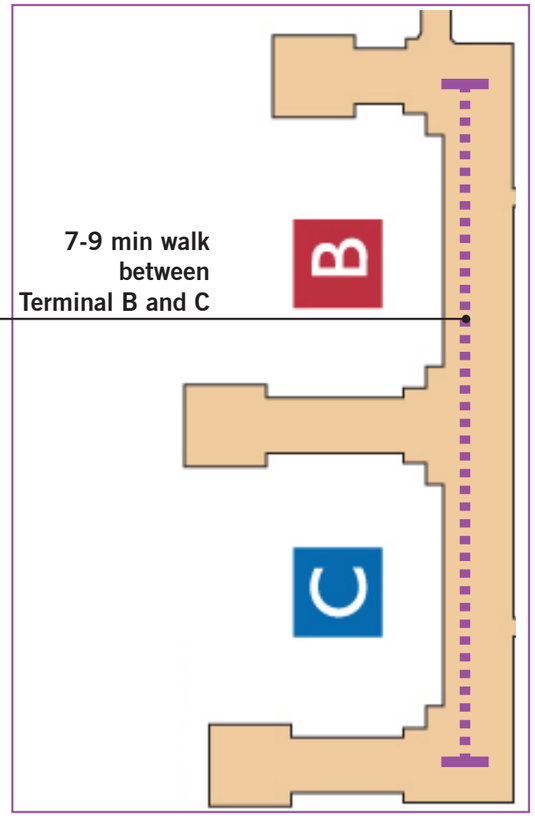
Alternative C-1 Bus Station on Burnham Place North
Walking Distances



CANAL PARK, DC



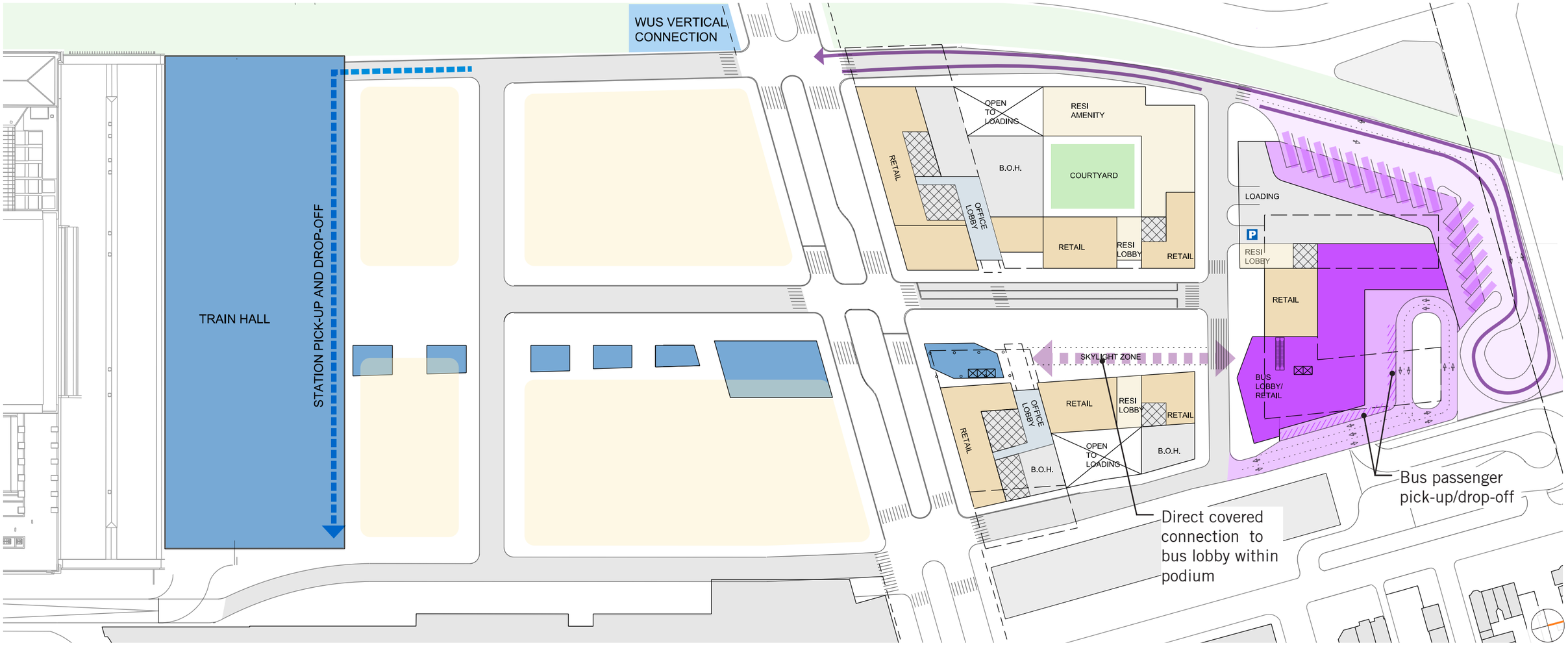
C1 - BUS ON NORTH



REAGAN NATIONAL AIRPORT TERMINAL B - C

Alternative C-1 Bus Station on Burnham Place North

Site Plan

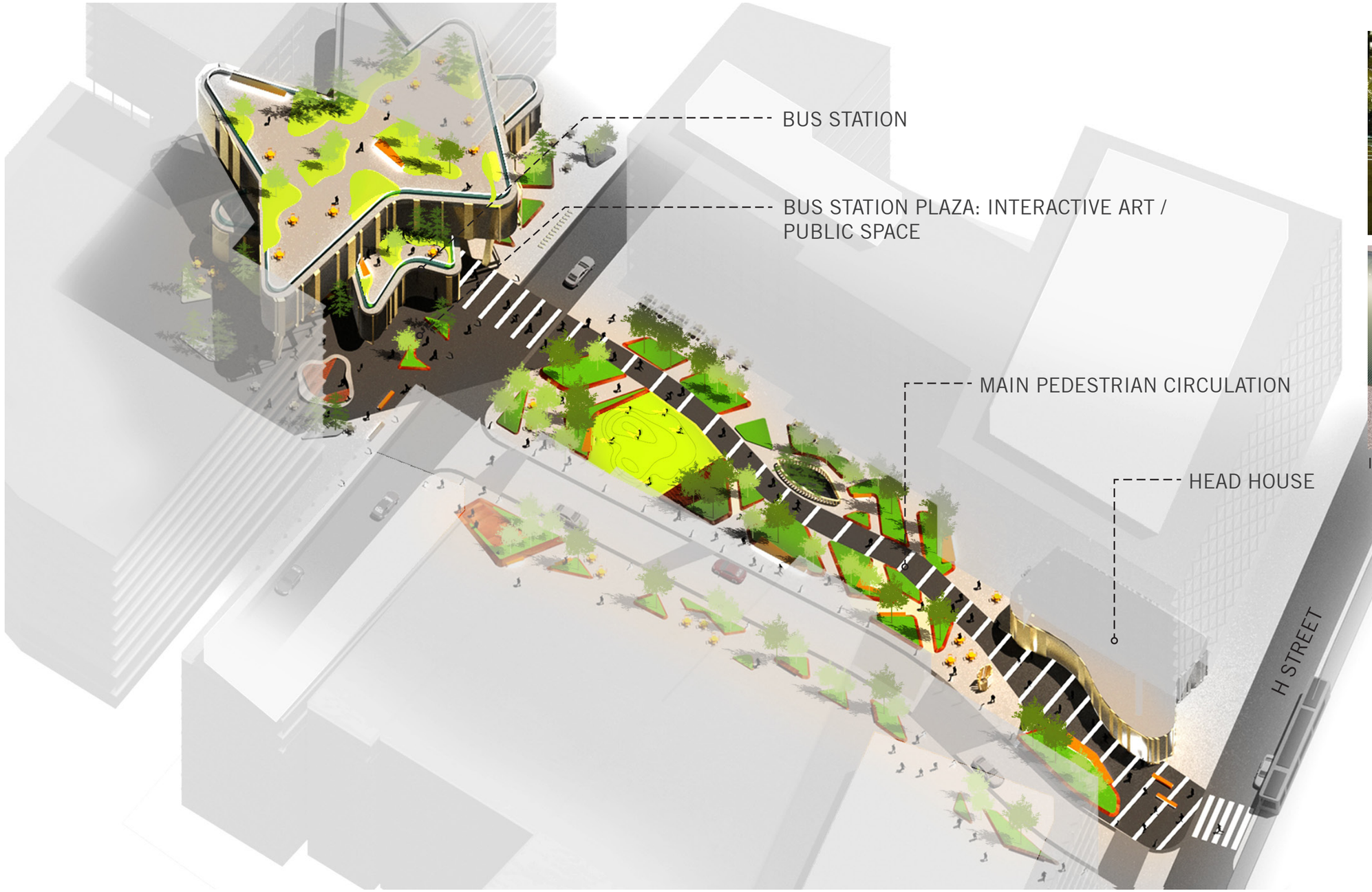


Alternative C-1 Bus Station on Burnham Place North

Site Plan North of H Street

Alternative C-1 Bus Station on Burnham Place North

Axon - Program Uses



Illuminated Paver and Skylight Precedents

Alternative C-1 Bus Station on Burnham Place North
View from H Street looking north

BURNHAM PLACE

WASHINGTON, D.C. | 09/27/2019 |

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Alternative C-1 Bus Station on Burnham Place North
View from North Headhouse looking north

Alternative C-1 Bus Station on Burnham Place North

Bus Station

Alternative C-1 Bus Station on Burnham Place North

Skylight walkway towards the Bus Station

Alternative C-1 Bus Station on Burnham Place North

Covered walkway connecting the Bus Station and North Headhouse

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