

5 Environmental Consequences

5.1 Introduction

1 This chapter defines the impact analysis framework used in this Draft Environmental Impact
2 Statement (DEIS) to adhere to the Federal Railroad Administration (FRA) *Procedures for*
3 *Considering Environmental Impacts*.¹ Prior to issuing permits or approvals for a project,
4 Federal agencies must consider the environmental effects of their actions in accordance with
5 the National Environmental Policy Act of 1969 (NEPA) (42 United States Code [USC] 4321 *et*
6 *seq.*). To comply with NEPA and the Council on Environmental Quality (CEQ) *Implementing*
7 *Regulations for NEPA*, this DEIS identifies the direct, indirect, and cumulative effects the
8 Washington Union Station (WUS) Expansion Project (the Project) could have on the human
9 and natural environment.² This DEIS also identifies measures to avoid, minimize, or mitigate
10 potential adverse impacts.

11 Whenever applicable and practicable, FRA conducted the analyses in accordance with the
12 environmental review policies and guidance of relevant Federal agencies as well as state and
13 local jurisdictions. In this way, the DEIS will support the review of the document by Federal,
14 state, and local agencies from which permits or approvals are required for the Project.

5.1.1 Definitions

15 The CEQ's *Implementing Regulations for NEPA and Forty Most Asked Questions*³ provide the
16 following key definitions:

- 17 ■ **Direct impacts** result from the action and occur at the same time and place.⁴
- 18 ■ **Indirect impacts** result from the action and are later in time or farther removed in
19 distance but are still reasonably foreseeable.

20 Impacts may vary with regard to their duration, significance, and outcome:

¹ 64 Federal Register [FR] 28545, Section 12, May 26, 1999 as updated by 78 FR 2713, January 14, 2013.

² 40 Code of Federal Regulations (CFR) 1500-1508.

³ Council on Environmental Quality. 1981. *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*. Accessed from <https://www.energy.gov/nepa/downloads/forty-most-asked-questions-concerning-ceqs-national-environmental-policy-act>. Accessed on April 3, 2020.

⁴ Effects and impacts, as used in the CEQ *Implementing Regulations* and this report, are synonymous.

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- **Duration:** The impact analyses for each alternative address operational impacts and construction impacts. Operational impacts are long-term or permanent impacts associated with the operation of the Project. They would occur for the foreseeable future. Construction impacts are associated with the construction phase of the Project and would stop with the completion of construction activities. In that sense, they are short-term or temporary impacts.
 - **Context and Intensity:** Depending on the nature of the topic, relevant contexts include society as a whole (human, national), the affected region, the affected interests, or the locality. Intensity refers to the severity of impact and includes consideration of beneficial and adverse impacts. Intensity can be assessed using a wide range of criteria. Among these criteria are public health and safety, unique characteristics of the geographic locale, the level of public controversy, whether the action would fail to comply with applicable laws and regulations, and other considerations. In this DEIS, impacts are assessed using the following scale⁵:
 - **Negligible impacts** may be adverse or beneficial but would occur at the lowest level of detection.
 - **Minor impacts** would be noticeable but would not affect the function or integrity of the resource.
 - **Moderate impacts** would be readily apparent and would influence the function or integrity of the resource.
 - **Major impacts** would be substantial and would result in severely adverse or exceptionally beneficial changes to the resource.
 - **Outcome:** Impacts may be beneficial or adverse:
 - **Beneficial impacts** would result in positive outcomes to the natural or human environment.
 - **Adverse impacts** would result in unfavorable or undesirable outcomes to the natural or human environment.

48 The FRA analyzed and assessed the potential environmental impacts of the No-Action
49 Alternative and six Action Alternatives on fifteen resources. FRA compared the alternatives'
50 impacts to two baselines (see **Table 5-1**):

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- The operational impacts of the No-Action Alternative in the 2040 planning horizon year were assessed relative to existing conditions as of 2017.⁶

⁵ For some of the resources considered in this chapter, resource-specific definitions that build on and refine these general definitions are provided in the *Methodology* section.

⁶ Existing conditions of the affected environment for each resource are described in **Chapter 4, Affected Environment**, and in greater detail in **Appendix C2, Washington Union Station Expansion Project Affected Environment Technical Report**.

- 53 ■ The operational impacts of the Action Alternatives in the 2040 planning horizon year
- 54 were assessed relative to No-Action Alternative conditions in 2040, **and** relative to
- 55 existing conditions as of 2017. The two-baseline approach was adopted because the
- 56 No-Action Alternative includes the development of the privately owned air rights
- 57 above the WUS rail terminal, a separate, large scale project that would substantially
- 58 change conditions in the Project Area. Assessment against both No-Action
- 59 Alternative and existing conditions is intended to provide a more complete
- 60 understanding of the impacts of the Project.
- 61 ■ The construction impacts of all alternatives were assessed relative to existing
- 62 conditions.

Table 5-1. Framework for Evaluating Impacts

| Alternative | Impacts | No-Action Alternative Baseline (2040) | Existing Conditions Baseline (2017) |
|------------------------------|------------------|---------------------------------------|-------------------------------------|
| No-Action Alternative | Operation (2040) | N/A | ● |
| | Construction | N/A | ● |
| Action Alternatives | Operation (2040) | ● | ● |
| | Construction | N/A | ● |

N/A = Not applicable

5.1.2 Format for Evaluating Impacts in this DEIS

63 This DEIS analyzes the environmental impacts of the Project for each applicable resource in
 64 individual resource sections. The resources considered are listed below:

- 65 ■ **Section 5.2**, Natural Ecological Systems
- 66 ■ **Section 5.3**, Water Resources and Water Quality
- 67 ■ **Section 5.4**, Solid Waste Disposal and Hazardous Materials
- 68 ■ **Section 5.5**, Transportation
- 69 ■ **Section 5.6**, Air Quality
- 70 ■ **Section 5.7**, Greenhouse Gas Emissions and Resilience
- 71 ■ **Section 5.8**, Energy Resources
- 72 ■ **Section 5.9**, Land Use, Land Planning and Property
- 73 ■ **Section 5.10**, Noise and Vibration
- 74 ■ **Section 5.11**, Aesthetics and Visual Quality
- 75 ■ **Section 5.12**, Cultural Resources
- 76 ■ **Section 5.13**, Parks and Recreation Areas

- 77 ■ **Section 5.14**, Social and Economic Conditions
- 78 ■ **Section 5.15**, Public Safety and Security
- 79 ■ **Section 5.16**, Public Health, Elderly and Persons with Disabilities
- 80 ■ **Section 5.17**, Environmental Justice
- 81 ■ **Section 5.18**, Cumulative Impacts
- 82 ■ **Section 5.19**, Commitment of Resources

83 For each resource, impacts are briefly characterized in bold lettering, followed by a
84 supporting description and analysis. **Appendix C1**, *Washington Union Station Expansion*
85 *Project Environmental Impact Statement Methodology Report*; **Appendix C2**, *Washington*
86 *Union Station Expansion Project Affected Environment Technical Report*; and **Appendix C3**,
87 *Washington Union Station Expansion Project Environmental Consequences Technical Report*,
88 provide more detailed analysis information. **Section 5.18**, *Cumulative Impacts*, describes
89 cumulative impacts. **Section 5.19** addresses irreversible or irretrievable commitments of
90 resources as well as the relationship between short-term uses of the environment and the
91 maintenance and enhancement of long-term productivity.

92 **Chapter 6**, *Draft Section 4(f) Evaluation*, presents the Draft Section 4(f) Evaluation. **Chapter 7**,
93 *Mitigation Measures, Project Commitments, and Permits*, lists the measures FRA is
94 considering implementing to avoid, minimize, or mitigate the adverse impacts of the Project,
95 as well as applicable permit requirements.

96 FRA conducted the impact analyses in accordance with FRA's *Procedures for Considering*
97 *Environmental Impacts*⁷ along with other applicable guidance and regulations. Each section
98 of the report lists the laws and regulations that apply to the resource under consideration
99 and describes the methodologies used for the impact assessment. Whenever applicable and
100 practicable, the analyses have been conducted in accordance with local environmental
101 review policies and guidance.

102 For each resource category, the following information is provided directly or by reference:

- 103 ■ **Regulatory Context:** List of relevant Federal and local laws and regulations.
- 104 ■ **Study Area:** Definition of the area or areas within which the Project may have
105 impacts.
- 106 ■ **Methodology:** Summary description of the approach adopted to evaluate and assess
107 the potential operational and construction impacts of the alternatives. The
108 methodology section summarizes or complements the information presented in the
109 April 2018 *Environmental Impact Statement Methodology Report*.

⁷ 64 Federal Register [FR] 28545, Section 12, May 26, 1999 as updated by 78 FR 2713, January 14, 2013.

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- **Impact Analysis:** Description and assessment of the operational (long-term or permanent) and construction impacts of the No-Action Alternative and the six Action Alternatives. In accordance with CEQ’s regulations for implementing NEPA, the DEIS assesses impacts based on context and intensity. The assessment uses the scale defined in **Section 5.1.1, Definitions** or, as applicable, the more resource-specific scales defined in the *Methodology* section for the affected resource.
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- For each resource, the direct and indirect operational impacts of the No-Action Alternative are assessed relative to existing conditions. The direct and indirect operational impacts of the Action Alternatives are assessed relative to the No-Action Alternative. This assessment is complemented by a briefer evaluation of the impacts relative to existing conditions. For the Action Alternatives, indirect impacts include the impacts of potential development in the Federal property that Project elements would not occupy.
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- **Comparison of Alternatives:** Comparison of the impacts of each of the seven alternatives highlighting meaningful differences.
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- **Avoidance, Minimization, and Mitigation Evaluation:** If applicable, list of recommended measures FRA or the Project Proponents would implement to minimize, avoid, or mitigate the adverse impacts of the Action Alternatives wherever practicable. The measures listed in this section are under consideration.
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- **Permits and Regulations:** If applicable, list of relevant permitting or regulatory requirements the Project Proponents would have to comply with. The permit requirements listed in this section are under evaluation.
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5.2 Natural Ecological Systems

1 This section describes and characterizes the potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on natural ecological systems. If applicable,
3 it also recommends measures to avoid, minimize, or mitigate potential adverse impacts and
4 it identifies relevant permitting and regulatory compliance requirements. Natural ecological
5 systems include resources such as vegetation, common and protected wildlife, wetlands, and
6 floodplains.

5.2.1 Regulatory Context and Guidance

7 Relevant Federal policies, regulations and guidance that pertain to natural ecological
8 resources are listed **Section 4.2.1, *Regulatory Context and Guidance***.

5.2.2 Study Area

9 As defined in **Section 4.2.2, *Study Area***, the Local Study Area for natural ecological systems,
10 shown in **Figure 4-1**, includes the Project Area along with a 150-foot buffer. The Regional
11 Study Area includes areas surrounding the Local Project Area out to approximately 1,000
12 feet.

5.2.3 Methodology

13 This section summarizes the methodology for evaluating the potential impacts of the
14 alternatives on Natural Ecological Systems. **Appendix C3, *Washington Union Station***
15 ***Expansion Project Environmental Consequences Technical Report***, **Section 2.4, *Methodology***
16 provides a description of the analysis methodology. A summary is below.

17 Impacts were assessed as major, moderate, minor, or negligible based on the intensity scale
18 defined in **Section 5.1.1, *Definitions***.

5.2.3.1 Operational Impacts

19 The assessment of potential operational impacts on natural ecological systems consisted of a
20 review of the natural ecological systems that may occur within the Study Areas to determine
21 whether WUS operations would interfere with components of these systems.

5.2.3.2 Construction Impacts

22 Construction impacts were similarly assessed by evaluating whether construction activities
23 would disrupt or damage any natural ecological system components.

5.2.4 Impact Analysis

24 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
25 natural ecological systems. Because all the Action Alternatives would have the same impacts,
26 they are addressed together to minimize redundancy.

5.2.4.1 No-Action Alternative

Direct Operational Impacts

27 **Relative to existing conditions, the No-Action Alternative would have no direct operational**
28 **impacts on natural ecological systems.**

29 As documented in the **Section 4.2, *Natural Ecological Systems***, the Local Study Area is fully
30 developed with transportation infrastructure and buildings. It contains no natural ecological
31 systems. Similarly, the Regional Study Area encompasses urban neighborhoods densely
32 developed with commercial and residential buildings, streets and roads, and paved parking
33 areas. It is devoid of any natural habitat. Therefore, the No-Action Alternative would have no
34 direct operational impacts on natural ecological systems.

Indirect Operational Impacts

35 **Relative to existing conditions, the No-Action Alternative would have no indirect**
36 **operational impacts on natural ecological systems.**

37 For the same reasons as stated above, the No-Action Alternative would have no indirect
38 operational impacts on natural ecological systems.

Construction Impacts

39 **There would be no construction impacts on natural ecological systems in the No-Action**
40 **Alternative.**

41 Construction activities associated with the projects included in the No-Action Alternative
42 would likely disturb and displace the urban-dwelling birds or mammals that may be present
43 in the Project Area. Such disturbance is common in urban areas and would only affect birds
44 that could easily relocate to adjacent area or nuisance species such as rats. This would not
45 amount to an impact on natural ecological systems.

5.2.4.2 Action Alternatives

Direct Operational Impacts

46 **Relative to the No-Action Alternative, none of the Action Alternatives would have direct**
47 **operational impacts on natural ecological systems.**

48 As explained for the No-Action Alternative, and documented in **Section 4.2, *Natural***
49 ***Ecological Systems***, the Local and Regional Study Areas are fully developed with

50 transportation infrastructure and buildings. They contain no natural ecological systems.
51 Therefore, the Action Alternatives would have no direct operational impacts on natural
52 ecological systems.

Indirect Operational Impacts

53 **Relative to the No-Action Alternative, the Action Alternatives would have no indirect**
54 **operational impacts on natural ecological systems.**

55 For the same reasons as stated above, none of the Action Alternatives would have indirect
56 operational impacts on natural ecological systems.

Construction Impacts

57 **Construction of all Action Alternatives would result in minor adverse impacts on natural**
58 **ecological systems.**

59 As documented in **Section 4.2.4.3, *Vegetation, Wildlife, and Protected Species***, there are
60 approximately 26 ornamental trees (*Zelkova serrata*) on the east sidewalk of First Street NE
61 between G and K Streets and ten trees of the same species on the west sidewalk of 2nd
62 Street NE between G Street and the H Street Bridge. Construction activities along the
63 western edge of the Project Area and along the east side of First Street NE would require the
64 removal of the 26 existing trees. The construction of pick-up and drop off spaces on the west
65 side of 2nd Street NE south of the H Street Bridge would likely require removing four of the
66 ten trees currently present on the sidewalk. These would be minor adverse impacts, as the
67 trees are non-native, ornamental street trees that do not form part of a larger natural
68 system.

69 Construction activities throughout the Project Area would likely disturb and displace any
70 urban-dwelling birds or mammals that may be present. Such disturbance is common in urban
71 areas and would only affect birds that could easily relocate to adjacent areas or nuisance
72 species such as rats. This would not amount to an impact on natural ecological systems.

5.2.5 Comparison of Alternatives

73 **Table 5-2** presents a comparison of the alternatives. The No-Action Alternative would have
74 no direct operational, indirect operational, or construction impacts on natural ecological
75 systems.

76 All the Action Alternatives would have the same impacts: no direct or indirect operational
77 impacts and minor adverse construction impacts due to urban tree removal along First Street
78 NE between G and K Streets.

Table 5-2. Comparison of Alternatives, Natural Ecological Systems

| Type of Impact | No-Action Alternative | All Action Alternatives |
|-----------------------------|-----------------------|-------------------------|
| Direct Operational | No impacts | No impacts |
| Indirect Operational | No impacts | No impacts |
| Construction | No Impacts | Minor adverse impacts |

5.2.6 Avoidance, Minimization, and Mitigation Evaluation

79 The exact number of street trees to be removed would be determined and minimized during
80 construction planning in coordination with the District Department of Transportation (DDOT)
81 Urban Forestry Ward Arborist. Compensation for removed trees would be provided in
82 accordance with the applicable permitting requirements described in Section 5.2.7, *Permits*
83 *and Regulatory Compliance*.

5.2.7 Permits and Regulatory Compliance

84 Removal of street trees would require a Public Space Tree Permit from the DDOT Urban
85 Forestry Division. Compensation for lost trees is based on the health of the tree. Non-
86 hazardous street trees require payment of \$200 per inch diameter plus planting of a new
87 street tree per DDOT Green Infrastructure Standards. Hazardous street trees require planting
88 a new street tree per DDOT Green Infrastructure Standards at a 1:1 ratio.¹

¹ A hazardous tree is a “a tree that, in the opinion of a certified arborist, is defective, diseased, dying, or dead and should be removed; poses a high risk of failure or fracture with the potential to cause injury to people or damage to property and should be removed; or is causing damage to property or structures that cannot be mitigated in any manner other than removal of the tree.” (Code of the District of Columbia, Title 8, Chapter 6B, §8–651.02, *Definitions*.)

5.3 Water Resources and Water Quality

1 This section describes and characterizes potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on surface and groundwater resources,
3 stormwater, wastewater, and water supply infrastructure. If applicable, this section also
4 recommends measures to avoid, minimize, or mitigate potential adverse impacts, as well as
5 potential permitting and regulatory compliance requirements.

5.3.1 Regulatory Context and Guidance

6 Relevant Federal policies, regulations, and guidance that pertain to water resources and
7 water quality are listed in **Section 4.3.1, *Regulatory Context and Guidance***.

5.3.2 Study Area

8 As defined in **Section 4.3.2, *Study Area***, the Local Study Area includes the Project Area,
9 extended by 500 feet to encompass adjacent connections to the District of Columbia (DC)
10 Water stormwater, water supply, and wastewater infrastructure (**Figure 4-2**). Because
11 activities from the construction and operation of the Project would be mostly limited to the
12 Project Area, the discussion of impacts generally focuses on the Project Area. On a regional
13 level, water resources were analyzed as they pertain to the Chesapeake Bay Watershed.

5.3.3 Methodology

14 This section summarizes the methodology for evaluating the potential impacts of the
15 alternatives on water resources and water quality. **Appendix C3, *Washington Union Station***
16 ***Expansion Project Environmental Consequences Technical Report, Section 3.4, Methodology***,
17 provides a description of the analysis methodology. A summary is below.

18 The impact analysis characterizes and compares potential impacts to surface water and
19 groundwater quality, and to DC Water stormwater, water supply, and wastewater
20 infrastructure for each alternative. Potential impacts were characterized as beneficial or
21 adverse:

- 22 ■ Beneficial impacts are those that improve surface water and groundwater quality,
23 provide groundwater recharge, reduce potable water usage and wastewater flows,
24 and/or improve the level-of-service for water supply, wastewater, and/or
25 stormwater infrastructure.
- 26 ■ Adverse impacts are those that degrade surface water and groundwater quality,
27 decrease groundwater recharge, increase potable water usage and wastewater
28 flows, and/or impair the level-of-service for water supply, wastewater, and/or
29 stormwater infrastructure.

30 Potential impacts are characterized as negligible, minor, moderate, or major consistent with
31 the intensity scale defined in **Section 5.1.1, Definitions**.

5.3.3.1 Operational Impacts

32 The operational impacts of each alternative were assessed based on the following
33 information and indicators:

- 34 ■ Anticipated long-term dewatering needs based on preliminary geotechnical
35 modeling.
- 36 ■ Spreadsheet calculation of regulated Stormwater Retention Volume (SWRv) per the
37 District Department of Energy and Environment (DOEE) Stormwater Management
38 Guidebook.
- 39 ■ Projected wastewater generation compared to the available treatment capacity and
40 qualitative assessment of DC Water’s wastewater infrastructure to convey those
41 flows.
- 42 ■ Projected drinking water demand compared to available supply and qualitative
43 assessment based of DC Water’s water supply infrastructure.
- 44 ■ Proposed mitigation strategies such as stormwater Best Management Practices
45 (BMPs), green infrastructure, water conservation, and water reuse.

5.3.3.2 Construction Impacts

46 Construction impacts were assessed based on the depth of excavation; dewatering needs;
47 construction techniques for groundwater exclusion; treatment and discharge; and erosion
48 and sediment control practices.

5.3.4 Impact Analysis

49 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
50 water resources and water quality.

5.3.4.1 No-Action Alternative

51 Direct Operational Impacts

Surface Waters

52 **Relative to existing conditions, the No-Action Alternative would have no direct operational**
53 **impacts on surface waterbodies.**

54 There are no surface waterbodies within the Project Area or Local Study Area and, therefore,
55 no potential for direct operational impacts.

Groundwater

56 **Relative to existing conditions, the No-Action Alternative would have negligible adverse**
57 **direct operational impacts on groundwater.**

58 No public groundwater supplies or wellhead protection areas¹ exist within the Project Area.
59 The water table lies from approximately 15 feet above sea level (asl) south of the H Street
60 Tunnel to about 25 feet asl at the northern end of the Project Area.²

61 Up to 945 drilled shafts would provide structural support for the private air-rights
62 development deck. The drilled shafts would range in diameter from 5 feet to 12 feet,
63 depending on the structural load they would support. Their average depth would be up to
64 150 feet. Drilling the shafts would displace groundwater. Groundwater displacement may
65 slightly alter localized groundwater levels within the Project Area and Local Study Area. Given
66 the depth to water table, any localized changes to the water table would not noticeably
67 affect infrastructure or vegetation in the Local Study Area. Additionally, the volume occupied
68 by the drill shafts would be very small in the context of the Local Study Area and the entire
69 aquifer, making the resulting displacement negligible. For this reason, groundwater
70 displacement from building foundations generally is not a major concern and DC Municipal
71 Regulations do not regulate it.

72 The No-Action Alternative would not affect groundwater quality or recharge. The Project
73 Area currently consists of impervious cover that inhibits groundwater recharge. Project Area
74 land cover would remain impervious under the No-Action Alternative.

Stormwater

75 **Relative to existing conditions, the No-Action Alternative would have a minor adverse**
76 **direct operational impact on stormwater infrastructure. It would have no direct**
77 **operational impact on stormwater flows, as SWRV would remain unchanged relative to**
78 **existing conditions.**

79 Modifications to the Project Area's drainage infrastructure would be necessary to
80 accommodate the private air-rights development. These drainage modifications may
81 necessitate minor adjustments to DC Water drainage infrastructure within the Local Study
82 Area such as new catch basins, drainage pipes, and pipe connections within District right-of-
83 way. Such adjustments routinely occur in the context of large development projects and
84 would be a minor adverse impact. DC Water's combined sewer or separate stormwater
85 infrastructure would continue to collect and convey stormwater runoff as it does currently.

¹ *Wellhead protection areas* are surface and subsurface land areas regulated to prevent contamination of a well or well-field supplying a public water system. Established under the Safe Drinking Water Act (42 USC 330f-300j), this program is implemented through state governments.

² Wood Environment & Infrastructure Solutions. February 2019. *Preliminary Report of Aquifer Pump Test and Seepage Analysis, Union Station, Washington, D.C.*

86 **Table 5-3** presents the SWRv calculated for the No-Action Alternative for each drainage area
 87 overlapping with the Local Study Area. SWRv represents the volume of stormwater to retain
 88 on-site to mimic pre-development hydrologic conditions and protect District waterbodies.³
 89 An increase in total or drainage-area level SWRv relative to existing conditions would be an
 90 adverse impact unless mitigated through stormwater BMPs.

91 No-Action Alternative and existing conditions SWRv would be the same, amounting to a little
 92 more than 221,000 cubic feet. This is because the rail terminal is already entirely impervious.
 93 Constructing a deck and buildings above the tracks between WUS and K Street would not
 94 create any new impervious or pervious surface.

Table 5-3. No-Action Alternative SWRv in the Project Area

| Drainage Area | Paved Area within LOD ¹ (Acres) | Compacted Area ³ within LOD (Acres) | Natural Area ⁴ within LOD (Acres) | Total Area within LOD (Acres) | SWRv ⁵ (Cubic Feet) |
|---|--|--|--|-------------------------------------|--------------------------------------|
| Tiber Creek (CSO² 12) | 43.4 | 0 | 0 | 43.4 | 179,799 |
| Northeast Boundary (CSO 19) | 9.8 | 0 | 0 | 9.8 | 40,571 |
| Hickey Run (MS4) | 0.2 | 0 | 0 | 0.2 | 677 |
| Total | 53.4 | 0 | 0 | 53.4 | 221,047 |

1. LOD – Limit of Disturbance, defined for this study as the Project Area boundary
2. CSO – Combined Sewer Outfall
3. Compacted Area - Land disturbed and/or graded for use as managed turf or landscaping.
4. Natural Area - Land that is undisturbed and exhibits hydrologic properties equal to or better than meadow in good condition.
5. SWRv – Stormwater retention volume. Calculated using 1.2 inches of rainfall as required for Major Land Disturbing Activities.

Wastewater

95 **Relative to existing conditions, the No-Action Alternative would have minor adverse direct**
 96 **operational impacts on wastewater infrastructure and wastewater flows, due to greater**
 97 **production of wastewater in the Project Area.**

98 The private air-rights development would require modifications to sewer laterals in the Local
 99 Study Area to serve the new buildings. No information is available on the location and extent
 100 of these modifications. Such work is routine for large development projects and would be a
 101 minor adverse impact. DC Water sewer lines would continue to collect wastewater and
 102 convey it to the Blue Plains Advanced Wastewater Treatment Plant (Blue Plains), within the
 103 Regional Study Area.

³ District Office of Energy and Environment. 2013. *Stormwater Management Guidebook*. Accessed from <https://doee.dc.gov/swguidebook>. Accessed on April 2, 2020.

104 **Table 5-4** shows estimated increases in wastewater flows in the No-Action Alternative.
 105 Increased ridership at WUS and the private air-rights development would cause an increase
 106 in the amount of wastewater produced in the Project Area.

Table 5-4. No-Action Alternative Estimated Wastewater Generation Increase

| Location | Use | Unit Flow Rate ¹ | Total Unit (2040) | Estimated Average Daily Flow (gpd) |
|--|---------------------------|------------------------------------|------------------------------------|------------------------------------|
| WUS | Rail and Bus ² | 1.7 gpd/ passenger ³ | 19,000 additional passengers | 32,300 |
| Private air-rights Development | Residential | 60 gpd/ resident | 2,150 residents | 129,000 |
| Private air-rights Development | Hotel | 0.25 gpd/ sf | 410,000 sf | 102,500 |
| Private air-rights Development | Office | 0.09 gpd/ sf | 2,160,000 sf | 194,400 |
| Private air-rights Development | Retail | 0.05 gpd/ sf | 120,000 sf | 6,000 |
| Private Air-rights Development Subtotal | | | | 431,900 |
| Total | | | | 464,200 |

gpd = gallons per day; sf= square foot

1. Rates based on Maryland Design Guidelines for Wastewater Facilities unless otherwise noted. ⁴

2. Amtrak + Maryland Area Regional Commuter (MARC) + Virginia Railway Express (VRE) + Intercity bus ridership

3. Per-passenger unit rate calculated for existing conditions based on 2017 station water usage.

107
 108 The average daily wastewater flow would increase by approximately 464,200 gallons per day.
 109 Relative to 83,500 gallons per day under existing conditions, this would be a more than
 110 fivefold increase.

111 This impact would be minor because wastewater from the Project Area would continue to be
 112 conveyed to the Blue Plains, which has the capacity to treat an average of 384 million gallons
 113 per day and in peak wet weather capacity to treat more than one billion gallons per day.⁵
 114 Relative to Blue Plains’ design capacity, the projected increase in wastewater flow would be
 115 minor, representing a little more than 0.1 percent of the average capacity.

⁴ Maryland Department of the Environment Engineering and Capital Projects Program (2016) *Design Guidelines for Wastewater Facilities*. Accessed from <https://mde.maryland.gov/programs/Permits/WaterManagementPermits/Documents/WastewaterDesignGuidelines-2016.pdf>. Accessed on April 3, 2020.

⁵ DC Water. *Blue Plains Advanced Wastewater Treatment Plant brochure*. Accessed from https://www.dcwater.com/sites/default/files/Blue_Plains_Plant_brochure.pdf. Accessed on April 2, 2020.

Drinking Water

116 **Relative to existing conditions, the No-Action Alternative would have a minor adverse**
117 **direct operational impact on drinking water infrastructure and drinking water distribution**
118 **due to greater demand from the Project Area.**

119 The private air-rights development would require modifications to the water distribution
120 infrastructure in the Local Study Area to provide the additional capacity to meet the demand
121 from the development’s occupants. There is no information on the location and extent of the
122 needed modifications, but they would be within the range of what is typical for a large
123 development project and would represent a minor impact.

124 Increased WUS ridership and the private air-rights requirement would place new demands on
125 the water supply system. Water demand increase was estimated based on wastewater
126 generation, with an added factor of 10 percent to account for consumption, system losses,
127 and other uses. Based on an estimated additional wastewater generation of
128 464,200 gallons per day, additional water demand in the No-Action Alternative would be
129 510,620 gallons per day. This would include 35,530 gallons per day for WUS uses and
130 475,090 gallons per day for private air-rights development uses.

DC Water would continue to distribute water to the Project Area and the Washington
Aqueduct would continue to supply the water. The Aqueduct produces an average of
155 million gallons per day in the two treatment plants located in the District.⁶ The increase
in demand relative to existing conditions would represent approximately 0.3 percent of the
Aqueduct’s average production.

131 Indirect Operational Impacts

Surface Waters

132 **Relative to existing conditions, the No-Action Alternative would result in negligible adverse**
133 **and beneficial indirect operational impact on surface waterbodies, including the Anacostia**
134 **River, Potomac River, and Chesapeake Bay.**

135 In the No-Action Alternative, combined stormwater and wastewater from the Project Area
136 would continue to flow through DC Water’s combined sewer system to either Blue Plains or,
137 to combined sewer overflow (CSO) outfalls in the Anacostia River during large storms. A small
138 portion of the Project Area (approximately 7,000 square feet at the furthest northeast end)
139 would continue to drain to the Anacostia River through the municipal separate storm sewer
140 system (MS4). No changes to drainage subwatersheds would occur.

141 The No-Action Alternative would see an increase in wastewater flows from WUS and the
142 private air-rights development. Adding wastewater to DC Water’s combined sewer system
143 could increase the likelihood of untreated sewage releases from CSO outfalls into the

⁶ U.S. Army Corps of Engineers. *Washington Aqueduct*. Accessed from <https://www.nab.usace.army.mil/Missions/Washington-Aqueduct/>. Accessed on April 2, 2020.

144 Anacostia River during large storm events. This could exacerbate water quality impairments
145 due to bacterial and nutrient loadings in the Anacostia River and the Chesapeake Bay, a
146 potential adverse impact. However, the reduction in in CSO events that would result from DC
147 Water’s Anacostia River Tunnel and Northeast Boundary Tunnel projects would largely offset
148 this increased risk and the adverse impact would be negligible.

149 Currently, stormwater from the portion of the Project Area that drains to the MS4 is
150 untreated and carries pollutants from the Project Area to the Anacostia River. If the projects
151 included in the No-Action Alternative implement stormwater BMPs to the maximum extent
152 practicable as required by DOEE *Stormwater Management Guidebook* and, for Federal
153 projects, the Energy Independence Security Act (EISA) of 2007 and Executive Order (EO)
154 13834, runoff volume, peak flow rate, and pollutant loading from the Project Area to the
155 Anacostia River would decrease. Given the small size of the MS4 drainage area relative to the
156 Anacostia River watershed, any potential beneficial impacts from this reduction on water
157 quality in the Anacostia River and downstream waterbodies would be negligible.

Groundwater

158 **Relative to existing conditions, the No-Action Alternative would have no indirect**
159 **operational impact on groundwater.**

160 There would be no indirect impacts on groundwater because, as described in **Section 5.3.4.1,**
161 *No-Action Alternative, Direct Operational Impacts*, there is no potential to indirectly affect
162 private or public water supply wells, wetlands, or springs.

Stormwater

163 **Relative to existing conditions, the No-Action Alternative would have no indirect**
164 **operational impact on stormwater.**

165 There would be no indirect impacts on stormwater because the No-Action Alternative would
166 result in no changes to stormwater flows in or outside the Local or Regional Study Area.

Wastewater

167 **Relative to existing conditions, the No-Action Alternative would have no indirect**
168 **operational impact on wastewater.**

169 There would be no indirect impacts on wastewater because the No-Action Alternative would
170 result in no changes to wastewater production outside the Project Area. As explained in
171 **Section 5.3.4.1, No-Action Alternative, Direct Operational Impacts**, DC Water and Blue Plains
172 have sufficient capacity to convey and treat additional wastewater flows from the Study
173 Area.

Drinking Water

174 **In the No-Action Alternative, there would be no indirect operational impact on drinking**
175 **water.**

176 There would be no indirect impacts on drinking water. The No-Action Alternative would
177 result in no changes to demand for water outside the Project Area. As explained in **Section**
178 **5.3.4.1, No-Action Alternative, Direct Operational Impacts**, DC Water and the Washington
179 Aqueduct have sufficient capacity to meet additional water demand from the Project Area.

180 **Construction Impacts**

181 In the No-Action Alternative, construction of the Project would not occur. Construction of the
182 projects included in the No-Action Alternative, including the private air-rights development,
183 would take place at various times and each would generate construction impacts. Because
184 specific schedules and construction methods are still undetermined, it is only possible to
185 describe and assess these impacts in general terms.

Surface Waters

186 **There would be no construction impacts to surface waterbodies in the No-Action**
187 **Alternative.**

188 No surface waterbodies lie within or adjacent to the Project Area. Therefore, none of the
189 construction activities that would occur in the No-Action Alternative would affect surface
190 waterbodies.

Groundwater

191 **In the No-Action Alternative, construction activities would cause minor adverse impacts on**
192 **groundwater.**

193 Construction of drilled shafts for the private air-rights development deck would necessitate
194 dewatering. The amount of groundwater that would be pumped and disposed of cannot be
195 estimated. Provided work complies with applicable National Pollutant Discharge Elimination
196 System (NPDES) construction general permit dewatering requirements as well as with
197 applicable DOEE and DC Water requirements for treating and metering pumped
198 groundwater, adverse impacts would be minor.

Stormwater

199 **In the No-Action Alternative, construction activities would cause minor adverse impacts on**
200 **stormwater flows.**

201 Ground-disturbing activities associated with the projects included in the No-Action
202 Alternative could result in increased erosion and sedimentation, affecting the quality of
203 stormwater runoff. This risk would be small because these projects would have to include
204 erosion and sediment controls in compliance with NPDES construction general permit and

205 DOEE's *Erosion and Sediment Control Manual* requirements.^{7,8} Erosion and sediment control
206 practices would prevent the transport of sediment from the construction sites to city streets,
207 drainage systems, and waterbodies, resulting in minor adverse impacts.

Wastewater

208 **Wastewater flows from construction-related dewatering would cause a negligible adverse**
209 **impact on wastewater.**

210 Drilled shafts for the private air-rights development would be located within the CSO
211 drainage area. It is likely that pumped groundwater would be pre-treated, if needed, on site
212 and discharged to the DC Water combined sewer system. This would generate additional
213 flow of clean water through DC Water's MS4 or combined sewer system to Blue Plains. With
214 a capacity to treat an average of 384 million gallons per day and peak wet weather capacity
215 to treat more than one billion gallons per day, Blue Plains would have the capacity to treat
216 the additional flow, resulting in a negligible impact.

Drinking Water

217 **Water demand during construction activities would result in a negligible adverse impact on**
218 **water supply.**

219 Construction activities would require the use of water for dust control, equipment washing,
220 and construction worker sanitation and consumption. DC Water would likely provide the
221 water. Although it is not possible to estimate the amount of water these activities would use,
222 it would be typical of medium to large-scale construction projects in the District and is not
223 likely to exceed the Washington Aqueduct capacity. Impacts would be negligible.

5.3.4.2 Alternative A

224 Direct Operational Impacts

Surface Waters

225 **Relative to the No-Action Alternative, Alternative A would have no direct operational**
226 **impacts on surface waterbodies.**

227 There are no bodies of surface water in or adjacent to the Project Area. Therefore,
228 Alternative A has no potential to directly affect surface waters.

⁷ U.S. Environmental Protection Agency. 2017. *National Pollutant Discharge Elimination System (NPDES) Construction General Permit*. Accessed from **Error! Hyperlink reference not valid.** <https://www.epa.gov/npdes/2017-construction-general-permit-cgp>. Accessed on April 2, 2020.

⁸ District Office of Energy and Environment. 2017. *Erosion and Sediment Control Manual*. Accessed from <https://doee.dc.gov/esc>. Accessed on April 2, 2020.

Groundwater

229 **Relative to the No-Action Alternative, Alternative A would have a negligible adverse direct**
230 **operational impact on groundwater.**

231 There are no public groundwater supplies or wellhead protection areas within the Project
232 Area. Therefore, Alternative A would have no impacts on those resources. Land cover within
233 the Project Area in the No-Action Alternative would consist of impervious surfaces that
234 inhibit groundwater recharge. The Project Area's land cover would similarly be fully
235 impervious in Alternative A. Therefore, Alternative A would have no impacts on groundwater
236 recharge.

237 Alternative A would have negligible adverse direct operational impacts on groundwater
238 levels for the following reasons. Compared to the No-Action Alternative, Alternative A would
239 require excavating the Project Area up to a depth of approximately 20 feet asl to construct
240 lower-level concourses. In the Project Area south of H Street, the water table lies at
241 approximately 15 feet asl, although depth may vary across the site and some seeping may
242 occur.⁹ Preliminary modeling indicates that in the long term, dewatering rates for excavation
243 in Alternative A would be less than 10 gallons per minute, or less than 14,400 gallons a day
244 that would have to be pumped and disposed of.¹⁰ This is well below the ceiling DC Water
245 established for the issuance of a Non-significant Non-Categorical Industrial User Wastewater
246 Discharge Permit, which applies to industrial or commercial businesses and government
247 agencies that have less than 25,000 gallons per day of process flow.¹¹ Additionally, inflow
248 would occur only if and where groundwater level exceed 20 feet asl.

Stormwater

249 **Relative to the No-Action Alternative, Alternative A would have minor adverse direct**
250 **operational impacts on stormwater infrastructure and no direct operational impact on**
251 **stormwater flows.**

252 Modifications to the Project Area's drainage infrastructure would be necessary to
253 accommodate the Project. These drainage modifications may necessitate minor adjustments
254 to DC Water drainage infrastructure in the Local Study Area, such as new catch basins,
255 drainage pipes, and pipe connections within District right-of-way. Such adjustments would
256 largely overlap with those that would occur in the No-Action Alternative for the private air-
257 rights development and it would be possible to coordinate them. This would minimize the

⁹ Wood Environment & Infrastructure Solutions. February 2019. *Preliminary Report of Aquifer Pumping Test and Seepage Analysis, Union Station, Washington, D.C.*

¹⁰ Wood Environment & Infrastructure Solutions. February 2019. *Preliminary Report of Aquifer Pumping Test and Seepage Analysis, Union Station, Washington, D.C.*

¹¹ DC Water. *Industrial User Wastewater Discharge Permit*. Accessed from <https://www.dcwater.com/industrial-user-wastewater-discharge-permit>. Accessed on January 4, 2019.

258 work needed to accommodate the Project. Relative to the No-Action Alternative, adverse
 259 impacts would be minor.

260 Because the Project Area would be entirely impervious in the No-Action Alternative and
 261 would remain so in Alternative A, this alternative would cause no change in SWRv.
 262 Alternative A would have to implement stormwater BMPs in accordance with DOEE’s
 263 Stormwater Management Guidebook and, to the maximum extent technically feasible,
 264 Section 438 of the EISA of 2007 and EO 13834. These BMPs would decrease runoff volume,
 265 peak flow rate, and pollutant loading from the Project Area. Therefore, there would be no
 266 impacts on the quantity or quality of stormwater runoff.

Wastewater

267 **Relative to the No-Action Alternative, Alternative A would have minor adverse direct**
 268 **operational impacts on wastewater infrastructure and wastewater.**

269 Alternative A would likely require modifications to sewer laterals to serve the expanded
 270 station. No information is available on the location and extent of these modifications, but
 271 they would likely overlap with those that would occur in the No-Action Alternative for the
 272 private air-rights development as both projects would take place within the boundaries of
 273 the WUS rail terminal. Coordination would minimize the work needed to accommodate the
 274 Project. Relative to the No-Action Alternative, adverse impacts would be minor.

275 **Table 5-5** presents the estimated additional wastewater flow from the Project Area in
 276 Alternative A based on the number of additional passengers relative to the No-Action
 277 Alternative. The average additional daily wastewater flow would be approximately
 278 90,130 gallons per day, plus up to approximately 14,400 gallons per day due to long-term
 279 groundwater disposal (see above **Section 5.3.4.2, Alternative A, Groundwater**) for a total of
 280 up to 104,530 gallons per day. This would represent a 22 percent increase relative to the No-
 281 Action Alternative.

Table 5-5. Alternative A Estimated Wastewater Generation (Average Daily Flow)

| Location | Use | Unit Flow Rate ¹ | Total Unit (2040) | Estimated Average Daily Flow (gpd) |
|--------------|---------------------------|-----------------------------------|---|------------------------------------|
| WUS | Rail and Bus ¹ | 1.7 gpd/ passenger ² | 50,900 additional passengers | 86,530 |
| WUS | New Retail | 0.05 gpd/square foot ³ | 72,000 additional square feet of retail | 3,600 |
| Total | | | | 90,130 |

1. Amtrak + MARC + VRE + Intercity bus ridership.
2. Per-passenger unit rate calculated for existing conditions based on 2017 station water usage.
3. Rates based on Maryland Design Guidelines for Wastewater Facilities unless otherwise noted.

282 DC Water sewer lines to Blue Plains would continue to collect and convey wastewater as they
283 do now. Given Blue Plains' capacity, the increase in the amount of wastewater requiring
284 treatment in Alternative A relative to the No-Action Alternative would be a minor adverse
285 impact. It would represent less than 0.02 percent of the average treatment capacity.

Drinking Water

286 **Relative to the No-Action Alternative, Alternative A would have a minor adverse direct**
287 **operational impact on drinking water infrastructure and demand.**

288 Alternative A would require modifications to the water distribution infrastructure to provide
289 the additional capacity to meet the demand from the expanded station. There is no
290 information on the location and extent of the needed modifications, but they would likely
291 overlap with those that would occur in the No-Action Alternative for the private air-rights
292 development and coordination would be possible. This would minimize the work needed to
293 accommodate the Project. Relative to the No-Action Alternative, adverse impacts would be
294 minor.

295 Additional water demand from the Project Area in Alternative A, based on wastewater
296 generation with an added factor of 10 percent to account for consumption, system losses,
297 and other use, would be approximately 99,143 gallons per day, a 19 percent increase relative
298 to the No-Action Alternative. Drinking water would continue to be distributed by DC Water
299 and supplied by the Washington Aqueduct. The increase in demand relative to the No-Action
300 Alternative would represent about 0.06 percent of the Aqueduct's capacity. This would be a
301 minor adverse impact.

Indirect Operational Impacts

Surface Waters

303 **Relative to the No-Action Alternative, Alternative A would result in negligible adverse**
304 **indirect operational impacts on surface waterbodies, including the Anacostia River,**
305 **Potomac River, and Chesapeake Bay.**

306 Alternative A would not generate additional stormwater runoff relative to the No-Action
307 Alternative but it would generate additional wastewater. This increase would have an
308 adverse impact on the quality of water in the surface waterbodies that drain the Project
309 Area. This adverse impact would be negligible because of the small size of the Project Area
310 and net flow increase relative to those waterbodies' drainage basins.

Groundwater

311 **Relative to the No-Action Alternative, Alternative A would have negligible adverse indirect**
312 **operational impacts on groundwater.**

313 Because of the shallow depth of Alternative A and the limited amount of groundwater that
314 would require pumping, Alternative A would not cause measurable impacts on groundwater,

315 including soil settlement, in or outside the Project Area. There is no potential to indirectly
316 affect private or public water supply wells, wetlands, or springs.

Stormwater

317 **Relative to the No-Action Alternative, Alternative A would have no indirect operational**
318 **impact on stormwater.**

319 There would be no indirect impacts on stormwater because Alternative A would result in no
320 changes to stormwater flows relative to the No-Action Alternative.

Wastewater

321 **Relative to the No-Action Alternative, Alternative A would have no indirect operational**
322 **impact on wastewater.**

323 The potential future development of the Federal air rights in Alternative A as additional
324 parking would not generate wastewater beyond what Alternative A would generate directly.

Drinking Water

325 **Relative to the No-Action Alternative, Alternative A would have no indirect operational**
326 **impact on drinking water.**

327 The potential future development of the Federal air rights in Alternative A as additional
328 parking would not generate drinking water demand beyond that directly resulting from the
329 Project.

Construction Impacts

Surface Waters

331 **Construction of Alternative A would have no impacts on surface waterbodies.**

332 No surface waterbodies lie within or adjacent to the Project Area. Therefore, the
333 construction activities associated with Alternative A would not affect surface waterbodies.

Groundwater

334 **Construction of Alternative A would have negligible adverse impacts on groundwater.**

335 Because of the relative shallowness of the excavation required in Alternative A, and the
336 construction of a cut-off wall around the perimeter of the Project Area, construction would
337 require only a limited amount of dewatering. Groundwater pumped out of the Project Area
338 during construction would be discharged to the wastewater conveyance system after being
339 treated on site if required. Preliminary modeling indicates a short-term dewatering rate of
340 less than 10 gallons per minute, similar to the long-term dewatering rate described in
341 **Section 5.3.4.2, Alternative A, Direct Operational Impacts.** Construction impacts would be
342 negligible for the reasons explained in that section.

Stormwater

343 **Construction of Alternative A would cause minor adverse impacts on stormwater flows.**

344 Ground-disturbing activities associated with the construction of Alternative A could result in
345 increased erosion and sedimentation, which would affect the quality of stormwater runoff
346 from the Project Area. Increased sediment loadings in stormwater conveyed by drainage
347 systems can also result in lost conveyance capacity. These risks would be small because
348 Alternative A would have to include erosion and sediment controls in compliance with the
349 requirements of the NPDES construction general permit and DOEE's *Erosion and Sediment*
350 *Control Manual*.^{12,13} Erosion and sediment control practices would prevent the transport of
351 significant amounts of sediment from the construction site to city streets, drainage systems,
352 and waterbodies. Adverse impacts would be minor.

Wastewater

353 **Wastewater flows from Alternative A construction-related dewatering would cause a**
354 **negligible adverse impact on wastewater.**

355 As explained above, because of the relatively shallow depth of excavation in Alternative A
356 and the construction of a cut-off wall, the maximum amount of discharged groundwater that
357 DC Water sewer lines would have to convey to Blue Plains as wastewater would be less than
358 14,400 gallons a day. Given Blue Plains' capacity, the increased amount of wastewater
359 generated by construction activities in Alternative A would represent a negligible impact.

Drinking Water

360 **Water demand during construction of Alternative A would result in a negligible adverse**
361 **impact on drinking water.**

362 Construction activities involving water use would include dust control, equipment washing,
363 and construction worker sanitation and consumption. DC Water would likely provide the
364 water. Although a specific estimate is not possible, the amount of water these activities
365 would use would be typical of a large-scale construction project in the District and is not
366 likely to exceed the Washington Aqueduct's capacity. Impacts would be negligible.

Comparison to Existing Conditions

367
368 The impacts of Alternative A on surface waterbodies, groundwater, and stormwater would
369 be the same relative to existing conditions and to the No-Action Alternative because there
370 are no relevant differences between the two baselines. Relative to existing conditions,
371 Alternative A would have minor adverse impacts on wastewater and drinking water.

¹² U.S. Environmental Protection Agency. 2017. *National Pollutant Discharge Elimination System (NPDES) Construction General Permit*. Accessed from **Error! Hyperlink reference not valid.** <https://www.epa.gov/npdes/2017-construction-general-permit-cgp>. Accessed on April 2, 2020.

¹³ District Office of Energy and Environment. 2017. *Erosion and Sediment Control Manual*. Accessed from <https://doee.dc.gov/esc>. Accessed on April 2, 2020.

372 Alternative A would cause an increase in demand for these services (**Table 5-6**) that would be
 373 proportionately greater relative to existing conditions than relative to the No-Action
 374 Alternative. Impacts would be minor because the increases in demand would be small
 375 relative to the capacity of DC Water’s water supply and wastewater infrastructure. The
 376 increase in wastewater demand would represent approximately 0.04 percent of Blue Plains’
 377 average daily capacity. The increase in drinking water demand would represent
 378 approximately 0.09 percent of the Washington Aqueduct’s daily production.

Table 5-6. Comparison of Alternative A to Existing Conditions

| Water Resource Category | Existing Conditions (gpd) | Increased Demand in Alternative A (2040) (gpd) | Increase Relative to Existing Conditions |
|-------------------------|---------------------------|--|--|
| Wastewater | 83,500 | 136,830 ¹ | 164% |
| Drinking Water | 91,850 | 134,673 ² | 147% |

1 Based on increase in Amtrak + MARC + VRE + Intercity bus ridership relative to existing conditions, new retail, and groundwater disposal from long-term dewatering.

2 Based on wastewater from total ridership and retail + 10 percent.

5.3.4.3 Alternative B

379 **Direct Operational Impacts**

Surface Waters

380 **Relative to the No-Action Alternative, Alternative B would have no direct operational**
 381 **impacts on surface waterbodies.**

382 There are no bodies of surface water in or adjacent to the Project Area. Therefore,
 383 Alternative B has no potential to directly affect surface waters.

Groundwater

384 **Relative to the No-Action Alternative, Alternative B would have a negligible adverse direct**
 385 **operational impact on groundwater.**

386 For the same reasons as Alternative A (**Section 5.3.4.2, Alternative A, Operational Direct**
 387 **Impacts**), Alternative B would have no impacts on public groundwater supplies, wellhead
 388 protection, or groundwater recharge.

389 Alternative B would have negligible direct operational impacts on groundwater levels for the
 390 same reasons as Alternative A (**Section 5.3.4.2, Alternative A, Operational Direct Impacts**).
 391 Alternative B would require excavating most of the rail terminal to a depth of approximately
 392 10 feet below sea level to accommodate two levels of below-ground parking. This would be
 393 well below the groundwater elevation in the Project Area (at about 15 feet asl). The
 394 construction of a cut-off slurry wall down to bedrock around the perimeter of the excavated
 395 area and the installation of concrete pressure slabs at the bottom of the excavation would

396 minimize any long-term groundwater seepage, but it may not eliminate it entirely.
397 Preliminary modeling indicates that in the long term, dewatering for the Project in
398 Alternative B would result in less than 14,400 gallons a day requiring pumping and disposal.¹⁴
399 This is similar to what would occur in Alternative A. Therefore, impacts would be negligible
400 for the same reasons as stated for Alternative A.

Stormwater

401 **Relative to the No-Action Alternative, Alternative B would have minor adverse direct**
402 **operational impacts on stormwater infrastructure and no direct operational impact on**
403 **stormwater flows.**

404 The impacts of Alternative B on stormwater would be the same as those of Alternative A
405 (Section 5.3.4.2, *Alternative A, Direct Operational Impacts*) because the Project Area would
406 remain entirely impervious, like in Alternative A and the No-Action Alternative.

Wastewater

407 **Relative to the No-Action Alternative, Alternative B would have minor adverse direct**
408 **operational impacts on wastewater infrastructure and wastewater flows.**

409 The impacts of Alternative B on wastewater demand would be the same as those of
410 Alternative A (Section 5.3.4.2, *Alternative A, Direct Operational Impacts*). This is because
411 Alternative B would generate the same additional demand for wastewater as Alternative A.

Drinking Water

412 **Relative to the No-Action Alternative, Alternative B would have minor adverse direct**
413 **operational impacts on drinking water infrastructure and drinking water demand.**

414 The impacts of Alternative B on the water supply would be the same as those of Alternative A
415 (Section 5.3.4.2, *Alternative A, Direct Operational Impacts*). This is because Alternative B
416 would generate the same additional demand for water as Alternative A.

Indirect Operational Impacts

Surface Waters, Groundwater, and Stormwater

418 **Relative to the No-Action Alternative, Alternative B would have negligible adverse indirect**
419 **operational impacts on surface waterbodies and groundwater. It would have no indirect**
420 **operational impacts on stormwater.**

421 The indirect operational impacts of Alternative B on surface waterbodies, groundwater, and
422 stormwater would be as in Alternative A. These impacts are described in Section 5.3.4.2,
423 *Alternative A, Indirect Operational Impacts*.

¹⁴ Wood Environment & Infrastructure Solutions. February 2019. *Preliminary Report of Aquifer Pumping Test and Seepage Analysis, Union Station, Washington, D.C.*

Wastewater

424 **Relative to the No-Action Alternative, Alternative B would have a minor adverse indirect**
425 **operational impact on wastewater.**

426 In Alternative B, the potential Federal air-rights development would consist of approximately
427 917,420 gross square feet of office space. This office space would generate approximately
428 82,600 gallons per day of wastewater (assuming a unit flow rate of 0.09 gallon per square
429 foot per day: see **Table 5-4**).

430 DC Water sewer lines to Blue Plains would continue to collect and convey wastewater from
431 the Project Area. The additional production of 82,600 gallons per day of wastewater would
432 be a minor adverse impact. It would represent only about 0.02 percent of Blue Plains'
433 average daily capacity.

Drinking Water

434 **Relative to the No-Action Alternative, Alternative B would have a minor adverse indirect**
435 **operational impact on drinking water.**

436 In Alternative B, the potential development of the Federal air rights would increase drinking
437 water demand by approximately 90,860 gallons per day (calculated as wastewater demand
438 plus 10 percent for consumption, system losses, and other uses). Drinking water would
439 continue to be distributed by DC Water and supplied by the Washington Aqueduct. The
440 increase in demand from the Federal air-rights development would represent 0.05 percent of
441 the Aqueduct's capacity, amounting to a minor adverse impact.

Construction Impacts

Surface Waters, Stormwater, and Drinking Water

443 **Construction of Alternative B would have no impacts on surface waterbodies, minor**
444 **adverse impacts on stormwater, and negligible adverse impacts on drinking water.**

445 The impacts from construction of Alternative B on surface waterbodies, stormwater, and
446 drinking water would be the same as those of Alternative A. These impacts are described in
447 **Section 5.3.4.2, Alternative A, Construction Impacts.**

Groundwater

448 **Construction of Alternative B would have a moderate adverse impacts on groundwater.**

449 Because of the depth of the excavation required in Alternative B, groundwater seepage
450 would occur during construction and require dewatering. Preliminary modeling indicates a
451 short-term dewatering rate 374,400 to 619,200 gallons per day.¹⁵ This would be well above

¹⁵ Wood Environment & Infrastructure Solutions. February 2019. *Preliminary Report of Aquifer Pumping Test and Seepage Analysis, Union Station, Washington, D.C.*

452 the threshold for a Significant Non-Categorical Industrial User Wastewater Discharge Permit
453 (25,000 gpd). Dewatering would have to be conducted in compliance with NPDES
454 construction general permit dewatering requirement¹⁶ as well as DOEE and DC Water
455 requirement for the treatment and metering of pumped groundwater.

456 Groundwater withdrawal has the potential to cause soil settlement in the vicinity of the
457 withdrawal. Due to lack of information, the extent of the area that could be affected cannot
458 be determined at this time. Based on preliminary modeling, the features at greatest risk for
459 groundwater drawdown-induced settlement would be shallow utility infrastructure such as
460 sewer lines, gas lines, or water lines in the Project Area or adjacent public roadways; the
461 WUS Metrorail station; and adjoining buildings supported by shallow foundation systems.
462 Most of the larger buildings adjacent to WUS likely sit on deep foundations and are therefore
463 unlikely to experience settlement.¹⁷ Due to their local character, these potential adverse
464 impacts would be moderate.

Wastewater

465 **Wastewater flow from Alternative B construction-related dewatering would cause a minor**
466 **adverse impact on wastewater.**

467 Groundwater pumped out of the Project Area during construction would be discharged to
468 the wastewater conveyance system after being treated on site, if needed. As explained
469 above, the maximum amount of discharged groundwater would be approximately 619,200
470 gallons a day. Wastewater would be conveyed via DC Water sewer lines to Blue Plains. Given
471 Blue Plains' capacity, the additional amount of wastewater Alternative B construction would
472 generate would be a minor adverse impact.

Comparison to Existing Conditions

474 The impacts of Alternative B on surface waterbodies, groundwater, and stormwater would
475 be the same relative to existing conditions and to the No-Action Alternative because there
476 are no relevant differences between the two baselines. Relative to existing conditions,
477 Alternative B would have minor adverse impacts on wastewater and drinking water.
478 Alternative B would cause an increase in demand for these services (**Table 5-7**) that would be
479 proportionately greater relative to existing conditions than relative to the No-Action
480 Alternative.

¹⁶ U.S. Environmental Protection Agency. 2017. *National Pollutant Discharge Elimination System (NPDES) General Permit for Construction Activities*. Section 2.4 Construction Dewatering Requirements. https://www.epa.gov/sites/production/files/2019-05/documents/final_2017_cgpfact_sheet.pdf. Accessed on April 3, 2020.

¹⁷ Wood Environment & Infrastructure Solutions. February 2019. *Preliminary Report of Aquifer Pumping Test and Seepage Analysis, Union Station, Washington, D.C.*

Table 5-7. Comparison of Alternative B to Existing Conditions

| Water Resource Category | Location | Existing Conditions (gpd) | Increased Demand in Alternative B (2040) (gpd) | Increase Relative to Existing Conditions |
|-------------------------|--------------------------------|---------------------------|--|--|
| Wastewater | WUS | 83,500 | 136,830 ¹ | 164% |
| | Federal Air-rights Development | 0 | 82,600 | - |
| | Total | 83,500 | 219,430 | 263% |
| Drinking Water | WUS | 91,850 | 134,673 ² | 147% |
| | Federal Air-rights Development | 0 | 90,860 | - |
| | Total | 91,850 | 225,533 | 246% |

1 Based on increase in Amtrak + MARC + VRE + Intercity bus ridership relative to existing conditions, new retail, and groundwater disposal from long-term dewatering.

2 Based on wastewater from total ridership and retail + 10 percent.

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Adverse impacts would be minor because the projected increases would be small relative to the capacity of DC Water’s water supply and wastewater infrastructure. The additional wastewater demand would represent approximately 0.06 percent of Blue Plains’ average daily capacity. The additional drinking water demand would represent approximately 0.15 percent of the Washington Aqueduct’s daily production.

5.3.4.4 Alternative C (Both Options)

487

Direct Operational Impacts

Surface Waters

488

489

Relative to the No-Action Alternative, Alternative C would have no direct operational impacts on surface waterbodies.

490

491

There are no bodies of surface water in or adjacent to the Project Area. Therefore, Alternative C has no potential to directly affect surface waterbodies.

Groundwater

492

493

Relative to the No-Action Alternative, Alternative C would have moderate adverse direct operational impacts on groundwater.

494

495

496

Like Alternative A, and for the same reasons (**Section 5.3.4.2, Alternative A, Operational Direct Impacts**), Alternative C would have no impacts on public groundwater supplies, wellhead protection, or groundwater recharge.

497 Alternative C would have moderate direct operational impacts on groundwater levels.
498 Alternative C would require excavating most of the rail terminal to a depth of approximately
499 3 feet asl to accommodate one level of below-ground parking. This would be below
500 groundwater elevation at the site. The construction of a sheet-pile cut-off down to the
501 Potomac Clay layer underlying the Project Area around the perimeter of the excavation and
502 the installation of concrete pressure slabs at the bottom of the excavation would minimize
503 any long-term groundwater seepage, but it may not eliminate it entirely. Preliminary
504 modeling indicates that in the long term, dewatering rates for the Project in Alternative C
505 would range from approximately 28,800 to 43,200 gallons a day to be pumped and disposed
506 of, after treatment if required.¹⁸ This would be above the ceiling DC Water established for
507 the issuance of Significant Non-Categorical Industrial User Wastewater Discharge Permit,
508 which applies to industrial or commercial businesses and government agencies that have less
509 than 25,000 gallons per day of process flow.¹⁹ Groundwater withdrawal may increase the risk
510 of soil settlement, as described in **Section 5.3.4.3, Alternative B, Construction Impacts.**

Stormwater

511 **Relative to the No-Action Alternative, Alternative C would have minor adverse direct**
512 **operational impacts on stormwater infrastructure and no impact on stormwater flows.**

513 The impacts of Alternative C on stormwater would be the same as those of Alternative A
514 (**Section 5.3.4.2, Alternative A, Direct Operational Impacts**).

Wastewater

515 **Relative to the No-Action Alternative, Alternative C would have minor adverse direct**
516 **operational impacts on wastewater infrastructure and wastewater flows.**

517 Like Alternative A and the other Action Alternatives, Alternative C would likely require
518 modifications to sewer laterals to serve the expanded station. Such impacts would be minor
519 as explained for Alternative A in **Section 5.3.4.2, Alternative A, Direct Operational Impacts.**

520 In Alternative C, the increase in WUS ridership and retail space would cause the same
521 increase in wastewater production as in Alternative A, approximately 90,130 gallons per day
522 (**Section 5.3.4.2, Alternative A, Direct Operational Impacts**). In addition, up to 43,200 gallons
523 per day of groundwater from long-term dewatering would be discharged to the sewer
524 conveyance system, for a total of up to 133,330 gallons per day. This would be a 29 percent
525 increase relative to the No-Action Alternative.

526 DC Water sewer lines would continue to collect wastewater and convey it to Blue Plains.
527 Given Blue Plains' capacity, the increase in the amount of wastewater requiring treatment in

¹⁸ Wood Environment & Infrastructure Solutions. February 2019. *Preliminary Report of Aquifer Pumping Test and Seepage Analysis, Union Station, Washington, D.C.*

¹⁹ DC Water. *Industrial User Wastewater Discharge Permit*. Accessed from <https://www.dewater.com/industrial-user-wastewater-discharge-permit>. Accessed on January 4, 2019.

528 Alternative C relative to the No-Action Alternative would be a minor adverse impact. It would
529 represent less than 0.03 percent of Blue Plains' average treatment capacity.

Drinking Water

530 **Relative to the No-Action Alternative, Alternative C would have minor adverse direct**
531 **operational impacts on drinking water infrastructure and drinking water demand.**

532 The impacts of Alternative C on drinking water would be the same as those of Alternative A
533 (Section 5.3.4.2, *Alternative A, Direct Operational Impacts*). This is because Alternative C
534 would generate the same additional demand for water as Alternative A.

Indirect Operational Impacts

Surface Waters, Groundwater, and Stormwater

536 **Relative to the No-Action Alternative, Alternative C would have negligible adverse indirect**
537 **operational impacts on surface waterbodies and groundwater. It would have no indirect**
538 **operational impacts on stormwater.**

539 The indirect operational impacts of Alternative C on surface waterbodies, groundwater, and
540 stormwater would be as in Alternative A. These impacts are described in Section 5.3.4.2,
541 *Alternative A, Indirect Operational Impacts*.

Wastewater

542 **Relative to the No-Action Alternative, Alternative C would have a minor adverse indirect**
543 **operational impact on wastewater.**

544 In Alternative C, the potential Federal air-rights development would consist of approximately
545 952,600 square feet of office space. This office space would generate approximately
546 85,700 gallons per day of wastewater.

547 Wastewater would continue to be collected and conveyed via DC Water sewer lines to Blue
548 Plains. The additional production of 85,700 gallons per day of wastewater would be a minor
549 adverse impact. It would represent about 0.02 percent of Blue Plains' average daily capacity.

Drinking Water

550 **Relative to the No-Action Alternative, Alternative C would have a minor adverse indirect**
551 **operational impact on drinking water.**

552 In Alternative C, the potential development of the Federal air rights would increase drinking
553 water demand. The Federal air-rights development, consisting of office space, would
554 generate an additional 94,300 gallons per day of water demand (calculated as wastewater
555 demand plus 10 percent for consumption, system losses, and other uses).

556 Drinking water would continue to be distributed by DC Water and supplied by the
557 Washington Aqueduct. The increase in demand from the Federal air-rights development
558 would represent 0.06 percent of the Aqueduct's capacity, amounting to a minor adverse
559 impact.

560 **Construction Impacts**

Surface Waters, Stormwater, and Drinking Water

561 **Construction of Alternative C would have no impacts on surface waterbodies, minor**
562 **adverse impacts on stormwater, and negligible adverse impacts on drinking water.**

563 The construction impacts of Alternative C on surface waterbodies, stormwater, and drinking
564 water would be the same as those of Alternative A. These impacts are described in **Section**
565 **5.3.4.2, Alternative A, Construction Impacts.**

Groundwater

566 **Construction of Alternative C would have moderate adverse impacts on groundwater.**

567 Because of the depth of the excavation required in Alternative C, groundwater seepage
568 would occur during construction and require dewatering. Preliminary modeling indicates a
569 short-term dewatering rate of approximately 316,800 to 403,200 gallons per day.²⁰ This
570 would be well above the threshold for a Significant Non-Categorical Industrial User
571 Wastewater Discharge Permit (25,000 gpd). Groundwater withdrawal may increase the risk
572 of soil settlement, as described in **Section 5.3.4.3, Alternative B, Construction Impacts.**

Wastewater

573 **Wastewater flows from Alternative C construction-related dewatering would cause a minor**
574 **adverse impact on wastewater.**

575 Groundwater pumped out of the Project Area during construction would be discharged to
576 the wastewater conveyance system after being treated on site, if required. As explained
577 above, the maximum amount of discharged groundwater would be approximately 403,200
578 gallons a day. DC Water sewer lines would convey wastewater to Blue Plains. Given Blue
579 Plains' treatment capacity, the additional amount generated by Alternative C construction
580 would represent a minor impact.

581 **Comparison to Existing Conditions**

582 The impacts of Alternative C on surface waters, groundwater, and stormwater would be the
583 same relative to existing conditions and to the No-Action Alternative because there are no
584 relevant differences between the two baselines. Relative to existing conditions, Alternative C
585 would have minor adverse impacts on wastewater and drinking water. Alternative C would
586 cause an increase in demand for these services (**Table 5-8**) that would be proportionately
587 greater relative to existing conditions than relative to the No-Action Alternative.

²⁰ Wood Environment & Infrastructure Solutions. February 2019. *Preliminary Report of Aquifer Pumping Test and Seepage Analysis, Union Station, Washington, D.C.*

Table 5-8. Comparison of Alternative C to Existing Conditions

| Water Resource Category | Location | Existing Conditions (gpd) | Increased Demand in Alternative C (2040) (gpd) | Increase Relative to Existing Conditions |
|-------------------------|--------------------------------|---------------------------|--|--|
| Wastewater | WUS | 83,500 | 165,630 ¹ | 198% |
| | Federal Air-rights Development | 0 | 85,700 | - |
| | Total | 83,500 | 251,330 | 301% |
| Drinking Water | WUS | 91,850 | 134,673 ² | 143% |
| | Federal Air-rights Development | 0 | 94,300 | - |
| | Total | 91,850 | 228,973 | 249% |

1 Based on increase in Amtrak + MARC + VRE + Intercity bus ridership relative to existing conditions, new retail, and groundwater disposal from long-term dewatering.

2 Based on wastewater from total ridership and retail + 10 percent.

588 Impacts would be minor because the projected increases in demand would be small relative
589 to the capacity of DC Water’s water supply and wastewater infrastructure. The additional
590 wastewater demand would represent approximately 0.07 percent of Blue Plains’ average
591 daily capacity. The additional drinking water demand would represent approximately 0.15
592 percent of the Washington Aqueduct’s daily production.

5.3.4.5 Alternative D

593 Direct Operational Impacts

Surface Waters and Stormwater

594 **Relative to the No-Action Alternative, Alternative D would have no direct operational**
595 **impacts on surface waterbodies; and minor adverse operational impacts on stormwater**
596 **infrastructure and no impacts on stormwater flows.**

597 The direct operational impacts of Alternative D on surface waterbodies and stormwater
598 would be the same as those of Alternative A. These impacts are described in **Section 5.3.4.2,**
599 *Alternative A, Direct Operational Impacts.*

Groundwater

600 **Relative to the No-Action Alternative, Alternative D would have moderate adverse direct**
601 **operational impacts on groundwater.**

602 The direct operational impacts of Alternative D on groundwater would be the same as those
603 of Alternative C. These impacts are described in **Section 5.3.4.4, Alternative C, Direct**
604 *Operational Impacts.*

Wastewater

605 **Relative to the No-Action Alternative, Alternative D would have minor adverse direct**
606 **operational impacts on wastewater infrastructure and wastewater flows.**

607 Like Alternative A and the other Action Alternatives, Alternative D would likely require
608 modifications to sewer laterals to serve the expanded station. Such impacts would be minor
609 as explained for Alternative A in **Section 5.3.4.2, Alternative A, Direct Operational Impacts.**

610 In Alternative D, the increase in WUS ridership would cause the same increase in wastewater
611 production as in Alternative A, approximately 86,530 gallons per day (**Section 5.3.4.2,**
612 *Alternative A, Direct Operational Impacts*). The addition of approximately 100,000 square
613 feet of retail space would further generate around 5,000 gallons per day of wastewater.
614 Finally, up to 43,200 gallons per day of groundwater from long-term dewatering would be
615 discharged to the sewer conveyance system. Altogether, Alternative D would generate up to
616 134,730 gallons per day of wastewater. This would be a 29 percent increase relative to the
617 No-Action Alternative.

618 DC Water sewer lines would continue to collect wastewater and convey it to Blue Plains.
619 Given Blue Plains' capacity, the increase in the amount of wastewater requiring treatment in
620 Alternative D relative to the No-Action Alternative would be a minor adverse impact. It would
621 represent approximately 0.04 percent of Blue Plains' average treatment capacity.

Drinking Water

622 **Relative to the No-Action Alternative, Alternative D would have a minor adverse direct**
623 **operational impact on drinking water infrastructure and demand.**

624 Like Alternative A and the other Action Alternatives, Alternative D would require
625 modifications to the water distribution infrastructure to provide the additional capacity to
626 meet the demand from the expanded station. Such impacts would be minor as explained in
627 **Section 5.3.4.2, Alternative A, Direct Operational Impacts.**

628 Additional drinking water demand from the Project Area in Alternative D, based on
629 wastewater generation with an added factor of 10 percent to account for consumption,
630 system losses, and other use, would approximately be 100,683 gallons per day, a 20 percent
631 increase relative to the No-Action Alternative. Drinking water would continue to be
632 distributed by DC Water and supplied by the Washington Aqueduct. The increase in demand
633 relative to the No-Action Alternative would represent about 0.06 percent of this capacity.
634 This would be a minor adverse impact.

Indirect Operational Impacts

Surface Waters, Groundwater, and Stormwater

636 **Relative to the No-Action Alternative, Alternative D would have negligible adverse indirect**
637 **operational impacts on surface waterbodies and groundwater. It would have no indirect**
638 **operational impacts on stormwater.**

639 The indirect operational impacts of Alternative D on surface waterbodies, groundwater, and
640 stormwater would be as in Alternative A. These impacts are described in **Section 5.3.4.2,**
641 *Alternative A, Indirect Operational Impacts.*

Wastewater

642 **Relative to the No-Action Alternative, Alternative D would have a minor adverse indirect**
643 **operational impact on wastewater.**

644 In Alternative D, the potential Federal air-rights development would consist of approximately
645 688,050 gross square feet of office space. This office space would generate approximately
646 61,900 gallons per day of wastewater (assuming a unit flow rate of 0.09 gallon per square
647 foot per day: see **Table 5.3-2**).

648 DC Water sewer lines would continue to collect wastewater from the Project Area and
649 convey it to Blue Plains. Given Blue Plains' capacity, the production of an additional 61,900
650 gallons per day of wastewater would be a minor adverse impact. It would represent about
651 0.016 percent of Blue Plains' average daily capacity.

Drinking Water

652 **Relative to the No-Action Alternative, Alternative D would have a minor adverse indirect**
653 **operational impact on drinking water.**

654 In Alternative D, the potential development of the Federal air rights as office space would
655 increase drinking water demand by approximately an additional 68,100 gallons per day of
656 water (calculated as wastewater demand plus 10 percent for consumption, system losses,
657 and other uses).

658 Drinking water would continue to be distributed by DC Water and supplied by the
659 Washington Aqueduct. The increase in demand from the Federal air-rights development
660 would represent around 0.04 percent of the Aqueduct's capacity, amounting to a minor
661 adverse impact.

Construction Impacts

Surface Waters, Stormwater, and Drinking Water

663 **Construction of Alternative D would have no impacts on surface waterbodies, minor**
664 **adverse impacts on stormwater, and negligible adverse impacts on drinking water.**

665 The construction impacts of Alternative D on surface waterbodies, stormwater, and drinking
666 water would be the same as those of Alternative A. These impacts are described in **Section**
667 **5.3.4.2, Alternative A, Construction Impacts.**

Groundwater and Wastewater

668 **Construction of Alternative D would have moderate adverse impacts on groundwater and**
669 **minor adverse impacts on wastewater.**

670 The construction impacts of Alternative D on groundwater and wastewater would be the
 671 same as those of Alternative C. These impacts are described in **Section 5.3.4.4, Alternative C,**
 672 *Construction Impacts.*

673 **Comparison to Existing Conditions**

674 The impacts of Alternative D on surface waterbodies, groundwater, and stormwater would
 675 be the same relative to existing conditions as to the No-Action Alternative because there are
 676 no relevant differences between the two baselines.

677 Relative to existing conditions, Alternative D would have minor adverse impacts on
 678 wastewater and drinking water. Alternative D would cause an increase in demand for these
 679 services (**Table 5-9**) that would be proportionately greater relative to existing conditions than
 680 relative to the No-Action Alternative. The impacts would be minor because projected
 681 demand increases would be small relative to the capacity of DC Water’s water supply and
 682 wastewater infrastructure. Additional wastewater demand would represent approximately
 683 0.06 percent of Blue Plains’ average daily capacity. Additional drinking water demand would
 684 represent approximately 0.13 percent of the Washington Aqueduct’s daily production.

Table 5-9. Comparison of Alternative D to Existing Conditions

| Water Resource Category | Location | Existing Conditions (gpd) | Increased Demand in Alternative D (2040) (gpd) | Increase Relative to Existing Conditions |
|-------------------------|--------------------------------|---------------------------|--|--|
| Wastewater | WUS | 83,500 | 167,030 ¹ | 200% |
| | Federal Air-rights Development | 0 | 61,900 | - |
| | Total | 83,500 | 228,930 | 274% |
| Drinking Water | WUS | 91,850 | 136,213 ² | 148% |
| | Federal Air-rights Development | 0 | 68,100 | - |
| | Total | 91,850 | 204,313 | 222% |

1 Based on increase in Amtrak + MARC + VRE + Intercity bus ridership relative to existing conditions, new retail, and groundwater disposal from long-term dewatering.

2 Based on wastewater from total ridership and retail + 10 percent.

5.3.4.6 Alternative E

685 **Direct Operational Impacts**

Surface Waters and Stormwater

686 **Relative to the No-Action Alternative, Alternative E would have no direct operational**
 687 **impacts on surface waterbodies, minor adverse operational impacts on stormwater**
 688 **infrastructure, and no impacts on stormwater flows.**

689 The direct operational impacts of Alternative E on surface waterbodies and stormwater
690 would be the same as those of Alternative A. These impacts are described in **Section 5.3.4.2,**
691 *Alternative A, Direct Operational Impacts*.

Groundwater

692 **Relative to the No-Action Alternative, Alternative E would have negligible adverse direct**
693 **operational impacts on groundwater.**

694 The direct operational impacts of Alternative E on groundwater would be the same as those
695 of Alternative B. These impacts are described in **Section 5.3.4.3, Alternative B, Direct**
696 *Operational Impacts*.

Wastewater

697 **Relative to the No-Action Alternative, Alternative E would have minor adverse direct**
698 **operational impacts on wastewater infrastructure and wastewater flows.**

699 Like Alternative A and the other Action Alternatives, Alternative E would likely require
700 modifications to sewer laterals to serve the expanded station. Such impacts would be minor
701 as explained for Alternative A in **Section 5.3.4.2, Alternative A, Direct Operational Impacts**.

702 In Alternative E, the increase in WUS ridership would cause the same increase in wastewater
703 production as in Alternative A, approximately 86,530 gallons per day (**Section 5.3.4.2,**
704 *Alternative A, Direct Operational Impacts*). The addition of approximately 100,000 square
705 feet of retail space would further generate around 5,000 gallons per day of wastewater.
706 Finally, up to 14,400 gallons per day of groundwater from long-term dewatering would be
707 discharged to the sewer conveyance system. Altogether, Alternative E would generate up to
708 105,930 gallons per day of wastewater. This would be a 23 percent increase relative to the
709 No-Action Alternative.

710 Wastewater would continue to be collected and conveyed via DC Water sewer lines to Blue
711 Plains. Given Blue Plains' capacity, the increase in the amount of wastewater to be treated in
712 Alternative D relative to the No-Action Alternative would be a minor adverse impact. It would
713 represent approximately 0.03 percent of the average treatment capacity.

Drinking Water

714 The impacts of Alternative E on the water supply would be the same as those of Alternative D
715 (see **Section 5.3.4.5, Alternative D, Direct Operational Impacts**). Alternative E would generate
716 the same additional demand for water as Alternative D.

Indirect Operational Impacts

Surface Water, Groundwater, and Stormwater

718 **Relative to the No-Action Alternative, Alternative E would have negligible adverse indirect**
719 **operational impacts on surface waterbodies and groundwater. It would have no indirect**
720 **operational impacts on stormwater.**

721 The indirect operational impacts of Alternative E on surface waters, groundwater, and
722 stormwater water would be the same as those of Alternative A. These impacts are described
723 in **Section 5.3.4.2, Alternative A, Indirect Operational Impacts.**

Wastewater and Drinking Water

724 **Relative to the No-Action Alternative, Alternative E would have minor adverse indirect**
725 **operational impacts on wastewater and drinking water.**

726 The indirect operational impacts of Alternative E on wastewater and drinking water would be
727 the same as those of Alternative D. These impacts are described in **Section 5.3.4.5,**
728 *Alternative D, Indirect Operational Impacts.*

Construction Impacts

Surface Waters, Stormwater, and Drinking Water

730 **Construction of Alternative E would have no impacts on surface waterbodies; minor**
731 **adverse impacts on stormwater; and negligible adverse impacts on drinking water.**

732 The construction impacts of Alternative E on surface waterbodies, stormwater, and drinking
733 water would be the same as those of Alternative A. These impacts are described in **Section**
734 **5.3.4.2, Alternative A, Construction Impacts.**

Groundwater and Wastewater

735 **Construction of Alternative E would have moderate adverse impacts on groundwater and**
736 **minor adverse impacts on wastewater.**

737 The construction impacts of Alternative E on groundwater and wastewater would be the
738 same as those of Alternative B. These impacts are described in **Section 5.3.4.3, Alternative B,**
739 *Construction Impacts.*

Comparison to Existing Conditions

741 The impacts of Alternative E on surface waterbodies, groundwater, and stormwater would be
742 the same relative to existing conditions as to the No-Action Alternative because there are no
743 relevant differences between the two baselines. Relative to existing conditions, Alternative E
744 would have minor adverse impacts on wastewater and drinking water. Alternative E would
745 cause an increase in demand for these services (**Table 5-10**) that would be proportionately
746 greater relative to existing conditions than relative to the No-Action Alternative. The impacts
747 would be minor because the demand increases would be small relative to the capacity of DC
748 Water's water supply and wastewater infrastructure. The additional wastewater demand
749 would represent approximately 0.05 percent of Blue Plains' average daily capacity. The
750 additional drinking water demand would represent approximately 0.13 percent of the
751 Washington Aqueduct's daily production.

Table 5-10. Comparison of Alternative E to Existing Conditions

| Water Resource Category | Location | Existing Conditions (gpd) | Increased Demand in Alternative E (2040) (gpd) | Increase Relative to Existing Conditions |
|-------------------------|--------------------------------|---------------------------|--|--|
| Wastewater | WUS | 83,500 | 138,230 ¹ | 166% |
| | Federal Air-rights Development | 0 | 61,900 | - |
| | Total | 83,500 | 200,130 | 240% |
| Drinking Water | WUS | 91,850 | 136,213 ² | 148% |
| | Federal Air-rights Development | 0 | 68,100 | - |
| | Total | 91,850 | 204,313 | 222% |

1 Based on increase in Amtrak + MARC + VRE + Intercity bus ridership relative to existing conditions, new retail, and groundwater disposal from long-term dewatering.

2 Based on wastewater from total ridership and retail + 10 percent.

5.3.4.7 Alternative A-C (Preferred Alternative)

752

Direct Operational Impacts

Surface Waters, Groundwater, Stormwater, Wastewater, and Drinking Water

753

Relative to the No-Action Alternative, Alternative A-C would have no direct operational impacts on surface waterbodies; negligible adverse impacts on groundwater; minor adverse operational impacts on stormwater infrastructure and no impacts on stormwater flows; minor adverse direct operational impacts on wastewater infrastructure and wastewater flows; and minor adverse direct operational impacts on drinking water infrastructure and demand.

754

755

756

757

758

759

The direct operational impacts of Alternative A-C on surface waterbodies, groundwater, stormwater, wastewater, and drinking water would be the same as those of Alternative A. These impacts are described in **Section 5.3.4.2, Alternative A, Direct Operational Impacts.**

760

761

762

Indirect Operational Impacts

Surface Waters, Groundwater, and Stormwater

763

Relative to the No-Action Alternative, Alternative A-C would have negligible adverse indirect operational impacts on surface waterbodies and groundwater. It would have no indirect operational impacts on stormwater.

764

765

766

The indirect operational impacts of Alternative A-C on surface waterbodies, groundwater, and stormwater would be as in Alternative A. These impacts are described in **Section 5.3.4.2, Alternative A, Indirect Operational Impacts.**

767

768

Wastewater

769 **Relative to the No-Action Alternative, Alternative A-C would have a minor adverse indirect**
770 **operational impact on wastewater.**

771 In Alternative A-C, the potential Federal air-rights development would consist of
772 approximately 380,000 gross square feet of office space. This office space would generate
773 approximately 34,200 gallons per day of wastewater (assuming a unit flow rate of 0.09 gallon
774 per square foot per day: see **Table 5-4**).

775 DC Water sewer lines would continue to collect wastewater from the Project Area and
776 convey it to Blue Plains. Given Blue Plains' capacity, the production of an additional 34,200
777 gallons per day of wastewater would be a minor adverse impact. It would represent about
778 0.008 percent of Blue Plains' average daily capacity.

Drinking Water

779 **Relative to the No-Action Alternative, Alternative A-C would have a minor adverse indirect**
780 **operational impact on drinking water.**

781 In Alternative A-C, the potential development of the Federal air rights as office space would
782 increase drinking water demand by approximately an additional 37,620 gallons per day of
783 water (calculated as wastewater demand plus 10 percent for consumption, system losses,
784 and other uses).

785 Drinking water would continue to be distributed by DC Water and supplied by the
786 Washington Aqueduct. The increase in demand from the Federal air-rights development
787 would represent around 0.02 percent of the Aqueduct's capacity, amounting to a minor
788 adverse impact.

Construction Impacts

Surface Waters, Groundwater, Stormwater, Wastewater, and Drinking Water

790 **Construction of Alternative A-C would have no impacts on surface waterbodies; negligible**
791 **impacts on groundwater; minor adverse impacts on stormwater; negligible adverse**
792 **impacts on wastewater; and negligible adverse impacts on drinking water.**

793 The construction impacts of Alternative A-C would be the same as those of Alternative A
794 because both alternatives are similar with respect to the relevant factors (such as depth of
795 excavation). These impacts are described in **Section 5.3.4.2, Construction Impacts**.

Comparison to Existing Conditions

797 The impacts of Alternative A-C on surface waterbodies, groundwater, and stormwater would
798 be the same relative to existing conditions as to the No-Action Alternative because there are
799 no relevant differences between the two baselines. Relative to existing conditions,
800 Alternative A-C would have minor adverse impacts on wastewater and drinking water.
801 Alternative A-C would cause an increase in demand for these services (**Table 5-11**) that would

802 be proportionately greater relative to existing conditions than relative to the No-Action
 803 Alternative.

Table 5-11. Comparison of Alternative A-C to Existing Conditions

| Water Resource Category | Location | Existing Conditions (gpd) | Increased Demand in Alternative A-C (2040) (gpd) | Increase Relative to Existing Conditions |
|-------------------------|--------------------------------|---------------------------|--|--|
| Wastewater | WUS | 83,500 | 136,830 ¹ | 164% |
| | Federal Air-rights Development | 0 | 34,200 | - |
| | Total | 83,500 | 171,030 | 240% |
| Drinking Water | WUS | 91,850 | 134,673 ² | 147% |
| | Federal Air-rights Development | 0 | 37,620 | - |
| | Total | 91,850 | 172,293 | 188% |

1 Based on increase in Amtrak + MARC + VRE + Intercity bus ridership relative to existing conditions, new retail, and groundwater disposal from long-term dewatering.

2 Based on wastewater from total ridership and retail + 10 percent.

804 The impacts would be minor because the demand increases would be small relative to the
 805 capacity of DC Water’s water supply and wastewater infrastructure. The additional
 806 wastewater demand would represent approximately 0.04 percent of Blue Plains’ average
 807 daily capacity. The additional drinking water demand would represent approximately 0.1
 808 percent of the Washington Aqueduct’s daily production.

5.3.5 Comparison of Alternatives

809 **Table 5-12** presents a comparison of the impacts of the No-Action Alternative and six Action
 810 Alternatives. All alternatives would have similar impacts on surface waters and stormwater.
 811 Impacts on groundwater would vary among the alternatives. Although no quantitative
 812 assessment is possible at this stage, the No-Action Alternative would have the smallest
 813 impact, with dewatering required only for the construction of drilled shafts to support the
 814 overbuild deck.

815 The Action Alternatives would require varying amounts of short-term and long-term
 816 dewatering depending on the depth of excavation and cut-off wall type associated with each
 817 alternative. **Table 5-13** shows estimated amounts. Construction-phase dewatering
 818 requirements would be greatest for Alternatives B and E and smallest for Alternatives A and
 819 A-C. Long-term dewatering needs would be negligible for all Action Alternatives except for
 820 Alternatives C and D. This is because in these two alternatives, the cut-off wall would extend
 821 only down to the clay layer underlying the Project Area and, as such, may not be fully
 822 effective in preventing seepage.

Table 5-12. Comparison of Alternatives, Water Resources

| Impact Category | Type of Impact | No-Action Alternative | Alternative A | Alternative B | Alternative C (Either Option) | Alternative D | Alternative E | Alternative A-C (Preferred) |
|-----------------|----------------------|--|----------------------------|----------------------------|----------------------------------|--------------------------|----------------------------|--------------------------------|
| Surface Waters | Direct Operational | No impacts | | | | | | |
| | Indirect Operational | Negligible adverse impacts | | | | | | |
| | Construction | No impacts | | | | | | |
| Groundwater | Direct Operational | Negligible adverse impacts | Negligible adverse impacts | Negligible adverse impacts | Moderate adverse impacts | Moderate adverse impacts | Negligible adverse impacts | Negligible adverse impacts |
| | Indirect Operational | No impacts | Negligible adverse impacts | | | | | |
| | Construction | Negligible adverse impacts | Negligible adverse impacts | Moderate adverse impacts | | | | Negligible adverse impacts |
| Stormwater | Direct Operational | Minor Adverse Impacts on Infrastructure; No impacts on Flows | | | | | | |
| | Indirect Operational | No impacts | | | | | | |
| | Construction | Minor adverse impacts | | | | | | |
| Wastewater | Direct Operational | Minor adverse impacts | | | | | | |
| | Indirect Operational | No impacts | No impacts | Minor adverse impacts | | | | |

| Impact Category | Type of Impact | No-Action Alternative | Alternative A | Alternative B | Alternative C (Either Option) | Alternative D | Alternative E | Alternative A-C (Preferred) |
|-----------------------|-----------------------------|----------------------------|----------------------------|-----------------------|-------------------------------|---------------|---------------|-----------------------------|
| | Construction | Negligible adverse impacts | Negligible adverse impacts | Minor adverse impacts | | | | Negligible adverse impacts |
| Drinking Water | Direct Operational | Minor adverse impacts | | | | | | |
| | Indirect Operational | No impacts | No impacts | Minor adverse impacts | | | | |
| | Construction | Negligible adverse impacts | | | | | | |

Table 5-13. Quantitative Estimates by Alternative

| Water Resources Category | Parameter | Source | No-Action Alternative | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative A-C |
|--------------------------------------|--------------------------------|--|-----------------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| Construction-phase Dewatering | Dewatering Rate (gpm) | Project Area | N/A | Less than 10 | 260 to 430 | 220 to 280 | 220 to 280 | 260 to 430 | Less than 10 |
| Long-term Dewatering | Dewatering Rate (gpm) | Project Area | N/A | Less than 10 | Less than 10 | 20 to 30 | 20 to 30 | Less than 10 | Less than 10 |
| Wastewater | Additional Demand (gpd) | WUS | 32,300 | 104,530 | 104,530 | 133,330 | 134,730 | 105,930 | 104,530 |
| | | Private Air-Rights Development | 431,900 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Potential Federal Air-Rights Development | 0 | 0 | 82,600 | 85,700 | 61,900 | 61,900 | 34,200 |
| | | Total | 464,200 | 104,530 | 187,130 | 219,030 | 196,630 | 167,830 | 138,730 |
| Water | Additional Demand (gpd) | WUS | 35,530 | 99,143 | 99,143 | 99,143 | 100,683 | 100,683 | 99,143 |
| | | Private Air-Rights Development | 475,090 | 0 | 0 | 0 | 0 | 0 | 0 |
| | | Potential Federal Air-Rights Development | 0 | 0 | 90,860 | 94,300 | 68,100 | 68,100 | 37,620 |
| | | Total | 510,620 | 99,143 | 190,003 | 193,443 | 168,783 | 168,783 | 136,763 |

Abbreviations: gpm = gallons per minute; gpd = gallons per day; N/A = Not Available

823 With regard to wastewater and drinking water, all Action Alternatives would generate
824 additional demand relative to the No-Action Alternative, as shown in **Table 5-13**. Differences
825 among the Action Alternatives would result from long-term discharge of groundwater to the
826 wastewater system and from the varying amount of Federally owned air rights that would be
827 available for potential development. Alternative C would generate the greatest additional
828 demand for wastewater and drinking water capacity and Alternative A the smallest.

5.3.6 Avoidance, Minimization and Mitigation Evaluation

829 The following measures to minimize or mitigate potential adverse impacts to surface
830 waterbodies, groundwater, stormwater, wastewater, and water supply infrastructure are
831 being considered by FRA consistent with the U.S. Environmental Protection Agency (EPA)'s
832 2017 NPDES Construction General Permit, Section 438 of the EISA, DOEE's *Stormwater*
833 *Management Guidebook*, District Department of Transportation (DDOT)'s *Green*
834 *Infrastructure Standards*, DC Water's *Green Infrastructure Utility Protection Guidelines*, and
835 DC Water's *Project Design Manual, Volume 3, Infrastructure Design*:

- 836 ■ The construction contractor would develop and implement erosion and
837 sedimentation controls during construction.
- 838 ■ The construction contractor would be required to provide on-site treatment of
839 pumped groundwater as needed and discharge it through the District's MS4 instead
840 of through the combined sewer system to Blue Plains.
- 841 ■ Prior to the beginning of construction, Project Proponents to conduct additional
842 groundwater studies, including:
 - 843 ● Performing additional borings to depths of 120 to 150 feet inside and along
844 the perimeter of the Project Area to better characterize the lower aquifer's
845 composition and extent as well as any discontinuities of the Potomac Clay
846 layer separating the aquifers.
 - 847 ● Performing research on adjacent properties to understand the local impacts
848 of ongoing or periodic dewatering systems operating around the Project
849 Area.
 - 850 ● Performing additional pump testing that target zones of clay discontinuity in
851 the lower aquifer.
 - 852 ● If warranted by the above, performing further modeling to map areas with
853 high potential to experience ground subsidence from groundwater
854 drawdown.
- 855 ■ During construction, if warranted by the studies listed above, Project contractor to
856 monitor and control active dewatering on the site so it does not create subsidence in
857 and around adjacent properties.

- 858 ■ Project Proponents to ensure that stormwater management features, including
859 green infrastructure practices such as rainwater collection and reuse, green roofs,
860 and bioretention facilities, are included in Project design as appropriate to manage
861 post-construction stormwater flows in accordance with DOEE’s *Stormwater*
862 *Management Guidebook*.
- 863 ■ Project Proponents to incorporate in Project design additional stormwater
864 management measures to restore, to the maximum extent technically feasible, pre-
865 development site hydrology in compliance with Section 438 of the EISA.

5.3.7 Permits and Regulatory Compliance

866 DOEE is the lead authority on environmental compliance within the District. DOEE completes
867 reviews and issues permits for land-disturbing projects. The Project would qualify as Major
868 Land Disturbing Activities²¹ and would need to secure permits for erosion and sediment
869 control, dewatering, and post-construction stormwater management.

870 The Project would also be regulated under EPA’s NPDES Construction General Permit and
871 would need to submit a Stormwater Pollution Prevention Plan (SWPPP) to both DOEE and the
872 EPA Region 3 that is compliant with the requirements of the permit. A SWPPP is a document
873 that identifies potential sources of stormwater pollution at a construction site, describes
874 practices to reduce pollutants in stormwater discharge from the site, and identifies
875 procedures to achieve compliance.

876 DC Water is an independent authority that distributes drinking water and collects and treats
877 stormwater and wastewater in the District. The Project would need to secure a DC Water
878 Permit Operations Department approval for water and wastewater connections, as well as
879 for the discharge of pumped groundwater.

880 DOEE and DC Water regulations and procedures govern construction-phase groundwater
881 discharge. The discharge must comply with DC Municipal Regulation, Title 21 – Water and
882 Sanitation. Particularly relevant sections include Chapter 21-1501, *Discharge Standards and*
883 *Sewer Use Requirements* and §21-207, *Sanitary Sewer Service Charge for Groundwater:*
884 *Improved Sites and Construction Sites*. Treatment prior to discharge may be required. DC
885 water measures construction groundwater discharge and charges \$3.11 per 1,000 gallons.
886 The Project may require a Large Industrial User Wastewater Discharge Permit (more than
887 25,000 gallons per day and more than six months duration), which costs \$7,500 for five years.

²¹ Major Land Disturbing Activity is considered any land disturbance greater than or equal to 5,000 square feet.

5.4 Solid Waste Disposal and Hazardous Materials

1 This section describes and characterizes potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on solid waste production and disposal and
3 on the use and disposal of hazardous materials. If applicable, this section also recommends
4 measures to avoid, minimize, or mitigate potential adverse impacts and identifies relevant
5 permitting and regulatory compliance requirements.

5.4.1 Regulatory Context and Guidance

6 Relevant Federal policies, regulations and guidance that pertain to natural ecological
7 resources are listed **Section 4.4.1, *Regulatory Context and Guidance***.

5.4.2 Study Area

8 As defined in **Section 4.4.2, *Study Area***, the Local Study Area for hazardous waste is the same
9 as the Project Area (**Figure 1-1**). It is unlikely that solid waste and hazardous materials
10 present at a regional level would require handling or storage within the Project Area;
11 therefore, a Regional Study Area was not considered.

5.4.3 Methodology

12 This section summarizes the methodology for evaluating the potential impacts of the
13 alternatives on solid waste disposal and hazardous materials. **Appendix C3, *Washington***
14 ***Union Station Expansion Project Environmental Consequences Technical Report, Section 4.4,***
15 ***Methodology***, provides a description of the analysis methodology. A summary is below.
16 Impacts were assessed as major, moderate, minor, or negligible based on the intensity scale
17 defined in **Section 5.1.1, *Definitions***.

5.4.3.1 Operational Impacts

18 Operational impacts on solid waste were evaluated based on estimated volumes of solid
19 waste that the Project Area would generate in the various alternatives. Estimates of WUS-
20 generated waste were based on available data on current waste generation. For other land
21 uses, including the private air-rights development and the potential Federal air-rights
22 development, the analysis used generation rates provided by the District Department of
23 Public Works. There is no information on the total amount of solid waste the District
24 produces currently or would produce in 2040, nor is there any information on the number
25 and capacity of available transfer disposal facilities at that time. As a result, waste generation
26 estimates were compared to the most amount of waste processed through the District's two
27 existing waste transfer stations in fiscal year 2017, which represents only a portion of the
28 total amount of waste generated in the District.

29 The Impact assessment for hazardous materials was qualitative. The analysis presumes that
30 operations at WUS comply and would continue to comply with all applicable laws and
31 regulations.

5.4.3.2 Construction Impacts

32 Construction impacts were evaluated using a similar approach to that used for the
33 operational impacts. Waste generation estimates were derived from the constructability
34 analysis conducted for the Project. Compliance with laws and regulations pertaining to
35 hazardous materials was presumed.

5.4.4 Impact Analysis

36 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
37 solid waste disposal and hazardous materials.

5.4.4.1 No-Action Alternative

Direct Operational Impacts

Municipal Solid Waste

38 **Relative to existing conditions, in the No-Action Alternative, there would be minor adverse**
39 **direct operational impacts from the increased amount of solid waste generated in the**
40 **Project Area.**

41 Increased activity at WUS in the No-Action Alternative would generate an increase in the
42 amount of municipal solid waste produced at the station. Between January and August 2017,
43 WUS generated approximately 1,145 tons of municipal solid waste and 415 tons of recyclable
44 material, or an average of 195 tons of waste a month. This corresponds to an annual amount
45 of 2,340 tons.

46 It is possible to develop an order-of-magnitude estimate of the increase in solid waste
47 generation that would occur in the No-Action Alternative based on the assumption that it
48 would be approximately proportional to the increase in ridership. In 2040, daily WUS
49 ridership (Amtrak, VRE, MARC, and intercity buses) is projected to increase by around
50 33 percent relative to existing conditions. A 33 percent increase in solid waste generation
51 would result in approximately 765 more tons of municipal waste a year.

52 The private air-rights development, including residential, hotel, office, and retail uses, would
53 also generate new municipal solid waste. An order-of-magnitude estimation based on typical
54 generation rates by use shows that the development would generate approximately 14,480
55 tons of solid waste annually. How this estimate was developed is explained in **Appendix C3,**
56 *Washington Union Station Expansion Project Environmental Consequences Technical Report,*
57 **Section 4.5.1.1, Direct Operational Impacts.**

58 Altogether, in the No-Action Alternative, the Project Area would annually produce
59 approximately 15,245 more tons of solid waste than under existing condition, for a total of
60 17,585 tons per year. It is not possible to determine how and by whom future waste from the
61 Project Area would be handled. It may be processed through one of the District's two solid
62 waste transfer stations. In fiscal year 2017, the District-owned solid waste transfer station
63 processed approximately 464,000 tons of waste from the District.¹ The increased quantity of
64 waste generated by the Project Area represents a small proportion of this amount (about 3.3
65 percent). Additionally, it can be anticipated that a large part of the waste would be either
66 recycled or composted, in keeping with District policy.² Non-recycled waste would be sent to
67 landfill facilities in Virginia or Maryland. In Virginia alone, total sanitary landfill capacity at the
68 end of 2017 was just under 248 million tons, with a remaining permitted life of 23.1 years.³
69 Additional waste from the Project Area in the No-Action Alternative is unlikely to cause
70 capacity issues.

Hazardous Materials and Waste

71 **Relative to existing conditions, in the No-Action Alternative, there would be an increase in**
72 **the amount of hazardous materials stored, used, and disposed of in the Project Area. This**
73 **would result in negligible adverse direct operational impacts.**

74 Train operations involve the storage and use of fuel, oils, lubricants, and other hazardous or
75 regulated materials for operation or maintenance of stationary or mobile equipment. There
76 would be an increase in rail operations at WUS in the No-Action Alternative, from 24 percent
77 for Amtrak operations to 6 percent for VRE operations. However, the nature of operations
78 would remain similar to what it is currently. The same types of hazardous materials would
79 continue to be used, though in greater amounts. The storage, utilization, and disposal of
80 these materials would continue to comply with applicable laws, regulations, and policies.
81 Increased activities at WUS may slightly increase the risk of accidental spills and release of oil
82 or hazardous materials (OHM).

83 The private air-rights development would involve the storage and use of hazardous materials
84 typically found in residential and office buildings. The District has a program for the disposal

¹ District Department of Public Works. *Washington DC Solid Waste Diversion Progress Report. Fiscal Year 2017*. Accessed from: <https://dpw.dc.gov/wastediversionreport>. Accessed on June 3, 2019.

² The District has a goal of diverting 80 percent of citywide waste from landfills and waste-to-energy facilities. To help achieve this goal, the District requires multi-family dwellings, office buildings, and restaurants to recycle a full suite of materials. Accessed from <https://dpw.dc.gov/release/new-dc-recycling-requirements-begin-january-1st>. Accessed on April 3, 2020.

³ Commonwealth of Virginia Department of Environmental Quality. *2018 Annual Solid Waste Report for Calendar Year 2017*. Accessed from: <https://www.deq.virginia.gov/Portals/0/DEQ/Land/ReportsPublications/2018%20SWIA%20Report%20for%20CY2017%20-%20ADA.pdf?ver=2018-08-20-151437-490>. Accessed on June 3, 2019.

85 of household hazardous materials at the Fort Totten Transfer Station, which would be
86 available to residents of the development.

Indirect Operational Impacts

87 **There would be no indirect operational impacts. The No-Action Alternative would not**
88 **affect solid waste or hazardous materials generation away from the Project Area.**

89 The No-Action Alternative would not affect the production of solid waste or hazardous
90 materials generation away from the Project Area

Construction Impacts

91 **Construction activities in the No-Action Alternative would result in negligible adverse**
92 **impacts from the storage and use of hazardous materials and the generation and disposal**
93 **of hazardous and non-hazardous waste and debris. They would generate potential minor**
94 **beneficial impacts from the removal of contaminated materials or media from the Project**
95 **Area.**

96 In the No-Action Alternative, construction of the Project would not occur and there would be
97 no construction impacts. The construction of several of the projects included in this
98 alternative, including the private air-rights development, the replacement of the H Street
99 Bridge, the relocation of Substation 25A, and the VRE Midday Storage Facility, would
100 generate impacts. Specific information on the construction methods and schedules for those
101 projects is not available. This section assesses anticipated impacts in a general and qualitative
102 manner.

103 Adverse impacts from the storage and use of hazardous materials and the generation and
104 disposal of hazardous and non-hazardous waste and debris during construction would be
105 negligible because it can be anticipated that these activities would comply with applicable
106 Federal and local laws and regulations, as explained below.

107 Construction activities would involve the storage, use, and disposal of petroleum and
108 hazardous materials such as fuel, lubricants, or solvents, among others, for the operation and
109 maintenance of equipment during construction activities. This would create a risk of spill or
110 release into the environment. Compliance with Emergency Planning and Community Right-
111 to-know Act (EPCRA), Oil Pollution Act (OPA), and Resource Conservation and Recovery Act
112 (RCRA) requirements would minimize impacts from spills or releases.

113 The projects in the No-Action Alternative would generate construction spoils and debris.
114 Limited sampling suggests that soil and groundwater below the rail terminal contain
115 contaminants in low concentrations. Some soil concentrations exceeded regulatory screening
116 levels for total petroleum hydrocarbons, diesel range organics (TPH-DRO), polychlorinated
117 biphenyls (PCB), and arsenic.⁴ Construction contractors would be required to handle and

⁴ Amtrak. November 2019. *Final Washington Union Station Terminal Infrastructure Project Constructability Report*.

118 dispose of spoil materials and groundwater in accordance with applicable laws and
119 regulations, including RCRA and the Comprehensive Environmental Response, Compensation,
120 and Liability Act (CERCLA).

121 The replacement of Substation 25A may generate hazardous debris. Electrical substations
122 include electrical equipment such as transformers or capacitors that contain dielectric fluids.
123 The Toxics Substances Control Act (TSCA) regulates the storage and disposal of PCB-
124 contaminated materials like dielectric fluids. Construction contractors would have to comply
125 with TSCA, as applicable.

126 Pre-1980 structures, including Substation 25A and the H Street Bridge, may contain asbestos-
127 containing materials (ACM) as well as lead-based paints. In the event such materials are
128 present, special handling during the demolition process would be required. Removal and
129 disposal of these materials would have to be in accordance with the applicable regulations
130 and standard abatement protocols.

131 In the aggregate, the removal of contaminated materials from the Project Area would
132 constitute a minor beneficial impact. This impact would be minor because of the likely
133 limited level of contamination present.

5.4.4.2 Alternative A

Direct Operational Impacts

Municipal Solid Waste

134 **Relative to the No-Action Alternative, Alternative A would have a minor adverse direct**
135 **operational impact on solid waste generation.**

136 Increased activity and ridership at WUS in Alternative A would generate an increase in the
137 amount of municipal solid waste produced by the station. It is possible to calculate an order-
138 of-magnitude estimate of the increase in solid waste generation that would occur based on
139 the assumption that it would be approximately proportional to the increase in ridership. In
140 2040, daily WUS ridership (Amtrak, VRE, MARC, and intercity buses) would increase by
141 around 65 percent relative to the No-Action Alternative. A proportional increase in annual
142 solid waste generation would result in approximately 2,031 more tons of municipal waste.
143 The addition of 72,000 square feet of retail to the approximately 208,000 square feet that are
144 currently at WUS would contribute approximately 713 tons of additional waste per year,
145 bringing the total increase to 2,744 tons per year. This would be a 16 percent increase
146 relative to the No-Action Alternative.

147 This increase would amount to approximately 0.6 percent of the 464,000 tons of waste
148 processed at the District's transfer stations during fiscal year 2017 and, consistent with the

149 District's goals for waste diversion, a large part of it would likely be recycled or composted.⁵
150 The rest would be sent to facilities in Maryland and Virginia, according to availability. In
151 Virginia alone, as of the end of 2017, sanitary landfill capacity was just under 248 million
152 tons.⁶ The additional solid waste generated in Alternative A is not likely to cause capacity
153 issues at landfills.

Hazardous Materials and Waste

154 **Relative to the No-Action Alternative, Alternative A would a negligible adverse direct**
155 **operational impact on hazardous materials and waste.**

156 Train operations involve the storage and use of fuel, oils, lubricants, and other hazardous or
157 regulated materials for the operation or maintenance of stationary or mobile equipment.
158 There would be an increase in rail operations at WUS in Alternative A relative to the No-
159 Action Alternative (see **Table 5-16** and **Table 5-27** in **Section 5.5, Transportation**). However,
160 the nature of the operations would not change and the same type of hazardous materials
161 would continue to be used, though in greater quantities. The storage, utilization, and disposal
162 of these materials would continue to comply with applicable laws, regulations, and policies.
163 Increased activities and train operations at WUS may slightly increase the risk of accidental
164 spills and release of hazardous materials. Releases would continue to be reported to the
165 applicable regulatory authority in accordance with the EPCRA, OPA, and other applicable
166 laws and regulations. Amtrak's Spill Prevention Control and Countermeasure (SPCC) Plan
167 specifies the actions to be taken in case of spill.

Indirect Operational Impacts

Municipal Solid Waste

168 **Relative to the No-Action Alternative, in Alternative A, the potential development of the**
169 **Federal air rights would result in a negligible indirect adverse operational impact on solid**
170 **waste generation.**

171 The potential use of the Federal air rights as additional parking would generate a small
172 amount of solid waste, mostly from the users of the parking. This would represent a
173 negligible increase in the amount of waste produced in Alternative A and would be a
174 negligible adverse impact.

⁵ District Department of Public Works. *Washington DC Solid Waste Diversion Progress Report. Fiscal Year 2017*. Accessed from: <https://dpw.dc.gov/wastediversionreport>. Accessed on June 3, 2019

⁶ Commonwealth of Virginia Department of Environmental Quality. *2018 Annual Solid Waste Report for Calendar Year 2017*. Accessed from: <https://www.deq.virginia.gov/Portals/0/DEQ/Land/ReportsPublications/2018%20SWIA%20Report%20for%20CY2017%20-%20ADA.pdf?ver=2018-08-20-151437-490>. Accessed on June 3, 2019.

Hazardous Materials and Waste

175 **Relative to the No-Action Alternative, in Alternative A, the potential development of the**
176 **Federal air rights would result in a negligible indirect operational adverse impact on**
177 **hazardous material and waste.**

178 Development of the Federal air rights into two levels of parking above the new parking
179 facility would add to the amount of hazardous materials and waste— such as oils and
180 lubricants - used or produced in the Project Area. Because of the moderate size of facility,
181 this increase would be proportionally small and impacts would be negligible.

Construction Impacts

182 **Construction of Alternative A would result in minor adverse impacts from the storage and**
183 **use of hazardous materials and the generation and disposal of hazardous and non-**
184 **hazardous waste and debris. It would have potential minor beneficial impacts from the**
185 **removal of contaminated materials or media from the Project Area.**

186 Construction of Alternative A would require the storage, use and disposal of petroleum
187 products and hazardous materials such as fuel, lubricants, antifreeze, fire retardants, brake
188 fluid, adhesives, or solvents for the operation and maintenance of construction equipment
189 and vehicles. This would create a risk of spill or release into the environment. This would be a
190 minor adverse impact because compliance with EPCRA, OPA, RCRA, and other applicable
191 Federal and local laws and regulations would minimize this risk. The implementation of
192 standard best management practices by the construction contractor, including spill
193 prevention plans and the construction and maintenance of containment systems, would
194 contribute to minimizing the risk of spills.

195 Alternative A would require excavating the rail terminal to a depth of approximately 20 feet
196 asl.⁷ It would also involve demolishing existing infrastructure such as tracks, platforms, and
197 catenaries as well as the Claytor Concourse and the existing parking garage. Over the entire
198 construction period (approximately 11 years and 4 months), this would generate a
199 substantial amount of spoils and debris – approximately 1.16 million cubic yards - that would
200 require transport and disposal. However, excavation would not occur all at once but in four
201 separate steps as each construction phase (except the Intermediate Phase) would include a
202 period of significant excavation early in the phase. The shortest period of continuous, major
203 excavation work would be in Phase 1 (approximately 5 months out of a total phase duration
204 of 2 years and 5 months) and the longest in Phase 4 (approximately 1 year and 5 months out
205 of a total phase duration of 3 years and 1 month). The amount of spoil produced in each
206 phase would vary proportionately, from a total of approximately 141,000 cubic yard during
207 Phase 1 to a total of approximately 524,000 cubic yards during Phase 4.

⁷ **Appendix A7. Support of Excavation (SOE) Diagrams.**

208 Some of the excavated soil may contain TPH-DRO, PCBs, and arsenic in excess of regulatory
209 levels. Shallow groundwater samples from beneath the former H Street Tunnel contained
210 some metals concentrations in excess of regulatory levels.⁸ Construction contractors would
211 be required to handle and dispose of spoil materials and groundwater in accordance with
212 applicable laws and regulations, including RCRA, CERCLA, and other Federal and District laws
213 and regulations, as applicable.

214 Construction debris would include platforms and railroad tracks. Used wooden railroad ties
215 are typically coated with chemical preservatives including creosote, which contains semi-
216 volatile organic compounds. Materials would be characterized, managed, and disposed of in
217 accordance with RCRA and other applicable regulations. This would also be the case of debris
218 that, based on age, may contain ACM or lead-based paint. All such waste would be disposed
219 of at facilities permitted for this type of material.

220 Spoil generated under each phase of construction would be disposed of at regional disposal
221 facilities based on the type of waste, facility's capacity, and waste characterization
222 requirements. The appropriate transport methods and disposal locations would be identified
223 as part of construction planning.

224 The removal of contaminated media materials from the Project Area would constitute a
225 minor beneficial impact. The impact would be minor because of the likely limited level of
226 contamination present. All fill used to replace materials removed during construction would
227 be certified-clean material.

Comparison to Existing Conditions

228 Relative to existing conditions, Alternative A would result in an operational, long-term
229 increase in solid waste generation of approximately 117 percent instead of 16 percent
230 relative to the No-Action Alternative. While this would be a proportionately greater increase,
231 the total amount of additional waste that would require processing would remain the same
232 and it is not likely to exceed the capacity of the District's waste transfer facilities or the
233 capacity of potential receiving facilities in the region. Impacts would be minor.

234 In Alternative A, there would be an increase in the amount of hazardous materials stored,
235 used, and disposed of in the Project Area relative to existing conditions. This would represent
236 a negligible adverse direct operational impact. The greater number of operations in
237 Alternative A than in under existing conditions would involve an increase in the storage and
238 use of fuel, oils, lubricants, and other hazardous or regulated materials. However, the nature
239 of operations would remain similar to what it is currently. The same type of hazardous
240 materials would continue to be used, though in greater quantities. The storage, utilization,
241 and disposal of these materials would continue to comply with applicable laws, regulations,
242 and policies.

⁸ Amtrak. November 2019. *Final Washington Union Station Terminal Infrastructure Project Constructability Report*.

5.4.4.3 Alternative B

Direct Operational Impacts

Municipal Solid Waste

243 **Relative to the No-Action Alternative, Alternative B would have a minor adverse direct**
244 **operational impact on solid waste generation.**

245 Alternative B's impacts on solid waste generation would be the same as Alternative A's
246 (Section 5.4.4.2, *Alternative A, Direct Operational Impacts*). This is because the increase in
247 WUS activities would be the same in both alternatives.

Hazardous Materials and Waste

248 **Relative to the No-Action Alternative, Alternative B would have negligible adverse direct**
249 **operational impact on hazardous materials and waste.**

250 The impacts of Alternative B would be the same as those of Alternative A (Section 5.4.4.2,
251 *Alternative A, Direct Operational Impacts*). This is because the increase in WUS activities
252 would be the same in both alternatives.

Indirect Operational Impacts

Municipal Solid Waste

253 **Relative to the No-Action Alternative, in Alternative B, the potential development of the**
254 **Federal air rights would result in a minor adverse indirect operational impact on solid**
255 **waste generation.**

256 In Alternative B, the potential Federal air-rights development would consist of approximately
257 917,420 square feet of office space. It would generate an estimated 4,532 tons per year of
258 additional solid waste.⁹ While this would more than double the amount of additional waste
259 Alternative B would generate, it would be a small increase (about 0.97 percent) relative to
260 the 464,000 tons of waste processed in the District's two transfer stations in fiscal year 2017.
261 Additionally, a large part of it would likely be recycled, in keeping with the policies in place to
262 achieve the District's goals of diverting 80 percent of the citywide waste stream from landfills
263 or waste-to-energy facilities.¹⁰ Non-recycled waste would be sent to landfills in Maryland and
264 Virginia. In Virginia alone, as of the end of 2017, sanitary landfill capacity was just under 248

⁹ Developed based on generation rates provided by District Department of Public Works, Office of Waste Diversion (January 2019) and volume-to-weight conversion factors obtained from EPA (see https://www.epa.gov/sites/production/files/2016-04/documents/volume_to_weight_conversion_factors_memorandum_04192016_508fnl.pdf). Accessed on April 2, 2020.

¹⁰ See <https://dpw.dc.gov/release/new-dc-recycling-requirements-begin-january-1st>. Accessed on April 2, 2020.

265 million tons, with a remaining permitted life of 23.1 years.¹¹ The additional solid waste
266 generated by the potential Federal air-rights development in Alternative B is not likely to
267 cause capacity issues.

Hazardous Materials and Waste

268 **Relative to the No-Action Alternative, in Alternative B, the potential development of the**
269 **Federal air rights would result in a negligible indirect operational adverse impact on**
270 **hazardous material and waste.**

271 Development of the Federal air rights into office space would not involve the storage and use
272 of hazardous materials beyond products typically found in office buildings such as batteries,
273 solvents, paints, or detergents, among others. Impacts would be negligible.

Construction Impacts

274 **Construction of Alternative B would result in minor adverse impacts from the storage and**
275 **use of hazardous materials and the generation and disposal of hazardous and non-**
276 **hazardous waste and debris. It would have potential minor beneficial impacts from the**
277 **removal of contaminated materials or media from the Project Area.**

278 Construction of Alternative B would require the storage, use, and disposal of petroleum
279 products and hazardous materials. This would result in minor adverse impacts as in
280 Alternative A (**Section 5.4.4.2, Alternative A, Construction Impacts**).

281 Alternative B would require excavating the rail terminal to approximately 10 feet below sea
282 level. It would also involve demolishing existing infrastructure such as tracks, platforms, and
283 catenaries as well as the Claytor Concourse and the existing parking garage. This would
284 generate a substantial amount of spoils and debris – approximately 1.85 million cubic yards –
285 requiring transport and disposal over the entire construction period (approximately 14 years
286 and 4 months). However, excavation would not occur all at once but in four separate steps as
287 each construction phase (except the Intermediate Phase) would include a period of
288 significant excavation early in the phase. The shortest period of continuous, major excavation
289 work in Alternative B would be in Phase 1 (approximately 5 months out of a total phase
290 duration of 2 years and 5 months) and the longest in Phase 4 (approximately 2 years and 7
291 months out of a total phase duration of 4 years and 11 months). The amount of spoil
292 produced in each phase would vary proportionately, from a total of approximately 141,000
293 cubic yards during Phase 1 to a total of approximately 957,000 cubic yards during Phase 4.

¹¹ Commonwealth of Virginia Department of Environmental Quality. *2018 Annual Solid Waste Report for Calendar Year 2017*. Accessed from <https://www.deq.virginia.gov/Portals/0/DEQ/Land/ReportsPublications/2018%20SWIA%20Report%20for%20CY2017%20-%20ADA.pdf?ver=2018-08-20-151437-490>. Accessed on June 3, 2019.

294 Appropriate transport methods and disposal locations would be identified during
295 construction planning.

296 For the same reasons as stated for Alternative A, the removal of contaminated media
297 materials from the Project Area would constitute a minor beneficial impact. All fill used
298 during construction would be certified-clean material.

Comparison to Existing Conditions

299 Like Alternative A, Alternative B would result in an operational, long-term increase in solid
300 waste generation of approximately 117 percent relative to existing condition instead of
301 16 percent relative to the No-Action Alternative. Factoring in the indirect impacts from the
302 potential Federal air-rights development, projected increases would be 299 percent and
303 40 percent, respectively. While the increase would be proportionately greater relative to
304 existing conditions than relative to the No-Action Alternative, the total amount of additional
305 waste that would require processing would remain the same regardless of the comparison
306 baseline. It is not likely to exceed the capacity of the District's waste transfer facilities or
307 regional receiving facilities. The impact would be minor.

308 In Alternative B, there would be an increase in the quantity of hazardous materials stored,
309 used, and disposed of in the Project Area relative to existing conditions. This would represent
310 a negligible adverse direct operational impact the same as Alternative A (**Section 5.4.4.2,**
311 *Alternative A, Comparison to Existing Conditions*).

5.4.4.4 Alternative C (Both Options)

Direct Operational Impacts

Municipal Solid Waste

312 **Relative to the No-Action Alternative, Alternative C would have a minor adverse direct**
313 **operational impact on solid waste generation.**

314 The impacts of Alternative C on solid waste generation would be the same as those of
315 Alternative A (**Section 5.4.4.2, Alternative A, Direct Operational Impacts**). This is because the
316 increase in WUS activities would be the same in both alternatives.

Hazardous Materials and Waste

317 **Relative to the No-Action Alternative, Alternative C would have negligible adverse direct**
318 **operational impacts on hazardous materials and waste.**

319 Alternative C's impacts would be the same as Alternative A's (**Section 5.4.4.2, Alternative A,**
320 *Direct Operational Impacts*) because the increase in WUS activities would be the same in
321 both alternatives.

Indirect Operational Impacts

Municipal Waste

322 **Relative to the No-Action Alternative, in Alternative C, the potential development of the**
323 **Federal air rights would result in a minor adverse indirect operational impact on solid**
324 **waste generation.**

325 In Alternative C, the potential Federal air-rights development would consist of approximately
326 952,600 square feet of office space. This would generate an estimated 4,700 tons per year of
327 additional solid waste. While this would more than double the amount of additional waste
328 Alternative C would generate, it would be a small increase (about 1 percent) relative to the
329 464,000 tons of waste processed in the District in fiscal year 2017. Additionally, a large part
330 of it would likely be recycled, in keeping with the policies in place to achieve the District’s
331 goals of diverting 80 percent of the citywide waste stream from landfills or waste-to-energy
332 facilities.¹² Non-recycled waste would be sent to landfills in Maryland and Virginia. In Virginia
333 alone, as of the end of 2017, sanitary landfill capacity was just under 248 million tons, with a
334 remaining permitted life of 23.1 years.¹³ The additional solid waste generated by the
335 potential Federal air-rights development in Alternative C is not likely to cause capacity issues.

Hazardous Materials and Waste

336 **Relative to the No-Action Alternative, in Alternative C, the potential development of the**
337 **Federal air rights would result in a negligible indirect operational adverse impact on**
338 **hazardous material and waste.**

339 Development of the Federal air rights into office space would not involve the storage and use
340 of hazardous materials beyond products typically found in office buildings such as batteries,
341 solvents, paints, or detergents, among others. Impacts would be negligible.

Construction Impacts

342 **Construction of Alternative C would result in minor adverse impacts from the storage and**
343 **use of hazardous materials and the generation and disposal of hazardous and non-**
344 **hazardous waste and debris. It would have potential minor beneficial impacts from the**
345 **removal of contaminated materials or media from the Project Area.**

346 Construction of Alternative C would require the storage, use and disposal of petroleum
347 products and hazardous materials. This would result in minor adverse impacts as in
348 Alternative A (**Section 5.4.4.2, Alternative A, Construction Impacts**).

¹² See <https://dpw.dc.gov/release/new-dc-recycling-requirements-begin-january-1st>. Accessed on April 2, 2020.

¹³ Commonwealth of Virginia Department of Environmental Quality. *2018 Annual Solid Waste Report for Calendar Year 2017*. Accessed from: <https://www.deq.virginia.gov/Portals/0/DEQ/Land/ReportsPublications/2018%20SWIA%20Report%20for%20CY2017%20-%20ADA.pdf?ver=2018-08-20-151437-490>. Accessed on April 2, 2020.

349 Alternative C would require excavating the rail terminal to a depth of approximately 3 feet
350 asl. It would also involve demolishing existing infrastructure such as tracks, platforms, and
351 catenaries as well as the Claytor Concourse and the existing parking garage. This would
352 generate a substantial amount of spoils and debris – approximately 1.5 million cubic yards
353 requiring transport and disposal over the entire construction period (approximately 12 years
354 and 3 months). However, excavation would not occur all at once but in four separate steps as
355 each construction phase (except the Intermediate Phase) would include a period of
356 significant excavation early in the phase. The shortest period of continuous, major excavation
357 work in Alternative C would be in Phase 1 (approximately 5 months out of a total phase
358 duration of 2 years and 5 months) and the longest in Phase 4 (approximately 2 years out of a
359 total phase duration of 4 years). The amount of spoil produced in each phase would vary
360 proportionately, from a total of approximately 141,000 cubic yard during Phase 1 to a total of
361 approximately 753,000 cubic yards during Phase 4. Appropriate transport methods and
362 disposal locations would be identified during construction planning.

363 For the same reasons as in Alternative A, the removal of contaminated media materials from
364 the Project Area would constitute a minor beneficial impact. All fill used during construction
365 would be certified-clean material.

Comparison to Existing Conditions

366 As in Alternatives A and B, in Alternative C solid waste generation would increase by
367 approximately 117 percent relative to existing conditions, compared to 16 percent relative to
368 the No-Action Alternative. Factoring in the indirect impacts from the potential Federal air-
369 rights development, increases would be 318 percent and 42 percent, respectively. While the
370 increase would be proportionately greater relative to existing conditions, the total amount of
371 additional waste requiring processing would remain the same regardless of the comparison
372 baseline. It is not likely to exceed the capacity of the District’s waste transfer facilities or
373 regional receiving facilities. The impacts would be minor.

374 In Alternative C, there would be an increase in the amount of hazardous materials stored,
375 used, and disposed of in the Project Area relative to existing conditions. This would represent
376 a negligible adverse direct operational impact as in Alternative A and for the same reasons
377 (**Section 5.4.4.2, Alternative A, Comparison to Existing Conditions**).

5.4.4.5 Alternative D

Direct Operational Impacts

Municipal Solid Waste

378 **Relative to the No-Action Alternative, Alternative D would have a minor adverse direct**
379 **operational impact on solid waste generation.**

380 Increased activity and ridership at WUS would generate an increase in the amount of
381 municipal solid waste produced by the station similar to what would occur for Alternative A

382 and the other Action Alternatives. As explained in **Section 5.4.4.2, Alternative A, Direct**
383 *Operational Impacts*, this would result in a total of 2,031 additional tons of solid waste
384 produced annually in the Project Area.

385 The addition of approximately 100,000 square feet of retail would further contribute
386 approximately 990 tons of waste per year, bringing the total increase to 3,021 tons every
387 year. This would be a 17 percent increment relative to what the No-Action Alternative would
388 generate.

389 This increase would amount to about 0.65 percent of the 464,000 tons of waste processed in
390 the District's transfer stations in fiscal year 2017.¹⁴ Much of it would likely be recycled, in
391 keeping with the District's goal of diverting 80 percent of citywide waste from landfills or
392 waste-to-energy facilities.¹⁵ Non-recycled waste would be sent to facilities in Maryland and
393 Virginia. . In Virginia alone, as of the end of 2017, sanitary landfill capacity was just under 248
394 million tons, with a remaining permitted life of 23.1 years.¹⁶ The projected increase is
395 unlikely to cause capacity issues and adverse impacts would be minor.

Hazardous Materials and Waste

396 **Relative to the No-Action Alternative, Alternative D would have negligible adverse direct**
397 **operational impacts in hazardous materials and waste.**

398 Impacts would be the same as in Alternative A (**Section 5.4.4.2, Alternative A, Direct**
399 *Operational Impacts*).

Indirect Operational Impacts

Municipal Solid Waste

400 **Relative to the No-Action Alternative, in Alternative D, the potential development of the**
401 **Federal air rights would result in a minor adverse indirect operational impact on solid**
402 **waste generation.**

403 In Alternative D, the potential Federal air-rights development would consist of approximately
404 688,050 square feet of office space. This would generate an estimated 3,410 tons per year of
405 additional solid waste. While it would more than double the amount of additional waste
406 Alternative D would generate, it would be a small increase (about 0.7 percent) relative to the
407 464,000 tons of waste processed in the District in fiscal year 2017. A large part of it would

¹⁴ District Department of Public Works. *Washington DC Solid Waste Diversion Progress Report. Fiscal Year 2017*. Accessed from: <https://dpw.dc.gov/wastediversionreport>. Accessed on April 2, 2020.

¹⁵ See <https://dpw.dc.gov/release/new-dc-recycling-requirements-begin-january-1st>. Accessed on April 2, 2020.

¹⁶ Commonwealth of Virginia Department of Environmental Quality. *2018 Annual Solid Waste Report for Calendar Year 2017*. Accessed from: <https://www.deq.virginia.gov/Portals/0/DEQ/Land/ReportsPublications/2018%20SWIA%20Report%20for%20CY2017%20-%20ADA.pdf?ver=2018-08-20-151437-490>. Accessed on April 2, 2020.

408 likely be recycled, in keeping with the policies in place to achieve the District’s goals of
409 diverting 80 percent of the citywide waste stream from landfills or waste-to-energy facilities.
410 ¹⁷ Non-recycled waste would be sent to landfills in Maryland and Virginia. In Virginia alone,
411 as of the end of 2017, sanitary landfill capacity was just under 248 million tons, with a
412 remaining permitted life of 23.1 years. The additional solid waste generated by the potential
413 Federal air-rights development in Alternative D is not likely to cause capacity issues. The
414 impact would be minor.

Hazardous Materials and Waste

415 **Relative to the No-Action Alternative, in Alternative D, the potential development of the**
416 **Federal air rights would result in a negligible indirect operational adverse impact on**
417 **hazardous material and waste.**

418 Development of the Federal air rights into office space would not involve the storage and use
419 of hazardous materials beyond products typically found in office buildings such as batteries,
420 solvents, paints, or detergents, among others. Impacts would be negligible.

Construction Impacts

421 **Construction of Alternative D would result in minor adverse impacts from the storage and**
422 **use of hazardous materials and the generation and disposal of hazardous and non-**
423 **hazardous waste and debris. It would have potential minor beneficial impacts from the**
424 **removal of contaminated materials or media from the Project Area.**

425 The construction impacts of Alternative D would be the same as those of Alternative C
426 (Section 5.4.4.4, *Alternative C, Construction Impacts*).

Comparison to Existing Conditions

427 Relative to existing conditions, Alternative D would result in an increase in solid waste
428 generation of approximately 129 percent relative to existing condition instead of 17 percent
429 relative to the No-Action Alternative. Factoring in the indirect impacts from the potential
430 Federal air-rights development, the projected increases would be 275 percent and
431 37 percent, respectively. While the increase would be proportionately greater relative to
432 existing conditions, the total amount of additional waste that would require processing
433 would remain the same regardless of the comparison baseline. It is not likely to exceed the
434 capacity of the District’s waste transfer facilities or regional receiving facilities. Adverse
435 impacts would be minor.

436 In Alternative D, there would be an increase in the amount of hazardous materials stored,
437 used, and disposed of in the Project Area relative to existing conditions. This would represent
438 a negligible adverse direct operational impact as for Alternative A and for the same reasons
439 (Section 5.4.4.2, *Alternative A, Comparison to Existing Conditions*).

¹⁷ See <https://dpw.dc.gov/release/new-dc-recycling-requirements-begin-january-1st>. Accessed on April 2, 2020.

5.4.4.6 Alternative E

Direct Operational Impacts

Municipal Solid Waste

440 **Relative to the No-Action Alternative, Alternative E would have a minor adverse direct**
441 **operational impact on solid waste generation.**

442 Impacts would be the same as in Alternative D because the increase in WUS activities would
443 be the same in both alternatives (**Section 5.4.4.5, Alternative D, Direct Operational Impacts**).

Hazardous Materials and Waste

444 **Relative to the No-Action Alternative, Alternative E would have a negligible adverse direct**
445 **operational impact on hazardous materials and waste.**

446 Impacts would be the same as in Alternative A because the increase in WUS activities would
447 be the same in both alternatives (**Section 5.4.4.2, Alternative A, Direct Operational Impacts**).

Indirect Operational Impacts

Municipal Solid Waste and Hazardous Materials and Waste

448 **Relative to the No-Action Alternative, in Alternative E, the potential development of the**
449 **Federal air-rights would result in a minor adverse indirect operational impact on solid**
450 **waste generation and negligible indirect operational impacts on hazardous materials and**
451 **waste.**

452 Indirect operational impacts would be the same as in Alternative D (**Section 5.4.4.5,**
453 *Alternative D, Indirect Operational Impacts*). This is because the size of the potential federal
454 air-rights development would be the same in both alternatives.

Construction Impacts

455 **Construction of Alternative E would result in minor adverse impacts from the storage and**
456 **use of hazardous materials and the generation and disposal of hazardous and non-**
457 **hazardous waste and debris. It would have potential minor beneficial impacts from the**
458 **removal of contaminated materials or media from the Project Area.**

459 The construction impacts of Alternative E would be the same as those of Alternative B
460 (**Section 5.4.4.3, Alternative B, Construction Impacts**).

Comparison to Existing Conditions

461 Alternative E would compare to existing conditions like Alternative D (**Section 5.4.4.5,**
462 *Alternative D, Comparison to Existing Conditions*).

5.4.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

Municipal Solid Waste

463 **Relative to the No-Action Alternative, Alternative A-C would have a minor adverse direct**
464 **operational impact on solid waste generation.**

465 Alternative A-C's impacts on solid waste generation would be the same as Alternative A's
466 (Section 5.4.4.2, *Alternative A, Direct Operational Impacts*). This is because the increase in
467 WUS activities would be the same in both alternatives.

Hazardous Materials and Waste

468 **Relative to the No-Action Alternative, Alternative A-C would have negligible adverse direct**
469 **operational impact on hazardous materials and waste.**

470 The impacts of Alternative A-C would be the same as those of Alternative A (Section 5.4.4.2,
471 *Alternative A, Direct Operational Impacts*). This is because the increase in WUS activities
472 would be the same in both alternatives.

Indirect Operational Impacts

Municipal Solid Waste

473 **Relative to the No-Action Alternative, in Alternative A-C, the potential development of the**
474 **Federal air rights would result in a minor adverse indirect operational impact on solid**
475 **waste generation.**

476 In Alternative A-C, the potential Federal air-rights development would consist of
477 approximately 380,000 square feet of office space. It would generate an estimated 1,881
478 tons per year of additional solid waste.¹⁸ This would be a small increase (about 0.4 percent)
479 relative to the 464,000 tons of waste processed in the District's two transfer stations in fiscal
480 year 2017. Additionally, a large part of it would likely be recycled, in keeping with the policies
481 in place to achieve the District's goals of diverting 80 percent of the citywide waste stream
482 from landfills or waste-to-energy facilities.¹⁹ Non-recycled waste would be sent to landfills in
483 Maryland and Virginia. In Virginia alone, as of the end of 2017, sanitary landfill capacity was
484 just under 248 million tons, with a remaining permitted life of 23.1 years.²⁰ The additional

¹⁸ Developed based on generation rates provided by District Department of Public Works, Office of Waste Diversion (January 2019) and volume-to-weight conversion factors obtained from EPA (see https://www.epa.gov/sites/production/files/2016-04/documents/volume_to_weight_conversion_factors_memorandum_04192016_508fnl.pdf). Accessed on April 2, 2020.

¹⁹ See <https://dpw.dc.gov/release/new-dc-recycling-requirements-begin-january-1st>. Accessed on April 2, 2020.

²⁰ Commonwealth of Virginia Department of Environmental Quality. *2018 Annual Solid Waste Report for Calendar Year 2017*. Accessed from:

485 solid waste generated by the potential Federal air-rights development in Alternative A-C is
486 not likely to cause capacity issues.

Hazardous Materials and Waste

487 **Relative to the No-Action Alternative, in Alternative A-C, the potential development of the**
488 **Federal air rights would result in a negligible indirect operational adverse impact on**
489 **hazardous material and waste.**

490 Development of the Federal air rights into office space would not involve the storage and use
491 of hazardous materials beyond products typically found in office buildings such as batteries,
492 solvents, paints, or detergents, among others. Impacts would be negligible.

Construction Impacts

493 **Construction of Alternative A-C would result in minor adverse impacts from the storage**
494 **and use of hazardous materials and the generation and disposal of hazardous and non-**
495 **hazardous waste and debris. It would have potential minor beneficial impacts from the**
496 **removal of contaminated materials or media from the Project Area.**

497 The construction impacts of Alternative A-C would be the same as those of Alternative A
498 (**Section 5.4.4.2, Alternative A, Construction Impacts**).

Comparison to Existing Conditions

499 Relative to existing conditions, Alternative A-C would result in an increase in solid waste
500 generation of approximately 117 percent relative to existing condition instead of 16 percent
501 relative to the No-Action Alternative. Factoring in the indirect impacts from the potential
502 Federal air-rights development, the projected increases would be 198 percent and
503 26 percent, respectively. While the increase would be proportionately greater relative to
504 existing conditions, the total amount of additional waste that would require processing
505 would remain the same regardless of the comparison baseline. It is not likely to exceed the
506 capacity of the District's waste transfer facilities or regional receiving facilities. Adverse
507 impacts would be minor.

5.4.5 Comparison of Alternatives

508 **Table 5-14** shows a comparison of impacts among the alternatives. The Action Alternatives
509 differ with respect to the amount of municipal solid waste they would generate as well as the
510 amount of construction-related spoil and debris, as shown in **Table 5-15**.

<https://www.deq.virginia.gov/Portals/0/DEQ/Land/ReportsPublications/2018%20SWIA%20Report%20for%20CY2017%20-%20ADA.pdf?ver=2018-08-20-151437-490>. Accessed on April 2, 2020.

Table 5-14. Comparison of Alternatives, Solid Waste and Hazardous Materials

| Impact Category | Type of Impact | No-Action Alternative | Alternative A | Alternative B | Alternative C (Either Option) | Alternative D | Alternative E | Alternative A-C (Preferred) |
|-----------------------|----------------------|---|--------------------------------------|-----------------------|-------------------------------|---------------|---------------|-----------------------------|
| Municipal Solid Waste | Direct Operational | Minor Adverse Impacts | | | | | | |
| | Indirect Operational | No impacts | Negligible adverse impacts | Minor adverse impacts | | | | |
| | Construction | Minor adverse impacts | | | | | | |
| Hazardous Materials | Direct Operational | Negligible adverse impacts | | | | | | |
| | Indirect Operational | Negligible impacts | | | | | | |
| | Construction | Negligible adverse / Minor beneficial impacts | Minor adverse and beneficial impacts | | | | | |

Table 5-15. Comparison of Estimated Additional Waste Generation per Alternative

| Operational Source | No-Action Alternative | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative A-C |
|---|-----------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| WUS | 765 tpy | 2,744 tpy | 2,744 tpy | 2,744 tpy | 3,021 tpy | 3,021 tpy | 2,744 tpy |
| Private Air-Rights Development | 14,480 tpy | - | - | - | - | - | - |
| Potential Federal Air-Rights Development | - | Negligible | 4,532 tpy | 4,700 tpy | 3,410 tpy | 3,410 tpy | 1,881 tpy |
| Total | 15,245 tpy | 2,744 tpy | 7,276 tpy | 7,444 tpy | 6,431 tpy | 6,431 tpy | 4,625 tpy |
| Construction Spoils and Debris | - | 1,160,885 cy | 1,845,224 cy | 1,507,102 cy | 1,507,102 cy | 1,845,224 cy | 1,160,885 cy |

Abbreviations: tpy = tons per year; cy = cubic yards

511 The differences in municipal waste generation arise from the amount of new retail provided
512 in the various Action Alternatives as well as the function and size of the potential Federal air-
513 rights development. Overall, based on the order-of-magnitude estimates provided in the
514 above analysis, Alternative A would cause the smallest increase in the amount of waste and
515 Alternative C the largest one. Alternative A would generate substantially less solid waste than
516 the other Action Alternatives. All six Action Alternatives would generate more waste than the
517 No-Action Alternative.

518 The amount of construction spoil and debris that would require transportation and disposal
519 varies according to the depth of excavation required by each alternative, with Alternatives A
520 and A-C generating the least amount and Alternatives B and E the most.

521 There would be no substantive differences among the alternatives with regard to hazardous
522 materials and waste. While the quantities of such substances stored, used, or disposed of in
523 the Project Area would vary, the same regulations and procedures would apply to ensure
524 that any potential adverse effects are negligible, regardless of the alternative.

5.4.6 Avoidance, Minimization and Mitigation Evaluation

525 The following measures to avoid and minimize adverse impacts pertaining to solid waste and
526 hazardous materials are being considered by FRA:

- 527 ■ WUS' existing SPCC Plan would be updated to reflect any major changes to on-site
528 petroleum product or liquid hazardous waste storage.
- 529 ■ For the construction phase of the Project, the contractor would be required to
530 prepare and implement a construction-specific SPCC.
- 531 ■ The construction contractor would be required to identify and inventory hazardous
532 building materials (such as asbestos, lead-based paint, PCBs, and mercury) would be
533 identified prior to any demolition work. If such materials are present, they would be
534 properly abated by a licensed contractor in accordance with state and local
535 regulations. Debris would be shipped to a receiving facility licensed to handle the
536 relevant type of waste in compliance with applicable shipping regulations.
- 537 ■ The construction contractor would develop a Soil Management Plan (SMP) based
538 upon subsurface investigations, as needed. The purpose of these investigations
539 would be to pre-characterize the soils to be removed during the construction of the
540 Project. An SMP typically outlines standards and procedures for the identification
541 and disposal of contaminated materials encountered during construction.
- 542 ■ The construction contractor would only use certified clean fill to replace excavated
543 soils.
- 544 ■ During soil disturbing activities, the construction contractor would control fugitive
545 dust through wetting, sweeping, and other suppression techniques.

- 546 ■ The construction contractor would develop a Health and Safety Plan to provide the
547 minimum health and safety specifications that must be met during construction,
548 including requirements for environmental monitoring, personnel protective
549 equipment, site control and security, and training.

- 550 ■ The District has adopted a vision to divert 80 percent of all solid waste generated in
551 the District through source reduction, reuse, recycling, composting, and anaerobic
552 digestion. USRC would require municipal solid waste generated at WUS to be
553 managed to maximize opportunities for recycling or other waste diversion methods
554 in support of the District’s vision.

5.4.7 Permits and Regulatory Compliance

555 Spill risk management to prevent the release of hazardous materials due to inappropriate
556 storage and handling is dictated by the local and federal authorities. A SPCC Plan per
557 40 CFR 112, *Oil Pollution Prevention*, is currently in place at the facility and would be updated
558 as needed. Updates are required when there is a change in the facility design, construction,
559 operation, or maintenance that materially affects its potential for a discharge as described in
560 40 CFR 112.1(b). SPCC plans must meet standard engineering practices and be certified by a
561 licensed Professional Engineer. During construction, the contractor will be responsible for
562 implementing a construction-specific spill prevention program.

563 Underground storage tanks that are covered under 20 District of Columbia Municipal
564 Regulations (DCMR) Chapter 55 must be registered in accordance with 20 DCMR Chapter 56.
565 Heating oil USTs less than 1,100 gallons and petroleum USTs that are less than 110 gallons do
566 not have to be registered with the District. Above-ground storage tanks are primarily
567 regulated by the DC Fire code and inspections are required by the Office of the Fire
568 Marshall’s Fire Prevention Division.

569 The abatement of hazardous building materials requires a licensed contractor and prior
570 notification to the District. DOEE provides an *Asbestos Notification Form* for the removal of
571 asbestos and a Lead Abatement and Renovation permit for the abatement of lead-based
572 paints. On-site management of contaminated soil must be in accordance with a SMP that will
573 dictate appropriate handling and storage procedures. In the event that contaminated soil
574 residuals are encountered, they can only be consigned, conveyed, and/or transported to
575 facilities and locations licensed, permitted, or approved to accept such materials by
576 appropriate federal, state or local authorities. Soils meeting the criteria for a listed or
577 characteristic hazardous waste can only be disposed of at a RCRA hazardous waste landfill,
578 TSCA facility, or RCRA hazardous waste incinerator.

579 Municipal solid waste must be sent to a facility that is appropriately licensed under RCRA
580 Subtitle D and must be managed per 21 DCMR Chapters 7-8. To meet the District’s
581 sustainability goals, commercial properties are required to separate for recycling paper,
582 paperboard, cardboard, and clean and rinsed metal, glass and plastic containers per 21
583 DCMR Chapter 20.

5.5 Transportation

1 This section describes and characterizes potential direct and indirect impacts of the No-
2 Action Alternative and the five Action Alternatives on the multiple transportation modes
3 (modes) in and around Washington Union Station (WUS). If applicable, this section
4 recommends measures to avoid, minimize, or mitigate potential adverse impacts. It also
5 identifies applicable permitting and regulatory compliance requirements.

6 The transportation modes considered include:

- 7 ■ Railroad (Amtrak, VRE, and MARC Train);
- 8 ■ Intercity, tour/charter, and sightseeing buses (including hop-on/hop-off buses and
9 daily sightseeing coaches);¹
- 10 ■ Private vehicles;
- 11 ■ For-hire vehicles;²
- 12 ■ Bicycles;
- 13 ■ Transit (Metrorail, Streetcar, and Metrobus); and
- 14 ■ Pedestrians.

5.5.1 Regulatory Context and Guidance

15 Relevant Federal, regional, and Washington, DC (District) policies, regulations and guidance
16 that pertain to transportation are listed in **Section 4.5.1, *Affected Environment,***
17 ***Transportation, Regulatory Context and Guidance.***

5.5.2 Study Area

18 As defined in **Section 4.5.2, *Affected Environment, Transportation, Study Area,*** the Local
19 Study Area for transportation includes the Project Area and immediately adjacent roadway
20 network along with key intersections near WUS (**Figure 4-3**). Traffic conditions and
21 coordination with DDOT were the basis for the identification of these key intersections.

22 Given transportation patterns in the District, the impacts of the various alternatives on the
23 transportation network would quickly dissipate outside the Local Study Area. Therefore, the

¹ Hop-on/hop-off sightseeing buses provide scheduled routes that allow tourists to visit different sites in Washington, DC and surrounding areas either by continuously riding the bus in a loop, or by getting off the bus at certain stops and then getting back on to continue with their visit. Daily sightseeing buses are coach-style buses that provide scheduled service to certain tourist destinations. Currently, hop-on/hop-off buses serve the front of WUS while daily buses are located in the existing bus facility.

² “For-hire” refers to licensed taxicabs, livery cars, and transportation networking companies like Uber and Lyft.

24 Regional Study Area identified in **Section 4.5.2, *Affected Environment, Transportation, Study***
25 ***Area***, was used for the purposes of understanding the regional distribution of vehicular and
26 transit trips originating at WUS but it was not used for the analysis of impacts.³

5.5.3 Methodology

27 This section summarizes the methodology for evaluating the probable consequences of the
28 alternatives on transportation. **Appendix C3, Section 5.4, *Methodology***, provides a full
29 description of the analysis methodology. This analysis identifies the impacts of the
30 alternatives on the transportation system due to changes in the volume or patterns of
31 railroad, bus, private vehicle, for-hire vehicle, bicycle, transit, and pedestrian trips. A
32 summary is below. Impacts were assessed as major, moderate, minor, or negligible
33 consistent with the intensity scale defined in **Section 5.1.1, *Definitions***.

34 The transportation impact analysis used existing and anticipated trip generation information
35 to estimate future transportation volumes and the resulting impacts on the various modes.
36 Transportation agencies, private operators, and site visits provided the data informing the
37 analysis. Key inputs included:

- 38 ■ Projected ridership, service frequency, and schedule data (provided by Amtrak,
39 DDOT, MARC, Washington Metropolitan Area Transit Authority [WMATA], and VRE);
- 40 ■ National Capital Region Transportation Planning Board (TPB) travel demand model;
- 41 ■ TPB 2040 Constrained Long-Range Transportation Plan;
- 42 ■ Reasonable assumptions about future private and Federal air-rights development
43 programs, including office, residential, and retail uses;
- 44 ■ Projected local transit ridership;
- 45 ■ Projected pedestrian and bicycle activity;
- 46 ■ Projected intercity bus ridership;
- 47 ■ WUS retail uses; and
- 48 ■ Growth from planned private development projects within one ½ mile of WUS and
49 general background growth.

³ The Methodology Report states that “The regional study area for transportation is the area of the jurisdictions that are members of the Metropolitan Washington Council of Governments (MWCOG)—the local Metropolitan Planning Organization (MPO)—in Maryland, the District of Columbia, and Virginia. This regional study area is being selected because Washington Union Station (WUS) is a Project of regional significance that has an impact on transportation movements in different modes across the MWCOG area. It is at the geography of MWCOG that the Constrained Long-Range Plan and regional modeling efforts are conducted.” Further assessment indicated that this regional view was not necessary to capture the impacts of the Project.

50 FRA developed projections for each mode through a detailed multimodal model (model)
51 using existing and projected ridership and developments, and estimated mode splits.⁴
52 Projections included morning (AM) and evening (PM) peak-hour rail, intercity and tour bus,
53 and transit ridership, traffic,⁵ bicycle, and pedestrian information.

54 The data presented in the tables throughout this section derive from the above-listed sources
55 and are outputs of the FRA NEC FUTURE FEIS, the TPB Constrained Long-Range
56 Transportation Plan, WUS Multimodal Model, or the Synchro model used for traffic impact
57 analysis.

5.5.3.1 Operational Impacts

58 Operational impacts are long-term or permanent impacts that would result from the
59 operation of the Project after construction is complete in the planning horizon year of 2040.
60 The following mode-specific impacts were assessed:

- 61 ■ **Amtrak, VRE, and MARC commuter railroads:** Increases or decreases in, and ability
62 to meet, expected service levels and ridership;
- 63 ■ **WMATA Metrorail:** Increases or decreases in passenger demand, impacts on
64 passenger flow, capacity issues that may result from increases;
- 65 ■ **DC Streetcar:** Increases or decreases in passenger demand and capacity issues that
66 may result from increases;
- 67 ■ **Intercity, tour, and charter bus:** Increases or decreases in service capacity level and
68 ridership, ability to meet future service capacity levels;
- 69 ■ **Loading:** Availability and accessibility of loading docks and ability to meet WUS
70 needs;
- 71 ■ **Pedestrian and bicycle activity:** Increases or decreases in pedestrian and bicycle
72 activity, ability to meet activity demands, and impacts on safety;
- 73 ■ **WMATA Metrobus, DC Circulator, and commuter buses:** Increases or decreases in
74 passenger demand, impacts on access to transit buses;
- 75 ■ **Parking and rental cars:** Increases or decreases in space available for parking
76 (including from rental car companies);⁶

⁴ Mode splits are the percentage of trips that are taken via a certain mode. For example, if twenty percent of station users take transit, their “transit mode split” is twenty percent.

⁵ Traffic in this context refers to the movements of different vehicular modes, including private vehicles, for-hire vehicles, trucks for loading and delivering, and buses, on roadways.

⁶ The parking impact analysis addresses parking as a resource for which there is a demand. Therefore, a reduction in parking availability is considered an adverse impact on parking. A reduction in parking availability may also have adverse or

- 77 ■ **Ride-for-hire circulation:** Increases or decreases in traffic volumes on nearby streets,
78 and ability to meet demands at the WUS curbside space;⁷
- 79 ■ **Private pick-up and drop-off activity:** Increases or decreases in traffic volumes on
80 nearby streets, and ability to meet demands at the WUS curbside space;⁸ and
- 81 ■ **Vehicular traffic:** Increases and decreases in traffic volumes on nearby streets, level
82 of service (LOS) impacts, and queuing impacts at key intersections. LOS, increases in
83 average delay, and queuing are the three measures of effectiveness (MOE) on which
84 the assessment of traffic impacts is based.

5.5.3.2 Construction Impacts

85 Construction impacts are those impacts that would result from constructing the Project and
86 would cease when the Project is complete. The potential impacts from the construction of
87 the Action Alternatives were assessed for each transportation mode. Because construction
88 planning is still in its early stages, the impact analysis is qualitative. In All Action Alternatives,
89 construction of the Project would take place in four phases. The analysis focuses particularly
90 on Phase 4 of construction (beginning 8 to 9 years after the start of construction) because
91 Phase 4 has the greatest potential to affect transportation conditions in the Local Study Area.
92 Demolition of the existing bus facility and parking garage would occur in Phase 4 and the
93 west ramp would be closed for repurposing. This would disrupt bus, parking, and for-hire
94 operations. Phase 4 is also the longest construction phase in all Action Alternatives.

5.5.4 Impact Analysis

95 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
96 the various transportation modes at WUS. For each alternative, direct and indirect
97 operational as well as construction impacts are considered. Within each alternative, for each
98 mode, impacts are first summarized in bold lettering, followed by a supporting description
99 and analysis. The impacts of the No-Action Alternative are assessed relative to existing
100 conditions. The operational impacts of the Action Alternative are assessed relative to the No-
101 Action Alternative. A brief summary of impacts relative to existing conditions is provided for
102 each mode. Additional data and details are provided in **Section 5, Transportation, of**

beneficial consequences for other resources or transportation modes. Such consequences are incorporated into the impact analyses for those other resources or transportation modes.

⁷ A single for-hire vehicle generates two trips: one arriving and one departing from WUS, regardless of whether it is picking up or dropping off a passenger. For the purposes of the impact analysis, a single for-hire pick-up or drop-off was estimated to produce 1.5 trips to reflect the linking of trips in the WUS circulation network (“linking of trips” refers to a for-hire vehicle picking-up a passenger just after dropping one off).

⁸ A single private pick-up/drop-off trip generates two trips: one arriving and one departing from WUS, regardless of whether it is picking up or dropping off a passenger. For the purposes of the impact analysis, a single private pick-up or drop-off is estimated to produce 2 trips as no linking can be assumed.

103 **Appendix C3, Washington Union Station Expansion Project Environmental Consequences**
 104 *Technical Report.*

5.5.4.1 No-Action Alternative

Direct Operational Impacts

Commuter and Intercity Railroads

105 **Relative to existing conditions, the No-Action Alternative would have major adverse direct**
 106 **operational impacts on commuter and intercity rail service because their ability to meet**
 107 **future demand would be severely constrained.**

108 Amtrak, MARC, and VRE would continue to provide rail service to and from WUS in 2040.
 109 However, concourse and track conditions would be very constrained and limit the growth of
 110 rail transportation in the Washington, D.C. area. The constraints on track and platform
 111 infrastructure in the No-Action Alternative would cause only 50 percent of the 2040
 112 unconstrained Amtrak service levels and 68 percent of the unconstrained ridership levels to
 113 be realized. Only 42 percent of MARC service and 53 percent of MARC ridership would be
 114 achieved. Only 37 percent of VRE service and 36 percent of VRE ridership would be achieved.
 115 The existing platforms are antiquated and deteriorated, have inadequate width for passenger
 116 volumes, and do not meet current ADA or life safety standards.

117 **Table 5-16** shows changes in ridership and daily trains for Amtrak, MARC, and VRE between
 118 existing conditions and the No-Action Alternative.

Table 5-161. Daily Train Service and Total Ridership, No-Action Alternative

| Service | No-Action Alternative | Existing Conditions | Projected Change |
|-------------------------|-----------------------|---------------------|------------------|
| Amtrak Trains | 144 | 116 | 24% |
| Amtrak Ridership | 21,800 | 16,400 | 33% |
| MARC Trains | 106 | 95 | 11% |
| MARC Ridership | 37,900 | 28,100 | 35% |
| VRE Trains | 34 | 32 | 6% |
| VRE Ridership | 4,900 | 3,900 | 26% |

Intercity Railroad Service

119 The average number of Amtrak weekday trains would increase by approximately 24 percent
 120 to 144 trains a day. Over that same period, average Amtrak weekday ridership would
 121 increase by 33 percent, to 21,800 passengers, as a result of planned service improvements
 122 and regional and local growth.

MARC

123 In the No-Action Alternative, MARC would see a modest increase in service, with an
 124 11 percent average increase in weekday trains across the three lines serving WUS from 95 to

125 106. The Brunswick Line, which would add five trains to and from WUS by 2040, is slated for
126 the largest increase. MARC would see a 35 percent growth in ridership over that same
127 period, with approximately 37,900 average daily riders in 2040.

VRE

128 VRE would see a 6 percent average increase in weekday revenue trains serving WUS
129 (currently 32, to increase to 34), accompanied by a 26 percent increase in average weekday
130 ridership by 2040. This increase would bring daily VRE ridership to 4,900 daily riders. VRE
131 plans to accommodate the increase by running longer trains and using more double-deck
132 train cars.

WMATA Metrorail

133 **Relative to existing conditions, the No-Action Alternative would result in a moderate**
134 **adverse direct operational impact on WMATA Metrorail operations at WUS because**
135 **increased demand would exceed capacity in the PM peak and would exacerbate station**
136 **circulation issues at the WMATA platform level.**

137 WUS ridership growth would result in an adverse operational impact because volumes at the
138 WUS Metrorail station would exceed capacity in the Glenmont direction during the PM peak.
139 This adverse impact would be moderate as only one direction and one peak period would be
140 affected. Where volume to capacity (V/C) exceeds 100 percent, there would be a need for
141 additional service to prevent overcrowding.⁹ **Table 5-17** summarizes WUS-related peak-hour
142 activities at the WUS Metrorail station.

143 By 2040, peak-hour train loads at the WUS Metrorail Station would follow the same pattern
144 as currently, with higher utilization in the westbound direction (Shady Grove) in the AM peak
145 hour and in the eastbound direction (Glenmont) in the PM peak hour. During both the AM
146 and PM peak, there would be more than 13,000 boardings and alightings, against less than
147 8,000 in existing conditions.

148 Volumes would remain below capacity in the Shady Grove direction during the AM peak.
149 They would exceed it in the Glenmont direction during the PM peak (107 percent arriving),
150 creating a need for additional capacity (approximately 1,110 passengers).

151 The increase in Metrorail ridership at WUS in the No-Action Alternative would adversely
152 affect passenger circulation. Passenger circulation is an existing issue at the station. It can
153 take up to 8 minutes for passengers to clear the two sets of escalators from the platform
154 level. The improvements to circulation included in the planned Concourse Modernization
155 Project would have a beneficial impact on circulation at the WMATA mezzanine level and
156 between the mezzanine level and the WUS concourse. However, the existing circulation
157 between the WMATA platform and the WMATA mezzanine would remain a constraint.

⁹ This standard was set to conform with WMATA guidance. The specific service capacity levels were set based on coordination with WMATA.

158 Increased passenger volumes in the No-Action Alternative relative to existing conditions
 159 would further degrade conditions.

Table 5-17. Peak-hour WUS-related Metrorail Activity, No-Action Alternative¹⁰

| | No-Action Alternative | | Existing Conditions | |
|---------------------------------------|-----------------------|-------------|---------------------|----------|
| | Shady Grove | Glenmont | Shady Grove | Glenmont |
| AM Peak Hour | | | | |
| V/C Arriving at WUS ¹¹ | 80% | 25% | 57% | 34% |
| WUS Boardings | 5,202 | 1,010 | 2,802 | 528 |
| WUS Alightings | 4,128 | 2,803 | 923 | 3,644 |
| Through Ridership | 9,523 | 1,447 | 7,576 | 1,427 |
| Ridership Departing WUS ¹² | 17,725 | 2,457 | 10,378 | 1,955 |
| V/C After WUS | 86% | 14% | 69% | 13% |
| Excess Demand | 0 | 0 | 0 | 0 |
| PM Peak Hour | | | | |
| V/C Arriving at WUS | 20% | 107% | 19% | 72% |
| WUS Boardings | 2,559 | 3,661 | 3,265 | 918 |
| WUS Alightings | 1,154 | 6,126 | 582 | 3,090 |
| Through Ridership | 1,953 | 10,722 | 2,010 | 6,858 |
| Ridership Departing WUS | 4,512 | 14,383 | 5,275 | 7,776 |
| V/C After WUS | 29% | 91% | 38% | 56% |
| Excess Demand | 0 | 1,110 | 0 | 0 |

DC Streetcar

160 **Relative to existing conditions, the No-Action Alternative would result in a minor beneficial**
 161 **direct operational impact on DC Streetcar operations. The benefits of increased ridership**
 162 **would be partially offset by greater operational delays.**

163 By 2040, the DC Streetcar would be extended eastward to the Benning Road Metro Station
 164 and westward to Georgetown.¹³ In the No-Action Alternative, it is likely that ridership growth
 165 at WUS and nearby development projects, including the private air-rights development,
 166 would generate additional demand. Modeling shows that this demand would contribute to
 167 supporting the operation of the Streetcar without creating capacity issues, amounting to a

¹⁰ Estimates of WMATA peak hour capacity are consistent with TPB Constrained Long-Range Transportation Plan elements and direction from WMATA.

¹¹ Red Line hourly nominal capacity at the peak hour is 19,200 passengers, assuming trains every 3 minutes, 120 passenger capacity, and 100 percent 8-car train operations. However, in this analysis, capacity is curtailed due to peaking factors. As a result, the initial v/c upon arrival at WUS is based on a 1.12 multiplier of actual volumes in the AM peak and 1.22 multiplier of actual volumes in the PM peak.

¹² “Through ridership” refers to riders who neither board nor alight at WUS but ride the Red Line train through the WUS Metrorail Station.

¹³ The DC Streetcar extensions to Benning Road and to Georgetown are incorporated in the TPB 2040 Constrained Long-Range Transportation Plan.

168 beneficial impact. Maximum capacity would be in the eastbound direction in the AM peak
169 (33 percent). This beneficial impact would be minor because the introduction of new
170 signalized intersections on the H Street Bridge for the roadways that would serve the private
171 air-rights development and greater traffic volumes (see **Section 5.5.4.1, No-Action**
172 *Alternative, Direct Operational Impacts, Vehicular Traffic*) may create operational delays,
173 which would partially offset the benefits of increased ridership.

Intercity, Tour/Charter, and Sightseeing Buses

174 **Relative to existing conditions, the No-Action Alternative would have a major adverse**
175 **direct operational impact on bus passenger facilities' ability to accommodate projected**
176 **increases in users.**

177 In the No-Action Alternative, intercity, tour, daily sightseeing, and charter buses would
178 continue to use the existing 61-slip (parking space) bus facility. Hop-on/hop-off sightseeing
179 buses would continue to serve the front of WUS.

180 Intercity bus ridership is anticipated to increase by 27 percent by 2040. The average peak-
181 hour intercity, tour, daily sightseeing, and charter bus movements—buses entering and
182 exiting the bus facility – would increase by 37 percent, from a total of 49 to a total of 67. The
183 existing bus facility, which would continue to be used in the No-Action Alternative, would be
184 sufficient to accommodate the increase in bus movements.

185 However, when completed, the extension of the DC Streetcar to the west would make it
186 impossible for buses exiting the facility to turn left (westward) onto H Street NE. Buses
187 heading to points west would be forced to take an indirect route to their destination.
188 Additionally, the proximity to the exit ramp to the private air-rights development's center
189 road with H Street would create a complex intersection that may complicate bus exiting
190 movements. Additionally, buses coming from the east and making a left turn into the facility
191 would have to navigate an offset intersection created by the road that would run along the
192 northwest side of the private air-rights development.

193 Existing passenger accommodations are deficient and the No-Action Alternative would
194 exacerbate this situation. Passengers must use cramped walkways to access the Greyhound
195 and Bolt Bus bays and have to cross an active busway to reach other services, including
196 Megabus. Bolt Bus and Megabus lack adequate queueing space. The projected increase in
197 passengers would make these conditions worse. This, together with the constraint on exiting
198 buses, would amount to a major adverse impact.

Loading

199 **In the No-Action Alternative, there would be no direct operational impacts on loading dock**
200 **operations. The retail and event programs would not change. Loading levels would remain**
201 **as in existing conditions.**

202 WUS would continue to receive deliveries and service through two existing primary loading
203 locations. One, on First Street NE between Massachusetts Avenue NE and G Street NE,

204 provides access to the train tracks. The other, on H Street NE to the east of the railroad
 205 tracks, is shared with the existing Station Place development. Based on existing conditions,
 206 eight truck movements would occur in the AM peak and two would occur in the PM peak.
 207 Loading dock activity would continue to peak in the mid-morning (10:00 AM to 11:00 AM).
 208 Future loading dock activities would mirror existing conditions. Amtrak service access to
 209 operations would remain on First and 2nd Streets.

Pedestrians

210 **Relative to existing conditions, the No-Action Alternative would have a major adverse**
 211 **direct operational impact on pedestrian circulation within WUS due to overcrowded**
 212 **conditions in concourses and at access points. Pedestrian volumes near WUS would also**
 213 **increase, with no change to existing pedestrian infrastructure, resulting in a minor adverse**
 214 **direct operational impact.**

215 In the No-Action Alternative, interior pedestrian volumes at WUS would increase
 216 substantially relative to existing conditions. In both the AM and PM peaks, volumes would be
 217 33 percent greater as shown in **Table 5-18**. The largest generator of internal pedestrian trips
 218 would be passengers transferring between commuter rail and Metrorail. While the
 219 Concourse Modernization Project would enhance capacity at WUS, it would not provide
 220 sufficient space to handle anticipated 2040 volumes without overcrowding. This would
 221 constrain any further growth.

Table 5-18. Interior Pedestrian Volumes, No-Action Alternative

| | No-Action Alternative | | Existing Conditions | |
|--------------------|-----------------------|---------|---------------------|---------|
| | AM Peak | PM Peak | AM Peak | PM Peak |
| Pedestrians | 47,703 | 61,416 | 35,867 | 46,178 |

222 While a number of pedestrians would remain within WUS to connect to other modes or
 223 immediately adjacent land uses, many would exit the station through the existing doors on
 224 First Street NE and at the front of the historic station building. **Table 5-19** shows the
 225 projected total number of WUS passengers who would be entering and exiting WUS by foot
 226 from or to local destinations (excluding the private air-rights development).

Table 5-192. Exterior Pedestrian Volumes, No-Action Alternative

| | No-Action Alternative | | Existing Conditions | |
|--------------|-----------------------|---------|---------------------|---------|
| | AM Peak | PM Peak | AM Peak | PM Peak |
| Ins | 3,753 | 6,587 | 3,419 | 6,736 |
| Outs | 7,370 | 4,232 | 4,927 | 3,654 |
| Total | 11,123 | 10,819 | 8,346 | 10,390 |

227 Analysis conducted for two signalized pedestrian crossings (the east-west crossing of First
 228 Street NE and the east-west crossing of Union Station Drive) showed that, while queuing to
 229 cross the street would increase, there would be sufficient sidewalk space to accommodate
 230 queuing pedestrians and the adverse impact would be minor.

231 Anticipated increases in vehicular traffic near WUS, including pick-up and drop-off activities,
 232 along with the increases in pedestrian volumes, may cause a greater risk of conflict between
 233 pedestrians and vehicles. Based on the projected number and distribution of new multimodal
 234 trips, the two locations most likely to be affected would be G Street NE between North
 235 Capitol Street and First Street NE, and Union Station Drive in front of WUS.

Bicycle Activity

236 **Relative to existing conditions, the No-Action Alternative would result in a moderate**
 237 **adverse direct operational impact on bicycle activity. Demand for bikeshare spaces¹⁴ and**
 238 **private bicycle parking and storage near WUS would increase with no additional bicycle**
 239 **facilities being provided.**

240 In the No-Action Alternative, existing bicycle facilities near WUS would remain in their
 241 current condition: a cycle track along First Street NE; bicycle lanes on the south and east
 242 sides of WUS; a secure bike storage facility; and multiple nearby Capital Bikeshare docking
 243 stations.

244 Bicycle traffic would grow by 2040 due to increased activity at WUS and the growing use of
 245 bicycle as a mode of transportation in the District. **Table 5-20** shows projected 2040 bicycle
 246 volumes. Of these volumes, 80 percent would be westbound and 20 percent eastbound.
 247 First Street, D Street, and Louisiana Avenue would see the largest westbound volumes. F
 248 Street, 2nd Street, and Massachusetts Avenue would see the largest eastbound volumes.

Table 5-203. Peak-hour Private Bicycle Activity, No-Action Alternative

| | No-Action Alternative | | Existing Conditions | |
|-------------------|-----------------------|---------|---------------------|---------|
| | AM Peak | PM Peak | AM Peak | PM Peak |
| Ins | 89 | 124 | 67 | 93 |
| Out s | 118 | 117 | 89 | 88 |
| Tota l | 207 | 241 | 156 | 181 |

¹⁴ For the purposes of this analysis, dockless bikeshare was not directly considered. Dockless bikeshare is new to the District and has been marked by volatile market conditions, with several firms ending service only months after starting it. The demand for bikeshare shown in this analysis can be understood as the demand for private bikesharing services generally.

249 The growth of bicycle as a transportation mode has implications for the Capital Bikeshare
250 system. Bikeshare stations rely on a balance between trips starting and trips ending at the
251 station to maintain functionality. When more trips start than end in a given time, the station
252 empties out. When more trips end than start, the station runs out of docking spaces.

253 Analysis of Bikeshare demand showed that overall, the Columbus Circle station, which is
254 closest to WUS, would see the largest imbalance during the PM peak. The station at the
255 intersection of North Capitol Street and F Street NW would see the largest imbalance during
256 the AM peak.

257 To eliminate the potential deficit in Bikeshare bicycle docking stations and reduce the need
258 to rebalance by trucking bicycles from station to station, it would be necessary to provide
259 new bicycle docks in equal number to the maximum potential peak-hour imbalance—a
260 projected 59 docks in the No-Action Alternative. The No-Action Alternative includes no new
261 Bikeshare bicycle docks. Thus, the anticipated imbalance would not be remedied. While this
262 would be an adverse impact, this impact would be moderate as Bikeshare stations could
263 nevertheless continue to operate and it is possible that docks would be added through future
264 upgrades or projects.

265 Greater vehicular and bicycle volumes in the No-Action Alternative may result in more
266 conflicts between bicycles and vehicles. However, planned DDOT bicycle facility
267 improvements, such as on Louisiana Avenue NE and K Street NE, would help provide safe
268 accommodations for bicyclists.

City and Commuter Buses

269 **Relative to existing conditions, in the No-Action Alternative, anticipated increases in**
270 **ridership and traffic volumes would cause a moderate adverse direct operational impact**
271 **due to overcrowding of some WMATA buses and likely decreases in bus speeds and**
272 **reliability.**

Both city and commuter buses would experience adverse impacts in the No-Action Alternative from overcrowding or delays due to traffic conditions, or both. Based on the number of affected routes, however, these adverse impacts would be moderate.

273 Based on available information, in the No-Action Alternative, there would be no changes to
274 commuter bus or WMATA Metrobus routes or stop locations. The DC Circulator that
275 currently runs between WUS and Georgetown (GT-US route) would likely be discontinued to
276 avoid redundancy with the expanded DC Streetcar. Most existing DC Circulator GT-US route
277 boardings and alightings at WUS would divert to the DC Streetcar.¹⁵ The other DC Circulator
278 routes serving WUS would continue to operate as at present, as would all other local and
279 commuter bus services in the Study Area. Employee shuttles serving the United States

¹⁵ Conversely, if the DC Streetcar extension to Georgetown was not constructed, the GT-US route may be maintained and other bus routes created to accommodate the transit demand the Streetcar could not serve.

280 Citizenship and Immigration Service (USCIS) and Gallaudet University could continue to
 281 operate out of the WUS bus facility.

282 Total projected 2040 peak-hour Metrobus activity generated by WUS would be 1,431 in the
 283 AM peak and 1,592 in the PM peak. The AM peak would feature higher volumes of riders
 284 exiting WUS and boarding Metrobus, while the PM peak would feature higher volumes
 285 alighting at and entering WUS.

286 Collectively, buses (including Metrobus, DC Circulator, and Maryland Transit Administration
 287 [MTA] and Loudoun County Transit [LCT] commuter buses) would operate below capacity.
 288 However, assuming service levels remain the same as currently, six WMATA Metrobus routes
 289 would experience overcrowding in the AM peak and five would experience overcrowding in
 290 the PM peak (Table 5-21).

Table 5-214. Bus Routes Over Capacity,¹ No-Action Alternative

| | No-Action Alternative | Existing Conditions |
|----------------|--|--|
| AM Peak | 80 (Southbound), D4 (Westbound), D6 (Westbound), P6 (Both directions) X1 (Westbound), X2 (Westbound), X9 (Both directions) | X2 (Westbound), X9 (Both directions) |
| PM Peak | 96 (Eastbound), D6 (Eastbound), P6 (Northbound), X2 (Both directions), X9 (Both directions) | X2 (Both directions), X9 (Both directions) |

1. Over capacity is in relation to the stated capacity in WMATA’s service standards, which is 1.2 times the number of seats on a bus.

291 Increases in vehicle delays and queues due to greater traffic volumes would likely affect bus
 292 reliability and speed. Of the 13 Metrobus routes that pass through the Local Study Area, four
 293 would pass through at least two intersections degrading to LOS F in the AM peak and five
 294 would do so in the PM peak. One DC Circulator routes and seven commuter buses routes
 295 (out of nine) would be similarly affected in the PM peak hour.

Vehicular Parking and Rental Cars

296 **Relative to existing conditions, the No-Action Alternative would have no direct operational**
 297 **impact on parking. It would have a minor adverse direct operational impact on rental car**
 298 **operations at WUS because the existing, already challenged, rental car facility would have**
 299 **to accommodate additional trips.**

300 The existing WUS parking garage would continue to operate in the No-Action Alternative. The
 301 private air-rights development would provide new parking facilities. Access to this parking
 302 would be via H Street NE, with private air-rights development parking located both to the
 303 north and south of the street.

304 The WUS parking garage capacity would remain unchanged, with room for approximately
 305 2,450 vehicles, including rental cars. The private air-rights development parking facilities

306 would include an estimated 1,320 new parking spaces.¹⁶ These spaces would accommodate
 307 the parking needs the development would generate.

308 Trip generation modeling showed that in 2040 under the No-Action Alternative, relative to
 309 existing conditions, there would be an estimated 152 additional peak-hour parking trips (for a
 310 total of 487 trips): 61 in the AM peak (for a total of 189 trips in the AM peak) and 92 in the
 311 PM peak (for a total of 299 trips in the PM peak). The additional parking demand could be
 312 accommodated in the existing garage.

313 The rental car facility would generate another 14 additional peak-hour trips (for a total of 91
 314 trips): 5 trips in the AM peak (for a total of 46 trips) and 9 trips in the PM peak (for a total of
 315 45 trips). The projected increase in rental car trips would be small enough for the existing
 316 rental car facility (which would remain unchanged in the No-Action Alternative) to
 317 accommodate it. However, this facility already makes use of “stacked parking” and existing
 318 conditions are cramped. With the additional trips, conditions at the unchanged rental car
 319 facility would become more challenging, an adverse impact. This adverse impact would be
 320 minor, as the facility could accommodate the increase and remain functional.

For-hire Vehicles

321 **Relative to existing conditions, the No-Action Alternative would have a major adverse**
 322 **direct operational impact on for-hire vehicle operations at the front of WUS. The existing**
 323 **lane configuration would remain unchanged and there would be no additional for-hire**
 324 **areas. As a result, the available curb and circulation space would fail to adequately**
 325 **accommodate anticipated increases in the use of for-hire vehicles.**

326 For-hire vehicles, including traditional taxis, limousines, and transportation networking
 327 companies (TNC) like Uber and Lyft, would continue to use the existing designated pick-up
 328 and drop-off locations at the front of WUS. As shown in **Table 5-22**, growth in use of for-hire
 329 vehicles is anticipated to continue through 2040. A projected total of 524 AM peak-hour and
 330 862 PM peak-hour trips for-hire vehicle trips would occur in 2040. Relative to existing
 331 conditions, this would represent a 33 percent increase in the AM and PM peaks.¹⁷

Table 5-225. Peak-hour For-hire vehicle Trips, No-Action Alternative

| | No-Action Alternative | | Existing Conditions | |
|--------------|-----------------------|---------|---------------------|---------|
| | AM Peak | PM Peak | AM Peak | PM Peak |
| Ins | 262 | 431 | 197 | 324 |
| Outs | 262 | 431 | 197 | 324 |
| Total | 524 | 862 | 394 | 648 |

¹⁶ Letter from Akridge to FRA dated May 31, 2016.

¹⁷ New for-hire vehicle trips would also be generated by background development growth and the private air-rights development, in addition to the WUS-generated trips shown in Table 5-22.

332 With only a single designated location available to for-hire vehicles serving WUS passengers
 333 (in front of the historic station building), conditions would deteriorate relative to existing
 334 conditions. Existing taxi queues would lengthen during peak periods, leading to increased
 335 queueing on H Street NE. Combined with the increase in private pick-up and drop-off (see
 336 next section), the outside drop-off lanes would become more congested than they are today.
 337 This congestion would create queueing issues at both the entry and exit of the lanes, with
 338 potential spillover onto Massachusetts Avenue, amounting to a major adverse impact.

339 A modest increase in the use of informal pick-up and drop-off locations on First Street NE,
 340 2nd Street NE, and H Street NE would also likely occur. For-hire vehicles would also serve the
 341 private air-rights development via the private roadways off both sides of the H Street Bridge.

Private Pick-up and Drop-off¹⁸

342 **Relative to existing conditions, the No-Action Alternative would have a major adverse**
 343 **direct operational impact on private pick-up and drop-off operations at the front of WUS.**
 344 **The existing lane configuration would remain unchanged and there would be no additional**
 345 **private pick-up and drop-off areas. As a result, the available curb and circulation space**
 346 **would fail to adequately accommodate anticipated increases in private pick-up and drop-**
 347 **off.**

348 The outermost lanes of Union Station Drive NE, at the front of WUS, would remain
 349 designated for private pick-up and drop-off activity. Private vehicles would likely also
 350 continue to use informal pick-up and drop-off locations on First Street NE, 2nd Street NE, and
 351 H Street NE.

352 A projected total of 872 AM peak-hour and 948 PM peak-hour private pick-up and drop-off
 353 trips would occur at WUS in 2040 (Table 5-23). Relative to existing conditions, this would
 354 represent a 33 percent increase in both the AM and PM peaks.

Table 5-23. Private Pick-up and Drop-off Activity, No-Action Alternative

| | No-Action Alternative | | Existing Conditions | |
|--------------|-----------------------|---------|---------------------|---------|
| | AM Peak | PM Peak | AM Peak | PM Peak |
| Ins | 436 | 474 | 328 | 356 |
| Outs | 436 | 474 | 328 | 356 |
| Total | 872 | 948 | 656 | 712 |

355 The continued use of a single location for private pick-ups and drop-offs, in front of WUS,
 356 would further exacerbate existing congested conditions. The size of the private pick-up and
 357 drop-off curb spaces and the storage capacity of the lanes are very constrained and would
 358 remain so. The increased volumes would exceed capacity. Queues during both the AM and

¹⁸ “Private pick-up and drop-off” refers to private vehicle transporting passengers to WUS without parking at the station or charging a fare.

359 PM peak would extend beyond Union Station Drive and spill back into both eastbound and
 360 westbound Massachusetts Avenue NE. This spill back would lead to congestion and conflicts
 361 on that major thoroughfare.

Vehicular Traffic

362 **Relative to existing conditions, in the No-Action Alternative, there would be major adverse**
 363 **direct operational impacts on traffic operations at several intersections near WUS. During**
 364 **at least one of the peak periods, out of 35 intersections in the Local Study Area, six would**
 365 **degrade to LOS F; 21 would experience an increase in queue length of more than 150 feet;**
 366 **and 18 would experience an increase in average delay of more than 5 seconds.**

367 **Table 5-24** and **Table 5-25** show AM-peak (8:00 AM to 9:00 AM) and PM-peak (5:00 PM to
 368 6:00 PM) WUS-related traffic volumes in the No-Action Alternative, along with the
 369 corresponding information for existing conditions. Compared to existing conditions, the No-
 370 Action Alternative would generate 412 additional AM peak trips (a 34 percent increase) and
 371 551 additional PM peak trips (a 34 percent increase). These volume increases, combined with
 372 background and private air-rights development growth, would adversely affect traffic
 373 operations in the Local Study Area.

Table 5-24. AM Peak-hour Traffic Volumes, No-Action Alternative

| | No-Action Alternative | | | Existing Conditions | | |
|---------------------------------|-----------------------|-----|-----|---------------------|-----|-----|
| | Total Trips | In | Out | Total Trips | In | Out |
| Parking | 189 | 127 | 62 | 128 | 104 | 24 |
| Private Pick-Up/Drop-Off | 872 | 436 | 436 | 656 | 328 | 328 |
| For-hire Vehicles | 524 | 262 | 262 | 394 | 197 | 197 |
| Car Rental | 46 | 28 | 18 | 41 | 26 | 15 |
| Total Trips | 1,631 | 853 | 778 | 1,219 | 655 | 564 |

Table 5-25. PM Peak-hour Traffic Volumes, No-Action Alternative

| | No-Action Alternative | | | Existing Conditions | | |
|---------------------------------|-----------------------|-------|-------|---------------------|-----|-----|
| | Total Trips | In | Out | Total Trips | In | Out |
| Parking | 299 | 102 | 197 | 207 | 53 | 154 |
| Private Pick-Up/Drop-Off | 948 | 474 | 474 | 712 | 356 | 356 |
| For-hire Vehicles | 862 | 431 | 431 | 648 | 324 | 324 |
| Car Rental | 45 | 17 | 28 | 36 | 13 | 23 |
| Total Trips | 2,154 | 1,024 | 1,130 | 1,603 | 746 | 857 |

374 The impacts of the No-Action Alternative on traffic operations were assessed using Synchro
375 modeling. Three indicators were used to assess impacts relative to existing conditions at each
376 of the study intersections:

- 377 ■ Degradation of intersection LOS to F from a better LOS;
- 378 ■ Increase in average vehicle delay of more than five seconds; and
- 379 ■ Increase in 95th-percentile queue lengths of more than 150 feet for any lane group.¹⁹

380 While six out of the 35 study intersections would operate at a better LOS in the No-Action
381 Alternative than under existing conditions during at least one peak hour and 15 would
382 experience shorter delays (see **Appendix C3, Section 5.5.5.1, Direct Operational Impacts,**
383 *Vehicular Traffic* for more details), in general, traffic conditions would deteriorate.

384 **Figure 5-1** shows projected LOS for the 35 No-Action Alternative study intersections. **Table 5-**
385 **26** shows the intersections that would degrade to LOS F by 2040 or experience an increase in
386 average delay greater than 5 seconds relative to existing conditions. Six intersections would
387 degrade to LOS F from a better LOS in at least one peak hour: four intersections in the AM
388 peak hour and three in the PM peak hour. Three intersections already operating at LOS F
389 under existing conditions would experience longer delays in the AM peak.

390 Eighteen of the 35 study intersections would experience an increase in average delay of more
391 than 5 seconds for at least one peak period relative to existing conditions: 14 intersections in
392 the AM peak period and ten in the PM peak period. Some of the increases would be
393 substantial. In the AM peak, average delay at three intersections – North Capitol Street with
394 H Street (#5); Louisiana Avenue with North Capitol Street (#21); and the WUS East
395 Intersection at H Street (#8) – would increase by more than 120 seconds.

¹⁹ These indicators align with those used by DDOT in identifying traffic operations impacts as included in *DDOT Guidelines for Comprehensive Transportation Review (CTR) Requirements*, available at <https://ddot.dc.gov/publication/ddot-guidelines-comprehensive-transportation-review-ctr-requirements>.

Figure 5-1. Intersection Peak-Hour LOS, No-Action Alternative

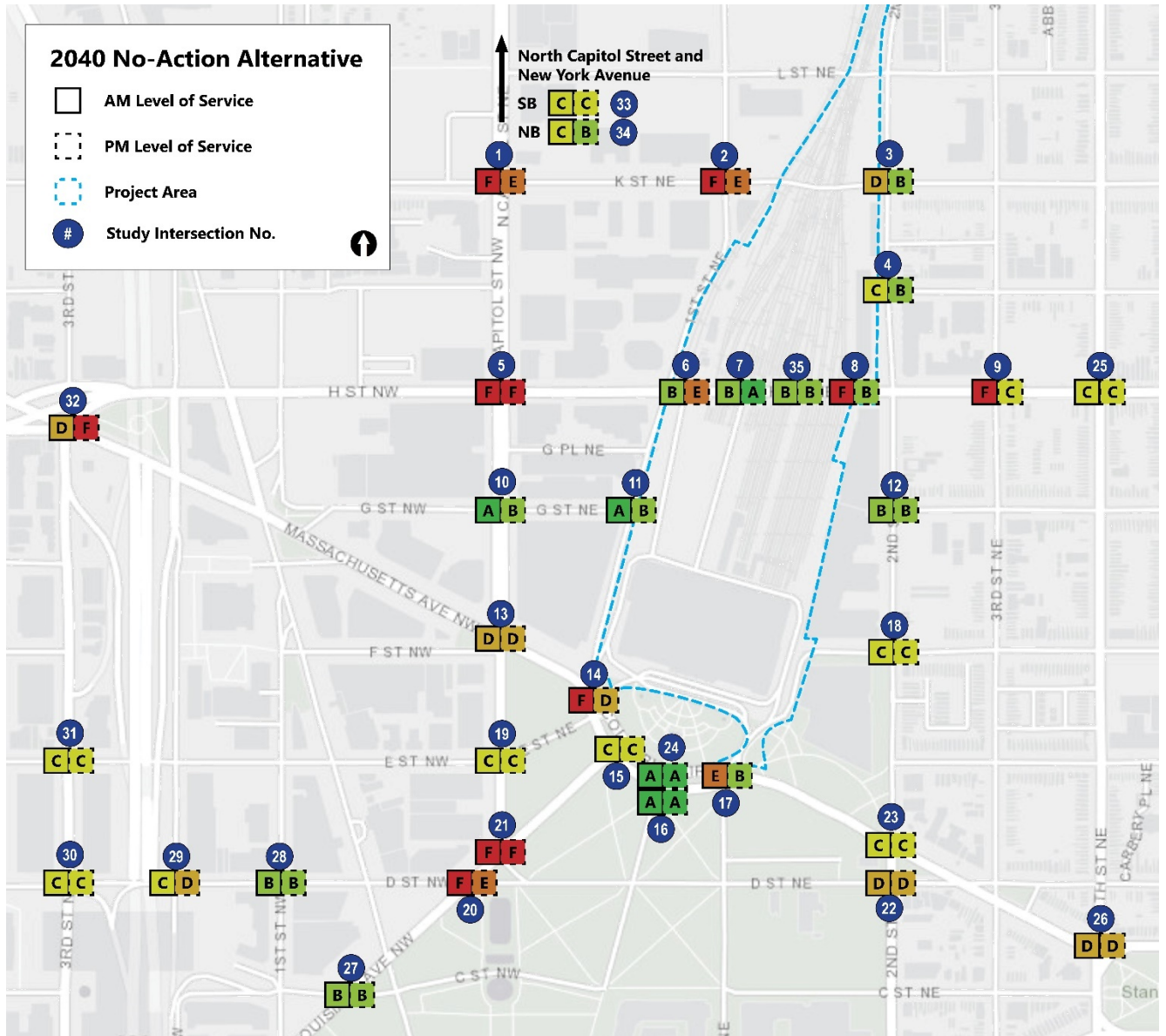


Table 5-26. Intersections Degrading to LOS F or Experiencing Delays > 5 seconds, No-Action Alternative

| Intersection # | Intersection Name | No-Action Alternative | | | | Existing Conditions | | | |
|----------------|---|-----------------------|--------------|-----|--------------|---------------------|-------|-----|-------|
| | | AM | | PM | | AM | | PM | |
| | | LOS | Delay/Change | LOS | Delay/Change | LOS | Delay | LOS | Delay |
| 1 | North Capitol Street / K Street | F | 135.2/47 | E | 71.4/35.5 | F | 88.2 | D | 35.9 |
| 2 | First Street / K Street NE | F | 166.9/71.8 | E | 78.1/18.4 | F | 95.1 | E | 59.7 |
| 3 | 2nd Street / K Street NE | D | 37.9/11.3 | B | 13.0/1.0 | C | 26.6 | B | 12.0 |
| 5 | North Capitol Street / H Street | F | 178.8/161.2 | F | 292.9/265.6 | C | 17.6 | C | 27.3 |
| 6 | WUS West Intersection / H Street NE | B | 12.3/10.5 | E | 57.1/49.3 | A | 1.8 | A | 7.8 |
| 7 | WUS Bus Exit / H Street NE | B | 14.2/11.9 | A | 7.0/1.5 | A | 2.3 | A | 5.5 |
| 8 | WUS East Intersection / H Street NE | F | 160.8/149.9 | B | 13.7/3.9 | B | 10.9 | B | 9.8 |
| 9 | 3rd Street / H Street NE | F | 102.8/44.7 | C | 32.0/7.2 | E | 58.1 | C | 24.8 |
| 13 | North Capitol Street / Massachusetts Ave | D | 39.3/3.9 | D | 46.1/10 | D | 35.4 | D | 36.1 |
| 14 | Massachusetts Avenue / E Street / First St NE | F | 86.8/13.9 | D | 45.6/-27 | E | 72.9 | E | 72.6 |
| 15 | Louisiana Ave /Massachusetts Avenue NE | C | 27.8/8.9 | C | 26.3/-1.7 | B | 18.9 | C | 28.0 |
| 17 | First Street / E Street / Massachusetts Avenue NE | E | 62.6/22.1 | B | 19.3/0.8 | D | 40.5 | B | 18.5 |
| 21 | Louisiana Avenue / North Capitol Street | F | 262.1/177.8 | F | 203.4/161.4 | F | 84.3 | D | 42.0 |
| 25 | 4th Street / H Street NE | C | 21.5/4.5 | C | 22.0/10.1 | B | 17.0 | B | 11.9 |
| 26 | Massachusetts Avenue / C Street / 4th St NE | D | 40.9/11.3 | D | 44.3/1.3 | C | 29.6 | D | 43.0 |

| Intersection # | Intersection Name | No-Action Alternative | | | | Existing Conditions | | | |
|----------------|---|-----------------------|--------------|-----|--------------|---------------------|-------|-----|-------|
| | | AM | | PM | | AM | | PM | |
| | | LOS | Delay/Change | LOS | Delay/Change | LOS | Delay | LOS | Delay |
| 27 | Louisiana Avenue / C Street NW | B | 18.4/6.1 | B | 14.0/4.1 | B | 12.3 | A | 9.9 |
| 31 | 3rd Street / E Street NW | C | 28.3/2.0 | C | 30.0/6.8 | C | 26.3 | C | 23.2 |
| 32 | 3rd Street / Massachusetts Avenue / H St NW | D | 42.7/-14.1 | F | 81.4/32.6 | E | 56.8 | D | 48.8 |

396 Two of these intersections - North Capitol Street with H Street (#5) and Louisiana Avenue
 397 with North Capitol Street (#21) - would experience a similar increase in the PM peak.

398 Additionally, 21 intersections would experience queue increases greater than 150 feet for
 399 one or more lane groups. Of these, ten would experience such an increase in both peak
 400 hours.

Indirect Operational Impacts

There would be no indirect impacts in the No-Action Alternative. No actions would be taken that would induce other transportation changes.

Construction Impacts

401 **In the No-Action Alternative, construction of the Project would not occur. The construction**
 402 **of other projects in the Project Area would cause a range of potential construction-related**
 403 **adverse impacts. The intensity of those impacts would depend on schedules, durations,**
 404 **and methods of construction, which are not known at this time.**

405 The paragraphs below provide a qualitative summary description of the likely potential
 406 construction impacts of the projects included in the No-Action Alternative that have the most
 407 potential to generate construction impacts on the transportation system.

Concourse Modernization Project and WMATA Metrorail Station Improvements

408 The Concourse Modernization Project would cause disruptions to passenger circulation in
 409 both the Claytor Concourse and the WMATA Metrorail Station mezzanine level. Passengers
 410 may have to walk longer distances because of construction activities in the passenger areas.
 411 Temporary closure of the WMATA Metrorail north mezzanine may be necessary, which
 412 would concentrate pedestrian flows at the south entrance and may cause overcrowded
 413 conditions.

VRE Midday Storage Replacement Facility

414 The construction of the VRE Midday Storage Replacement Facility would cause temporary
415 disruptions to the railroad infrastructure north of K Street NE and to railroad service in the
416 rail terminal when the facility's tracks are connected into the existing system. These
417 disruptions may include track outages, flagger operations, and reduced speed limits, and may
418 require temporary modifications to rail terminal operations.

Other Station and Track Improvements

419 The other station and track improvements listed in **Section 3.4.1.4, Transportation Projects**
420 *within the Project Area* may cause minor disruptions to the transportation infrastructure
421 from short-term track closures, the temporary unavailability of passenger circulation areas,
422 and temporary disruptions to passenger service including cancellations, delays, and reduced
423 speeds in the rail terminal.

H Street Bridge Replacement

424 DDOT, in conjunction with the Federal Highway Administration, proposes to replace the H
425 Street Bridge on its existing alignment and within DDOT's right of way.²⁰ DDOT's construction
426 approach would avoid or minimize transportation impacts. The bridge would remain open to
427 traffic during construction but with one travel lane in each direction. As a result, it is
428 expected that some vehicular traffic would divert to nearby parallel routes. As construction
429 occurs on the bridge deck, existing transit stops would temporarily close. This includes the DC
430 Streetcar WUS stop and two WMATA bus stops. The streetcar would continue to operate
431 between 3rd Street NE and Oklahoma Avenue. A shuttle service between 3rd Street and
432 Union Station would be considered. Pedestrian access across the bridge would be maintained
433 during construction, but it would be limited to one side. Access to the WUS Parking Garage
434 would remain but it may be intermittently rerouted to accommodate construction activities.

435 The new bridge design was closely coordinated with Amtrak and WMATA to avoid any
436 impacts to the track alignment. The approach to bridge construction would be closely
437 coordinated with Amtrak and WMATA to ensure construction is scheduled to avoid impacts
438 to rail and transit operations.

DC Streetcar Extension

439 The extension of the DC Streetcar to Georgetown would require construction along H Street
440 NE. This may require lane closures and disrupt traffic operations on H Street. There may be a
441 need for temporary detours for vehicular traffic. This could cause delays and inconvenience
442 to WUS users, the persons residing or working nearby, and commuters.

²⁰ As of March 2020, preparation of a Categorical Exclusion for this project is ongoing.

Private Air-rights Development

443 The development of the privately-owned air rights above the rail terminal is the project with
444 the most potential to cause substantial construction-related impacts at and near WUS.
445 Methods and duration of construction are not known at this time. However, construction
446 would likely take place in phases over several years. It would entail building an overbuild
447 deck within the air rights to support buildings and infrastructure. Columns to support the
448 deck would be constructed in the rail terminal, likely requiring modifications to tracks and
449 platforms. Depending on the duration of any construction-related shutdowns, there could be
450 adverse impacts on rail terminal operations, with implications for Amtrak, MARC, and VRE
451 operations. However, Amtrak would have approval authority over the construction activity
452 and would minimize impacts to operations as much as possible.

453 Construction on the west side of the rail terminal (north of the H Street Bridge, as the air
454 rights on the west side south of the bridge are Federally owned) may affect the operation of
455 Metrorail's Red Line. There may be a need for temporary single-tracking or partial closures,
456 although it is possible that these could be limited to non-revenue hours.

457 Construction activities on the west side in proximity to the existing bus facility may affect
458 tour and intercity bus operations. Temporary shutdowns during the construction of the
459 adjacent parts of the air-rights deck and buildings could be required and, if so, would need to
460 be coordinated with WUS. If they occur, such shutdowns would disrupt bus operations and
461 may require the establishment of an interim bus terminal. They may also affect parking
462 garage access.

463 The construction of new intersections on H Street may temporarily affect DC Streetcar
464 operations. Construction activities along First Street NE and 2nd Street NE may affect
465 pedestrian circulation to and from WUS. These activities may also block or complicate access
466 to H Street and the DC Streetcar station.

467 Construction-generated traffic would affect the local transportation network. Construction
468 would not require large amounts of excavation, limiting the number of trucks that would
469 travel to and from the site. There may be some short-term lane closures along First and 2nd
470 Streets NE, but in general, the construction traffic generated by this project can be
471 anticipated to be commensurate with, and typical of, any large downtown mixed-use
472 development.

5.5.4.2 Alternative A

473 The following sections present the direct and indirect, operational and construction impacts
474 of Alternative A. **Figure 5-2** illustrates the key transportation elements of Alternative A.

Figure 5-2. Key Transportation Elements, Alternative A



Direct Operational Impacts

Commuter and Intercity Railroads

475 **Relative to the No-Action Alternative, Alternative A would have a major beneficial direct**
476 **operational impact on commuter and intercity railroad service, as it would support**
477 **increased service accommodating many more passengers than the No-Action Alternative.**

478 Relative to the No-Action Alternative, Alternative A (and all other Action Alternatives) would
479 have a major beneficial direct operational impact on intercity and commuter railroad service.
480 The reconstruction of the tracks and platforms included in Alternative A as well as the other
481 Action Alternatives would allow for a substantial expansion of rail capacity at WUS.

482 The new tracks and platforms would support simultaneous boarding of trains, quicker
483 turnaround times for trains, and double berthing.²¹ Alternative A would make these
484 procedures possible by providing wider platforms that can safely accommodate more
485 passengers; longer usable edges along the platforms that would lengthen the amount of
486 space effectively usable for passenger activity;²² and greater redundancy in the track system.
487 These changes would allow for longer trains and for more frequent trains because trains
488 could load and unload passengers more quickly.

489 Based on this additional capacity, Amtrak developed an operating plan capable of
490 accommodating the anticipated growth in ridership. This operating plan would allow for two
491 new services: a new low-cost intercity service called the “Metropolitan” and MARC through-
492 running trains to Virginia.

493 The Metropolitan service, introduced in the *Northeast Corridor (NEC) FUTURE Final*
494 *Environmental Impact Statement (FEIS)*, is a proposed unreserved intercity service between
495 Washington, DC and Boston. This service would be less expensive than most Northeast
496 Regional service and would make more frequent intermediate stops. As planned, it would
497 provide intercity service to new markets and attract riders who might otherwise drive or take
498 the bus, potentially reducing vehicular traffic along the northeast corridor. It would also
499 provide commuter service for longer distance commuters.

500 MARC Through-Running would provide regional commuter rail service between the District,
501 Maryland, and Virginia, with trains connecting from the MARC Penn Line to the two VRE
502 lines. Although it is referred to as MARC Through-Running in this DEIS, MARC and VRE have
503 not reached an agreement on how this service would operate.

504 **Table 5-27** shows anticipated daily train volumes for intercity and commuter train services in
505 Alternative A and all other Action Alternatives. No-Action Alternative data are also provided
506 for comparison.

²¹ “Double berthing” is when two trains are lined up, one in front of the other, on the same track.

²² While some platforms may retain the same total length as today, they would differ greatly in how much of that length is actively used. Portions of platforms are currently unused due to lack of accessibility, insufficient width, and other issues.

Table 5-27. Daily Intercity and Commuter Train Volumes by Alternative

| Service | All Action Alternatives | No-Action Alternative |
|-------------------------------------|-------------------------|-----------------------|
| Amtrak Trains (All Services) | 288 | 144 |
| Amtrak Total Ridership | 32,000 | 21,800 |
| MARC Trains (All Services) | 250 | 106 |
| MARC Total Ridership | 70,700 | 37,900 |
| VRE Trains (All Services) | 92 | 34 |
| VRE Total Ridership | 13,600 | 4,900 |

507 Train volumes would increase substantially relative to the No-Action Alternative in
 508 Alternative A and the other Action Alternatives. Daily intercity train volumes would increase
 509 by 100 percent, MARC Trains by 136 percent, and VRE trains by 171 percent.

510 In contrast to the No-Action Alternative, where increased train volumes would further stress
 511 WUS’s existing, constrained infrastructure, in Alternative A and the other Action Alternatives,
 512 the proposed improvements to platforms and concourses would adequately accommodate
 513 these volumes.

Comparison to Existing Conditions

514 Relative to existing condition, Alternative A and all other Action Alternatives would also have
 515 a major beneficial direct operational impact on intercity, MARC, and VRE services.²³ Intercity
 516 train services could accommodate 95 percent more passengers than under existing
 517 conditions. Intercity train volumes would increase by 148 percent relative to existing
 518 conditions. Total MARC ridership would increase by 152 percent and all-day train volumes by
 519 163 percent. Similarly, VRE total daily ridership would increase by 249 percent and all-day
 520 train volumes by 188 percent.

Private Train Cars

521 **Relative to the No-Action Alternative, Alternative A would have no direct operational**
 522 **impact on private train car operations.**

523 Currently, Amtrak allows private train cars to be stored at WUS. Under the reconfiguration of
 524 the rail terminal in Alternative A and all Action Alternatives, Amtrak has identified space for 8
 525 private train cars to be stored at a time. Therefore, private car storage could continue.

Comparison to Existing Conditions

526 Impacts relative to existing conditions would be the same as relative to the No-Action
 527 Alternative because there is no difference between the two baselines with regard to private
 528 train cars.

²³ See Section 5.5.2.1, Direct Operational Impacts, Commuter and Intercity Railroads in Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report for existing conditions data.

WMATA Metrorail

529 **Relative to the No-Action Alternative, Alternative A would have a moderate adverse direct**
 530 **operational impact on Metrorail operations because of increased demand that would**
 531 **aggravate train overcapacity and station circulation issues.**

532 Increased train service and ridership in Alternative A, as well as the reduction in parking
 533 capacity and new retail uses, would generate increased demand on Metrorail at WUS. **Table**
 534 **5-28** shows modeled activity in the AM peak and PM peak, along with the corresponding data
 535 for the No-Action Alternative. When the projected V/C ratio would exceed 100 percent, there
 536 would be a need for additional service to address overcrowding.²⁴

Table 5-28. Peak-hour WUS-related Metrorail Activity, Alternative A²⁵

| | Alternative A | | No-Action Alternative | |
|-------------------------|---------------|----------|-----------------------|----------|
| | Shady Grove | Glenmont | Shady Grove | Glenmont |
| AM Peak Hour | | | | |
| V/C Arriving at WUS | 83% | 28% | 80% | 25% |
| WUS Boardings | 8,390 | 1,623 | 5,202 | 1,010 |
| WUS Alightings | 5,042 | 3,423 | 4,128 | 2,803 |
| Through Ridership | 9,222 | 1,296 | 9,523 | 1,447 |
| Ridership Departing WUS | 17,612 | 2,919 | 14,725 | 2,457 |
| V/C Departing WUS | 103% | 17% | 86% | 14% |
| Excess Demand | 469 | 0 | 0 | 0 |
| PM Peak Hour | | | | |
| V/C Arriving at WUS | 20% | 115% | 20% | 107% |
| WUS Boardings | 3,170 | 4,536 | 2,559 | 3,661 |
| WUS Alightings | 1,553 | 8,240 | 1,154 | 6,126 |
| Through Ridership | 1,647 | 9,919 | 1,953 | 10,722 |
| Ridership Departing WUS | 4,817 | 14,455 | 4,512 | 14,383 |
| V/C Departing WUS | 31% | 92% | 29% | 91% |
| Excess Demand | 0 | 2,421 | 0 | 1,110 |

537 By 2040, Alternative A volumes would exceed capacity in the Shady Grove direction during
 538 the AM peak (departing from WUS) and in the Glenmont direction during the PM peak
 539 (arriving at WUS).

540 Relative to the No-Action Alternative, in the AM peak, Alternative A would cause the V/C
 541 ratio leaving WUS toward Shady Grove to reach 103 percent, against 86 percent in the No-
 542 Action Alternative. As a result, Alternative A would increase the excess demand by

²⁴ WMATA capacity standards are based on WMATA’s operating manual. The capacity reported in this DEIS (all alternatives) is less than the “crush load” of WMATA trains. Capacity represents the level at which WMATA believes they can operate effectively without delays to trains and passengers due to overcrowding.

²⁵ Estimates of WMATA peak hour capacity are consistent with TPB Constrained Long-Range Transportation Plan elements and direction from WMATA (all alternatives).

543 approximately 469 passengers. Based on WMATA ridership trends, overcapacity conditions
544 are anticipated to dissipate within the Red Line core.²⁶

545 In the PM peak, capacity exceedance toward Glenmont (115 percent) would be greater in
546 Alternative A than in the No-Action Alternative (107 percent). Alternative A would aggravate
547 the level of crowding, generating an additional demand of approximately 1,311 passengers,
548 for a total of around 2,421.

549 Relative to the No-Action Alternative, the increase in Metrorail ridership at WUS would
550 further adversely affect passenger circulation at the WMATA platform level. The North
551 Mezzanine improvements included in the Concourse Modernization Project, which would
552 occur in Alternative A as well as in the No-Action Alternative, would improve circulation. The
553 construction of the First Street Concourse and the reconfiguration of access from Metrorail
554 to the rail platform level of Concourse A in Alternative A would accommodate circulation
555 between the WMATA mezzanine and WUS rail platform levels. However, vertical circulation
556 between the WMATA platform and the WMATA mezzanine would remain as in the No-Action
557 Alternative. This connection would be a constraint on circulation in the No-Action Alternative
558 and would remain one in Alternative A. It is likely that in Alternative A, circulation conditions
559 on the WMATA platform for passengers seeking to access the North Mezzanine would
560 further degrade compared to the No-Action Alternative as a result of increased volumes.

Comparison to Existing Conditions

561 Relative to existing conditions, Alternative A would have a major adverse direct operational
562 impact on Metrorail operations at WUS.²⁷ The increase in overcrowding and need for extra
563 capacity would be greater compared to existing conditions than to the No-Action Alternative.

564 In the AM peak, Alternative A would cause the V/C ratio leaving WUS toward Shady Grove to
565 reach 103 percent, against 69 percent in existing conditions. Alternative A would increase the
566 overall demand in the AM peak in the Shady Grove direction by 7,234 passengers. In the PM
567 peak, the Alternative A V/C ratio toward Glenmont would be 115 percent arriving at WUS,
568 against 72 percent in existing conditions. Alternative A would increase overall demand in the
569 PM peak by 8,211 passengers.

DC Streetcar

570 **Relative to the No-Action Alternative, Alternative A would result in a minor beneficial**
571 **direct operational impact on DC Streetcar operations. The benefits of increased ridership**
572 **would be partially offset by greater operational delays.**

²⁶ The Red Line core, as defined by WMATA, consists of the line segment between Dupont Circle and WUS.

²⁷ See **Section 5.5.2.1, Direct Operational Impacts, WMATA Metrorail of Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data. Total ridership projections for Alternative A include ridership generated by the private air-rights development.

573 Relative to the No-Action Alternative, Alternative A would increase Streetcar ridership
574 without creating a capacity exceedance. In the AM peak, passenger volumes would go up by
575 344 departing in the westbound direction and 86 in the eastbound direction. In the PM peak,
576 passenger volumes would increase by 53 in the westbound direction and 210 in the
577 eastbound direction. Thus, Alternative A would result in greater use of the DC Streetcar than
578 the No-Action Alternative while leaving sufficient room for further growth, a beneficial
579 impact. This beneficial impact would be minor because greater traffic congestion on H Street
580 (see **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Vehicular Traffic**) may create
581 operational delays that would partially offset the benefits of increased ridership.

Comparison to Existing Conditions

582 Because of the different operational conditions of the DC Streetcar in existing conditions, it is
583 not possible to compare the impacts of Alternative A to this mode to existing conditions.
584 Under existing conditions, the DC Streetcar terminates at WUS, continuing east along H
585 Street/Benning Road NE to Oklahoma Avenue. This service travels every 12 minutes. In the
586 No-Action Alternative and Action Alternatives, the DC Streetcar would continue east to the
587 Benning Road Metrorail Station and west to Georgetown, making it a substantially different
588 transportation element.

Intercity, Tour/Charter, and Sightseeing Buses

589 **Relative to the No-Action Alternative, Alternative A would have a moderate adverse direct**
590 **operational impact on intercity and tour/charter, and daily sightseeing bus operations**
591 **because of the new 30-minute time limit for buses at WUS. Alternative A would have a**
592 **negligible adverse direct operational impact on hop-on/hop-off sightseeing buses as a**
593 **result of their relocation to G Street NE.**

594 In Alternative A and all action alternatives, intercity buses, tour/charter buses, and daily
595 sightseeing buses,²⁸ would be accommodated in a new facility replacing the existing one.
596 Hop-on/hop-off sightseeing buses would be accommodated on G Street NE. Impacts to all
597 these modes are assessed in this section.

598 In Alternative A, the new bus facility would be located in approximately the same location as
599 the existing WUS parking garage. Buses would reach it via the new west intersection on H
600 Street NE. Exit would be via a ramp east of that intersection, near where the existing ramp is
601 located today. All intercity and tour/charter buses that serve WUS would use this facility. As
602 in the No-Action Alternative, exiting buses could only turn right onto eastbound H Street NE.
603 However, the west intersection would not be offset (as it would be in the No-Action
604 Alternative), which would facilitate inbound bus movements.

605 In Alternative A and all Action Alternatives, an “active management” approach would be used
606 to optimize the capacity of the bus facility. With this approach, buses could not stay at a slip

²⁸ Daily sightseeing buses are coach-style buses that provide scheduled tours of Washington-area sites and currently depart from the existing WUS bus facility.

607 for more than 30 minutes during peak hours of operation. This quick turnaround would allow
 608 the bus facility to process more buses with a smaller number of slips than would be the case
 609 in the No-Action Alternative, which would maintain existing conditions, including no time
 610 limits on bus layovers.

611 In 2040, Alternative A and all Action Alternatives would generate an estimated 117 peak-
 612 hour intercity, tour/charter and sightseeing bus movements (**Table 5-29**). Relative to the No-
 613 Action Alternative, this would be an increase of 75 percent (22 trips, or 79 percent, in the AM
 614 peak and 28 trips, or 72 percent, in the PM peak.)

615 Bus demand would be lower in Alternative A and all Action Alternatives than in the No-Action
 616 Alternative because of the introduction of the lower-cost Metropolitan Train service.
 617 However, the 30-minute stay policy would result in more trips in and out of the bus facility
 618 and may create additional delays for bus operators. Buses may need to lay over at other
 619 locations in the District or the region as a result of the 30-minute policy. These locations have
 620 not been determined.

Table 5-29. Peak-hour Bus Trips by Alternative, All Alternatives

| | All Action Alternatives | | No-Action Alternative | |
|--------------|-------------------------|---------|-----------------------|---------|
| | AM Peak | PM Peak | AM Peak | PM Peak |
| Ins | 25 | 34 | 14 | 20 |
| Outs | 25 | 33 | 14 | 19 |
| Total | 50 | 67 | 28 | 39 |

621 In Alternative A and all Action Alternatives, sightseeing buses, which currently serve the front
 622 of WUS, would provide service via a curbside loading zone on the south side of G Street NE
 623 (See **Figure 5-2** above). There would be seven slips at that location. Future sightseeing bus
 624 operations would need four of them. The additional slips would serve to accommodate any
 625 overflow from the bus facility during peak season as well as other vehicular pick-up and drop-
 626 off activity. While the 30-minute-stay policy would create a constraint on bus operations at
 627 the bus facility, the availability of overflow spaces on G Street NE would provide added
 628 flexibility.

Comparison to Existing Conditions

629 Relative to existing conditions, bus trips would increase by 29 trips (138 percent) in the AM
 630 peak and 39 trips (139 percent) in the PM peak.²⁹ Of the additional trips, 19 percent would
 631 be due to the anticipated increase in demand and the rest to the implementation of the 30-
 632 minute stay limit.

²⁹ See **Section 5.5.2.1, Direct Operational Impacts, Intercity, Tour/Charter, and Sightseeing Buses in Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

Loading

633 **Relative to the No-Action Alternative, Alternative A would have no adverse direct**
634 **operational impacts on loading space availability. Demand would increase but it would be**
635 **met through continued use of the existing docks and the provision of a new dock on 2nd**
636 **Street NE.**

637 In Alternative A and all Action Alternatives, use of the existing east and west loading docks
638 would continue. A new loading dock (north dock) between 2nd Street and K Street NE with
639 access from 2nd Street NE would be constructed. Relative to the No-Action Alternative, the
640 demand for loading dock slips at WUS would increase an estimated 75 percent because of
641 the greater amount of retail and the increase in multimodal operations. Between the existing
642 loading docks and the new north dock, there would be sufficient capacity to accommodate
643 the expected volume of vehicles and materials.

644 The east dock would continue to accommodate up to six vehicles per hour, while the west
645 dock would accommodate only Package Express loading needs due to the potential
646 reconfiguration of access from the Metrorail station to WUS. The new north loading dock
647 would include 14 slips, with at least two of these slips designed to accommodate smaller
648 vehicles.

649 Across all three docks, the AM peak would include 30 loading movements and the PM peak
650 eight loading movements. The heaviest volumes would continue to be in the midday hours
651 (between 10:00 AM to 11:00 AM) with 40 total loading movements.

652 The north dock would introduce new truck activity along 2nd Street NE relative to the No-
653 Action Alternative. This truck activity would be distributed throughout the day, with the
654 highest volumes outside the rush hour periods. Compliance with existing truck route
655 restrictions would keep truck traffic from spilling into nearby residential streets. Trucks
656 serving the north dock would comply with District law that prohibits backing up in the public
657 right-of-way.

Comparison to Existing Conditions

658 The impacts of Alternative A on loading relative to existing conditions would be the same as
659 relative to the No-Action Alternative. There is no difference between the two baselines with
660 regard to loading dock conditions.

Pedestrians

661 **Relative to the No-Action Alternative, Alternative A would have a major beneficial direct**
662 **operational impact on pedestrian circulation inside WUS. Additional access points to WUS**
663 **would disperse pedestrian traffic and make access to WUS easier. Outside of WUS,**
664 **Alternative A would have a minor adverse direct operational impact on pedestrian**
665 **circulation because of increased queueing at certain crossings near the station.**

666 As shown in **Table 5-30**, interior passenger volumes at WUS would increase in Alternative A
667 and all Action Alternatives relative to the No-Action Alternative. In both the AM and PM

668 peaks, volumes would be approximately 50 percent greater. The largest generator of internal
 669 pedestrian trips would be passengers transferring between commuter rail and Metrorail.

Table 5-30. Interior Pedestrian Volumes, All Alternatives

| | Action Alternatives | | No-Action Alternative | |
|--------------|---------------------|---------|-----------------------|---------|
| | AM Peak | PM Peak | AM Peak | PM Peak |
| Total | 71,734 | 92,356 | 47,703 | 61,416 |

670 By providing new concourse space and access points, Alternative A, like all Action
 671 Alternatives, would facilitate the movement of passengers and visitors through and in and
 672 out of WUS, avoiding the congestion that would occur in the No-Action Alternative. In the
 673 No-Action Alternative, the existing, already congested circulation space and entry points
 674 would have to accommodate a growing number of persons. Therefore, in spite of the
 675 increase in pedestrian volumes, Alternative A would result in a major beneficial impact on
 676 pedestrian conditions in WUS.

677 Outside WUS, pedestrian volumes would increase by around 61 percent in the AM peak and
 678 55 percent in the PM peak, as shown in **Table 5-31**.

Table 5-31. Exterior Pedestrian Volumes, All Alternatives

| | Action Alternatives | | No-Action Alternative | |
|--------------|---------------------|---------|-----------------------|---------|
| | AM Peak | PM Peak | AM Peak | PM Peak |
| Ins | 5,566 | 10,339 | 3,753 | 6,587 |
| Outs | 12,372 | 6,427 | 7,370 | 4,232 |
| Total | 17,938 | 16,766 | 11,123 | 10,819 |

679 In Alternative A, as in all Action Alternatives, projected queues at the two study crossings
 680 would be longer than they would be in the No-Action Alternative but they would remain
 681 manageable as queues could remain contained within the available sidewalk space at these
 682 locations.

683 Anticipated increases in vehicular traffic near WUS, including pick-up and drop-off activities,
 684 along with increases in pedestrian volumes, may result in more conflicts between pedestrians
 685 and vehicles. Based on the projected number and distribution of new multimodal trips, the
 686 following locations would be most affected: G Street NE between North Capitol Street and
 687 First Street NE; First Street NE between G Street NE and K Street NE; H Street NE between the
 688 west intersection and east intersection; and 2nd Street NE between F Street NE and K Street
 689 NE.

Comparison to Existing Conditions

690 The impacts of Alternative A relative to existing conditions would be similar to those relative
691 to the No-Action Alternative. The major beneficial impact that would result from the
692 provision of more circulation space and access points would be somewhat greater because it
693 would represent more of an improvement relative to existing conditions than relative to the
694 No-Action Alternative, which would incorporate some changes beneficial to pedestrians, such
695 as those associated with the Concourse Modernization project. The increase in pedestrian
696 volumes inside WUS would also be greater relative to existing conditions (about 115 percent
697 in the AM and 61 percent in the PM peak).³⁰ Impacts on outside pedestrian circulation would
698 be the same relative to existing conditions as relative to the No-Action Alternative since they
699 are a function of a feature – sidewalk queuing space for pedestrians – which would be the
700 same in both baselines.

Bicycle Activity

701 **Relative to the No-Action Alternative, Alternative A would result in a minor beneficial**
702 **direct operational impact on bicycle activity. Anticipated demand for private bicycle**
703 **parking and storage would be accommodated by the provision of 104 Bikeshare spaces and**
704 **200 bicycle storage spots. However, this benefit would be partially offset by increased**
705 **conflicts with pedestrians and vehicles.**

706 In Alternative A, as in all Action Alternatives, a total of 586 WUS-generated peak-hour bicycle
707 trips would be generated, with 285 trips in the AM peak and 301 trips in the PM peak
708 (Table 5-32). Alternative A volumes would represent an increase of 78 AM trips and 60 PM
709 trips over the No-Action Alternative.

710 Alternative A and all Action Alternatives would provide 104 Bikeshare spaces and 200 bicycle
711 storage spaces. These new bicycle storage facilities would be adjacent to the H Street
712 Concourse entrances at First and 2nd Streets NE. With the new bicycle facilities, Alternative A
713 would fully accommodate the increased volumes in bicycle trips unlike the No-Action
714 Alternative, which would not accommodate any additional bicycle storage. Therefore,
715 Alternative A would have a beneficial direct operational impact on bicycle activity relative to
716 the No-Action Alternative.

³⁰ See Section 5.5.2.1, *Direct Operational Impacts, Pedestrians* in Appendix C3, *Washington Union Station Expansion Project Environmental Consequences Technical Report* for existing conditions data.

Table 5-32. Peak-hour Bicycle Trips, All Alternatives

| | All Action Alternatives | | No-Action Alternative | |
|--------------|-------------------------|---------|-----------------------|---------|
| | AM Peak | PM Peak | AM Peak | PM Peak |
| Ins | 118 | 163 | 89 | 124 |
| Outs | 167 | 138 | 118 | 117 |
| Total | 285 | 301 | 207 | 241 |

717 However, greater vehicular, pedestrian, and bicycle volumes in Alternative A (and all Action
 718 Alternatives) would increase the risk of conflicts between bicycles and vehicles. Bicycle
 719 facility improvements planned by DDOT (on Louisiana Avenue NE and K Street NE, for
 720 instance) would improve safety. However, the volumes and new activities like pick-up and
 721 drop-off on First Street would create conflicts even with these additional safety measures.
 722 This would partially offset the beneficial impact from increased storage, resulting in a minor
 723 beneficial net impact.

Comparison to Existing Conditions

724 The impacts of Alternative A relative to existing conditions would be similar to those relative
 725 to the No-Action Alternative. Alternative A would generate 129 additional AM peak trips (83
 726 percent increase) and 120 additional PM peak trips (66 percent increase) relative to existing
 727 conditions.³¹ The bicycle parking and storage facilities included in Alternative A and all Action
 728 Alternatives could accommodate up to 200 bicycles, more than enough to cover the
 729 anticipated increase, with room for further growth. Based on the growth in peak-hour WUS-
 730 related bicycle trips, an additional 88 Bikeshare docks would be required to meet demand
 731 under Alternative A relative to existing conditions. Alternative A would fully accommodate
 732 this demand as it would provide 104 Bikeshare spaces. Like relative to the No-Action
 733 Alternative, greater vehicular, pedestrian, and bicycle volumes would increase the risk of
 734 conflict with bicycles.

City and Commuter Buses

735 **Relative to the No-Action Alternative, Alternative A would have a minor adverse direct**
 736 **operational impact on city and commuter buses. Increases in WUS-generated ridership**
 737 **would incrementally contribute to the overcrowding of some city buses and increases in**
 738 **traffic congestion would incrementally contribute to delays experienced by all city and**
 739 **commuter buses. There would also be a moderate adverse direct operational impact on**
 740 **some employee shuttles, which would have to stop operating out of the WUS bus facility.**

741 Alternative A would generate more use of the city and commuter buses (including DC
 742 Circulator Metrobus, MTA, and LCT buses) that serve WUS. Compared to the No-Action

³¹ See Section 5.5.2.1, *Direct Operational Impacts, Bicycle Activity* in **Appendix C3**, *Washington Union Station Expansion Project Environmental Consequences Technical Report* for existing conditions data.

743 Alternative, there would be an additional 384 alighting WUS passengers (81 percent increase)
 744 and 865 boarding WUS passengers (104 percent increase) in the AM peak on city and
 745 commuter buses. There would be an additional 621 alighting passengers (73 percent
 746 increase) and 398 boarding passengers (65 percent increase) in the PM peak.

747 Considered collectively, city and commuter buses would continue to operate under capacity.
 748 The same individual Metrobus routes that would be over capacity in the No-Action
 749 Alternative would be over capacity in Alternative A (see **Table 5-33**). Because of the increase
 750 in ridership, the overcrowding would be worse but Alternative A would not cause more
 751 Metrobus or DC Circulator lines to run above capacity than the No-Action Alternative. As a
 752 result, Alternative A would only have a minor adverse direct operational impact on city and
 753 commuter buses.

754 The reconstruction of the bus facility in Alternative A and all Action Alternatives would
 755 require employee shuttles currently making use of the facility to relocate to another location.
 756 These shuttles serve USCIS and Gallaudet University. The relocation of the employee shuttles
 757 would be a moderate adverse impact on their operation because, while they must be
 758 proximate to WUS, they do not need to be within the bus facility itself to continue fulfilling
 759 their purpose. No impact to traffic operations would occur because of this relocation.

Table 5-33. Bus Routes Over Capacity, All Alternatives

| | Metrobus | Direction | Action Alternatives | No-Action Alternative |
|----------------|----------|-----------|---------------------|-----------------------|
| AM Peak | 80 | SB | Over Capacity | Over Capacity |
| | D4 | WB | Over Capacity | Over Capacity |
| | D6 | WB | Over Capacity | Over Capacity |
| | P6 | NB | Over Capacity | Over Capacity |
| | P6 | SB | Over Capacity | Over Capacity |
| | X1 | WB | Over Capacity | Over Capacity |
| | X2 | WB | Over Capacity | Over Capacity |
| | X9 | EB | Over Capacity | Over Capacity |
| | X9 | WB | Over Capacity | Over Capacity |
| PM Peak | 96 | EB | Over Capacity | Over Capacity |
| | D6 | EB | Over Capacity | Over Capacity |
| | P6 | NB | Over Capacity | Over Capacity |
| | X2 | EB | Over Capacity | Over Capacity |
| | X2 | WB | Over Capacity | Over Capacity |
| | X9 | EB | Over Capacity | Over Capacity |
| | X9 | WB | Over Capacity | Over Capacity |

SB: Southbound, WB: Westbound, EB: Eastbound, NB: Northbound

760 Increases in vehicle delays and queues due to greater traffic volumes would likely affect bus
 761 reliability and speed. Out of the 13 Metrobus routes that serve the Local Study Area, four in

762 the AM peak and five in the PM peak would pass through at least two intersections that
763 would degrade to LOS F relative to the No-Action Alternative, a potential source of delays.
764 One DC Circulator routes and seven commuter bus routes (out of nine) would be similarly
765 affected, but in the PM peak only. Conditions would be similar to those in the No-Action
766 Alternative, though delays may be slightly greater.

Comparison to Existing Conditions

767 Compared to existing conditions, in Alternative A there would be an additional 466 alighting
768 WUS passengers (118 percent) and 977 boarding WUS passengers (136 percent) in the AM
769 peak on city and commuter buses.³² There would be an additional 756 alighting passengers
770 (105 percent) and 509 boarding passengers (102 percent) in the PM peak. Considered
771 collectively, city and commuter buses would continue to operate under capacity. Because of
772 the increase in ridership, six Metrobuses in the AM peak and three Metrobuses in the PM
773 peak would become over capacity. Impacts on employee shuttles would be the same relative
774 to existing conditions or the No-Action Alternative because there is no difference between
775 the two baselines in this regard.

776 Compared to existing conditions, in Alternative A buses would see increases in delays and
777 queues that would affect their reliability and speed because of greater traffic. Four bus
778 routes in the AM peak and 13 bus routes in the PM peak would pass through intersections
779 degrading to LOS F relative to existing conditions.

Vehicular Parking and Rental Cars

780 **Relative to the No-Action Alternative, Alternative A would have a moderate adverse direct**
781 **operational impact on parking at WUS because of a reduction in parking capacity. There**
782 **would be a minor beneficial direct operational impact on rental car operations.**

783 In Alternative A, all parking and rental car activity would be in a new above-ground facility
784 (multimodal surface transportation center) located within the same general footprint as the
785 existing WUS parking garage, with access via H Street NE (west intersection) and the new
786 southwest road. The new facility would have space for approximately 700 fewer cars than
787 the existing one (which would remain in use in the No-Action Alternative). While this
788 reduction in parking capacity would be an adverse impact, the new facility would meet the
789 parking program for the Project.³³ It would not fully meet the projected parking demand but
790 it is anticipated that lack of parking would cause some users to use different modes to reach

³² See Section 5.5.2.1, *Direct Operational Impacts, City and Commuter Buses* in Appendix C3, *Washington Union Station Expansion Project Environmental Consequences Technical Report* for existing conditions data.

³³ As noted in Section 5.5.3.1, *Operational Impacts*, the parking impact analysis addresses parking as a resource for which there is a demand. Therefore, a reduction in parking availability is considered an adverse impact on parking. A reduction in parking availability may also have adverse or beneficial consequences for other resources or transportation modes. Such consequences are incorporated into the impact analyses for those other resources or transportation modes.

791 the station.³⁴ In general, fewer passengers or visitors are expected to be driving to and
792 parking at WUS.³⁵ Therefore, the adverse impact would be moderate.

793 Although there would be fewer parking spaces, WUS activity in Alternative A would generate
794 more peak-hour parking trips than would be the case in the No-Action Alternative because
795 greater peak-hour train volumes would bring more people, including drivers, to WUS.
796 Relative to the No-Action Alternative, Alternative A would generate an estimated 99
797 additional peak-hour trips (20 percent increase): 88 in the AM peak hour (47 percent
798 increase) and 11 in the PM peak hour (4 percent increase). These trips were considered in the
799 traffic impact analysis (see **Tables 5-34 and 5-35** below).

800 Increased WUS activity would also generate more rental car trips relative to the No-Action
801 Alternative, also because of greater peak-hour train volumes. In both the AM and PM peak
802 hours, the number of car-rental trips would more than double relative to the No-Action
803 Alternative (105 against 46 in the AM peak and 92 against 45 in the PM peak). As with
804 parking, these trips were considered in the traffic impact analysis.

805 The design of the new rental car facility would address the capacity issues that would occur
806 in the No-Action Alternative, resulting in a beneficial impact. This beneficial impact would be
807 minor, being partially offset by the increase in operations.

Comparison to Existing Conditions

808 The impacts of Alternative A on parking and rental car activity would be the same relative to
809 existing conditions as relative to the No-Action Alternative since the existing parking garage
810 and rental car facility would be in use in both baselines. The reduction in parking capacity
811 would be the same relative to existing conditions as relative to the No-Action Alternative.
812 Alternative A would generate proportionately more peak-hour parking trips relative to
813 existing conditions than relative to the No-Action Alternative.³⁶ In the AM peak, Alternative A
814 would generate 149 trips (116 percent) more than in existing conditions. In the PM peak, the
815 increase would be 103 trips (50 percent) above existing conditions. With regard to rental
816 cars, in the AM peak, the number of trips would increase by 64 (156 percent). In the PM
817 peak, trips would increase by 56 (156 percent).

For-hire Vehicles

818 **Relative to the No-Action Alternative, Alternative A would have a moderate beneficial**
819 **direct operational impact on for-hire vehicle activity because of the provision of new**

³⁴ **Appendix A6, Parking Program Memorandum**, provides more information on parking demand projection and the development of the parking program.

³⁵ The MWCOC Model estimates a 10% reduction in single-occupancy vehicle trips in the WUS area to 2040. Additionally, Amtrak as indicated to FRA that passenger parking is not essential to Amtrak's operation of intercity passenger rail at WUS and it anticipates passenger parking demand to continually decrease in the future.

³⁶ See **Section 5.5.2.1, Direct Operational Impacts, Vehicular Parking and Rental Cars** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

820 **locations for pick-ups and drop-offs. These locations would adequately accommodate the**
821 **anticipated growth in for-hire trips, but queuing would not be eliminated. Alternative A**
822 **would also have a major adverse direct operational impact on for-hire vehicles due to**
823 **increased traffic congestion.**

824 Alternative A would include the four following pick-up and drop-off locations (see **Figure 5-2**
825 above):

826 ■ **Front of WUS:** For-hire vehicles would have two means of access depending on trip
827 purpose: from Columbus Circle (drop-off only) and, for taxis, from H Street NE, via
828 the center intersection, center road, and east ramp (pick-up only). Egress from the
829 front of WUS would continue to be via the intersection of Massachusetts Avenue,
830 E Street NE, and First Street NE. In Alternative A, a projected 40 percent of for-hire
831 drop-off activity and 40 percent of for-hire pick-up activity would occur in front of
832 WUS.

833 Improvements to the traffic lanes in front of WUS would double the number of lanes
834 available for for-hire drop-off from two to four over the No-Action Alternative. This
835 doubling of capacity would benefit for-hire vehicle operations. Taxi pick-up would
836 continue to have dedicated lanes closest to the WUS entrance.

837 ■ **Adjacent to the north-south train hall on the deck level:** For-hire vehicles would
838 access this location via the center intersection on H Street NE, with egress via either
839 the east intersection to H Street NE or the east ramp to F Street NE. In Alternative A,
840 a projected 35 percent of for-hire drop-off activity and 35 percent of for-hire pick-up
841 activity would occur at this location.

842 ■ **New H Street Concourse entrance on First Street NE:** This location would serve the
843 new WUS entrance on First Street NE and consist of a curbside pick-up and drop-off
844 area on the east side of the street, north of G Place NE. For-hire vehicles would reach
845 it via northbound First Street NE. In Alternative A, a projected 20 percent of for-hire
846 drop-off activity and 20 percent of for-hire pick-up activity would use this location.

847 ■ **New H Street Concourse entrance on 2nd Street NE:** This location would serve the
848 new WUS entrance on 2nd Street NE. It would consist of space for curbside pick-up
849 and drop-off on both sides of the street. These layby areas would be developed to
850 accommodate expected volumes associated with a station entrance. The west side
851 location would be reached via southbound 2nd Street NE. Vehicles would reach the
852 east side location via northbound 2nd Street NE. In Alternative A, a projected 5
853 percent of for-hire drop-off activity and 5 percent of for-hire pick-up activity would
854 use this location.

855 Relative to the No-Action Alternative, Alternative A would generate an estimated 1,404 new
856 peak-hour for-hire trips in the AM peak hour (268 percent increase). In the PM peak hour, it
857 would generate an additional 1,206 for-hire trips (140 percent increase). The principal source
858 of increased peak-hour for-hire trips would be the increase in intercity rail activity. These
859 trips were considered in the traffic impact analysis (see **Tables 5-34 and 5-35** below).

860 As explained below (**Section 5.5.4.2, Alternative A, Direct Operational Impacts, Vehicular**
861 *Traffic*), volumes associated with for-hire as well as private pick-up and drop-off activity on
862 the deck level and in front of WUS could create queueing and congestion, resulting in a major
863 adverse impact on for-hire vehicle operations at WUS.

Comparison to Existing Conditions

864 The beneficial impacts of Alternative A on for-hire vehicle activities would be the same
865 relative to existing conditions as relative to the No-Action Alternative since pick-up and drop-
866 off locations would be the same in both baselines. The increase in trips would be
867 proportionately greater. Relative to existing conditions, Alternative A would generate an
868 estimated 1,534 new AM peak-hour for-hire trips (389 percent increase) and 1,420 new PM
869 peak-hour for-hire trips (219 percent increase).³⁷ The principal source of increased peak-hour
870 for-hire trips would be the increase in intercity rail activity.

Private Pick-up and Drop-off

871 **Relative to the No-Action Alternative, Alternative A would have a moderate beneficial**
872 **direct operational impact on private pick-up and drop-off activities because of the**
873 **provision of new locations for these activities. These locations would adequately**
874 **accommodate the anticipated growth in private pick-up and drop-off trips, but queuing**
875 **may occur. Alternative A would also have a major adverse direct operational impact on**
876 **private pick-ups and drop-offs due to increased traffic congestion.**

877 The same four locations used by for-hire vehicles would be available for private pick-up and
878 drop-off activity. However, private vehicles would not be allowed to use the east ramp.
879 Relative to the No-Action Alternative, Alternative A would generate an estimated 812
880 additional private pick-up and drop-off trips in the AM peak hour (93 percent increase) and
881 an estimated 592 private pick-up and drop-off trips in the PM peak hour (63 percent
882 increase). The principal source of increased peak-hour private pick-up and drop-off trips
883 would be the increase in intercity rail activity. The anticipated distribution of trips would be
884 the same as for for-hire vehicles. These trips were considered in the traffic impact analysis
885 (see **Tables 5-34 and 5-35** below).

886 As explained below (**Section 5.5.4.2, Alternative A, Direct Operational Impacts, Vehicular**
887 *Traffic*), volumes associated with private pick-up and drop-off, as well as for-hire, activity on
888 the deck level and in front of WUS could create queueing and congestion, resulting in a major
889 adverse impact on private pick-up and drop-off operations at WUS.

³⁷ See **Section 5.5.2.1, Direct Operational Impacts, For-hire Vehicles** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

Comparison to Existing Conditions

890 The beneficial impacts of Alternative A on private pick-up and drop-off activity would be the
891 same relative to existing conditions as relative to the No-Action Alternative since pick-up and
892 drop-off locations would be the same in both baselines. The increase in trips would be
893 proportionately greater.³⁸ Relative to existing conditions, Alternative A would generate an
894 estimated 1,028 additional private pick-up and drop-off trips in the AM peak hour (157
895 percent) and an estimated 828 additional private pick-up and drop-off trips in the PM peak
896 hour (116 percent). The principal source of increased peak-hour private pick-up and drop-off
897 trips would be the increase in intercity rail activity.

Vehicular Traffic

898 **Relative to the No-Action Alternative, Alternative A would have major adverse direct**
899 **operational impacts on traffic operations at several intersections near WUS due to**
900 **increased traffic volumes. During at least one of the peak periods, out of 35 intersections in**
901 **the Local Study Area, seven would degrade to LOS F; 16 would experience an increase in**
902 **queue length of more than 150 feet; and 20 would experience an increase in average delay**
903 **of more than 5 seconds.**

Trip Generation and Circulation

904 WUS-related vehicular activity in Alternative A would be primarily distributed across four
905 locations:

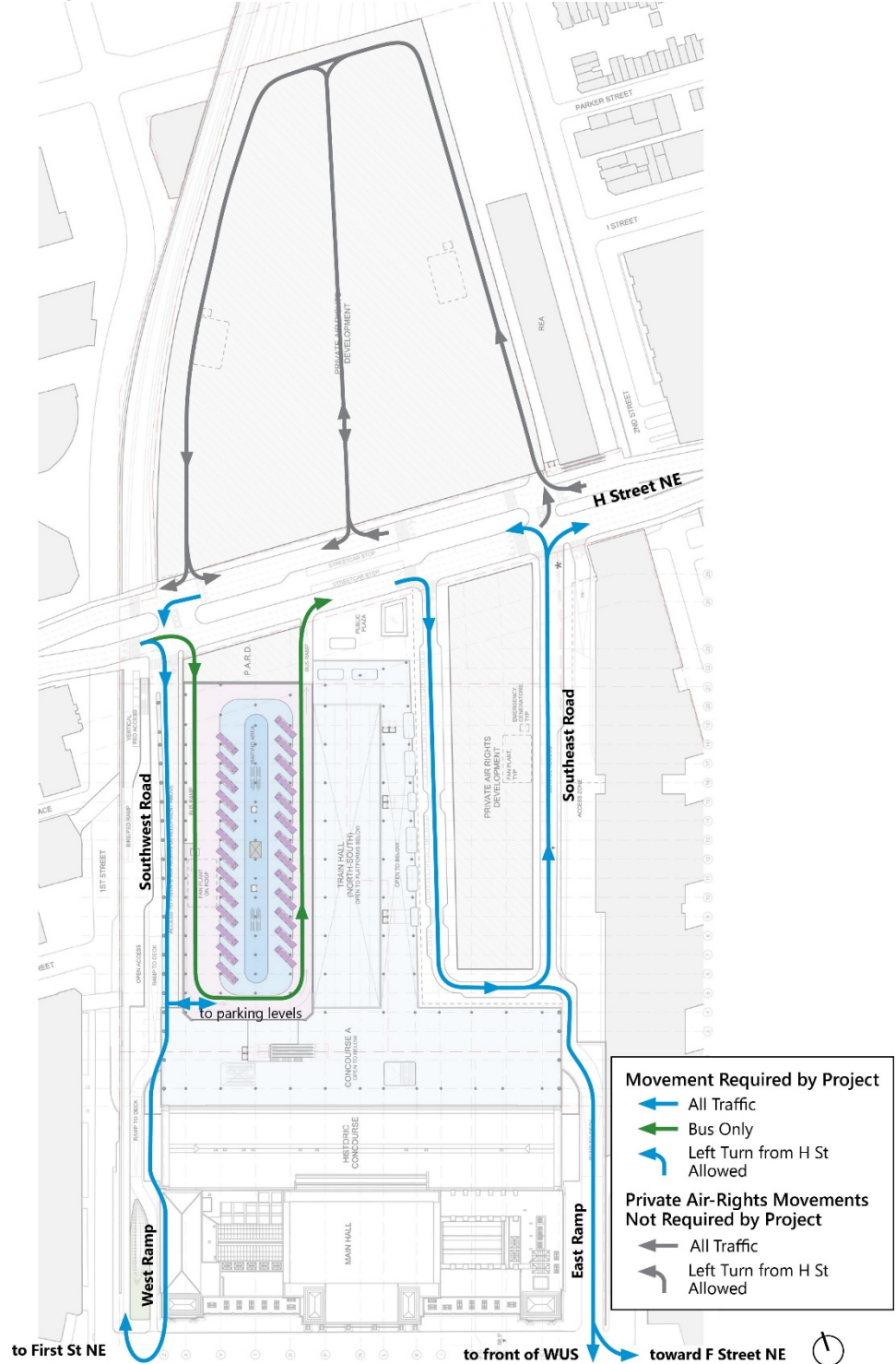
- 906 ■ The pick-up and drop-off loop at the front of WUS;
- 907 ■ The new bus and parking facility, and new deck-level pick-up and drop-off location,
908 accessed from H Street NE;
- 909 ■ The new curbside pick-up and drop-off location on First Street NE (serving the new H
910 Street Concourse); and
- 911 ■ The new curbside pick-up and drop-off locations on 2nd Street NE (serving the new H
912 Street Concourse).

913 Parking and rental car activity would converge onto H Street NE to reach the new facility.
914 Private and for-hire pick-up and drop-off activity would be spread across all four locations.
915 Approximately 70 percent of WUS-related traffic is expected to travel to and from points
916 west of WUS, with 30 percent traveling to and from points east of WUS. Deck-level
917 circulation patterns in Alternative A are represented in **Figure 5-3**.³⁹

³⁸ See **Section 5.5.2.1, Direct Operational Impacts, Private Pick-up and Drop-off** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

³⁹ Figure 5-3 shows all movements, including those assumed in consultation with DDOT for the private air-rights development, to provide a better understanding of anticipated traffic operations on the H Street Bridge. Arrows indicate movements, not planned street alignments.

Figure 5-3. Deck Level Circulation (All Movements), Alternative A



918 **Table 5-34** and **Table 5-35**, respectively, show AM and PM peak WUS-related traffic volumes
 919 in Alternative A, along with the corresponding information for the No-Action Alternative.
 920 Compared to the No-Action Alternative, Alternative A would generate 2,363 additional AM
 921 peak trips (145 percent increase) and 1,856 additional PM peak trips (86 percent increase).
 922 These volume increases would result in major adverse impacts to traffic operations at some
 923 study intersections, as described below.

Table 5-34. AM Peak-hour Traffic Volumes, Alternative A

| | Alternative A | | | No-Action Alternative | | |
|---------------------------------|---------------|-------|-------|-----------------------|-----|-----|
| | Total Trips | In | Out | Total Trips | In | Out |
| Parking | 277 | 190 | 87 | 189 | 127 | 62 |
| Private Pick-Up/Drop-Off | 1,684 | 842 | 842 | 872 | 436 | 436 |
| For-hire Vehicles | 1,928 | 964 | 964 | 524 | 262 | 262 |
| Car Rental | 105 | 57 | 48 | 46 | 28 | 18 |
| Total Trips | 3,994 | 2,053 | 1,941 | 1,631 | 853 | 778 |

Table 5-35. PM Peak-hour Traffic Volumes, Alternative A

| | Alternative A | | | No-Action Alternative | | |
|---------------------------------|---------------|-------|-------|-----------------------|-------|-------|
| | Total Trips | In | Out | Total Trips | In | Out |
| Parking | 310 | 83 | 227 | 299 | 102 | 197 |
| Private Pick-Up/Drop-Off | 1,540 | 770 | 770 | 948 | 474 | 474 |
| For-hire Vehicles | 2,068 | 1,034 | 1,034 | 862 | 431 | 431 |
| Car Rental | 92 | 37 | 55 | 45 | 17 | 28 |
| Total Trips | 4,010 | 1,924 | 2,086 | 2,154 | 1,024 | 1,130 |

Comparison to Existing Conditions

924 Relative to existing conditions, Alternative A would generate 2,775 additional AM peak trips
 925 (228 percent increase) and 2,407 additional PM peak trips (150 percent increase).⁴⁰

Curbside Analysis

926 The anticipated vehicular volumes associated with for-hire and private pick-up and drop-off
 927 activities on the deck level and on First and 2nd Streets NE may create conflicts and could
 928 lead to queues. In particular, queues may occur at the intersection of the deck-level pick-up
 929 and drop-off area and the southeast road/east ramp. As a result, conflicts could occur

⁴⁰ See **Section 5.5.2.1, Direct Operational Impacts, Vehicular Traffic of Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

930 between for-hire vehicles heading down the east ramp and vehicles seeking to exit onto H
931 Street NE. Queues may slow down vehicle movements in the pick-up and drop-off area and
932 cause delays.

933 At deck level, queues at the first layby lane next to the train hall on the center road would be
934 located less than 100 feet from H Street NE and could possibly “spill back” onto this street. In
935 the AM peak, the estimated maximum queue length could reach 15 cars. In the PM peak, the
936 estimated maximum queue length could reach 107 cars. This queue would have a major
937 adverse impact on traffic operations. In these conditions, it is possible that WUS users may
938 walk to nearby destinations to find a for-hire vehicle.

939 The front of WUS, First Street, and 2nd Street would also experience curbside activity.
940 Queues at the front may spill back into travel lanes on Massachusetts Avenue. The pick-up
941 and drop-off lanes on First and 2nd Streets would help accommodate the excess volumes. No
942 queue would form at the First Street or 2nd Street pick-up and drop-off areas. On First Street,
943 236 pick-ups and drop-offs would occur in the AM peak and 206 would occur in the PM peak.
944 On 2nd Street, 77 pick-ups and drop-offs would occur in the AM peak and 65 would occur in
945 the PM peak.

Intersection Analysis

946 The impacts of Alternative A on traffic operations were assessed using Synchro modeling.
947 Three indicators were used to assess the impacts on traffic operations relative to the No-
948 Action Alternative at each of the study intersections:

- 949 ■ Degradation of intersection LOS to F from a better LOS due to vehicle trips generated
950 by the Project;
- 951 ■ Increase in average vehicle delay of more than five seconds; and
- 952 ■ Increase in 95th-percentile queue lengths of more than 150 feet for any lane group in
953 an intersection.⁴¹

954 **Table 5-36** identifies the study intersections that would experience an impact relative to the
955 No-Action Alternative under any of the three indicators considered in the analysis. The peak
956 hour LOS of each studied intersection is shown in **Figure 5-4**. In Alternative A, relative to the
957 No-Action Alternative, seven out of 35 study intersections would degrade to LOS F in at least
958 one peak hour.

959 Sixteen intersections out of 35 would experience an increase in queue length of more than
960 150 feet for one or more lane groups relative to the No-Action Alternative. Of those
961 16 intersections, eight would experience such a queue increase in both peak hours.

⁴¹ These indicators align with those used by DDOT in identifying traffic operations impacts as included in *DDOT Guidelines for Comprehensive Transportation Review (CTR) Requirements*, available at <https://ddot.dc.gov/publication/ddot-guidelines-comprehensive-transportation-review-ctr-requirements>.

962 Finally, in Alternative A, 20 of the 35 study intersections would experience an increase in
 963 average delay of more than 5 seconds for at least one peak period relative to the No-Action
 964 Alternative. Fourteen of those 20 intersections would see such an increased delay in both
 965 peak hours.

Figure 5-4. Intersection Peak Hour LOS, Alternative A

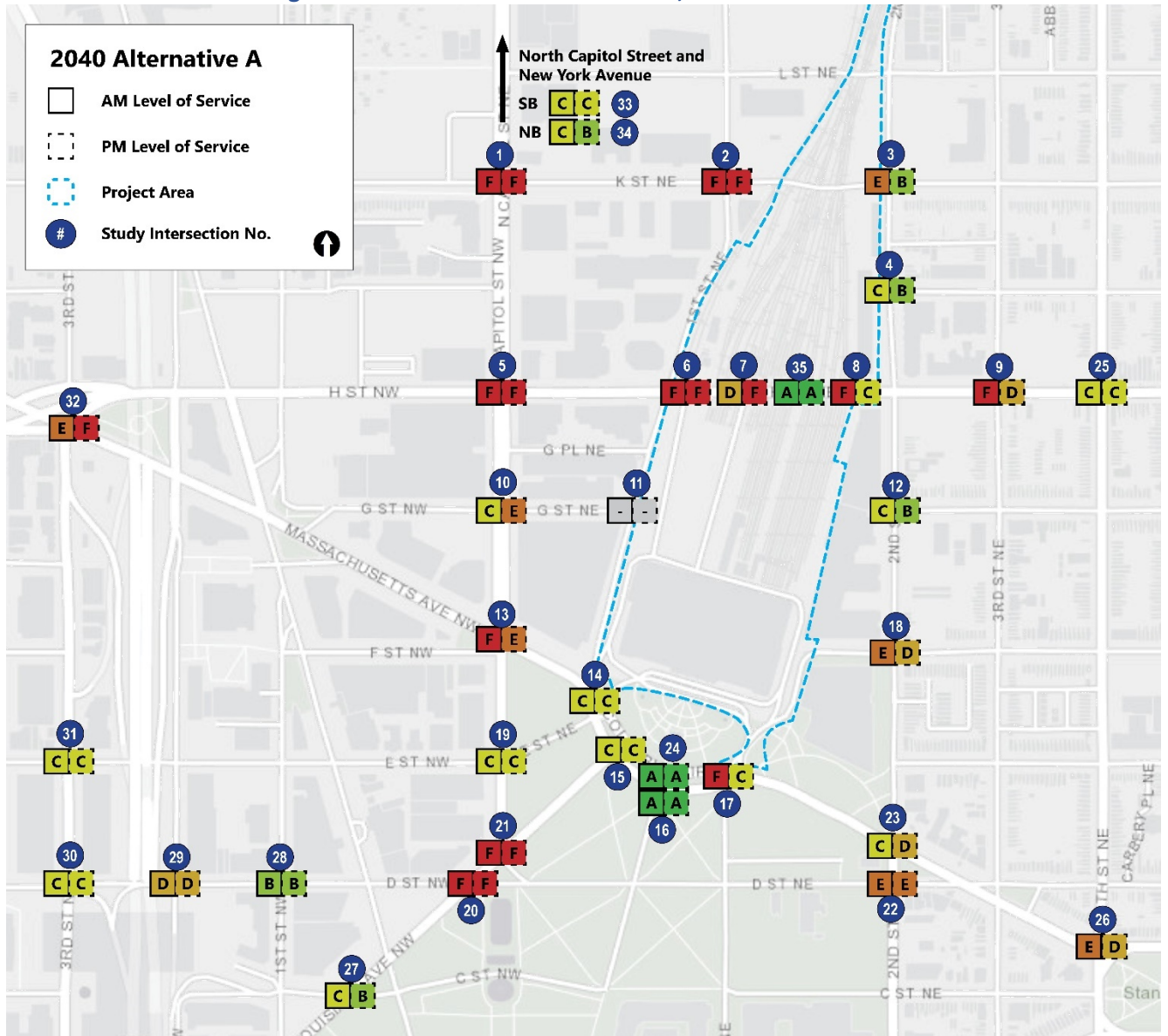


Table 5-36. Summary of Traffic Impacts, Alternative A

| Intersection # | Intersection Name | LOS | Queuing | Delay |
|----------------|---|-----|---------|-------|
| 1 | North Capitol Street / K Street | X | X* | X* |
| 2 | First Street / K Street NE | X | X* | X |
| 3 | 2nd Street / K Street NE | | | X |
| 5 | North Capitol Street / H Street | | X* | X* |
| 6 | WUS West Intersection / H Street NE | X | X* | X* |
| 7 | WUS Bus Exit / H Street NE | X | X* | X* |
| 8 | WUS East Intersection / H Street NE | | X | X* |
| 9 | 3rd Street / H Street NE | | X | X* |
| 10 | North Capitol Street / G Street | | X* | X* |
| 13 | North Capitol Street / Massachusetts Ave | X | X | X* |
| 17 | First Street / Massachusetts Avenue NE | X | | X |
| 18 | 2nd Street / F Street NE | | | X* |
| 19 | North Capitol Street / E Street | | X | X |
| 20 | Louisiana Avenue / D Street NW | X | X* | X* |
| 21 | Louisiana Avenue / North Capitol Street | | X | X* |
| 22 | 2nd Street / D Street NE | | X | X* |
| 23 | 2nd Street / Massachusetts Avenue NE | | X | |
| 26 | Massachusetts Avenue / C Street / 4th Street NE | | | X* |
| 27 | Louisiana Avenue / C Street NW | | X* | X |
| 29 | 2nd Street / D Street NW | | | X |
| 31 | 3rd Street / E Street NW | | X | |
| 32 | 3rd Street / Massachusetts Avenue / H Street NW | | | X* |

* indicates the impact would occur in both peak hours.

Comparison to Existing Conditions

966 Relative to existing conditions, in Alternative A:⁴²

- 967 ■ Eleven intersections would degrade to LOS F in at least one peak period.
- 968 ■ Twenty-six intersections would experience an increase in queue length of more than
- 969 150 feet for one or more lane groups, with 21 projected to do so in both peak hours.
- 970 ■ Twenty-four intersections would experience delay increases of more than 5 seconds,
- 971 with 18 projected to do so in both peak hours.

Indirect Operational Impacts

972 **Alternative A would have minor adverse indirect operational impacts on traffic because of**

973 **the trips generated by the potential Federal air-rights development.**

⁴² See Section 5.5.2.1, *Direct Operational Impacts, Vehicular Traffic* in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

974 In Alternative A, approximately 323,720 square feet of air rights above the bus and parking
 975 facility would be potentially available for development, separately from the Project. Because
 976 of the relatively small amount of available space, and its location on top of a multistory
 977 ground transportation facility with no direct street access, it was assumed for the purposes of
 978 the analysis that this space would be for additional parking.⁴³ It was further conservatively
 979 assumed that the space would operate near capacity. **Table 5-37** shows the trips the Federal
 980 air-rights development would generate under this assumption.

Table 5-37. Federal Air-rights Development Trip Generation, Alternative A

| | AM Peak | | | PM Peak | | |
|----------------|-------------|---------|----------|-------------|---------|----------|
| | Total Trips | Inbound | Outbound | Total Trips | Inbound | Outbound |
| Parking | 180 | 90 | 90 | 180 | 90 | 90 |

981 The potential Federal air-rights development would increase the total number of trips
 982 generated by Alternative A by approximately 5 percent. These trips were incorporated in the
 983 traffic impact analysis for Alternative A.

Construction Impacts

984 Construction of Alternative A would take place over approximately 11 years and 5 months.
 985 Work would be conducted in four phases moving from the east side to the west side of the
 986 Project Area. Between Phases 1 and 2, there would a 12-month period (Intermediate Phase)
 987 when only column removal work in the First Street Tunnel would take place. The intensity
 988 and location of construction activities would vary with the phase. The following sections
 989 characterize the potential impacts of the construction of Alternative A on the various
 990 transportation modes at and near WUS. The discussion focuses on Phase 4 of construction.
 991 Phase 4 would have the greatest impacts on transportation because of the demolition of the
 992 existing parking garage and bus facility that would occur during this phase and because of the
 993 concentration of construction activities on the west side of WUS, adjacent to Metrorail’s Red
 994 Line. In Alternative A, Phase 4 would begin approximately 8 years and 4 months after the
 995 start of construction and last for approximately 3 years and 1 month.

996 During each of the four phases, a similar sequence of activities would take place, as described
 997 in **Section 3.5.1, Construction Phasing and Sequence**. A set of tracks would be taken out of
 998 service. Temporary tracks and connections would be constructed as needed to help maintain
 999 operations and potentially support the operation of work trains. Cut-off and support walls
 1000 (slurry, sheet-pile, or secant-pile walls: see **Section 3.5.2, Support of Excavation Options**, for
 1001 more details) would be installed, as needed, to support excavation and keep groundwater
 1002 out. Following excavation, drilled shafts would be constructed to provide deep foundations
 1003 for the slabs supporting the new tracks and the columns supporting the deck on which the

⁴³ This assumption is for the purposes of the impact analysis only and does not preclude other types of potential development in the remaining Federal air rights.

1004 Project elements would stand. As construction moves to the next phase, the deck-level
 1005 Project elements would be constructed.

1006 Estimated phases durations in Alternative A are shown in **Table 5-38**. The table also shows
 1007 the estimated duration of excavation activities in each phase. As explained further in the
 1008 relevant sections, periods of excavation would be when some impacts are most intense or
 1009 noticeable.

Table 5-38. Construction and Excavation Duration, Alternative A

| Phase | Overall Duration | Duration of Excavation |
|---------------------------------|--------------------|------------------------|
| Phase 1 | 2 years, 5 months | 5 months |
| <i>Intermediate Phase</i> | <i>12 months</i> | None |
| Phase 2 | 2 years, 5 months | 9 months |
| Phase 3 | 2 years, 6 months | 8 months |
| Phase 4 | 3 years, 1 month | 1 year, 5 months |
| Total Project Completion | 11 years, 5 months | 3 years, 3 months |

Commuter and Intercity Railroads

1010 **Construction of Alternative A would cause a moderate adverse impact to Intercity and**
 1011 **Commuter rail operations. Limited train delays and cancellations may occur during the**
 1012 **entire construction period.**

1013 Each phase of construction would involve taking a set of tracks out of service, thus reducing
 1014 the number of tracks and platforms available for train service. The provision of temporary
 1015 tracks and connections would largely make up for this temporary loss. A construction-period
 1016 operating plan designed to maximize use of the available infrastructure through a flexible
 1017 approach to train signaling would be put in place. However, railroad operations would be
 1018 affected, as certain trips would have to be canceled or rescheduled. **Table 5-39** shows
 1019 anticipated schedule impacts by service by construction phase. Impacts would continue for
 1020 the full duration of the relevant construction phase. These impacts would be the same in all
 1021 Action Alternatives.

Table 5-39. All Day Train Cancellations and Alterations during Construction of Alternative A

| Service | Construction | | | |
|---|------------------------------|---------|---------|---------|
| | Phase 1 & Intermediate Phase | Phase 2 | Phase 3 | Phase 4 |
| Amtrak Trains Altered (of 144 Daily) | 0 | 2 | 0 | 1 |
| MARC Canceled (of 106 Daily) | 0 | 4 | 0 | 4 |
| VRE Canceled (of 34 Daily) | 2 | 2 | 0 | 0 |

1022 Not all services would be affected at the same time and none would be affected during the
1023 entire construction period. Impacts on VRE operations would occur only in the first two
1024 phases of construction while impacts on Amtrak and MARC service would occur only in
1025 Phases 2 and 4. There would be no impacts on any service during Phase 3. Amtrak, MARC,
1026 and VRE operations during the entire construction period would meet the levels defined in
1027 the 2025 operating plan developed for the Project. This operating plan is consistent with
1028 short- to medium-term operator plans (see **Appendix B, Washington Union Station Terminal**
1029 *Infrastructure EIS Report, Section 7.2.3*).

1030 In all phases, anticipated service cancellations would represent at most approximately 3
1031 percent of the overall service levels at WUS. While moderate and manageable, this would
1032 reduce flexibility and increase delays. Phase 4 of construction would see an average delay to
1033 train operations of 6 minutes and 12 seconds.⁴⁴ Phase 2 would see larger delays and greater
1034 disruptions to train operations. During this phase, there would be a total of 8 train
1035 cancellations daily. The average train delay would be 18 minutes and 36 seconds. These
1036 delays and cancellations would cause disruption for passengers, most notably VRE
1037 passengers, as 6 percent of VRE trains would be canceled.

WMATA Metrorail

1038 **Construction of Alternative A would have major adverse impacts on WMATA Metrorail Red**
1039 **Line operations due to intermittent stoppages or single-tracking events.**

1040 Metrorail's Red Line runs along the western side of the Project Area. Therefore, it would be
1041 most affected during Phase 4 of construction, when the First Street Concourse and the First
1042 Street entrance to the H Street Concourse would be built. Additionally, in Phase 4, the
1043 existing parking garage would be demolished and a new Track 37 would be constructed near
1044 the NoMa-Gallaudet station.

1045 These construction activities may require schedule adjustments for safety purposes.
1046 Intermittent stoppages or single-tracking may occur on weeknights or weekends. Such
1047 impacts would occur throughout Phase 4 (see **Table 5-38** above for the duration of Phase 4 in
1048 Alternative A) and their exact frequency or duration is not known at this stage of planning.
1049 No extended shutdowns or periods of single-tracking are anticipated.

1050 During the same period, the unavailability of parking at WUS would likely generate additional
1051 daily Metrorail trips when the station is open. This would not cause noticeable overcrowding
1052 as those trips would be distributed over the entire day.

⁴⁴ This is the average delay that a scheduled train would experience due to the construction. This metric does not include canceled trains.

DC Streetcar

1053 **Construction of Alternative A would have moderate adverse impacts on DC Streetcar**
1054 **operations due to temporary disruptions to direct access between the WUS Streetcar**
1055 **station and WUS.**

1056 DC Streetcar operations would be affected during Project construction if the H Street Bridge
1057 were to be closed for safety reasons. Such closures are not likely and if they did occur, they
1058 would be rare and of limited duration. The construction of the Project elements and the
1059 demolition of the existing parking garage may result in a loss of direct access between the
1060 WUS Streetcar station and WUS (including the WUS Metrorail Station) during certain times.
1061 Such adverse impacts would be moderate due to their limited duration.

Intercity, Tour/Charter, and Sightseeing Buses

1062 **Construction of Alternative A would have major adverse impacts on bus operations and**
1063 **bus passenger accommodations.**

1064 Impacts on intercity, tour/charter, and daily sightseeing bus operations would be
1065 concentrated in Phase 4 of construction, which would last for approximately 3 years and 1
1066 month and begin approximately 8 years and 4 months after the start of construction. During
1067 this time, the entire existing bus facility and parking garage would be demolished to
1068 construct the replacement structure.

1069 Without an adequately sized interim bus facility near WUS, intercity, tour/charter, and
1070 sightseeing bus service at WUS would be severely disrupted. Adverse impacts would be
1071 major. At this stage of planning, no location for an interim bus facility or suitable loading
1072 zones have been identified. Buses serving WUS would have to operate curbside within the
1073 street grid. As explained in **Section 3.1.6.1, *Bus Program Size***, a bus program of at least 25
1074 slips would be needed to adequately accommodate future bus service, reduced from 47 slips
1075 through the implementation of an active management approach. Because street
1076 accommodations may not lend themselves to the type of active management required by the
1077 reduced program, it can be estimated that on-street space equivalent to 25 to 47 bus slips
1078 would be needed to accommodate bus activity at WUS.

1079 Based on a bus length of 45 feet and adding 25 percent to account for separation and
1080 maneuvering room, it would take approximately from 1,400 to 2,600 feet of linear curbside
1081 to provide the equivalent of 25 to 47 slips. For purposes of illustration, this would amount to
1082 the entire length of First Street NE from the front of WUS to at least I Street NE and as far as
1083 north of L Street NE.

1084 Even though the needed space could be divided among several streets, the street grid
1085 around WUS would not be able to support this level of bus activity without major disruptions
1086 to vehicular traffic, on-street parking, and pedestrian and bicycle movements. The District, or
1087 the adjacent property owners such as the Architect of the Capitol (south of WUS), are
1088 unlikely to authorize bus companies to operate in these conditions. Additionally, even if
1089 authorized, on-street operations would cause a severe deterioration in passenger

1090 experience, with longer walking distances to and from WUS; unsheltered boarding or
1091 alighting areas; and lack of basic amenities for waiting passengers such as restrooms or
1092 benches. As a result, it is likely that some or most bus service would be displaced away from
1093 WUS, reducing multimodal connectivity at the station for several years.

Loading

1094 **Construction of Alternative A would have a major adverse impact on loading operations**
1095 **and facilities.**

1096 The east loading facility, accessed from H Street NE, would remain open for operation during
1097 the majority of the Alternative A construction period. However, closure of the west loading
1098 dock would occur in Phase 4 during nearby construction activities. The new loading dock at
1099 2nd and K Streets NE would not be operational until the end of the construction period.
1100 Because of these constraints, large truck loading on-site would be limited. Deliveries would
1101 have to be by small trucks instead. This would require a facility to transfer and screen large
1102 loads to smaller trucks. At this stage of planning, the location of this temporary facility has
1103 not been determined.

Pedestrians

1104 **Construction of Alternative A would have moderate adverse impacts on pedestrian traffic.**

1105 Throughout the construction period, circulation within WUS would be affected as tracks and
1106 platforms are replaced; sections of the station are closed to allow for column removal in the
1107 First Street Tunnel; and new concourses and access points are built. The intensity of the
1108 impacts would vary with the phase but would be greatest during Phases 1 and 2 (including
1109 the Intermediate Phase), when the column removal work is ongoing, and during Phase 4,
1110 because of interior construction activities on the west side of the site. Access to the Metrorail
1111 station from within WUS may also be affected.

1112 Externally, throughout the construction period, street and sidewalk segments around WUS
1113 would be subject to temporary closures. The affected areas would include the front of the
1114 historic station building during the upgrade of the pick-up and drop-off lanes; and First Street
1115 NE, G Street, NE, and 2nd Street NE, as multimodal facilities are constructed there.

1116 Construction traffic (up to 120 trucks a day during periods of excavation; see **Table 5-38**
1117 above for durations) may also make pedestrian movements more challenging and generate
1118 conflicts along truck routes, especially 2nd Street NE.

Bicycle Activity

1119 **Construction of Alternative A would have a major adverse impact on bicycle circulation**
1120 **during the reconstruction of the First Street Cycle Track.**

1121 During Phase 4 of construction, portions of First Street NE would be rebuilt. This would
1122 involve reconstructing the existing First Street cycle track to safely accommodate new pick-
1123 up and drop-off areas on First Street. During this work, it would not be possible to maintain a
1124 bicycle accommodation along the First Street corridor. Bicyclists would likely have to be

1125 rerouted to the 2nd Street shared-use path portion of the Metropolitan Branch Trail. How
1126 long disruption of the cycle track would last is not known at this time but it would likely be
1127 less than the full duration of Phase 4. Temporary road closures around WUS would also
1128 disrupt bicycle circulation, as described above for pedestrians.

City and Commuter Buses

1129 **Construction of Alternative A would have negligible adverse impacts on city and commuter**
1130 **bus operations as there would only be intermittent disruptions. Construction would have a**
1131 **moderate adverse impact on employee shuttles operating out of the WUS bus facility for**
1132 **the duration of Phase 4.**

1133 Construction activities would not significantly affect commuter bus activities. Most
1134 commuter bus service in the area serves North Capitol Street and the Columbus Circle area,
1135 where the larger transportation network would absorb the construction truck traffic and
1136 where there would be no direct access to the site. City bus operations could be disrupted if H
1137 Street NE were to be closed for safety reasons. Specific information on the frequency and
1138 duration of such closures is not available at this time, but long-term disruptions to H Street
1139 NE are not anticipated.

1140 Employees shuttle operations out of the existing bus facility would have to stop in Phase 4,
1141 when the facility would be demolished. The shuttles would need to look for a new pick-up
1142 and drop-off location. As explained in **Section 5.5.4.2, Alternative A, Direct Operational**
1143 **Impacts, City and Commuter Buses**, it would become a permanent condition since the
1144 shuttles could not be accommodated in the new facility. For the reasons explained in that
1145 section, this would be a moderate adverse impact.

Vehicular Parking and Rental Cars

1146 **Construction of Alternative A would have a major adverse impact on parking between the**
1147 **demolition of the existing parking garage and the completion of the new one in Phase 4 of**
1148 **construction.**

1149 Major impacts to parking and rental car operations would occur in Phase 4 of construction,
1150 when demolition of the existing parking garage would occur. There would be a partial loss of
1151 parking capacity during Phase 3, as partial demolition of the garage would begin but it is only
1152 during Phase 4, which would last for approximately 3 years and 1 month and begin
1153 approximately 8 years and 4 months after the start of construction that parking would be
1154 entirely unavailable at WUS. During that time, the Project's parking program of 1,600 spaces
1155 would not be met.

1156 To meet the program, interim parking would have to be provided starting in Phase 3. At the
1157 current stage of planning, no potential location or locations have been identified. Without an
1158 adequately sized interim parking location, all parking, including rental car parking, would be
1159 unavailable at WUS during Phase 4 until the new parking facility is completed, resulting in a
1160 major adverse impact on parking.

1161 The loss of parking capacity would likely lead WUS visitors or passengers to use alternative
1162 modes of transportation, including Metrorail, for-hire vehicles, and private pick-ups and
1163 drop-offs. Based on projected mode distribution, this shift would generate an estimated 581
1164 daily Metrorail trips, 431 daily for-hire trips, and 431 daily private pick-up and drop-off trips.
1165 Given the overall daily volumes of these modes, the added trips would be manageable.

1166 It is possible that a number of WUS-users would still drive to the station, including users from
1167 areas not well served by transit, who may have a limited set of options. These drivers may
1168 seek parking in commercial garages nearby or on the streets around the station. Street
1169 parking near WUS is in very limited supply, as most streets within a quarter mile of the
1170 station are residential parking permit areas, two-hour parking areas, or monitored parking
1171 areas on Architect of the Capitol property. Therefore, no WUS passengers or visitors are likely
1172 to use street parking as a substitute for long-term garage parking. There may be some
1173 demand for local on-street parking from WUS retail patrons. During Phase 4, the lack of
1174 parking at WUS may make the station unusable by anyone who would lack other options to
1175 reach it (see also **Section 5.16.4.2, Alternative A, Construction Impacts**).

For-hire Vehicles

1176 **Construction of Alternative A would have a major adverse impact on for-hire vehicle**
1177 **operations because of extended queueing.**

1178 Passenger pick-up and drop-off in front of the historic station building by for-hire vehicles
1179 would remain available during most of the construction period. Some disruption would occur
1180 during the work associated with the improvement of the taxi and private pick-up and drop-
1181 off lanes to enhance traffic flow and promote pedestrian safety. The existing loop road along
1182 the back of the station building would be unavailable during the entire period of
1183 construction. Therefore, the east ramp currently used by taxis to reach the front of the
1184 station would not be accessible until the new southeast road and reconstructed east ramp
1185 are completed during Phase 2. Taxis would have to queue along the west ramp as they do
1186 today when the east ramp is not available. During Phase 4, the west ramp would be closed
1187 for repurposing and taxis would have to queue along the new southeast road on the deck
1188 level and the east ramp (both available after completion of Phases 1 and 2). Based on the
1189 largest projected volumes of for-hire vehicles, during peak period, the queue may extend to
1190 H Street NE. The east ramp would be used for the entirety of Phase 4. The loss of parking
1191 likely would result in an uptick in for-hire operations, which would contribute to the adverse
1192 impact on these operations during Phase 4.

Private Pick-up and Drop-off

1193 **Construction of Alternative A would have a moderate adverse impact on private pick-up**
1194 **and drop-off operations.**

1195 Private pick-up and drop-off would remain available in front of WUS during the construction
1196 period. During the reconstruction of the traffic lanes in from the station to enhance traffic
1197 flow and promote pedestrian safety, there may be temporary and partial closures of the pick-

1198 up and drop-off area. Some spaces would remain available at all times. The loss of parking
1199 during that Phase 4 likely would result in an uptick in private pick-up and drop-off operations,
1200 which would contribute to the adverse impact on these operations.

Vehicular Traffic

1201 **Construction of Alternative A would have a major adverse impact on vehicular traffic**
1202 **operations because of roadway closures and construction vehicle traffic.**

1203 Construction of Alternative A would result in major adverse impacts on local traffic
1204 operations as described below.

1205 In Alternative A as in all Action Alternatives, construction activities at WUS would generate
1206 traffic to and from the site throughout the day during the entire construction period,
1207 although the volume and nature of this traffic would vary depending on the phase and type
1208 of activities being conducted. It would be minimal during the Intermediate Phase, when only
1209 column-removal work would be performed. It would be greatest during excavations
1210 activities, when up to 120 trucks per 20-hour day could be traveling to and from the site. This
1211 is a maximum, conservative estimate that assumes that no work trains would be used to haul
1212 spoils away. Use of two work trains a day would eliminate most of this truck traffic.
1213 Additionally, while each construction phase (excluding the Intermediate Phase) would
1214 include a period of excavation and associated truck traffic, that period would be substantially
1215 shorter than the phase itself, as shown in **Table 5-38** above. The longest period of excavation
1216 (approximately 1 year and 5 months) would occur during Phase 4, on the west side of the
1217 Project Area. During that time, most truck traffic would travel on First Street NE to connect to
1218 designated District truck routes along the North Capitol Street and New York Avenue
1219 corridors. Phase 1, on the east side of the Project Area, would have the shortest excavation
1220 period (approximately 5 months). During that period, trucks would likely travel along
1221 portions of 2nd Street NE before connecting to a designated truck route. No trucks would
1222 circulate along residential streets or any other street not designated as a truck route by the
1223 District.

1224 As WUS would remain operational throughout the construction period, construction traffic
1225 would add to the traffic generated by users of the station. By the time of Phase 4, WUS
1226 would generate similar levels of vehicular traffic to what it is expected to do in the No-Action
1227 Alternative. Although construction traffic would add to total traffic volumes on major WUS
1228 access routes, it would be spread out across the entire day, reducing its impact on local
1229 traffic operations.

1230 Additionally, at different times during the construction period, temporary roadway closures
1231 would be required, especially along First Street NE (between Columbus Circle and K Street)
1232 and 2nd Street NE (between Massachusetts Avenue and K Street), to accommodate
1233 construction traffic in and out of the construction site. Road closures would generally last
1234 from 5 to 6 minutes on average and no more than 20 minutes. During those times, traffic

1235 may temporarily move to other streets such as G Street, H Street, K Street, 4th Street, and
1236 North Capitol Street.

5.5.4.3 Alternative B

1237 The following sections describe the direct, indirect, operational and construction impacts of
1238 Alternative B. **Figure 5-5** illustrates the key transportation elements of Alternative B.

Direct Operational Impacts

1239 The direct operational impacts of Alternative B on commuter and intercity railroads; the DC
1240 Streetcar; intercity, tour/charter, and sightseeing buses; loading; pedestrians; and car rental
1241 activities would be the same as those of Alternative A (**Section 5.5.4.2, Alternative A, Direct**
1242 *Operational Impacts*). This section does not address them further. It only addresses those
1243 transportation modes that would experience meaningfully different operational impacts in
1244 Alternative B.

WMATA Metrorail

1245 **Relative to the No-Action Alternative, Alternative B would have a moderate adverse direct**
1246 **operational impact on Metrorail operations because of increased demand that would**
1247 **aggravate train overcapacity and station circulation issues.**

1248 Increased train service and ridership in Alternative B, as well as the reduction in parking
1249 capacity and new retail uses, would generate increased demand on Metrorail at WUS. **Table**
1250 **5-40** shows modeled activity in the AM peak and PM peak, along with corresponding data for
1251 the No-Action Alternative. When the projected V/C ratio would exceed 100 percent, there
1252 would be a need for additional service to address overcrowding.

1253 Alternative B volumes would exceed capacity departing from WUS in the Shady Grove
1254 direction during the AM peak and in the Glenmont direction during the PM peak arriving at
1255 WUS. In the AM peak, Alternative B would cause the V/C ratio leaving toward Shady Grove to
1256 reach 102 percent against 86 percent in the No-Action Alternative. As a result, Alternative B
1257 would increase the excess demand by around 400 passengers. Based on WMATA ridership
1258 trends, overcapacity conditions are anticipated to dissipate in the Red Line core.⁴⁵

1259 In the PM peak, capacity exceedance toward Glenmont (115 percent) would be greater than
1260 in the No-Action Alternative (107 percent). As a result, Alternative B would increase the
1261 excess demand by 1,311, for a total of 2,421 passengers.

⁴⁵ That is, between WUS and Dupont Circle.

Figure 5-5. Key Transportation Elements, Alternative B



Table 5-40. Peak WUS-related Metrorail Activity, Alternative B

| | Alternative B | | No-Action Alternative | |
|-------------------------|---------------|----------|-----------------------|----------|
| | Shady Grove | Glenmont | Shady Grove | Glenmont |
| AM Peak Hour | | | | |
| V/C Arriving at WUS | 83% | 28% | 80% | 25% |
| WUS Boardings | 8,402 | 28% | 5,202 | 1,010 |
| WUS Alightings | 5,123 | 1,631 | 4,128 | 2,803 |
| Through Ridership | 9,141 | 3,478 | 9,523 | 1,447 |
| Ridership Departing WUS | 17,543 | 1,241 | 14,725 | 2,457 |
| V/C Departing WUS | 102% | 2,8721 | 86% | 14% |
| Excess Demand | 400 | 17% | 0 | 0 |
| PM Peak Hour | | | | |
| V/C Arriving at WUS | 20% | 115% | 20% | 107% |
| WUS Boardings | 3,263 | 4,670 | 2,559 | 3,661 |
| WUS Alightings | 1,560 | 8,276 | 1,154 | 6,126 |
| Through Ridership | 1,640 | 9,883 | 1,953 | 10,722 |
| Ridership Departing WUS | 4,903 | 14,533 | 4,512 | 14,383 |
| V/C Departing WUS | 31% | 92% | 29% | 91% |
| Excess Demand | 0 | 2,421 | 0 | 1,110 |

1262 The increase in Metrorail ridership at WUS would also affect passenger circulation as
 1263 described for Alternative A in **Section 5.5.4.2, Alternative A, Direct Operational Impacts,**
 1264 *WMATA Metrorail.*

Comparison to Existing Conditions

1265 Relative to existing conditions, Alternative B would have a major adverse direct operational
 1266 impact on Metrorail operations at WUS. The increase in overcrowding and need for extra
 1267 capacity would be greater compared to existing conditions than to the No-Action Alternative.
 1268 ⁴⁶ In the AM peak, Alternative B would cause the V/C ratio leaving WUS toward Shady Grove
 1269 to reach 102 percent, against 69 percent in existing conditions. Alternative B would increase
 1270 the overall demand in the AM peak in the Shady Grove direction by an estimated 7,165
 1271 passengers. In the PM peak, the V/C ratio toward Glenmont arriving at WUS would be 115
 1272 percent, against 72 percent under existing conditions. Alternative B would increase overall
 1273 demand in this direction by approximately 8,211 passengers.

⁴⁶ See **Section 5.5.3.1, Direct Operational Impacts, WMATA Metrorail of Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data. Total ridership projections for Alternative B include ridership generated by the private air-rights development.

Bicycle Activity

1274 **Relative to the No-Action Alternative, Alternative B would result in a minor adverse direct**
1275 **operational impact on bicycle activity. Anticipated demand for private bicycle parking and**
1276 **storage would be accommodated by the provision of 104 Bikeshare spaces and 200 bicycle**
1277 **storage spots. However, this benefit would be offset by increased conflicts with**
1278 **pedestrians and vehicles on both First Street and K Street NE.**

1279 Alternative B would have the same impacts on bicycle activity as Alternative A, described in
1280 **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Bicycle Activity.** Additionally, the
1281 entrance to the below ground parking facility on K Street NE would create conflicts with
1282 proposed K Street bicycle facilities. This adverse impact on K Street, combined with the other
1283 adverse impacts described for Alternative A, which would also occur in Alternative B, would
1284 offset the benefits from additional storage. On balance, net impacts would be adverse but
1285 minor.

City and Commuter Buses

1286 **Relative to the No-Action Alternative, Alternative B would have a minor adverse direct**
1287 **operational impact on city and commuter buses. Increases in WUS-generated ridership**
1288 **would incrementally contribute to the overcrowding of some city buses and increases in**
1289 **traffic congestion would incrementally contribute to delays experienced by all buses. There**
1290 **would also be a moderate adverse direct operational impact on some employee shuttles,**
1291 **which would have to stop operating out of the WUS bus facility.**

1292 The impacts of Alternative B on city and commuter bus ridership would be the same as those
1293 of Alternative A and the other Action Alternatives: See **Section 5.5.4.2, Alternative A, Direct**
1294 **Operational Impacts, City and Commuter Buses.**

1295 As in Alternative A and the other Action Alternatives, increases in vehicle delays and queues
1296 due to greater traffic volumes would likely affect bus reliability and speed. In Alternative B,
1297 out of the 13 Metrobus routes that serve the Local Study Area, four in the AM peak and four
1298 in the PM peak would pass through at least two intersections that would degrade to LOS F
1299 relative to the No-Action Alternative, a potential source of delays. One DC Circulator routes
1300 and seven commuter bus routes (out of nine) would be similarly affected but in the PM peak
1301 only. Conditions would be similar to those in the No-Action Alternative, though delays may
1302 be slightly greater.

Vehicular Parking and Rental Cars

1303 **Relative to the No-Action Alternative, Alternative B would have a minor adverse direct**
1304 **operational impact on parking at WUS because of a reduction in parking capacity. There**
1305 **would be a minor beneficial impact on rental car operations.**

1306 In Alternative B, all parking and rental car activity would be in a below-ground facility located
1307 beneath the railroad tracks south of K Street NE. Vehicular access to the below-ground
1308 facility would be via a new signalized intersection on K Street NE between First Street and

1309 2nd Street NE. While this would change the routes WUS-bound drivers would take to travel
1310 to or from the parking facility and affect the local street network, the change in location by
1311 itself would not adversely affect parking or car rental activities.

1312 The new parking facility would offer room for approximately 450 fewer cars than the existing
1313 one. The reduction in parking capacity would be an adverse impact but the new facility's
1314 capacity would exceed the parking program for the Project.⁴⁷ It still would not fully meet the
1315 projected parking demand, but it is anticipated that users not able to park would use
1316 different modes to reach the station.⁴⁸ In general, by 2040, fewer passengers or visitors are
1317 anticipated to drive and park at WUS.⁴⁹

1318 WUS activity in Alternative B would generate more peak-hour parking trips than would be
1319 the case under the No-Action Alternative because of the increase in peak-hour rail service.
1320 Relative to the No-Action Alternative, Alternative B would generate an estimated 188
1321 additional peak-hour trips (39 percent increase): 132 in the AM peak hour (70 percent
1322 increase) and 56 in the PM peak hour (20 percent increase). These trips were considered in
1323 the traffic impact analysis (see **Tables 5-41 and 5-42** below).

Comparison to Existing Conditions

1324 The impacts of Alternative B on parking and rental car activity would be the same relative to
1325 existing conditions as relative to the No-Action Alternative since the existing parking garage
1326 and rental car facility would be in use in both baselines. The reduction in parking capacity
1327 would be the same relative to existing conditions as relative to the No-Action Alternative.

1328 Alternative B would generate proportionately more peak-hour parking trips relative to
1329 existing conditions than relative to the No-Action Alternative.⁵⁰ In the AM peak, the
1330 difference between Alternative B and existing conditions would be 193 trips (151 percent
1331 increase). In the PM peak, the difference would be 148 trips (72 percent increase).

For-hire Vehicles

1332 **Relative to the No-Action Alternative, Alternative B would have a moderate beneficial**
1333 **direct operational impact on for-hire vehicle activity because of the provision of new**
1334 **locations for pick-ups and drop-offs. These locations would adequately accommodate the**

⁴⁷ As noted in **Section 5.5.3.1, Operational Impacts**, the parking impact analysis addresses parking as a resource for which there is a demand. Therefore, a reduction in parking availability is considered an adverse impact on parking. A reduction in parking availability may also have adverse or beneficial consequences for other resources or transportation modes. Such consequences are incorporated into the impact analyses for those other resources or transportation modes.

⁴⁸ **Appendix A6, Parking Program Memorandum**, provides more information on parking demand projections and the development of the parking program.

⁴⁹ The MWCOG Model estimates a 10% reduction in single-occupancy vehicle trips in the WUS area to 2040. Additionally, Amtrak as indicated to FRA that passenger parking is not essential to Amtrak's operation of intercity passenger rail at WUS and it anticipates passenger parking demand to continually decrease in the future.

⁵⁰ See **Section 5.5.3.1, Direct Operational Impacts, Vehicular Parking and Rental Cars** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

1335 anticipated growth in for-hire trips, but queuing would not be eliminated. Alternative B
1336 would also have a major adverse direct operational impact on for-hire vehicles due to
1337 increased traffic congestion.

1338 Alternative B would provide five pick-up and drop-off locations (see **Figure 5-5**). The first four
1339 would also be in Alternative A:

- 1340 ■ **Front of WUS:** See **Section 5.5.4.2, Alternative A, Direct Operational Impacts, For-hire**
1341 *Vehicles* for a description. In Alternative B, a projected 40 percent of for-hire drop-off
1342 activity and 30 percent of for-hire pick-up activity is anticipated to occur in front of
1343 WUS.
- 1344 ■ **Adjacent to the north-south train hall on the deck level:** See **Section 5.5.4.2,**
1345 *Alternative A, Direct Operational Impacts, For-hire Vehicles* for a description. In
1346 Alternative B, a projected 35 percent of for-hire drop-off activity and 25 percent of
1347 for-hire pick-up activity would occur at this location.
- 1348 ■ **New H Street Concourse entrance on First Street NE:** See **Section 5.5.4.2, Alternative**
1349 *A, Direct Operational Impacts, For-hire Vehicles* for a description. In Alternative B, 20
1350 percent of for-hire drop-off activity and 20 percent of for-hire pick-up activity would
1351 occur at this location.
- 1352 ■ **New H Street Concourse entrance on 2nd Street NE:** See **Section 5.5.4.2, Alternative**
1353 *A, Direct Operational Impacts, For-hire Vehicles* for a description. In Alternative B, an
1354 anticipated 5 percent of for-hire drop-off activity and 5 percent of for-hire pick-up
1355 activity would occur at this location.
- 1356 ■ **New below-ground parking facility:** For-hire vehicles serving the below-ground
1357 parking facility would access it via a new intersection on K Street NE, between First
1358 Street and 2nd Street NE. In Alternative B, a projected 20 percent of for-hire pick-up
1359 activity would occur in the below-ground facility; no for-hire drop-off activity would
1360 be permitted there.

1361 Relative to the No-Action Alternative, Alternative B would generate an estimated 1,412 new
1362 for-hire trips (270 percent increase) in the AM peak hour and an estimated 1,212 new for-
1363 hire trips in the PM peak hour (141 percent increase). The principal source of increased peak-
1364 hour trips would be the increase in intercity rail activity. These trips were included in the
1365 traffic impact analysis (see **Tables 5-41 and 5-42** below).

1366 As explained in **Section 5.5.4.3, Alternative B, Direct Operational Impacts, Vehicular Traffic,**
1367 *Curbside Analysis*, volumes associated with for-hire as well as private pick-up and drop-off
1368 activity on the deck level and in front of WUS would potentially create queuing and
1369 congestion. This would result in a major adverse impact on for-hire vehicle operations at
1370 WUS.

[Comparison to Existing Conditions](#)

1371 The beneficial impacts of Alternative B on for-hire vehicle activities would be the same
1372 relative to existing conditions as relative to the No-Action Alternative since pick-up and drop-

1373 off locations would be the same in both baselines. The increase in trips would be
1374 proportionately greater.⁵¹ Relative to existing conditions, Alternative B would generate an
1375 estimated 1,542 new for-hire trips in the AM peak hour (391 percent increase) and 1,426
1376 new for-hire trips in the PM peak hour (220 percent increase). The principal source of
1377 increased peak-hour trips would be the increase in intercity rail activity.

Private Pick-up and Drop-off

1378 **Relative to the No-Action Alternative, Alternative B would have a moderate beneficial**
1379 **direct operational impact on private pick-ups and drop-offs because of the provision of**
1380 **new locations for these activities. These locations would adequately accommodate the**
1381 **anticipated growth in private pick-up and drop-off trips, but queuing may occur.**
1382 **Alternative B would also have a major adverse direct operational impact on private pick-**
1383 **ups and drop-offs due to increased traffic congestion.**

1384 The same locations used by for-hire vehicles would be available for private pick-up and drop-
1385 off activity in Alternative B. However, private vehicles would not be allowed to use the east
1386 ramp to reach the front of WUS. The anticipated distribution of trips would be the same as
1387 for for-hire vehicles.

1388 Relative to the No-Action Alternative, Alternative B would generate an estimated 824
1389 additional private pick-up and drop-off trips in the AM peak hour (94 percent increase) and
1390 598 private pick-up and drop-off trips in the PM peak hour (63 percent increase). The
1391 principal source of increased peak-hour trips would be the increase in intercity rail activity.
1392 These trips were considered in the traffic impact analysis (see **Tables 5-41 and 5-42** below).

1393 As explained in **Section 5.5.4.3, Alternative B, Direct Operational Impacts, Vehicular Traffic,**
1394 **Curbside Analysis**, volumes associated with private pick-up and drop-off as well as for-hire
1395 activity on the deck level and in front of WUS would potentially create queuing and
1396 congestion. This would result in a major adverse impact on for-hire vehicle operations at
1397 WUS.

Comparison to Existing Conditions

1398 The beneficial impacts of Alternative B on private pick-up and drop-off activity would be the
1399 same relative to existing conditions as relative to the No-Action Alternative since pick-up and
1400 drop-off locations would be the same in both baselines. The increase in trips would be
1401 proportionately greater.⁵² Relative to existing conditions, Alternative B would generate an
1402 estimated new 1,040 private pick-up and drop-off trips in the AM peak hour (158 percent
1403 increase) and 834 new private pick-up and drop-off trips in the PM peak hour (117 percent

⁵¹ See **Section 5.5.3.1, Direct Operational Impacts, For-hire Vehicles** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

⁵² See **Section 5.5.3.1, Direct Operational Impacts, Private Pick-up and Drop-off** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

1404 increase). The principal source of increased peak-hour trips would be the increase in intercity
1405 rail activity.

Vehicular Traffic

1406 **Relative to the No-Action Alternative, Alternative B would have major adverse direct**
1407 **operational impacts on traffic operations at several intersections near WUS because of**
1408 **increased traffic volumes and changes in traffic patterns due to the new parking facility**
1409 **location. During at least one of the peak periods, out of 36 intersections in the Local Study**
1410 **Area, four would degrade to LOS F; 15 would experience an increase in queue length of**
1411 **more than 150 feet; and 21 would experience an increase in average delay of more than 5**
1412 **seconds.**

Trip Generation and Circulation

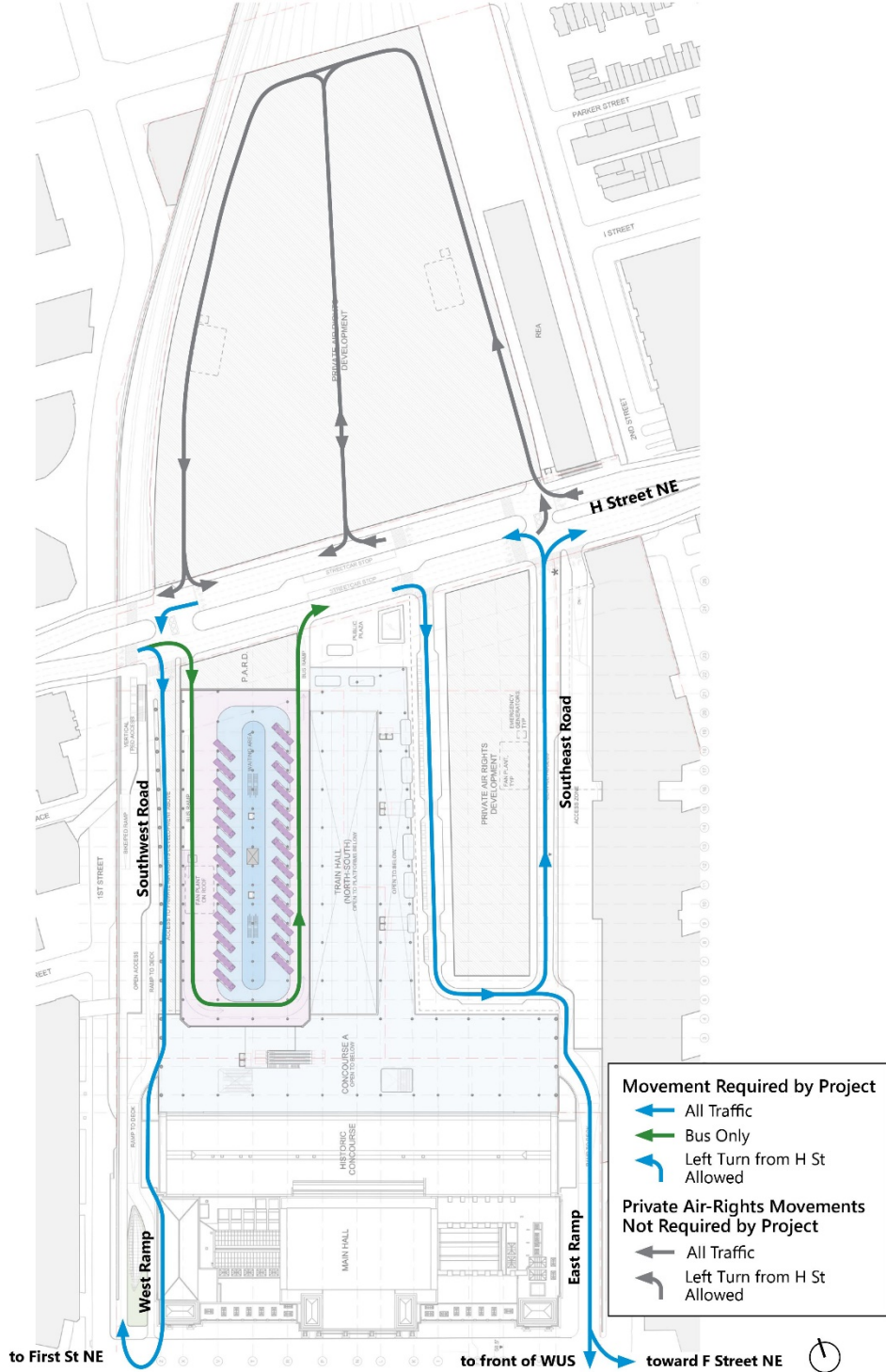
1413 WUS-related vehicular activity in Alternative B would be primarily distributed across five
1414 locations:

- 1415 ■ The pick-up and drop-off loop at the front of WUS;
- 1416 ■ The new bus facility and new deck-level pick-up and drop-off location accessed from
1417 H Street NE;
- 1418 ■ The new curbside pick-up and drop-off location on First Street NE (serving the new H
1419 Street Concourse);
- 1420 ■ The new curbside pick-up and drop-off locations on 2nd Street NE (serving the new H
1421 Street Concourse); and
- 1422 ■ The new below-ground parking facility accessed from K Street NE.

1423 All parking and rental car activity would be in the below-ground parking facility. Relative to
1424 the No-Action Alternative, this would redirect all parking facility and rental car traffic from H
1425 Street NE or the east ramp to K Street NE. Private and for-hire pick-up and drop-off activity
1426 would be spread across all five locations. Approximately 70 percent of WUS-related traffic is
1427 expected to travel to and from points west of WUS, with 30 percent traveling to and from
1428 points east of WUS. Anticipated circulation patterns on the deck level in Alternative B are
1429 represented in **Figure 5-6**.⁵³

⁵³ Figure 5-6 shows all movements, including those assumed in consultation with DDOT for the private air-rights development, to provide a better understanding of anticipated traffic operations on the H Street Bridge. Arrows indicate movements, not planned street alignments.

Figure 5-6. Deck Level Circulation (All Movements), Alternative B



1430 **Table 5-41** and **Table 5-42** show AM and PM peak WUS-related traffic volumes in Alternative
 1431 B, along with the corresponding information for the No-Action Alternative. Compared to the
 1432 No-Action Alternative, Alternative B would generate 2,427 additional AM peak trips (149
 1433 percent increase) and 1,913 additional PM peak trips (89 percent increase). These increases
 1434 in volumes would result in major adverse impacts to traffic operations at some study
 1435 intersections, as described below.

Table 5-41. AM Peak-hour Traffic Volumes, Alternative B

| | Alternative B | | | No-Action Alternative | | |
|---------------------------------|---------------|-------|-------|-----------------------|-----|-----|
| | Total Trips | In | Out | Total Trips | In | Out |
| Parking | 321 | 211 | 110 | 189 | 127 | 62 |
| Private Pick-Up/Drop-Off | 1,696 | 848 | 848 | 872 | 436 | 436 |
| For-hire Vehicles | 1,936 | 968 | 968 | 524 | 262 | 262 |
| Car Rental | 105 | 57 | 48 | 46 | 28 | 18 |
| Total Trips | 4,058 | 2,084 | 1,974 | 1,631 | 853 | 778 |

Table 5-426. PM Peak-hour Traffic Volumes, Alternative B

| | Alternative B | | | No-Action Alternative | | |
|---------------------------------|---------------|-------|-------|-----------------------|-------|-------|
| | Total Trips | In | Out | Total Trips | In | Out |
| Parking | 355 | 104 | 251 | 299 | 102 | 197 |
| Private Pick-Up/Drop-Off | 1,546 | 773 | 773 | 948 | 474 | 474 |
| For-hire Vehicles | 2,074 | 1,037 | 1,037 | 862 | 431 | 431 |
| Car Rental | 92 | 37 | 55 | 45 | 17 | 28 |
| Total Trips | 4,067 | 1,951 | 2,116 | 2,154 | 1,024 | 1,130 |

Comparison to Existing Conditions

1436 Relative to existing conditions, Alternative B would generate 2,839 additional AM peak trips
 1437 (233 percent increase) and 2,464 additional PM peak trips (154 percent increase).⁵⁴

Curbside Analysis

1438 The anticipated volumes associated with for-hire and private pick-up and drop-off activity
 1439 would potentially create conflicts and queueing. At deck level, queues at the first layby lane
 1440 next to the train hall on the center road would be located less than 100 feet from H Street NE
 1441 and could possibly “spill back” onto this street. In the AM peak, the estimated maximum
 1442 queue length could reach 15 cars. In the PM peak, the estimated maximum queue length
 1443 could reach 107 cars. This queue would have a major adverse impact on traffic operations. In

⁵⁴ See **Section 5.5.3.1, Direct Operational Impacts, Vehicular Traffic of Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

1444 these conditions, it is possible that WUS users may walk to nearby destinations to find a for-
 1445 hire vehicle.

1446 The front of WUS as well as First and 2nd Streets would also experience curbside activity.
 1447 Queues at the front may spill back into travel lanes on Massachusetts Avenue. The pick-up
 1448 and drop-off lanes on First and 2nd Streets would help accommodate the excess volumes. No
 1449 queue would form at the First Street or 2nd Street pick-up and drop-off area. On First Street,
 1450 257 pick-ups and drop-offs would occur in the AM peak; 225 would occur in the PM peak. On
 1451 2nd Street, 78 pick-ups and drop-offs would occur in the AM peak; 67 would occur in the PM
 1452 peak. An estimated 93 pick-ups and drop-offs in the AM peak and 82 pick-ups and drop-offs
 1453 in the PM peak would use the below-ground parking facility accessed from K Street NE.

Intersection Analysis

1454 As for all alternatives, three indicators were used to assess impacts on traffic operations in
 1455 Alternative B relative to the No-Action Alternative: degradation of intersection LOS to F due
 1456 to vehicle trips generated by the alternative; increase in average vehicle delay at an
 1457 intersection by more than five seconds; and increase in 95th-percentile queue lengths of
 1458 more than 150 feet for any lane group in an intersection. **Table 5-43** identifies the study
 1459 intersections that would experience an impact relative to the No-Action Alternative under
 1460 any of these three indicators.

Table 5-43. Summary of Traffic Impacts, Alternative B

| Intersection # | Intersection Name | LOS | Queuing | Delay |
|----------------|---|-----|---------|-------|
| 1 | North Capitol Street / K Street | X | X* | X* |
| 2 | First Street / K Street NE | X | X* | X* |
| 3 | 2nd Street / K Street NE | | | X* |
| 5 | North Capitol Street / H Street | | X* | X* |
| 6 | WUS West Intersection / H Street NE | X | X* | X* |
| 7 | WUS Bus Exit / H Street NE | | X* | X* |
| 8 | WUS East Intersection / H Street NE | | X | X* |
| 9 | 3rd Street / H Street NE | | X | X |
| 10 | North Capitol Street / G Street | | X* | X* |
| 13 | North Capitol Street / Massachusetts Ave | | X | X* |
| 17 | First Street / Massachusetts Avenue NE | X | | X |
| 18 | 2nd Street / F Street NE | | | X* |
| 19 | North Capitol Street / E Street | | X | X |
| 20 | Louisiana Avenue / D Street NW | | X* | X* |
| 21 | Louisiana Avenue / North Capitol Street | | | X* |
| 22 | 2nd Street / D Street NE | | X | X* |
| 23 | 2nd Street / Massachusetts Avenue NE | | X | X |
| 26 | Massachusetts Avenue / C Street / 4th Street NE | | | X* |
| 27 | Louisiana Avenue / C Street NW | | X* | X* |
| 31 | 3rd Street / E Street NW | | X | X |
| 32 | 3rd Street / Massachusetts Avenue / H Street NW | | | X* |

* indicates the impact would occur in both peak hours.

1461 **Figure 5-7** shows the peak hour LOS at each of the study intersections. In Alternative B,
1462 relative to the No-Action Alternative, four out of 36 study intersections would degrade to LOS
1463 F in at least one peak hour.

1464 Fifteen intersections out of 36 would experience an increase in queue length of more than
1465 150 feet for one or more lane groups relative to the No-Action Alternative. Of those
1466 15 intersections, eight would experience such a queue increase in both peak hours.

1467 Finally, in Alternative B, 21 of the 36 study intersections would experience an increase in
1468 average delay of more than 5 seconds for at least one peak period relative to the No-Action
1469 Alternative. Sixteen of those 21 intersections would see such an increase in both peak hours.

Comparison to Existing Conditions

1470 Relative to existing conditions, in Alternative B:⁵⁵

- 1471 ■ Nine intersections would degrade to LOS F in at least one peak period.
- 1472 ■ Twenty-six intersections would experience an increase in queue length of more than
1473 150 feet for one or more lane groups, with 19 projected to do so in both peak hours.
- 1474 ■ Twenty-three intersections would experience delay increases of more than
1475 5 seconds, with 19 projected to do so in both peak hours.

Indirect Operational Impacts

1476 **Alternative B would have moderate adverse indirect operational impacts on multimodal**
1477 **transportation because of the trips generated by the potential Federal air-rights**
1478 **development.**

1479 In Alternative B, around 917,420 square feet of Federal air rights above the bus facility would
1480 be potentially available for development separately from the Project. For the purposes of the
1481 transportation analysis, it was conservatively assumed that this space would become office
1482 space. **Table 5-44** shows the multimodal trips that the potential Federal air-rights
1483 development would generate under this assumption.⁵⁶ All vehicular trips were considered in
1484 the traffic impact analysis. The Federal air-rights development would add trips to most other
1485 local transportation modes, an adverse impact. However, the number of trips it would
1486 generate would be typical of an office space development of its size and represent a small
1487 increment over the number of trips generated directly by Alternative B. Therefore, this
1488 adverse indirect impact would be moderate.

⁵⁵ See **Section 5.5.3.1, Direct Operational Impacts, Vehicular Traffic** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

⁵⁶ Based on coordination with DDOT and the private air-rights developer in 2016-2017, this analysis assumes 4 employees per 1,000 square feet of office space. Current DDOT CTR guidelines assume 2.5 employees per 1,000 square feet. Therefore, the present analysis provides a conservative projection of office-related transportation demand.

Figure 5-7. Intersection Peak Hour LOS, Alternative B

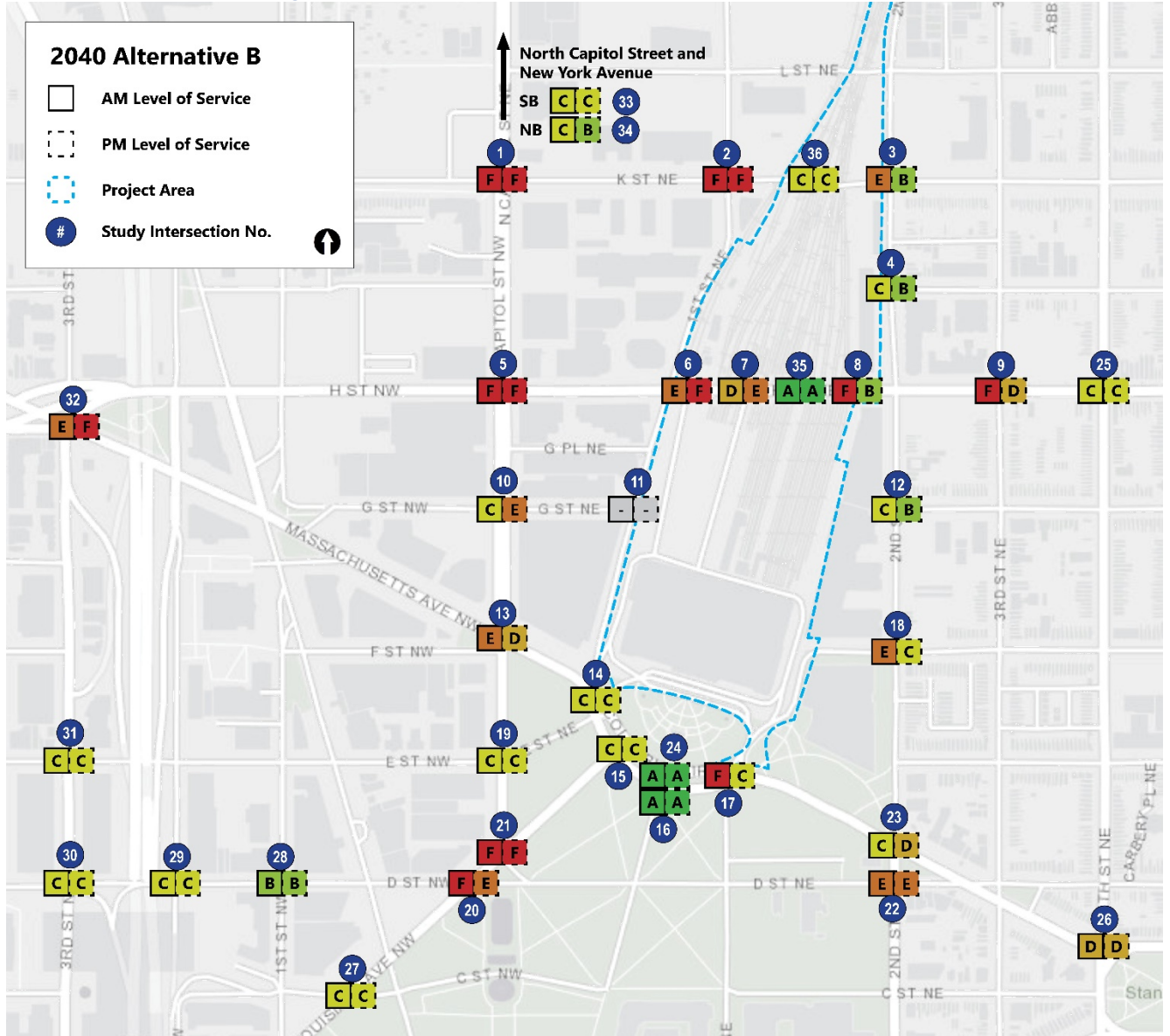


Table 5-44. Federal Air-rights Development Trip Generation, Alternative B

| | Total Trips | AM Peak | | Total Trips | PM Peak | |
|---------------------------------|-------------|---------|----------|-------------|---------|----------|
| | | Inbound | Outbound | | Inbound | Outbound |
| Parking | 287 | 252 | 24 | 282 | 48 | 234 |
| Private Pick-Up/Drop-Off | 0 | 0 | 0 | 0 | 0 | 0 |
| For-hire Vehicles | 20 | 18 | 2 | 20 | 3 | 17 |
| Car Rental | 0 | 0 | 0 | 0 | 0 | 0 |
| Amtrak Express | 10 | 9 | 1 | 11 | 2 | 9 |
| Amtrak Corridor | 0 | 0 | 0 | 0 | 0 | 0 |
| MARC | 133 | 125 | 8 | 141 | 22 | 119 |
| VRE | 76 | 71 | 5 | 81 | 13 | 68 |
| Metrorail | 284 | 267 | 17 | 304 | 48 | 256 |
| Streetcar | 29 | 27 | 2 | 31 | 5 | 26 |
| City/Commuter Bus | 56 | 53 | 3 | 61 | 10 | 51 |
| Pedestrian | 95 | 89 | 6 | 101 | 16 | 85 |
| Bicycle | 95 | 89 | 6 | 101 | 16 | 85 |

Construction Impacts

1489 Construction of Alternative B would take place over approximately 14 years and 4 months. As
 1490 in all Action Alternatives, and as explained for Alternative A in **Section 5.5.4.2, Alternative A,**
 1491 *Construction Impacts*, work would be conducted in four east-to-west phases with the
 1492 greatest impacts on transportation occurring in Phase 4. Phase durations and the duration of
 1493 excavation activities in each phase for Alternative B are shown in **Table 5-45**.

Table 5-45. Construction and Excavation Duration, Alternative B

| Phase | Overall Duration | Duration of Excavation |
|---------------------------------|--------------------|------------------------|
| Phase 1 | 2 years, 5 months | 5 months |
| Intermediate Phase | 12 months | None |
| Phase 2 | 3 years | 11 months |
| Phase 3 | 3 years | 13 months |
| Phase 4 | 4 years, 11 months | 2 years, 7 months |
| Total Project Completion | 14 years, 4 months | 5 years, 1 month |

1494
 1495 Except for the difference in duration, the construction impacts of Alternative B on most
 1496 transportation modes would be as described for Alternative A in **Section 5.5.4.2, Alternative**
 1497 *A, Construction Impacts*. In particular, adverse impacts on intercity bus operations and
 1498 parking would be the same but last longer because of the longer duration of Phase 4 in
 1499 Alternative B. This is because Alternative B would involve the construction of two levels of

1500 below-ground parking on the west side of the Project Area as well as that of a new
1501 intersection in the K Street NE underpass to provide access to the parking. This would require
1502 more excavation during Phase 4 than in Alternative A. It would also cause impacts to K Street
1503 NE that would not occur under Alternative A. The following sections focus on those
1504 additional impacts. Refer to **Section 5.5.4.2** for a description of impacts on the modes not
1505 addressed below.

City and Commuter Buses

1506 **The construction of Alternative B would have minor adverse impacts on city and commuter**
1507 **bus operations during periods of lane closure on K Street NE.**

1508 In addition to the impacts described in **Section 5.5.4.2, Alternative A, Construction Impacts,**
1509 *City and Commuter Buses*, construction of the new intersection in the K Street NE underpass
1510 would require the closure of one or both of the existing eastbound lanes for an extended
1511 period. One lane of traffic in each direction would remain available during daytime, allowing
1512 for traffic movement in both directions. Metrobus Line D4 travels along K Street at that
1513 location, as do several MTA commuter bus lines (220, 240, and 260). The closure of one or
1514 two of the four existing lanes may cause delays and inconvenience passengers, but it is not
1515 likely that buses would have to be rerouted during construction.

Vehicular Traffic

1516 **Construction of Alternative B would have major adverse impact on vehicular traffic**
1517 **operations because of roadway closures and construction vehicle traffic.**

1518 In addition to the impacts described in **Section 5.5.4.2, Alternative A, Construction Impacts,**
1519 *Vehicular Traffic*, the construction of the new intersection providing access to the below-
1520 ground parking facility require lane closures under the K Street overpass. As noted above,
1521 one lane of traffic in each direction would remain in operation at all times during the day.
1522 However, delays and back-up may occur and some traffic may seek alternative routes, such
1523 as L Street.

1524 As in the other Action Alternatives, construction of Alternative B would generate truck traffic
1525 to and from the Project Area during the entire construction period. The greatest amount of
1526 traffic would occur during excavation activities, with up to 120 trucks per day. As explained
1527 for Alternative A, this is a maximum, conservative estimate that assumes that no work trains
1528 would be used to haul spoils away. As in all Action Alternatives, construction trucks have the
1529 potential to result in major adverse impacts on local traffic operations during parts of the
1530 construction period. Alternative B (along with Alternative E) would involve deep excavation
1531 to accommodate two levels of below-ground parking and it would generate a large amount
1532 of spoil material. Excavation for the parking facility would occur mostly in Phase 4 and in
1533 Alternative B, excavation-related heavy truck traffic would occur for approximately 2 years
1534 and 7 months. Because work in Phase 4 would be on the west side of the Project Area, First
1535 Street NE would be the local street most affected. As in all Action Alternatives, use of work
1536 train to remove the spoils could reduce or eliminate excavation-related truck traffic.

5.5.4.4 Alternative C

1537 The following sections describe the direct and indirect, operational and construction impacts
1538 of Alternative C. Alternative C has two options. The East Option would place the bus facility
1539 and above-ground parking along the east side of the Project Area north of H Street NE. The
1540 West Option would place them along the west side of the Project Area, also north of
1541 H Street. The key transportation elements of each option are illustrated in **Figure 5-8** and
1542 **Figure 5-9**, respectively. Unless otherwise specified, the impacts described in the following
1543 sections would occur regardless of the option.

Direct Operational Impacts

1544 The direct operational impacts of Alternative C (either option) on commuter and intercity
1545 railroads; the DC Streetcar; loading; city and commuter bus ridership; and car rental activities
1546 would be the same as those of Alternative A (**Section 5.5.4.2, Alternative A, Direct**
1547 *Operational Impacts*). Impacts on bicycle activities and city and commuter bus operations
1548 would be the same as in Alternative B (**Section 5.5.4.3, Alternative B, Direct Operational**
1549 *Impacts*). This section does not address these impacts further. It only addresses those
1550 transportation modes that would experience meaningfully different direct operational
1551 impacts in Alternative C.

WMATA Metrorail

1552 **Relative to the No-Action Alternative, Alternative C (either option) would have a moderate**
1553 **adverse direct operational impact on Metrorail operations because of increased demand**
1554 **that would aggravate train overcapacity and station circulation issues.**

1555 Increased train service and ridership in Alternative C as well as the reduction in parking
1556 capacity and the new retail uses included in the alternative would generate increased
1557 demand on Metrorail at WUS. **Table 5-46** shows modeled AM peak and PM peak activity.
1558 When the projected V/C ratio would exceed 100 percent, there would be a need for
1559 additional service to address overcrowding.

1560 Alternative C volumes would exceed capacity departing from WUS in the Shady Grove
1561 direction during the AM peak and arriving at WUS in the Glenmont direction during the PM
1562 peak. In the AM peak, Alternative C would cause the V/C ratio leaving WUS toward Shady
1563 Grove to reach 103 percent, against 86 percent in the No-Action Alternative. As a result,
1564 Alternative C would create an excess demand of approximately 444 passengers. Based on
1565 WMATA ridership trends, overcapacity conditions are anticipated to dissipate within the Red
1566 Line core.⁵⁷

⁵⁷ The Red Line core, as defined by WMATA, consists of the line segment between Dupont Circle and WUS.

Figure 5-8. Key Transportation Elements, Alternative C East Option



Figure 5-9. Key Transportation Elements, Alternative C West Option

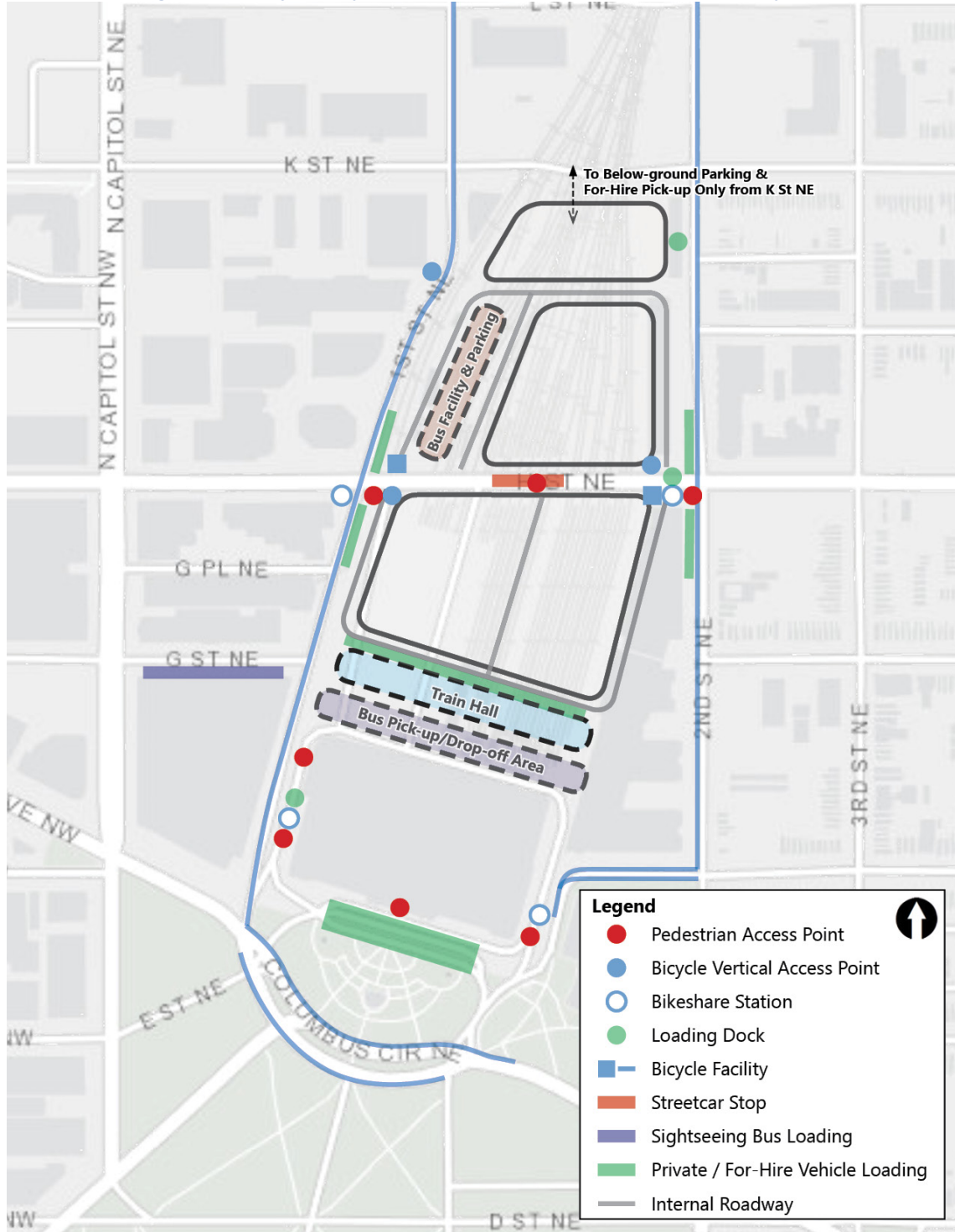


Table 5-46. Peak-hour WUS-related Metrorail Activity, Alternative C

| | Alternative C | | No-Action Alternative | |
|-------------------------|---------------|----------|-----------------------|----------|
| | Shady Grove | Glenmont | Shady Grove | Glenmont |
| AM Peak Hour | | | | |
| V/C Arriving at WUS | 83% | 28% | 80% | 25% |
| US Boardings | 8,365 | 1,623 | 5,202 | 1,010 |
| WUS Alightings | 5,042 | 3,423 | 4,128 | 2,803 |
| Through Ridership | 9,222 | 1,296 | 9,523 | 1,447 |
| Ridership Departing WUS | 17,587 | 2,929 | 14,725 | 2,457 |
| V/C Departing WUS | 103% | 17% | 86% | 14% |
| Excess Demand | 444 | 0 | 0 | 0 |
| PM Peak Hour | | | | |
| V/C Arriving at WUS | 20% | 115% | 20% | 107% |
| WUS Boardings | 3,201 | 4,580 | 2,559 | 3,661 |
| WUS Alightings | 1,550 | 8,221 | 1,154 | 6,126 |
| Through Ridership | 1,650 | 9,938 | 1,953 | 10,722 |
| Ridership Departing WUS | 4,851 | 14,518 | 4,512 | 14,383 |
| V/C Departing WUS | 31% | 92% | 29% | 91% |
| Excess Demand | 0 | 2,421 | 0 | 1,110 |

1567 In the PM peak, capacity exceedance toward Glenmont (115 percent) would be greater in
 1568 Alternative C than in the No-Action Alternative (107 percent). Alternative C would aggravate
 1569 the level of crowding, generating an additional excess demand of approximately 1,311
 1570 passengers, for a total excess demand of 2,421.

1571 The increase in Metrorail ridership at WUS would affect passenger circulation as described in
 1572 **Section 5.5.4.2, Alternative A, Direct Operational Impacts, WMATA Metrorail.**

Comparison to Existing Conditions

1573 Relative to existing conditions, Alternative C would have a major adverse direct operational
 1574 impact on Metrorail operations at WUS. The increase in overcrowding and need for extra
 1575 capacity would be greater compared to existing conditions than to the No-Action
 1576 Alternative.⁵⁸ In the AM peak, Alternative C would cause the V/C ratio leaving WUS toward
 1577 Shady Grove to reach 103 percent, against 69 percent under existing conditions. This would
 1578 increase the overall AM peak demand in the Shady Grove direction by 7,209 passengers. In
 1579 the PM peak, the V/C ratio toward Glenmont arriving at WUS would be 115 percent, against
 1580 72 percent under existing conditions. Alternative C would increase overall demand in this
 1581 direction by 8,211 passengers.

⁵⁸ See **Section 5.5.4.1, Direct Operational Impacts, WMATA Metrorail of Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data. Total ridership projections for Alternative C include ridership generated by the private air-rights development.

Intercity, Tour/Charter, and Sightseeing Buses

1582 **Relative to the No-Action Alternative, Alternative C (either option) would have a moderate**
1583 **adverse direct operational impact on intercity, tour/charter, and daily sightseeing bus**
1584 **operations because of the new 30-minute time limit for buses at WUS and greater distance**
1585 **between the Metrorail Station and the bus facility. Alternative C (either option) would**
1586 **have a negligible adverse direct operational impact on hop-on/hop-off sightseeing buses as**
1587 **a result of their relocation to G Street NE.**

1588 Alternative C would provide two locations for bus operations: a main bus facility to the north
1589 of H Street NE and a bus drop-off and pick-up area to the south of H Street NE, adjacent to
1590 the train hall. Buses would reach this area from H Street NE via the west intersection. They
1591 would exit back to H Street via the east intersection.

1592 The main facility's location and capacity would vary with the option. In the East Option, the
1593 facility would be to the northeast of H Street and feature 17 slips. Bus access would be via
1594 the east intersection. In the West Option, the facility would be to the northwest of H Street
1595 and would have 19 slips. Bus access would be via the west intersection.

1596 The anticipated increases in bus ridership and the impacts of the 30-minute time limit
1597 required because of the reduction in the number of slips would be the same as in Alternative
1598 A. **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Intercity, Tour/Charter, and**
1599 **Sightseeing Buses** describes these impacts.

1600 There would be greater flexibility in bus movements in Alternative C than in the No-Action
1601 Alternative. In the West Option, unlike in the No-Action Alternative, buses exiting the facility
1602 could turn either left or right onto H Street NE. In the East Option, buses exiting the facility
1603 could not turn left (eastward) onto H Street but this movement would be available to buses
1604 coming from the bus pick-up and drop-off area.

1605 Because of the location of the main bus facility, the distance bus passengers would have to
1606 walk to reach the front of WUS and the Metrorail station would increase relative to No-
1607 Action Alternative conditions; passengers connecting to Metrorail would walk approximately
1608 an additional 1,100 feet with the East Option and an additional 250 feet with the West
1609 Option. The East Option would also offer fewer bus slips than the West Option. Thus,
1610 although the impacts of both options would be comparable, the West Option would present
1611 some benefits over the East Option.

Comparison to Existing Conditions

1612 The bus facility location would be the same in the No-Action Alternative as under existing
1613 conditions. Therefore, impacts pertaining to walking distances would be the same regardless
1614 of the baseline.

Pedestrians

1615 **Relative to the No-Action Alternative, Alternative C (either option) would have a moderate**
1616 **beneficial direct operational impact on pedestrian circulation inside WUS. Additional**

1617 **access points would disperse pedestrian traffic and make access to WUS easier; however,**
1618 **some passengers would have to walk longer distances. Outside of WUS, Alternative C**
1619 **(either option) would have a minor adverse direct operational impact on pedestrian**
1620 **circulation because of increased queuing at certain crossings near the station.**

1621 The impacts of Alternative C would generally be similar to those of Alternative A, described in
1622 **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Pedestrians**, and would be
1623 beneficial. However, increased walking distances between WUS elements would partially
1624 offset the benefits from larger circulation space and additional access points, making this
1625 impact moderate.

1626 Because of the location of the new main bus facility, walking distances for those passengers
1627 transferring between an intercity bus and Metrorail or the front of WUS would increase, as
1628 noted above (**Section 5.5.4.4, Alternative C, Direct Operational Impacts, Intercity,**
1629 **Tour/Charter, and Sightseeing Buses**). This would also be the case for visitors or passengers
1630 using the new above-ground parking facility. Bus passengers and above-ground parking users
1631 would have to walk outside to reach the nearest entry point to the H Street Concourse.
1632 Drivers who would park near the northern end of the below-ground parking facility would be
1633 farther away from the front of WUS than in the No-Action Alternative.

1634 Not all bus passengers would have to walk greater distances, however, as some buses would
1635 also use the bus drop-off and pick-up area adjacent to the train hall, which would bring riders
1636 closer to the front of WUS and the Metrorail station. Which buses would use the pick-up and
1637 drop-off area would vary depending on destination, schedule, and conditions at the main bus
1638 facility.

Comparison to Existing Conditions

1639 The impacts of Alternative C relative to existing conditions would be as described for
1640 Alternative A in **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Pedestrians**.

Vehicular Parking and Rental Cars

1641 **Relative to the No-Action Alternative, Alternative C (either option) would have a moderate**
1642 **adverse direct operational impact on parking at WUS because of a reduction in parking**
1643 **capacity. Alternative C would have a minor beneficial direct operational impact on rental**
1644 **car operations.**

1645 Alternative C would split parking between a new above-ground parking facility (to the
1646 northeast or northwest of H Street depending on the option) and a new below-ground facility
1647 beneath the railroad tracks south of K Street NE. Vehicular access to below-ground parking
1648 would be through a new intersection in the K Street NE underpass, like in Alternative B (see
1649 **Section 5.5.4.3, Alternative B, Direct Operational Impacts, Vehicular Parking and Rental Cars**).
1650 All rental car activity would be in the below-ground parking facility. Under either option, the
1651 above-ground facility would accommodate an estimated 46 percent of all parking trips, with
1652 the below-ground one accommodating the other 54 percent.

1653 While this would change the routes WUS users would take to park at the station, and affect
1654 the local network, the change in location by itself would not adversely affect parking or car
1655 rental activities. Altogether, the new parking facilities would offer space for approximately
1656 800 fewer cars than the existing garage under the East Option; and for approximately 840
1657 fewer cars under the West Option. This would be an adverse impact.⁵⁹ This adverse impact
1658 would be moderate because the new facilities would meet the parking program for the
1659 Project and while they would not meet the projected parking demand, it is anticipated that
1660 users not able to park would use different modes to reach the station.⁶⁰ By 2040, fewer
1661 passengers or visitors are anticipated to drive and park at WUS.⁶¹

1662 WUS activity in Alternative C would generate more overall peak-hour parking trips than in the
1663 No-Action Alternative in the AM peak and fewer in the PM peak. Relative to the No-Action
1664 Alternative, Alternative C would generate an estimated 68 additional peak-hour trips (14
1665 percent increase): 73 additional trips the AM peak hour (39 percent increase) and 5 fewer
1666 trips in the PM peak (2 percent decrease). These trips were considered in the traffic impact
1667 analysis (see **Tables 5-47 and 5-48** below).

Comparison to Existing Conditions

1668 The impacts of Alternative C on parking and rental car activity would be the same relative to
1669 existing conditions as relative to the No-Action Alternative since the existing parking garage
1670 and rental car facility would be in use in both baselines. The reduction in parking capacity
1671 would be the same relative to existing conditions as relative to the No-Action Alternative.
1672 Alternative C would generate proportionately more peak-hour parking trips relative to
1673 existing conditions than relative to the No-Action Alternative.⁶² In the AM peak, the
1674 difference between Alternative C and existing conditions would be 134 trips (105 percent
1675 increase). In the PM peak, the difference would be 87 trips (42 percent increase).

For-hire Vehicles

1676 **Relative to the No-Action Alternative, Alternative C (either option) would have a moderate**
1677 **beneficial direct operational impact on for-hire vehicle activity because of the provision of**
1678 **new locations for pick-ups and drop-offs. These locations would adequately accommodate**
1679 **the anticipated growth in for-hire trips, but queuing would not be eliminated. Alternative C**

⁵⁹ As noted in **Section 5.5.3.1, Operational Impacts**, the parking impact analysis addresses parking as a resource for which there is a demand. Therefore, a reduction in parking availability is considered an adverse impact on parking. A reduction in parking availability may also have adverse or beneficial consequences for other resources or transportation modes. Such consequences are incorporated into the impact analyses for those other resources or transportation modes.

⁶⁰ **Appendix A6, Parking Program Memorandum**, provides more information on parking demand projections and the development of the parking program.

⁶¹ The MWCOC Model estimates a 10% reduction in single-occupancy vehicle trips in the WUS area to 2040. Additionally, Amtrak as indicated to FRA that passenger parking is not essential to Amtrak's operation of intercity passenger rail at WUS and it anticipates passenger parking demand to continually decrease in the future.

⁶² See **Section 5.5.4.1, Direct Operational Impacts, Vehicular Parking and Rental Cars** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

1680 (either option) would also have a moderate adverse direct operational impact on for-hire
1681 vehicles due to increased traffic congestion.

1682 The following five pick-up and drop-off locations would be provided in Alternative C:

- 1683 ■ **Front of WUS:** See **Section 5.5.4.2, Alternative A, Direct Operational Impacts, For-hire**
1684 *Vehicles* for a description. In Alternative C, a projected 40 percent of for-hire drop-off
1685 activity and 30 percent of for-hire pick-up activity is anticipated to occur in front of
1686 WUS.
- 1687 ■ **Adjacent to the east-west train hall on the deck level:** For-hire vehicles would access
1688 this location via the west intersection on H Street NE and southwest road, potentially
1689 after staging in the first level of the above-ground parking facility. Egress would be
1690 either via the southeast road and east intersection to H Street NE or via the east
1691 ramp to F Street NE or the front of WUS. A projected 35 percent of for-hire drop-off
1692 activity and 25 percent of for-hire pick-up activity is projected to occur at this
1693 location.
- 1694 ■ **New H Street Concourse entrance on First Street NE:** See **Section 5.5.4.2, Alternative**
1695 *A, Direct Operational Impacts, For-hire Vehicles* for a description. In Alternative C, 20
1696 percent of for-hire drop-off activity and 20 percent of for-hire pick-up activity would
1697 occur at this location.
- 1698 ■ **New H Street Concourse entrance on 2nd Street NE:** See **Section 5.5.4.2, Alternative**
1699 *A, Direct Operational Impacts, For-hire Vehicles* for a description. An anticipated 5
1700 percent of for-hire drop-off activity and 5 percent of for-hire pick-up activity would
1701 occur at this location.
- 1702 ■ **New below-ground parking facility:** See **Section 5.5.4.3, Alternative B, Direct**
1703 *Operational Impacts, For-hire Vehicles* for a description. A projected 20 percent of
1704 for-hire pick-up activity would occur in the below-ground facility; no for-hire drop-off
1705 activity would be permitted there.

1706 Relative to the No-Action Alternative, Alternative C would generate an estimated
1707 1,400 additional for-hire trips in the AM peak hour (267 percent increase) and an additional
1708 1,202 for-hire trips (140 percent) in the PM peak hour. The principal source of increased
1709 peak-hour trips would be the increase in intercity rail activity. These trips were considered in
1710 the traffic impact analysis (see **Tables 5-47 and 5-48** below).

1711 As explained below (**Section 5.5.4.4, Alternative C, Direct Operational Impacts, Vehicular**
1712 *Traffic, Curbside Analysis*), volumes associated with for-hire as well as private pick-up and
1713 drop-off activity in front of WUS could create queueing and congestion, which would result in
1714 a moderate adverse impact on for-hire vehicle operations at WUS.

[Comparison to Existing Conditions](#)

1715 The beneficial impacts of Alternative C on for-hire vehicle activities would be the same
1716 relative to existing conditions as relative to the No-Action Alternative since pick-up and drop-
1717 off locations would be the same in both baselines. The increase in trips would be

1718 proportionately greater.⁶³ Relative to existing conditions, Alternative C would generate an
1719 estimated 1,530 additional for-hire trips in the AM peak hour (388 percent increase) and
1720 1,416 in the PM peak hour (219 percent increase). The principal source of increased peak-
1721 hour trips would be the increase in intercity rail activity.

Private Pick-up and Drop-off

1722 **Relative to the No-Action Alternative, Alternative C (either option) would have a moderate**
1723 **beneficial direct operational impact on private pick-ups and drop-offs because of the**
1724 **provision of new locations for these activities. These locations would adequately**
1725 **accommodate the anticipated growth in private pick-up and drop-off trips, but queuing**
1726 **may occur. Alternative C (either Option) would also have a moderate adverse direct**
1727 **operational impact on private pick-ups and drop-offs due to increased traffic congestion.**

1728 The same locations used by for-hire vehicles would be available for private pick-up and drop-
1729 off activity in Alternative C. However, private vehicles would not be allowed to use the east
1730 ramp to reach the front of WUS. The anticipated distribution of trips would be the same as
1731 for for-hire vehicles.

1732 Relative to the No-Action Alternative, Alternative C would generate an estimated 822
1733 additional private pick-up and drop-off trips (94 percent increase) in the AM peak hour and
1734 600 private pick-up and drop-off trips in the PM peak hour (63 percent increase). The
1735 principal source of increased peak-hour trips would be the increase in intercity rail activity.
1736 These trips were considered in the traffic impact analysis (see **Tables 5-47 and 5-48** below).

1737 As explained below (**Section 5.5.4.4, Alternative C, Direct Operational Impacts, Vehicular**
1738 **Traffic, Curbside Analysis**), volumes associated with private pick-up and drop-off as well as
1739 for-hire activity in front of WUS could create queueing and congestion, which would result in
1740 a moderate adverse impact on private pick-up and drop-off operations at WUS.

Comparison to Existing Conditions

1741 The beneficial impacts of Alternative C on private pick-up and drop-off activity would be the
1742 same relative to existing conditions as relative to the No-Action Alternative since pick-up and
1743 drop-off locations would be the same in both baselines. The increase in trips would be
1744 proportionately greater.⁶⁴ Relative to existing conditions, Alternative C would generate an
1745 estimated 1,038 additional trips in the AM peak hour (158 percent increase) and 836 in the
1746 PM peak hour (117 percent increase). The principal source of increased peak-hour trips
1747 would be the increase in intercity rail activity.

⁶³ See **Section 5.5.4.1, Direct Operational Impacts, For-hire Vehicles** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

⁶⁴ See **Section 5.5.4.1, Direct Operational Impacts, Private Pick-up and Drop-off** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

Vehicular Traffic

1748 **Relative to the No-Action Alternative, Alternative C would have major adverse direct**
1749 **operational impacts on traffic operations at several intersections near WUS because of**
1750 **increased traffic volumes and changes in traffic patterns due to the new parking locations.**

1751 ■ **In Alternative C, East Option, during at least one of the peak periods, out of 36**
1752 **intersections in the Local Study Area, five would degrade to LOS F; 19 would**
1753 **experience an increase in queue length of more than 150 feet; and 21 would**
1754 **experience an increase in average delay of more than 5 seconds.**

1755 ■ **In Alternative C, West Option, during at least one of the peak periods, out of**
1756 **36 intersections in the Local Study Area, four would degrade to LOS F; 15 would**
1757 **experience an increase in queue length of more than 150 feet; and 20 would**
1758 **experience an increase in average delay of more than 5 seconds.**

Trip Generation and Circulation

1759 WUS-related vehicular activity in Alternative C would be primarily distributed across five
1760 locations:

- 1761 ■ The pick-up and drop-off loop at the front of WUS;
- 1762 ■ The new bus and above-ground parking facilities, and new deck-level pick-up and
1763 drop-off location accessed from H Street NE;
- 1764 ■ The new curbside pick-up and drop-off location on First Street NE (serving the new H
1765 Street Concourse);
- 1766 ■ The new curbside pick-up and drop-off locations on 2nd Street NE (serving the new H
1767 Street Concourse); and
- 1768 ■ The new below-ground parking facility accessed from K Street NE.

1769 Alternative C would split parking activity between an above-ground facility, accessed from H
1770 Street NE (54 percent of all parking-generated traffic) and a below-ground facility, accessed
1771 from K Street NE (46 percent of parking-generated traffic). This would distribute parking-
1772 generated traffic approximately equally between the two streets. All rental car activity would
1773 be in the below-ground parking. Private and for-hire pick-up and drop-off activity would be
1774 spread across all five locations. Approximately 70 percent of WUS-related traffic is expected
1775 to travel to and from points west of WUS and 30 percent to and from points east. Deck-level
1776 circulation patterns in Alternative C are represented in **Figure 5-10** for the East Option and
1777 **Figure 5-11** for the West Option.⁶⁵

⁶⁵ These figures show all movements, including those assumed in consultation with DDOT for the private air-rights development, to provide a better understanding of anticipated traffic operations on the H Street Bridge. Arrows indicate movements, not planned street alignments.

Figure 5-101. Deck Level Circulation (All Movements), Alternative C, East Option

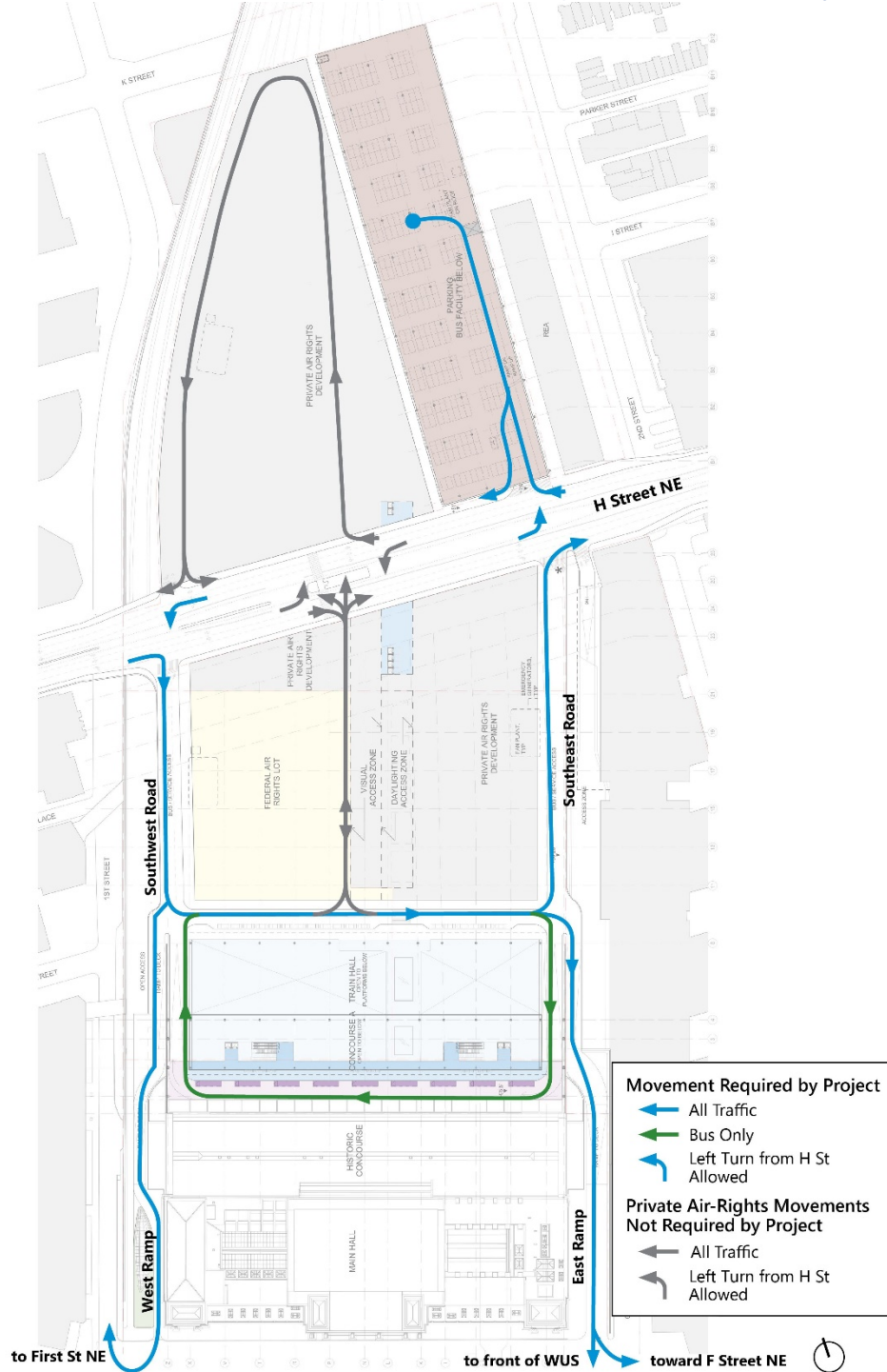
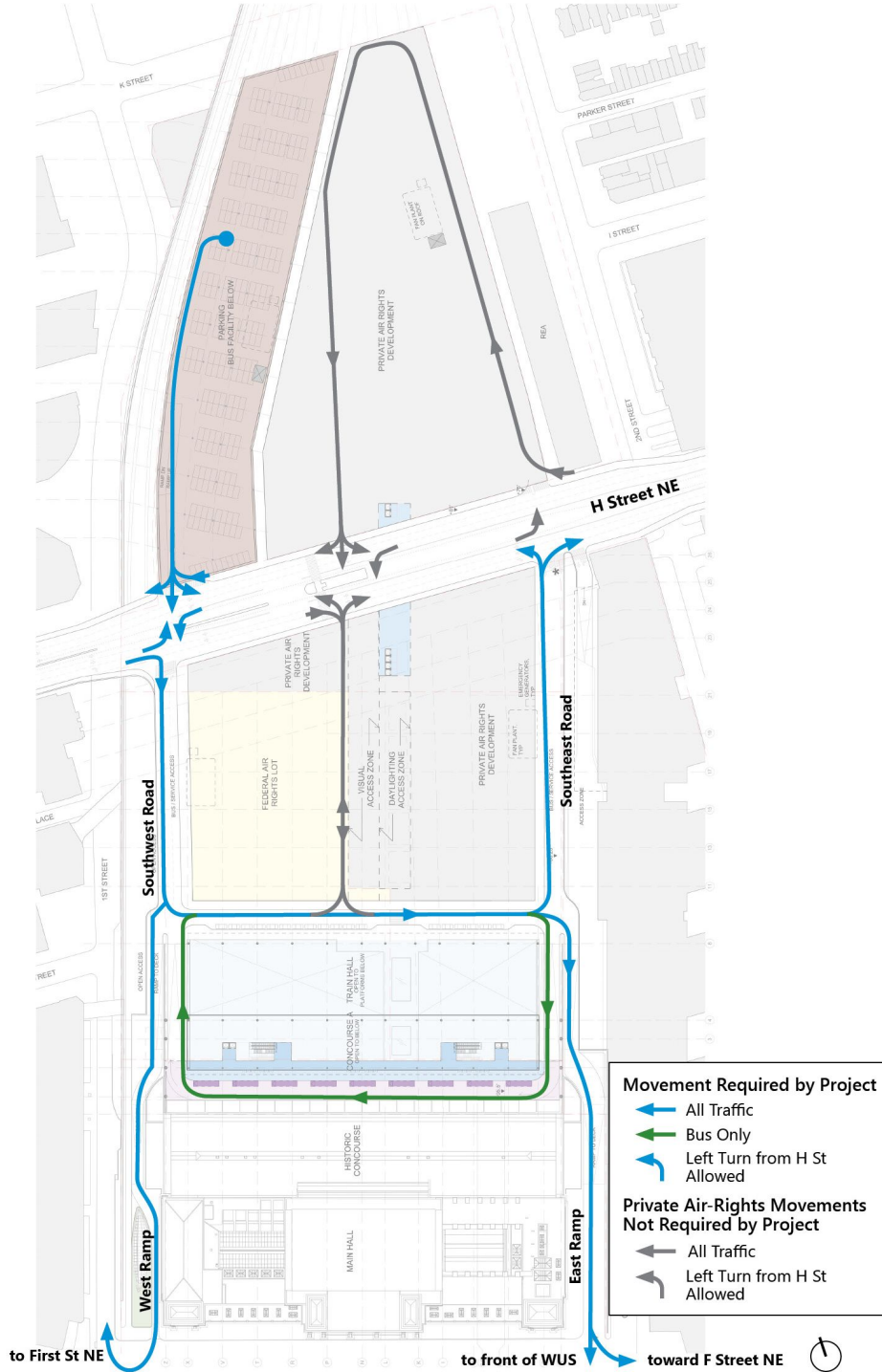


Figure 5-11. Deck Level Circulation (All Movements), Alternative C, West Option



1778 **Table 5-47** and **Table 5-48** show Alternative C AM and PM peak WUS-related traffic volumes,
 1779 respectively, along with the corresponding information for the No-Action Alternative.
 1780 Compared to the No-Action Alternative, Alternative C would generate 2,354 additional AM
 1781 peak trips (144 percent increase) and 1,844 additional PM peak trips (86 percent increase).
 1782 These volume increases would result in major adverse impacts to traffic operations at some
 1783 study intersections, as described below.

Table 5-47. AM Peak-hour Traffic Volumes, Alternative C

| | Alternative C | | | No-Action Alternative | | |
|---------------------------------|---------------|-------|-------|-----------------------|-----|-----|
| | Total Trips | In | Out | Total Trips | In | Out |
| Parking | 262 | 183 | 79 | 189 | 127 | 62 |
| Private Pick-Up/Drop-Off | 1,694 | 847 | 847 | 872 | 436 | 436 |
| For-hire Vehicles | 1,924 | 962 | 962 | 524 | 262 | 262 |
| Car Rental | 105 | 57 | 48 | 46 | 28 | 18 |
| Total Trips | 3,985 | 2,049 | 1,936 | 1,631 | 853 | 778 |

Table 5-48. PM Peak-hour Traffic Volumes, Alternative C

| | Alternative C | | | No-Action Alternative | | |
|---------------------------------|---------------|-------|-------|-----------------------|-------|-------|
| | Total Trips | In | Out | Total Trips | In | Out |
| Parking | 294 | 76 | 218 | 299 | 102 | 197 |
| Private Pick-Up/Drop-Off | 1,548 | 774 | 774 | 948 | 474 | 474 |
| For-hire Vehicles | 2,064 | 1,032 | 1,032 | 862 | 431 | 431 |
| Car Rental | 92 | 37 | 55 | 45 | 17 | 28 |
| Total Trips | 3,998 | 1,919 | 2,079 | 2,154 | 1,024 | 1,130 |

Comparison to Existing Conditions

1784 Relative to existing conditions, Alternative C would generate 2,766 additional AM peak trips
 1785 (227 percent increase) and 2,395 additional PM peak trips (149 percent increase).⁶⁶

Curbside Analysis

1786 The anticipated volumes associated with for-hire and private pick-up and drop-off activity
 1787 would potentially create conflicts and queuing in the front of WUS. At deck level, queuing
 1788 analysis indicates that the approximately 550 feet of curbside space adjacent to the east-
 1789 west train hall would accommodate for-hire vehicles and private pick-up and drop-off
 1790 without spill-back onto H Street NE. No queue would form at the First Street or 2nd Street
 1791 pick-up and drop-off areas. On First Street NE, there would be 253 pick-ups and drop-offs in
 1792 the AM peak and 223 in the PM peak. On 2nd Street NE, there would be 77 pick-up and drop-

⁶⁶ See Section 5.5.4.1, Direct Operational Impacts, Vehicular Traffic of Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report for existing conditions data.

1793 offs in the AM peak and 67 in the PM peak. In the below-ground parking facility accessed
 1794 from K Street, 95 pick-up and drop-offs would occur in the AM peak and 82 would occur in
 1795 the PM peak.

Intersection Analysis

1796 As for the other Action Alternatives, three indicators were used to assess Alternative C's
 1797 impacts on traffic operations relative to the No-Action Alternative: degradation of
 1798 intersection LOS to F due to vehicle trips generated by the alternative; increase in average
 1799 vehicle delay at an intersection of more than five seconds; and increase in 95th-percentile
 1800 queue lengths of more than 150 feet for any lane group in an intersection.

Alternative C, East Option

1801 **Table 5-49** identifies the study intersections that would experience an impact relative to the
 1802 No-Action Alternative under any of the three indicators considered in the analysis.

Table 5-49. Summary of Traffic Impacts, Alternative C East Option

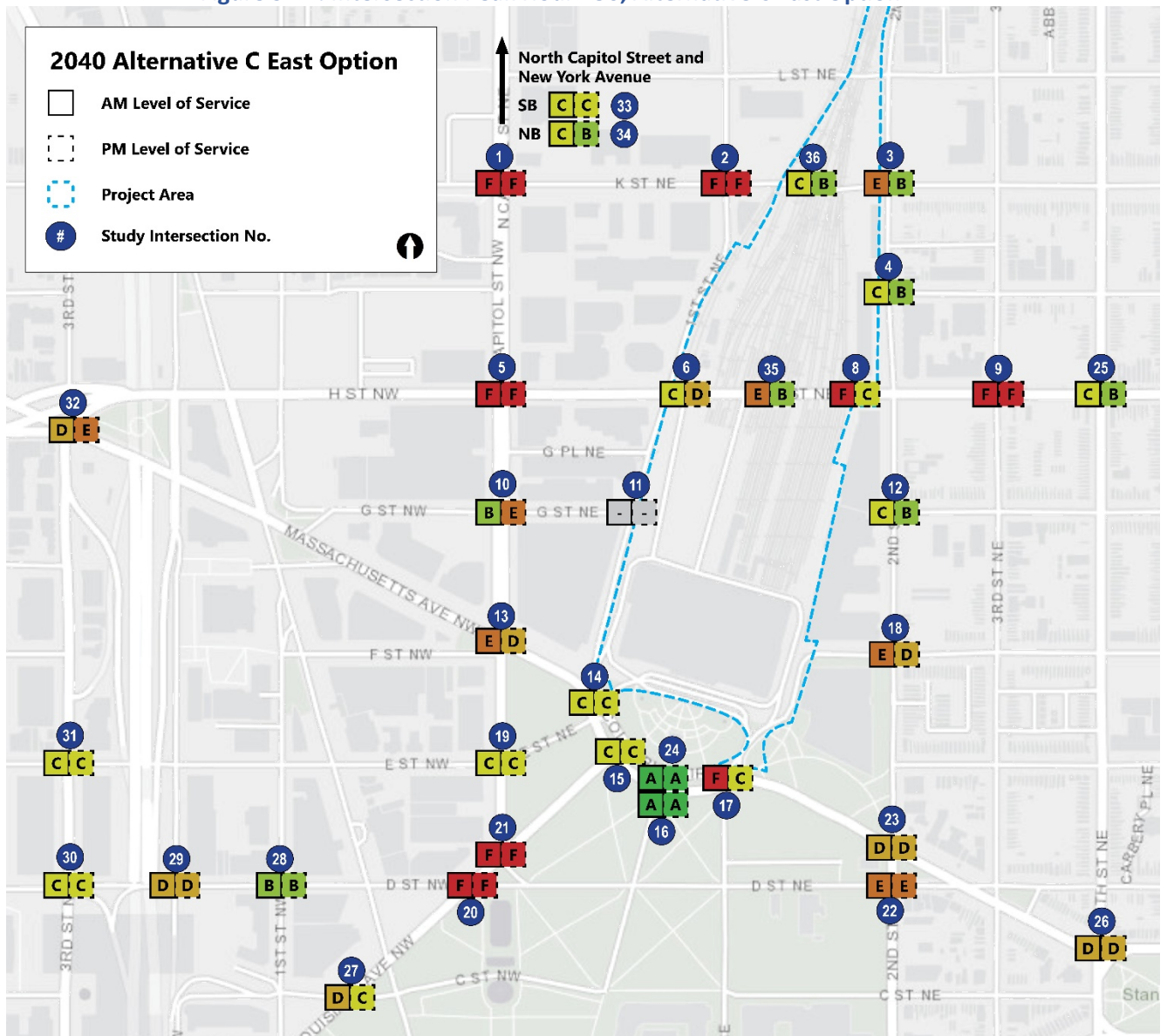
| Intersection # | Intersection Name | LOS | Queuing | Delay |
|----------------|---|-----|---------|-------|
| 1 | North Capitol Street / K Street | X | X* | X* |
| 2 | First Street / K Street NE | X | X* | X* |
| 3 | 2 nd Street / K Street NE | | X | X* |
| 5 | North Capitol Street / H Street | | X* | X* |
| 6 | WUS West Intersection / H Street NE | | X | X |
| 8 | WUS East Intersection / H Street NE | | X* | X* |
| 9 | 3 rd Street / H Street NE | X | X* | X* |
| 10 | North Capitol Street / G Street | | X* | X* |
| 13 | North Capitol Street / Massachusetts Ave | | X | X* |
| 17 | First Street / Massachusetts Avenue NE | X | X | X* |
| 18 | 2 nd Street / F Street NE | | | X* |
| 19 | North Capitol Street / E Street | | X | X |
| 20 | Louisiana Avenue / D Street NW | X | X* | X* |
| 21 | Louisiana Avenue / North Capitol Street | | | X* |
| 22 | 2 nd Street / D Street NE | | X* | X* |
| 23 | 2 nd Street / Massachusetts Avenue NE | | X* | X* |
| 26 | Massachusetts Avenue / C Street / 4 th Street NE | | | X |
| 27 | Louisiana Avenue / C Street NW | | X* | X* |
| 29 | 2 nd Street / D Street NW | | X | X* |
| 32 | 3 rd Street / Massachusetts Avenue / H Street NW | | X* | X |
| 33 | North Capitol Street (SB Ramp) / New York Avenue | | X | |
| 34 | North Capitol Street (NB Ramp) / New York Avenue | | X* | |
| 35 | WUS Central Intersection / H Street NE | | | X* |

* indicates the impact would occur in both peak hours.

1803 **Figure 5-12** shows peak-hour LOS at each of the study intersections in Alternative C with the
 1804 East Option. Five out of 36 study intersections would degrade to LOS F in at least one peak
 1805 hour. Nineteen intersections out of 36 would experience an increase in queue length of more

1806 than 150 feet for one or more lane groups relative to the No-Action Alternative. Of those
 1807 19 intersections, 12 would experience such a queue increase in both peak hours.
 1808 Finally, in Alternative C with the East Option, 21 of the 36 study intersections would
 1809 experience an increase in average delay of more than 5 seconds for at least one peak period
 1810 relative to the No-Action Alternative. Seventeen of those 21 intersections would see such an
 1811 increased delay in both peak hours.

Figure 5-12. Intersection Peak Hour LOS, Alternative C East Option



Comparison to Existing Conditions

1812 Relative to existing conditions, in Alternative C with the East Option: ⁶⁷

- 1813 ■ Seven intersections would degrade to LOS F in at least one peak period.
- 1814 ■ Twenty-five intersections would experience an increase in queue length of more than
- 1815 150 feet for one or more lane groups, with 20 doing so in both peak hours.
- 1816 ■ Twenty-three intersections would experience delay increases of more than 5
- 1817 seconds, with 14 doing so in both peak hours.

Alternative C, West Option

1818 **Table 5-50** identifies the study intersections that would experience an impact relative to the
 1819 No-Action Alternative under any of the three indicators considered in the analysis under
 1820 Alternative C with the West Option.

Table 5-50. Summary of Traffic Impacts, Alternative C West Option

| Intersection # | Intersection Name | LOS | Queuing | Delay |
|----------------|---|-----|---------|-------|
| 1 | North Capitol Street / K Street | X | X* | X* |
| 2 | First Street / K Street NE | X | X* | X* |
| 3 | 2 nd Street / K Street NE | | | X* |
| 5 | North Capitol Street / H Street | | X* | X* |
| 6 | WUS West Intersection / H Street NE | X | X* | X* |
| 8 | WUS East Intersection / H Street NE | | | X* |
| 9 | 3 rd Street / H Street NE | | | X |
| 10 | North Capitol Street / G Street | | X* | X* |
| 13 | North Capitol Street / Massachusetts Ave | | X | X |
| 17 | First Street / Massachusetts Avenue NE | X | | X |
| 18 | 2 nd Street / F Street NE | | | X* |
| 19 | North Capitol Street / E Street | | X | X |
| 20 | Louisiana Avenue / D Street NW | | X* | X* |
| 21 | Louisiana Avenue / North Capitol Street | | | X* |
| 22 | 2 nd Street / D Street NE | | X | X* |
| 23 | 2 nd Street / Massachusetts Avenue NE | | X | X* |
| 26 | Massachusetts Avenue / C Street / 4 th Street NE | | X | X* |
| 27 | Louisiana Avenue / C Street NW | | X* | X* |
| 30 | 3 rd Street / I-395 On-ramp / D Street NW | | X | |
| 31 | 3 rd Street / E Street NW | | X | X |
| 32 | 3 rd Street / Massachusetts Avenue / H Street NW | | | X* |
| 35 | WUS Central Intersection / H Street NE | | X | |

* indicates the impact would occur in both peak hours.

⁶⁷ See **Section 5.5.4.1, Direct Operational Impacts, Vehicular Traffic** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

1821 **Figure 5-13** shows the peak hour LOS at each of the 36 study intersections in Alternative C
1822 with the West Option. Four intersections would degrade to LOS F during at least one peak
1823 hour relative to the No-Action Alternative.

1824 Fifteen intersections out of 36 would experience an increase in queue length of more than
1825 150 feet for one or more lane groups relative to the No-Action Alternative. Of those
1826 15 intersections, seven would experience such a queue increase in both peak hours.

1827 Finally, in Alternative C with the West Option, 20 of the 36 study intersections would
1828 experience an increase in average delay of more than 5 seconds in at least one peak period
1829 relative to the No-Action Alternative. Fifteen of those 20 intersections would see such an
1830 increase in both peak hours.

Comparison to Existing Conditions

Relative to existing conditions, in Alternative C with the West Option:⁶⁸

- 1831 ■ Nine intersections would degrade to LOS F in at least one peak period.
- 1832 ■ Twenty-six intersections would experience an increase in queue length of more than
1833 150 feet for one or more lane groups, with 20 doing so in both peak hours.
- 1834 ■ Twenty-two intersections would experience delay increases of more than 5 seconds,
1835 with 18 doing so in both peak hours.

Indirect Operational Impacts

1836 **Alternative C (either option) would have moderate adverse indirect operational impacts on**
1837 **multimodal transportation because of the trips generated by the potential Federal air-**
1838 **rights development.**

1839 In Alternative C, around 952,600 square feet of Federal air rights within the footprint of the
1840 existing parking garage and bus facility would be potentially available for development
1841 separately from the Project. For the purposes of the transportation analysis, it was
1842 conservatively assumed that this space would become office space.

1843 **Table 5-51** shows the multimodal trips that the Federal air-rights development would
1844 generate under this assumption. All vehicular trips were considered in the traffic impact
1845 analysis for Alternative C. The Federal air-rights development would add trips to all other
1846 local transportation modes, an adverse impact. The number of additional trips would be
1847 typical of an office space development of its size, however, and represent a small increment
1848 over the number of trips directly generated by Alternative C. Therefore, this adverse impact
1849 would be moderate.

⁶⁸ See **Section 5.5.4.1, Direct Operational Impacts, Vehicular Traffic** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

Figure 5-13. Intersection Peak Hour LOS, Alternative C West Option

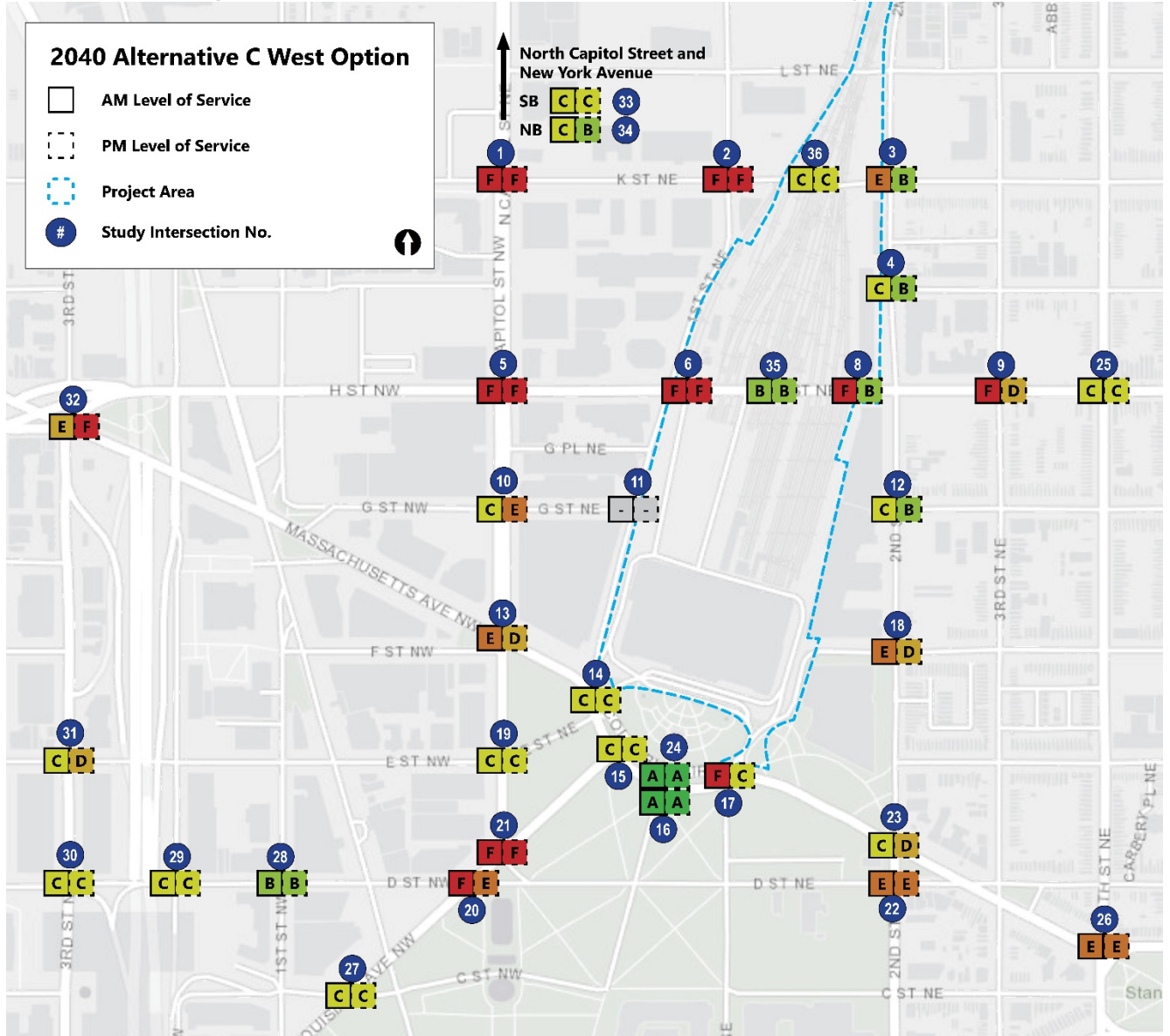


Table 5-51. Federal Air-rights Development Trip Generation, Alternative C

| | AM Peak | | | PM Peak | | |
|--------------------------|-------------|---------|----------|-------------|---------|----------|
| | Total Trips | Inbound | Outbound | Total Trips | Inbound | Outbound |
| Parking | 296 | 260 | 36 | 292 | 50 | 141 |
| Private Pick-Up/Drop-Off | 0 | 0 | 0 | 0 | 0 | 0 |
| For-hire Vehicles | 22 | 19 | 3 | 21 | 4 | 17 |
| Car Rental | 0 | 0 | 0 | 0 | 0 | 0 |
| Amtrak Express | 10 | 9 | 1 | 11 | 2 | 9 |
| Amtrak Corridor | 0 | 0 | 0 | 0 | 0 | 0 |
| MARC | 137 | 128 | 9 | 147 | 23 | 124 |
| VRE | 79 | 74 | 5 | 84 | 13 | 71 |
| Metrorail | 295 | 276 | 19 | 316 | 50 | 266 |
| Streetcar | 29 | 27 | 2 | 32 | 5 | 27 |
| City/Commuter Bus | 59 | 55 | 4 | 63 | 10 | 53 |
| Pedestrian | 98 | 92 | 6 | 105 | 17 | 88 |
| Bicycle | 98 | 92 | 6 | 195 | 17 | 88 |

Construction Impacts

1850 Construction of Alternative C (either option) would take place over approximately 12 years
 1851 and 3 months. As in the other Action Alternatives, and as explained for Alternative A in
 1852 **Section 5.5.4.2, Alternative A, Construction Impacts**, work would be conducted in four east-
 1853 to-west phases with the greatest impacts on transportation occurring in Phase 4. Phase
 1854 durations and the duration of excavation activities in each phase for Alternative B are shown
 1855 in **Table 5-52**.

Table 5-52. Construction and Excavation Duration, Alternative C

| Phase | Overall Duration | Duration of Excavation |
|---------------------------------|--------------------|------------------------|
| Phase 1 | 2 years, 5 months | 5 months |
| <i>Intermediate Phase</i> | <i>12 months</i> | None |
| Phase 2 | 2 years, 4 months | 10 months |
| Phase 3 | 2 years, 6 months | 11 months |
| Phase 4 | 4 years | 2 years |
| Total Project Completion | 12 years, 3 months | 4 years, 2 months |

1856 Except for the difference in duration, the construction impacts of Alternative C on all
 1857 transportation modes considered other than intercity, tour/charter, and sightseeing buses;
 1858 city and commuter buses; vehicular parking and rental cars; and vehicular traffic would be as
 1859 described for Alternative A in **Section 5.5.4.2, Alternative A, Construction Impacts**.

1860 Construction impacts on city and commuter buses would be as described for Alternative B in
1861 **Section 5.5.4.3, *Alternative B, Construction Impacts***. The following sections focus on those
1862 Alternative C impacts that would meaningfully differ from those of Alternative A or
1863 Alternative B. Refer to **Section 5.5.4.2** or **5.5.4.3** for impacts on the transportation modes not
1864 addressed below.

Intercity, Tour/Charter, and Sightseeing Buses

1865 **Construction of Alternative C with the East Option would have minor adverse impacts on**
1866 **bus operations and bus passenger accommodations.**

1867 In Alternative C with the East Option, the existing bus facility would remain in operation until
1868 its demolition during Phase 4 of construction. Phase 4 would last approximately 4 years and
1869 begin approximately 8 years and 3 months after the start of construction. The new facility,
1870 located to the north of H Street NE on the eastern side of the Project Area, would be
1871 complete by the time the existing one is demolished. Bus operations could move to the new
1872 location with minimal disruption. The bus pick-up and drop-off area near the train hall would
1873 not be available until the end of Phase 4. However, implementation of an enhanced active
1874 management approach would allow the main facility to operate adequately in the interim.
1875 The potential reduction in flexibility and the greater active management challenges would be
1876 a minor adverse impact.

1877 **Construction of Alternative C with the West Option would have major adverse impacts on**
1878 **bus operations and bus passenger accommodations.**

1879 In the West Option, neither the bus facility nor the bus pick-up and drop-off area would be
1880 available when demolition of the existing bus facility takes place. Therefore, impacts would
1881 be as described for Alternative A in **Section 5.5.4.2, *Alternative A, Construction Impacts,***
1882 ***Intercity, Tour/Charter, and Sightseeing Buses***, except for the difference in duration (4 years
1883 in Alternative C).

Vehicular Parking and Rental Cars

1884 **Construction of Alternative C (either option) would have a major adverse direct impact on**
1885 **parking between the demolition of the existing parking garage and the completion of the**
1886 **below-ground parking in Phase 4 of construction.**

Alternative C, East Option

1887 The existing parking garage would remain in operation until its demolition in Phase 4 of
1888 construction, which would last for approximately 4 years and begin approximately 8 years
1889 and 3 months after the start of construction. By that time, the new above-ground parking
1890 facility on the eastern side of the Project Area would be complete. This facility would provide
1891 about 750 spaces. Below-ground parking would not be available until the end of Phase 4.
1892 Until the completion of the below-ground parking facility, there would be a shortage of
1893 parking at WUS relative to the parking program of 1,600 spaces. The program would not be
1894 fully met.

1895 To fully meet the parking program, interim parking would have to be provided. At the current
1896 stage of planning, no potential location or locations have been identified. Without an
1897 adequately sized interim parking location, during phase 4, there would be a shortage of
1898 around 850 parking spaces at WUS relative to the program.

1899 The reduction in parking capacity would likely lead WUS visitors or passengers to use
1900 alternative modes of transportation, including Metrorail, for-hire vehicle, and private pick-
1901 ups and drop-offs. Based on projected distribution, this shift would generate approximately
1902 114 daily Metrorail trips, 171 daily for-hire trips, and 170 daily private pick-up and drop-off
1903 trips. Given the overall daily volumes of these modes, the added trips would be manageable.

1904 As explained for Alternative A in **Section 5.5.4.2, Alternative A, Construction Impacts,**
1905 *Vehicular Parking and Rental Cars*, it is possible that some WUS-users would still drive to the
1906 station, including users from areas not well served by transit, who may have a limited set of
1907 options. These users may seek parking in commercial garages. No significant use of local
1908 streets for WUS-related long-term parking is likely because of parking restrictions.

Alternative C, West Option

1909 In the West Option, neither the above-ground nor the below-ground parking facility would be
1910 available when demolition of the existing garage occurs. Therefore, impacts would be as
1911 described for Alternative A (see **Section 5.5.4.2, Alternative A, Construction Impacts,**
1912 *Vehicular Parking and Rental Cars*) except for the duration. In this alternative, parking would
1913 be unavailable at WUS for four years.

Vehicular Traffic

1914 **Construction of Alternative C (either option) would have major adverse impact on vehicular**
1915 **traffic operations because of roadway closures and construction vehicle traffic.**

1916 In addition to the impacts described in **Section 5.5.4.2, Alternative A, Construction Impacts,**
1917 *Vehicular Traffic*, the construction of the new intersection providing access to the below-
1918 ground parking facility would require lane closures under the K Street overpass. As noted in
1919 **Section 5.5.4.3, Alternative B, Construction Impacts, Vehicular Traffic**, one lane of traffic in
1920 each direction would remain in operation at least during the day. However, delays and back-
1921 up may occur, and some traffic may seek alternative routes, such as L Street.

1922 As in the other Action Alternatives, construction of Alternative C would generate truck traffic
1923 to and from the Project Area during the entire construction period. The greatest amount of
1924 traffic would occur during excavation activities, with up to 120 trucks per day. As explained
1925 for Alternative A, this is a maximum, conservative estimate that assumes that no work trains
1926 would be used to haul spoils away. As in all Action Alternatives, construction trucks have the
1927 potential to result in major adverse impacts on local traffic operations. With one-level of
1928 below-ground parking on the west side of the Project Area, Alternative C would require
1929 substantial excavation and generate a commensurate amount of spoil. Excavation for the
1930 below-ground parking facility would occur in Phase 4. In Alternative C, excavation-related

1931 truck traffic would occur for approximately 2 years. Because work in Phase 4 would be on the
1932 west side of the Project Area, First Street NE would be the local street most affected. As in all
1933 Action Alternatives, use of work train to remove the spoils could reduce or eliminate
1934 excavation-related truck traffic.

5.5.4.5 Alternative D

1935 The following sections describe the direct and indirect, operational and construction impacts
1936 of Alternative D. **Figure 5-14** illustrates the key transportation elements of Alternative D.

Direct Operational Impacts

1937 The direct operational impacts of Alternative D on commuter and intercity railroads; the DC
1938 Streetcar; loading; city and commuter bus ridership; and car rental activities would be the
1939 same as those of Alternative A (**Section 5.5.4.2, Alternative A, Direct Operational Impacts**).
1940 Impacts on bicycle activity and city and commuter bus operations would be the same as in
1941 Alternative B. (**Section 5.5.4.3, Alternative B, Direct Operational Impacts**). Impact on for-hire
1942 vehicles and private pick-up and drop-off would be the same as those of Alternative C
1943 (**Section 5.5.4.4, Alternative C, Direct Operational Impacts**). This section does not address
1944 these impacts further. It only addresses those transportation modes that would experience
1945 meaningfully different operational impacts in Alternative D.

WMATA Metrorail

1946 **Relative to the No-Action Alternative, Alternative D would have a moderate adverse direct**
1947 **operational impact on Metrorail operations because of increased demand that would**
1948 **aggravate train overcapacity and station circulation issues.**

1949 Increased train service and ridership as well as the reduction in parking capacity and the new
1950 retail uses included in the alternative would generate increased demand on Metrorail at
1951 WUS. **Table 5-53** shows modeled AM peak and PM peak activity in Alternative D. When the
1952 projected V/C ratio exceeds 100 percent, there would be a need for additional service to
1953 address overcrowding.

Figure 5-14. Key Transportation Elements, Alternative D

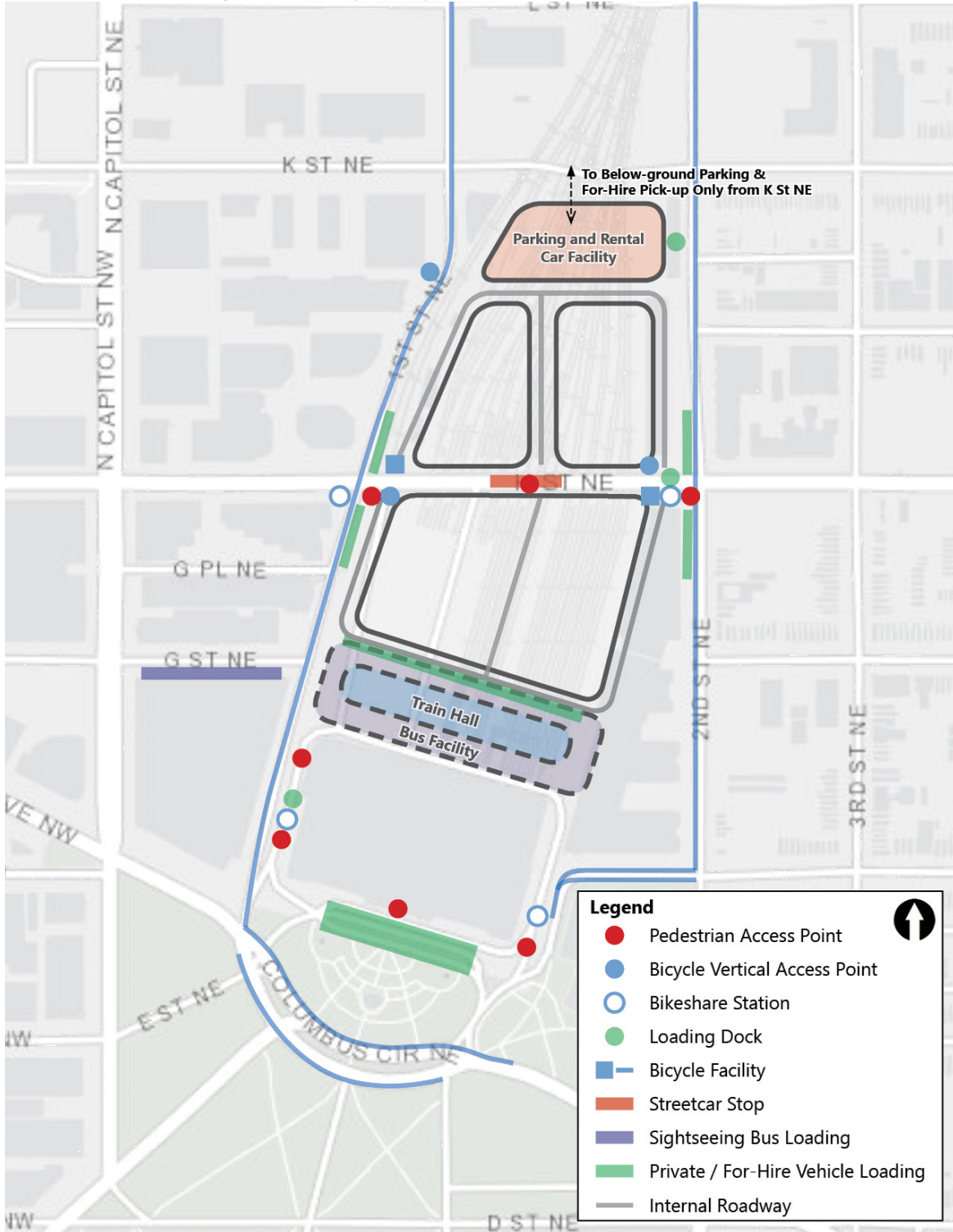


Table 5-53. Peak WUS-related Metrorail Activity, Alternative D

| | Alternative D | | No-Action Alternative | |
|-------------------------|---------------|----------|-----------------------|----------|
| | Shady Grove | Glenmont | Shady Grove | Glenmont |
| AM Peak Hour | | | | |
| V/C Arriving at WUS | 83% | 28% | 80% | 25% |
| WUS Boardings | 8,377 | 1,626 | 5,202 | 1,010 |
| WUS Alightings | 5,050 | 3,428 | 4,128 | 2,803 |
| Through Ridership | 9,214 | 1,291 | 9,523 | 1,447 |
| Ridership Departing WUS | 17,591 | 2,917 | 14,725 | 2,457 |
| V/C Departing WUS | 103% | 17% | 86% | 14% |
| Excess Demand | 448 | 0 | 0 | 0 |
| PM Peak Hour | | | | |
| V/C Arriving at WUS | 21% | 115% | 20% | 107% |
| WUS Boardings | 3,209 | 4,591 | 2,559 | 3,661 |
| WUS Alightings | 1,553 | 8,239 | 1,154 | 6,126 |
| Through Ridership | 1,647 | 9,920 | 1,953 | 10,722 |
| Ridership Departing WUS | 4,856 | 14,511 | 4,512 | 14,383 |
| V/C Departing WUS | 31% | 92% | 29% | 91% |
| Excess Demand | 0 | 2,421 | 0 | 1,110 |

1954 In Alternative D, volumes would exceed capacity departing from WUS in the Shady Grove
 1955 direction during the AM peak and arriving to WUS in the Glenmont direction during the PM
 1956 peak. In the AM peak, Alternative D would cause the V/C ratio leaving WUS toward Shady
 1957 Grove to reach 103 percent, against 86 percent in the No-Action Alternative. This would
 1958 create an excess demand of around 448 passengers. Based on WMATA ridership trends,
 1959 overcapacity conditions are anticipated to dissipate within the Red Line core.⁶⁹

1960 In the PM peak, capacity exceedance toward Glenmont (115 percent) would be greater in
 1961 Alternative D than in the No-Action Alternative (107 percent). Alternative D would aggravate
 1962 the level of crowding, generating an additional excess demand of approximately 1,311
 1963 passengers, for a total of 2,421.

1964 The increase in Metrorail ridership at WUS would affect passenger circulation as described in
 1965 **Section 5.5.4.2, Alternative A, Direct Operational Impacts, WMATA Metrorail.**

Comparison to Existing Conditions

1966 Relative to existing conditions, Alternative D would have a major adverse direct operational
 1967 impact on Metrorail operations at WUS. The increase in overcrowding and need for extra
 1968 capacity would be greater compared to existing conditions than to the No-Action

⁶⁹ The Red Line core, as defined by WMATA, consists of the line segment between Dupont Circle and WUS.

1969 Alternative.⁷⁰ In the AM peak, Alternative D would cause the V/C ratio leaving WUS toward
1970 Shady Grove to reach 103 percent, against 69 percent in existing conditions. This would
1971 increase the overall demand in the AM peak in the Shady Grove direction by an estimated
1972 7,213 passengers. In the PM peak, the V/C ratio arriving at WUS toward Glenmont would be
1973 115 percent, against 72 percent under existing conditions. Alternative D would increase
1974 overall demand in this direction by around 8,211 passengers.

Intercity, Tour/Charter, and Sightseeing Buses

1975 **Relative to the No-Action Alternative, Alternative D would have a moderate adverse direct**
1976 **operational impact on intercity and tour/charter bus operations because of the new 30-**
1977 **minute time limit for buses at WUS. Alternative D would have a negligible adverse direct**
1978 **operational impact on sightseeing buses as a result of their relocation to G Street NE.**

1979 In Alternative D, the bus facility would be located just north of the historic station building,
1980 looping around the new train hall. Access would be from H Street NE via the west
1981 intersection and egress back to H Street NE would be via the east intersection. All intercity,
1982 and tour/charter buses serving WUS would use this facility.

1983 The anticipated increase in bus ridership and impacts of the 30-minute time limit required
1984 because of the reduction in the number of slips relative to the existing facility (which would
1985 continue in use in the No-Action Alternative) would be the same as those of Alternative A:
1986 see **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Intercity, Tour/Charter, and**
1987 **Sightseeing Buses**. There would be greater flexibility in bus movements in Alternative D than
1988 in the No-Action Alternative because buses exiting the facility could turn either left or right
1989 onto H Street NE.

Pedestrians

1990 **Relative to the No-Action Alternative, Alternative D would have a moderate beneficial**
1991 **direct operational impact on pedestrian circulation inside WUS. Additional access points**
1992 **would disperse pedestrian traffic and make access to WUS easier; however, some**
1993 **passengers would have to walk longer distances. Outside of WUS, Alternative D would**
1994 **have a minor adverse direct operational impact on pedestrian circulation because of**
1995 **increased queueing at certain crossings near the station.**

1996 The impacts of Alternative D would generally be similar to those of Alternative A
1997 (**Section 5.5.4.2, Alternative A, Direct Operational Impacts, Pedestrians**) and would be
1998 beneficial. Because of the location of the new above- and below-ground parking facilities,
1999 however, beneficial impacts would be moderate because longer walking distances would
2000 partially offset the benefits from larger circulation spaces and additional access points.

⁷⁰ See **Section 5.5.5.1, Direct Operational Impacts, WMATA Metrorail of Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data. Total ridership projections for Alternative D include ridership generated by the private air-rights development.

2001 Above-ground parking users would have to walk outside from the facility to H Street NE to
2002 reach the nearest entry point to the H Street Concourse.

Comparison to Existing Conditions

2003 The impacts of Alternative D relative to existing conditions would be as described for
2004 Alternative A in **Section 5.5.4.2, *Alternative A, Direct Operational Impacts, Pedestrians.***

Vehicular Parking and Rental Cars

2005 **Relative to the No-Action Alternative, Alternative D would have a moderate adverse direct**
2006 **operational impact on parking at WUS because of a reduction in parking capacity.**
2007 **Alternative D would have a minor beneficial direct operational impact on rental car**
2008 **operations.**

2009 Alternative D would split parking between a new above-ground facility (south of K Street NE)
2010 and a new below-ground facility beneath the rail terminal. Vehicular access to above-ground
2011 parking would be via H Street NE. Inbound vehicles would use the east intersection and
2012 outbound ones the west intersection. Vehicular access to below-ground parking would be
2013 through a new intersection in the K Street NE underpass, as in Alternatives B and C (see
2014 **Section 5.5.4.3, *Alternative B, Direct Operational Impacts, Vehicular Parking and Rental Cars.***)

2015 Relative to the No-Action Alternative, this would change the routes WUS users would take to
2016 park at the station and affect the local network. However, the change in location by itself
2017 would not adversely affect parking or car rental activities. The new parking facilities would
2018 have space for approximately 800 fewer cars than the existing one. This would be an adverse
2019 impact.⁷¹ This adverse impact would be moderate because the new facilities would meet the
2020 parking program for the Project and while they would not meet the projected parking
2021 demand, it is anticipated that users not able to park would use different modes to reach the
2022 station.⁷² Fewer passengers or visitors are anticipated to drive and park at WUS by 2040.⁷³

2023 Because parking capacity in Alternative D would be very close to that provided in Alternative
2024 C, the number of parking-generated vehicular trips would be the same as in that alternative:
2025 see **Section 5.5.4.4, *Alternative C, Direct Operational Impacts, Vehicular Parking and Rental***
2026 ***Cars.*** However, the trips to the above-ground parking facility would be distributed differently.
2027 In Alternative D, parking access would be distributed between two intersections on H Street

⁷¹ As noted in **Section 5.5.3.1, *Operational Impacts,*** the parking impact analysis addresses parking as a resource for which there is a demand. Therefore, a reduction in parking availability is considered an adverse impact on parking. A reduction in parking availability may also have adverse or beneficial consequences for other resources or transportation modes. Such consequences are incorporated into the impact analyses for those other resources or transportation modes.

⁷² **Appendix A6, *Parking Program Memorandum,*** provides more information on parking demand projections and the development of the parking program.

⁷³ The MWCOG Model estimates a 10% reduction in single-occupancy vehicle trips in the WUS area to 2040. Additionally, Amtrak as indicated to FRA that passenger parking is not essential to Amtrak's operation of intercity passenger rail at WUS and it anticipates passenger parking demand to continually decrease in the future.

2028 NE (east and west intersections) as opposed to a single intersection (east or west
2029 intersection, depending on the option) in Alternative C.

Comparison to Existing Conditions

2030 The impacts of Alternative D relative to existing conditions would be as described for
2031 Alternative C in **Section 5.5.4.4, Alternative C, Direct Operational Impacts, Vehicular Parking**
2032 **and Rental Cars.**

Vehicular Traffic

2033 **Relative to the No-Action Alternative, Alternative D would have major adverse direct**
2034 **operational impacts on traffic operations at several intersections near WUS because of**
2035 **increased traffic volumes and changes in traffic patterns due to the new parking locations.**
2036 **During at least one of the peak periods, out of 36 intersections in the Local Study Area, four**
2037 **would degrade to LOS F; 14 would experience an increase in queue length of more than 150**
2038 **feet; and 20 would experience an increase in average delay of more than 5 seconds.**

Trip Generation and Circulation

2039 WUS-related vehicular activity in Alternative D would be primarily distributed across five
2040 locations:

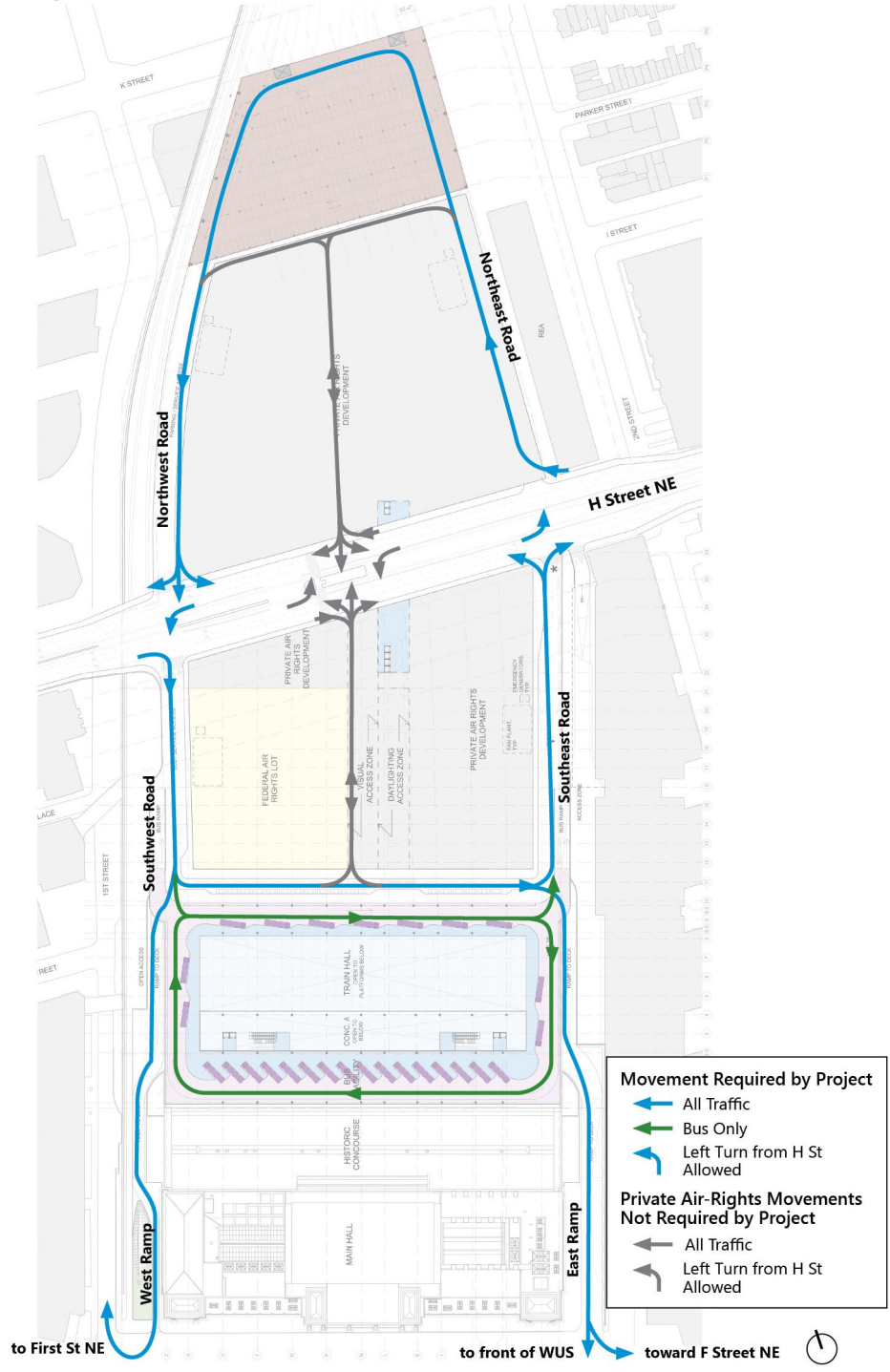
- 2041 ■ The pick-up and drop-off loop at the front of WUS;
- 2042 ■ The new bus and above-ground parking facilities, and new deck-level pick-up and
2043 drop-off location accessed from H Street NE;
- 2044 ■ The new below-ground parking facility accessed from K Street NE;
- 2045 ■ The new curbside pick-up and drop-off location on First Street NE (serving the new H
2046 Street Concourse); and
- 2047 ■ The new curbside pick-up and drop-off locations on 2nd Street NE (serving the new H
2048 Street Concourse).

2049 Alternative D would also generate the same number of WUS-related trips as Alternative C:
2050 see **Section 5.5.4.4, Alternative C, Direct Operational Impacts, Vehicular Traffic.**

2051 Approximately 70 percent of WUS-related traffic is expected to travel to and from points
2052 west of WUS and 30 percent going to points east. Deck-level circulation in Alternative D is
2053 represented in **Figure 5-15.**⁷⁴

⁷⁴ Figure 5-15 shows all movements, including those assumed in consultation with DDOT for the private air-rights development, to provide a better understanding of anticipated traffic operations on the H Street Bridge. Arrows indicate movements, not planned street alignments.

Figure 5-15. Deck Level Circulation (All Movements), Alternative D



Curbside Analysis

2054 The anticipated volumes associated with for-hire and private pick-up and drop-off activity
2055 would potentially create conflicts and queueing, as in Alternative C. These impacts are
2056 addressed in **Section 5.5.4.4, Alternative C, Direct Operational Impacts, Vehicular Traffic,**
2057 *Curbside Analysis*.

Intersection Analysis

2058 As with all the Action Alternatives, three indicators were used to assess impacts on traffic
2059 operations in Alternative D, based on comparison to the No-Action Alternative: degradation
2060 of intersection LOS to F due to vehicle trips generated by the Project; increase in average
2061 vehicle delay at an intersection by more than 5 seconds; and increase in 95th-percentile
2062 queue lengths of more than 150 feet for any lane group in an intersection. **Table 5-54**
2063 identifies the study intersections that would experience an impact relative to the No-Action
2064 Alternative under any of these three indicators.

2065 **Figure 5-16** shows peak-hour LOS for each of the study intersections in Alternative D. In this
2066 alternative, four intersections would degrade to LOS F during at least one peak hour relative
2067 to the No-Action Alternative.

2068 Fourteen intersections out of 36 would experience an increase in queue length of more than
2069 150 feet for one or more lane groups relative to the No-Action Alternative. Of those
2070 14 intersections, seven would experience such a queue increase in both peak hours.

2071 Finally, in Alternative D, 20 of the 36 study intersections would experience an increase in
2072 average delay of more than 5 seconds for at least one peak period relative to the No-Action
2073 Alternative. Fourteen of those 20 intersections would see such an increased delay in both
2074 peak hours.

Comparison to Existing Conditions

2075 Relative to existing conditions, in Alternative D:⁷⁵

- 2076 ■ Eight intersections would degrade to LOS F in at least one peak period.
- 2077 ■ Twenty-six intersections would experience an increase in queue length of more than
2078 150 feet for one or more lane groups, with 19 doing so in both peak hours.
- 2079 ■ Twenty-two intersections would experience delay increases of more than 5 seconds,
2080 with 18 doing so in both peak hours.

⁷⁵ See **Section 5.5.5.1, Direct Operational Impacts, Vehicular Traffic** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

Figure 5-16. Intersection Peak Hour LOS, Alternative D

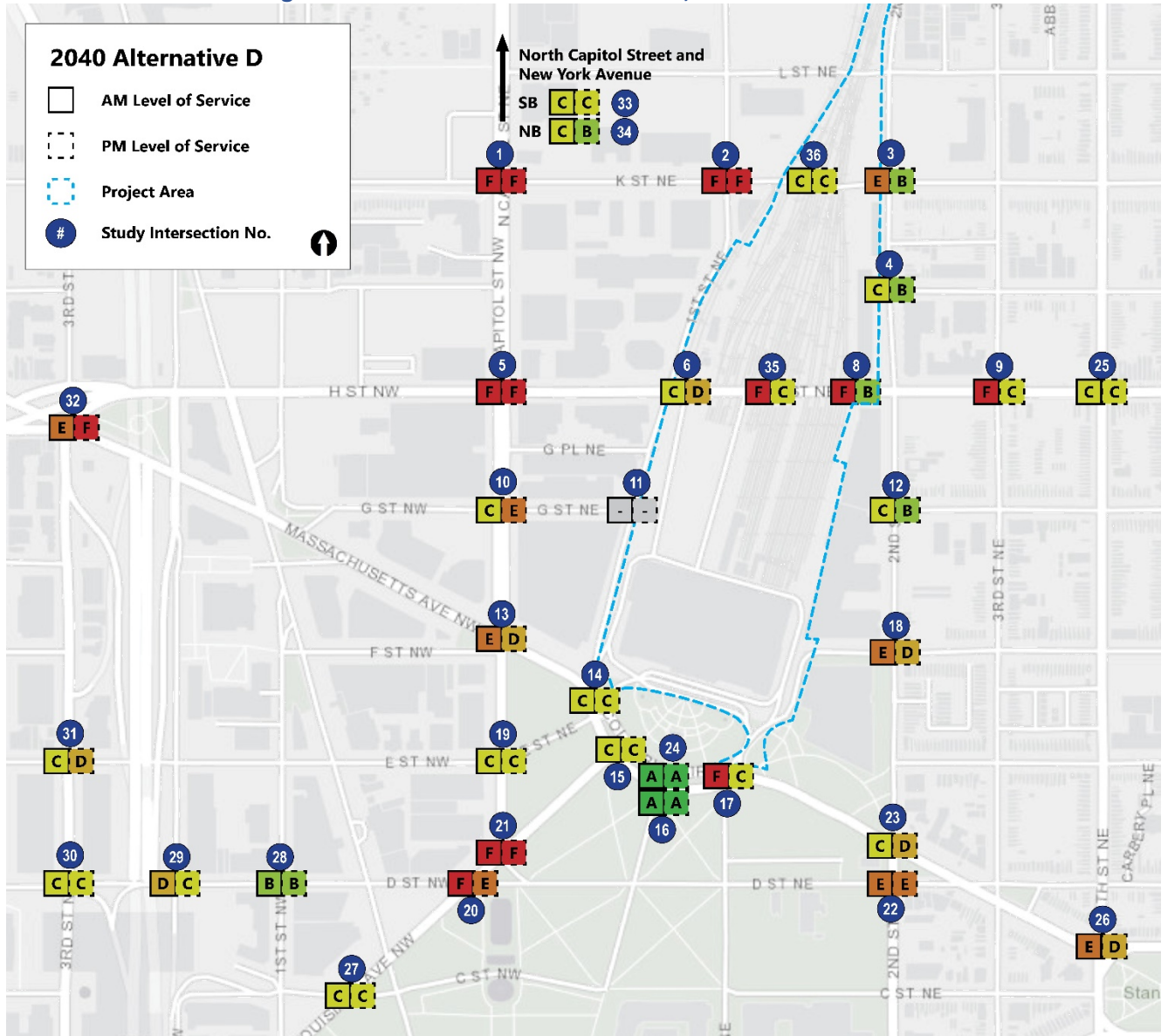


Table 5-54. Summary of Traffic Impacts, Alternative D

| Intersection # | Intersection Name | LOS | Queuing | Delay |
|----------------|---|-----|---------|-------|
| 1 | North Capitol Street / K Street | X | X* | X* |
| 2 | First Street / K Street NE | X | X* | X* |
| 3 | 2nd Street / K Street NE | | | X* |
| 5 | North Capitol Street / H Street | | X* | X* |
| 6 | WUS West Intersection / H Street NE | | X | X |
| 9 | 3rd Street / H Street NE | | | X |
| 10 | North Capitol Street / G Street | | X* | X* |
| 13 | North Capitol Street / Massachusetts Ave | | X | X |
| 17 | First Street / Massachusetts Avenue NE | X | | X |
| 18 | 2nd Street / F Street NE | | | X* |
| 19 | North Capitol Street / E Street | | X | X |
| 20 | Louisiana Avenue / D Street NW | | X* | X* |
| 21 | Louisiana Avenue / North Capitol Street | | | X* |
| 22 | 2nd Street / D Street NE | | X | X* |
| 23 | 2nd Street / Massachusetts Avenue NE | | X | X* |
| 26 | Massachusetts Avenue / C Street / 4th Street NE | | X | X* |
| 27 | Louisiana Avenue / C Street NW | | X* | X* |
| 31 | 3rd Street / E Street NW | | X | X |
| 32 | 3rd Street / Massachusetts Avenue / H Street NW | | | X* |
| 35 | WUS Central Intersection / H Street NE | X | X* | X* |

* indicates the impact would occur in both peak hours.

Indirect Operational Impacts

2081 **Alternative D would have moderate adverse indirect operational impacts on multimodal**
 2082 **transportation because of the trips generated by the potential Federal air-rights**
 2083 **development.**

2084 In Alternative D, approximately 688,050 square feet of Federal air rights within the footprint
 2085 of the existing parking garage and bus facility would be potentially available for development
 2086 separately from the Project. For the purposes of the transportation impact analysis, it was
 2087 conservatively assumed that this space would become office space.

2088 **Table 5-55** shows the multimodal trips that the Federal air-rights development would
 2089 generate under this assumption. All vehicular trips were considered in the traffic impact
 2090 analysis for Alternative D. The Federal air-rights development would add trips to other local
 2091 transportation modes, an adverse impact. The number of additional trips would be typical of
 2092 an office space development of its size, however, and represent a small increment over the
 2093 number of trips directly generated by Alternative D. Therefore, this adverse impact would be
 2094 moderate.

Table 5-55. Federal Air-rights Development Trip Generation, Alternative D

| | AM Peak | | | PM Peak | | |
|--------------------------|-------------|---------|----------|-------------|---------|----------|
| | Total Trips | Inbound | Outbound | Total Trips | Inbound | Outbound |
| Parking | 228 | 201 | 27 | 216 | 37 | 179 |
| Private Pick-Up/Drop-Off | 0 | 0 | 0 | 0 | 0 | 0 |
| For-hire Vehicles | 16 | 14 | 2 | 16 | 3 | 13 |
| Car Rental | 0 | 0 | 0 | 0 | 0 | 0 |
| Amtrak Express | 7 | 7 | 0 | 8 | 2 | 6 |
| Amtrak Corridor | 0 | 0 | 0 | 0 | 0 | 0 |
| MARC | 100 | 96 | 4 | 106 | 16 | 90 |
| VRE | 57 | 55 | 2 | 60 | 9 | 51 |
| Metrorail | 215 | 206 | 9 | 227 | 35 | 192 |
| Streetcar | 21 | 20 | 1 | 23 | 4 | 19 |
| City/Commuter Bus | 43 | 41 | 2 | 45 | 7 | 38 |
| Pedestrian | 72 | 69 | 3 | 76 | 12 | 64 |
| Bicycle | 72 | 69 | 3 | 76 | 12 | 64 |

Construction Impacts

2095 With regard to construction, Alternative D would be very similar to Alternative C, placing
 2096 similar elements in similar locations (one level of below-ground parking, above-ground
 2097 parking facility north of H Street NE, and bus slips adjacent to the new train hall). The
 2098 anticipated construction period would be the same (12 years and 3 months) and each phase,
 2099 including Phase 4, would take the same amount of time. Impacts would be as in Alternative C
 2100 with the West Option. **Section 5.5.4.4, Alternative C, Construction Impacts** addresses these
 2101 impacts.

5.5.4.6 Alternative E

2102 The following sections describe the direct, indirect, and construction impacts of Alternative E.
 2103 **Figure 5-17** illustrates the key transportation elements of Alternative E.

Figure 5-17. Key Transportation Elements, Alternative E



Direct Operational Impacts

2104 The direct operational impacts of Alternative E on commuter and intercity railroads; the DC
 2105 Streetcar; loading; and city and commuter bus ridership would be the same as in Alternative
 2106 A (**Section 5.5.4.2, Alternative A, Direct Operational Impacts**). Impacts on pedestrians; bicycle
 2107 activity; city and commuter bus operations; and vehicular parking and rental cars would be
 2108 the same as in Alternative B (**Section 5.5.4.3, Alternative B, Direct Operational Impacts**).
 2109 Impact on intercity, tour/charter, and sightseeing buses would be the same as in Alternative
 2110 D (**Section 5.5.4.5, Alternative D, Direct Operational Impacts**). This section does not address
 2111 these impacts further. It only addresses those transportation modes that would experience
 2112 meaningfully different operational impacts in Alternative E.

WMATA Metrorail

2113 **Relative to the No-Action Alternative, Alternative E would have a moderate adverse direct**
 2114 **operational impact on Metrorail operations because of increased demand that would**
 2115 **aggravate train overcapacity and station circulation issues.**

2116 In Alternative E, increased train service and ridership as well as the reduction in parking
 2117 capacity and the new retail uses, would generate increased demand on Metrorail at WUS.
 2118 **Table 5-56** shows modeled AM peak and PM peak activity in Alternative E. When the
 2119 projected V/C ratio exceeds 100 percent, there would be a need for additional service to
 2120 address overcrowding.

Table 5-56. Peak-hour WUS-related Metrorail Activity, Alternative E

| | Alternative E | | No-Action Alternative | |
|-------------------------|---------------|----------|-----------------------|----------|
| | Shady Grove | Glenmont | Shady Grove | Glenmont |
| AM Peak Hour | | | | |
| V/C Arriving at WUS | 83% | 28% | 80% | 25% |
| WUS Boardings | 8,397 | 1,630 | 5,202 | 1,010 |
| WUS Alightings | 5,096 | 3,459 | 4,128 | 2,803 |
| Through Ridership | 9,168 | 1,260 | 9,523 | 1,447 |
| Ridership Departing WUS | 17,565 | 2,890 | 14,725 | 2,457 |
| V/C Departing WUS | 102% | 17% | 86% | 14% |
| Excess Demand | 422 | 0 | 0 | 0 |
| PM Peak Hour | | | | |
| V/C Arriving at WUS | 20% | 115% | 20% | 107% |
| WUS Boardings | 3,244 | 4,643 | 2,559 | 3,661 |
| WUS Alightings | 1,558 | 8,268 | 1,154 | 6,126 |
| Through Ridership | 1,642 | 9,891 | 1,953 | 10,722 |
| Ridership Departing WUS | 4,886 | 14,534 | 4,512 | 14,383 |
| V/C Departing WUS | 31% | 92% | 29% | 91% |
| Excess Demand | 0 | 2,421 | 0 | 1,110 |

2121 Alternative E volumes would exceed capacity departing from WUS in the Shady Grove
2122 direction during the AM peak. In the PM peak, volumes would exceed capacity in the
2123 Glenmont direction when arriving at WUS.

2124 In the AM peak, Alternative E would cause the V/C ratio leaving WUS toward Shady Grove to
2125 reach 102 percent, against 86 percent in the No-Action Alternative. This would result in an
2126 excess demand of around 422 passengers. Based on WMATA ridership trends, overcapacity
2127 conditions are anticipated to dissipate within the Red Line core.⁷⁶

2128 In the PM peak, capacity exceedance toward Glenmont (115 percent) would be greater in
2129 Alternative E than in the No-Action Alternative (107 percent). Alternative E would aggravate
2130 the level of crowding, generating an additional excess demand of approximately 1,311
2131 passengers, for a total excess demand of 2,421.

The increase in Metrorail ridership at WUS would affect passenger circulation as described in
Section 5.5.4.2, Alternative A, Direct Operational Impacts, WMATA Metrorail.

Comparison to Existing Conditions

2132 Relative to existing conditions, Alternative E would have a major adverse direct operational
2133 impact on Metrorail operations at WUS. The increase in overcrowding and need for extra
2134 capacity would be greater compared to existing conditions than to the No-Action
2135 Alternative.⁷⁷ In the AM peak, Alternative E would cause the V/C ratio leaving WUS toward
2136 Shady Grove to reach 102 percent, against 69 percent in existing conditions. Alternative E
2137 would increase the overall demand in the AM peak in the Shady Grove direction by
2138 approximately 7,187 passengers. In the PM peak, the V/C ratio toward Glenmont arriving at
2139 WUS in Alternative E would be 115 percent, against 72 percent under existing conditions.
2140 This would increase overall demand in this direction by around 8,211 passengers.

For-hire Vehicles

2141 **Relative to the No-Action Alternative, Alternative E would have a moderate beneficial**
2142 **direct operational impact on for-hire vehicle activity because of the provision of new**
2143 **locations for pick-ups and drop-offs. These locations would adequately accommodate the**
2144 **anticipated growth in for-hire trips, but queuing would not be eliminated. Alternative E**
2145 **would also have a moderate adverse direct operational impact on for-hire vehicles due to**
2146 **increased traffic congestion.**

2147 The same five pick-up and drop-off locations would be provided in Alternative E as in
2148 Alternative C. These locations are described in **Section 5.5.4.4, Alternative C, Direct**
2149 **Operational Impacts, For-hire Vehicles.**

⁷⁶ The Red Line core, as defined by WMATA, consists of the line segment between Dupont Circle and WUS.

⁷⁷ See **Section 5.5.6.1, Direct Operational Impacts, WMATA Metrorail of Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data. Total ridership projections for Alternative E include ridership generated by the private air-rights development.

2150 Relative to the No-Action Alternative, Alternative E would generate the same number of
2151 additional for-hire trips as Alternative B (see **Section 5.5.4.3, Alternative B, Direct Operational**
2152 *Impacts, For-hire Vehicles*). However, in Alternative E, the peak-hour trips would make use of
2153 the full length of the southwest road, east-west train hall, and southeast road. This loop
2154 would provide more space for vehicle circulation and passenger loading and unloading
2155 activity than in Alternative B. The additional trips were incorporated in the traffic impact
2156 analysis.

2157 In Alternative E, volumes associated with for-hire as well as private pick-up and drop-off
2158 activity would potentially create queueing and congestion, as described in **Section 5.5.4.4,**
2159 *Alternative C, Direct Operational Impacts, Vehicular Traffic, Curbside Analysis* for Alternative
2160 C. This would result in a moderate adverse impact on for-hire vehicle operations at WUS.

Comparison to Existing Conditions

2161 The impacts of Alternative E on for-hire vehicle activities relative to existing conditions would
2162 be as described for Alternative B in **Section 5.5.4.3, Alternative B, Direct Operational Impacts,**
2163 *for-hire Vehicles, Comparison to Existing Conditions*.

Private Pick-up and Drop-off

2164 **Relative to the No-Action Alternative, Alternative E would have a moderate beneficial**
2165 **direct operational impact on private pick-ups and drop-offs because of the provision of**
2166 **new locations for these activities. These locations would adequately accommodate the**
2167 **anticipated growth in private pick-up and drop-off trips, but queuing may occur.**
2168 **Alternative E would also have a major adverse direct operational impact on private pick-**
2169 **ups and drop-offs due to increased traffic congestion.**

2170 The same locations used by for-hire vehicles would be available for private pick-up and drop-
2171 off activity in Alternative E. However, private vehicles would not be allowed to use the east
2172 ramp to reach the front of WUS. The anticipated distribution of trips would be the same as
2173 for for-hire vehicles.

2174 Relative to the No-Action Alternative, Alternative E would generate the same number of
2175 additional private pick-up and drop-off trips as Alternative B (see **Section 5.5.4.3, Alternative**
2176 *B, Direct Operational Impacts, For-hire Vehicles*). However, in Alternative E, the peak-hour
2177 trips would make use of the full length of the southwest road, east-west train hall, and
2178 southeast road. This loop would provide more space for vehicle circulation and passenger
2179 loading and unloading activity than in Alternative B. The additional trips were incorporated in
2180 the traffic impact analysis.

2181 In Alternative E, volumes associated with private pick-up and drop-off as well as for-hire
2182 activity would potentially create queueing and congestion, as described in **Section 5.5.4.4,**
2183 *Alternative C, Direct Operational Impacts, Vehicular Traffic, Curbside Analysis* for Alternative
2184 C. This would result in a moderate adverse impact on private pick-up and drop-off vehicle
2185 operations at WUS.

Comparison to Existing Conditions

2186 The impacts of Alternative E on private pick-up and drop-off activities relative to existing
2187 conditions would be as described for Alternative B in **Section 5.5.4.3, Alternative B, Direct**
2188 *Operational Impacts, Private Pick-up and Drop-off, Comparison to Existing Conditions.*

Vehicular Traffic

2189 **Relative to the No-Action Alternative, Alternative E would have major adverse direct**
2190 **operational impacts on traffic operations at several intersections near WUS because of**
2191 **increased traffic volumes and changes in traffic patterns due to the new parking location.**
2192 **During at least one of the peak periods, out of 36 intersections in the Local Study Area, four**
2193 **would degrade to LOS F; 16 would experience an increase in queue length of more than 150**
2194 **feet; and 20 intersections would experience an increase in average delay of more than 5**
2195 **seconds.**

Trip Generation and Circulation

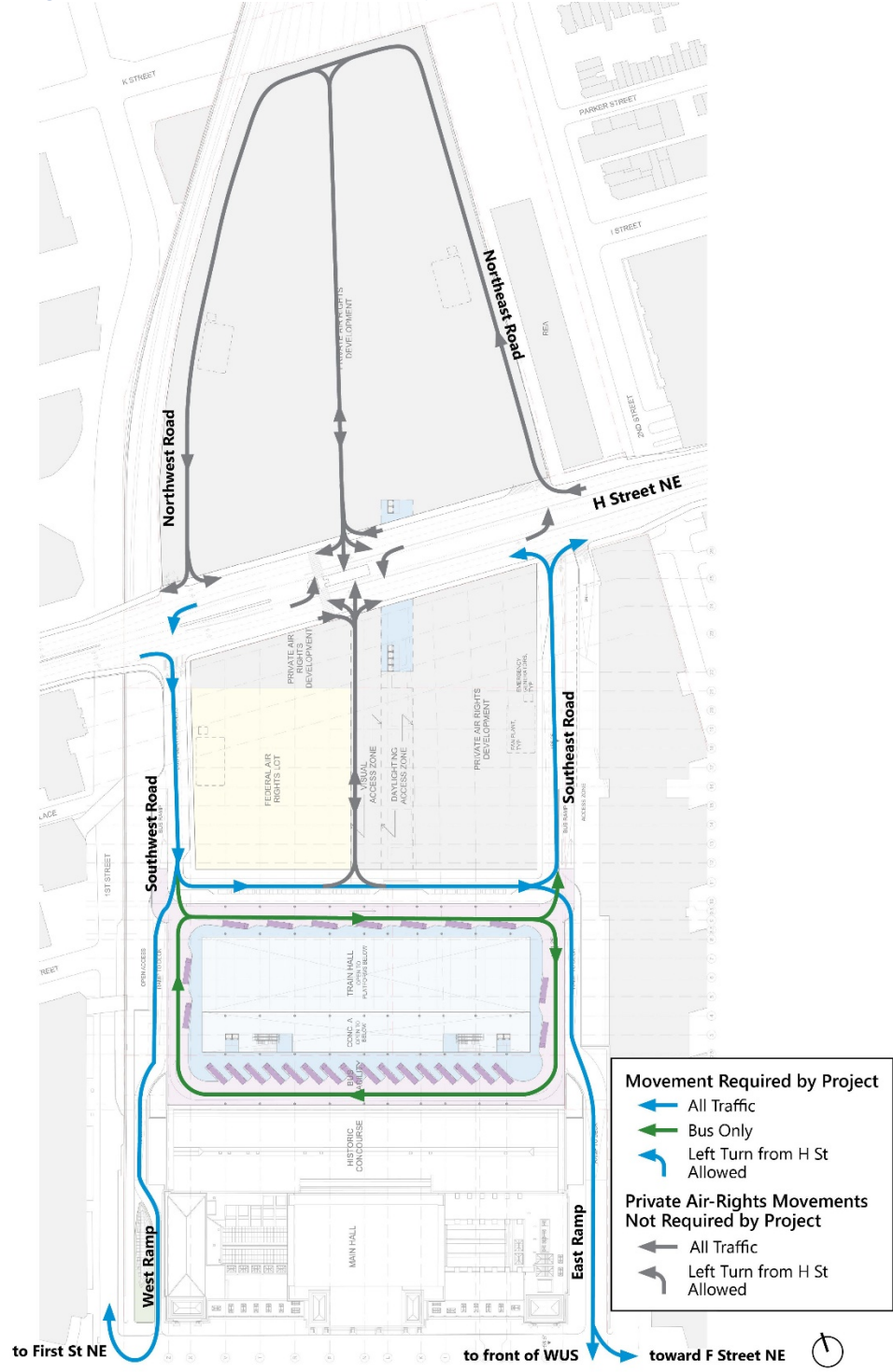
2196 WUS-related vehicular activity in Alternative E would be primarily distributed across five
2197 locations:

- 2198 ■ The pick-up and drop-off loop at the front of WUS;
- 2199 ■ The new bus facility and new deck-level pick-up and drop-off location accessed from
2200 H Street NE;
- 2201 ■ The new below-ground parking facility accessed from K Street NE;
- 2202 ■ The new curbside pick-up and drop-off location on First Street NE (serving the new H
2203 Street Concourse); and
- 2204 ■ The new curbside pick-up and drop-off locations on 2nd Street NE (serving the new H
2205 Street Concourse).

2206 In Alternative E, all parking and rental car activity would be in the below-ground parking
2207 facility accessed from K Street NE. Private and for-hire pick-up and drop-off activity would be
2208 spread across all five locations above. Approximately 70 percent of WUS-related traffic would
2209 travel to and from points west of WUS and 30 percent to and from points east. Deck-level
2210 circulation in Alternative E is represented in **Figure 5-18.**⁷⁸ AM and PM peak WUS-related
2211 traffic volumes in Alternative E would be the same as in Alternative B: see **Section 5.5.4.3,**
2212 *Alternative B, Direct Operational Impacts, Vehicular Traffic.*

⁷⁸ Figure 5-18 shows all movements, including those assumed in consultation with DDOT for the private air-rights development, to provide a better understanding of anticipated traffic operations on the H Street Bridge. Arrows indicate movements, not planned street alignments.

Figure 5-18. Deck Level Circulation (All Movements), Alternative E



Curbside Analysis

2213 The anticipated volumes associated with for-hire and private pick-up and drop-off activity
 2214 would potentially create conflicts and queueing, as in Alternative C. These impacts are
 2215 addressed in **Section 5.5.4.4, Alternative C, Direct Operational Impacts, Vehicular Traffic,**
 2216 *Curbside Analysis.*

Intersection Analysis

2217 As with all Action Alternatives, three indicators were used to assess impacts on traffic
 2218 operations in Alternative E relative to the No-Action Alternative: degradation of intersection
 2219 LOS to F due to vehicle trips generated by the Project; an increase in average vehicle delay at
 2220 an intersection by more than 5 seconds; and an increase in 95th-percentile queue lengths of
 2221 more than 150 feet for any lane group in an intersection. **Table 5-57** identifies the study
 2222 intersections that would experience an impact relative to the No-Action Alternative under
 2223 any of these three indicators.

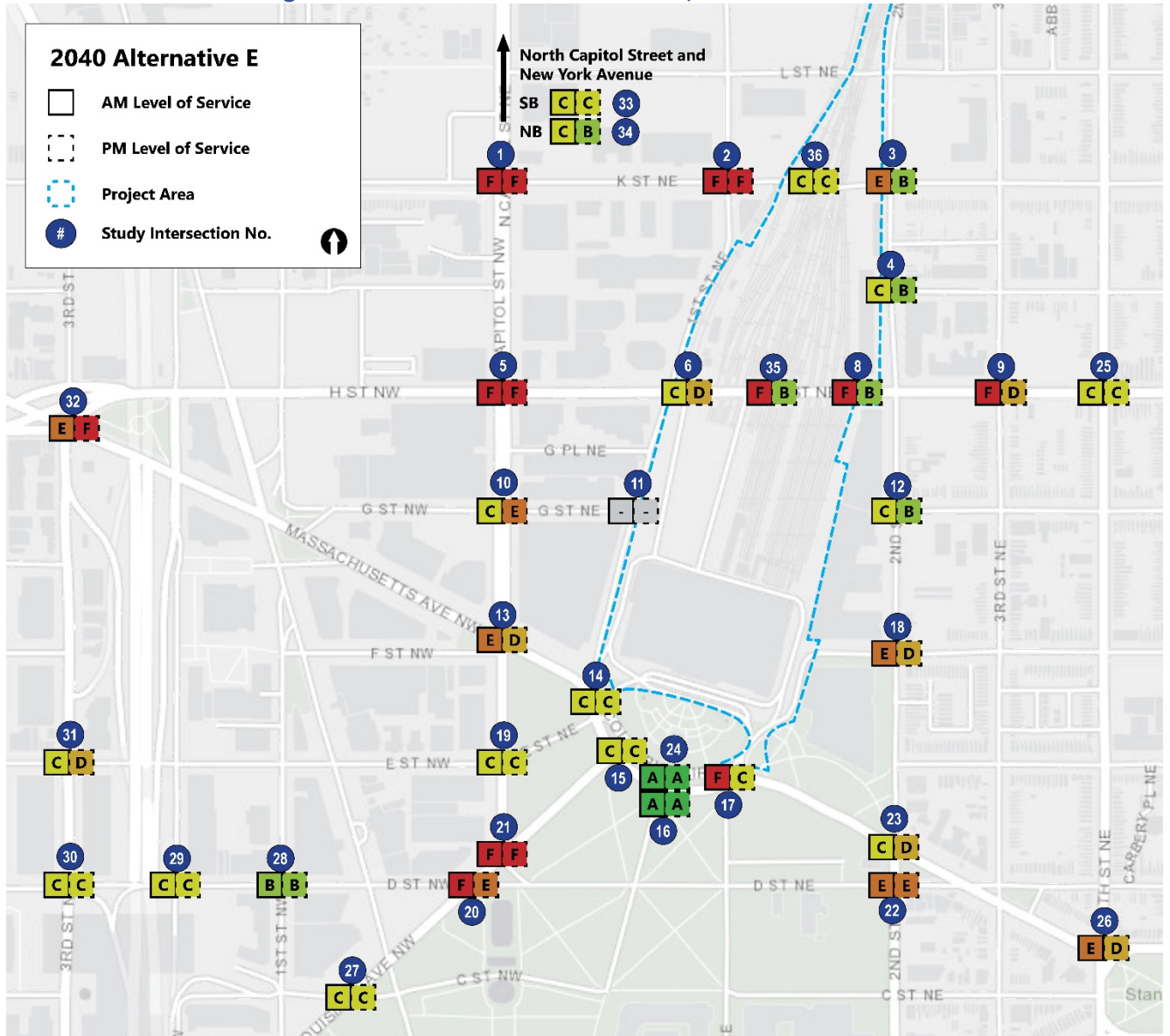
Table 5-57. Summary of Traffic Impacts, Alternative E

| Intersection # | Intersection Name | LOS | Queueing | Delay |
|----------------|---|-----|----------|-------|
| 1 | North Capitol Street / K Street | X | X* | X* |
| 2 | First Street / K Street NE | X | X* | X* |
| 3 | 2nd Street / K Street NE | | | X |
| 5 | North Capitol Street / H Street | | X* | X* |
| 6 | WUS West Intersection / H Street NE | | X | X |
| 8 | WUS East Intersection / H Street NE | | X* | X |
| 9 | 3rd Street / H Street NE | | X | X |
| 10 | North Capitol Street / G Street | | X* | X* |
| 13 | North Capitol Street / Massachusetts Ave | | X | X |
| 17 | First Street / Massachusetts Avenue NE | X | | X |
| 18 | 2nd Street / F Street NE | | | X* |
| 19 | North Capitol Street / E Street | | X | |
| 20 | Louisiana Avenue / D Street NW | | X* | X* |
| 21 | Louisiana Avenue / North Capitol Street | | | X* |
| 22 | 2nd Street / D Street NE | | X* | X* |
| 23 | 2nd Street / Massachusetts Avenue NE | | X | X* |
| 26 | Massachusetts Avenue / C Street / 4th Street NE | | X | X* |
| 27 | Louisiana Avenue / C Street NW | | X* | X* |
| 31 | 3rd Street / E Street NW | | X* | X |
| 32 | 3rd Street / Massachusetts Avenue / H Street NW | | | X* |
| 35 | WUS Central Intersection / H Street NE | X | X* | X |

* indicates the impact would occur in both peak hours.

2224 **Figure 5-19** shows peak hour LOS for each of the study intersections. In Alternative E, four
 2225 intersections out of 36 would degrade to LOS F during at least one peak hour relative to the
 2226 No-Action Alternative.

Figure 5-19. Peak Hour Intersection LOS, Alternative E



2227 Sixteen intersections would experience an increase in queue length of more than 150 feet for
2228 one or more lane groups relative to the No-Action Alternative. Of these, ten would
2229 experience such a queue increase in both peak hours.

2230 Twenty intersections would experience increased average delays relative to the No-Action
2231 Alternative of more than 5 seconds in at least one peak period. Twelve would see such delay
2232 increases in both peak hours.

Comparison to Existing Conditions

2233 Relative to existing conditions, in Alternative E:⁷⁹

- 2234 ■ Eight intersections would degrade to LOS F in at least one peak period.
- 2235 ■ Twenty-five intersections would experience an increase in queue length of more than
2236 150 feet for one or more lane groups, with 20 doing so in both peak hours.
- 2237 ■ Twenty-one intersections would experience increased delays of more than 5
2238 seconds, with 18 doing so in both peak hours.

Indirect Operational Impacts

2239 **Alternative E would have moderate adverse indirect operational impacts on multimodal**
2240 **transportation because of the trips generated by the potential Federal air-rights**
2241 **development.**

2242 In Alternative E, the potential Federal air-rights development would be the same as in
2243 Alternative D. Impacts would be the same. They are described in **Section 5.5.4.5, Alternative**
2244 **D, Indirect Operational Impacts.**

Construction Impacts

2245 With regard to construction, Alternative E would be very similar to Alternative B, as both
2246 alternatives include two levels of below-ground parking. The anticipated construction period
2247 would be the same (14 years and 4 months) and each phase, including Phase 4, would take
2248 the same amount of time. Therefore, impacts would be as described for Alternative B in
2249 **Section 5.5.4.3, Alternative B, Construction Impacts.**

5.5.4.7 Alternative A-C (Preferred Alternative)

2250 The following sections describe the direct, indirect, operational and construction impacts of
2251 Alternative A-C. **Figure 5-20** illustrates the key transportation elements of Alternative A-C.

⁷⁹ See **Section 5.5.6.1, Direct Operational Impacts, Vehicular Traffic** in **Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data.

Figure 5-20. Key Transportation Elements, Alternative A-C



Direct Operational Impacts

2252 The direct operational impacts of Alternative A-C on commuter and intercity railroads; the DC
 2253 Streetcar; intercity, tour/charter, and sightseeing buses;⁸⁰ loading; pedestrians; bicycle
 2254 activity; city and commuter buses; and car rental activities would be the same as those of
 2255 Alternative A (**Section 5.5.4.2, Alternative A, Direct Operational Impacts**). This section does
 2256 not address them further. It only addresses those transportation modes that would
 2257 experience meaningfully different operational impacts in Alternative A-C.

WMATA Metrorail

2258 **Relative to the No-Action Alternative, Alternative A-C would have a moderate adverse**
 2259 **direct operational impact on Metrorail operations because of increased demand that**
 2260 **would aggravate train overcapacity and station circulation issues.**

2261 Increased train service and ridership in Alternative A-C, as well as the reduction in parking
 2262 capacity and new retail uses, would generate increased demand on Metrorail at WUS. **Table**
 2263 **5-58** shows modeled activity in the AM peak and PM peak, along with the corresponding data
 2264 for the No-Action Alternative. When the projected V/C ratio exceeds 100 percent, there
 2265 would be a need for additional service to address overcrowding.

Table 5-58. Peak WUS-related Metrorail Activity, Alternative A-C

| | Alternative A-C | | No-Action Alternative | |
|-------------------------|-----------------|----------|-----------------------|----------|
| | Shady Grove | Glenmont | Shady Grove | Glenmont |
| AM Peak Hour | | | | |
| V/C Arriving at WUS | 83% | 28% | 80% | 25% |
| WUS Boardings | 8,365 | 1,623 | 5,202 | 1,010 |
| WUS Alightings | 5,042 | 3,423 | 4,128 | 2,803 |
| Through Ridership | 9,222 | 1,296 | 9,523 | 1,447 |
| Ridership Departing WUS | 17,587 | 2,929 | 14,725 | 2,457 |
| V/C Departing WUS | 103% | 17% | 86% | 14% |
| Excess Demand | 444 | 0 | 0 | 0 |
| PM Peak Hour | | | | |
| V/C Arriving at WUS | 20% | 115% | 20% | 107% |
| WUS Boardings | 3,201 | 4,580 | 2,559 | 3,661 |
| WUS Alightings | 1,550 | 8,221 | 1,154 | 6,126 |
| Through Ridership | 1,650 | 9,938 | 1,953 | 10,722 |
| Ridership Departing WUS | 4,851 | 14,518 | 4,512 | 14,383 |
| V/C Departing WUS | 31% | 92% | 29% | 91% |
| Excess Demand | 0 | 2,421 | 0 | 1,110 |

⁸⁰ Except that in Alternative A-C, the west intersection would be an offset intersection, like in the No-Action Alternative.

2266 Alternative A-C volumes would exceed capacity departing from WUS in the Shady Grove
2267 direction during the AM peak and in the Glenmont direction during the PM peak arriving at
2268 WUS. In the AM peak, Alternative A-C would cause the V/C ratio leaving WUS toward Shady
2269 Grove to reach 103 percent, against 86 percent in the No-Action Alternative. As a result,
2270 Alternative A-C would increase the excess demand by around 444 passengers. Based on
2271 WMATA ridership trends, overcapacity conditions are anticipated to dissipate within the Red
2272 Line core.⁸¹

2273 In the PM peak, capacity exceedance toward Glenmont (115 percent arriving) would be
2274 greater than in the No-Action Alternative (107 percent). As a result, Alternative A-C would
2275 increase the excess demand by 1,311, for a total of 2,421 passengers.

2276 The increase in Metrorail ridership at WUS would affect passenger circulation as described
2277 for Alternative A in **Section 5.5.4.2, Alternative A, Direct Operational Impacts, WMATA**
2278 *Metrorail*.

Comparison to Existing Conditions

2279 Relative to existing conditions, Alternative A-C would have a major adverse direct operational
2280 impact on Metrorail operations at WUS. The increase in overcrowding and need for extra
2281 capacity would be greater compared to existing conditions than to the No-Action
2282 Alternative.⁸² In the AM peak, Alternative A-C would cause the V/C ratio leaving WUS toward
2283 Shady Grove to reach 103 percent, against 69 percent in existing conditions. This would
2284 increase the overall demand in the AM peak in the Shady Grove direction by an estimated
2285 7,209 passengers. In the PM peak, the V/C ratio arriving at WUS toward Glenmont would be
2286 115 percent, against 72 percent under existing conditions. Alternative A-C would increase
2287 overall demand in this direction by around 8,211 passengers.

Vehicular Parking and Rental Cars

2288 **Relative to the No-Action Alternative, Alternative A-C would have a moderate adverse**
2289 **direct operational impact on parking at WUS because of a reduction in parking capacity.**
2290 **There would be a minor beneficial impact on rental car operations.**

2291 In Alternative A-C, all parking and rental car activity would be in an above-ground facility
2292 (multimodal surface transportation center) located within the same general footprint as the
2293 existing WUS parking garage, with access from H Street NE via the west intersection and the
2294 new southwest road. The new facility would offer space for approximately 850 fewer cars
2295 than the existing garage, which would continue to be used in the No-Action Alternative. This

⁸¹ The Red Line core, as defined by WMATA, consists of the line segment between Dupont Circle and WUS.

⁸² See **Section 5.5.7.1, Direct Operational Impacts, WMATA Metrorail of Appendix C3, Washington Union Station Expansion Project Environmental Consequences Technical Report** for existing conditions data. Total ridership projections for Alternative A-C include ridership generated by the private air-rights development.

2296 would be an adverse impact.⁸³ This adverse impact would be moderate because the new
2297 facility would meet the parking program for the Project and while it would not meet the
2298 projected parking demand, it is anticipated that users not able to park would use different
2299 modes to reach the station.⁸⁴ Fewer passengers or visitors are anticipated to drive and park
2300 at WUS by 2040.⁸⁵

2301 Alternative A-C would generate the same number of additional parking trips as Alternative A:
2302 see **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Vehicular Parking and Rental**
2303 **Cars**. However, access routes would be different. Parking users would enter the facility from
2304 the new southwest and east-west roads. Exiting would be via the southeast road and H Street
2305 or the east ramp.

Comparison to Existing Conditions

2306 The impacts of Alternative A-C relative to existing conditions would be as described for
2307 Alternative A: See **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Vehicular**
2308 **Parking and Rental Cars**.

For-hire Vehicles

2309 **Relative to the No-Action Alternative, Alternative A-C would have a moderate beneficial**
2310 **direct operational impact on for-hire vehicle activity because of the provision of new**
2311 **locations for pick-ups and drop-offs. These locations would adequately accommodate the**
2312 **anticipated growth in for-hire trips, but queuing would not be eliminated. Alternative A-C**
2313 **would also have a moderate adverse direct operational impact on for-hire vehicles due to**
2314 **increased traffic congestion.**

2315 Alternative A-C would provide four pick-up and drop-off locations (see **Figure 5-20**):

- 2316 ■ **Front of WUS:** See **Section 5.5.4.2, Alternative A, Direct Operational Impacts, For-hire**
2317 **Vehicles** for a description. In Alternative A-C, a projected 40 percent of for-hire drop-
2318 off activity and 40 percent of for-hire pick-up activity is anticipated to occur in front
2319 of WUS.
- 2320 ■ **Adjacent to the north-south train hall on the deck level:** For-hire vehicles would
2321 access this location via the west intersection on H Street NE and southwest road.
2322 Egress would be either via the southeast road and east intersection to H Street NE or
2323 via the east ramp to F Street NE or the front of WUS. In Alternative A-C, a projected

⁸³ As noted in **Section 5.5.3.1, Operational Impacts**, the parking impact analysis addresses parking as a resource for which there is a demand. Therefore, a reduction in parking availability is considered an adverse impact on parking. A reduction in parking availability may also have adverse or beneficial consequences for other resources or transportation modes. Such consequences are incorporated into the impact analyses for those other resources or transportation modes.

⁸⁴ **Appendix A6, Parking Program Memorandum**, provides more information on parking demand projections and the development of the parking program.

⁸⁵ The MWCOC Model estimates a 10% reduction in single-occupancy vehicle trips in the WUS area to 2040. Additionally, Amtrak as indicated to FRA that passenger parking is not essential to Amtrak's operation of intercity passenger rail at WUS and it anticipates passenger parking demand to continually decrease in the future.

2324 35 percent of for-hire drop-off activity and 35 percent of for-hire pick-up activity is
2325 projected to occur at this location.

2326 ■ **New H Street Concourse entrance on First Street NE:** See **Section 5.5.4.2, Alternative**
2327 *A, Direct Operational Impacts, For-hire Vehicles* for a description. In Alternative A-C,
2328 20 percent of for-hire drop-off activity and 20 percent of for-hire pick-up activity
2329 would occur at this location.

2330 ■ **New H Street Concourse entrance on 2nd Street NE:** See **Section 5.5.4.2, Alternative**
2331 *A, Direct Operational Impacts, For-hire Vehicles* for a description. In Alternative A-C,
2332 an anticipated 5 percent of for-hire drop-off activity and 5 percent of for-hire pick-up
2333 activity would occur at this location.

2334 Alternative A-C would generate the same number of additional for-hire vehicular trips as
2335 Alternative A: see **Section 5.5.4.2, Alternative A, Direct Operational Impacts, For-hire**
2336 *Vehicles*. However, the circulation patterns in Alternative A-C would be different. The peak-
2337 hour trips would make use of the full length of the southwest road, east-west train hall, and
2338 southeast road. This loop would provide more space for vehicle circulation and passenger
2339 loading and unloading than in Alternative A.

2340 As explained below (**Section 5.5.4.7, Alternative A-C, Direct Operational Impacts, Vehicular**
2341 *Traffic, curbside analysis*), volumes associated with for-hire as well as private pick-up and
2342 drop-off activity in front of WUS could create queueing and congestion, which would result in
2343 a moderate adverse impact on for-hire vehicle operations at WUS.

Comparison to Existing Conditions

2344 The impacts of Alternative A-C relative to existing conditions would be as described for
2345 Alternative A: See **Section 5.5.4.2, Alternative A, Direct Operational Impacts, For-Hire**
2346 *Vehicles*.

Private Pick-up and Drop-off

2347 **Relative to the No-Action Alternative, Alternative A-C would have a moderate beneficial**
2348 **direct operational impact on private pick-up and drop-off activities because of the**
2349 **provision of new locations for these activities. These locations would adequately**
2350 **accommodate the anticipated growth in private pick-up and drop-off trips, but queuing**
2351 **may occur. Alternative A-C would also have a moderate adverse direct operational impact**
2352 **on private pick-up and drop-off due to increased traffic congestion.**

2353 The same four locations used by for-hire vehicles would be available for private pick-up and
2354 drop-off activity. However, private vehicles would not be able to use the east ramp NE.
2355 Alternative A-C would generate the same number of additional private pick-up and drop-off
2356 trips as Alternative A: see **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Private**
2357 *Pick-up and Drop-off*. However, as noted above for the for-hire trips, the peak-hour private
2358 pick-up and drop-off trips would make use of the full length of the southwest road, east-west
2359 train hall, and southeast road. This loop would provide more space for vehicle circulation and
2360 passenger loading and unloading than in Alternative A.

2361 As explained below (**Section 5.5.4.7, Alternative A-C, Direct Operational Impacts, Vehicular**
2362 *Traffic, Curbside Analysis*), volumes associated with private pick-up and drop-off as well as
2363 for-hire activity in front of WUS could create queueing and congestion, which would result in
2364 a moderate adverse impact on private pick-up and drop-off operations at WUS.

Comparison to Existing Conditions

2365 The impacts of Alternative A-C relative to existing conditions would be as described for
2366 Alternative A: See **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Private Pick-up**
2367 *and Drop-off*.

Vehicular Traffic

2368 **Relative to the No-Action Alternative, Alternative A-C would have major adverse direct**
2369 **operational impacts on traffic operations at several intersections near WUS because of**
2370 **increased traffic volumes. During at least one of the peak periods, out of 35 intersections in**
2371 **the Local Study Area, five would degrade to LOS F; 19 would experience an increase in**
2372 **queue length of more than 150 feet; and 22 would experience an increase in average delay**
2373 **of more than 5 seconds.**

Trip Generation and Circulation

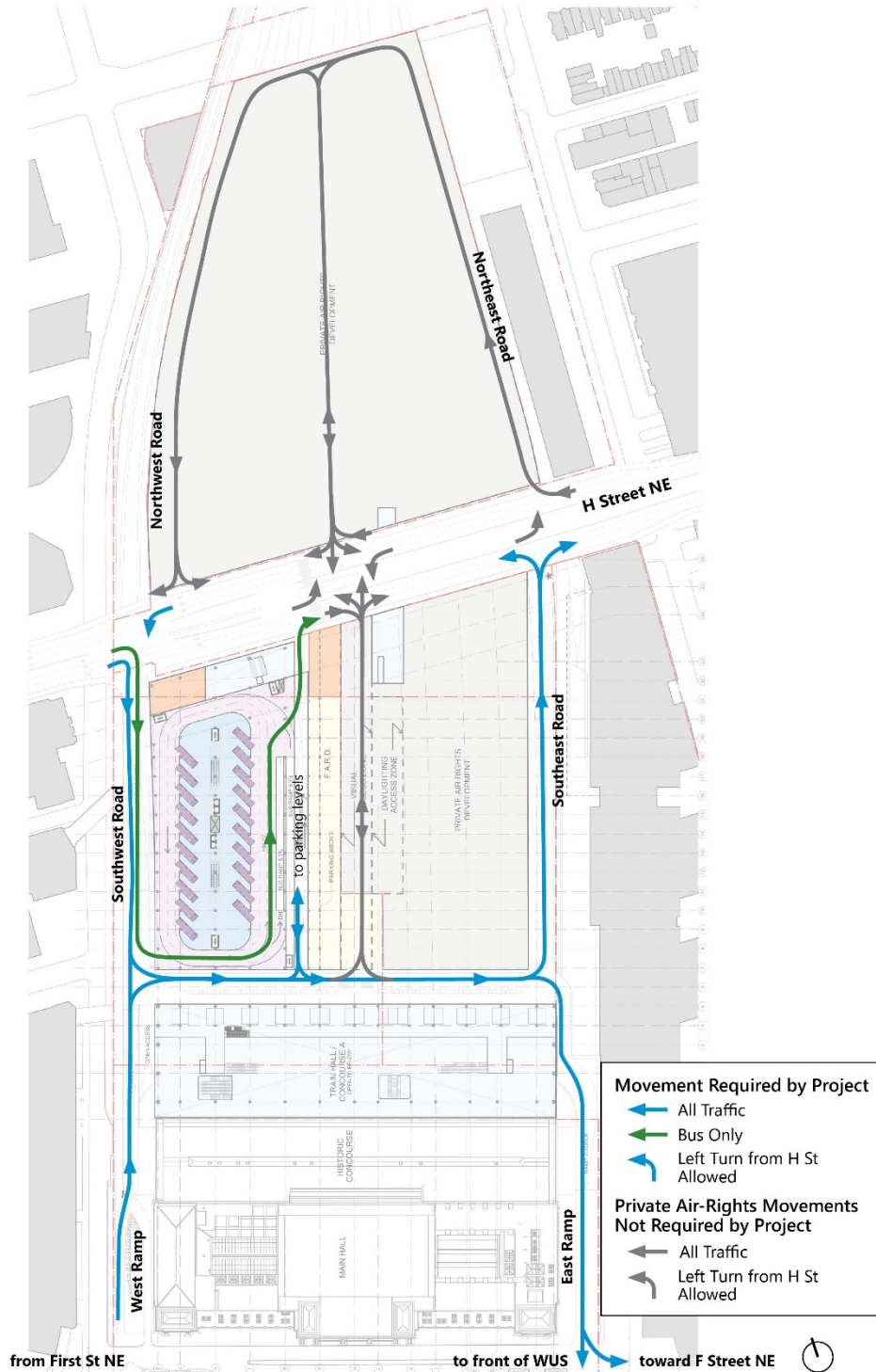
2374 WUS-related vehicular activity in Alternative A-C would be primarily distributed across four
2375 locations:

- 2376 ■ The pick-up and drop-off loop at the front of WUS;
- 2377 ■ The new bus facility and new deck-level pick-up and drop-off location accessed from
2378 H Street NE;
- 2379 ■ The new curbside pick-up and drop-off location on First Street NE (serving the new H
2380 Street Concourse); and
- 2381 ■ The new curbside pick-up and drop-off locations on 2nd Street NE (serving the new H
2382 Street Concourse).

2383 Parking and rental car activity would converge onto H Street NE to reach the parking facility.
2384 Private and for-hire pick-up and drop-off activity would be spread across all four locations.
2385 Approximately 70 percent of WUS-related traffic would travel to and from points west of
2386 WUS and 30 percent to and from points east. Deck-level circulation in Alternative A-C is
2387 represented in **Figure 5-21**.⁸⁶

⁸⁶ Figure 5-21 shows all movements, including those assumed in consultation with DDOT for the private air-rights development, to provide a better understanding of anticipated traffic operations on the H Street Bridge. Arrows indicate movements, not planned street alignments.

Figure 5-21. Deck Level Circulation (All Movements), Alternative A-C



2388 Compared to the No-Action Alternative, Alternative A-C would generate 2,364 additional AM
2389 peak-hour trips (228 percent increase) and 1,858 additional PM peak trips (86 percent
2390 increase). These volume increases would result in major adverse impacts to traffic operations
2391 at some study intersections.

Comparison to Existing Conditions

2392 Relative to existing conditions, Alternative A-C would generate 2,776 additional AM peak
2393 trips (236 percent increase) and 2,407 additional PM peak trips (116 percent increase).⁸⁷

Curbside Analysis

2394 The anticipated for-hire and private pick-up and drop-off activity at the front of WUS would
2395 create conflicts and queueing. At the H Street deck level, queueing analysis indicates that the
2396 approximately 550 feet of curbside space adjacent to the east-west train hall would
2397 accommodate for-hire vehicles and private pick-up and drop-off without spill-back onto H
2398 Street NE. No queue would form at the First Street or 2nd Street pick-up and drop-off areas.
2399 On First Street NE, there would be 266 pick-ups and drop-offs in the AM peak and 232 in the
2400 PM peak. On 2nd Street NE, there would be 77 pick-up and drop-offs in the AM peak and 65
2401 in the PM peak.

Intersection Analysis

2402 As with all Action Alternatives, three indicators were used to assess the impacts of
2403 Alternative A-C on traffic operations relative to the No-Action Alternative: degradation of
2404 intersection LOS to F due to vehicle trips generated by the Project; an increase in average
2405 vehicle delay at an intersection of more than 5 seconds; and an increase in 95th-percentile
2406 queue lengths of more than 150 feet for any lane group. **Table 5-59** identifies the study
2407 intersections that would experience an impact relative to the No-Action Alternative under
2408 any of these three indicators.

2409 **Figure 5-22** shows the peak hour LOS for the study intersections. In Alternative A-C, five
2410 intersections out of 35 would degrade to LOS F during at least one peak hour relative to the
2411 No-Action Alternative.

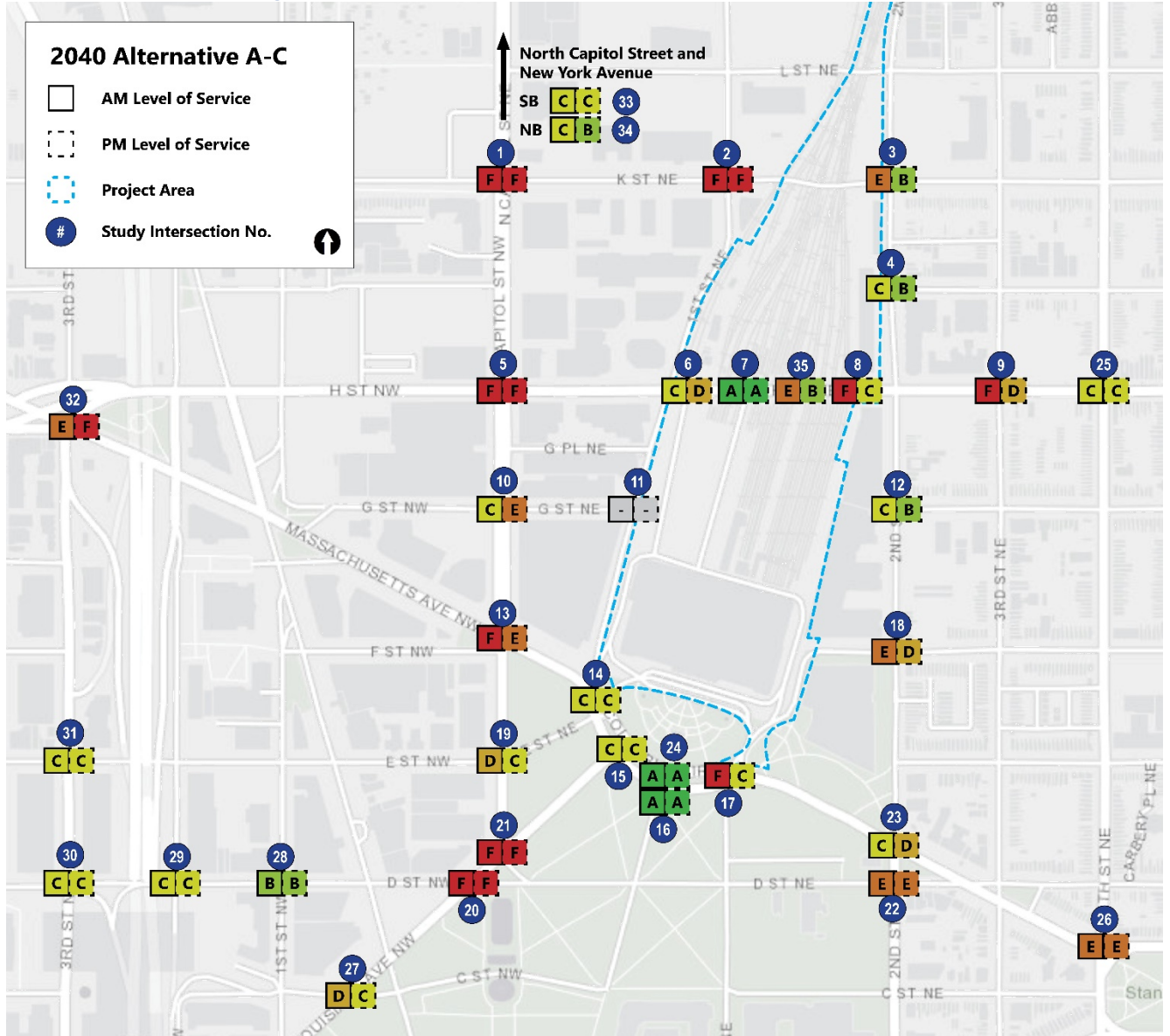
⁸⁷ See **Section 5.5.7.1**, *Direct Operational Impacts, Vehicular Traffic of Appendix C3*, *Washington Union Station Expansion Project Environmental Consequences Technical Report* for existing conditions data.

Table 5-59. Summary of Traffic Impacts, Alternative A-C

| Intersection # | Intersection Name | LOS | Queuing | Delay |
|----------------|---|-----|---------|-------|
| 1 | North Capitol Street / K Street | X | X* | X* |
| 2 | First Street / K Street NE | X | X* | X |
| 3 | 2nd Street / K Street NE | | | X |
| 5 | North Capitol Street / H Street | | X* | X* |
| 6 | WUS West Intersection / H Street NE | | X* | X |
| 8 | WUS East Intersection / H Street NE | | X* | X* |
| 9 | 3rd Street / H Street NE | | X | X* |
| 10 | North Capitol Street / G Street | | X* | X* |
| 13 | North Capitol Street / Massachusetts Ave | X | X | X* |
| 14 | Massachusetts Ave / E Street / First Street NE | | X* | |
| 17 | First Street / Massachusetts Avenue NE | X | X | X* |
| 18 | 2nd Street / F Street NE | | | X* |
| 19 | North Capitol Street / E Street | | X | X |
| 20 | Louisiana Avenue / D Street NW | X | X* | X* |
| 21 | Louisiana Avenue / North Capitol Street | | | X* |
| 22 | 2nd Street / D Street NE | | X* | X* |
| 23 | 2nd Street / Massachusetts Avenue NE | | X | X |
| 25 | 4th Street / H Street NE | | | X |
| 26 | Massachusetts Avenue / C Street / 4th Street NE | | X* | X* |
| 27 | Louisiana Avenue / C Street NW | | X* | X* |
| 30 | 3rd Street / I-395 On-ramp / D Street NW | | X | |
| 31 | 3rd Street / E Street NW | | X* | X* |
| 32 | 3rd Street / Massachusetts Avenue / H Street NW | | | X* |
| 35 | WUS Central Intersection / H Street NE | | X* | X* |

* indicates the impact would occur in both peak hours.

Figure 5-22. Peak Hour Intersection LOS, Alternative A-C



2412 Nineteen intersections would experience an increase in queue length of more than 150 feet
2413 for one or more lane groups relative to the No-Action Alternative. Of these, 13 would
2414 experience such a queue increase in both peak hours.

2415 Twenty-two intersections would experience increased delays relative to the No-Action
2416 Alternative of more than 5 seconds in at least one peak period. Sixteen would see such delay
2417 increases in both peak hours.

Comparison to Existing Conditions

2418 Relative to existing conditions, in Alternative A-C:⁸⁸

- 2419 ■ Nine intersections would degrade to LOS F in at least one peak period.
- 2420 ■ Twenty-four intersections would experience an increase in queue length of more
2421 than 150 feet for one or more lane groups, with 20 doing so in both peak hours.
- 2422 ■ Twenty-two intersections would experience increased delays of more than 5
2423 seconds, with 17 doing so in both peak hours.

Indirect Operational Impacts

2424 **Alternative A-C would have minor adverse indirect operational impacts on multimodal**
2425 **transportation because of the trips generated by the potential Federal air-rights**
2426 **development.**

2427 In Alternative A-C, around 380,000 square feet of Federal air rights would be potentially
2428 available for development separately from the Project. For the purposes of the
2429 transportation analysis, it was conservatively assumed that this space would be used for
2430 office space.

2431 **Table 5-60** shows the multimodal trips the Federal air-rights development would generate
2432 under this assumption. Vehicular trips were considered in the traffic impact analysis. The
2433 Federal air-rights development would add trips to other local transportation modes as well,
2434 an adverse impact. The number of additional trips would be typical of an office space
2435 development of its size. The development would be of relatively modest size in Alternative A-
2436 C and its impacts on transportation demand would be minor.

⁸⁸ See **Section 5.5.7.1**, *Direct Operational Impacts, Vehicular Traffic* in **Appendix C3**, *Washington Union Station Expansion Project Environmental Consequences Technical Report* for existing conditions data.

Table 5-60. Federal Air-rights Development Trip Generation, Alternative A-C

| | Total Trips | AM Peak | | Total Trips | PM Peak | |
|--------------------------|-------------|---------|----------|-------------|---------|----------|
| | | Inbound | Outbound | | Inbound | Outbound |
| Parking | 121 | 117 | 4 | 115 | 19 | 96 |
| Private Pick-Up/Drop-Off | 0 | 0 | 0 | 0 | 0 | 0 |
| For-hire Vehicles | 9 | 8 | 1 | 8 | 1 | 7 |
| Car Rental | 0 | 0 | 0 | 0 | 0 | 0 |
| Amtrak Express | 5 | 5 | 0 | 5 | 1 | 4 |
| Amtrak Corridor | 0 | 0 | 0 | 0 | 0 | 0 |
| MARC | 66 | 64 | 2 | 63 | 10 | 53 |
| VRE | 38 | 37 | 1 | 36 | 6 | 30 |
| Metrorail | 142 | 138 | 4 | 136 | 22 | 114 |
| Streetcar | 14 | 14 | 0 | 13 | 2 | 11 |
| City/Commuter Bus | 29 | 28 | 1 | 27 | 4 | 23 |
| Pedestrian | 47 | 46 | 1 | 45 | 7 | 38 |
| Bicycle | 47 | 46 | 1 | 45 | 7 | 38 |

Construction Impacts

2437 With regard to construction, Alternative A-C would be very similar to Alternative A, placing
 2438 similar elements in similar locations (bus facility and above-ground parking southwest of H
 2439 Street NE) and involving the same depth of excavation. Therefore, the anticipated
 2440 construction period would be the same (11 years and 5 months) and impacts would be as
 2441 described for Alternative A in **Section 5.5.4.2, Alternative A, Construction Impacts**.

5.5.5 Comparison of Alternatives

2442 Each Action Alternative entails some level of impact to the multimodal transportation
 2443 network in the Local Study Area relative to the No-Action Alternative. **Table 5-61** summarizes
 2444 the intensity of the potential impacts by mode for each Action Alternative relative to the
 2445 Existing Conditions and the No-Action Alternative. **Table 5-62** provides more detailed
 2446 information and estimates.

5.5.6 Avoidance, Minimization and Mitigation Evaluation

2447 The transportation impacts analysis identified a series of potential impacts that may require
 2448 actions that would avoid, minimize, or mitigate these impacts. **Table 5-63** lists avoidance,
 2449 minimization, and mitigation actions FRA is considering for each type of potential impact.

Table 5-61. Comparison of Alternatives, Transportation

| Mode | Type of Impact | No-Action Alternative | Action Alternative A | Action Alternative B | Action Alternative C | Action Alternative D | Action Alternative E | Alternative A-C (Preferred) |
|--|----------------------|-------------------------|---|--|--|---|----------------------|-----------------------------|
| Commuter and Intercity Railroads | Direct Operational | Major adverse impact | Major beneficial impact | | | | | |
| | Construction | N/A | Moderate adverse impact | | | | | |
| WMATA Metrorail | Direct Operational | Moderate adverse impact | | | | | | |
| | Construction | N/A | Moderate adverse impact | | | | | |
| DC Streetcar | Direct Operational | Minor beneficial impact | | | | | | |
| | Construction | N/A | Moderate adverse impact | | | | | |
| Intercity, Tour/Charter, and Sightseeing Buses | Direct Operational | Major adverse impact | Negligible (hop-on/hop-off buses) or moderate (all others) adverse impact | | | | | |
| | Construction | N/A | Major adverse impact | | East Option: Minor adverse impact West Option: Major adverse impact | Major adverse impact | | |
| Loading | Direct Operational | No Impact | No impact | | | | | |
| | Construction | N/A | Major adverse impact | | | | | |
| Pedestrians | Direct Operational | Major Adverse Impact | Major beneficial (inside WUS) and minor adverse (outside WUS) impacts | | Moderate beneficial (inside WUS) and minor adverse (outside WUS) impacts | Major beneficial (inside WUS) and minor adverse (outside WUS) impacts | | |
| | Construction | N/A | Moderate adverse impact | | | | | |
| Bicycle Activity | Direct Operational | Moderate Adverse Impact | Minor beneficial impact | | Minor adverse impact | | | Minor beneficial impact |
| | Construction | N/A | Major adverse impact | | | | | |
| City and Commuter Buses | Direct Operational | Moderate Adverse Impact | Minor adverse impact | | | | | |
| | Construction | N/A | Negligible adverse impact | Minor adverse impact | | | | Negligible adverse impact |
| Employee Shuttles | Direct Operational | No Impact | Moderate adverse impact | | | | | |
| | Construction | N/A | Moderate adverse impact | | | | | |
| Vehicular Parking | Direct Operational | No Impact | Moderate adverse impact | Minor adverse impact | Moderate adverse impact | Moderate adverse impact | Minor adverse impact | Moderate adverse impact |
| | Construction | N/A | Major adverse impact | | | | | |
| Rental Cars | Direct Operational | Minor Adverse Impact | Minor beneficial impact | | | | | |
| | Construction | N/A | Major adverse impact | | | | | |
| For-hire Vehicles | Direct Operational | Major Adverse Impact | Moderate beneficial (facilities) and major adverse (traffic congestion) impacts | Moderate beneficial (facilities) and moderate adverse (traffic congestion) impacts | | | | |
| | Construction | N/A | Major adverse impact | | | | | |
| Private Pick-up/Drop-off | Direct Operational | Major Adverse Impact | Moderate beneficial (facilities) and major adverse (traffic congestion) impacts | Moderate beneficial (facilities) and moderate adverse (traffic congestion) impacts | | | | |
| | Construction | N/A | Moderate adverse impact | | | | | |
| Vehicular Traffic | Direct Operational | Major adverse impact | | | | | | |
| | Construction | N/A | Major adverse impact | | | | | |
| All Modes | Indirect Operational | N/A | Minor adverse impact | Moderate adverse impact | | | | Minor adverse impact |

Table 5-62. Detailed Comparison of Alternatives

| Mode | No-Action Alternative | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative A-C |
|---|---|---|---|---|---|---|---|
| Direct Operational Impacts | | | | | | | |
| Commuter and Intercity Railroads | Major adverse impact: constraint on ability to accommodate ridership growth. | Major beneficial impact: ability to accommodate ridership growth. | Major beneficial impact: ability to accommodate ridership growth. | Major beneficial impact: ability to accommodate ridership growth. | Major beneficial impact: ability to accommodate ridership growth. | Major beneficial impact: ability to accommodate ridership growth. | Major beneficial impact: ability to accommodate ridership growth. |
| Amtrak | | | | | | | |
| Daily Train Volume | 144 | 288 | 288 | 288 | 288 | 288 | 288 |
| Peak Train Volume | 17 | 20 | 20 | 20 | 20 | 20 | 20 |
| Daily Ridership | 21,800 | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 | 32,000 |
| Private Cars | Storage Available. | Storage Available. | Storage Available. | Storage Available. | Storage Available. | Storage Available. | Storage Available. |
| MARC | | | | | | | |
| Daily Train Volume | 106 | 250 | 250 | 250 | 250 | 250 | 250 |
| Peak Train Volume | 15 | 34 | 34 | 34 | 34 | 34 | 34 |
| Daily Ridership | 37,900 | 70,700 | 70,700 | 70,700 | 70,700 | 70,700 | 70,700 |
| VRE | | | | | | | |
| Daily Train Volume | 34 | 92 | 92 | 92 | 92 | 92 | 92 |
| Peak Train Volume | 4 | 16 | 16 | 16 | 16 | 16 | 16 |
| Daily Ridership | 4,900 | 13,600 | 13,600 | 13,600 | 13,600 | 13,600 | 13,600 |
| WMATA Metrorail | Moderate adverse impact due to capacity exceedance. | Moderate adverse impact due to increased capacity exceedance. | Moderate adverse impact due to increased capacity exceedance. | Moderate adverse impact due to increased capacity exceedance. | Moderate adverse impact due to increased capacity exceedance. | Moderate adverse impact due to increased capacity exceedance. | Moderate adverse impact due to increased capacity exceedance. |
| AM V/C Arriving at WUS from Glenmont | 80% | 83% | 83% | 83% | 83% | 83% | 83% |
| AM V/C Leaving WUS toward Shady Grove | 86% | 103% | 102% | 103% | 103% | 102% | 103% |
| Excess Passengers Shady Grove | 0 | 469 | 400 | 444 | 448 | 422 | 444 |
| PM V/C Arriving at WUS from Shady Grove | 107% | 115% | 115% | 115% | 115% | 115% | 115% |
| PM V/C Leaving WUS toward Glenmont | 91% | 92% | 92% | 92% | 92% | 92% | 92% |
| Excess Passengers Glenmont | 1,110 | 2,421 | 2,421 | 2,421 | 2,421 | 2,421 | 2,421 |
| DC Streetcar | Moderate beneficial impact from additional ridership and minor adverse impact from new intersections. | Moderate beneficial impact from additional ridership within capacity. | Moderate beneficial impact from additional ridership within capacity. | Moderate beneficial impact from additional ridership within capacity. | Moderate beneficial impact from additional ridership within capacity. | Moderate beneficial impact from additional ridership within capacity. | Moderate beneficial impact from additional ridership within capacity. |
| V/C Eastbound AM(PM) Arriving at WUS | 15% (20%) | 18% (31%) | 18% (31%) | 18% (31%) | 18% (31%) | 18% (31%) | 18% (31%) |
| V/C Eastbound AM(PM) Leaving WUS | 33% (27%) | 42% (42%) | 42% (42%) | 42% (42%) | 42% (42%) | 42% (42%) | 42% (42%) |
| V/C Westbound AM (PM) Arriving at WUS | 50% (17%) | 65% (25%) | 65% (25%) | 65% (25%) | 65% (25%) | 65% (25%) | 65% (25%) |
| V/C Westbound AM (PM) Leaving WUS | 32% (7%) | 50% (8%) | 50% (8%) | 50% (8%) | 50% (8%) | 50% (8%) | 50% (8%) |

| Mode | No-Action Alternative | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative A-C |
|---|--|--|--|--|--|--|--|
| Intercity, Tour/Charter, and Sightseeing Buses | Major adverse impact on bus passenger facilities' ability to accommodate projected increases in users. | Moderate adverse impact on intercity and tour/charter bus operations because of the new 30-minute time limit for buses at WUS. Negligible adverse impact on hop-on/hop-off sightseeing buses as a result of relocation to G Street NE. | Moderate adverse impact on intercity and tour/charter bus operations because of the new 30-minute time limit for buses at WUS. Negligible adverse impact on hop-on/hop-off sightseeing buses as a result of relocation to G Street NE. | Moderate adverse impact on intercity and tour/charter bus operations because of the new 30-minute time limit for buses at WUS. Negligible adverse impact on hop-on/hop-off sightseeing buses as a result of relocation to G Street NE. | Moderate adverse impact on intercity and tour/charter bus operations because of the new 30-minute time limit for buses at WUS. Negligible adverse impact on hop-on/hop-off sightseeing buses as a result of relocation to G Street NE. | Moderate adverse impact on intercity and tour/charter bus operations because of the new 30-minute time limit for buses at WUS. Negligible adverse impact on hop-on/hop-off sightseeing buses as a result of relocation to G Street NE. | Moderate adverse impact on intercity and tour/charter bus operations because of the new 30-minute time limit for buses at WUS. Negligible adverse impact on hop-on/hop-off sightseeing buses as a result of relocation to G Street NE. |
| Peak-hour Bus Trips AM (PM) | 28 (39) | 50 (67) | 50 (67) | 50 (67) | 50 (67) | 50 (67) | 50 (67) |
| Loading | No impact due to sufficient loading capacity. | No impact due to sufficient loading capacity. | No impact due to sufficient loading capacity. | No impact due to sufficient loading capacity. | No impact due to sufficient loading capacity. | No impact due to sufficient loading capacity. | No impact due to sufficient loading capacity. |
| Pedestrians | Major adverse impact due to increased volumes in and out of WUS. | Major beneficial impact inside and minor adverse impact outside of WUS. | Major beneficial impact inside and minor adverse impact outside of WUS. | Moderate beneficial impact inside and minor adverse impact outside of WUS. | Moderate beneficial impact inside and minor adverse impact outside of WUS. | Major beneficial impact inside and minor adverse impact outside of WUS. | Major beneficial impact inside and minor adverse impact outside of WUS. |
| Peak Interior Volumes AM (PM) | 47,703 (61,646) | 71,734 (92,356) | 71,734 (92,356) | 71,734 (92,356) | 71,734 (92,356) | 71,734 (92,356) | 71,734 (92,356) |
| Peak Exterior Volumes AM (PM) | 11,123 (10,819) | 17,938 (16,766) | 17,938 (16,766) | 17,938 (16,766) | 17,938 (16,766) | 17,938 (16,766) | 17,938 (16,766) |
| Bicycle Activity | Moderate adverse impact from increased volumes with no change to facilities. No impact to existing bicycle facilities. | Minor beneficial impact from added storage and parking capable of accommodating increased bicycle volumes, though increased conflicts would partially offset benefits. | Minor adverse impact from conflicts on First and K Street NE. Adverse impact partially offset by added storage and parking capable of accommodating increased bicycle volumes. | Minor adverse impact from conflicts on First and K Street NE. Adverse impact partially offset by added storage and parking capable of accommodating increased bicycle volumes. | Minor adverse impact from conflicts on First and K Street NE. Adverse impact partially offset by added storage and parking capable of accommodating increased bicycle volumes. | Minor adverse impact from conflicts on First and K Street NE. Adverse impact partially offset by added storage and parking capable of accommodating increased bicycle volumes. | Minor beneficial impact from added storage and parking capable of accommodating increased volumes, though increased conflicts would partially offset benefits. |
| Peak Activity AM (PM) | 207 (241) | 285 (301) | 285 (301) | 285 (301) | 285 (301) | 285 (301) | 285 (301) |
| City and Commuter Buses | Moderate adverse impact from overcrowding of some routes and increases in traffic congestion. | Minor adverse impact from incrementally greater overcrowding of some routes and traffic congestion. Moderate impacts on some employee shuttle. | Minor adverse impact from incrementally greater overcrowding of some routes and traffic congestion. Moderate impacts on some employee shuttle. | Minor adverse impact from incrementally greater overcrowding of some routes and traffic congestion. Moderate impacts on some employee shuttle. | Minor adverse impact from incrementally greater overcrowding of some routes and traffic congestion. Moderate impacts on some employee shuttle. | Minor adverse impact from incrementally greater overcrowding of some routes and traffic congestion. Moderate impacts on some employee shuttle. | Minor adverse impact from incrementally greater overcrowding of some routes and traffic congestion. Moderate impacts on some employee shuttle. |
| V/C AM/PM (All Buses) | 54% (48%) | 65% (54%) | 65% (54%) | 65% (54%) | 65% (54%) | 65% (54%) | 65% (54%) |
| Over Capacity Routes | All 16 | All 16 | All 16 | All 16 | All 16 | All 16 | All 16 |
| Vehicular Parking and Rental Cars | No impact on parking. Minor adverse impacts on rental car operations from increased activity with same facilities. | Moderate adverse impact from loss of parking capacity. Minor beneficial adverse impacts on rental car operation because of new facility. | Minor adverse impact from loss of parking capacity. Minor beneficial adverse impacts on rental car operation because of new facility. | Moderate adverse impact from loss of parking capacity. Minor beneficial adverse impacts on rental car operation because of new facility. | Moderate adverse impact from loss of parking capacity. Minor beneficial adverse impacts on rental car operation because of new facility. | Minor adverse impact from loss of parking capacity. Minor beneficial adverse impacts on rental car operation because of new facility. | Moderate adverse impact from loss of parking capacity. Minor beneficial adverse impacts on rental car operation because of new facility. |
| Change in Parking Capacity | 0 | -700 | -450 | - 800 (East Option) - 840 (West Option) | -800 | -450 | -850 |
| Peak-hour Parking Trips AM (PM) | 189 (299) | 277 (310) | 321 (355) | 262 (294) | 262 (294) | 321 (355) | 277 (310) |
| Peak-hour Rental Car Trips AM (PM) | 46 (45) | 105 (92) | 105 (92) | 105 (92) | 105 (92) | 105 (92) | 105 (92) |

| Mode | No-Action Alternative | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative A-C |
|--|---|---|--|--|--|--|--|
| For-hire Vehicles | Major adverse impact from increased volumes with no change to infrastructure. | Moderate beneficial impact from more location to accommodate increased volumes. Major adverse impact from traffic congestion. | Moderate beneficial impact from more location to accommodate increased volumes. Major adverse impact from traffic congestion. | Moderate beneficial impact from more location to accommodate increased volumes. Moderate adverse impact from traffic congestion. | Moderate beneficial impact from more location to accommodate increased volumes. Moderate adverse impact from traffic congestion. | Moderate beneficial impact from more location to accommodate increased volumes. Moderate adverse impact from traffic congestion. | Moderate beneficial impact from more location to accommodate increased volumes. Moderate adverse impact from traffic congestion. |
| Peak-hour For-hire trips AM (PM) | 524 (862) | 1,928 (2,068) | 1,936 (2,074) | 1,924 (2,064) | 1,924 (2,064) | 1,936 (2,074) | 1,928 (2,068) |
| Private Pick-up/Drop-off | Major adverse impact from increased volumes with no change to infrastructure. | Moderate beneficial impact from more location to accommodate increased volumes. Major adverse impact from traffic congestion. | Moderate beneficial impact from more location to accommodate increased volumes. Major adverse impact from traffic congestion. | Moderate beneficial impact from more location to accommodate increased volumes. Moderate adverse impact from traffic congestion. | Moderate beneficial impact from more location to accommodate increased volumes. Moderate adverse impact from traffic congestion. | Moderate beneficial impact from more location to accommodate increased volumes. Moderate adverse impact from traffic congestion. | Moderate beneficial impact from more location to accommodate increased volumes. Moderate adverse impact from traffic congestion. |
| Peak-hour Private Pick-up/Drop-off AM (PM) | 872 (948) | 1,684 (1,540) | 1,696 (1,546) | 1,694 (1,548) | 1,694 (1,548) | 1,696 (1,546) | 1,684 (1,540) |
| Vehicular Traffic | Major adverse impact to traffic operations relative to existing conditions. Six intersections degrading to F during at least on peak hour; 21 intersections experiencing increases in queue length of more than 150 feet; 18 intersections experiencing average delay increases of more than 5 seconds. | Major adverse impact to traffic operations relative to No-Action. Seven intersections degrading to F during at least on peak hour; 16 intersections experiencing increases in queue length of more than 150 feet; 20 intersections experiencing average delay increases of more than 5 seconds. | Major adverse impact to traffic operations relative to No-Action. Four intersections degrading to F during at least on peak hour; 15 intersections experiencing increases in queue length of more than 150 feet; 21 intersections experiencing average delay increases of more than 5 seconds. | Major adverse impact to traffic operations relative to No-Action. Five (East Option) or four (west Option) intersections degrading to F during at least on peak hour; 19 (East Option) or 21 (West Option) intersections experiencing increases in queue length of more than 150 feet; 21 (East Option) or 20 (West Option) experiencing average delay increases of more than 5 seconds. | Major adverse impact to traffic operations relative to No-Action. Four intersections degrading to F during at least on peak hour; 14 intersections experiencing increases in queue length of more than 150 feet; 20 intersections experiencing average delay increases of more than 5 seconds. | Major adverse impact to traffic operations relative to No-Action. Four intersections degrading to F during at least on peak hour; 16 intersections experiencing increases in queue length of more than 150 feet; 20 intersections experiencing average delay increases of more than 5 seconds. | Major adverse impact to traffic operations relative to No-Action. Five intersections degrading to F during at least on peak hour; 19 intersections experiencing increases in queue length of more than 150 feet; 22 intersections experiencing average delay increases of more than 5 seconds. |
| Peak-hour Traffic Volumes AM (PM) | 1,631 (2,154) | 3,994 (4,010) | 4,058 (4,067) | 3,985 (3,998) | 3,985 (3,998) | 4,058 (4,067) | 3,994 (4,010) |
| Indirect Operational Impacts | | | | | | | |
| Potential Federal Air-Rights Development | | Minor adverse impact from generated activity. | Moderate adverse impact from generated activity. | Moderate adverse impact from generated activity. | Moderate adverse impact from generated activity. | Moderate adverse impact from generated activity. | Minor adverse impact from generated activity. |
| Size of Federal Air-rights Development (Square Feet) | | 323,720 | 917,420 | 952,600 | 688,050 | 688,050 | 380,000 |
| Peak-hour Vehicular Trips AM (PM) | | 180 (180) | 307 (302) | 318 (313) | 244 (232) | 244 (232) | 130 (123) |
| Peak-hour Combined Rail and Transit Trips AM (PM) | | 0 | 588 (629) | 609 (653) | 443 (469) | 443 (469) | 294 (280) |
| Construction Impacts | | | | | | | |
| Intercity and Commuter Railroads | | Moderate adverse impacts due to limited train cancellations (maximum of 8 in Phase 2 [2 years 5 months]) and delays (maximum of 18.5 minutes in Phase 2). | Moderate adverse impacts due to limited train cancellations (maximum of 8 in Phase 2 [3 years]) and delays (maximum of 18.5 minutes in Phase 2). | Moderate adverse impacts due to limited train cancellations (maximum of 8 in Phase 2 [2 years 4 months]) and delays (maximum of 18.5 minutes in Phase 2). | Moderate adverse impacts due to limited train cancellations (maximum of 8 in Phase 2 [2 years 4 months]) and delays (maximum of 18.5 minutes in Phase 2). | Moderate adverse impacts due to limited train cancellations (maximum of 8 in Phase 2 [3 years]) and delays (maximum of 18.5 minutes in Phase 2). | Moderate adverse impacts due to limited train cancellations (maximum of 8 in Phase 2 [2 years 5 months]) and delays (maximum of 18.5 minutes in Phase 2). |

| Mode | No-Action Alternative | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative A-C |
|---|-----------------------|--|--|---|--|--|--|
| WMATA Metrorail | | Moderate adverse impacts to Red Line operations due to delays or intermittent stoppages on evenings and weekends during Phase 4 (3 years 1 month). | Moderate adverse impacts to Red Line operations due to delays or intermittent stoppages on evenings and weekends during Phase 4 (4 years 11 months). | Moderate adverse impacts to Red Line operations due to delays or intermittent stoppages on evenings and weekends during Phase 4 (4 years). | Moderate adverse impacts to Red Line operations due to delays or intermittent stoppages on evenings and weekends during Phase 4 (4 years). | Moderate adverse impacts to Red Line operations due to delays or intermittent stoppages on evenings and weekends during Phase 4 (4 years 11 months). | Moderate adverse impacts to Red Line operations due to delays or intermittent stoppages on evenings and weekends during Phase 4 (3 years and 1 month). |
| DC Streetcar | | Moderate adverse impact from temporary losses of direct access from WUS. H Street closure possible but unlikely. | Moderate adverse impact from temporary losses of direct access from WUS. H Street closure possible but unlikely. | Moderate adverse impact from temporary losses of direct access from WUS. H Street closure possible but unlikely. | Moderate adverse impact from temporary losses of direct access from WUS. H Street closure possible but unlikely. | Moderate adverse impact from temporary losses of direct access from WUS. H Street closure possible but unlikely. | Moderate adverse impact from temporary losses of direct access from WUS. H Street closure possible but unlikely. |
| Intercity, Tour/Charter, and Sightseeing Buses | | Major adverse impacts in Phase 4 (3 years 1 month) between the demolition of the existing facility and completion of the new one. | Major adverse impacts in Phase 4 (4 years 11 months) between the demolition of the existing facility and completion of the new one. | East Option: Minor adverse impacts in Phase 4 (4 years) until completion of the pick-up and drop-off area. West Option: Major adverse impacts in Phase 4 (4 years) between the demolition of the existing facility and completion of the new one. | Major adverse impacts in Phase 4 (4 years) between the demolition of the existing facility and completion of the new one. | Major adverse impacts in Phase 4 (4 years 11 months) between the demolition of the existing facility and completion of the new one. | Major adverse impacts in Phase 4 (3 years 1 month) between the demolition of the existing facility and completion of the new one. |
| Loading | | Major adverse impacts from closure of the west dock in Phase 4 (3 years 1 month). | Major adverse impacts from closure of the west dock in Phase 4 (4 years 11 months). | Major adverse impacts from closure of the west dock in Phase 4 (4 years). | Major adverse impacts from closure of the west dock in Phase 4 (4 years). | Major adverse impacts from closure of the west dock in Phase 4 (4 years 11 months). | Major adverse impacts from closure of the west dock in Phase 4 (3 years 1 month). |
| Pedestrians | | Moderate adverse impacts from disruption of interior and exterior spaces. | Moderate adverse impacts from disruption of interior and exterior spaces. | Moderate adverse impacts from disruption of interior and exterior spaces. | Moderate adverse impacts from disruption of interior and exterior spaces. | Moderate adverse impacts from disruption of interior and exterior spaces. | Moderate adverse impacts from disruption of interior and exterior spaces. |
| Bicycle Activity | | Major adverse impact during reconstruction of First Street cycle track. | Major adverse impact during reconstruction of First Street cycle track. | Major adverse impact during reconstruction of First Street cycle track. | Major adverse impact during reconstruction of First Street cycle track. | Major adverse impact during reconstruction of First Street cycle track. | Major adverse impact during reconstruction of First Street cycle track. |
| City and Commuter Buses | | Negligible adverse impact. H Street closure is unlikely. | Minor adverse impacts on K Street bus routes during construction of the below-ground parking entrance. | Minor adverse impacts on K Street bus routes during construction of the below-ground parking entrance. | Minor adverse impacts on K Street bus routes during construction of the below-ground parking entrance. | Minor adverse impacts on K Street bus routes during construction of the below-ground parking entrance. | Negligible adverse impact. H Street closure is unlikely. |
| Vehicular Parking and Rental Cars | | Major adverse impact on parking in Phase 4 (3 years 1 month) between the demolition of the existing parking garage and the completion of the new parking facility. | Major adverse impact on parking in Phase 4 (4 years 11 months) between the demolition of the existing parking garage and the completion of the new parking facility. | East Option: Major adverse impact on parking in Phase 4 (4 years) between the demolition of the existing parking garage and the completion of the below-ground parking facility. West Option: Major adverse impact on parking in Phase 4 (4 years) between the demolition of the existing parking garage and the new parking facilities. | Major adverse impact on parking in Phase 4 (4 years) between the demolition of the existing parking garage and the completion of the new parking facilities. | Major adverse impact on parking in Phase 4 (4 years 11 months) between the demolition of the existing parking garage and the completion of the new parking facilities. | Major adverse impact on parking in Phase 4 (3 years 1 month) between the demolition of the existing parking garage and the completion of the new parking facility. |
| For-hire Vehicles | | Major adverse impacts from loss of queuing space. | Major adverse impacts from loss of queuing space. | Major adverse impacts from loss of queuing space. | Major adverse impacts from loss of queuing space. | Major adverse impacts from loss of queuing space. | Major adverse impacts from loss of queuing space. |

| Mode | No-Action Alternative | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative A-C |
|---------------------------------|-----------------------|---|---|---|---|---|---|
| Private Pick-up/Drop-off | | Moderate adverse impacts due to temporary lane closures. | Moderate adverse impacts due to temporary lane closures. | Moderate adverse impacts due to temporary lane closures. | Moderate adverse impacts due to temporary lane closures. | Moderate adverse impacts due to temporary lane closures. | Moderate adverse impacts due to temporary lane closures. |
| Vehicular Traffic | | Major adverse impacts from roads closures and construction traffic. | Major adverse impacts from roads closures and construction traffic. | Major adverse impacts from roads closures and construction traffic. | Major adverse impacts from roads closures and construction traffic. | Major adverse impacts from roads closures and construction traffic. | Major adverse impacts from roads closures and construction traffic. |

Table 5-63. Potential Mitigation

| Mode | Impact | Proposed Responsible Party ¹ | Recommended Action |
|---------------------------------|---|---|--|
| All Modes - Construction | All construction impacts on transportation | Proponents | Proponents to require the construction contractor to prepare an integrated Construction Transportation Management Plan defining the measures to be implemented by the construction contractor to avoid, minimize, or mitigate impacts from construction on all transportation modes in each phase of construction, along with procedures to enforce, monitor, and evaluate these measures. |
| Amtrak – Construction | During construction, up to two Amtrak trains may be canceled daily. | Amtrak | No mitigation is available. |
| MARC – Construction | During construction, up to 4 MARC trains may be canceled daily. | Amtrak | Amtrak to coordinate with MARC on alternative service options for affected MARC passengers, including the honoring of MARC tickets on alternative services. |
| VRE - Construction | During construction, up to 2 VRE trains may be canceled daily. | Amtrak | Amtrak to coordinate with VRE on alternative service options for affected VRE passengers, including the honoring of VRE tickets on alternative services. |
| Metrorail | Increase in passenger volumes would have moderate impact on passenger circulation at WUS WMATA Station. | Proponents | Proponents to contribute to improvements identified in WMATA’s Station Access and Capacity Study that have not been addressed by the Concourse Modernization Project or by WMATA by the time of implementation. |
| Metrorail | Increase in passenger volumes would contribute to capacity issues on WMATA Red Line. | Proponents | Proponents to coordinate with WMATA about regional efforts to increase mainline capacity along the Red Line. |
| Metrorail - Construction | During construction Phase 4, temporary schedule adjustments or intermittent stoppages may be required on evenings or during weekends. | Proponents | Proponents to coordinate with WMATA on construction approaches that would minimize delays and stoppages on the Red Line. |

| Mode | Impact | Proposed Responsible Party ¹ | Recommended Action |
|---|--|---|---|
| DC Streetcar – Construction | During construction, activities may block direct access from Streetcar station to WUS facilities. | Proponents | Proponents to coordinate with DDOT on options for temporary Streetcar station access during construction. Proponents to take steps with the District State Safety Office to address issues that may affect Streetcar certification. |
| Intercity Bus | Active management approach may adversely affect intercity bus operations due to 30-minute timeframe limit during peak hour. | USRC | USRC to develop Bus Facility Operations Plan in concert with intercity and tour/charter operators. USRC to work with DDOT and DCOP on strategies to address potential off-site bus layover activities. |
| Intercity Bus | Active management approach may have impact on tour/charter bus parking needs within the District. | USRC | USRC to coordinate with DDOT on strategy to address bus parking capacity loss associated with the Project. |
| Intercity Bus | In Alternative C-East Option, the distance between the bus facility and WMATA or the front of WUS would be substantially increased. | USRC | In Alternative C-East Option, Proponents to refine facility design to ensure that the connection among the different destinations is entirely covered or within the concourse environments of WUS. |
| Intercity Bus - Construction | In all Action Alternatives except Alternative C East Option, bus service would not be accommodated at WUS during Phase 4 of construction. | USRC | USRC to work with the District to identify a location for an adequately sized interim bus facility or bus loading zones as close to WUS as possible. |
| Vehicular Parking and Rental Cars – Construction | Loss of parking capacity during Phase 4 of construction. | USRC | USRC to identify adequately sized interim parking facilities outside the Project Area. |
| Private and For-hire Pick-up and Drop-off | The large increases in pick-up and drop-off volumes are likely to cause major congestion at the designated pickup points, which may also have a moderate impact on pedestrian safety due to conflicts with these vehicles. | USRC | USRC to ensure there is sufficient staffing to monitor traffic levels and ensure safe pedestrian crossing at all designated pick-up and drop-off areas. USRC to coordinate with Metropolitan Police Department (MPD) on enforcement strategies. |

| Mode | Impact | Proposed Responsible Party ¹ | Recommended Action |
|--|--|---|--|
| | Increased traffic volumes may negatively affect pick-up and drop-off operations. | | <p>USRC to coordinate with District Department of Public Works and MPD to provide coordinated enforcement of active curb areas along public streets.</p> <p>USRC to coordinate with the District Department of For-Hire Vehicles (DDFHV) to develop regulatory strategies to manage taxis and TNCs’ pick-up and drop-off activity at WUS, including a performance-based strategy for reducing impacts.</p> <p>USRC to coordinate with MPD to provide coordinated enforcement to minimize queues on public roadways.</p> <p>USRC to develop, in coordination with DDOT and DDFHV, an advanced vehicle dispatching strategy to distribute taxis and TNCs and maintain consistent queue lengths.</p> <p>USRC to manage, in coordination with DDOT and DDFHV, a regular monitoring program to reduce queues and spillback, particularly onto H Street NE from the deck roadways.</p> |
| For-hire Pick-up – Construction | During Phase 4 of the construction period, the demolition of the west ramp and back ramp would be unavailable, forcing for-hire vehicles to queue on the southeast road and east ramp. This queue could interfere with traffic operations on the deck. | USRC | USRC to develop a for-hire vehicle plan as part of the integrated Construction Management Plan. The Plan should prioritize maintaining safe traffic operations and distributing pick-ups and drop-offs. |
| Pedestrian | The large increases in passenger volumes adjacent to WUS may have a moderate impact on pedestrian crossing and queueing conditions. | USRC | USRC to coordinate with DDOT to adjust signal timings to provide sufficient crossing time for pedestrians exiting the front of WUS and to pursue opportunities to provide enhanced pedestrian accommodations at the front of WUS. |

| Mode | Impact | Proposed Responsible Party ¹ | Recommended Action |
|---|--|---|---|
| | | | USRC to coordinate with DDOT on additional pedestrian safety infrastructure measures. |
| Bicycle – Construction | Work on First Street NE would disrupt use of the Cycle track during parts of the construction period. | USRC | USRC to coordinate with DDOT on appropriate bicycle accommodations and wayfinding plan, to direct bicyclists to 2nd Street shared use path portion of Metropolitan Branch Trail. |
| Bicycle – Operations | Conflicts between bicycles, pedestrians, and vehicles on the First Street cycle track. | USRC | USRC to coordinate with DDOT on appropriate bicycle facilities and strategies to reduce conflicts among bicyclists, pedestrians, and vehicles. |
| Hop-on/Hop-off Sightseeing Buses | Movement of hop-on/hop-off sightseeing buses from front of WUS. | USRC | USRC to provide enhanced facilities at new G Street hop-on/hop-off bus location and to work with DDOT to provide an enhanced pedestrian connection to WUS entrances. |
| Employee Shuttles | Loss of spaces for employee shuttles. | USRC | USRC to coordinate with USCIS and Gallaudet University to identify new stop locations convenient to WUS. |
| Vehicular Traffic | Increases in traffic volumes would result in increases in delay and queuing at multiple intersections. | Proponents | <p>Proponents to work with DDOT to identify solutions out of a toolbox of traffic mitigation approaches, including, but not limited to, regular monitoring activities, turn restrictions, alternative intersection phasing, lane reassignment, parking restrictions, and street pattern changes, at the most severely impacted intersections in the study area.</p> <p>Proponents to coordinate with DDOT and WMATA on opportunities to achieve greater core transit capacity through additional lines or services, in order to accommodate a greater mode shift from vehicles to transit.</p> <p>Proponents to coordinate with DDOT on transportation demand management, for-hire, and transit strategies to reduce the total number of 2040 trips by 20%.</p> |

| Mode | Impact | Proposed Responsible Party ¹ | Recommended Action |
|-----------------------------------|--|---|--|
| Truck Traffic-Construction | During excavation, up to 120 daily construction trucks would enter and exit the site. | Proponents | <p>Proponents to incorporate truck traffic plan into the integrated Construction Transportation Management Plan to minimize impacts of truck traffic on residential neighborhoods. Truck traffic plan to be coordinated with DDOT. Affected Advisory Neighborhood Commissions to be given an opportunity to comment on the plan.</p> <p>If possible without major disruptions to train operations, Amtrak to allow for the use of work trains instead of dump trucks to haul away excavation spoil. This approach would substantially eliminate the work trucks associated with excavation. Typical construction truck traffic would be addressed by the integrated Construction Transportation Management Plan.</p> |
| Indirect Impacts | Potential Federal air-rights development would generate additional vehicular activity. | USRC | USRC to coordinate with DDOT on required transportation demand management practices to reduce traffic activity associated with the development through Comprehensive Transportation Review (CTR) process. |

1. Attribution proposed on the basis of each Proponent’s area of responsibility. Attribution to “Proponents” means shared or undetermined responsibility. Responsibilities will be finalized along with the mitigation measures.

5.5.7 Permits and Regulatory Compliance

2450 The following regulatory processes are required to implement the transportation elements of
2451 the Project:

- 2452 ■ Section 4(f) of the Department of Transportation Act of 1966: Chapter 6 of this DEIS
2453 contains a draft Section 4(f) evaluation for the Project.
- 2454 ■ Amtrak Engineering Requirements: The track and platform plan implemented as part
2455 of this Project, as well as any structures that interact with the tracks, platforms, and
2456 overhead catenary systems, would need to be approved by Amtrak’s Engineering
2457 Department.
- 2458 ■ DDOT Comprehensive Transportation Review: As a large project located within the
2459 District, WUS would complete a Comprehensive Transportation Review with DDOT.
- 2460 ■ DDOT Design and Engineering Manual: Designs for public right-of-way must comport
2461 with requirements in the Design and Engineering Manual, unless waivers are
2462 obtained.
- 2463 ■ DC Zoning Commission Review: As part of the expected rezoning of the Federal air-
2464 rights development parcel, transportation conditions governing the Federal air-rights
2465 development are expected.

2466 The following permits are expected to implement the transportation elements of the Project:

- 2467 ■ DDOT permits governing the use of the public right-of-way and creation of roadway
2468 access permits⁸⁹ would be required, including:
 - 2469 ● Public Space Permit – Construction
 - 2470 ● Public Space Permit - Occupancy
 - 2471 ● Traffic Control Plan for both Construction and Occupancy Permits
- 2472 ■ Project Proponents are expected to coordinate with DDOT to obtain necessary
2473 permits and permissions through the Transportation Online Permitting System
2474 (TOPS).
- 2475 ■ The transfer of the H Street underpass right-of-way would be coordinated through
2476 the DC Surveyor’s Office (DCSO) and the Council of the District of Columbia.
- 2477 ■ Utility and maintenance access easements would be coordinated with DDOT, DCSO,
2478 and the appropriate utilities.

⁸⁹ District Department of Transportation Public Space Permit. Accessed from <https://ddot.dc.gov/node/496092>. Accessed on March 29, 2020.

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- DDOT manuals and guidance would need to be followed in the design and implementation of the transportation elements, including:
 - DDOT DC Temporary Traffic Control Manual
 - DC Streetcar Design Criteria
 - DC Streetcar Utilities Standard of Practice
 - WMATA permits governing adjacent construction and service closure would be required. WMATA's *Adjacent Construction Project Manual* outlines the requirements applicable to all projects next to or impacting WMATA facilities.

5.6 Air Quality

1 This section describes and characterizes potential direct and indirect impacts of the
2 No-Action Alternative and the six Action Alternatives on air quality. If applicable, this section
3 also recommends measures to avoid, minimize, or mitigate potential adverse impacts and
4 identifies potential permitting and regulatory compliance requirements.

5.6.1 Regulatory Context and Guidance

5 Relevant Federal policies, regulations and guidance that pertain to air quality are listed in
6 **Section 4.6.1, *Regulatory Context and Guidance***.

5.6.2 Study Area

7 As defined in **Section 4.6.2, *Study Area***, the air quality Local Study Area is the same as the
8 transportation Local Study Area (**Figure 4-3**). The Regional Study Area (**Figure 4-6**)
9 encompasses the jurisdictions that are members of MWCOG.

5.6.3 Methodology

10 This section summarizes the methodology for evaluating the potential impacts of the
11 alternatives on air quality. **Appendix C3, *Washington Union Station Expansion Project***
12 ***Environmental Consequences Technical Report*, Section 6.4, *Methodology***, provides a
13 description of the analysis methodology. A summary is below. Impacts were assessed as
14 major, moderate, minor, or negligible consistent with the intensity scale defined in **Section**
15 **5.1.1, *Definitions***.

5.6.3.1 Criteria Pollutants and General Conformity

16 The EPA has established National Ambient Air Quality Standards (NAAQS) for air criteria
17 pollutants as explained in **Section 4.6.4.2, *Ambient Air Quality***: carbon monoxide (CO), sulfur
18 dioxide (SO₂), nitrogen dioxide (NO₂), ozone (O₃), particulate matter sized 10 micrometers or
19 less (PM₁₀) and 2.5 micrometers or less (PM_{2.5}), and lead (Pb). The NAAQS include primary
20 and secondary standards. The primary standards are designed to protect human health,
21 including sensitive populations such as children, the elderly, and persons with respiratory
22 diseases, with an adequate margin of safety. The secondary standards are designed to
23 protect public welfare, damage to property, transportation hazards, economic values, and
24 personal comfort and well-being (see **Section 6.4.1, *Criteria Pollutants and General***
25 ***Conformity of Appendix C3, *Washington Union Station Expansion Project Environmental****
26 ***Consequences Technical Report***).

27 The EPA assesses an area's compliance with the NAAQS by assigning it one of four
28 designations for each criteria pollutant:

- 29 ■ **Attainment** when ambient air concentrations of the pollutant are below the NAAQS.
- 30 ■ **Nonattainment** when ambient air concentrations of the pollutant are above the
- 31 NAAQS.
- 32 ■ **Maintenance** when an area has recently achieved attainment status after being
- 33 previously designated as a Nonattainment area.
- 34 ■ **Unclassifiable** when insufficient data exist to assign a designation. Unclassifiable
- 35 areas are generally treated as Attainment areas.

36 General Conformity requirements under the Clean Air Act (CAA) ensure that Federal actions
37 in Nonattainment or Maintenance areas do not interfere with a state’s plans to attain and
38 maintain the NAAQS. Per these requirements, Federal activities must not cause or contribute
39 to new violations of the NAAQS; not worsen existing violations of the NAAQS; and not delay
40 the attainment of the NAAQS. To determine whether a project meets General Conformity
41 requirements, EPA established *de minimis* thresholds, or amounts of annual emissions a
42 project within a Nonattainment or Maintenance area should not exceed (**Table 5-64**). The
43 EPA has designated the District a Marginal Nonattainment area for the 8-hour O₃ standard in
44 an Ozone Transport Region and a Moderate Maintenance area for CO and PM_{2.5}.

5.6.3.2 Operational Impacts

45 Operational impacts on air quality were analyzed on two scales: microscale analysis for local,
46 direct impacts and mesoscale analysis for regional, indirect impacts.

Microscale Methodology

47 Microscale analysis determines a project’s local impacts on pollutant concentrations. The
48 microscale analysis for the Project had three components: a CO hotspot analysis; a PM_{2.5}
49 hotspot analysis; and a parking facility hotspot analysis for CO emissions. Details on the
50 modeling procedures used to assess microscale impacts are available in **Appendix C3**,
51 *Washington Union Station Expansion Project Environmental Consequences Technical Report*,
52 **Section 6.4.2, Operational Impacts**. In all three analyses, estimated emissions attributable to
53 the Project were compared to the applicable NAAQS.

- 54 ■ **CO Hotspot Analysis:** This analysis evaluated CO concentrations at the most
55 congested intersections in the Local Study Area. Intersections were ranked based on
56 traffic volumes and level of service (LOS) as determined by the transportation impact
57 analysis documented in **Section 5.5, Transportation**. Depending on the analysis, the
58 intersections analyzed included: North Capitol Street and K Street; North Capitol
59 Street and H Street; First Street and K Street; WUS facility access and H Street; and
60 North Capitol Street and Massachusetts Avenue.

Table 5-64. General Conformity *de minimis* Emissions Levels

| Pollutant | Tons per Year | Area Type |
|--|---------------|--|
| O₃ (VOC or NO_x)¹ | 50 | Serious Nonattainment |
| | 25 | Severe Nonattainment |
| | 10 | Extreme Nonattainment |
| | 100 | Other Areas Outside an Ozone Transport Region |
| O₃ (NO_x) | 100 | Marginal and Moderate Nonattainment Inside an Ozone Transport Region |
| | 100 | Maintenance |
| O₃ (VOC) | 50 | Marginal and Moderate Nonattainment Inside an Ozone Transport Region |
| | 50 | Maintenance Within an Ozone Transport Region |
| | 100 | Maintenance Outside an Ozone Transport Region |
| CO, SO₂, and NO₂ | 100 | All Nonattainment and Maintenance |
| PM₁₀ | 70 | Serious Nonattainment |
| | 100 | Moderate Nonattainment and Maintenance |
| PM_{2.5}² | 70 | Serious Nonattainment |
| | 100 | Moderate Nonattainment and Maintenance |
| Pb | 25 | All Nonattainment and Maintenance |

Source: EPA, <https://www.epa.gov/general-conformity/de-minimis-tables>. Accessed June 8, 2019.

1. Volatile organic compounds (VOC) and nitrogen oxides (NO_x) are precursor emissions that combine in the atmosphere to form O₃.

2. Direct emissions, SO₂, NO_x (unless determined not to be a significant precursor), VOC, or ammonia (if determined to be a significant precursor).

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- **Particulate Matter Hotspot Analysis:** PM_{2.5} concentrations were evaluated at select intersections in the Local Study Area in accordance with EPA guidance.¹ Intersections that would experience the greatest increase in PM_{2.5} emissions are those frequented by heavy-duty diesel vehicles. For the Project, these intersections were those providing access to the bus facility.
 - **Parking Facility Analysis:** Depending on the alternative, a naturally ventilated above-ground parking facility or a mechanically ventilated below-ground parking facility, or both, were considered. Emissions from parking ventilation can combine with emissions from traffic on nearby streets. To assess the resulting potential impacts, the analysis modeled CO concentrations at the near and far sidewalk of the most heavily travelled street adjacent to parking ventilation.

¹ U.S. Environmental Protection Agency. November 2015. *Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM_{2.5} and PM₁₀ Nonattainment and Maintenance Areas*. EPA-420-B-15-084.

72 Microscale analysis also included a qualitative consideration of stationary source emissions.
73 The only Project-related stationary source equipment with direct emissions would be
74 emergency generators and cooling towers, a minor source of emissions. The stationary
75 source analysis for each Action Alternative was based on available information on size and
76 location as well as on applicable regulatory requirements.

Mesoscale Methodology

77 The mesoscale analysis considered roadway and rail emission sources, including diesel
78 locomotives, motor vehicles, and buses, on a regional level. Details about the modeling
79 procedures used to conduct this analysis are available in **Appendix C3**, *Washington Union
80 Station Expansion Project Environmental Consequences Technical Report, Section 6.4.2.3*,
81 *Mesoscale Methodology*. The mesoscale analysis had two components:

- 82 ■ **Criteria Pollutant Emissions:** Quantitative estimation of the change in annual area-
83 wide emissions of VOC, NO_x (precursors of O₃), CO, and PM attributable to the
84 Project. Project-related emissions were compared to the applicable *de minimis*
85 thresholds to assess impacts on air quality, in compliance with General Conformity
86 requirements.
- 87 ■ **Mobile Source Air Toxics (MSAT) Emissions:** Qualitative analysis of MSAT emissions,
88 as the Action Alternatives have low potential for MSAT impacts. The analysis
89 considered anticipated volumes, vehicle mix, and routing and speed of traffic as well
90 as future rail activity.

5.6.3.3 Construction Impacts

91 The duration of construction would exceed five years in all Action Alternatives. To comply
92 with General Conformity requirements, a quantitative modeling of potential peak
93 construction year emissions was performed. Excavation and spoil removal typically are the
94 most emission-intensive construction activities. The analysis considered two spoil removal
95 scenarios: one assuming removal of spoil by dump trucks only (up to 120 trucks per day) and
96 the other one assuming removal by work trains (two work trains a day). The first scenario
97 yields a conservative, maximum emission estimate for all Action Alternatives. The second
98 scenario shows by how much using work trains to haul away spoil could reduce emissions. At
99 this time, the removal method is undetermined.

100 Other major construction activities considered in the analysis were: support of excavation
101 construction; caisson drilling; pressure slab construction; and overbuild deck construction. In
102 all Action Alternatives, construction would proceed in four phases. Peak-activity emissions in

103 each phase were estimated assuming a worst-case scenario where these activities would all
104 take place within a single calendar year.²

5.6.4 Impacts Analysis

105 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
106 air quality.

5.6.4.1 No-Action Alternative

Direct Operational Impacts

107 Direct impacts are those resulting from pollutant emissions at a local scale and are assessed
108 through microscale analysis. This section presents the CO and PM_{2.5} hotspot analyses and
109 parking facility analysis for the No-Action Alternative.

110 The No-Action Alternative includes various station improvement projects but no major
111 changes that would cause significant amounts of new air pollutant emissions at WUS. The
112 private air rights above the rail terminal would be developed, causing increases in local traffic
113 volumes. Traffic volumes in the Local Study Area and railroad operations at WUS would also
114 increase due to background growth in population and future travel demand. There would be
115 changes in local vehicular and locomotive emissions driven by regulation and technology.

Microscale Analysis: CO Hotspot

116 **Relative to existing conditions, in the No-Action Alternative, there would be a minor**
117 **adverse direct operational impact on air quality from CO emissions. At all modeled**
118 **receptor locations, CO concentrations would be well below the applicable NAAQS.**

119 All estimated concentrations include background concentrations of 1.7 parts per million
120 (ppm) for the 1-hour averaging period and 1.5 ppm for the 8-hour averaging period. One-
121 hour CO concentrations would range from 1.9 parts per million (ppm) (0.2 ppm above
122 background) to 2.2 ppm (0.5 ppm above background) while 8-hour concentrations would
123 range from 1.6 ppm (0.1 ppm above background) to 1.8 ppm (0.3 ppm above background).
124 All concentrations would be only slightly above background levels and well below the

² The quantitative modeling of construction impacts does not include emissions associated with the column removal work, which would be the same in all Action Alternatives. During Phases 1 and 2 of construction, the column removal work would overlap with the excavation and reconstruction of portions of the rail terminal and would contribute additional emissions. However, this work would take place within the historic station building and involve installing temporary supports, removing, and replacing structural elements. These activities are not machine-intensive and would not involve the type of excavation or foundation installation work associated with the reconstruction of the rail terminal. In none of the Action Alternatives are annual emissions in Phases 1 or 2 anticipated to exceed 50 percent of the applicable *de minimis* levels, as documented in this section. Given the small scale of the column removal work, the emissions associated with this work have no potential to result in an exceedance of the *de minimis* in Phase 1 or 2, or during the Intermediate Phase.

125 applicable NAAQS of 35 ppm for 1-hour concentrations, and 9 ppm for 8-hour
126 concentrations.

Microscale Analysis: PM_{2.5} Hotspot

127 **Relative to existing conditions, in the No-Action Alternative, there would be a minor**
128 **adverse direct operational impact on air quality from PM_{2.5}. At all modeled receptor**
129 **locations, PM_{2.5} concentrations would be below the applicable NAAQS.**

130 PM_{2.5} emissions were modeled for the intersections on H Street NE providing access to, and
131 exit from, the existing bus facility. For modeling purposes, receptors were divided into two
132 groups: north of H Street and south of H Street.

133 All estimates include background concentrations of 22 micrograms per cubic meter (µg/m³)
134 for the 24-hour averaging period and 9.2 µg/m³ for the annual averaging period. North of H
135 Street, receptors would experience a maximum 24-hour concentration of 23.6 µg/m³ (1.6
136 µg/m³ above background) and a maximum annual concentration of 9.9 µg/m³ (0.7 µg/m³
137 above background). South of H Street, receptors would experience a maximum 24-hour
138 concentration of 23.4 µg/m³ (1.4 µg/m³ above background) and a maximum annual
139 concentration of 10 µg/m³ (0.8 µg/m³ above background).

140 In both locations, concentrations would be below the applicable NAAQS of 35 µg/m³ for 24-
141 hour and 12 µg/m³ for annual concentrations. While total concentrations would approach
142 the NAAQS (approximately 69 percent of the 24-hour standard and 83 percent of the annual
143 standard), this would mostly be due to background conditions.

Microscale Analysis: Parking Facility

144 **Relative to existing conditions, in the No-Action Alternative, there would be a minor**
145 **adverse direct operational impact on air quality from CO near the parking garage. At all**
146 **modeled receptor locations, CO concentrations would be well below the applicable**
147 **NAAQS.**

148 The parking facility analysis for the No-Action Alternative considered the existing, naturally
149 ventilated parking garage with projected No-Action Alternative traffic volumes and
150 operations. Passenger vehicles were assumed to travel an average of 1,500 feet in the garage
151 when departing and 1,750 feet when parking. Buses using the terminal were assumed to
152 travel only on the bus deck, for an average distance of 500 feet.

153 All concentrations include background concentrations of 1.7 ppm for the 1-hour averaging
154 period and 1.5 ppm for the 8-hour averaging period. The maximum CO concentrations would
155 be primarily the result of traffic on H Street NE rather than garage operations. For the near
156 sidewalk, modeled CO concentrations would be 2.1 ppm (0.4 ppm above background) for the
157 1-hour averaging period and 1.7 ppm (0.2 ppm above background) for the 8-hour averaging
158 period. Concentrations at the far sidewalk would be slightly lower (2.1 ppm). At both
159 locations, modeled concentrations remain well below the NAAQS (35ppm for 1-hour and
160 9ppm for 8-hour concentrations).

Indirect Operational Impacts

Mesoscale Analysis

161 **Relative to existing conditions, in the No-Action Alternative, reductions in emissions of**
 162 **VOC, NO_x, CO, and PM_{2.5} would result in a beneficial indirect operational impact on air**
 163 **quality.**

164 As shown in **Table 5-65**, regional emissions of VOC, NO_x, CO, and PM_{2.5} in the No-Action
 165 Alternative would decrease substantially compared to the existing conditions. This is
 166 attributable to the anticipated effect of new regulations and improved technology in vehicles
 167 and locomotives. PM₁₀ emissions would increase relative to existing conditions because of
 168 increased vehicular traffic on local streets and emissions generated from brake-and-tire
 169 wear.

Table 5-65. Mesoscale Inventory, No-Action Alternative

| Source | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|-------------------------------|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Motor Vehicle Emissions | 33.9 | 4.1 | 63.9 | 4.4 | 0.9 |
| Locomotive Emissions | 0.9 | 26.5 | 12.2 | 0.5 | 0.5 |
| Total Emissions | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Existing Conditions Emissions | 62.2 | 73.0 | 161.0 | 4.3 | 2.1 |

170

Construction Impacts

171 **Construction of the projects included in the No-Action Alternative would cause air**
 172 **pollutant emissions. Available information on methods and schedules of construction is**
 173 **insufficient to quantify and characterize impacts on air quality.**

174 The construction of the private air-rights development, replacement of the H Street Bridge,
 175 and other projects included in the No-Action Alternative would generate emissions of air
 176 criteria pollutants. Primary sources would include construction equipment and heavy
 177 machinery exhaust as well as ground disturbing activities. The total annual amount of
 178 emissions would depend on equipment and vehicle types as well as on the schedule of each
 179 project. This information is not currently available, precluding the development of
 180 quantitative estimates.

5.6.4.2 Alternative A

Direct Operational Impacts

Microscale Analysis: CO Hotspot

181 **Relative to the No-Action Alternative, in Alternative A, there would be a minor adverse**
 182 **direct operational impact on air quality due to small increases in CO concentrations. At all**

183 **modeled receptor locations, CO concentrations would remain well below the applicable**
184 **NAAQS.**

185 In Alternative A, total 1-hour CO concentrations at modeled locations would range from
186 2.0 ppm (0.3 ppm above background) to 2.3 ppm (0.5 ppm above background). Eight-hour
187 concentrations would range from 1.7 ppm (0.2 ppm above background) to 1.9 ppm (0.4 ppm
188 above background). All concentrations would be only slightly above background levels.

189 Comparing total emissions in Alternative A to emissions in the No-Action Alternative shows
190 the amount of emission specifically due to the Project. In Alternative A, changes in
191 concentrations of no more than 0.2 ppm would occur for the 1-hour averaging time. For the
192 8-hour averaging time, emissions would increase by no more than 0.1 ppm. All
193 concentrations would remain well below the applicable NAAQS of 35 ppm for 1-hour and
194 9 ppm for 8-hour concentrations.

Microscale Analysis: PM_{2.5} Hotspot

195 **Relative to the No-Action Alternative, in Alternative A, there would be a minor adverse**
196 **direct operational impact on air quality due to small increases in PM_{2.5} concentrations. At**
197 **all modeled receptor locations, PM_{2.5} concentrations would remain below the applicable**
198 **NAAQS.**

199 In Alternative A, the modeled intersections were the H Street NE entrance and exit from the
200 new bus facility. North of H Street NE, receptors would experience a maximum 24-hour
201 concentration of 23.7 µg/m³ (1.7 µg/m³ above background) and a maximum annual
202 concentration of 10.0 µg/m³ (0.8 µg/m³ above background). South of H Street,
203 concentrations would be the same.

204 Compared to the No-Action Alternative estimates, in Alternative A there would be an
205 increase in maximum concentrations of 0.1 µg/m³ for both the 24-hour averaging time and
206 the annual averaging time. In both modeled locations, emission levels would be below the
207 applicable NAAQS. While total concentrations would approach the NAAQS of 35 for 24-hour
208 and 12 for annual concentrations (approximately 68 percent of the 24-hour standard and
209 83 percent of the annual standard), this would mostly be due to background levels.

Microscale Analysis: Parking Facility Analysis

210 **Relative to the No-Action Alternative, in Alternative A, there would be a minor adverse**
211 **direct operational impact on air quality near the parking facility due to small increases in**
212 **CO concentrations. At all modeled receptor locations, CO concentrations would be well**
213 **below the applicable NAAQS.**

214 The microscale parking facility analysis for Alternative A considered the operation of the
215 proposed bus facility and parking facility along with projected future traffic volumes and
216 operations for Alternative A. The bus facility would be where the existing garage currently
217 stands and buses would enter and exit through H Street NE. Parking would be on several

218 levels above the bus facility, with vehicle access via H Street NE. Emissions from vehicles
219 travelling on H Street NE were included in the analysis.

220 CO concentrations were evaluated at receptor locations on the near and far sidewalks
221 adjacent to the parking facility on H Street NE. These locations would experience the highest
222 CO concentrations because they are near both the facility and the heavily travelled H Street
223 Bridge. A car's average path through the parking facility was assumed to be 5,475 feet when
224 departing and 5,725 feet when parking, based on the planned dimensions of the facility and
225 assuming an equal distribution of users across the parking levels. Buses using the facility
226 were assumed to travel only on the bus deck with an average path length of 630 feet
227 inbound and 630 feet outbound.

228 On the near and far sidewalk, modeled CO concentrations would be 2.2 ppm for the 1-hour
229 averaging period (0.5 ppm above background) and 2.0 ppm for the 8-hour averaging period
230 (0.5 ppm above background).

231 Relative to the No-Action Alternative, emissions in Alternative A would be slightly higher. For
232 the 1-hour averaging time, there would be an increase of 0.2 ppm (far sidewalk) or 0.1 ppm
233 (near sidewalk). For the 8-hour averaging time, the increase would be 0.3 ppm at both
234 locations. All concentrations would remain well below the NAAQS of 35 ppm for 1-hour and 9
235 ppm for 8-hour concentrations.

Stationary Source Analysis

236 **Relative to the No-Action Alternative, stationary source emissions in Alternative A would**
237 **have negligible adverse direct operational impacts on air quality.**

238 The stationary source analysis included a preliminary assessment of the potential location of
239 heat, ventilation, and air conditioning (HVAC) equipment in Alternative A. Cooling towers
240 would likely be next to the northside of the Railway Express Agency (REA) Building, on the
241 east side of the Project Area. Cooling towers are a minor source of particulate matter
242 emissions. They do not emit pollutants through a combustion process. The towers would be
243 placed at least 30 feet from adjacent buildings or on a roof to maintain good ambient air
244 quality.

245 Emergency generators would be installed next to the cooling towers. The exact number, size,
246 and model of these generators have not yet been determined and would be defined during
247 the final design process. They would be sized to serve the needs of both WUS and the private
248 air-rights development. Emergency generators are direct sources of air pollutant emissions
249 from combustion. However, the operation of emergency generators is limited to 500 hours
250 per year and they can be operated only during emergency situations and for periodic testing.
251 Current design criteria indicate that the emergency generators would have to be located at
252 least 30 feet from adjacent buildings or on a rooftop. They would require obtaining an air
253 quality permit from DOEE before installation and operation. During the permitting process,
254 the applicant would be required to demonstrate that the generators would not cause an
255 impact on air quality.

Indirect Operational Impacts

Mesoscale Analysis

256 **Relative to the No-Action Alternative, Alternative A would have moderate adverse indirect**
 257 **operational impacts on air quality due to increased emissions. Emissions of criteria**
 258 **pollutants attributable to Alternative A would be below the General Conformity *de minimis***
 259 **criteria applicable to the District.**

260 The mesoscale analysis considered the changes in VOC, NO_x, CO, and PM emissions from
 261 motor vehicle and locomotive anticipated to occur by 2040 under Alternative A, using data
 262 (volumes, delays, and speeds) from the Alternative A traffic analysis. Locomotive emissions
 263 were modeled based on future rail operations and assumed the use of diesel locomotives.
 264 The analysis accounted for emissions from locomotive propulsion and idling as well as for
 265 generator activity.

266 Emissions from ventilation fans were also considered. Fan plants likely would be in three
 267 locations across the Project Area: one south of H Street NE, on the west side of WUS near the
 268 service road at the southern end of the private air-rights development area; and two north of
 269 H Street NE, in the east and west corners of the private air-right development area,
 270 respectively, immediately adjacent to K Street NE. Fans would be at least 30 feet from the
 271 nearest operable windows, louvers, or doors.

272 Modeling showed that Alternative A would have moderate adverse indirect operational
 273 impacts on air quality. As shown in **Table 5-66**, emissions of VOC, NO_x, CO, PM₁₀, and PM_{2.5} all
 274 would increase relative to the No-Action Alternative. NO_x emissions would increase the most
 275 in both absolute and relative terms. The emissions of NO_x attributable to Alternative A
 276 represent a 116 percent increase relative to No-Action Alternative emissions and around a
 277 third of the applicable *de minimis* level. Emissions of CO would increase substantially by
 278 approximately 32 percent and the CO emissions attributable to Alternative A would
 279 represent almost one quarter of the applicable *de minimis* level. All emissions attributable to
 280 Alternative A would remain below the applicable *de minimis* level.

Table 5-66. Mesoscale Inventory, Alternative A

| Source | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|--|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Motor Vehicle Emissions | 37.7 | 4.7 | 70.8 | 4.7 | 1.0 |
| Locomotive Emissions | 2.0 | 61.4 | 29.8 | 1.0 | 1.0 |
| Subtotal | 39.7 | 66.1 | 100.6 | 5.8 | 2.0 |
| No-Action Emissions | 34.8 | 30.6 | 76 | 4.8 | 1.3 |
| Total Alternative A Emissions¹ | 4.9 | 35.5 | 24.6 | 1.0 | 0.7 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

1. Emissions specifically attributable to the Project in Alternative A. Calculated by subtracting total No-Action Alternative emissions from total Alternative A emissions.

Mobile Source Air Toxics Analysis

281 **Relative to the No-Action Alternative, Alternative A may result in localized, higher levels of**
282 **MSAT emissions in the Local Study Area. Information to quantitatively assess these impacts**
283 **is not available. Based on existing information, they are anticipated to be minor.**

284 The amount of MSAT emitted in Alternative A would be proportional to the amount of bus
285 vehicle miles traveled (VMT) and railroad activity, assuming other variables (such as travel
286 not associated with WUS) remain the same. Most Project-generated motor vehicle traffic
287 would be light-duty vehicles, which are not a substantial source of MSAT. Although in
288 Alternative A the capacity of the new bus facility would be less than in the No-Action
289 Alternative, this would not prevent peak-hour bus activity to increase to accommodate an
290 increased number of passengers. Rail operations would also increase relative to the No-
291 Action Alternative. The increase in bus VMT and rail activity would lead to higher diesel
292 particulate matter emissions (a component of MSAT) near WUS. The higher emissions could
293 be partly offset by two factors: the decrease in regional traffic due to greater use of
294 commuter rail and increased speed on area highways due to the decrease in commuter
295 traffic.

296 Only a portion of the increase in railroad activity would be associated with electric
297 locomotives, which do not generate MSAT emissions. Therefore, increases in railroad activity
298 would cause an increase in operations by diesel-fuel locomotives and in diesel-related
299 emissions near homes, schools, and businesses next to WUS. Therefore, there may be areas
300 where ambient concentrations of MSAT would be locally higher in Alternative A than in the
301 No-Action Alternative. The magnitude and duration of these potential impacts cannot be
302 reliably quantified due to incomplete or unavailable information.

303 On a regional basis, EPA's vehicle and fuel regulations, coupled with the progressive
304 replacement over time of older vehicles by newer ones, is anticipated to cause substantial
305 reductions in MSAT emissions over time, resulting in overall lower MSAT levels in 2040. EPA's
306 national control programs are projected to reduce annual MSAT emissions by over
307 90 percent between 2010 and 2050.³

Construction Impacts

308 **Construction of Alternative A would have moderate adverse impacts on air quality due to**
309 **increased annual emissions during all phases of construction. Emissions of criteria**
310 **pollutants would be below the General Conformity *de minimis* criteria applicable to the**
311 **District.**

312 Construction activities in Alternative A would cause air pollutant emissions in amounts that
313 would vary across the construction period, which would last approximately 11 years and 5

³ U.S. Department of Transportation, Federal Highway Administration. October 18, 2016. *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. Accessed from https://www.fhwa.dot.gov/environment/air_quality/air_toxics/policy_and_guidance/msat/. Accessed on April 4, 2020.

314 months. This would include emissions from construction equipment and heavy machinery
 315 exhaust; fugitive dust from ground-disturbing activities; and fugitive dust from the operation
 316 of construction vehicles on unpaved roadways. Construction-related air quality impacts were
 317 estimated for each of the four construction phases. Since excavation would be the most
 318 emission-intensive part of the construction process, two scenarios were analyzed for the
 319 removal of spoils: removal by trucks and removal by work trains.

320 Of all four construction phases, Phase 4 would generate the largest amount of emissions for
 321 all criteria pollutants. Spoil removal via trucks would generate more emissions than removal
 322 by work trains for all pollutants except NO_x. Otherwise, the greatest amounts of annual
 323 emissions would occur during Phase 4 of the All Truck Scenario, with 6.6 tons of VOC,
 324 23.3 tons of CO, 3.2 tons of PM₁₀, and 1.4 tons of PM_{2.5}.

325 During all phases and in both scenarios, emissions of criteria pollutants would remain below
 326 the applicable *de minimis* level even with the conservative scheduling assumption used for
 327 the analysis (Table 5-67 and Table 5-68).

Table 5-67. Construction Emissions per Phase, Alternative A (All Truck Scenario)

| Construction Period | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|----------------------------|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Phase 1 | 3.3 | 24.3 | 11.1 | 1.4 | 0.9 |
| Phase 2 | 4.8 | 35.6 | 16.4 | 2.2 | 1.4 |
| Phase 3 | 3.9 | 29.6 | 13.7 | 1.9 | 1.2 |
| Phase 4 | 6.6 | 50.3 | 23.3 | 3.2 | 2.0 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

Table 5-68. Construction Emissions per Phase, Alternative A (Work Train Scenario)

| Construction Period | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|----------------------------|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Phase 1 | 2.6 | 27.1 | 9.7 | 0.7 | 0.7 |
| Phase 2 | 3.5 | 40.2 | 14.0 | 1.1 | 1.0 |
| Phase 3 | 2.9 | 33.6 | 11.6 | 0.9 | 0.8 |
| Phase 4 | 4.8 | 57.1 | 19.8 | 1.5 | 1.4 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

Comparison to Existing Conditions

328 At the local level, the impacts of Alternative A on air quality relative to existing conditions
 329 would generally be the same as relative to the No-Action Alternative. Increases in pollutant
 330 concentrations would be proportionally slightly greater relative to existing conditions but
 331 would remain small. Concentrations would remain below the NAAQS.

332 At the regional level (**Table 5-69**), emissions attributable to Alternative A would not change
 333 but total emissions would be less or the same as under existing conditions for all pollutants
 334 except PM₁₀. This is because total emissions in Alternative A would incorporate the reduction
 335 in criteria pollutant emissions anticipated to occur by 2040 as a result of regulations and
 336 improved technology for vehicles and locomotives.

Table 5-69. Mesoscale Inventory Comparison, Alternative A

| Total Emissions | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|---|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Existing Conditions | 62.6 | 73.0 | 161.0 | 4.3 | 2.1 |
| No-Action Alternative | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative A | 39.7 | 66.1 | 100.6 | 5.8 | 2.0 |
| Emissions Attributable to Alternative A ¹ | 4.9 | 35.5 | 24.6 | 1.0 | 0.7 |

1. Calculated by subtracting total No-Action Alternative emissions from total Alternative A emissions.

5.6.4.3 Alternative B

Direct Operational Impacts

Microscale Analysis: CO Hotspot

337 **Relative to the No-Action Alternative, in Alternative B, there would be a minor adverse**
 338 **direct operational impact on air quality due to small increases in CO concentrations. At all**
 339 **modeled receptor locations, CO concentrations would remain well below the applicable**
 340 **NAAQS.**

341 In Alternative B, 1-hour CO concentrations at modeled locations would range from 2.1 ppm
 342 (0.4 ppm above background) to 2.6 ppm (0.9 ppm above background). Eight-hour
 343 concentrations would range from 1.7 ppm (0.2 ppm above background) to 1.9 ppm (0.4 ppm
 344 above background). All concentrations would be only slightly above background levels.

345 Compared to modeled No-Action Alternative estimates, differences would increase by up to
 346 0.5 ppm for the 1-hour averaging time. For the 8-hour averaging time, emissions would
 347 increase by up to 0.2 ppm. All concentrations would remain well below the applicable
 348 NAAQS.

Microscale Analysis: PM_{2.5} Hotspot

349 **Relative to the No-Action Alternative, in Alternative B, there would be a minor adverse**
 350 **direct operational impact on air quality due to small increases in PM_{2.5} concentrations. At**
 351 **all modeled receptor locations, PM_{2.5} concentrations would remain below the applicable**
 352 **NAAQS.**

353 The PM_{2.5} microscale analysis for Alternative B was conducted for the same receptor
354 locations as for Alternative A because the bus facility would be in the same location
355 (**Section 5.6.4.2, Air Quality, Direct Operational Impacts, Microscale Analysis**).

356 Both north and south of H Street NE, receptors would experience a maximum 24-hour
357 concentration of 23.6 µg/m³ (1.6 µg/m³ above background) and a maximum annual
358 concentration of 9.9 µg/m³ (0.7 µg/m³ above background).

359 Compared to the No-Action Alternative, there would be a maximum increase in
360 concentrations of 0.2 µg/m³ for the 24-hour averaging time and no significant change for the
361 annual averaging time. Emission levels would be below the applicable NAAQS of 35 µg/m³ for
362 24-hour or 12 µg/m³ for annual concentrations. While total concentrations would approach
363 the NAAQS (approximately 67 percent of the 24-hour standard and 83 percent of the annual
364 standard), this would mostly be due to background levels.

Microscale Analysis: Parking Facility

365 **Relative to the No-Action Alternative, in Alternative B, there would be a minor adverse**
366 **direct operational impact on air quality near the parking facility due to small increases in**
367 **CO concentrations. At all modeled receptor locations, CO concentrations would be well**
368 **below the applicable NAAQS.**

369 In Alternative B, the new bus facility and new parking facility would be separate. The bus
370 facility would be approximately where the existing parking garage stands. Buses would enter
371 and exit through H Street NE. Parking would be in two below-ground levels beneath the rail
372 terminal. Vehicles would enter and exit via K Street NE. The parking facility microscale
373 analysis considered both facilities along with future traffic volumes and operations for
374 Alternative B. Emissions from vehicles travelling along H Street, K Street, and First Streets NE
375 were included in the analysis.

376 CO concentrations were evaluated at receptor locations on near and far sidewalks on
377 H Street NE and at the intersection of K Street NE with First Street NE. Emissions from the
378 parking facility were considered at the two fan locations near the intersection of K and First
379 Street NE and on top of the bus deck. The bus facility was modeled as a volume source to
380 represent the bus deck. Emissions from vehicles travelling along H Street NE and K Street NE
381 were included in the analysis.

382 The average path through the parking facility was estimated to be 1,554 feet when departing
383 and 2,697 feet when parking based on the planned dimensions of the facility and assuming
384 an equal distribution of users across the two levels. Buses in the bus facility were assumed to
385 travel only on the bus deck, with an average path length of 630 feet for both inbound and
386 outbound trips.

387 For the H Street NE receptors, maximum CO concentrations would be 2.3 ppm for the 1-hour
388 averaging period (0.6 ppm above background) and 1.9 ppm for the 8-hour averaging period
389 (0.4 ppm above background) on the near sidewalk. For the receptors at K Street NE and First
390 Street NE intersection, maximum CO concentrations would be 2.5 ppm for the 1-hour

391 averaging period (0.9 ppm above background) and 1.9 ppm for the 8-hour averaging period
392 on the near sidewalk (0.4 ppm above background).

393 Relative to the No-Action Alternative, on H Street NE, emissions would be slightly higher. For
394 the 1-hour averaging time, there would be an increase of 0.2 ppm (both sidewalks). For the
395 8-hour averaging time, the increase would be 0.2 ppm (near sidewalk) or 0.1 ppm (far
396 sidewalk). In all locations, CO concentrations would be well below the NAAQS.

Stationary Source Analysis

397 **Relative to the No-Action Alternative, stationary source emissions in Alternative B would**
398 **have negligible adverse direct operational impacts on air quality.**

399 The stationary source analysis for Alternative A also applies to Alternative B (**Section 5.6.4.2,**
400 *Alternative A, Stationary Source Analysis*). The locations of fan plants would be different in
401 Alternative B but this does not affect the conclusions of the analysis. The plants would
402 exhaust air from the interior of WUS and the below-ground parking. In Alternative B, the
403 plants would be at four locations across the Project Area: two would be south of H Street NE,
404 adjacent to the east and west ends of the bus facility at the southern end of the private air-
405 rights development; and two would be north of H Street NE, at the east and west corners of
406 the Project Area adjacent to K Street NE.

Indirect Operational Impacts

Mesoscale Analysis

407 **Relative to the No-Action Alternative, Alternative B would have moderate adverse indirect**
408 **operational impacts on air quality due to increased emissions. Emissions of criteria**
409 **pollutants attributable to Alternative B would be below the General Conformity *de minimis***
410 **criteria applicable to the District.**

411 Alternative B would have moderate adverse indirect operational impacts on air quality.
412 Emissions of VOC, NO_x, CO, PM₁₀, and PM_{2.5} would increase relative to the No-Action
413 Alternative. NO_x emissions would increase the most in both absolute and relative terms
414 (**Table 5-70**). The emissions of NO_x attributable to Alternative B would represent a 117
415 percent increase relative to No-Action emissions and more than a third of the applicable *de*
416 *minimis* level. Emissions of CO would increase by approximately 27 percent and the
417 emissions attributable to Alternative B represent just under 30 percent of the applicable *de*
418 *minimis* level. All emissions attributable to Alternative B would remain below the applicable
419 *de minimis* level (**Table 5-64**).

Table 5-70. Mesoscale Inventory, Alternative B

| Source | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|--|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Motor Vehicle Emissions | 39.6 | 4.9 | 74.6 | 5.0 | 1.0 |
| Locomotive Emissions | 2.0 | 61.4 | 29.8 | 1.0 | 1.0 |
| Subtotal | 41.6 | 66.3 | 104.4 | 6.0 | 2.0 |
| No-Action Emissions | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative B Emissions¹ | 6.8 | 35.7 | 28.4 | 1.2 | 0.7 |
| De Minimis Criteria | 50 | 100 | 100 | 100 | 100 |

1. Emissions specifically attributable to the Project under Alternative B. Calculated by subtracting No-Action Alternative total emissions from total Alternative B emissions.

Mobile Source Air Toxics Analysis

420 **Relative to the No-Action Alternative, Alternative B may result in localized, higher levels of**
 421 **MSAT emissions in the Local Study Area. Information to quantitatively assess these impacts**
 422 **is not available. Based on existing information, they are anticipated to be minor.**

423 The MSAT analysis for Alternative B is the same as for Alternative A (**Section 5.6.4.2,**
 424 *Alternative A, Mobile Source Air Toxics Analysis*).

Construction Impacts

425 **Construction of Alternative B would have moderate adverse impacts on air quality due to**
 426 **increased annual emissions during all phases of construction. Emissions of criteria**
 427 **pollutants would be below the General Conformity *de minimis* criteria applicable to the**
 428 **District.**

429 Construction activities in Alternative B would cause air pollutant emissions in amounts that
 430 would vary across the construction period, which would last approximately 14 years and 4
 431 months. Main types and sources of emissions in Alternative B would be the same as in
 432 Alternative A (**Section 5.6.4.2, Construction Impacts**).

433 Phase 4 of construction would generate the largest amount of emissions for all pollutants.
 434 Spoil removal via trucks would produce greater emissions than removal by work trains for all
 435 pollutants excluding NO_x, which is a major pollutant produced by locomotives. During Phase
 436 4, annual NO_x emissions in the Work Train Scenario would reach 60 tons. Otherwise, the
 437 greatest amounts of annual emissions would occur during Phase 4 under the All Truck
 438 Scenario, with 6.8 tons of VOC, 24.7 tons of CO, 3.5 tons of PM₁₀, and 2.1 tons of PM_{2.5} (**Table**
 439 **5-71 and Table 5-72**). During all phases and in both scenarios, emissions of criteria pollutants
 440 would remain below the applicable *de minimis* level even with the conservative scheduling
 441 assumption used for the analysis.

Table 5-71. Construction Emissions per Phase, Alternative B (All Truck Scenario)

| Construction Period | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|----------------------------|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Phase 1 | 3.3 | 24.5 | 11.2 | 1.4 | 0.9 |
| Phase 2 | 5.9 | 44.2 | 20.4 | 2.5 | 1.7 |
| Phase 3 | 5.0 | 38.2 | 18.0 | 2.5 | 1.5 |
| Phase 4 | 6.8 | 52.4 | 24.7 | 3.5 | 2.1 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

Table 5-72. Construction Emissions per Phase, Alternative B (Work Train Scenario)

| Construction Period | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|----------------------------|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Phase 1 | 2.6 | 27.2 | 9.8 | 0.7 | 0.7 |
| Phase 2 | 4.7 | 48.9 | 18.0 | 1.3 | 1.3 |
| Phase 3 | 3.5 | 43.8 | 15.0 | 1.1 | 1.1 |
| Phase 4 | 4.8 | 60.0 | 20.7 | 1.5 | 1.5 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

Comparison to Existing Conditions

442 At the local level, the impacts of Alternative B on air quality relative to existing conditions
 443 would generally be the same as relative to the No-Action Alternative. Increases in pollutant
 444 concentrations would be proportionally slightly greater relative to existing conditions but
 445 they would remain small. Concentrations would remain below the NAAQS.

446 At the regional level, as shown in **Table 5-73**, the emissions specifically attributable to
 447 Alternative B would not change but total emissions would be less or the same as in existing
 448 conditions for all pollutants except PM₁₀. This is because total emissions in Alternative B
 449 would incorporate the reduction in emissions anticipated to occur by 2040 from regulations
 450 and improved technology for vehicles and locomotives.

Table 5-73. Mesoscale Inventory Comparison, Alternative B

| Total Emissions | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|---|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Existing Conditions | 62.6 | 73.0 | 161.0 | 4.3 | 2.1 |
| No-Action Alternative | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative B | 41.6 | 66.3 | 104.4 | 6.0 | 2.0 |
| Emissions Attributable to Alternative B ¹ | 6.8 | 35.7 | 28.4 | 1.2 | 0.7 |

1. Calculated by subtracting total No-Action Alternative emissions from total Alternative B emissions.

5.6.4.4 Alternative C

Direct Operational Impacts

Microscale Analysis: CO Hotspot

451 **Relative to the No-Action Alternative, in Alternative C (either option), there would be a**
452 **minor adverse direct operational impact on air quality due to small increases in CO**
453 **concentrations. At all modeled receptor locations, CO concentrations would remain well**
454 **below the applicable NAAQS.**

455 In Alternative C, the modeled intersections would vary with the option. For the East Option,
456 North Capitol Street and K street, North Capitol Street and H Street, and First Street and K
457 Street. For the West Option, Capitol Street and K street, North Capitol Street and H Street,
458 and parking access and H Street.

459 Concentrations would be similar regardless of the option. One-hour CO concentrations would
460 range from 2.1 ppm (0.4 ppm above background) to 2.6 ppm (0.9 ppm above background).
461 Eight-hour concentrations would range from 1.6 ppm (0.1 ppm above background) to
462 1.9 ppm (0.4 ppm above background). All concentrations would be only slightly above
463 background levels.

464 Compared to modeled No-Action Alternative estimates, differences would increase by up to
465 0.5 ppm for the 1-hour averaging time. For the 8-hour averaging time, emissions would
466 increase by up to 0.2 ppm. All concentrations would remain well below the applicable
467 NAAQS.

Microscale Analysis: PM_{2.5} Hotspot

468 **Relative to the No-Action Alternative, in Alternative C (either option), there would be a**
469 **minor adverse direct operational impact on air quality due to small increases in PM_{2.5}**
470 **concentrations. At all modeled receptor locations, PM_{2.5} concentrations would remain**
471 **below the applicable NAAQS.**

472 The PM_{2.5} microscale analysis for Alternative C was conducted for receptor locations at the
473 H Street NE entrance to the bus facility and at the bus pick-up and drop-off area. In
474 Alternative C with the East Option, receptors would experience a maximum 24-hour
475 concentration of 25.1 µg/m³ (3.1 µg/m³ above background) and a maximum annual
476 concentration of 10.8 µg/m³ (1.6 µg/m³ above background).

477 In Alternative C with the West Option, receptors would experience a maximum 24-hour
478 concentration of 25.0 µg/m³ (3.0 µg/m³ above background) and a maximum annual
479 concentration of 10.5 µg/m³ (1.3 µg/m³ above background).

480 Compared to the No-Action Alternative estimates, there would be an increase in
481 concentrations of up to 1.5 µg/m³ for the 24-hour averaging time and up to 0.8 µg/m³ for the
482 annual averaging time. PM_{2.5} concentrations at all receptor locations would be below the
483 NAAQS of 35 µg/m³ for 24-hour and 12 µg/m³ for annual concentrations. While total

484 concentrations would approach the NAAQS (approximately 71 percent of the 24-hour
485 standard and 90 percent of the annual standard), this would mostly be due to background
486 concentrations.

Microscale Analysis: Parking Facility

487 **Relative to the No-Action Alternative, in Alternative C (either option), there would be a**
488 **minor adverse direct operational impact on air quality near the parking facility and bus**
489 **pick-up and drop-off area due to small increases in CO concentrations. At all modeled**
490 **receptor locations, CO concentrations would be well below the applicable NAAQS.**

491 The parking facility analysis for Alternative C considered the operation of the new bus facility,
492 parking facilities, and bus pick-up and drop-off area in combination with future traffic
493 volumes and operations under this alternative. Emissions from vehicles traveling on H Street,
494 K Street, First Street and 2nd Street NE were included in the analysis.

495 CO concentrations in Alternative C were evaluated at receptor locations on both sidewalks
496 along H Street, K Street, First Street, and 2nd Street NE and along the bus pick-up and drop-
497 off area access road. Emissions from the below-ground facility were considered at the two
498 western fan locations near the intersection of K Street and First Street NE and near the
499 southwest corner of the bus pick-up and drop-off area.

500 The average path through the below-ground facility was estimated to be 777 feet when
501 departing and 1,920 feet when parking. In the above-ground facility, the corresponding
502 distances were estimated to be 3,288 feet and 3,826 feet, respectively. These path lengths
503 were estimated based on the planned dimensions of the facility and assuming an equal
504 distribution of users across the parking levels. Buses using the bus facility were assumed to
505 travel only on the bus deck with an average path length of 366 feet into and out of the
506 facility.

507 The maximum CO concentrations for both options would occur at the bus pick-up and drop-
508 off area near traveling buses and the below-ground parking exhaust vent. Concentrations
509 there would reach 2.7 ppm (1.0 ppm above background) for the 1-hour averaging time and
510 2.2 ppm (0.7 ppm above background) for the 8-hour averaging time. All CO concentrations
511 would remain well below the NAAQS of 35 ppm for 1-hour and 9 ppm for 8-hour
512 concentrations.

Stationary Source Analysis

513 **Relative to the No-Action Alternative, stationary source emissions in Alternative C (either**
514 **option) would have negligible adverse direct operational impacts on air quality.**

515 The stationary source analysis for Alternative C is the same as for Alternative A (**Section**
516 **5.6.4.2, *Alternative A, Stationary Source Analysis***). The locations of fan plants in Alternative C
517 would be the same as in Alternative B (**Section 5.6.4.3, *Alternative B, Stationary Source***
518 ***Analysis***) but this does not affect the conclusions of the analysis.

Indirect Operational Impacts

Mesoscale Analysis

519 **Relative to the No-Action Alternative, Alternative C (either option) would have moderate**
 520 **adverse indirect operational impacts on air quality due to increased emissions. Emissions of**
 521 **criteria pollutants attributable to Alternative C would be below the General Conformity *de***
 522 ***minimis* criteria applicable to the District.**

523 The mesoscale air quality analysis for each option of Alternative C was conducted for VOC,
 524 NO_x, CO, and PM emissions using vehicle and train traffic data from the Alternative C
 525 transportation impact analysis. Emissions of VOC, NO_x, CO, PM₁₀, and PM_{2.5} all would
 526 increase relative to the No-Action Alternative (**Table 5-74** and **Table 5-75**). NO_x emissions
 527 would increase the most in both absolute and relative terms. In either option, the emissions
 528 of NO_x attributable to Alternative C would represent a 117 percent increase relative to No-
 529 Action Alternative emissions and more than a third of the applicable *de minimis* level. CO
 530 Emissions would also increase in both options, by approximately 36 percent (East Option) or
 531 35 percent (West Option). The emissions attributable to Alternative C would represent less
 532 than 30 percent of the applicable *de minimis* level. All emissions attributable to Alternative C
 533 in either option would remain below the applicable *de minimis* level.

Table 5-74. Mesoscale Inventory, Alternative C East Option

| Source | VOC | NO _x | CO | PM ₁₀ | PM _{2.5} |
|--|-----------|-----------------|-----------|------------------|-------------------|
| | Tons/Year | Tons/Year | Tons/Year | Tons/Year | Tons/Year |
| Motor Vehicle Emissions | 38.9 | 4.8 | 73.7 | 4.9 | 1.0 |
| Locomotive Emissions | 2.0 | 61.4 | 29.8 | 1.0 | 1.0 |
| Subtotal | 40.9 | 66.2 | 103.5 | 5.9 | 2.0 |
| No-Action Emissions | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative C East Option Emissions¹ | 6.1 | 35.6 | 27.5 | 1.1 | 0.7 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

1. Calculated by subtracting total No-Action Alternative total emissions from total Alternative C, East Option emissions.

Table 5-75. Mesoscale Inventory, Alternative C West Option

| Source | VOC | NO _x | CO | PM ₁₀ | PM _{2.5} |
|--|-----------|-----------------|-----------|------------------|-------------------|
| | Tons/Year | Tons/Year | Tons/Year | Tons/Year | Tons/Year |
| Motor Vehicle Emissions | 38.8 | 4.7 | 72.8 | 4.9 | 1.0 |
| Locomotive Emissions | 2.0 | 61.4 | 29.8 | 1.0 | 1.0 |
| Subtotal | 40.8 | 66.1 | 102.6 | 5.9 | 2.0 |
| No-Action Emissions | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative C West Option Emissions¹ | 6.0 | 35.5 | 26.6 | 1.1 | 0.7 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

1. Calculated by subtracting total No-Action Alternative total emissions from total Alternative C, West Option emissions.

Mobile Source Air Toxics Analysis

534 **Relative to the No-Action Alternative, Alternative C (either option) may result in localized,**
 535 **higher levels of MSAT emissions in the Local Study Area. Information to quantitatively**
 536 **assess these impacts is not available. Based on existing information, they are anticipated to**
 537 **be minor.**

538 The MSAT analysis for Alternative C is the same as for Alternative A (**Section 5.6.4.2,**
 539 *Alternative A, Mobile Source Air Toxics Analysis*).

Construction Impacts

540 **Construction of Alternative C (either option) would have moderate adverse impacts on air**
 541 **quality due to increased annual emissions during all phases of construction. Emissions of**
 542 **criteria pollutants would be below the General Conformity *de minimis* criteria applicable to**
 543 **the District.**

544 Construction activities in Alternative C would cause air pollutant emissions in amounts that
 545 would vary across the construction period, approximately 12 years and 3 months. The main
 546 types and sources of emissions would be as described for Alternative A (**Section 5.6.4.2,**
 547 *Alternative A, Construction Impacts*).

548 In Alternative C as in the other Action Alternatives, Phase 4 would generate the largest
 549 amount of emissions for all pollutants. Spoil removal via trucks would produce the greatest
 550 emission levels for all pollutants excluding NO_x, which is a major pollutant produced by
 551 locomotives. During Phase 4, annual NO_x emissions in the Work Trains Scenario would reach
 552 55.9 tons. Otherwise, the greatest amounts of annual emissions would occur during Phase 4
 553 of the All Trucks Scenario, with 6.3 tons of VOC, 22.8 tons of CO, 3.3 tons of PM₁₀, and 1.9
 554 tons of PM_{2.5}.

555 During all phases and in both scenarios, emissions of criteria pollutants would remain below
 556 the applicable *de minimis* level even with the conservative scheduling assumption used for
 557 the analysis (**Table 5-76** and **Table 5-77**).

**Table 5-76. Construction Emissions per Phase, Alternative C Either Option
 (All Truck Scenario)**

| Construction Period | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|-----------------------------------|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Phase 1 | 3.1 | 22.9 | 10.5 | 1.4 | 0.9 |
| Phase 2 | 5.1 | 38.3 | 17.8 | 2.4 | 1.5 |
| Phase 3 | 4.8 | 37.0 | 17.3 | 2.4 | 1.5 |
| Phase 4 | 6.3 | 48.4 | 22.8 | 3.3 | 1.9 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

Table 5-77. Construction Emissions per Phase, Alternative C Either Option (Work Train Scenario)

| Construction Period | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|----------------------------|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Phase 1 | 2.4 | 25.7 | 9.0 | 0.7 | 0.7 |
| Phase 2 | 3.7 | 43.5 | 15.1 | 1.1 | 1.1 |
| Phase 3 | 3.4 | 42.3 | 14.5 | 1.1 | 1.0 |
| Phase 4 | 4.3 | 55.9 | 18.9 | 1.4 | 1.3 |
| De Minimis Criteria | 50 | 100 | 100 | 100 | 100 |

Comparison to Existing Conditions

558 At the local level, the impacts of Alternative C (either option) on air quality relative to existing
 559 conditions would generally be the same as relative to the No-Action Alternative. Increases in
 560 pollutant concentrations would be slightly greater relative to existing conditions but would
 561 remain small. Concentrations would remain below the NAAQS.

562 At the regional level, emissions specifically attributable to Alternative C would not change
 563 but total emissions would be less or the same as existing conditions for all pollutants except
 564 PM₁₀ (Table 5-78). This is because total emissions in Alternative C incorporate the reduction
 565 in emissions anticipated to occur by 2040 from regulations and improved technology for
 566 vehicles and locomotives.

Table 5-78. Mesoscale Inventory Comparison, Alternative C

| Total Emissions | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|--|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Existing Conditions | 62.6 | 73.0 | 161.0 | 4.3 | 2.1 |
| No-Action Alternative | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative C East Option | 40.9 | 66.2 | 103.5 | 5.9 | 2.0 |
| Emissions Attributable to Alternative C East Option¹ | 6.1 | 35.6 | 27.5 | 1.1 | 0.7 |
| Alternative C West Option | 40.8 | 66.1 | 102.6 | 5.9 | 2.0 |
| Emissions Attributable to Alternative C West Option¹ | 6.0 | 35.5 | 26.6 | 1.1 | 0.7 |

1. Calculated by subtracting total No-Action Alternative emissions from total Alternative C emissions.

5.6.4.5 Alternative D

Direct Operational Impacts

Microscale Analysis: CO Hotspot

567 **Relative to the No-Action Alternative, in Alternative D, there would be a minor adverse**
568 **direct operational impact on air quality due to small increases in CO. At all modeled**
569 **receptor locations, CO concentrations would remain well below the applicable NAAQS.**

570 One-hour CO concentrations in Alternative D would range from 2.1 ppm (0.4 ppm above
571 background) to 2.4 ppm (0.7 ppm above background). Eight-hour concentrations would
572 range from 1.7 ppm (0.2 ppm above background) to 1.9 ppm (0.4 ppm above background).
573 All concentrations would be only slightly above background levels.

574 Compared to the No-Action Alternative estimates, there would be increases of up to 0.4 ppm
575 for the 1-hour averaging time. For the 8-hour averaging time, emissions would increase by up
576 to 0.2 ppm. All concentrations would remain well below the applicable NAAQS of 35 ppm for
577 the 1-hour standard and 9 ppm for the 8-hour standard.

Microscale Analysis: PM_{2.5} Hotspot

578 **Relative to the No-Action Alternative, in Alternative D, there would be a minor adverse**
579 **direct operational impact on air quality due to small increases in PM_{2.5} concentrations. At**
580 **all modeled receptor locations, PM_{2.5} concentrations would remain below the applicable**
581 **NAAQS.**

582 The PM_{2.5} microscale analysis for Alternative D was conducted for receptor groupings on
583 H Street NE and on the roads leading to and from the bus facility adjacent to the train hall.

584 On the bus facility's exit road, receptors would experience a maximum 24-hour
585 concentration of 23.8 µg/m³ (1.8 µg/m³ above background) and annual concentration of
586 10.2 µg/m³ (1.0 µg/m³ above background). The highest concentrations would occur on H
587 Street NE, where receptors would experience a maximum 24-hour concentration of 24.5
588 µg/m³ (2.5 µg/m³ above background) and a maximum annual concentration of 10.6 µg/m³
589 (1.4 µg/m³ above background).

590 Compared to the No-Action Alternative maximum estimates, there would be an increase in
591 concentrations on H Street of up to 0.9 µg/m³ for the 24-hour averaging time and up to 0.6
592 µg/m³ for the annual averaging time. In all modeled locations, emission levels would be
593 below the applicable NAAQS. While maximum total concentrations would approach the
594 NAAQS (approximately 70 percent of the 24-hour standard and 88 percent of the annual
595 standard), this would mostly be due to background concentrations.

Microscale Analysis: Parking Facility Analysis

596 **Relative to the No-Action Alternative, in Alternative D, there would be a minor adverse**
597 **direct operational impact on air quality near the parking facility and bus facility due to**
598 **small increases in CO concentrations. At all modeled receptor locations, CO concentrations**
599 **would be well below the applicable NAAQS.**

600 In Alternative D, the bus facility would consist of a loop around the train hall. Buses using the
601 facility would access it via H Street NE. Parking would be provided in a one-level below-
602 ground facility along the western side of the Project Area and in a multi-story above-ground
603 facility south of K Street NE. Vehicles would access the below-ground parking facility via
604 K Street NE and the above-ground facility via H Street NE.

605 The parking facility microscale analysis for Alternative D considered the operations of the
606 proposed bus facility, below-ground parking facility, and above-ground parking facility along
607 with future traffic volumes and operations for this alternative. The analysis incorporated
608 emissions from vehicles traveling on H Street, K Street, First Street, 2nd Street NE, and access
609 roads to the bus facility and the above-ground parking facility.

610 CO concentrations were evaluated at receptor locations placed on H Street, K Street, First
611 Street, 2nd Street NE and the bus facility access roads. These would experience the highest
612 CO concentrations as they are near the bus facility, parking vents, and heavily traveled
613 streets. H Street and the bus facility roadway receptors are close to the parking facility's
614 southern fan plant and bus facility. Receptors on K Street, First Street and 2nd Street NE are
615 close to the parking's northern fan plant and the above-ground parking facility.

616 Emissions from the below-ground parking facility were considered at the two western fan
617 locations: near the intersection of K Street and First Street NE and near the western end of
618 the bus facility. The average path through the below-ground parking facility was estimated at
619 777 feet when departing and 1,531 feet when parking. In the above-ground facility, it would
620 be 2,145 feet when departing and 2,466 feet when parking. These path lengths were
621 estimated based on the planned dimensions of the facilities. They assume an equal
622 distribution of users across all parking levels. Buses using the bus facility were assumed to
623 travel an average path length of 876 feet in and out of the facility.

624 Maximum CO concentrations in Alternative D would occur along the bus facility's access
625 roadways. These concentrations would be the result of emissions from the facility and the
626 nearby below-ground parking exhaust vent. At this location, the maximum 1-hour CO
627 concentration would reach 2.3 ppm (0.6 ppm above background) and the maximum 8-hour
628 concentration would reach 2.0 ppm (0.5 ppm above background). All concentrations would
629 remain well below the NAAQS of 35 ppm for 1-hour concentrations and 9 ppm for 8-hour
630 concentrations.

Stationary Source Analysis

631 **Relative to the No-Action Alternative, stationary source emissions in Alternative D would**
 632 **have negligible adverse direct operational impacts on air quality.**

633 The stationary source analysis for Alternative D is the same as for Alternative A (**Section**
 634 **5.6.4.2, Alternative A, Stationary Source Analysis**). The locations of fan plants in Alternative D
 635 would be as in Alternative B (**Section 5.6.4.3, Alternative B, Stationary Source Analysis**) but
 636 this does not affect the conclusions of the analysis.

Indirect Operational Impacts

Mesoscale Analysis

637 **Relative to the No-Action Alternative, Alternative D would have moderate adverse indirect**
 638 **operational impacts on air quality due to increased emissions. Emissions of criteria**
 639 **pollutants attributable to Alternative D would be below the General Conformity *de minimis***
 640 **criteria applicable to the District.**

641 Emissions of VOC, NO_x, CO, PM₁₀, and PM_{2.5} in Alternative D would increase relative to the
 642 No-Action Alternative. NO_x emissions would increase the most in both absolute and relative
 643 terms. The emissions of NO_x attributable to Alternative D would represent a 116 percent
 644 increase relative to No-Action emissions and more than a third of the applicable *de minimis*
 645 level. Emissions of CO would increase by approximately 34 percent. The CO emissions
 646 attributable to Alternative D would represent more than a quarter of the applicable *de*
 647 *minimis* level. All emissions attributable to Alternative D would remain below the applicable
 648 *de minimis* level (**Table 5-79**).

Table 5-79. Mesoscale Inventory, Alternative D

| Source | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|--|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Motor Vehicle Emissions | 38.3 | 4.6 | 72.2 | 4.9 | 1.0 |
| Locomotive Emissions | 2.0 | 61.4 | 29.8 | 1.0 | 1.0 |
| Subtotal | 40.3 | 66.0 | 102.0 | 5.9 | 2.0 |
| No-Action Emissions | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative D Emissions¹ | 5.5 | 35.4 | 25.9 | 1.1 | 0.7 |
| De Minimis Criteria | 50 | 100 | 100 | 100 | 100 |

1. Emissions specifically attributable to the Project under Alternative D. Calculated by subtracting total No-Action Alternative emissions from total Alternative D emissions.

Mobile Source Air Toxics Analysis

649 **Relative to the No-Action Alternative, Alternative D may result in localized, higher levels of**
 650 **MSAT emissions in the Local Study Area. Information to quantitatively assess these impacts**
 651 **is not available. Based on existing information, they are anticipated to be minor.**

652 The MSAT analysis conducted for Alternative D is the same as for Alternative A (**Section**
 653 **5.6.4.2, Alternative A, Mobile Source Air Toxics Analysis**).

Construction Impacts

654 **Construction of Alternative D would have moderate adverse impacts on air quality due to**
 655 **increased annual emissions during all phases of construction. Emissions of criteria**
 656 **pollutants would be below the General Conformity *de minimis* criteria applicable to the**
 657 **District.**

658 Construction activities in Alternative D would cause air pollutant emissions in amounts that
 659 would vary across the construction period, approximately 12 years and 3 months. The main
 660 types and sources of emissions would be as described for Alternative A (**Section 5.6.4.2,**
 661 **Alternative A, Construction Impacts**).

662 In Alternative D as in the other Action Alternatives, Phase 4 would generate the largest
 663 amount of emissions for all criteria pollutants. Spoil removal via trucks only would produce
 664 greater emission levels than removal by work trains for all pollutants except NO_x, which is a
 665 major pollutant produced by locomotives. During Phase 4, annual NO_x emissions in the Work
 666 Train Scenario would reach 55.9 tons. Otherwise, the greatest amounts of annual emissions
 667 would occur during Phase 4 of the All Truck Scenario, with 6.3 tons of VOC, 22.8 tons of CO,
 668 3.3 tons of PM₁₀, and 1.9 tons of PM_{2.5} (**Table 5-80** and **Table 5-81**). During all phases and in
 669 both scenarios, emissions of criteria pollutants would remain below the applicable *de*
 670 *minimis* level even with the conservative scheduling assumption used for the analysis.

Table 5-80. Construction Emissions per Phase, Alternative D (All Trucks Scenario)

| Construction Period | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|----------------------------|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Phase 1 | 3.1 | 22.9 | 10.5 | 1.4 | 0.9 |
| Phase 2 | 5.1 | 38.3 | 17.8 | 2.4 | 1.5 |
| Phase 3 | 4.8 | 37.0 | 17.3 | 2.4 | 1.5 |
| Phase 4 | 6.3 | 48.4 | 22.8 | 3.3 | 1.9 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

Table 5-81. Construction Emissions per Phase, Alternative D (Work Train Scenario)

| Construction Period | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|----------------------------|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Phase 1 | 2.4 | 25.7 | 9.0 | 0.7 | 0.7 |
| Phase 2 | 3.7 | 43.5 | 15.1 | 1.1 | 1.1 |
| Phase 3 | 3.4 | 42.3 | 14.5 | 1.1 | 1.0 |
| Phase 4 | 4.3 | 55.9 | 18.9 | 1.4 | 1.3 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

Comparison to Existing Conditions

671 At the local level, the impacts of Alternative D on air quality would generally be the same
 672 relative to existing conditions as relative to the No-Action Alternative. Increases in pollutant
 673 concentrations would be proportionally greater relative to existing conditions but would
 674 remain small. Concentrations would remain below the NAAQS.

675 At the regional level, as show in **Table 5-82**, emissions specifically attributable to Alternative
 676 D would not change but total emissions would be less or the same as in existing conditions
 677 for all pollutants except PM₁₀. This is because total emissions in Alternative D would
 678 incorporate the reduction in emissions anticipated to occur by 2040 from regulations and
 679 improved technology for vehicles and locomotives.

Table 5-82. Mesoscale Inventory Comparison, Alternative D

| Total Emissions | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|--|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Existing Conditions | 62.6 | 73.0 | 161.0 | 4.3 | 2.1 |
| No-Action Alternative | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative D ¹ | 40.3 | 66.0 | 102.0 | 5.9 | 2.0 |
| Emissions Attributable to Alternative D | 5.5 | 35.4 | 25.9 | 1.1 | 0.7 |

1. Calculated by subtracting total No-Action Alternative emissions from total Alternative D emissions.

5.6.4.6 Alternative E

Direct Operational Impacts

Microscale Analysis: CO Hotspot

680 **Relative to the No-Action Alternative, in Alternative E, there would be a minor adverse**
 681 **direct operational impact on air quality due to small increases in CO concentrations. At all**
 682 **modeled receptor locations, CO concentrations would remain well below the applicable**
 683 **NAAQS.**

684 One-hour CO concentrations in Alternative E would range from 2.1 ppm (0.4 ppm above
685 background) to 2.5 ppm (0.8 ppm above background). Eight-hour concentrations would
686 range from 1.7 ppm (0.2 ppm above background) to 1.9 ppm (0.4 ppm above background).
687 All concentrations would be only slightly above background levels.

688 Compared to the No-Action Alternative estimates, there would be increases of up to 0.3 ppm
689 for the 1-hour averaging time. For the 8-hour averaging time, emissions would increase by up
690 to 0.1 ppm. All concentrations would remain well below the applicable NAAQS.

Microscale Analysis: PM_{2.5} Hotspot

691 **Relative to the No-Action Alternative, in Alternative E, there would be a minor adverse**
692 **direct operational impact on air quality due to small increases in PM_{2.5} concentrations. At**
693 **all modeled receptor locations, PM_{2.5} concentrations would remain below the applicable**
694 **NAAQS.**

695 The microscale PM_{2.5} analysis for Alternative E is the same as for Alternative D because the
696 bus facility and bus traffic would be the same in both alternatives. See **Section 5.6.4.5,**
697 *Alternative D, Microscale Analysis: PM_{2.5} Hotspot.*

Microscale Analysis: Parking Facility

698 **Relative to the No-Action Alternative, in Alternative E, there would be a minor adverse**
699 **direct operational impact on air quality near the parking facility and bus facility due to**
700 **small increases in CO concentrations. At all modeled receptor locations, CO concentrations**
701 **would be well below the applicable NAAQS.**

702 The parking facility microscale analysis for Alternative E considered the operations of the
703 proposed bus facility and below-ground parking facility along with future traffic volumes and
704 operations. The analysis incorporated the emissions from vehicles traveling on H Street, K
705 Street, and First Street NE as well as on the access roads to the bus facility.

706 CO concentrations in Alternative E were evaluated at receptor locations placed on the near
707 and far sidewalks on H Street, K Street, and First Street NE as well as the bus facility's access
708 roads. These locations would experience the highest CO concentrations as they would be
709 near the bus facility, parking facility vents, and heavily traveled streets. The H Street NE and
710 bus facility roadway receptors would be close to the bus facility and parking facility's
711 southern fan plant. Receptors on K Street NE and First Street NE would be close to the
712 parking facility's northern fan plant.

713 Emissions from the below-ground parking facility were considered at the two fan locations
714 near the intersection of K Street NE and First Street NE and near the bus facility. Vehicles
715 using the facility were estimated to travel an average path of 1,554 feet when departing and
716 2,697 feet when parking. These path lengths were estimated based on the planned
717 dimensions of the facility and assuming an equal distribution of users across the two parking
718 levels. Buses using the bus facility were assumed to travel an average length of 876 feet in
719 and out of the bus facility.

720 Maximum CO concentrations in Alternative E would occur on the bus facility's access
721 roadways. These concentrations would be the result of pollutant emissions from both the
722 bus facility and the below-ground parking exhaust vent. At this location, the maximum
723 1-hour CO concentration would reach 2.6 ppm (0.9 ppm above background) and the
724 maximum 8-hour concentration would reach 2.2 ppm (0.7 ppm above background). All
725 concentrations would remain well below the NAAQS of 35 ppm for 1-hour concentrations
726 and 9 ppm for 8-hour concentrations.

Stationary Source Analysis

727 **Relative to the No-Action Alternative, stationary source emissions in Alternative E would**
728 **have negligible adverse direct operational impacts on air quality.**

729 The stationary source analysis for Alternative E is the same as for Alternative A (**Section**
730 **5.6.4.2, Alternative A, Stationary Source Analysis**). The locations of fan plants in Alternative E
731 would be as in Alternative B (**Section 5.6.4.3, Alternative B, Stationary Source Analysis**) but
732 this does not affect the conclusions of the analysis.

Indirect Operational Impacts

Mesoscale Analysis

733 **Relative to the No-Action Alternative, Alternative E would have moderate adverse indirect**
734 **operational impacts on air quality due to increased emissions. Emissions of criteria**
735 **pollutants attributable to Alternative E would be below the General Conformity *de minimis***
736 **criteria applicable to the District.**

737 Emissions of VOC, NO_x, CO, PM₁₀, and PM_{2.5} for Alternative E would increase relative to the
738 No-Action Alternative (**Table 5-83**). NO_x emissions would increase the most in both absolute
739 and relative terms. The emissions of NO_x attributable to Alternative E would represent a
740 117 percent increase relative to No-Action Alternative emissions and more than a third of the
741 applicable *de minimis* level. Emissions of CO would increase by approximately 35 percent.
742 The CO emissions attributable to Alternative E would represent more than 25 percent of the
743 applicable *de minimis* level. All emissions attributable to Alternative E would remain below
744 the applicable *de minimis* level.

Mobile Source Air Toxics Analysis

745 **Relative to the No-Action Alternative, Alternative E may result in localized, higher levels of**
746 **MSAT emissions in the Local Study Area. Information to quantitatively assess these impacts**
747 **is not available. Based on existing information, they are anticipated to be minor.**

748 The MSAT analysis conducted for Alternative E is the same as for Alternative A (**Section**
749 **5.6.4.2, Alternative A, Mobile Source Air Toxics Analysis**).

Table 5-83. Mesoscale Inventory, Alternative E

| Source | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|--|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Motor Vehicle Emissions | 38.8 | 4.7 | 73.2 | 5.0 | 1.0 |
| Locomotive Emissions | 2.0 | 61.4 | 29.8 | 1.0 | 1.0 |
| Subtotal | 40.8 | 66.1 | 103.0 | 6.0 | 2.0 |
| No-Action Emissions | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative E Emissions¹ | 6.0 | 35.5 | 27.0 | 1.2 | 0.7 |
| De Minimis Criteria | 50 | 100 | 100 | 100 | 100 |

1. Emissions specifically attributable to the Project under Alternative E. Calculated by subtracting total No-Action Alternative emissions from total Alternative E emissions.

Construction Impacts

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Construction of Alternative E would have moderate adverse impacts on air quality due to increased annual emissions during all phases of construction. Emissions of criteria pollutants would be below the General Conformity *de minimis* criteria applicable to the District.

Construction activities in Alternative E would cause air pollutant emissions in amounts that would vary across the construction period, approximately 14 years and 4 months. The main types and sources of emissions would be as described for Alternative A (**Section 5.6.4.2**).

Like in the other Action Alternatives, Phase 4 would generate the largest amount of emissions for all pollutants. Spoil removal via trucks would produce greater emission levels for all pollutants than removal by work trains except for NO_x, which is a major pollutant produced by locomotives. During Phase 4, annual NO_x emissions in the Work Train Scenario would reach 60 tons. Otherwise, the greatest amounts of annual emissions would occur during Phase 4 of the All Truck Scenario, with 6.8 tons of VOC, 24.7 tons of CO, 3.5 tons of PM₁₀, and 2.1 tons of PM_{2.5}. During all phases and in both scenarios, emissions of criteria pollutants would remain below the applicable *de minimis* level even with the conservative scheduling assumption used for the analysis (**Table 5-84** and **Table 5-85**).

Table 5-84. Construction Emissions per Phase, Alternative E (All Truck Scenario)

| Construction Period | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|-------------------------------|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Phase 1 | 3.3 | 24.5 | 11.2 | 1.4 | 0.9 |
| Phase 2 | 5.9 | 44.2 | 20.4 | 2.5 | 1.7 |
| Phase 3 | 5.0 | 38.2 | 18.0 | 2.5 | 1.5 |
| Phase 4 | 6.8 | 52.4 | 24.7 | 3.5 | 2.1 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

Table 5-85. Construction Emissions per Phase, Alternative E (Work Trains Scenario)

| Construction Period | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|-------------------------------|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Phase 1 | 2.6 | 27.2 | 9.8 | 0.7 | 0.7 |
| Phase 2 | 4.7 | 48.9 | 18.0 | 1.3 | 1.3 |
| Phase 3 | 3.5 | 43.8 | 15.0 | 1.1 | 1.1 |
| Phase 4 | 4.8 | 60.0 | 20.7 | 1.5 | 1.5 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

Comparison to Existing Conditions

766 At the local level, the impacts of Alternative E on air quality relative to existing conditions
 767 would generally be the same as relative to the No-Action Alternative. Increases in pollutant
 768 concentrations would be proportionally greater relative to existing conditions but would
 769 remain small. Concentrations would remain below the NAAQS.

770 At the regional level, the emissions specifically attributable to Alternative E would not change
 771 but total emissions would be less or the same as in existing conditions for all pollutants
 772 except PM₁₀ (**Table 5-86**). This is because total emissions in Alternative E would incorporate
 773 the reduction in emissions anticipated by 2040 from regulations and improved technology for
 774 vehicles and locomotives.

Table 5-86. Mesoscale Inventory Comparison, Alternative E

| Total Emissions | VOC | NO _x | CO | PM ₁₀ | PM _{2.5} |
|--|-----------|-----------------|-----------|------------------|-------------------|
| | Tons/Year | Tons/Year | Tons/Year | Tons/Year | Tons/Year |
| Existing Conditions | 62.6 | 73.0 | 161.0 | 4.3 | 2.1 |
| No-Action Alternative | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative E | 40.8 | 66.1 | 103.0 | 6.0 | 2.0 |
| Emissions Attributable to Alternative E¹ | 6.0 | 35.5 | 27.0 | 1.2 | 0.7 |

1. Calculated by subtracting total No-Action Alternative emissions from total Alternative E emissions.

5.6.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

Microscale Analysis: CO Hotspot

775 **Relative to the No-Action Alternative, in Alternative A-C, there would be a minor adverse**
 776 **direct operational impact on air quality due to small increases in CO concentrations. At all**
 777 **modeled receptor locations, CO concentrations would remain well below the applicable**
 778 **NAAQS.**

779 One-hour CO concentrations in Alternative A-C would range from 2.0 ppm (0.3 ppm above
 780 background) to 2.3 ppm (0.6 ppm above background). Eight-hour concentrations would
 781 range from 1.7 ppm (0.2 ppm above background) to 1.9 ppm (0.4 ppm above background).
 782 All concentrations would be only slightly above background levels.

783 Compared to the No-Action Alternative estimates, emissions would increase by up to 0.1
 784 ppm for the 1-hour averaging time and the 8-hour averaging time. All concentrations would
 785 remain well below the applicable NAAQS of 35 ppm for 1 hour and 9 ppm for 8-hour
 786 concentrations.

Microscale Analysis: PM_{2.5} Hotspot

787 **Relative to the No-Action Alternative, in Alternative A-C, there would be a minor adverse**
 788 **direct operational impact on air quality due to small increases in PM_{2.5} concentrations. At**
 789 **all modeled receptor locations, PM_{2.5} concentrations would remain below the applicable**
 790 **NAAQS.**

791 The PM_{2.5} microscale analysis for Alternative A-C was conducted for the same receptor
 792 locations as for Alternative A, as the bus facility would be in the same general location.

793 North of H Street NE, receptors would experience a maximum 24-hour concentration of
 794 23.9 µg/m³ (1.9 µg/m³ above background) and a maximum annual concentration of
 795 10.1 µg/m³ (0.9 µg/m³ above background). South of H Street, receptors would experience a
 796 maximum 24-hour concentration of 23.7 µg/m³ (1.7 µg/m³ above background) and a
 797 maximum annual concentration of 10.2 µg/m³ (1.0 µg/m³ above background).

798 Compared to the No-Action Alternative estimates, there would be an increase in
799 concentrations of 0.3 $\mu\text{g}/\text{m}^3$ for the 24-hour averaging time and 0.2 $\mu\text{g}/\text{m}^3$ for the annual
800 averaging time. In both modeled locations, emission levels would be below the applicable
801 NAAQS. While total concentrations would approach the NAAQS (approximately 68 percent of
802 the 24-hour standard and 85 percent of the annual standard), this would mostly be due to
803 background concentrations.

Microscale Analysis: Parking Facility

804 **Relative to the No-Action Alternative, in Alternative A-C, there would be a minor adverse**
805 **direct operational impact on air quality near the parking facility and bus facility due to**
806 **small increases in CO concentrations. At all modeled receptor locations, CO concentrations**
807 **would be well below the applicable NAAQS.**

808 The microscale parking facility analysis for Alternative A-C considered the operation of the
809 proposed bus facility and parking facility along with projected future traffic volumes and
810 operations for Alternative A-C. The bus facility would be approximately where the existing
811 garage currently stands. Buses would enter via H Street NE; they would exit directly to H
812 Street NE via a dedicated ramp. Parking would be provided on six levels above the bus
813 facility. Vehicles would access and exit the parking facility via H Street (west intersection) and
814 the east-west road running along the length of the train hall. Emissions from vehicles
815 travelling on H Street NE were included in the analysis.

816 CO concentrations were evaluated at receptor locations on the near and far sidewalks
817 adjacent to the parking facility, north and south of H Street NE. These locations would
818 experience the highest CO concentrations as they are near both the parking facility and the
819 heavily travelled H Street Bridge. A car's average path through the facility was assumed to be
820 4,421 feet when departing and 4,671 feet when parking, based on the planned dimensions of
821 the parking facility and assuming an equal distribution of users across the parking levels.
822 Buses using the facility were assumed to travel only on the bus deck with an average path
823 length of 894 feet inbound and 894 feet outbound.

824 North of H Street, modeled CO concentrations would be 2.4 ppm for the 1-hour averaging
825 period (0.7 ppm above background) and 1.9 ppm for the 8-hour averaging period (0.4 ppm
826 above background). Concentrations south of H Street would be slightly lower.

827 Relative to the No-Action Alternative, emissions in Alternative A-C would be slightly higher.
828 For the 1-hour averaging time, there would be an increase of up to 0.3 ppm. For the 8-hour
829 averaging time, the increase would be of up to 0.2 ppm. All concentrations would remain
830 well below the NAAQS of 35 ppm for 1-hour and 9 ppm for 8-hour concentrations.

Stationary Source Analysis

831 **Relative to the No-Action Alternative, stationary source emissions in Alternative A-C would**
832 **have negligible adverse direct operational impacts on air quality.**

833 The stationary source analysis for Alternative A-C is the same as for Alternative A (**Section**
 834 **5.6.4.2, Alternative A, Stationary Source Analysis**).

Indirect Operational Impacts

Mesoscale Analysis

835 **Relative to the No-Action Alternative, Alternative A-C would have moderate adverse**
 836 **indirect operational impacts on air quality due to increased emissions. Emissions of criteria**
 837 **pollutants attributable to Alternative A-C would be below the General Conformity *de***
 838 ***minimis* criteria applicable to the District.**

839 Emissions of VOC, NO_x, CO, PM₁₀, and PM_{2.5} for Alternative A-C would increase relative to the
 840 No-Action Alternative (**Table 5-87**). NO_x emissions would increase the most in both absolute
 841 and relative terms. The emissions of NO_x attributable to Alternative A-C would represent a
 842 116 percent increase relative to No-Action Alternative emissions and more than a third of the
 843 applicable *de minimis* level. Emissions of CO would increase by approximately 31 percent and
 844 CO emissions attributable to Alternative A-C would represent more than 25 percent of the
 845 applicable *de minimis* level. All emissions attributable to Alternative A-C would remain below
 846 the applicable *de minimis* level.

Table 5-87. Mesoscale Inventory, Alternative A-C

| Source | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|--|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Motor Vehicle Emissions | 37.4 | 4.6 | 70.1 | 4.8 | 1.0 |
| Locomotive Emissions | 2.0 | 61.4 | 29.8 | 1.0 | 1.0 |
| Subtotal | 39.4 | 66.0 | 99.9 | 5.8 | 2.0 |
| No-Action Emissions | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative A-C Emissions¹ | 4.6 | 35.4 | 23.9 | 1.0 | 0.7 |
| <i>De Minimis</i> Criteria | 50 | 100 | 100 | 100 | 100 |

1. Emissions specifically attributable to the Project under Alternative A-C. Calculated by subtracting total No-Action Alternative emissions from total Alternative A-C emissions.

Mobile Source Air Toxics Analysis

847 **Relative to the No-Action Alternative, Alternative A-C may result in localized, higher levels**
 848 **of MSAT emissions in the Local Study Area. Information to quantitatively assess these**
 849 **impacts is not available. Based on existing information, they are anticipated to be minor.**

850 The MSAT analysis conducted for Alternative A-C is the same as for Alternative A (**Section**
 851 **5.6.4.2, Alternative A, Mobile Source Air Toxics Analysis**).

Construction Impacts

852 **Construction of Alternative A-C would have moderate adverse impacts on air quality due to**
 853 **increased annual emissions during all phases of construction. Emissions of criteria**
 854 **pollutants would be below the General Conformity *de minimis* criteria applicable to the**
 855 **District.**

856 Construction activities in Alternative A-C would be the same as in Alternative A, as both
 857 alternatives would involve the same depth of excavation, support of excavation methods,
 858 and would take the same amount of time to construct. Construction-related emissions would
 859 be as in Alternative A (see **Section 5.6.4.2, Alternative A, Construction Impacts**).

Comparison to Existing Conditions

860 At the local level, the impacts of Alternative A-C on air quality relative to existing conditions
 861 would generally be the same as relative to the No-Action Alternative. Increases in pollutant
 862 concentrations would be proportionally greater relative to existing conditions but would
 863 remain small. Concentrations would remain below the NAAQS.

864 At the regional level, the emissions specifically attributable to Alternative A-C would not
 865 change but total emissions would be less or the same as in existing conditions for all
 866 pollutants except PM₁₀ (**Table 5-88**). This is because total emissions in Alternative A-C would
 867 incorporate the reduction in emissions anticipated by 2040 from regulations and improved
 868 technology for vehicles and locomotives.

Table 5-88. Mesoscale Inventory Comparison, Alternative A-C

| Total Emissions | VOC Tons/Year | NO _x Tons/Year | CO Tons/Year | PM ₁₀ Tons/Year | PM _{2.5} Tons/Year |
|---|------------------|------------------------------|-----------------|-------------------------------|--------------------------------|
| Existing Conditions | 62.6 | 73.0 | 161.0 | 4.3 | 2.1 |
| No-Action Alternative | 34.8 | 30.6 | 76.0 | 4.8 | 1.3 |
| Alternative A-C | 39.4 | 66.0 | 99.9 | 5.8 | 2.0 |
| Emissions Attributable to Alternative A-C ¹ | 4.6 | 35.4 | 23.8 | 1.0 | 0.7 |

1. Calculated by subtracting total No-Action Alternative emissions from total Alternative A-C emissions.

5.6.5 Comparison of Alternatives

869 All Action Alternatives would cause impacts on air quality (**Table 5-89**). All would generate
 870 operational and construction-related air pollutant emissions that would not occur in the No-
 871 Action Alternative. The amount of new emissions attributable to each Action Alternative
 872 would be similar, varying only across a narrow range.

Table 5-89. Comparison of Alternatives. Air Quality

| Type of Impact | Analysis | No-Action Alternative | All Action Alternatives |
|-----------------------------|------------------------------|-----------------------|---------------------------|
| Direct Operational | Microscale CO | Minor adverse impact | Minor adverse impact |
| | Microscale PM _{2.5} | Minor adverse impact | Minor adverse impact |
| | Microscale Parking | Minor adverse impact | Minor adverse impact |
| | Stationary Source | N/A | Negligible adverse impact |
| Indirect Operational | Mesoscale | Beneficial impact | Moderate adverse impact |
| | MSAT | N/A | Minor adverse impact |
| Construction | | N/A | Moderate adverse impact |

873 As a result, the intensity of impacts relative to the No-Action Alternative would be the same
 874 for all Action Alternatives. All Action Alternatives would have:

- 875 ■ Minor adverse direct operational impacts on local air quality due to small, localized
 876 increases of CO and PM_{2.5} concentrations from mobile sources (motor vehicles and
 877 trains). Total concentrations would remain well below the NAAQS at all locations.
- 878 ■ Moderate adverse indirect operational impacts on regional air quality because they
 879 would increase annual NO_x emissions by 116 to 117 percent relative to the No-Action
 880 Alternative, amounting to more than a third of the *de minimis* level. Annual CO
 881 emissions would increase by approximately 31 to 37 percent relative to the No-
 882 Action Alternative, amounting to 24 to 28 percent of the *de minimis* level. Annual
 883 emissions of all criteria pollutants would remain below the *de minimis* levels and all
 884 Action Alternatives would meet General Conformity requirements with respect to
 885 operational impacts.
- 886 ■ Moderate construction-related impacts due to estimated annual emissions of NO_x,
 887 up to approximately 60 percent of the *de minimis* level and annual emission of CO
 888 representing from approximately 20 to 25 percent of the *de minimis* level for this
 889 pollutant. Annual emissions of all criteria pollutants would remain below the *de*
 890 *minimis* levels. All Action Alternatives would meet General Conformity requirements
 891 with respect to construction impacts.

892 The No-Action Alternative would have:

- 893 ■ A minor adverse direct operational impact on air quality from CO and PM_{2.5}
 894 emissions. Emissions of both pollutants would be well below the applicable NAAQS.

- 895 ■ A beneficial indirect operational impact on air quality due to reductions in emissions
896 of VOC, NOX, CO, and PM_{2.5}.

897 Undetermined construction-related impacts.

5.6.6 Avoidance, Minimization, and Mitigation Evaluation

898 The following avoidance, minimization, and mitigation measures are being considered by
899 FRA.

Operational Impacts

900 None of the Action Alternatives would result in major adverse operational impacts. To avoid
901 or minimize less than major adverse impacts on local air quality, the Project Proponents
902 would ensure that Project design places ventilation fans at least 30 feet from the nearest
903 operable windows, louvers, or doors. Emergency generators would be at least 30 feet from
904 the nearest building or on a rooftop. Rail operators would impose restrictions on diesel
905 locomotive idling to minimize MSAT emissions.

Construction Impacts

906 Even with conservative scheduling assumptions placing the most emission-intensive activities
907 within one calendar year for each construction phase, construction-related emissions would
908 not exceed the applicable *de minimis* criteria under any of the Action Alternatives. Although
909 no major adverse impacts are anticipated during construction, measures would be taken to
910 reduce pollutant emissions. Such measures, to be implemented by the construction
911 contractor, would include but are not limited to:

- 912 ■ Dust suppression; idling restrictions; use of Ultra Low Sulfur Diesel (ULSD) fuel;
913 proper maintenance of all motor vehicles, machinery, and equipment; and fitting of
914 equipment with mufflers or other regulatory-required emissions control devices
915 would be used.
- 916 ■ Compliance with the District’s anti-idling law (20 DCMR 900) during all construction
917 phases. This regulation limits non-road engine idling to three minutes. Idling
918 restriction signs would be placed on the premises to remind drivers and construction
919 personnel of the applicable regulations. Drivers and equipment operators would be
920 trained accordingly.
- 921 ■ Fitting all diesel-fuel construction equipment with after-engine emission controls.
922 The construction contractor would also be required to use ULSD fuel for all off-road
923 construction vehicles as an additional measure to reduce air emissions. Any non-road
924 diesel equipment would have to be rated 50 horsepower or greater to meet EPA’s
925 Tier 4 emission limits or be retrofitted with appropriate emission reduction
926 equipment. Emission reduction equipment could include EPA-verified or California
927 Air Resource Board-verified diesel oxidation catalysts or diesel particulate filters.

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- Implementing measures to protect local residents, visitors, passengers, and passers-by from off-site exposure to dust and debris in accordance with 20 DCMR 605. Appropriate methods of dust control would be determined according to the surfaces concerned (roadways or disturbed areas) and include, as applicable: application of water during ground-disturbing activities; stone surfacing of construction roads; seeding of areas of exposed or stock-piled soils; wheel washing; and regular sweeping of paved roadways. Recycling construction waste and demolition materials may also reduce dust emissions.
 - During construction in or immediately adjacent to the historic station building (demolition of the Claytor Concourse, column removal), put airtight walls or partitions in place around the construction areas, as needed to eliminate the risk of train engine exhaust fumes or dust drifting into the indoor areas accessible to the public or station employees.

5.6.7 Permits and Regulatory Compliance

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In any of the Action Alternatives considered, the Project would cause no exceedances of the applicable NAAQS and emissions inventories would remain below the applicable *de minimis* thresholds. The Project would comply with applicable regulations and General Conformity Rule requirements.

5.7 Greenhouse Gas Emissions and Resilience

1 This section describes and characterizes the potential direct and indirect impacts of the No-
2 Action Alternative and the five Action Alternatives on greenhouse gas (GHG) emissions and
3 resilience. If applicable, this section also recommends measures to avoid, minimize, or mitigate
4 potential adverse impacts and identifies potential permitting and regulatory compliance
5 requirements.

5.7.1 Regulatory Context and Guidance

6 Relevant Federal policies, regulations and guidance that pertain to greenhouse gas emissions
7 and resilience are listed in **Section 4.7.1, *Regulatory Context and Guidance***.

5.7.2 Study Area

8 As defined in **Section 4.7.2, *Study Area***, the Local Study Area consists of the Project Area and
9 the surrounding area within a half mile (**Figure 4-7**). The Local Study Area only applies to the
10 resilience impact analysis. Concerns about GHG emissions are primarily related to climate
11 change, a regional and global phenomenon. The state of dispersion science is not sufficiently
12 advanced to usefully consider GHG emission impacts at a local, microscale level. Therefore, a
13 Local Study Area was not defined for GHG and the study area for GHGs is regional only. The
14 Regional Study Area encompasses the jurisdictions of MWCOG (**Figure 4-6**).

5.7.3 Methodology

15 This section summarizes the methodology for evaluating the potential impacts of the
16 alternatives on greenhouse gas emissions and resilience. **Appendix C3, *Washington Union
17 Station Expansion Project Environmental Consequences Technical Report, Section 7.4,
18 Methodology***, provides a description of the analysis methodology. A summary is below.

5.7.3.1 Operational Impacts

19 The primary GHG associated with the operation of WUS is CO₂ from mobile and stationary
20 sources. The operational impact analysis consisted of estimating CO₂ emissions associated
21 with each alternative. Estimated emissions were compared to the District's CO₂-equivalent
22 (CO₂e) emissions inventory for 2017 (7.3 million metric tons) and to the District's emission
23 target for 2032 (5.05 million metric tons).¹ Impacts from changes in CO₂ emissions were

¹ District of Columbia Department of Energy and Environment (DDOE). *2006-2017 Greenhouse Gas Inventory*. Accessed from: <https://doee.dc.gov/service/greenhouse-gas-inventories>. Accessed on April 2, 2020. The District set emission reduction target for 2032 and 2050. The target for 2032 was used for this analysis as being closer to the Project's planning horizon year.

24 considered negligible if annual emissions would be equal to or less than 1 percent of the
25 2017 emission inventory and 2032 emission target amount; minor if they would be equal to
26 or less than 1 percent of the 2017 inventory and between 1 and 2 percent of the 2032 target
27 amount; moderate if they would be between 1 and 2 percent of both; and major if they
28 would be more than 2 percent of either.

Stationary Source Emissions

29 The methodology for assessing CO₂ emissions from stationary sources was adapted from the
30 methodology used to estimate energy impacts (**Appendix C2, Washington Union Station
31 Expansion Project Affected Environment Technical Report, Section 8.4, Methodology**), by
32 converting estimated energy use into CO₂ emissions. Conversion factors for electricity and
33 natural gas were from the U.S. Energy Information Administration (EIA). Conversion factors
34 for steam and chilled water were based on EPA guidance and published efficiencies of the
35 Capitol Power Plant.

36 Emissions of CO₂ that would occur in the Project Area were considered direct impacts. Only
37 emissions from natural gas use at the private air-rights development would have direct
38 stationary source impacts. Emissions from the consumption of energy produced away from
39 the Project Area were considered indirect impacts. These include emissions associated with
40 electricity consumption at both WUS and the private air-rights development as well as those
41 associated with cooling (chilled water) and heating (steam) at WUS.

Mobile Source Emissions

42 The mobile source analysis considered street and rail traffic emissions. Annual CO₂ emissions
43 were evaluated at the mesoscale level for the same diesel locomotive, motor vehicle, and
44 bus operations considered in the air quality impact analysis (**Section 5.6, Air Quality**). Motor
45 vehicle emission estimates were developed based on data from traffic impact analysis for the
46 alternative under consideration. Locomotive emissions were estimated based on planned
47 operations of diesel locomotives in the Project Area, including locomotive propulsion, idling,
48 and generator activity as well as anticipated train consists and movements.

Resilience

49 Potential impacts to resilience were assessed qualitatively for the Project and immediately
50 adjacent infrastructure. The analysis also considered consistency with *Resilient DC. A strategy
51 to Thrive in the Face of Change*.²

² Issued in April 2019. Available at: <https://resilient.dc.gov/>. Accessed on August 20, 2019.

5.7.3.2 Construction Impacts

52 Analysis of construction impacts involved the quantitative modeling of potential CO₂
53 emissions during the peak construction year for each phase, when emissions would be at
54 their greatest, especially during excavation.³ The analysis also factored in other major
55 construction activities such as support of excavation, caisson drilling, pressure slab
56 construction and overbuild deck construction. Two options were analyzed for spoil removal
57 associated with excavation: removal by dump trucks only and removal by work trains only.

58 Emissions from the peak activities under each phase of construction were estimated using
59 the conservative assumption that these activities would take place for the entire year. The
60 analysis accounted for emissions generated by on- and off-site diesel-powered construction
61 equipment and vehicles. The analysis considered phasing schedules, location, and activities
62 occurring throughout the construction period.

5.7.4 Impacts Analysis

63 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
64 GHG emissions and resilience.

5.7.4.1 No-Action Alternative

Direct Operational Impacts

65 **Relative to existing conditions, the No-Action Alternative would result in a negligible**
66 **adverse direct operational impact on CO₂ emissions due to new stationary sources of**
67 **emissions in the Project Area.**

68 The No-Action Alternative does not include any changes to WUS that would cause CO₂
69 emissions at WUS to vary significantly from existing conditions. New stationary source
70 emissions would be introduced by the construction of the private air-rights development.
71 The exact type of mechanical and combustion equipment that would be operated at the
72 private air-rights development is not known. The total estimated annual energy use of the
73 private air-rights development would be approximately 263,766,000 kilo British thermal units

³ The quantitative modeling of construction impacts does not include emissions associated with the column removal work, which would be the same in all Action Alternatives. During Phases 1 and 2 of construction, the column removal work would overlap with the excavation and reconstruction of portions of the rail terminal and would contribute additional GHG emissions. However, these emissions would be negligible because the work would take place within the historic station building and involve installing temporary supports, removing, and replacing structural elements; such activities are not machine-intensive and would not involve the type of emission-intensive excavation or foundation installation work associated with the reconstruction of the rail terminal.

74 (kBTUs), causing emissions of approximately 3,220 metric tons per year of CO₂.^{4, 5} This would
75 represent approximately 0.04 percent of the District's total 2017 GHG emissions (7.3 million
76 metric tons of CO₂e) and 0.06 percent of its 2032 emission target (5.05 million metric tons of
77 CO₂e).

Indirect Operational Impacts

78 **Relative to existing conditions, the No-Action Alternative would result in a minor adverse**
79 **indirect operational impact on CO₂ emissions due to new stationary and mobile sources of**
80 **emissions.**

81 Total stationary and mobile source emissions associated with the No-Action Alternative
82 would be approximately 76,568 metric tons, representing about 1.05 percent of the District's
83 total 2017 emissions (7.3 million metric tons of CO₂e) and 1.52 percent of its 2032 emission
84 target (5.05 million metric tons of CO₂e). The following sections describe the stationary and
85 mobile source emissions in more detail.

Stationary Source Analysis

86 The station improvement projects included in the No-Action Alternative would not
87 substantially affect energy usage. Electricity, steam, and chilled water consumption at WUS,
88 and the associated CO₂ emissions would remain in the same range as the existing ones.
89 Altogether, this would result in annual CO₂ emissions of approximately 12,274 tons. Electrical
90 consumption from the private air-rights development would generate an additional 32,833
91 tons of CO₂. Total annual stationary source CO₂ emissions would amount to approximately
92 45,107 metric tons. This would represent approximately 0.62 percent of the District's total
93 2017 emissions (7.3 million metric tons of CO₂e) and 0.89 percent of its emission target (5.05
94 million metric tons of CO₂e).

Mobile Source Analysis

95 Combined annual mobile source CO₂ emissions would amount to approximately 31,461
96 metric tons. This would represent 0.43 percent of the District's total 2017 emissions (7.3
97 million metric tons of CO₂e) and 0.62 percent of its 2032 emission target (5.05 million metric
98 tons of CO₂e).

⁴ A kBTU is 1,000 BTU. A BTU is a measure of the heat content of fuels or energy sources. Specifically, it is the quantity of heat required to raise the temperature of 1 pound of liquid water by 1 degree Fahrenheit at the temperature that water has its greatest density (approximately 39 degrees Fahrenheit).

⁵ U.S. Energy Information Administration. *Carbon Dioxide Emissions Coefficients*. Accessed from https://www.eia.gov/environment/emissions/co2_vol_mass.php. Accessed on April 2, 2020.

Total Direct and Indirect CO₂ Emissions

99 **Relative to existing conditions, combining direct and indirect impacts, the No-Action**
100 **Alternative would result in moderate adverse direct and indirect operational impacts on**
101 **CO₂ emissions due to new mobile and stationary sources of emissions.**

102 Total CO₂ emissions would be approximately 79,788 metric tons, representing 1.09 percent of
103 the District's total 2017 emissions (7.3 million metric tons of CO₂e) and 1.578 percent of its
104 2032 emission target (5.05 million metric tons of CO₂e).

Resilience

105 **Relative to existing conditions, the No-Action Alternative would have a moderate adverse**
106 **impact on resilience at WUS. Climate change impacts would likely increase resiliency**
107 **challenges while WUS infrastructure would remain mostly unchanged.**

108 In the No-Action Alternative, no major upgrades or retrofitting of the station's infrastructure
109 that would provide the opportunity to improve its resilience would occur. The No-Action
110 Alternative would not fully support the transportation objectives of *Resilient DC*, which calls
111 for greater integration, capacity, and frequency of regional transit systems at Union Station.
112 As climate change-related weather events become more numerous and challenging, WUS's
113 current infrastructure may become less and less able to withstand them, potentially leading
114 to disruptions in service and a deterioration of passenger and visitor experience. Such
115 potential impacts are summarized in **Table 5-90**.

116 By 2040, WUS may experience increased temperatures, increased frequency and duration of
117 heat waves, and increased frequency and intensity of precipitation and extreme storm
118 events, as noted for the District in the *Climate Ready DC Plan*. The District will become more
119 vulnerable to storm surge flooding from coastal storms and hurricanes. The most intense
120 impacts are likely to occur later than 2040, however, and the No-Action Alternative would
121 not preclude later upgrades to improve resiliency. Therefore, adverse impacts would be
122 moderate.

123 Due to its location, WUS is not likely to be directly affected by sea level rise and increased
124 storm surge risks. The elevation of the Local Study Area ranges from approximately 50 feet
125 near Columbus Plaza to near 100 feet at the northern end of the Project Area.

Construction Impacts

126 **Construction of the projects included in the No-Action Alternative would cause CO₂**
127 **emissions. Available information on methods and schedules of construction is insufficient**
128 **to quantify and characterize impacts.**

129 Projects that would be constructed through 2040 in the No-Action Alternative would
130 generate CO₂ emissions from construction equipment and heavy machinery exhaust.
131 Sufficient information on the total annual amount of emissions, type of equipment, vehicles,
132 and project schedules is currently not available to develop estimates.

Table 5-90. Potential Impacts of Climate Change

| Potential Impacts | |
|---|---|
| Increasing temperatures and frequency and duration of heat waves | <ul style="list-style-type: none"> ▪ Power outages due to larger demand for cooling during hot days ▪ Increased internal temperatures of buildings if ventilation is not adequate ▪ Increased stress on transmission lines, rail tracks, and critical electrical equipment ▪ Expanded joints or buckled rail tracks ▪ Increased risk of regional power loss, resulting in interruption or delay of service ▪ Increased risk of heat exposure and heat-related illness to construction workers, terminal employees, and passengers ▪ Improved safety and train services due to fewer cold days ▪ Reduced environmental impacts (from salt and chemicals) and costs from less need for snow and ice removal |
| Increasing frequency and intensity of precipitation and extreme storm events | <ul style="list-style-type: none"> ▪ Damages to facilities, disruption of operations and services due to flooding and standing water ▪ Flood risks near the Project due to overwhelmed stormwater/drainage systems that would impact access to the Project Site ▪ Damage to train and electrical equipment due to electrical voltage spikes during severe storms ▪ Fallen trees and debris (from high wind, ice storms, and other severe storm events), resulting in damaged rail infrastructure and terminal building ▪ Safety risk for outdoor workers and passengers ▪ Limitation of outdoor operations and maintenance services |

5.7.4.2 Alternative A

Direct Operational Impacts

Stationary Source Analysis

133 **Relative to the No-Action Alternative, Alternative A would result in no direct operational**
 134 **impact on CO₂ emissions.**

135 WUS is not a substantial source of direct (on-site) stationary source emissions of CO₂, as it
 136 receives electricity, chilled water, and steam from sources outside of the Project Area. At this
 137 stage of Project design, it is anticipated that WUS would continue to receive energy from
 138 these outside sources. All CO₂ impacts would be indirect.

Indirect Operational Impacts

139 **Relative to the No-Action Alternative, Alternative A would result in negligible adverse**
 140 **indirect operational impacts on CO₂ emissions from mobile and stationary sources.**

141 Total annual CO₂ emissions due to Alternative A (detailed in the following sections) would be
142 approximately 17,370 metric tons, approximately 0.24 percent of the District’s total 2017
143 emissions (7.3 million metric tons of CO₂e) and 0.34 percent of its 2032 emission target (5.05
144 million metric tons of CO₂e). This would be approximately a 22 percent increase over No-
145 Action Alternative emissions.

Stationary Source Analysis

146 Stationary source CO₂ emissions in Alternative A were estimated based on the anticipated
147 increase in energy consumption associated with the additional space requiring lighting,
148 cooling, and heating that the Project would construct. The expanded station would use an
149 additional 37,517,700 kBТУs per year of energy. Based on the proportion of each energy
150 source used at WUS in existing conditions, 52 percent of this energy would be electrical;
151 30 percent chilled water; and 18 percent steam. The production of this energy would
152 generate approximately 5,331 metric tons of stationary source CO₂ emissions annually. This
153 would be an increase of 12 percent over the No-Action Alternative. It would represent
154 approximately 0.07 percent of the District’s total 2017 emissions (7.3 million metric tons of
155 CO₂e) and 0.11 percent of its 2032 emission target (5.05 million metric tons of CO₂e).

Potential Federal Air-right Development

156 The potential development of the Federal air rights as additional parking space would add
157 approximately 3,690,408 kBТУs to WUS’s annual energy consumption, assumed to be
158 electricity. Producing this energy would generate approximately 597 metric tons of CO₂,
159 representing 0.01 percent of the District’s total 2017 emissions (7.3 million metric tons of
160 CO₂e) and of its 2032 emission target (5.05 million metric tons of CO₂e).

Mobile Source Analysis

161 Increased vehicular and rail traffic would generate additional CO₂ emissions on the regional
162 level. Relative to the No-Action Alternative, Alternative A would generate 11,442 additional
163 metric tons of mobile source CO₂ per year. This would be a 36 percent increase over the No-
164 Action Alternative. It would represent 0.16 percent of the District’s total 2017 emissions
165 (7.3 million metric tons of CO₂e) and 0.23 percent of its 2032 emission target (5.05 million
166 metric tons of CO₂e).

Resilience

167 **Relative to the No-Action Alternative, Alternative A would have a beneficial impact on**
168 **WUS’s resilience.**

169 Alternative A would result in a beneficial impact to the extent that it would provide an
170 opportunity to improve the station’s resilience. Features or measures designed to increase
171 the resiliency of WUS could be incorporated into the design and operation of the proposed
172 expansion to minimize the potential impacts of extreme weather events. Examples of
173 potential resilience-enhancing measures are listed in **Section 5.7.6.1, Operational Impacts,**
174 *Resilience.*

175 Station expansion in Alternative A would also support the transportation objectives of
176 *Resilient DC*, which calls for greater integration, capacity, and frequency of regional transit
177 systems at Union Station.⁶

Construction Impacts

178 **Construction of Alternative A would result in negligible adverse impacts on CO₂ emissions.**

179 Construction of Alternative A would generate CO₂ emissions from the use of construction
180 equipment, heavy machinery, and truck and vehicular traffic. Excavation, including the
181 loading, transportation and disposal of surplus soil and other materials, would require the
182 use of large diesel-fueled equipment (such as excavators and dump trailers) and would be
183 the most CO₂ intensive part of construction. Support of excavation, caisson drilling, pressure
184 slab and overbuild deck construction would also generate substantial amounts of CO₂.

185 Modeling of construction emissions shows that the All Truck Scenario would generate more
186 CO₂ emissions than the Work Train Scenario in all four phases of construction. In both
187 scenarios, Phase 4 would be the most emission-intensive phase. Phase 4 All Truck Scenario
188 emissions would be approximately 18,289 metric tons annually. This would represent
189 0.25 percent of the District's total 2017 CO₂e emissions (7.3 million metric tons) and
190 0.36 percent of its 2032 emission target (5.05 million metric tons).

Comparison to Existing Conditions

191 Alternative A would result in a greater proportional increase in CO₂ emissions relative to
192 existing conditions than relative to the No-Action Alternative. This is because the No-Action
193 Alternative baseline incorporates the emissions from the private air-rights development as
194 well as those from increased vehicular traffic and train service. For instance, with only WUS
195 as a source, stationary source emissions in Alternative A would increase by 44 percent
196 relative to existing conditions (47 percent with the potential Federal air-rights development)
197 instead of 11 percent relative to the No-Action Alternative (13 percent with the potential
198 Federal air-rights development).

199 However, the total amount of CO₂ emissions Alternative A would generate; their size relative
200 to overall District emissions; and their potential effect on climate change would be the same
201 regardless of the baseline.

⁶ *Resilient DC. A Strategy to Thrive in the Face of Change*. Accessed from <https://resilient.dc.gov/>. Accessed on August 20, 2019.

5.7.4.3 Alternative B

Direct Operational Impacts

Stationary Source Analysis

202 **Relative to the No-Action Alternative, Alternative B would result in no direct operational**
203 **impact on CO₂ emissions.**

204 Like in the other Action Alternatives, there would be no direct impacts because WUS is not a
205 significant source of on-site stationary source CO₂ emissions. All impacts would be indirect.

Indirect Operational Impacts

206 **Relative to the No-Action Alternative, Alternative B would result in negligible adverse**
207 **indirect operational impacts on CO₂ emissions from mobile and stationary sources.**

208 Total annual CO₂ emissions in Alternative B (detailed in the following sections) would be
209 approximately 26,453 metric tons, amounting to approximately 0.36 percent of the District's
210 total 2017 emissions (7.3 million metric tons of CO₂e) and 0.53 percent of its 2032 emission
211 target (5.05 million metric tons of CO₂e). This would represent approximately a 33 percent
212 increase over No-Action Alternative emissions (79,611 metric tons).

Stationary Source Analysis

213 Alternative B would generate an additional 5,995 metric tons of stationary source CO₂
214 emissions annually. This would be an increase of 13 percent over the No-Action Alternative.
215 It would represent approximately 0.08 percent of the District's total 2017 emissions (7.3
216 million metric tons of CO₂e) and 0.12 percent of its 2032 emission target (5.05 million metric
217 tons of CO₂e).

Potential Federal Air-right Development

218 The potential development of the remaining Federal air rights above the new bus facility as
219 additional office space would add approximately 61,742,366 kBtus to WUS's annual energy
220 consumption. This energy would be partly from natural gas and electricity. The generation of
221 this energy would generate approximately 8,439 metric tons of CO₂ emissions annually. This
222 would be equivalent to 0.12 percent of the District's total 2017 emissions (7.3 million metric
223 tons of CO₂e) and 0.17 percent of its 2032 emission target (5.05 million metric tons of CO₂e).

Mobile Source Analysis

224 Relative to the No-Action Alternative, Alternative B would generate annually approximately
225 12,019 additional metric tons of mobile source CO₂. This would be a 38 percent increase over
226 No-Action Alternative emissions. It would be equivalent to 0.16 percent of the District's total
227 2017 emissions (7.3 million metric tons of CO₂e) and 0.24 percent of its 2032 emission target
228 (5.05 million metric tons of CO₂e).

Resilience

229 **Relative to the No-Action Alternative, Alternative B would have a beneficial impact on**
230 **WUS's resilience.**

231 The impacts of Alternative B on WUS's resilience would be the same as Alternative A's
232 (Section 5.7.4.2, *Alternative A, Resilience*).

Construction Impacts

233 **Construction of Alternative B would result in negligible adverse impacts on CO₂ emissions.**

234 Alternative B's construction-related CO₂ emissions were estimated using the same approach
235 as for Alternative A (see Section 5.7.4.3, *Alternative A, Construction Impacts*). As in all Action
236 Alternatives, in Alternative B, the greatest amount of CO₂ emissions would occur during
237 Phase 4 in both spoil removal scenarios. The All Truck Scenario would generate more
238 emissions than the Work Train Scenario in all phases. Phase 4 All Truck Scenario emissions
239 would be approximately 18,736 metric tons. This would represent 0.26 percent of the
240 District's total 2017 emissions (7.3 million metric tons of CO₂e) and 0.36 percent of its 2032
241 emission target (5.05 million metric tons of CO₂e).

Comparison to Existing Conditions

242 Alternative B would result in a greater proportional increase in CO₂ emissions relative to
243 existing conditions than relative to the No-Action Alternative. This is because the No-Action
244 Alternative baseline incorporates the emissions from the private air-rights development and
245 from increased vehicular traffic and train service. With only WUS as a source, stationary
246 source emissions in Alternative B would increase by 49 percent relative to existing conditions
247 (113 percent if the potential Federal air-rights development is included) instead of 13 percent
248 relative to the No-Action Alternative (31 percent with the potential Federal air-rights
249 development). However, the total amount of CO₂ emissions Alternative B would generate;
250 their size relative to overall District emissions; and their potential effect on climate change
251 would be the same regardless of the baseline.

5.7.4.4 Alternative C

Direct Operational Impacts

Stationary Source Analysis

252 **Relative to the No-Action Alternative, Alternative C (either option) would result in no direct**
253 **operational impact on CO₂ emissions.**

254 Like in the other Action Alternatives, there would be no direct impacts because WUS is not a
255 significant source of on-site stationary source CO₂ emissions. All impacts would be indirect.

Indirect Operational Impacts

256 **Relative to the No-Action Alternative, Alternative C (either option) would result in**
257 **negligible adverse indirect operational impacts on CO₂ emissions from mobile and**
258 **stationary sources.**

259 The difference between the Alternative C East and West Options for stationary and mobile
260 source CO₂ emissions would be negligible. Total annual emissions (detailed in the following
261 sections) would be 24,845 (East Option) or 24,681 (West Option) metric tons, amounting to
262 approximately 0.34 percent of the District's total 2017 emissions (7.3 million metric tons of
263 CO₂e) and 0.49 percent of its 2032 emission target (5.05 million metric tons of CO₂e). This
264 would represent approximately a 31 percent increase over emissions in the No-Action
265 Alternative.

Stationary Source Analysis

266 Alternative C with the East Option would cause WUS to use an additional 37,834,170 kBtus
267 of energy per year. The corresponding number for Alternative C with the West Option would
268 be 37,614,720 kBtus. To produce this energy, Alternative C with the East Option would
269 generate 5,376 metric tons of stationary source CO₂ emissions annually. The West Option
270 would generate 5,345 metric tons. In both cases, this would be an increase of approximately
271 12 percent over the No-Action Alternative. It would represent 0.07 percent of the District's
272 total 2017 CO₂e emissions (7.3 million metric tons) and 0.11 percent of its 2032 emission
273 target (5.05 million metric tons).

Potential Federal Air-right Development

274 In Alternative C (either option), the potential development of the Federal air rights as
275 additional office space would add approximately 64,109,980 kBtus to WUS's annual energy
276 consumption. This energy would be partly from natural gas and electricity. Production of this
277 energy would generate annually around 8,762 metric tons of CO₂. This would represent 0.12
278 percent of the District's total 2017 emissions (7.3 million metric tons of CO₂e) and 0.17
279 percent of its 2032 emission target (5.05 million metric tons of CO₂e).

Mobile Source Analysis

280 Alternative C, East Option would produce approximately 10,707 metric tons of mobile source
281 CO₂ emissions annually, a 34 percent increase over the No-Action Alternative. This would be
282 equivalent to 0.15 percent of the District's total 2017 emissions (7.3 million metric tons of
283 CO₂e) and 0.21 percent of its 2032 emission target (5.05 million metric tons of CO₂e).

284 Alternative C, West Option would generate approximately 10,574 additional metric tons of
285 mobile source CO₂ annually over the No-Action Alternative, also a 34 percent increase. This
286 would be equivalent to 0.14 percent of the District's total 2017 emissions (7.3 million metric
287 tons of CO₂e) and 0.21 percent of its 2032 emission target (5.05 million metric tons of CO₂e).

Resilience

288 **Relative to the No-Action Alternative, Alternative C (either option) would have a beneficial**
289 **impact on WUS’s resilience.**

290 The impacts of Alternative C on WUS’s resilience would be the same as Alternative A
291 (Section 5.7.4.2, *Alternative A, Resilience*).

Construction Impacts

292 **Construction of Alternative C with either option would result in negligible adverse impacts**
293 **on CO₂ emissions.**

294 Alternative C’s construction-related CO₂ emissions were estimated using the same approach
295 as for Alternative A (see Section 5.7.4.3, *Alternative A, Construction Impacts*). As in all Action
296 Alternatives, the All Truck Scenario would generate more emissions than the Work Train
297 Scenario in all phases. The greatest amount of emissions would occur during Phase 4 in both
298 scenarios. Phase 4 All Truck Scenario CO₂ emissions would amount to approximately 17,260
299 metric tons annually. This would represent 0.24 percent of the District’s total 2017 emissions
300 (7.3 million metric tons of CO₂e) and 0.34 percent of its 2032 emission target (5.05 million
301 metric tons of CO₂e).

Comparison to Existing Conditions

302 Like the other Action Alternatives, Alternative C with either option would result in a greater
303 proportional increase in CO₂ emissions relative to existing conditions than relative to the No-
304 Action Alternative. This is because the No-Action Alternative baseline incorporates the
305 emissions from the private air-rights development and from increased vehicular traffic and
306 train service. For instance, with only WUS as a source, stationary source emissions in
307 Alternative C would increase by 44 percent relative to existing conditions (115 percent if the
308 potential Federal air-rights development is included) instead of 12 percent relative to the No-
309 Action Alternative (31 percent with the potential Federal air-rights development). However,
310 the total amount of CO₂ emissions Alternative C would generate; their size relative to overall
311 District emissions; and their potential effect on climate change would be the same regardless
312 of the baseline.

5.7.4.5 Alternative D

Direct Operational Impacts

Stationary Source Analysis

313 **Relative to the No-Action Alternative, Alternative D would result in no direct operational**
314 **impact on CO₂ emissions.**

315 Like in the other Action Alternatives, there would be no direct impacts in Alternative D. This
316 is because WUS is not a significant source of on-site stationary source CO₂ emissions. All
317 impacts would be indirect.

Indirect Operational Impacts

318 **Relative to the No-Action Alternative, Alternative D would result in negligible adverse**
319 **indirect operational impacts on CO₂ emissions from mobile and stationary sources.**

320 Total annual CO₂ emissions due to Alternative D (detailed in the following sections) would be
321 approximately 21,070 metric tons, amounting to 0.29 percent of the District's total 2017
322 emissions (7.3 million metric tons of CO₂e) and 0.42 percent of its 2032 emission target (5.05
323 million metric tons of CO₂e). This would be an approximately 26 percent increase over the
324 No-Action Alternative.

Stationary Source Analysis

325 Alternative D would cause WUS to use an additional 38,058,466 kBtUs of energy annually.
326 Producing this energy would generate approximately 5,409 metric tons of stationary source
327 CO₂ emissions, a 12 percent increase over the No-Action Alternative. It would represent 0.07
328 percent of the District's total 2017 emissions (7.3 million metric tons of CO₂e) and 0.11
329 percent of its 2032 emission target (5.05 million metric tons of CO₂e).

Potential Federal Air-Rights Development

330 In Alternative D, the potential development of the Federal air rights as additional office space
331 would add 46,305,765 kBtUs to WUS's annual energy consumption. This energy would be
332 partly from natural gas and electricity. Producing this energy would generate approximately
333 6,329 metric tons of CO₂ annually. This would represent 0.09 percent of the District's total
334 2017 emissions (7.3 million metric tons of CO₂e) and of 0.13 percent of its 2032 emission
335 target (5.05 million metric tons of CO₂e).

Mobile Source Analysis

336 Annually, Alternative D would generate approximately 9,332 metric tons of mobile source
337 CO₂ from motor vehicle and locomotive emissions. This would represent a 30 percent
338 increase over the No-Action Alternative. It would be equivalent to 0.13 percent of the
339 District's total 2017 emissions (7.3 million metric tons of CO₂e) and 0.18 percent of its 2032
340 emission target (5.05 million metric tons of CO₂e).

Resilience

341 **Relative to the No-Action Alternative, Alternative D would have a beneficial impact on**
342 **resilience relative to the No-Action Alternative.**

343 The impacts of Alternative D on WUS's resilience would be the same as Alternative A's
344 (Section 5.7.4.2, *Alternative A, Resilience*).

Construction Impacts

345 **Construction of Alternative D would result in negligible adverse impacts on CO₂ emissions.**

346 Alternative D’s construction-related CO₂ emissions would be the same as those of
347 Alternative C. This is because both alternatives would involve a similar amount of excavation
348 work over a similar schedule. See **Section 5.7.4.4, *Alternative C, Construction Impacts***.

Comparison to Existing Conditions

349 Like the other Action Alternatives, Alternative D, proportionately, would cause a greater
350 increase in CO₂ emissions relative to existing conditions than relative to the No-Action
351 Alternative. This is because the No-Action Alternative baseline incorporates the emissions
352 from the private air-rights development as well as those from increased vehicular traffic and
353 train service. For instance, with only WUS as a source, stationary source emissions in
354 Alternative D would increase by 44 percent relative to existing conditions (96 percent if the
355 potential Federal air-rights development is included) instead of 12 percent relative to the No-
356 Action Alternative (26 percent with the potential Federal air-rights development). However,
357 the total amount of CO₂ emissions Alternative D would generate; their size relative to overall
358 District emissions; and their potential effect on climate change would be the same regardless
359 of the baseline.

5.7.4.6 Alternative E

Direct Operational Impacts

360 **Relative to the No-Action Alternative, Alternative E would result in no direct operational**
361 **impact on CO₂ emissions.**

362 As in the other Action Alternatives, there would be no direct impacts in Alternative E. WUS is
363 not a significant source of on-site stationary source CO₂ emissions. All impacts would be
364 indirect.

Indirect Operational Impacts

365 **Relative to the No-Action Alternative, Alternative E would result in negligible adverse**
366 **indirect operational impacts on CO₂ emissions from mobile and stationary sources.**

367 Total CO₂ emissions due to Alternative E (detailed in the following sections) would be
368 approximately 22, 887 metric tons annually, amounting to 0.31 percent of the District’s total
369 2017 emissions (7.3 million metric tons of CO₂e) and 0.45 percent of its 2032 emission target
370 (5.05 million metric tons of CO₂e). This would represent approximately a 29 percent increase
371 over emissions in the No-Action Alternative.

Stationary Source Analysis

372 Alternative E would cause WUS to use an additional 41,210,140 kBtus of energy annually,
373 which would generate approximately 5,856 metric tons of stationary source CO₂ emissions.
374 This would be an increase of 13 percent over the No-Action Alternative. It would represent
375 0.08 percent of the District’s total 2017 emissions (7.3 million metric tons of CO₂e) and 0.12
376 percent of its 2032 emission target (5.05 million metric tons of CO₂e).

Potential Federal Air-rights Development

377 The size of the potential Federal air-rights development in Alternative E would be the same
378 as in Alternative D. It would consume the same amount of energy, resulting in the same
379 amount of annual CO₂ emissions: 6,329 metric tons (**Section 5.7.4.5, Alternative D, Potential**
380 **Federal Air-rights Development**).

Mobile Source Analysis

381 Alternative E would generate approximately 10,702 additional metric tons of mobile source
382 CO₂ per year. This would be a 34 percent increase over mobile source No-Action Alternative
383 emissions. It would represent 0.15 percent of the District's total 2017 emissions (7.3 million
384 metric tons of CO₂e) and 0.21 percent of its 2032 emission target (5.05 million metric tons of
385 CO₂e).

Resilience

386 **Relative to the No-Action Alternative, Alternative E would have a beneficial impact on**
387 **WUS's resilience.**

388 The impacts of Alternative E on WUS's resilience would be the same as those of Alternative A
389 (**Section 5.7.4.2, Alternative A, Resilience**).

Construction Impacts

390 **Construction of Alternative E would result in negligible adverse impacts on CO₂ emissions.**

391 Alternative E's construction-related CO₂ emissions would be the same as those of
392 Alternative B. Both alternatives would involve a similar amount of excavation work over a
393 similar schedule. See **Section 5.7.4.3, Alternative B, Construction Impacts**.

Comparison to Existing Conditions

394 Like the other Action Alternatives, Alternative E would generate a greater proportional
395 increase in CO₂ emissions relative to existing conditions than relative to the No-Action
396 Alternative. This is because the No-Action Alternative baseline incorporates emissions from
397 the private air-rights development and from increased vehicular traffic and train service. For
398 instance, with only WUS as a source, stationary source emissions in Alternative E would
399 increase by 47 percent relative to existing conditions (99 percent if the potential Federal air-
400 rights development is included) instead of 13 percent relative to the No-Action Alternative
401 (27 percent with the potential Federal air-rights development). However, the total amount of
402 CO₂ emissions Alternative E would generate; their size relative to overall District emissions;
403 and their potential effect on climate change would be the same regardless of the baseline.

5.7.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

404 **Relative to the No-Action Alternative, Alternative A-C would result in no direct operational**
405 **impact on CO₂ emissions.**

406 As in the other Action Alternatives, there would be no direct operational impacts in
407 Alternative A-C. WUS is not a significant source of on-site stationary source CO₂ emissions. All
408 impacts would be indirect.

Indirect Operational Impacts

409 **Relative to the No-Action Alternative, Alternative A-C would result in negligible adverse**
410 **indirect operational impacts on CO₂ emissions from mobile and stationary sources.**

411 Total CO₂ emissions due to Alternative A-C (detailed in the following sections) would be
412 approximately 18,506 metric tons annually, amounting to 0.25 percent of the District's total
413 2017 emissions (7.3 million metric tons of CO₂e) and 0.37 percent of its 2032 emission target
414 (5.05 million metric tons of CO₂e). This would represent approximately a 23 percent increase
415 over emissions in the No-Action Alternative.

Stationary Source Analysis

416 Alternative A-C would cause WUS to use an additional 36,735,090 kBtus of energy annually,
417 which would generate approximately 5,220 metric tons of stationary source CO₂ emissions.
418 This would be an increase of 11.5 percent over the No-Action Alternative. It would represent
419 0.07 percent of the District's total 2017 emissions (7.3 million metric tons of CO₂e) and 0.1
420 percent of its 2032 emission target (5.05 million metric tons of CO₂e).

Potential Federal Air-rights Development

421 In Alternative A-C, the potential development of the remaining Federal air rights above the
422 new bus and parking facilities as additional office space would add approximately 25,574,000
423 kBtus to WUS's annual energy consumption. This energy would be partly from natural gas
424 and electricity. The generation of this energy would generate approximately 3,495 metric
425 tons of CO₂ emissions annually. This would represent around 0.05 percent of the District's
426 total 2017 emissions (7.3 million metric tons of CO₂e) and 0.07 percent of its 2032 emission
427 target (5.05 million metric tons of CO₂e).

Mobile Source Analysis

428 Alternative A-C would generate approximately 9,791 additional metric tons of mobile source
429 CO₂ per year. This would be a 31 percent increase over mobile source No-Action Alternative
430 emissions. It would represent 0.13 percent of the District's total 2017 emissions (7.3 million
431 metric tons of CO₂e) and 0.19 percent of its 2032 emission target (5.05 million metric tons of
432 CO₂e).

Resilience

433 **Relative to the No-Action Alternative, Alternative A-C would have a beneficial impact on**
434 **WUS's resilience.**

435 The impacts of Alternative A-C on WUS's resilience would be the same as those of
436 Alternative A (**Section 5.7.4.2, Alternative A, Resilience**).

Construction Impacts

437 **Construction of Alternative A-C would result in negligible adverse impacts on CO₂**
438 **emissions.**

439 Alternative A-C's construction-related CO₂ emissions would be the same as those of
440 Alternative A. Both alternatives would involve a similar amount of excavation work over a
441 similar schedule. See **Section 5.7.4.2, Alternative A, Construction Impacts**.

Comparison to Existing Conditions

442 Like the other Action Alternatives, Alternative A-C would generate a greater proportional
443 increase in CO₂ emissions relative to existing conditions than relative to the No-Action
444 Alternative. This is because the No-Action Alternative baseline incorporates emissions from
445 the private air-rights development and from increased vehicular traffic and train service. For
446 instance, with only WUS as a source, stationary source emissions in Alternative A-C would
447 increase by 43 percent relative to existing conditions (71 percent if the potential Federal air-
448 rights development is included) instead of 11.5 percent relative to the No-Action Alternative
449 (19 percent with the potential Federal air-rights development). However, the total amount of
450 CO₂ emissions Alternative A-C would generate; their size relative to overall District emissions;
451 and their potential effect on climate change would be the same regardless of the baseline.

5.7.5 Comparison of Alternatives

452 **Table 5-91** summarizes the impacts of the alternatives. **Table 5-92** provides a summary
453 comparison of estimated emissions among alternatives. **Table 5-93** provides a summary
454 comparison of estimated construction emissions among alternatives.

455 All Action Alternatives would generate emissions of CO₂ that would not occur in the No-
456 Action Alternative. Operational emissions would result from the energy needs of the
457 expanded station and associated street and rail traffic while construction emissions would
458 result from the operation of equipment and vehicles throughout the construction period.
459 Based on the estimates presented in this section, Alternatives A and A-C would generate the
460 smallest amount of CO₂ emissions and Alternatives B and E the largest. In the context of total
461 emissions in the District, emissions would be proportionately very small regardless of the
462 Action Alternative. As a result, the impact intensities relative to the No-Action Alternative
463 would be the same for all Action Alternatives.

- 464 All Action Alternatives would have:
- 465 ■ No direct operational impacts because no Action Alternatives would create sources
 466 of CO₂ emissions in the Project Area.
 - 467 ■ Negligible indirect operational impacts, because CO₂ emissions from energy
 468 consumption or vehicular and rail traffic would be small, amounting to 1 percent or
 469 less of both the District’s 2017 CO₂e emissions and its 2032 emission target.
 - 470 ■ Negligible construction impacts, as the highest level of annual emissions (during
 471 Phase 4 if only trucks are used to remove excavation spoils) would amount to
 472 1 percent or less of both the District’s 2017 CO₂e emissions and its 2032 emission
 473 target.
 - 474 ■ Beneficial impacts on WUS’s resilience, as all Action Alternatives would provide the
 475 opportunity to improve WUS’s ability to better withstand the effects of climate
 476 change through design decisions.

477 The CO₂ emissions generated by the Action Alternatives would be well below those
 478 generated by the No-Action Alternative. The No-Action Alternative includes the development
 479 of the private air rights above the rail terminal, which would generate a substantial increase
 480 in energy demand and subsequent CO₂ emissions.

Table 5-91. Comparison of Alternatives, GHG Emissions

| Impact Category | Type of Impact | No-Action Alternative | All Action Alternatives |
|-----------------|------------------------------|----------------------------|----------------------------|
| GHG | Direct Operational | Negligible adverse impacts | No impacts |
| | Indirect Operational | Minor adverse impacts | Negligible adverse impacts |
| | Combined Direct and Indirect | Moderate adverse impacts | Negligible adverse impacts |
| | Construction | Undetermined | Negligible Adverse Impacts |
| Resilience | | Moderate adverse impacts | Beneficial impacts |

Table 5-92. Total Operational, Mobile Source, and Stationary Source CO₂ Emissions Summary

| Alternative | Total Operational CO ₂ Emissions (Metric tons/year) | Total Operational Mobile Source CO ₂ Emissions (Metric tons/year) | Total Operational Stationary Source CO ₂ Emissions (Metric tons/year) | |
|------------------------------|--|--|--|--|
| | | | Alternative Only | Alternative + Potential Federal Air Rights |
| No-Action | 79,778 | N/A | 45,107 | N/A |
| A | 17,370 | 11,442 | 5,331 | 5,928 |
| B | 26,453 | 12,019 | 5,994 | 14,433 |
| C East Option | 24,845 | 10,707 | 5,376 | 14,138 |
| C West Option | 24,681 | 10,574 | 5,345 | 14,107 |
| D | 21,070 | 9,332 | 5,409 | 11,738 |
| E | 22,887 | 10,702 | 5,856 | 12,185 |
| A-C | 18,506 | 9,791 | 5,220 | 8,715 |
| District Total (2017) | 7,300,000 | N/A | N/A | N/A |

**Table 5-93. Construction CO₂ Emissions Summary
 (All Truck Scenario / Work Train Scenario)**

| Alternative | Phase | CO ₂ Emissions (Metric tons per year) |
|-------------------|---------|---|
| A | Phase 1 | 9,201 / 6,438 |
| | Phase 2 | 13,195 / 8,495 |
| | Phase 3 | 10,289 / 6,709 |
| | Phase 4 | 18,289 / 11,342 |
| B | Phase 1 | 9,267 / 6,505 |
| | Phase 2 | 16,765 / 12,020 |
| | Phase 3 | 13,700 / 8,028 |
| | Phase 4 | 18,736 / 10,975 |
| C (either option) | Phase 1 | 8,722 / 5,959 |
| | Phase 2 | 14,028 / 8,702 |
| | Phase 3 | 13,272 / 7,820 |
| | Phase 4 | 17,260 / 9,680 |
| D | Phase 1 | 8,722 / 5,959 |
| | Phase 2 | 14,028 / 8,702 |
| | Phase 3 | 13,272 / 7,820 |
| | Phase 4 | 17,260 / 9,680 |
| E | Phase 1 | 9,267 / 6,505 |
| | Phase 2 | 16,765 / 12,020 |
| | Phase 3 | 13,700 / 8,028 |
| | Phase 4 | 18,736 / 10,975 |
| A-C | Phase 1 | 9,201 / 6,438 |
| | Phase 2 | 13,195 / 8,495 |
| | Phase 3 | 10,289 / 6,709 |
| | Phase 4 | 18,289 / 11,342 |

5.7.6 Avoidance, Minimization, and Mitigation Evaluation

481 The following avoidance, minimization, and mitigation measures are being considered by
 482 FRA.

5.7.6.1 Operational Impacts

483 As anticipated adverse GHG impacts would be negligible, no mitigation is needed. The most
 484 effective means to reduce stationary source GHG emissions would be to reduce energy
 485 consumption. **Section 5.8.6, Avoidance, Minimization, and Mitigation Evaluation** discusses
 486 potential energy conservation measures that could be implemented as part of the Project.
 487 Such measures would also reduce indirect GHG emissions.

Resilience

488 Strategies being considered by FRA to enhance WUS’s resilience include the adoption of the
489 following measures by the Project Proponents:

- 490 ■ Monitoring and incorporating into the Project design and technology features to
491 minimize buckled railroad tracks.
- 492 ■ Increasing power supply redundancy and backup generation.
- 493 ■ Reducing dependency on centralized power by installing renewable energy systems
494 at WUS.
- 495 ■ Designing shelter facilities to provide shading and natural ventilation for passenger
496 comfort and safety.
- 497 ■ Incorporating water conservation and green infrastructure features (see **Section**
498 **5.3.6, Avoidance, Minimization, and Mitigation Evaluation**).
- 499 ■ Considering reflective roofs or green roofs to reduce heat island effect.
- 500 ■ Considering appropriate glazing for the train hall to control solar heat by season.
- 501 ■ Although the Project Area is located outside of the floodplain:
 - 502 ● Considering raising electrical components above ground level to protect from
503 flash flood events during extreme storm events.
 - 504 ● Considering the use of building materials that can withstand inundation, or
505 installing flood barriers at openings of below-grade structures that may
506 become vulnerable to flooding
 - 507 ● Considering dry and wet floodproofing measures for proposed below-grade
508 parking areas.

5.7.6.2 Construction Impacts

509 Although only negligible GHG emissions are anticipated to result from the construction of the
510 Project under any of the Action Alternatives, measures could be taken to minimize these
511 emissions. Such measures would be the same as described in **Section 5.6.6, Avoidance,**
512 *Minimization, and Mitigation Evaluation* for other air pollutant emissions.

5.7.7 Permits and Regulatory Compliance

513 There are no permits pertaining to GHG emissions or resilience. During construction, the
514 contractors would have to comply with the District’s anti-idling regulations, as applicable.

5.8 Energy Resources

1 This section describes and characterizes the potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on energy resources. If applicable, this
3 section also recommends measures to avoid, minimize, or mitigate potential adverse impacts
4 and identifies relevant permitting and regulatory compliance requirements.

5.8.1 Regulatory Context and Guidance

5 Relevant Federal policies, regulations and guidance that pertain to energy are listed
6 **Section 4.8.1, *Regulatory Context and Guidance***.

5.8.2 Study Area

7 The Local Study Area includes the portion of the Project Area extending from the front of
8 WUS up to K Street (**Figure 4-8**). The Regional Study Area includes the District.

5.8.3 Methodology

9 This section summarizes the methodology for evaluating the potential impacts of the
10 alternatives on energy. **Appendix C3, *Washington Union Station Expansion Project***
11 ***Environmental Consequences Technical Report, Section 8.4, Methodology***, provides a
12 description of the analysis methodology. A summary is below. Impacts were assessed as
13 major, moderate, minor, or negligible consistent with the intensity scale defined in **Section**
14 **5.1.1, *Definitions***.

5.8.3.1 Operational Impacts

15 Order-of-magnitude estimates of future on-site energy use, measured in kilo British thermal
16 units (kBTUs),¹ were calculated by multiplying the square footage of the facilities provided in
17 the No-Action and the Action Alternatives by estimated Energy Use Intensity (EUI) measures
18 provided by the U.S. Federal Government's Energy Star Program.² EUI is expressed as energy
19 per square foot per year. It is calculated by dividing the total energy consumed by a building
20 in one year by the total gross floor area of the building. There are different EUIs for different
21 types of building spaces. The impact analysis used the EUIs best applicable to the facilities
22 included in each alternative. To provide a measure against which the intensity of the

¹ A kBTU is one thousand BTU. A BTU is "a measure of the heat content of fuels or energy sources." Specifically, it is the quantity of heat required to raise the temperature of 1 pound of liquid water by 1 degree Fahrenheit at the temperature that water has its greatest density (approximately 39 degrees Fahrenheit).

² Energy Star Portfolio Manager. March 2016. *Technical Reference. U.S. Energy Use Intensity by Property Type*.

23 resulting impacts could be assessed, projected energy uses was compared to the total
24 amount of energy consumed in the District in 2017, which was 168 billion kBtUs.³

5.8.3.2 Construction Impacts

25 Construction of the Project would require the operation of a wide range of equipment
26 powered by diesel fuel such as trucks, earth moving equipment, cranes, air compressors, and
27 forklifts. Additionally, some electrical equipment and battery-operated tools would need to
28 be charged on-site. The energy use related to the construction of each alternative is difficult
29 to quantify. In a 2011 conference paper addressing building construction in the United States
30 titled *Estimating Energy Consumption During Construction of Buildings: A Contractor's*
31 *Perspective*, the authors noted that:

32 “Presently, there are plenty of research works assessing the energy consumption and
33 environmental impacts of buildings, but few encompass construction process in complete life
34 cycle. Some studies have included the construction phase; however, this was limited to
35 various stages of material extraction, production, and transportation and did not include on-
36 site construction processes. The industry’s energy consumption during construction is not
37 well understood because of its fragmented nature and involvement of many parties during
38 construction phase. That is why, at the time of design and even before construction starts, it
39 is hard to predict the energy required and its impact at the construction phase.”⁴

40 Therefore, in this DEIS, energy use from construction is assessed qualitatively.

5.8.4 Impact Analysis

41 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
42 energy.

5.8.4.1 No-Action Alternative

Direct Operational Impacts

43 **Relative to existing conditions, the No-Action Alternative would have a minor adverse**
44 **direct operational impact on energy resources.**

45 In the No-Action Alternative, energy consumption at WUS would remain approximately the
46 same as under existing conditions because the station would not undergo any major physical

³ U.S. Energy Information Administration. *District of Columbia Energy Profile*. <https://www.eia.gov/state/print.php?sid=DC>. Accessed on August 21, 2019.

⁴ Shrivastava, Sandeep et al. 2018. *Estimating energy consumption during construction of buildings: a contractor's perspective*. Available from: **Error! Hyperlink reference not valid.** https://www.researchgate.net/publication/273693109_Estimating_energy_consumption_during_construction_of_buildings_a_contractor's_perspective. Accessed on April 2, 2020.

47 expansion. Existing consumption is approximately 103.5 million kBtus. It may decrease
 48 between now and 2040 due to the greater energy-efficiency of upgraded heat, ventilation,
 49 and air conditioning systems; lighting fixtures; and other equipment.

50 Therefore, the primary source of additional energy consumption in the Project Area would be
 51 the private air-rights development. **Table 5-94** shows an estimate of the annual energy use of
 52 this development. Altogether, the on-site energy use of the private air-rights development
 53 would be approximately 264 million kBtus per year.

Table 5-94. Estimated Annual Energy Use of Private Air-Rights Development

| Private Air Rights Development Space | Square Footage ¹ | EUI ² kBtus/Square Foot/Year | Estimated Annual Facility Use (kBtus) |
|--------------------------------------|-----------------------------|---|---------------------------------------|
| Office | 2,160,000 | 67.3 | 145,368,000 |
| Retail | 120,000 | 93.7 | 11,244,000 |
| Hotel | 410,000 | 73.4 | 30,094,000 |
| Residential | 1,050,000 | 73.4 | 77,070,000 |
| Total | 3,740,000 | - | 263,776,000 |

1. Akridge. 2016. Burnham Place Feasible Maximum Program Estimates Applicable to Station Expansion Project No-Build Option. Letter from Akridge to FRA dated May 31, 2016.

2. Values derived from Energy Star Portfolio Manager. March 2016. *Technical Reference. U.S. Energy Use Intensity by Property Type.*

54 This impact would be minor for the following reasons. The estimated additional energy
 55 consumption in the No-Action Alternative would represent only a small fraction (around
 56 0.16 percent) of the District’s total energy consumption in 2017 (168 billion kBtus). As such,
 57 it is unlikely to create capacity issues or to require the development of a dedicated energy
 58 source (such as a new power plant).

59 The additional electrical load from the private air-rights development may require a new
 60 substation.^{5,6} The new substation is likely to increase the electrical load on the local
 61 distribution system and could result in other necessary upgrades to ensure stable and
 62 reliable delivery of electricity to local customers. Such upgrades are typical for development
 63 project of that size.

Indirect Operational Impacts

64 **Relative to existing conditions, the No-Action Alternative would have no indirect**
 65 **operational impacts on energy resources.**

66 The No-Action Alternative would not affect energy consumption away from the Project Area.

⁵ A substation is a set of equipment that reduces the high voltage of electrical power transmission to levels suitable for supply to consumers.

⁶ Shalom Baranes Associates. 2015. *Washington Union Station: Concept Feasibility Review Report (Draft)*. BuroHappold Engineers, Hensel Phelps.

Construction Impacts

67 **Construction of the projects included in the No-Action Alternative would result in minor**
68 **adverse impacts on energy resources.**

69 In the No-Action Alternative, the Project would not be constructed and there would be no
70 energy-related impacts. The construction of other projects in the Project Area through 2040
71 would consume varying amounts of energy depending on the scale and duration of the
72 construction activities. While it is not possible to develop a quantitative estimate, this
73 consumption would be a minor adverse impact for the following reasons.

74 The projects included in the No-Action Alternative are of a type and size that are not unusual
75 in a large city like the District. Even the largest one – the development of the private air rights
76 – is similar in scale and nature, for instance, to the recent development of the air rights
77 above Interstate 95, a short distance from WUS. While the construction of such projects
78 requires large amounts of energy, mostly in the form of diesel fuel for construction vehicles
79 and equipment, the demand they generate is not such that it can create shortages or
80 capacity issues for energy suppliers. Additionally, the projects would be implemented at
81 different times and on different schedules, spreading the associated energy consumption
82 over up to two decades.

5.8.4.2 Alternative A

Direct Operational Impacts

83 **Relative to the No-Action Alternative, Alternative A would have a minor adverse direct**
84 **operational impact on energy resources.**

85 In Alternative A, relative to the No-Action Alternative, the expanded WUS would consume
86 additional energy to operate the new station elements. **Table 5-95** provides an order-of-
87 magnitude estimate of the increase in energy consumption that would result from each
88 relevant element. The resulting impact would be minor for the reasons explained below.

89 Alternative A would result in an increase in energy consumption of approximately
90 37.5 million kBTUs a year. This would be 10 percent of the Project Area’s projected
91 consumption in the No-Action Alternative estimate but amounts to only approximately 0.02
92 percent of the District’s total energy consumption in 2017 (168 billion kBTUs). As such, it is
93 not likely to create capacity issues or to require the development of a dedicated energy
94 source (such as a new power plant).

Table 5-95. Estimated Change in Annual Energy Use, Alternative A

| Alternative Element | Additional Square Footage | EUI ¹ kBTUs/Square Foot/Year | Estimated Annual Facility Use (kBTUs) |
|---------------------------------|---------------------------|--|---------------------------------------|
| Additional Retail | 72,000 | 93.7 | 6,746,400 |
| Additional Amtrak Support Space | 211,800 | 78.8 | 16,689,840 |
| Train Hall | 180,000 | 45.3 | 8,154,000 |
| Additional Concourse Space | 245,000 | 45.3 | 11,098,500 |
| Reduction in Parking/Bus Space | - 453,600 | 11.4 | - 5,171,040 |
| Total | 255,200 | - | 37,517,700 |

1. Values derived from *Energy Star Portfolio Manager. Technical Reference. U.S. Energy Use Intensity by Property Type*, March 2016 and *Parking and the ENERGY STAR Score in the United States and Canada*, August 2018.

95 Based on a review of energy bills for WUS in 2014 and 2015, approximately 52 percent of the
 96 energy used at the station comes from electricity. Therefore, it is likely that the majority of
 97 the increased energy consumption in Alternative A would be in the form of electrical power.
 98 Increased electricity demand may require upgrades to the local distribution and transmission
 99 systems.⁷ However, they are not likely to be beyond what it is commonly done for large-scale
 100 development projects.

Indirect Operational Impacts

101 **Relative to the No-Action Alternative, Alternative A would have a negligible adverse**
 102 **indirect operational impact on energy resources.**

103 The potential development of the Federal air rights into additional parking space would
 104 result in a further increase in energy consumption at WUS. **Table 5-96** provides an order-of-
 105 magnitude estimate. Additional energy consumption from the parking space would represent
 106 approximately 10 percent over the increase that would directly result from the Project. It
 107 would represent approximately 0.002 percent of the District’s total energy consumption in
 108 2017. As such, the resulting impact would be negligible.

Table 5-96. Estimated Annual Energy Use of Federal Air-rights Development, Alternative A

| Alternative Element | Additional Square Footage | EUI kBTUs/Square Foot/Year | Estimated Annual Facility Use (kBTUs) |
|--------------------------|---------------------------|-------------------------------|---------------------------------------|
| Additional Parking Space | 323,720 | 11.4 | 3,690,408 |

⁷ The potentially affected systems are protected as Critical Energy Infrastructure Information (CEII). Only the owning utility has access to this information and would need to conduct the appropriate to measure how the Project could affect them prior. Such analysis, and follow-on actions, would be conducted during the later stages of Project design.

Construction Impacts

109 **Construction of Alternative A would result in minor adverse impacts on energy resources.**
 110 Construction of Alternative A would consume large amounts of energy, mostly in the form of
 111 diesel fuel used for construction vehicles and equipment. As explained in **Section 5.8.3.2,**
 112 *Construction Impacts*, it is difficult to develop a quantitative estimate. However, impacts can
 113 be anticipated to be minor, as large-scale construction projects such as the Project are
 114 common in large urban areas like the District. While they require large amounts of energy,
 115 they do not create shortages or create capacity issues for suppliers or distributors. Also,
 116 construction of Alternative A would take place over 11 years and 5 months. Therefore, the
 117 demand for energy would be distributed over time, reducing the impact on both source and
 118 distribution.

Comparison to Existing Conditions

119 Relative to existing conditions, Alternative A would result in an estimated increase in energy
 120 consumption representing 40 percent of the existing WUS consumption. This would be a
 121 proportionately greater increase than relative to the No-Action Alternative (see **Table 5-97**).
 122 The total amount of additional energy would remain the same. As explained above, it would
 123 amount to a minor adverse impact.

Table 5-97. Comparison of Alternative A Energy Impacts to Existing Conditions

| Existing Conditions (kBTUs) | Alternative A Impact (kBTUs) | Alternative A Impact Relative to Existing Conditions | Additional Consumption No-Action Alternative (kBTUs) | Total No-Action Alternative (kBTUs) | Alternative A Impact Relative to No-Action Alternative |
|-----------------------------|------------------------------|--|--|-------------------------------------|--|
| 103,500,000 | 41,208,108 | 40% | 263,776,000 | 367,276,000 | 11% |

5.8.4.3 Alternative B

Direct Operational Impacts

124 **Relative to the No-Action Alternative, Alternative B would have a minor adverse direct**
 125 **operational impact on energy resources.**
 126 In Alternative B, as in the other Action Alternatives, the expanded WUS would consume
 127 additional energy to operate the new station elements. **Table 5-98** provides an order-of-
 128 magnitude estimate of the increase in energy consumption that would result from
 129 Alternative B.

Table 5-98. Estimated Change in Annual Energy Use, Alternative B

| Alternative Element | Additional Square Footage | EUI kBTUs/Square Foot/Year | Estimated Annual Facility Use (kBTUs) |
|---------------------------------|---------------------------|----------------------------------|---|
| Additional Retail | 72,000 | 93.7 | 6,746,400 |
| Additional Amtrak Support Space | 211,800 | 78.8 | 16,689,840 |
| Train Hall | 180,000 | 45.3 | 8,154,000 |
| Additional Concourse Space | 245,000 | 45.3 | 11,098,500 |
| Reduction in Parking/Bus Space | - 44,550 | 11.4 | -507,870 |
| Total | 664,250 | - | 42,180,870 |

130 Alternative B would result in an increase in energy consumption of approximately 42.2
 131 million kBTUs a year. This would be 11.5 percent of the Project Area’s projected consumption
 132 under the No-Action Alternative but amount to only approximately 0.03 percent of the
 133 District’s total energy consumption in 2017 (168 billion kBTUs). For the same reasons as for
 134 Alternative A (**Section 5.8.4.2, Alternative A, Direct Operational Analysis**), this would
 135 represent a minor adverse impact.

Indirect Operational Impacts

136 **Relative to the No-Action Alternative, Alternative B would have a minor adverse indirect**
 137 **operational impact on energy resources.**

138 The potential development of the Federal air rights into office space would result in a further
 139 increase in energy consumption at WUS. **Table 5-99** provides an order-of-magnitude
 140 estimate. Additional energy consumption from the office space would represent 146 percent
 141 of the increase that would result directly from the Project. It would be approximately 0.03
 142 percent of the District’s total energy consumption in 2017. As such, the resulting adverse
 143 impact would be minor.

Table 5-99. Estimated Annual Energy Use of Federal Air-rights Development, Alternative B

| Alternative Element | Additional Square Footage | EUI kBTUs/Square Foot/Year | Estimated Annual Facility Use (kBTUs) |
|-------------------------|------------------------------|----------------------------------|---|
| Additional Office Space | 917,420 | 67.3 | 61,742,366 |

Construction Impacts

144 **Construction of Alternative B would result in minor adverse impacts on energy resources.**

145 The construction of Alternative B, like that of Alternative A, would consume large amounts of
 146 energy, mostly in the form of diesel fuel used for construction vehicles and equipment.
 147 Construction of Alternative B would take place over approximately 14 years and 4 months.
 148 While the longer duration would result in greater total energy consumption, annual

149 consumption would likely be within the same range as for Alternative A. For the same
 150 reasons as explained in **Section 5.8.4.2, Alternative A, Construction Impacts**, the resulting
 151 impacts on energy resources would be minor.

Comparison to Existing Conditions

152 Relative to existing conditions, Alternative B would result in an estimated increase in energy
 153 consumption that would double the existing WUS consumption. This would be a
 154 proportionately greater increase relative to the No-Action Alternative (see **Table 5-100**). The
 155 total amount of additional energy consumed would remain the same, however. As explained
 156 above, it would amount to a minor adverse impact.

Table 5-100. Comparison of Alternative B Energy Impacts to Existing Conditions

| Existing Conditions (kBTUs) | Alternative B Impact (kBTUs) | Alternative B Impact Relative to Existing Conditions | Additional Consumption No-Action Alternative (kBTUs) | Total No-Action Alternative (kBTUs) | Alternative B Impact Relative to No-Action Alternative |
|-----------------------------|------------------------------|--|--|-------------------------------------|--|
| 103,500,000 | 103,923,236 | 100% | 263,776,000 | 367,276,000 | 28% |

5.8.4.4 Alternative C

Direct Operational Impacts

157 **Relative to the No-Action Alternative, Alternative C (either option) would have a minor**
 158 **adverse direct operational impact on energy because of increased energy consumption at**
 159 **WUS.**

160 In Alternative C, as in the other Action Alternatives, the expanded WUS would consume
 161 additional energy to operate the new station elements. **Table 5-101** and **Table 5-102** show
 162 order-of-magnitude estimates of the increase in energy consumption that would result from
 163 both options of Alternative C, respectively. As can be seen, the difference between the two
 164 options would be negligible.

Table 5-101. Estimated Change in Annual Energy Use, Alternative C East Option

| Alternative Element | Additional Square Footage | EUI kBTUs/Square Foot/Year | Estimated Annual Facility Use (kBTUs) |
|--|---------------------------|----------------------------|---------------------------------------|
| Additional Retail | 72,000 | 93.7 | 6,746,400 |
| Additional Amtrak Support Space | 211,800 | 78.8 | 16,689,840 |
| Train Hall | 115,000 | 45.3 | 5,209,500 |
| Additional Concourse Space | 245,000 | 45.3 | 11,098,500 |
| Reduction in Parking/Bus Space | -167,550 | 11.4 | -1,910,070 |
| Total | 476,192 | | 37,834,170 |

Table 5-102. Estimated Change in Annual Energy Use, Alternative C West Option

| Alternative Element | Additional Square Footage | EUI kBTUs/Square Foot/Year | Estimated Annual Facility Use (kBTUs) |
|--|---------------------------|----------------------------------|---|
| Additional Retail | 72,000 | 93.7 | 6,746,400 |
| Additional Amtrak Support Space | 211,800 | 78.8 | 16,689,840 |
| Train Hall | 115,000 | 45.3 | 5,209,500 |
| Additional Concourse Space | 245,000 | 45.3 | 11,098,500 |
| Reduction in Parking/Bus Space | -186,800 | 11.4 | -2,129,520 |
| Total | 457,000 | | 37,614,720 |

165 Alternative C would result in an increase in energy consumption of approximately 37.6 to
 166 37.8 million kBTUs a year. This would be a 10 percent of the Project Area’s projected
 167 consumption under the No-Action Alternative but amount to only approximately 0.02
 168 percent of the District’s total energy consumption in 2017 (168 billion kBTUs). For the same
 169 reasons as for Alternative A (**Section 5.8.4.2, Alternative A, Direct Operational Impacts**), this
 170 would represent a minor adverse impact.

Indirect Operational Impacts

171 **Relative to the No-Action Alternative, Alternative C (either option) would have a minor**
 172 **adverse indirect operational impact on energy consumption in the Project Area.**

173 The potential development of the Federal air rights into office space would result in a further
 174 increase in energy consumption at WUS. **Table 5-103** provides an order-of-magnitude
 175 estimate. Additional energy consumption from the office space would represent an increase
 176 of 170 percent over the increase that would result directly from the Project. It would
 177 represent approximately 0.04 percent of the District’s total energy consumption in 2017. As
 178 such, the resulting impact would be minor.

Table 5-103. Estimated Annual Energy Use of Federal Air-rights Development, Alternative C

| Alternative Element | Additional Square Footage | EUI kBTUs/Square Foot/Year | Estimated Annual Facility Use (kBTUs) |
|--------------------------------|---------------------------|----------------------------------|---|
| Additional Office Space | 952,600 | 67.3 | 64,109,980 |

Construction Impacts

179 **Construction of Alternative C (either option) would result in minor adverse impacts on**
 180 **energy resources.**

181 Construction of Alternative C, like that of Alternative A and the other Action Alternatives,
 182 would consume large amounts of energy, mostly in the form of diesel fuel used for
 183 construction vehicles and equipment. Construction of Alternative C would take place over
 184 approximately 12 years and 3 months. While the longer duration would result in greater total
 185 energy consumption, annual consumption would likely be within the same range as for

186 Alternative A. For the same reasons as explained in **Section 5.8.4.2, Alternative A,**
 187 *Construction Impacts*, the resulting impacts on energy resources would be minor.

Comparison to Existing Conditions

188 Relative to existing conditions, Alternative C would result in an estimated increase in energy
 189 consumption representing approximately 98 percent of the existing WUS consumption. This
 190 would be a proportionately greater increase than relative to the No-Action Alternative (see
 191 **Table 5-104**). The total amount of additional energy consumed would remain the same,
 192 however. As explained above, it would amount to a minor adverse impact.

Table 5-104. Comparison of Alternative C Energy Impacts to Existing Conditions

| Existing Conditions (kBTUs) | Alternative C Impact (kBTUs) | Alternative C Impact Relative to Existing Conditions | Additional Consumption No-Action Alternative (kBTUs) | Total No-Action Alternative (kBTUs) | Alternative C Impact Relative to No-Action Alternative |
|-----------------------------|------------------------------|--|--|-------------------------------------|--|
| 103,500,000 | 101,944,150 | 98% | 263,776,000 | 367,276,000 | 28% |

5.8.4.5 Alternative D

Direct Operational Impacts

193 **Relative to the No-Action Alternative, Alternative D would have a minor adverse direct**
 194 **operational impact on energy because of increased energy consumption at WUS.**

195 In Alternative D as in the other Action Alternatives, the expanded WUS would consume
 196 additional energy to operate the new station elements. **Table 5-105** provides an order-of-
 197 magnitude estimate of the increase in energy consumption that would result from
 198 Alternative D.

199 Alternative D would result in an increase in energy consumption of approximately 38 million
 200 kBTUs a year. This would be 10.4 percent of the Project Area’s projected consumption in the
 201 No-Action Alternative and amount to only approximately 0.02 percent of the District’s total
 202 energy consumption in 2017 (168 billion kBTUs). For the same reasons as for Alternative A
 203 (**Section 5.8.4.2, Alternative A, Direct Operational Impacts**), this would represent a minor
 204 adverse impact.

Table 5-105. Estimated Change in Annual Energy Use, Alternative D

| Alternative Element | Additional Square Footage | EUI kBTUs/Square Foot/Year | Estimated Annual Facility Use (kBTUs) |
|---------------------------------|---------------------------|----------------------------|---------------------------------------|
| Additional Retail | 100,000 | 93.7 | 9,370,000 |
| Additional Amtrak Support Space | 211,800 | 78.8 | 16,689,840 |
| Train Hall | 100,000 | 45.3 | 4,530,000 |
| Additional Concourse Space | 245,000 | 45.3 | 11,098,500 |
| Reduction in Parking/Bus Space | -318,410 | 11.4 | -3,629,874 |
| Total | 338,390 | - | 38,058,466 |

Indirect Operational Impacts

205 **Relative to the No-Action Alternative, Alternative D would have a minor adverse indirect**
 206 **operational impact on energy consumption in the Project Area.**

207 The potential development of the Federal air rights into office space would result in a further
 208 increase in energy consumption at WUS. **Table 5-106** provides an order-of-magnitude
 209 estimate. Additional energy consumption from the office space would represent 122 percent
 210 of the increase that would result directly from the Project. It would be approximately 0.03
 211 percent of the District’s total energy consumption in 2017. As such, the resulting impact
 212 would be minor.

Table 5-106. Estimated Annual Energy Use of Federal Air-rights Development, Alternative D

| Alternative Element | Additional Square Footage | EUI kBTUs/Square Foot/Year | Estimated Annual Facility Use (kBTUs) |
|-------------------------|---------------------------|----------------------------|---------------------------------------|
| Additional Office Space | 688,050 | 67.3 | 46,305,765 |

Construction Impacts

213 **Construction of Alternative D would result in minor adverse impacts on energy resources.**

214 The construction impacts of Alternative D would be the same as those of Alternative C. Both
 215 alternatives would involve the same depth of excavation and take the same amount of time
 216 to construct (**Section 5.8.4.4, Environmental Consequences, Energy Resources, Impact**
 217 **Analysis, Alternative C, Construction Impacts**).

Comparison to Existing Conditions

218 Relative to existing conditions, Alternative D would result in an estimated increase in energy
 219 consumption representing approximately 82 percent of the existing WUS consumption. This
 220 would be a proportionately greater increase than relative to the No-Action Alternative (see
 221 **Table 5-107**). The total amount of additional energy consumed would remain the same,
 222 however. As explained above, it would amount to a minor adverse impact.

Table 5-107. Comparison of Alternative D Energy Impacts to Existing Conditions

| Existing Conditions (kBTUs) | Alternative D Impact (kBTUs) | Alternative D Impact Relative to Existing Conditions | Additional Consumption No-Action Alternative (kBTUs) | Total No-Action Alternative (kBTUs) | Alternative D Impact Relative to No-Action Alternative |
|-----------------------------|------------------------------|--|--|-------------------------------------|--|
| 103,500,000 | 84,364,231 | 82% | 263,776,000 | 367,276,000 | 23% |

5.8.4.6 Alternative E

Direct Operational Impacts

223 **Relative to the No-Action Alternative, Alternative E would have a minor adverse direct**
 224 **operational impact on energy because of increased energy consumption at WUS.**

225 In Alternative E, as in the other Action Alternatives, the expanded WUS would consume
 226 additional energy to operate the new station elements. **Table 5-108** provides an order-of-
 227 magnitude estimate of the increase in energy consumption that would result from
 228 Alternative E.

Table 5-108. Estimated Change in Annual Energy Use, Alternative E

| Alternative Element | Additional Square Footage | EUI kBTUs/Square Foot/year | Estimated Annual Facility Use (kBTUs) |
|--|---------------------------|----------------------------|---------------------------------------|
| Additional Retail | 100,000 | 93.7 | 9,370,000 |
| Additional Amtrak Support Space | 211,800 | 78.8 | 16,689,840 |
| Train Hall | 100,000 | 45.3 | 4,530,000 |
| Additional Concourse Space | 245,000 | 45.3 | 11,098,500 |
| Reduction in Parking/Bus Space | -41,916 | 11.4 | -478,200 |
| Total | 614,884 | - | 41,210,140 |

229 Alternative E would result in an increase in energy consumption of approximately
 230 41.2 million kBTUs a year. This would be 11 percent of the Project Area’s projected
 231 consumption in the No-Action Alternative and amount to only approximately 0.02 percent of
 232 the District’s total energy consumption in 2017 (168 billion kBTUs). For the same reasons as
 233 for Alternative A (**Section 5.8.4.2, Alternative A, Direct Operational Impacts**), this would
 234 represent a minor adverse impact.

Indirect Operational Impacts

235 **Relative to the No-Action Alternative, Alternative E would have a minor adverse indirect**
 236 **operational impact on energy consumption in the Project Area.**

237 The indirect impacts of Alternative E would be the same as those of Alternative D. This is
 238 because the potential Federal air-rights development would be the same in both alternatives
 239 (**Section 5.8.4.5, Alternative D, Indirect Operational Impacts**).

Construction Impacts

240 **Construction of Alternative E would result in minor adverse impacts on energy resources.**

241 The construction impacts of Alternative E would be the same as those of Alternative B. Both
 242 alternatives would require the same depth of excavation and take the same amount of time
 243 to construct (**Section 5.8.4.3, Alternative B, Construction Impacts**).

Comparison to Existing Conditions

244 Relative to existing conditions, Alternative E would result in an estimated increase in energy
 245 consumption representing approximately 85 percent of the existing WUS consumption. This
 246 would be a proportionately greater increase than relative to the No-Action Alternative (see
 247 **Table 5-109**). The total amount of additional energy would remain the same, however. As
 248 explained above, it would amount to a minor adverse impact.

Table 5-109. Comparison of Alternative E Energy Impacts to Existing Conditions

| Existing Conditions (kBTUs) | Alternative E Impact (kBTUs) | Alternative E Impact Relative to Existing Conditions | Additional Consumption No-Action Alternative (kBTUs) | Total No-Action Alternative (kBTUs) | Alternative E Impact Relative to No-Action Alternative |
|-----------------------------|------------------------------|--|--|-------------------------------------|--|
| 103,500,000 | 87,515,905 | 85% | 263,776,000 | 367,276,000 | 24% |

5.8.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

249 **Relative to the No-Action Alternative, Alternative A-C would have a minor adverse direct**
 250 **operational impact on energy because of increased energy consumption at WUS.**

251 In Alternative A-C as in the other Action Alternatives, the expanded WUS would consume
 252 additional energy to operate the new station elements. **Table 5-110** provides an order-of-
 253 magnitude estimate of the increase in energy consumption that would result from
 254 Alternative A-C.

Table 5-110. Estimated Change in Annual Energy Use, Alternative A-C

| Alternative Element | Additional Square Footage | EUI kBTUs/Square Foot/Year | Estimated Annual Facility Use (kBTUs) |
|---------------------------------|---------------------------|----------------------------|---------------------------------------|
| Additional Retail | 72,000 | 93.7 | 6,746,400 |
| Additional Amtrak Support Space | 211,800 | 78.8 | 16,689,840 |
| Train Hall | 113,500 | 45.3 | 5,141,550 |
| Additional Concourse Space | 245,000 | 45.3 | 11,098,500 |
| Reduction in Parking/Bus Space | -258,000 | 11.4 | -2,941,200 |
| Total | 384,300 | - | 36,735,090 |

255 Alternative A-C would result in an increase in energy consumption of approximately
 256 36.7 million kBTUs a year. This would be 10 percent of the Project Area’s projected
 257 consumption in the No-Action Alternative and amount to only approximately 0.02 percent of
 258 the District’s total energy consumption in 2017 (168 billion kBTUs). For the same reasons as
 259 for Alternative A (**Section 5.8.4.2, Alternative A, Direct Operational Impacts**), this would
 260 represent a minor adverse impact.

Indirect Operational Impacts

261 **Relative to the No-Action Alternative, Alternative A-C would have a minor adverse indirect**
 262 **operational impact on energy consumption in the Project Area.**

263 The potential development of the Federal air rights into office space would result in a further
 264 increase in energy consumption at WUS. **Table 5-111** provides an order-of-magnitude
 265 estimate. Additional energy consumption from the office space would represent 70 percent
 266 of the increase that would result directly from the Project. It would be approximately 0.015
 267 percent of the District’s total energy consumption in 2017. As such, the resulting adverse
 268 impact would be minor.

Table 5-111. Estimated Annual Energy Use of Federal Air-rights Development, Alternative A-C

| Alternative Element | Additional Square Footage | EUI kBTUs/Square Foot/Year | Estimated Annual Facility Use (kBTUs) |
|-------------------------|---------------------------|----------------------------|---------------------------------------|
| Additional Office Space | 380,000 | 67.3 | 25,574,000 |

Construction Impacts

269 **Construction of Alternative A-C would result in minor adverse impacts on energy resources.**

270 Construction of Alternative A-C, like that of Alternative A and the other Action Alternatives,
 271 would consume large amounts of energy, mostly in the form of diesel fuel used for
 272 construction vehicles and equipment. Construction of Alternative A-C would take place over
 273 approximately 11 years and 5 months, like construction of Alternative A. For the same
 274 reasons as explained in **Section 5.8.4.2, Alternative A, Construction Impacts**, the resulting
 275 impacts on energy resources would be minor.

Comparison to Existing Conditions

276 Relative to existing conditions, Alternative A-C would result in an estimated increase in
 277 energy consumption representing approximately 60 percent of the existing WUS
 278 consumption. This would be a proportionately greater increase than relative to the No-Action
 279 Alternative (see **Table 5-112**). The total amount of additional energy would remain the same,
 280 however. As explained above, it would amount to a minor adverse impact.

Table 5-112. Comparison of Alternative A-C Energy Impacts to Existing Conditions

| Existing Conditions (kBTUs) | Alternative A-C Impact (kBTUs) | Alternative A-C Impact Relative to Existing Conditions | Additional Consumption No-Action Alternative (kBTUs) | Total No-Action Alternative (kBTUs) | Alternative A-C Impact Relative to No-Action Alternative |
|-----------------------------|--------------------------------|--|--|-------------------------------------|--|
| 103,500,000 | 62,309,090 | 60% | 263,776,000 | 367,276,000 | 17% |

281

5.8.5 Comparison of Alternatives

282 **Table 5-113** summarizes the impacts of all alternatives. **Table 5-114** shows order-of-
 283 magnitude direct and indirect energy impacts for each alternative. All Action Alternatives
 284 would result in lesser impacts than the No-Action Alternative because of the large size of the
 285 private air-right development and associated energy consumption. With regard to direct
 286 impacts, the Action Alternatives would vary within a narrow range, from 36.7 million kBTUs
 287 (Alternative A-C) to 42.2 million kBTUs (Alternative B).

288 Differences would become greater when factoring in the indirect impacts from the potential
 289 Federal air-rights development, with the impacts of Alternative A being substantially less
 290 than those of the other Action Alternatives. This is because of the smaller size and different
 291 function of the Federal air-rights development in Alternative A (parking instead of office
 292 space), which would require less energy. Alternatives B and C would have the greatest
 293 combined direct and indirect impacts. For all alternatives, the estimated impacts of the
 294 potential Federal air-rights development would be a very small fraction of the District’s

295 energy consumption in 2017. As such, they are not likely to generate supply or capacity
 296 issues.

Table 5-113. Comparison of Alternatives, Energy Resources

| Type of Impact | No-Action Alternative | Alternative A | Alternative B | Alternative C (Either Option) | Alternative D | Alternative E | Alternative A-C (Preferred) |
|-----------------------------|-----------------------|----------------------------|-----------------------|-------------------------------|---------------|---------------|-----------------------------|
| Direct Operational | Minor adverse impacts | | | | | | |
| Indirect Operational | No impacts | Negligible adverse impacts | Minor adverse impacts | | | | |
| Construction | Minor adverse impacts | | | | | | |

Table 5-114. Comparison of Estimated Energy Impacts by Alternative (Million kBTUs per Year)

| | Alternative | | | | | | | |
|---|-------------|-------------|--------------|--------------|--------------|-------------|-------------|-------------|
| | No-Action | A | B | C East | C West | D | E | A-C |
| WUS Expansion | - | 37.5 | 42.2 | 37.8 | 37.6 | 38 | 41.2 | 36.7 |
| Private Air-Rights Development | 264 | - | - | - | - | - | - | - |
| Potential Federal Air-Rights Development | - | 3.7 | 61.7 | 64.1 | 64.1 | 46.3 | 46.3 | 25.6 |
| Total | 264 | 41.2 | 103.9 | 101.9 | 101.7 | 84.3 | 87.5 | 62.3 |

297
 298 Construction of the alternatives would also consume energy. While it is not possible to
 299 quantify this impact, it would generally be proportional to the size of the development and
 300 the duration of the construction. On this basis, Alternatives A and A-C would have the
 301 smallest construction impact and Alternatives B and E the greatest. In general, these impacts
 302 would be in the range of what is typical of large construction projects.

5.8.6 Avoidance, Minimization and Mitigation Evaluation

303 The following avoidance, minimization, and mitigation measures are being considered by FRA
 304 to minimize energy impacts as much as possible:

- 305 ■ The Project Proponents would incorporate cost-effective energy efficiency technologies
 306 into the Project design. Numerous small upgrades to systems such as lighting,
 307 refrigeration, water heating and cooling, space heating and cooling, windows, doors, and
 308 building insulation, would result in major energy savings at reasonable costs and with

309 short payback periods. Other technologies would save additional energy by adjusting
310 energy consumption to the needs of the people using the space. These include, but are
311 not limited to, programmable and learning thermostats; energy management systems
312 that react to utility price signals and energy demand in the region; and light motion
313 sensors and dimmers.

314 ■ USRC would develop a Tenant Manual. The retail space in WUS is leased by USRC to a
315 single entity (Ashkenazy Acquisition Corporation, operating as Union Station Investco
316 [USI]), which in turn leases the individual spaces to tenants. A Tenant Manual would be
317 prepared for USI and any future entities that may control the new retail space created by
318 the Project. In that manual, USRC would identify strategies to reduce energy
319 consumption. Such strategies may include but are not limited to identifying core and
320 shell features that allow tenant choices in energy-related fit-out and requiring or
321 encouraging tenants to adopt appropriate sustainable design, energy efficiency, water
322 use, and water pollution control commitments to the extent feasible as part of their
323 respective lease agreements.

5.8.7 Permits and Regulatory Compliance

324 The Project would need to submit Green Determination Requests to the District Department
325 of Consumer and Regulatory Affairs to determine the applicability of green and energy laws
326 and regulations in the Green Building Design Process. When filing a Green Determination
327 Request, the project owner is seeking to determine which green building codes and laws are
328 applicable to the project.

329 The Green Building Division (Division) regulates construction in the District that falls under
330 the regulations of the Green Building Act,⁸ Green Construction Code,⁹ and Energy
331 Conservation Code.¹⁰ The Division is responsible for plan reviews, building inspections, and
332 certificate of occupancy review.

⁸ District of Columbia Official Code. 2013 District of Columbia Building Code. Green Building Act. Division I, Title 6, Chapter 14A, § 6-1451.01 — 6-1451.11.

⁹ *District of Columbia Green Construction Code*. 2013. Accessed from <https://doee.dc.gov/publication/districts-green-construction-code>. Accessed on April 2, 2020.

¹⁰ District of Columbia Official Code. 2013 District of Columbia Energy Code. Energy Conservation Code. Chapter 4 – Commercial Energy Efficiency. Accessed from https://codes.iccsafe.org/content/document/921?site_type=public. Accessed on April 2, 2020.

5.9 Land Use, Land Planning, and Property

1 This section describes and characterizes the potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on zoning and land use; property; and
3 applicable local and regional plans and policies. If applicable, this section also recommends
4 measures to avoid, minimize, or mitigate potential adverse impacts, as well as potential
5 permitting and regulatory compliance requirements.

5.9.1 Regulatory Context and Guidance

6 Relevant Federal policies, regulations and guidance that pertain to energy are listed in
7 **Section 4.9.1, Regulatory Context and Guidance.**

5.9.2 Study Area

8 As defined in **Section 4.9.2, Study Area**, the Local Study Area is the Project Area and the
9 zoning districts within one-half mile of the Project Area. North of K Street, where the Project
10 consists solely of track modifications, the Local Study Area is the track area and the zoning
11 districts within one-quarter mile of the Project Area (**Figure 4-9**). The Regional Study Area
12 includes the neighborhoods adjacent to the Project Area. The outer limits of the Regional
13 Study Area are the limits of Capitol Hill, the Atlas District/H Street Corridor, the Monumental
14 Core, NoMA, and Mount Vernon Triangle neighborhoods. This Regional Study Area
15 represents the broader land use context of the Project (**Figure 4-9**).

5.9.3 Methodology

16 This section summarizes the methodology for evaluating the potential impacts of the
17 alternatives on land use, property, and regional plans and policies. **Appendix C3, Washington**
18 **Union Station Expansion Project Environmental Consequences Technical Report, Section 9.4,**
19 **Methodology**, provides a description of the analysis methodology. A summary is below.
20 Impacts were assessed as major, moderate, minor, or negligible consistent with the intensity
21 scale defined in **Section 5.1.1, Definitions.**

5.9.3.1 Operational Impacts

22 Impacts on land use were determined by comparing the elements of the alternatives with the
23 designated land use of the parcels comprising the Project Area. Impacts within the Project
24 Area to property ownership, land acquisitions, and displacements were assessed by
25 identifying the need for property acquisition as required for project implementation,
26 including air-rights property. The alternatives' impacts on local and regional plans were
27 determined by considering the consistency of the Project program and elements with the
28 relevant goals of the plans.

29 Potential indirect impacts such as induced development, changes in development patterns,
30 or increased rates of development outside the Project Area are described qualitatively.
31 Indirect impacts resulting from the potential development of the Federal air rights in the
32 Project Area were determined based on the uses (parking or office) assumed for the
33 purposes of the DEIS analysis.

34 Federal property is not subject to local zoning. Federal development in the District is subject
35 to review and approval by the National Capital Planning Commission (NCPC) as the zoning
36 authority for Federal land. FRA has determined that it is reasonably foreseeable that the
37 Federal air-rights area would be rezoned to match the District's Union Station North (USN)
38 zoning designation that applies to the adjacent private air rights. Development consistent
39 with USN zoning was assumed for the Federal air rights.

40 Current PDR-3 zoning limits overall building height to 90 feet above existing grade; does not
41 allow residential uses; and would be unlikely to support a consistent pattern of development
42 on either side of the historic station building. USN zoning allows development to a maximum
43 height of up to 130 feet above the crest of the H Street Bridge with a 20-foot height step
44 down to 110 feet within 300 feet of the historic station building and another 20-foot height
45 step down to 90 feet within 150 feet of it.

5.9.3.2 Construction Impacts

46 Impacts from construction were evaluated based on whether construction activities would
47 cause inconsistencies with, or modifications or delays to, existing or planned land uses and
48 developments in the Local Study Area that are distinct from potential operational impacts.

5.9.4 Impact Analysis

49 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
50 land use, land planning, and property.

5.9.4.1 No-Action Alternative

Direct Operational Impacts

Zoning, Land Use, and Development

51 **Relative to existing conditions, the No-Action Alternative would have a major beneficial**
52 **direct operational impact on land use and development. It would have no direct**
53 **operational impacts on zoning.**

54 The projects included in the No-Action Alternative would be consistent with existing zoning
55 and, as such, would have no impacts on zoning. The various station and track improvements
56 in this alternative would be consistent with PDR-3 zoning. The private air-rights development

57 would be within what the USN zoning district allows. There would be no need for a zoning
58 amendment.

59 The various projects included in the No-Action Alternative would moderately enhance WUS
60 as a multi-modal transportation hub. Additionally, the private air-rights development would
61 result in denser and more varied land uses within the Project Area. This would be a major
62 beneficial impact on land use, as it would create a new mixed-use development consistent
63 with zoning and land use plans that would bridge the gap created by the existing rail terminal
64 in the local urban fabric. The No-Action Alternative would be consistent with DC Office of
65 Planning (DCOP)'s Future Land Use Map.

66 In spite of the beneficial impact on land use in the Project Area, the No-Action Alternative
67 would see a marked deterioration of WUS user experience. The number of visitors and
68 travelers would increase substantially. While the improvement projects included in the No-
69 Action Alternative, such as the Concourse Modernization Project, would contribute to
70 improving circulation conditions, they would not be sufficient to prevent increasing
71 congestion in the station. Overcrowding would exacerbate those existing short-comings that
72 the No-Action Alternative would leave unaddressed (for instance narrow platforms), making
73 boarding and alighting from trains more difficult. While the historic station building would
74 continue to be the center and heart of WUS, congested conditions would keep many visitors
75 and travelers from fully appreciating and enjoying its grand architecture.

Property Ownership, Land Acquisitions, and Displacements

76 **Relative to existing conditions, the No-Action Alternative would have no direct operational**
77 **impacts pertaining to property ownership, land acquisitions, or displacements.**

78 With one exception, the projects in the No-Action Alternative would entirely occur within
79 areas already owned or controlled by the respective project proponents. The exception is the
80 private air-rights development. North of the H Street Bridge and south of the bridge above
81 the stub-end tracks, the lower limit (vertical datum) of the private air rights stands at
82 elevation 80 feet. South of the H Street Bridge, there would be insufficient vertical space to
83 accommodate the full depth of a structural deck as proposed by the private air-rights
84 developer without encroaching into Federal property.¹ A similar encroachment would occur
85 within Amtrak property north of the H Street Bridge. Therefore, construction of this portion
86 of the private air-rights deck would require property agreements with the Federal
87 government and Amtrak.

88 Within the portion of the private air rights where the vertical datum is at 70 feet (southeast
89 of the H Street Bridge above the run-through tracks), there would be sufficient vertical space
90 to construct the structural deck and associated systems within the private air rights.

¹ Akridge. November 15, 2017. *Burnham Place and Washington Union Station. Concept Level Podium Structural Systems for 30'x55' Column Grid Areas.*

Consistency with Local and Regional Plans

91 **Relative to existing conditions, the No-Action Alternative would have minor adverse direct**
 92 **operational impacts on most local and regional plans.**

93 **Table 5-115** summarizes the impacts of the No-Action Alternative on local and regional plans.
 94 In general, the No-Action Alternative would fail to fully support the relevant goals of most
 95 plans, resulting in adverse impacts. These impacts would be minor because the No-Action
 96 Alternative would not preclude achieving all or a majority of the plans’ goals. See **Appendix**
 97 **C3**, *Washington Union Station Expansion Project Environmental Consequences Technical*
 98 *Report, Section 9.5.1.1, Direct Operational Impacts, Consistency with Local and Regional*
 99 *Plans* for more detailed analysis.

Table 5-115. Impacts of the No-Action Alternative on Local and Regional Plans

| Plan | Impacts |
|---|---|
| <i>Comprehensive Plan for The National Capital</i> | Minor adverse impact: The No-Action Alternative would not be fully consistent with the goals of the <i>Comprehensive Plan for the National Capital Transportation Element</i> , which calls for WUS to increase and expand its multimodal capacities and connectivity. |
| <i>H Street NE Strategic Development Plan</i> | Minor adverse impact: The No-Action Alternative would not be fully consistent with the goals of the <i>H Street NE Strategic Development Plan</i> , which calls for the strengthening of the connection between WUS and the H Street corridor and for the area to serve as a multi-modal center. |
| <i>NoMA Vision Plan and Development Strategy</i> | Minor adverse impact: The No-Action Alternative would not be fully consistent with the goals of the <i>NoMA Vision Plan and Development Strategy</i> , which calls for improved transit accessibility and vehicular circulation. |
| <i>Northwest One Redevelopment Plan</i> | Minor adverse impact: The No-Action Alternative would not support the goals of the <i>Northwest One Redevelopment Plan</i> , which calls for reconstructing the grid pattern of streets in the area, including using public space design on K Street consistent with the design developed for the Mount Vernon Triangle District to better connect the Northwest One neighborhood with its neighbors to the east and west. |
| <i>Mount Vernon Triangle Action Agenda</i> | No impact: The No-Action Alternative would be generally consistent with the <i>Mount Vernon Triangle Action Agenda</i> but the elements of the No-Action Alternative are outside the plan’s area. |

Indirect Operational Impacts

100 **Relative to existing conditions, the No-Action Alternative would have no adverse indirect**
101 **operational impacts on zoning, land use, or development; property ownership, land**
102 **acquisitions, and displacement; or local and regional plans.**

103 The development of the private air rights in the Project Area may encourage or accelerate
104 further medium- or high-density development in the H Street Corridor, which currently is
105 comprised of a high-activity street (H Street NE) surrounded by low-density residential
106 neighborhoods, and throughout Capitol Hill, where row houses predominate. Land use in the
107 other neighborhoods within the Local and Regional Study Areas, such as Mount Vernon
108 Triangle and NoMA, is already characterized by medium- and high-density development.
109 Everywhere, zoning regulations and applicable plans would continue to guide the density and
110 character of future developments. This would avoid incompatible land uses and ensure that
111 neighborhoods evolve in accordance with the District’s vision for their respective futures.

Construction Impacts

112 **Construction activities in the No-Action Alternative would result in minor adverse impacts**
113 **on land use and no impacts on zoning or development; property ownership, land**
114 **acquisitions, and displacement; or local and regional plans.**

115 In the No-Action Alternative, the Project would not be constructed and would have no
116 construction impacts. Construction of the various projects included in the No-Action
117 Alternative would result in no more than minor adverse impacts on land use. The largest of
118 these projects - the private air-rights development, the replacement of the H Street Bridge,
119 and the VRE Midday Storage Facility - would take place within the footprint of the rail
120 terminal and have the potential to affect its operations. Amtrak must authorize work in the
121 rail terminal. The permitting process would ensure that any impacts to rail operations are
122 minimized.

123 While construction activities and staging areas would likely remain within the respective
124 footprints of the projects, the noise, pollution, or transportation disruptions typically
125 associated with construction activities in a dense urban environment would affect adjacent
126 land uses. However, these impacts, which would be typical of medium to large construction
127 projects, are not likely to create durable incompatibilities that would prevent adjacent
128 facilities and buildings from continuing to operate or forcing them to relocate.

5.9.4.2 Alternative A

Direct Operational Impacts

Zoning, Land Use, and Development

129 **Relative to the No-Action Alternative, Alternative A would have no direct operational**
130 **impact on zoning. It would have a major beneficial direct operational impact on land use**
131 **and development.**

132 Alternative A would have no impact on zoning. Federal property is not subject to local zoning
133 and Federal development in the District is subject to review and approval by NCPC as the
134 zoning authority. As explained in **Section 5.9.3.1, *Operational Impacts***, it can reasonably be
135 assumed that development within the Federal air rights would be conducted consistent with
136 the requirements of the USN zoning designation applying to the adjacent private air rights.
137 Project elements in Alternative A include a train hall that would be approximately 42 feet in
138 height above the crest of the H Street Bridge elevation. This would be consistent with both
139 PDR-3 and USN zoning. Alternative also includes a bus facility and parking above it
140 (multimodal surface transportation center), which would rise about 91 feet above the H
141 Street Bridge. Although this height would not be compatible with the existing PDR-3 zoning,
142 it would be compatible with the USN zoning designation.

143 Alternative A would have a major beneficial impact on land use by enhancing multi-modal
144 transportation uses and connectivity within the Project Area and providing a more accessible,
145 up-to-date multi-modal facility capable of accommodating more passengers and more train
146 and bus service than in the No-Action Alternative. It would make efficient use of a highly
147 constrained area by keeping all WUS-related uses close together south of the H Street Bridge.
148 Alternative A would also benefit the neighborhood by creating new connections between the
149 areas on either side of the rail terminal and be compatible with the DCOP Future Land Use
150 Map.

151 The beneficial impact on land use would translate into an improvement in WUS user
152 experience relative to the No-Action Alternative. New access points from First, 2nd, and H
153 Streets into the H Street Concourse would make it easier to enter WUS from the surrounding
154 neighborhoods. It would also provide connectivity and continuity from First Street to 2nd
155 Street. Retail in the new concourses could potentially become a destination for local
156 residents as well as tourists.

157 The historic station building would remain the heart of the station and its most visible and
158 inviting entrance. By alleviating congestion, especially during peak travel times, the
159 additional concourse space and access points would make it easier for passengers and
160 visitors to appreciate and enjoy the grand architecture of the historic station. The north-
161 south train hall, which would be designed to be a monumental, compelling gateway space
162 worthy of welcoming visitors and travelers to the nation's capital, would extend areas of
163 architectural interest past the historic station building to encompass part of the track and

164 platform area. In combination with enhanced accessibility (wider platforms, full compliance
165 with ADA-requirements, effective signage), more spacious waiting areas, and greater
166 amounts of natural light, this would make boarding or alighting from trains at WUS a much
167 easier and more enjoyable experience than would be the case in the No-Action Alternative.

168 Similarly, intercity bus passengers would enjoy the benefits of a more contemporary facility
169 with better amenities and greater functional and visual integration with the rest of the
170 station, including the historic station building, via Concourse A. Improved internal circulation,
171 including additional vertical circulation elements, would provide passengers with better
172 connections to the Metrorail Station, an important mode of access for WUS users,
173 particularly tourists and travelers unfamiliar with the station. The First Street, Central, and H
174 Street Concourses, along with headhouses on H Street, would provide a more direct and
175 welcoming connection for DC Streetcar users.

Property Ownership, Land Acquisitions, and Displacements

176 **Relative to the No-Action Alternative, Alternative A would have a moderate adverse direct**
177 **operational impact on property ownership, land acquisitions, and displacements.**

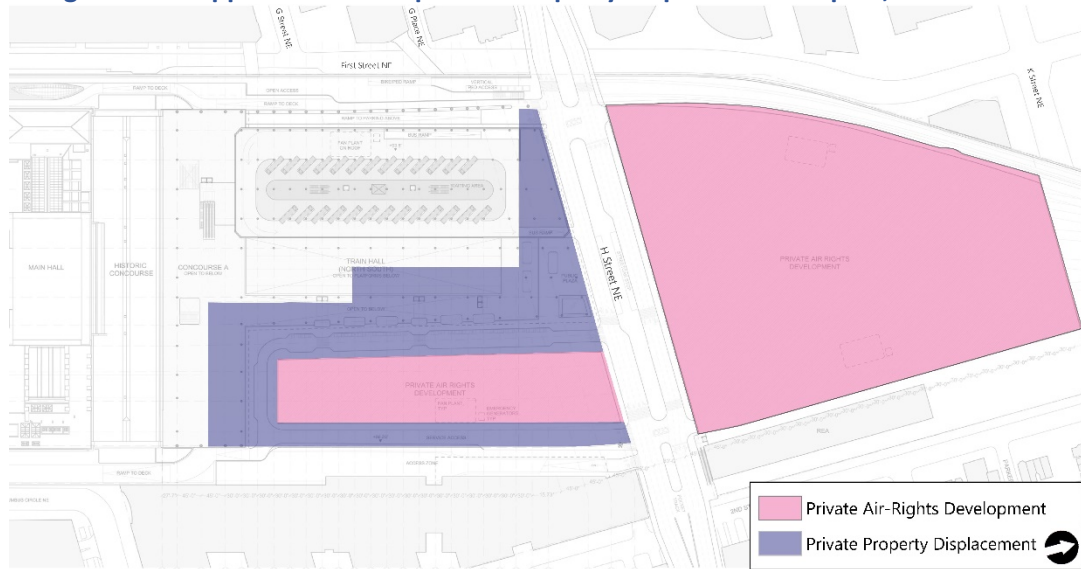
178 Alternative A would have an adverse impact on property ownership because it would involve
179 constructing a portion of the new train hall and access roads adjacent to the train hall within
180 the private air rights above the rail terminal. Also, the area between H Street NE and the bus
181 facility would be used by the Project to establish an entrance into the station. Altogether, this
182 would require acquiring approximately 135,700 square feet of private air-rights property
183 (approximately 3.1 acres) south of H Street.² **Figure 5-23** shows the approximate footprint of
184 the private air-rights property that would need to be acquired. It would represent
185 approximately 22 percent of the 622,800-gross-square-foot footprint of the private air
186 rights.³

187 The adverse impact would be moderate because, although sizable, the reduction would not
188 preclude developing the remaining air rights. Additionally, the 3.1 acres that would be
189 affected include roads that are needed to serve the private air-rights development as well as
190 WUS. Also, WUS-related structures would be concentrated south of H Street NE, leaving the
191 portion of air rights north of H Street fully available for development and minimizing the
192 fragmentation of the developable area.

² The method of acquisition has not yet been determined and may vary according to the element being accommodated.

³ Total area as stated in Letter from Akridge to FRA dated May 31, 2016.

Figure 5-23. Approximate Footprint of Property Displacement Impact, Alternative A



193 The Project would also require a property transaction to construct the new H Street
 194 Concourse at the location of the existing H Street Tunnel. This is the former at-grade
 195 alignment of H Street NE between First and Second Streets NE. This section of H Street was
 196 closed off after the construction of the H Street Bridge. It is owned by DDOT. In Alternative A
 197 and all Action Alternatives, the H Street Tunnel would be acquired and replaced by the new
 198 concourse.⁴

199 Relative to the No-Action Alternative, Alternative A would reduce the amount of Federal
 200 property for which the private air-rights developer would need an agreement with the
 201 Federal government (see **Section 9.5.1.1, Direct Operational Impacts, Property Ownership,**
 202 *Land Acquisitions, and Displacements*). The reduction would be important, as the entire
 203 private air-rights deck south of H Street would be within the 70-foot datum area. A property
 204 agreement with Amtrak would be potentially needed only for the private air-rights area
 205 north of H Street NE, as in the No-Action Alternative.

⁴ The exact process through which the tunnel would be acquired has not yet been determined.

Consistency with Local and Regional Plans

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Relative to the No-Action Alternative, Alternative A would have minor to major beneficial direct operational impacts on most relevant local and regional plans.

Table 5-116 shows the direct operational impacts of Alternative A on local and regional plans. The impacts of Alternative A on plans would generally be beneficial relative to the No-Action Alternative because Alternative A would support many of the goals the No-Action Alternative would not support.

Table 5-116. Impacts of Alternative A on Local and Regional Plans

| Plan | Impacts |
|---|--|
| <i>Comprehensive Plan for The National Capital</i> | Major beneficial impact: Alternative A would support the plan’s policies of increasing the utilization of passenger rail service in the Northeast Corridor and points south and west to serve Washington’s Union Station, reinforcing its status as a Capital Gateway that announces entry into the capital city. Alternative A would be consistent with these policies. It would expand and modernize WUS, a major goal of the <i>Comprehensive Plan for the National Capital Transportation Element</i> that the No-Action Alternative would not support. |
| <i>H Street NE Strategic Development Plan</i> | Moderate beneficial impact: Alternative A would help achieve the connectivity goals of the <i>H Street NE Strategic Development Plan</i> by providing connections between H Street NE and WUS. It would support the plan’s transit goals by expanding and modernizing multimodal options that the No-Action Alternative would not support. These goals are part of a larger set of plan objectives that Alternative A would neither prevent nor support; therefore, the impact would be moderate. |
| <i>NoMA Vision Plan and Development Strategy</i> | Moderate beneficial impact: Alternative A would support the connectivity goals of the <i>NoMA Vision Plan and Development Strategy</i> that the No-Action Alternative would not support by bringing the station elements into compliance with Americans with Disabilities Act (ADA) and Life Safety ⁵ requirements, providing new pedestrian entrances, and increasing the number of bikeshare docks and capacity for bicycle storage. The connectivity goals are part of a larger set of plan objectives that Alternative A would neither prevent nor support; therefore, the impact would be moderate. |
| <i>Northwest One Redevelopment Plan</i> | Minor beneficial impact: Alternative A would provide new access points on and below the H Street Bridge, generally supporting the connectivity goals of the <i>Northwest One Redevelopment Plan</i> that the No-Action would not support. These access points are outside of the plan area; therefore, the impact would be minor. |
| <i>The Mount Vernon Triangle Action Agenda</i> | No impact: Alternative A would be generally consistent with the <i>Mount Vernon Triangle Action Agenda</i> , including providing new retail, but it is outside the plan’s area. |

Indirect Operational Impacts

Potential Federal Air-Rights Development

212 **Relative to the No-Action Alternative, the potential Federal air-rights development in**
213 **Alternative A would have a minor beneficial indirect operational impact on land use. It**
214 **would have no adverse indirect operational impacts on zoning, or development; property**
215 **ownership, land acquisitions, and displacement; or local and regional plans.**

216 Alternative A would construct a new bus facility and parking facility in the Federally owned
217 air rights to the southwest of H Street NE. The new structure would rise approximately 91
218 feet above the crest of the H Street Bridge. Within the part of this area starting
219 approximately 300 feet from the historic station building, the USN zoning designation
220 (assumed to apply by 2040) would allow for heights of up to 130 feet above the H Street
221 Bridge. Therefore, air-rights space would be available for potential commercial development
222 that would bring the new, combined structure to the maximum permitted height. While the
223 mechanism to allow for this development has not yet been determined, as an example, FRA
224 could lease the air rights to USRC, which in turn would sublease the development rights.⁶

225 Alternative A would have no indirect adverse impacts on zoning. As explained in **Section**
226 **5.9.4.2, Alternative A, Direct Operational Impacts**, Federal land is not subject to local zoning
227 and NCPC is the zoning authority for Federal land in the District. It can be anticipated that the
228 potential Federal air-rights development would be planned consistent with the USN zoning
229 that applies to the adjacent private air rights. Based on USN zoning, a maximum envelope of
230 approximately 323,720 gross square feet (GSF) would be available for development. If and as
231 planning and design for this development occurs, Floor Area Ratio (FAR) requirements would
232 be reviewed to ensure, as much as practicable, full consistency with USN zoning.

233 Because of its relatively modest size and location on top of a bus facility and parking facility,
234 with no opportunity for direct access from the street level, it is assumed for the purposes of
235 this DEIS that the space would be used for additional parking.⁷ This would be a beneficial
236 impact because it would contribute to supporting WUS operations by making use of
237 potentially developable space that otherwise would remain unproductive in a manner
238 consistent with surrounding land uses. This beneficial impact would be minor because such a
239 development would not be fully consistent with DCOP's Future Land Use Map, which shows
240 mixed-use development with residential, retail, and office space at this location.

⁶ The FRA-USRC lease and USRC's organizational documents would permit USRC to facilitate the development similar to USRC's role in the 1980s development.

⁷ This assumption is for analysis purposes only and does not preclude any other type of potential development within the remaining Federal air rights. Of the plausible uses of this space, parking allows for a conservative evaluation of traffic impacts.

Regional Study Area

241 **Relative to the No-Action Alternative, Alternative A would have no adverse indirect**
242 **operational impacts on zoning, land use, or development; property ownership, land**
243 **acquisitions, and displacement; or local and regional plans.**

244 The improved connectivity and activity at WUS promoted by Alternative A may accelerate
245 medium- or high-density development near the station. Such development already
246 characterizes most of the Regional Study Area, such as Mount Vernon Triangle and NoMA.
247 Indirect impacts from induced development may be more noticeable along and near the H
248 Street Corridor, which currently is comprised of a high-activity street (H Street NE)
249 surrounded by residential rowhouse neighborhoods, and throughout Capitol Hill. However,
250 the District’s zoning regulations and applicable plans would continue to guide the density and
251 character of potential future developments in all areas. This would avoid incompatible land
252 uses and ensure that neighborhoods evolve in accordance with the District’s vision for their
253 respective futures. Therefore, no adverse impacts are anticipated.

Construction Impacts

254 **Construction of Alternative A would have moderate adverse impacts on land use and**
255 **development. It would have no impacts on zoning; property ownership, land acquisitions,**
256 **and displacement; or local and regional plans.**

257 Construction activities in Alternative A would largely be contained within the footprint of the
258 rail terminal. Construction would affect rail operations but the phased, east-to-west
259 construction approach would minimize this impact and the resulting disruptions in service
260 (see **Section 5.5.4.2, Alternative A, Construction Impacts**, for further discussion of potential
261 impacts on intercity buses and parking during Phase 4). At various times over the
262 construction period (approximately 11 years and 5 months⁸), five areas may be used for
263 access and staging: the West Rail Yard (between K Street and H Street); WUS east access
264 ramp, First Street NE, 2nd Street NE, and the H Street Bridge curbs; the H Street Tunnel; the
265 Railway Express Agency (REA) Parking Lot; and a train access area for material delivery and
266 removal in the constricted “throat” of the rail terminal north of K Street NE.

267 Of these, the WUS east access ramp, First Street NE, and 2nd Street NE curbs are just outside
268 the Project Area. They would be used as access points for personnel, minor equipment,
269 Short-term truck parking, and limited material deliveries, generally consistent with their
270 existing use. The H Street Bridge, although within the Project Area, is a public right-of-way. In
271 addition to the uses just listed, it could also be used to place equipment to hoist or pump
272 materials into and out of the site. This would be a short-term use occurring multiple times

⁸ This includes the 12-month Intermediate Phase between Phases 1 and 2, during which only column removal work would be performed. The need for outside staging space during this phase would be minimal.

273 over the entire period of construction. Close coordination with DDOT and Amtrak would
274 ensure that disruptions to street and rail traffic do not occur or remain minimal.

275 Use of the West Rail Yard area and the REA Parking Lot for construction access and staging
276 would involve a change in the current use of these areas, including demolitions of existing
277 buildings and construction of access ramps. The West Rail Yard would be a major staging area
278 during Phases 1 to 3 (excluding the Intermediate phase) and part of Phase 4. Use of the REA
279 Parking Lot likely would be mostly during Phase 1. Amtrak, one of the Project Proponents,
280 controls those areas. Construction planning would include minimizing any impacts on the
281 operation of the rail terminal.

282 The H Street Tunnel (former at-grade H Street right-of-way) would be used for east side
283 access during Phase 1 but that end of the tunnel would be demolished during Phase 1
284 excavation. The west end of the tunnel would be used for access during Phases 2 through 4.⁹

285 For the entire duration of the First Street Tunnel column removal work, part of the Retail and
286 Ticketing Concourse would be closed to the public to allow for the removal of columns in the
287 tunnel underneath the historic station building. This would affect the uses currently
288 accommodated in the eastern part of the concourse, including retail outlets, which would be
289 displaced for up to approximately 2 years and 6 months (total duration of the column
290 removal work including part of Phase 1, the Intermediate Phase, and part of Phase 2).

291 Preliminary planning indicates that in Alternative A, construction of the deck-level portion of
292 the private air-rights development would not be able to start until the completion of Phase 3
293 of the construction of the Project. This would be approximately 8 years and 4 months after
294 the start of construction.¹⁰

295 During Phase 4 of construction, the existing bus facility and parking garage would be
296 demolished and replaced. Intercity bus service and parking would not be available at WUS
297 during this period of approximately 3 years and 1 month (see **Section 5.5.4.2, Alternative A,**
298 *Construction Impacts* for further discussion of potential impacts on intercity buses and
299 parking during Phase 4).

Comparison to Existing Conditions

300 Relative to existing conditions, Alternative A would have major adverse direct and indirect
301 operational impacts on zoning. This is because the height of the combined new bus and
302 parking facilities and, potentially, the height of the Federal air-rights development would
303 exceed what the existing PDR-3 zoning allows.

304 Most the impacts of Alternative A on land use, property ownership, and plans relative to
305 existing conditions would be the same as they would be relative to the No-Action alternative.

⁹ As explained in **Section 5.9.4.2, Alternative A, Direct Operational Impacts**, the H Street Tunnel would be acquired to construct the new H Street Concourse.

¹⁰ Amtrak. November 2019. *Washington Union Station Terminal Infrastructure Project Constructability Report*.

306 These impacts would result from features of Alternative A or the Study Area that would not
307 change with the baseline.

5.9.4.3 Alternative B

Direct Operational Impacts

Zoning, Land Use, and Development

308 **Relative to the No-Action Alternative, Alternative B would have no direct operational**
309 **impact on zoning. It would have a major beneficial direct operational impact on land use**
310 **and development.**

311 Alternative B would have no adverse impact on zoning for the same reasons as explained for
312 Alternative A (see **Section 5.9.4.2, Alternative A, Direct Operational Impacts**). The train hall
313 and bus facility would be 42 feet in height above the crest of the H Street Bridge elevation,
314 consistent with both PDR-3 and USN zoning.

315 Alternative B would have a major beneficial impact on land use by enhancing multi-modal
316 transportation uses and connectivity within the Project Area and providing a more accessible,
317 up-to-date multi-modal facility capable of accommodating more passengers and more train
318 and bus service than in the No-Action Alternative. Alternative B would also benefit the
319 neighborhood by creating new connections between the areas on either side of the rail
320 terminal and it would be compatible with the DCOP Future Land Use Map. Alternative B
321 would keep all WUS-related uses close together south of the H Street Bridge or below
322 ground, making efficient use of a highly constrained area.

323 Improved land use in Alternative B would be accompanied by the same beneficial impacts on
324 WUS user experience as in Alternative A. These impacts are described in **Section 5.9.4.2,**
325 *Alternative A, Direct Operational Impacts*.

Property Ownership, Land Acquisitions, and Displacements

326 **Relative to the No-Action Alternative, Alternative B would have a moderate adverse direct**
327 **operational impact on property ownership, land acquisitions, and displacements.**

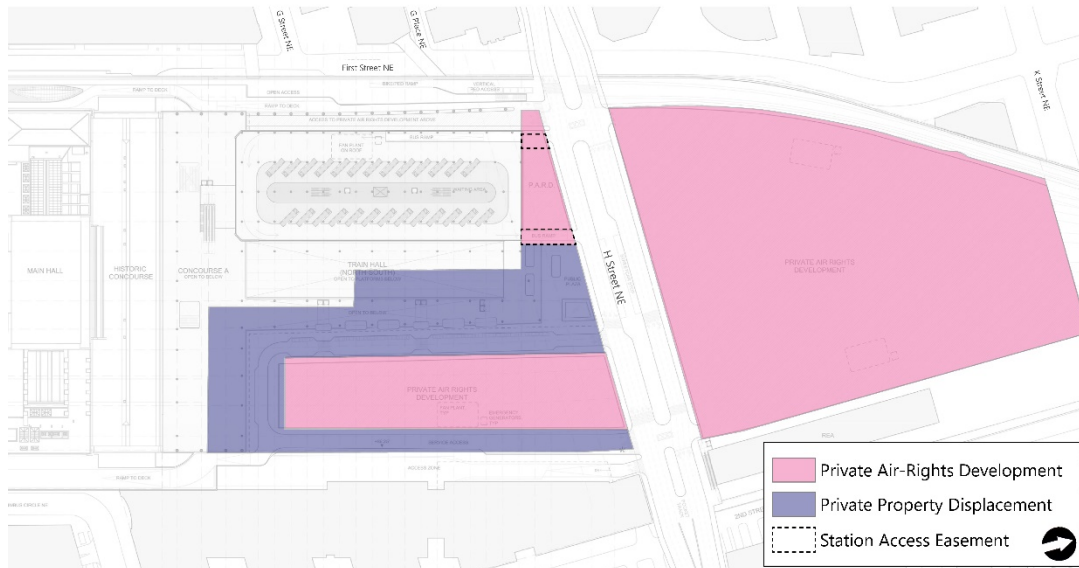
328 Alternative B would have an adverse impact on property ownership because it would involve
329 constructing a portion of the new train hall and access roads adjacent to the train hall within
330 the private air rights above the rail terminal. This would require acquiring approximately
331 120,800 square feet of private air-rights property (approximately 2.8 acres) south of H
332 Street.¹¹ **Figure 5-24** shows the approximate footprint of the private air-rights property that
333 would be affected. It would represent approximately 19 percent of the 622,800-gross-
334 square-foot footprint of the private air rights.¹² Alternative B would also require the

¹¹ The method of acquisition has not yet been determined and may vary according to the element being accommodated.

¹² Total area as stated in Letter from Akridge to FRA dated May 31, 2016.

335 acquisition of easement through the private air rights for the access ramps in and out of the
 336 bus facility.

Figure 5-24. Property Displacement Impacts, Alternative B



337 These adverse impacts would be moderate for the same reasons as explained for Alternative
 338 A (Section 5.9.4.2, Alternative A, Direct Operational Impacts). Also as explained in Section
 339 5.9.4.2, Alternative B would require acquiring the H Street Tunnel to construct the new H
 340 Street Concourse, as in all Action Alternatives.¹³

341 Relative to the No-Action Alternative, Alternative B, like Alternative A, would reduce the
 342 amount of Federal property for which the private air-rights developer would need an
 343 agreement with the Federal government, as explained in Section 5.9.4.2.

Consistency with Local and Regional Plans

344 **Relative to the No-Action Alternative, Alternative B would have minor to major beneficial**
 345 **direct operational impacts on most relevant local and regional plans.**

346 The impacts of Alternative B on local and regional plan would be the same as those of
 347 Alternative A (Section 5.9.4.2, Alternative A, Direct Operational Impacts and Table 5-116).

¹³ The exact process through which the tunnel would be acquired has not yet been determined.

Indirect Operational Impacts

Potential Federal Air-Rights Development

348 **Relative to the No-Action Alternative, the development of the Federal air rights in**
349 **Alternative B would have a major beneficial indirect operational impact on land use. It**
350 **would have no adverse indirect operational impacts on zoning or development; property**
351 **ownership, land acquisitions, and displacement; or local and regional plans.**

352 Alternative B would construct a new bus facility in the Federally owned air-rights to the
353 southwest of H Street NE. The new facility would rise approximately 42 feet above the crest
354 of the H Street Bridge. Within part of this area, approximately 300 feet from the historic
355 station building, the USN zoning designation (which it is assumed would apply by 2040)
356 allows for heights of up to 130 feet above the H Street Bridge. Therefore, air rights would
357 remain available above the facility for potential commercial development that would bring
358 the facility to the maximum permitted height. As explained for Alternative A (**Section 5.9.4.2,**
359 *Alternative A, Indirect Operational Impacts*), the mechanism for this development has not yet
360 been determined, but it could be achieved through a lease of the Federal air-rights by FRA to
361 USRC, which in turn would sublease the development rights.

362 Alternative B would have no indirect adverse impacts on zoning. As explained in **Section**
363 **5.9.4.2, Alternative A, Direct Operational Impacts**, for Alternative A, Federal land is not
364 subject to local zoning and NCPC is the zoning authority for Federal land in the District. It is
365 anticipated that the potential Federal air-right development would be planned consistent
366 with the USN zoning that applies to the adjacent private air rights. Based on USN zoning, a
367 maximum envelope of approximately 917,420 GSF would be available for development. If
368 and as planning and design for this development occurs, FAR requirements would be
369 reviewed to ensure, as much as practicable, full consistency with USN zoning.

370 As explained in **Section 3.4.3.1, Summary Description**, in Alternative B, it is assumed for the
371 purposes of the DEIS that this space would be developed as office space. This would have a
372 major beneficial impact on land use within the Project Area. It would be consistent with the
373 DCOP's Future Land Use Map, which shows mixed-use development with residential, retail,
374 and office space at this location. It would also contribute to supporting WUS operations by
375 making use of potentially developable space that otherwise would remain unproductive.

Regional Study Area

376 **Relative to the No-Action Alternative, Alternative B would have no adverse indirect**
377 **operational impacts on zoning, land use, or development; property ownership, land**
378 **acquisitions, and displacement; or local and regional plans.**

379 The indirect impacts of Alternative B on the Regional Study Area would be the same as those
380 of Alternative A (**Section 5.9.4.2, Alternative A, Indirect Operational Impacts**).

Construction Impacts

381 **Construction of Alternative B would have moderate adverse impacts on land use and**
382 **development. It would have no impacts on zoning; property ownership, land acquisitions,**
383 **and displacement; or local and regional plans.**

384 Construction of Alternative B would generally have similar impacts to those of the
385 construction of Alternative A (**Section 5.9.4.2, *Alternative A, Construction Impacts***). The same
386 access and staging areas would be used for similar activities, although for a longer period
387 (approximately 14 years and 4 months in total, including the 12-month Intermediate Phase
388 during which only column removal work in the First Street Tunnel would be performed).
389 During Phase 4, or approximately 4 years 11 months, intercity bus service and parking would
390 not be available at WUS.

391 In Alternative B, construction of the deck-level part of the private air-rights development
392 would not be able to start until the completion of Phase 3 of Project construction. This would
393 be approximately 9 years and 5 months after the start of construction.¹⁴

Comparison to Existing Conditions

394 Relative to existing conditions, Alternative B would have major adverse indirect operational
395 impacts on zoning. This is because the height of the potential Federal air-rights development
396 would exceed what the existing PDR-3 zoning allows.

397 Other impacts of Alternative B on land use, property ownership, and plans would be the
398 same relative to existing conditions as they would be relative to the No-Action Alternative.
399 These impacts would result from features of Alternative B or the Study Area that would not
400 change with the baseline.

5.9.4.4 Alternative C

Direct Operational Impacts

Zoning, Land Use, and Development

401 **Relative to the No-Action Alternative, Alternative C (either option) would have no direct**
402 **operational impact on zoning. It would have a moderate beneficial direct operational**
403 **impact on land use and development.**

404 Alternative C would have no adverse impact on zoning for the same reasons as explained for
405 Alternative A (see **Section 5.9.4.2, *Alternative A, Direct Operational Impacts***). The train hall
406 would be approximately 42 feet in height above the crest of the H Street Bridge elevation,
407 consistent with both PDR-3 and USN zoning. The bus facility and above-ground parking
408 facility above it would be approximately 59 feet high, consistent with USN zoning.

¹⁴ Amtrak. November 2019. *Washington Union Station Terminal Infrastructure Project Constructability Report*.

409 Alternative C would have a beneficial impact on land use by enhancing multi-modal
410 transportation uses and connectivity within the Project Area and providing a more accessible,
411 up-to-date multi-modal facility capable of accommodating more passengers and more train
412 and bus service than in the No-Action Alternative. Alternative C would also benefit the
413 neighborhood by creating new connections between the areas on either side of the rail
414 terminal and be compatible with the DCOP Future Land Use Map. This beneficial impact
415 would be moderate because of the location of the main bus facility and above-ground
416 parking to the north of the H Street Bridge. This would increase the distance between these
417 facilities and the front of WUS and result in a more spread-out, less cohesive multimodal
418 station than in the No-Action Alternative.

419 The beneficial impact on land use would translate into an improvement in WUS user
420 experience relative to the No-Action Alternative. In Alternative C, as in all Action Alternatives,
421 new access points from First, 2nd, and H Streets into the H Street Concourse would make it
422 easier to enter WUS from the surrounding neighborhoods and provide connectivity and
423 continuity from First Street to 2nd Street. Retail in the new concourses could potentially
424 become a local destination.

425 The historic station building would remain the heart of the station and its most visible and
426 inviting entrance. By alleviating congestion, especially during peak travel times, the
427 additional concourse space and access points would make it easier for passengers and
428 visitors to appreciate and enjoy the building's grand architecture. Concourse A and the
429 integrated east-west train hall, which would be designed to be a monumental, compelling
430 space on a scale commensurate with the nation's capital, would extend the area of
431 architectural interest beyond the historic station building and open up a visual connection
432 toward the track and platform area. This would create in the visitor a better sense of being at
433 a train station than would be the case in the No-Action Alternative, in which tracks and
434 platforms would remain largely out of sight, as they are today. This visual connection, in
435 combination with enhanced accessibility through wider platforms, full compliance with ADA-
436 requirements, effective signage, more spacious waiting areas, and greater amounts of
437 natural light, would make boarding or alighting from trains at WUS a much easier, more
438 enjoyable experience than in the No-Action Alternative.

439 Intercity bus passengers would enjoy the benefits of a more contemporary facility with better
440 amenities. However, the greater distance between the main bus facility and the historic
441 station building would weaken the functional and visual integration between WUS's
442 intermodal elements and detract somewhat from bus riders' experience of the station as a
443 unified place (see **Section 5.16.4.4, Alternative C, Direct Operational Impacts**, for further
444 information). Passengers of buses using the bus pick-up and drop-off area would enjoy a
445 more integrated experience, with a direct connection to the rest of the station, including the
446 Historic Station Building, via Concourse A.

447 As in the other Action Alternatives, improved internal circulation, including additional vertical
448 circulation elements, would provide passengers with better connections to the Metrorail

449 Station, an important mode of access for WUS users, particularly tourists and travelers
450 unfamiliar with the station. The First Street, Central, and H Street Concourses, along with
451 headhouses and the main bus facility on H Street, would provide a more direct and
452 welcoming connection for DC Streetcar users.

Property Ownership, Land Acquisitions, and Displacements

453 **Relative to the No-Action Alternative, Alternative C (either option) would have a major**
454 **adverse direct operational impact on property ownership, land acquisitions, and**
455 **displacements.**

456 Alternative C would have a major adverse impact on property ownership because it would
457 involve constructing part of the train hall and bus pick-up and drop-off area as well as the
458 entirety of the bus facility and above-ground parking facility, in the private air rights above
459 the rail terminal. This would require acquiring approximately 201,200 square feet (East
460 Option) or approximately 208,000 square feet (West Option) of private air-rights property
461 (approximately 4.6 and 4.8 acres, respectively) south and north of H Street NE.¹⁵ **Figure 5-25**
462 **and Figure 5-26** show the approximate footprint of the private air-rights property that would
463 need to be acquired under each option, respectively. It would represent approximately 32
464 percent (East Option) or 33 percent (West Option) of the 622,800-gross-square-foot footprint
465 of the private air rights.¹⁶ Additional space would also be needed to accommodate
466 daylighting and access easements.¹⁷

467 However, the loss in total developable envelope would be less than that because the air
468 rights above the bus and parking facility (which would rise approximately 59 feet above the H
469 Street Bridge elevation) would potentially remain available for development. Additionally,
470 the reduction estimate includes areas for roadways needed to serve the private development
471 as well as WUS. The total adverse impact would still be major because of the large square
472 footage of private air rights that would need to be acquired and their distribution across the
473 entire rail terminal, both south and north of H Street NE.

474 As explained for Alternative A in **Section 5.9.4.2, Alternative A, Direct Operational Impacts,**
475 **Alternative C, like all Action Alternatives, would require acquiring the H Street Tunnel to**
476 **construct the new H Street Concourse.**¹⁸

¹⁵ The method of acquisition has not yet been determined and may vary according to the element being accommodated.

¹⁶ Total area as stated in Letter from Akridge to FRA dated May 31, 2016.

¹⁷ Daylighting features would be located in the Daylight Access Zone. The shape, number, and exact location of the daylighting feature easements shown in Figures 5-25 and 5-26 are for illustrative purposes only.

¹⁸ The exact process through which the tunnel would be acquired has not yet been determined.

Figure 5-25. Property Displacement Impacts, Alternative C – East Option

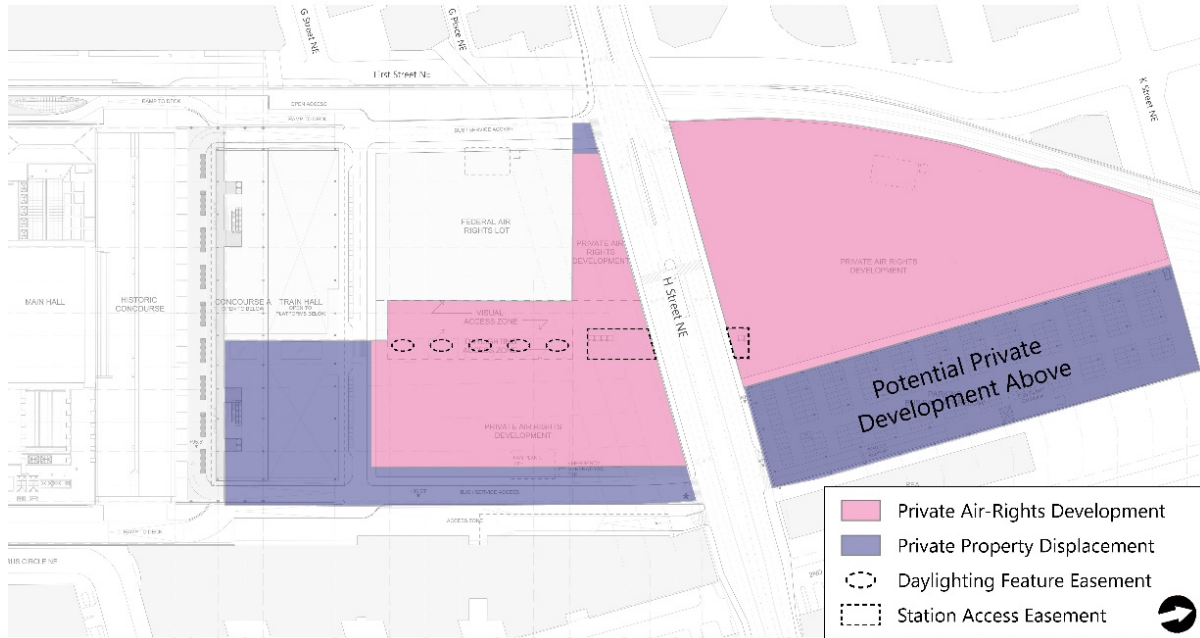


Figure 5-26. Property Displacement Impacts, Alternative C – West Option



477 Relative to the No-Action Alternative, Alternative C with either option would reduce the
478 amount of property for which the private developer would need agreements with the
479 Federal government and Amtrak. South of H Street NE, the reduction would be small, as most
480 of the private air rights within the 80-foot datum area (see **Section 5.9.4.1, No Action**
481 *Alternative, Direct Operational Impacts, Property Ownership, Land Acquisition, and*
482 *Displacements*) would remain available for private development. North of H Street NE, a
483 property agreement with Amtrak would be potentially needed only for the private air-rights
484 area not acquired for construction of the new bus and above-ground parking facilities.

Consistency with Local and Regional Plans

485 **Relative to the No-Action Alternative, Alternative C (either option) would have minor to**
486 **major beneficial direct operational impacts on most relevant local and regional plans.**

487 The impacts of Alternative C (both options) on local and regional plan would be the same as
488 those of Alternative A (**Section 5.9.4.2, Alternative A, Direct Operational Impacts, and Table**
489 **5-116**).

Indirect Impacts

Potential Federal Air-Rights Development

490 **Relative to the No-Action Alternative, the development of the Federal air rights in**
491 **Alternative C (either option) would have a major beneficial indirect operational impact on**
492 **land use. It would have no adverse indirect operational impacts on zoning, or**
493 **development; property ownership, land acquisitions, and displacement; or local and**
494 **regional plans.**

495 Alternative C would demolish the existing parking garage. The new bus pick-up and drop-off
496 area and train hall would occupy part of the demolished garage's footprint. The remainder
497 would be available for potential commercial development up to the height permitted under
498 the future USN zoning designation. As explained for Alternative A (**Section 5.9.4.2,**
499 *Alternative A, Indirect Operational Impacts*), this could be achieved, for example, through a
500 lease of the Federal air-rights by FRA to USRC, who would then sublease the development
501 rights.

502 Alternative C would have no indirect adverse impacts on zoning. As explained in **Section**
503 **5.9.4.2, Alternative A, Direct Operational Impacts,** for Alternative A, Federal land is not
504 subject to local zoning and NCPC is the zoning authority for Federal land in the District. It can
505 be anticipated that the potential Federal air-right development would be planned consistent
506 with the USN zoning that applies to the adjacent private air rights. Based on USN zoning, a
507 maximum envelope of approximately 952,600 GSF would be available for development. If
508 and as planning and design for this development occurs, FAR requirements would be
509 reviewed to ensure, as much as practicable, full consistency with USN zoning.

510 As explained in **Section 3.4.4.1, Summary Description,** it is assumed for the purposes of the
511 DEIS that in Alternative C, this space would be developed as office space. This would have a

512 beneficial impact on land use in the Project Area. It would be consistent with DCOP's Future
513 Land Use Map, which shows mixed-use development with residential, retail, and office space
514 at this location. It would also contribute to supporting WUS operations by making use of
515 potentially developable space that otherwise would remain unproductive. The beneficial
516 impact would be major because the development would fill in what would otherwise remain
517 a major gap in land use in the Project Area.

Regional Study Area

518 **Relative to the No-Action Alternative, Alternative C (either option) would have no adverse**
519 **indirect operational impacts on zoning, land use, or development; property ownership,**
520 **land acquisitions, and displacement; or local and regional plans.**

521 The indirect impacts of Alternative C within the Regional Study Area would be the same as
522 those of Alternative A (**Section 5.9.4.2, Alternative A, Indirect Operational Impacts**).

Construction Impacts

523 **Construction of Alternative C (either option) would have moderate adverse impacts on**
524 **land use and development. It would have no impacts on zoning; property ownership, land**
525 **acquisitions, and displacement; or local and regional plans.**

526 Construction of Alternative C would generally have similar impacts to those of the
527 construction of Alternative A (**Section 5.9.4.2, Alternative A, Construction Impacts**). The same
528 access and staging areas would be used for similar activities, although for a longer period
529 (approximately 12 years and 3 months in total including the 12-month Intermediate Phase
530 during which only column removal work in the First Street Tunnel would be performed).

531 Construction of the deck-level part of the private air-rights development would not be able
532 to begin until the completion of Phase 3 of the construction of the Project. This would be
533 approximately 8 years and 3 months after the start of construction.¹⁹

534 The existing bus facility and parking garage would be demolished during Phase 4 of
535 construction. In Alternative C with the West Option, intercity bus service and parking would
536 not be available at WUS for the duration of Phase 4, or approximately 4 years, until the new
537 parking facility and bus facility are completed. Under Alternative C with the East Option,
538 because the new bus facility and parking facility, on the east side of the rail terminal, could
539 be completed before the existing bus facility and parking garage are demolished, this impact
540 would not occur (see **Section 5.5.4.4, Alternative C, Construction Impacts** for further
541 discussion of potential impacts on intercity buses and parking during Phase 4).

¹⁹ Amtrak. November 2019. *Washington Union Station Terminal Infrastructure Project Constructability Report*.

Comparison to Existing Conditions

542 Relative to existing conditions, Alternative C (either option) would have major adverse
543 indirect operational impacts on zoning. This is because the height of the potential Federal air-
544 rights development would exceed what the existing PDR-3 zoning allows.

545 Other impacts of Alternative C on land use, property ownership, and plans would be the
546 same relative to existing conditions as they would be relative to the No-Action alternative.
547 These impacts would result from features of Alternative C or the Study Area that would not
548 change with the baseline.

5.9.4.5 Alternative D

Direct Operational Impacts

Zoning, Land Use, and Development

549 **Relative to the No-Action Alternative, Alternative D would have no direct operational**
550 **impact on zoning. It would have a moderate beneficial direct operational impact on land**
551 **use and development.**

552 Alternative D would have no adverse impact on zoning for the same reasons as explained for
553 Alternative A (see **Section 5.9.4.2, Alternative A, Direct Operational Impacts**). The train hall
554 would be approximately 44 feet in height above the crest of the H Street Bridge elevation,
555 consistent with both PDR-3 and USN zoning. The above-ground parking facility, just south of
556 K Street NE, would be 43 feet high, consistent with the USN designation.

557 Alternative D would have a beneficial impact on land use by enhancing multi-modal
558 transportation uses and connectivity within the Project Area and providing a more accessible,
559 up-to-date multi-modal facility capable of accommodating more passengers and more train
560 and bus service than in the No-Action Alternative. Alternative D would also benefit the
561 neighborhood by creating new connections between the areas on either side of the rail
562 terminal and be compatible with the DCOP Future Land Use Map. This beneficial impact
563 would be moderate because of the location of the above-ground parking facility to the north
564 of the H Street Bridge, just south of K Street. This would increase walking distances for some
565 WUS users and make a more spread-out, less cohesive multimodal station than in the No-
566 Action Alternative.

567 The beneficial impact on land use would translate into an improvement in WUS user
568 experience relative to the No-Action Alternative. In Alternative D, as in all Action
569 Alternatives, new access points from First, 2nd, and H Streets into the H Street Concourse
570 would make it easier to enter WUS from the surrounding neighborhoods and provide
571 connectivity and continuity from First Street to 2nd Street. Retail in the new concourses
572 could potentially become a local destination. However, the historic station building would
573 remain the heart of the station and its most visible and inviting entrance. By alleviating
574 congestion, especially during peak travel times, the additional concourse space and access

575 points would make it easier for passengers and visitors to appreciate and enjoy the building's
576 grand architecture.

577 Concourse A and the integrated east-west train hall, which would be designed to be a
578 monumental, compelling space on a scale commensurate with the nation's capital, would
579 extend the area of architectural interest past the historic station building and open up a
580 visual connection toward the track and platform area. This would create in the visitor a
581 better sense of being at a train station than would be the case in the No-Action Alternative,
582 in which tracks and platforms would remain largely out of sight as they are today. This visual
583 connection, in combination with enhanced accessibility through wider platforms, full
584 compliance with ADA-requirements, effective signage, more spacious waiting areas, and
585 greater amounts of natural light, would make boarding or alighting from trains at WUS a
586 much easier, more enjoyable experience than in the No-Action Alternative.

587 Intercity bus passengers would enjoy the benefits of a facility functionally and visually
588 integrated with the train hall and the rest of the station, including the historic station
589 building, reinforcing the experience of WUS as a single place and multimodal transportation
590 center. As in the other Action Alternatives, improved internal circulation, including additional
591 vertical circulation elements, would provide passengers with better connections to the
592 Metrorail Station, an important mode of access for WUS users, particularly tourists and
593 travelers unfamiliar with the station. The First Street, Central, and H Street Concourses, along
594 with headhouses and the main bus facility on H Street, would provide a more direct and
595 welcoming connection for DC Streetcar users.

Property Ownership, Land Acquisitions, and Displacements

596 **Relative to the No-Action Alternative, Alternative D would have a moderate adverse direct**
597 **operational impact on property ownership, land acquisitions, and displacements.**

598 Alternative D would have a major adverse impact on property ownership because it would
599 involve constructing part of the train hall and bus facility, as well as the whole of the above-
600 ground parking facility, within the private air rights above the rail terminal. This would
601 require acquiring approximately 211,100 square feet of private air-rights property
602 (approximately 4.8 acres) south and north of H Street NE.²⁰ **Figure 5-27** shows the
603 approximate footprint of the private air-rights property that would need to be acquired. It
604 would represent approximately 34 percent of the 622,800-gross-square-foot footprint of the
605 private air rights.²¹ Space would also be to accommodate daylighting and access
606 easements.²² However, the loss in total developable envelope would be less than that

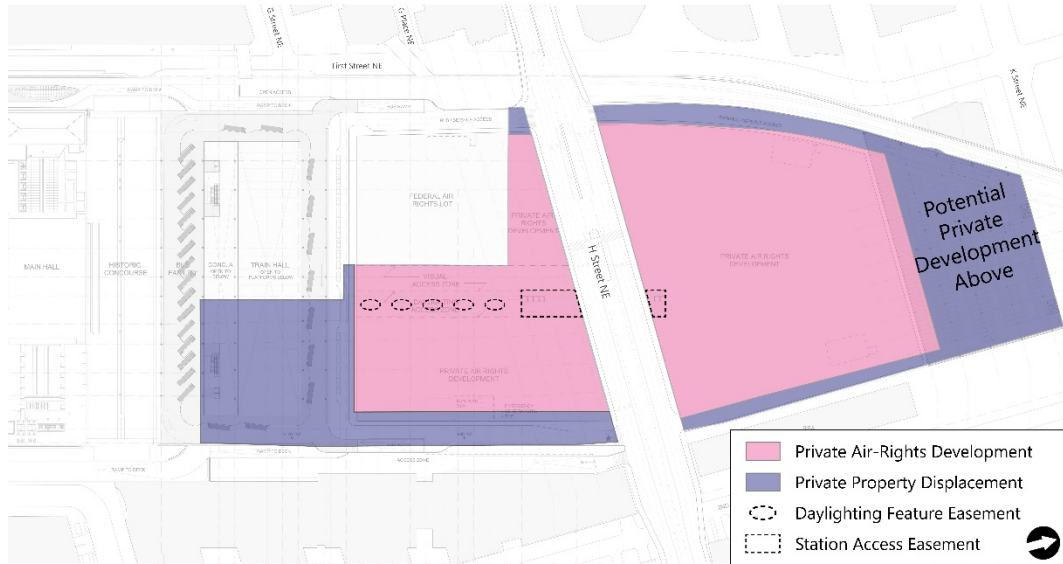
²⁰ The method of acquisition has not yet been determined and may vary according to the element being accommodated.

²¹ Total area as stated in Letter from Akridge to FRA dated May 31, 2016.

²² Daylighting features would be located in the Daylight Access Zone. The shape, number, and exact location of the daylighting feature easements shown in Figure 5-27 are for illustrative purposes only.

607 because the air rights above the parking facility (which would rise approximately 43 feet
 608 above the H Street Bridge elevation) would potentially remain available for development.

Figure 5-27. Property Displacement Impacts, Alternative D



609 The total impact would be moderate because, despite the substantial amount of private air-
 610 rights space that would need to be acquired, it would be located on the edge of the private
 611 air-rights area, minimizing the fragmentation of the developable space. Additionally, the
 612 reduction estimate takes into account areas for roadways that would be needed to serve the
 613 private development as well as WUS.

614 As explained for Alternative A in **Section 5.9.4.2, Alternative A, Direct Operational Impacts,**
 615 Alternative D, like all Action Alternatives, would require acquiring the H Street Tunnel to
 616 construct the new H Street Concourse.²³

617 Relative to the No-Action Alternative, Alternative D would reduce the amount of property for
 618 which the private developer would need agreements with the Federal government and
 619 Amtrak. South of H Street NE, the reduction would be small, as most of the private air rights
 620 within the 80-foot datum area (see **Section 5.9.4.1, No Action Alternative, Direct Operational**
 621 **Impacts, Property Ownership, Land Acquisition, and Displacements**) would remain available
 622 for private development. North of H Street NE, a property agreement with Amtrak would
 623 potentially be needed only for the private air-rights area not acquired for construction of the
 624 new above-ground parking facility.

²³ The exact process through which the tunnel would be acquired has not yet been determined.

Consistency with Local and Regional Plans

625 **Relative to the No-Action Alternative, Alternative D would have minor to major beneficial**
626 **direct operational impacts on most relevant local and regional plans.**

627 The impacts of Alternative D on local and regional plan would be the same as those of
628 Alternative A (**Section 5.9.4.2, Alternative A, Direct Operational Impacts** and **Table 5-116**).

Indirect Operational Impacts

Potential Federal Air-Rights Development

629 **Relative to the No-Action Alternative, the development of the Federal air rights in**
630 **Alternative D would have a major beneficial indirect operational impact on land use. It**
631 **would have no adverse indirect operational impacts on zoning, or development; property**
632 **ownership, land acquisitions, and displacement; or local and regional plans.**

633 Alternative D would demolish the existing parking garage. The train hall and new bus facility
634 would occupy part of the demolished garage's footprint. The remainder would be available
635 for potential commercial development up to the height permitted under the future USN
636 zoning designation. As explained for Alternative A (**Section 5.9.4.2, Alternative A, Indirect**
637 **Operational Impacts**), the specific mechanism for this has not yet been determined, but it
638 could be achieved through a lease of the Federal air-rights by FRA to USRC, who in turn
639 would sublease the development rights.

640 Alternative D would have no indirect adverse impacts on zoning. As explained in **Section**
641 **5.9.4.2, Alternative A, Direct Operational Impacts**, for Alternative A, Federal land is not
642 subject to local zoning and NCPC is the zoning authority for Federal land in the District. It can
643 be anticipated that the potential Federal air-right development would be planned consistent
644 with the USN zoning that applies to the adjacent private air rights. Based on USN zoning, a
645 maximum envelope of approximately 688,050 GSF would be available for development. If
646 and as planning and design for this development occurs, FAR requirements would be
647 reviewed to ensure, as much as practicable, full consistency with USN zoning.

648 As explained in **Section 3.4.5.1, Summary Description**, in Alternative D, it is assumed for the
649 purposes of the DEIS that this space would be developed as office space. This would be a
650 beneficial impact on land use in the Project Area. It would be consistent with DCOP's Future
651 Land Use Map, which shows mixed-use development with residential, retail, and office space
652 at this location. It would also contribute to supporting WUS operations by making use of
653 potentially developable space that otherwise would remain unproductive. The beneficial
654 impact would be major because the development would fill in what would otherwise remain
655 a major gap in land coverage in the Project Area.

Regional Study Area

656 **Relative to the No-Action Alternative, Alternative D would have no adverse indirect**
657 **operational impacts on zoning, land use, or development; property ownership, land**
658 **acquisitions, and displacement; or local and regional plans.**

659 The indirect impacts of Alternative D within the Regional Study Area would be the same as
660 those of Alternative A (**Section 5.9.4.2, *Alternative A, Indirect Operational Impacts***).

Construction Impacts

661 **Construction of Alternative D would have moderate adverse impacts on land use and**
662 **development. It would have no impacts on zoning; property ownership, land acquisitions,**
663 **and displacement; or local and regional plans.**

664 Construction in Alternative D would have similar impacts to those in Alternative C with the
665 West Option (**Section 5.9.4.4, *Alternative C, Construction Impacts***).

Comparison to Existing Conditions

666 Relative to existing conditions, Alternative D would have major adverse indirect operational
667 impacts on zoning. This is because the height of the potential Federal air-rights development
668 would exceed what the existing PDR-3 zoning allows.

669 Other impacts of Alternative D on land use, property ownership, and plans would be the
670 same relative to existing conditions as they would be relative to the No-Action alternative.
671 These impacts would result from features of Alternative D or the Study Area that would not
672 change with the baseline.

5.9.4.6 Alternative E

Direct Operational Impacts

Zoning, Land Use, and Development

673 **Relative to the No-Action Alternative, Alternative E would have no direct operational**
674 **impact on zoning. It would have a major beneficial direct operational impact on land use**
675 **and development.**

676 Alternative E would have no adverse impact on zoning for the same reasons as explained for
677 Alternative A (see **Section 5.9.4.2, *Alternative A, Direct Operational Impacts***). The train hall
678 would be approximately 44 feet in height above the crest of the H Street Bridge elevation,
679 consistent with both PDR-3 and USN zoning.

680 Like Alternative B and for similar reasons, Alternative E would have a major beneficial impact
681 on land use within the Project Area (**Section 5.9.4.3, *Alternative B, Direct Operational***
682 ***Impacts***).

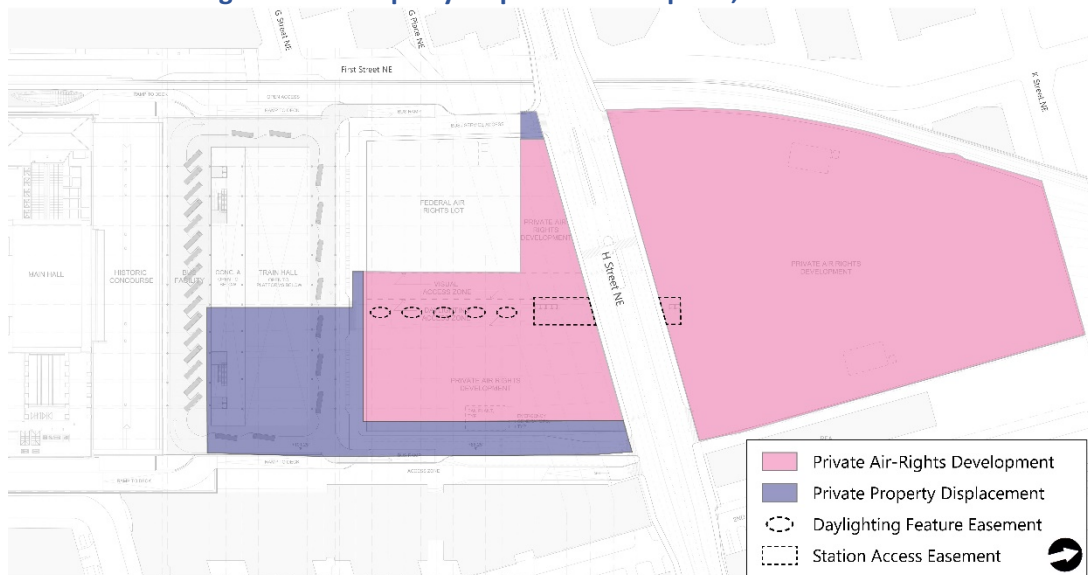
683 Improved land use in Alternative E would be accompanied by the same beneficial impacts on
 684 WUS user experience as in Alternative D. These impacts are described in **Section 5.9.4.5,**
 685 *Alternative D, Direct Operational Impacts.*

Property Ownership, Land Acquisitions, and Displacements

686 **Relative to the No-Action Alternative, Alternative E would have a moderate adverse direct**
 687 **operational impact on property ownership, land acquisitions, and displacements.**

688 Alternative E would have a moderate adverse impact on property ownership because it
 689 would involve constructing part of the train hall and bus facility within the private air rights
 690 above the rail terminal. This would require acquiring approximately 85,000 square feet of
 691 private air-rights property (approximately 1.9 acres) south of H Street NE.²⁴ **Figure 5-28**
 692 shows the approximate footprint of the private air-rights property that would need to be
 693 acquired. It would represent approximately 14 percent of the 622,800-gross-square-foot
 694 footprint of the private air rights.²⁵ Space would also be needed to accommodate daylighting
 695 and access easements.²⁶

Figure 5-28. Property Displacement Impacts, Alternative E



²⁴ The method of acquisition has not yet been determined and may vary according to the element being accommodated.

²⁵ Total area as stated in Letter from Akridge to FRA dated May 31, 2016.

²⁶ Daylighting features would be located in the Daylight Access Zone. The shape, number, and exact location of the daylighting feature easements shown in Figure 5-28 are for illustrative purposes only.

696 The adverse impact would be moderate for the same reasons as explained for Alternative A
697 (**Section 5.9.4.2, Alternative A, Direct Operational Impacts**).

698 As explained for Alternative A in **Section 5.9.4.2, Alternative A, Direct Operational Impacts**,
699 Alternative E, like all Action Alternatives, would require acquiring the H Street Tunnel to
700 construct the new H Street Concourse.²⁷

701 Relative to the No-Action Alternative, Alternative E would reduce the amount of property for
702 which the private developer would need an agreement with the Federal government. The
703 reduction would be moderate, as most of the private air rights within the 80-foot datum area
704 (see **Section 5.9.4.1, No Action Alternative, Direct Operational Impacts, Property Ownership,**
705 **Land Acquisition, and Displacements**) would remain available for private development. A
706 property agreement with Amtrak would potentially be needed north of H Street, as in the
707 No-Action Alternative.

Consistency with Local and Regional Plans

708 **Relative to the No-Action Alternative, Alternative E would have minor to major beneficial**
709 **direct operational impacts on most relevant local and regional plans.**

710 The impacts of Alternative E on local and regional plan would be the same as those of
711 Alternative A (**Section 5.9.4.2, Alternative A, Direct Operational Impacts** and **Table 5-116**).

Indirect Operational Impacts

Potential Federal Air-Rights Development

712 **Relative to the No-Action Alternative, the development of the Federal air rights in**
713 **Alternative E would have a major beneficial indirect operational impact on land use. It**
714 **would have no adverse indirect operational impacts on zoning, or development; property**
715 **ownership, land acquisitions, and displacement; or local and regional plans.**

716 In Alternative E, the same envelope of Federal air rights would be available for potential
717 development as in Alternative D. Impacts would be as described for Alternative D (**Section**
718 **5.9.4.5, Alternative D, Indirect Operational Impacts**).

Regional Study Area

719 **Relative to the No-Action Alternative, Alternative E would have no adverse indirect**
720 **operational impacts on zoning, land use, or development; property ownership, land**
721 **acquisitions, and displacement; or local and regional plans.**

722 The indirect impacts of Alternative E within the Regional Study Area would be the same as
723 those of Alternative A (**Section 5.9.4.2, Alternative A, Indirect Operational Impacts**).

²⁷ The exact process through which the tunnel would be acquired has not yet been determined.

Construction Impacts

724 **Construction of Alternative E would have moderate adverse impacts on land use and**
725 **development. It would have no impacts on zoning; property ownership, land acquisitions,**
726 **and displacement; or local and regional plans.**

727 Construction of Alternative E would have the same impacts as construction of Alternative B
728 (**Section 5.9.4.3, Alternative B, Construction Impacts**).

Comparison to Existing Conditions

729 Relative to existing conditions, Alternative E would have major adverse indirect operational
730 impacts on zoning. This is because the height of the potential Federal air-rights development
731 would exceed what the existing PDR-3 zoning allows.

732 Other impacts of Alternative E on land use, property ownership, and plans would be the
733 same relative to existing conditions as they would be relative to the No-Action Alternative.
734 These impacts would result from features of Alternative E or the Study Area that would not
735 change with the baseline.

5.9.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

Zoning, Land Use, and Development

736 **Relative to the No-Action Alternative, Alternative A-C would have no direct operational**
737 **impact on zoning. It would have a major beneficial direct operational impact on land use**
738 **and development.**

739 The impacts of Alternative A-C on zoning, land use, and development would be the same as
740 those of Alternative A, described in **Section 5.9.4.2, Alternative A, Direct Operational**
741 **Impacts**.

742 The beneficial impact on land use would translate into an improvement in WUS user
743 experience relative to the No-Action Alternative. As in all Action Alternatives, new access
744 points from First, 2nd, and H Streets into the H Street Concourse would make it easier to
745 enter WUS from the surrounding neighborhoods. They would also provide connectivity and
746 continuity from First Street to 2nd Street. Retail in the new concourses could potentially
747 become a destination for local residents as well as tourists. The historic station building
748 would remain the heart of the station and its most visible and inviting entrance, however. By
749 alleviating congestion, especially during peak travel times, the additional concourse space
750 and access points would make it easier for passengers and visitors to appreciate and enjoy
751 the grand architecture of the historic station.

752 Concourse A and the integrated east-west train hall, which would be designed to be a
753 monumental, compelling space on a scale commensurate with the nation's capital, would
754 extend the area of architectural interest past the historic station building and open up a

755 visual connection toward the track and platform area. This would create in the visitor a
756 better sense of being at a train station than would be the case in the No-Action Alternative,
757 in which tracks and platforms would remain largely out of sight as they are today. This visual
758 connection, in combination with enhanced accessibility through wider platforms, full
759 compliance with ADA-requirements, effective signage, more spacious waiting areas, and
760 greater amounts of natural light, would make boarding or alighting from trains at WUS a
761 much easier, more enjoyable experience than in the No-Action Alternative.

762 Similarly, intercity bus passengers would enjoy the benefits of a more modern facility with
763 better amenities and greater functional and visual integration with the rest of the station,
764 including the historic station building, via Concourse A. In Alternative A-C, as in the other
765 Action Alternatives, improved internal circulation, including additional vertical circulation
766 elements, would provide passengers with better connections to the Metrorail Station, an
767 important mode of access for WUS users, particularly tourists and travelers unfamiliar with
768 the station. The First Street, Central, and H Street Concourses, along with headhouses and
769 the main bus facility on H Street, would provide a more direct and welcoming connection for
770 DC Streetcar users.

Property Ownership, Land Acquisitions, and Displacements

771 **Relative to the No-Action Alternative, Alternative A-C would have a moderate adverse**
772 **direct operational impact on property ownership, land acquisitions, and displacements.**

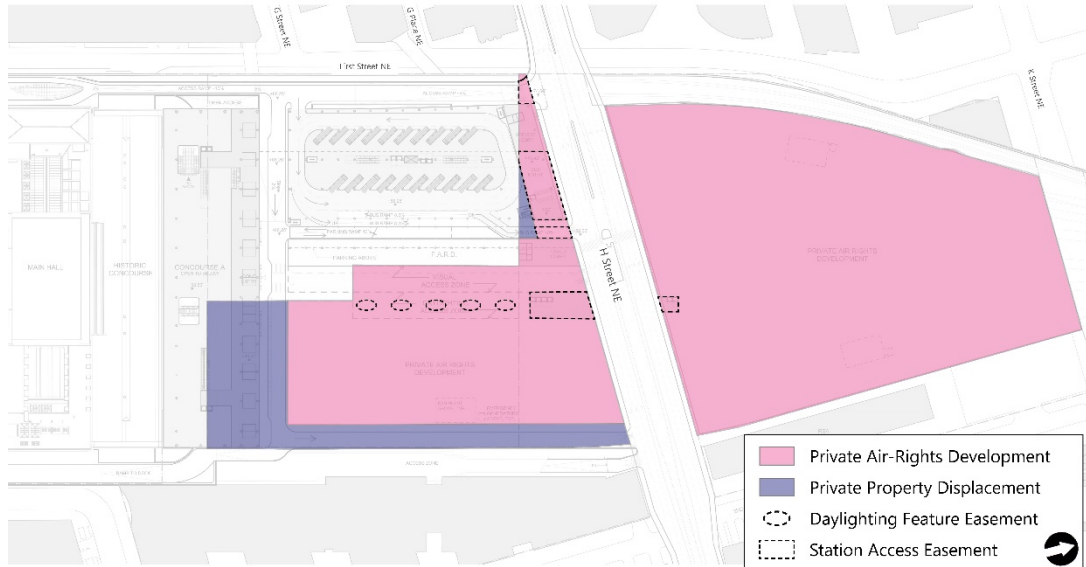
773 Alternative A-C would have an adverse impact on property ownership because it would
774 involve constructing a portion of the new train hall and east-west access road within the
775 private air rights above the rail terminal. This would require acquiring approximately 49,500
776 square feet of private air-rights property (approximately 1.1 acres) south of H Street NE.²⁸
777 **Figure 5-29** shows the approximate footprint of the private air-rights property that would
778 need to be acquired. It would represent approximately 7 percent of the 622,800 gross square
779 foot footprint of the private air rights.²⁹ Additional space would also be needed to
780 accommodate daylighting and access easements, including an entrance to the bus facility.³⁰

²⁸ The method of acquisition has not yet been determined and may vary according to the element being accommodated.

²⁹ Total area as stated in Letter from Akridge to FRA dated May 31, 2016.

³⁰ Daylighting features would be located in the Daylight Access Zone. The shape, number, and exact location of the daylighting feature easements shown in Figure 5-29 are for illustrative purposes only.

Figure 5-29. Approximate Footprint of Property Displacement Impact, Alternative A-C



781 The adverse impact would be moderate for the same reasons as explained for Alternative A
 782 (see **Section 5.9.4.2, Alternative A, Direct Operational Impacts**).

783 As explained for Alternative A in **Section 5.9.4.2, Alternative A, Direct Operational Impacts**,
 784 Alternative A-C, like all Action Alternatives, would require acquiring the H Street Tunnel to
 785 construct the new H Street Concourse.³¹

786 Relative to the No-Action Alternative, Alternative A-C would reduce the amount of Federal
 787 property for which the private air-rights developer would need an agreement with the
 788 Federal government (see **Section 5.9.4.1, No Action Alternative, Direct Operational Impacts,**
 789 *Property Ownership, Land Acquisition, and Displacements*). The reduction would be
 790 substantial, as the entire private deck south of H Street would be within the 70-foot datum
 791 area. A property agreement with Amtrak would be potentially needed only for the private
 792 air-rights area north of H Street NE, as in the No-Action Alternative.

Consistency with Local and Regional Plans

793 **Relative to the No-Action Alternative, Alternative A-C would have minor to major**
 794 **beneficial direct operational impacts on most relevant local and regional plans.**

795 The impacts of Alternative A-C on local and regional plan would be the same as those of
 796 Alternative A (**Section 5.9.4.2, Alternative A, Direct Operational Impacts** and **Table 5-116**).

³¹ The exact process through which the tunnel would be acquired has not yet been determined.

Indirect Operational Impacts

Potential Federal Air-Rights Development

797 **Relative to the No-Action Alternative, the development of the Federal air rights in**
798 **Alternative A-C would have a major beneficial indirect operational impact on land use. It**
799 **would have no adverse indirect operational impacts on zoning or development; property**
800 **ownership, land acquisitions, and displacement; or local and regional plans.**

801 Alternative A-C would construct a new bus facility and parking facility (multimodal surface
802 transportation center) in the Federally owned air rights to the southwest of H Street NE. The
803 new facility would rise approximately 104 feet above the crest of the H Street Bridge. Within
804 part of this area, approximately 300 feet from the historic station building, the USN zoning
805 designation, which it is assumed would apply by 2040, allows for heights of up to 130 feet
806 above the H Street Bridge. Therefore, air rights would remain available above the facility for
807 potential commercial development that would bring the facility to the maximum permitted
808 height. Space within the Federal air rights would also be available along the eastern side of
809 the bus facility and parking facility. As explained for Alternative A (**Section 5.9.4.2, *Alternative***
810 ***A, Indirect Operational Impacts***), the specific mechanism for this has not yet been
811 determined, but it could be achieved through a lease of the Federal air-rights by FRA to
812 USRC, who in turn would sublease the development rights.

813 Alternative A-C would have no indirect adverse impacts on zoning. As explained in **Section**
814 **5.9.4.2, *Alternative A, Direct Operational Impacts***, for Alternative A, Federal land is not
815 subject to local zoning and NCPC is the zoning authority for Federal land in the District. It can
816 be anticipated that the potential Federal air-right development would be planned consistent
817 with the USN zoning that applies to the adjacent private air rights. Based on USN zoning, a
818 maximum envelope of approximately 380,000 GSF would be available for development. If
819 and as planning and design for this development occurs, FAR requirements would be
820 reviewed to ensure, as much as practicable, full consistency with USN zoning.

821 As explained in **Section 3.4.7.1, *Summary Description***, it is assumed for the purposes of the
822 DEIS that in Alternative A-C, this space would be developed as office space. This would be a
823 major beneficial impact on land use in the Project Area, as it would make optimal use of
824 available developable space. It would be consistent with the District's Future Land Use Map,
825 which shows mixed-use development with residential, retail, and office space at this location.

Regional Study Area

826 **Relative to the No-Action Alternative, Alternative A-C would have no adverse indirect**
827 **operational impacts on zoning, land use, or development; property ownership, land**
828 **acquisitions, and displacement; or local and regional plans.**

829 The indirect impacts of Alternative A-C in the Regional Study Area would be the same as
830 those of Alternative A (**Section 5.9.4.2, *Alternative A, Indirect Operational Impacts***).

Construction Impacts

831 **Construction of Alternative A-C would have moderate adverse impacts on land use and**
832 **development. It would have no impacts on zoning; property ownership, land acquisitions,**
833 **and displacement; or local and regional plans.**

834 Construction of Alternative A-C would have the same impacts as construction of Alternative A
835 (Section 5.9.4.2, *Alternative A, Construction Impacts*).

Comparison to Existing Conditions

836 Relative to existing conditions, Alternative A-C would have major adverse indirect operational
837 impacts on zoning. This is because the height of the potential Federal air-rights development
838 would exceed what the existing PDR-3 zoning allows.

839 Other impacts of Alternative A-C on land use, property ownership, and plans would be the
840 same relative to existing conditions as they would be relative to the No-Action Alternative.
841 These impacts would result from features of Alternative E or the Study Area that would not
842 change with the baseline.

5.9.5 Comparison of Alternatives

843 **Table 5-117** compares the alternatives, including the No-Action Alternative, to each other. All
844 alternatives would be consistent with anticipated future zoning in the Project Area and would
845 result in more varied and intensive land use than currently. The No-Action Alternative would
846 differ from the Action Alternatives in the following respects:

- 847 ■ It would not enhance multi-modal transportation uses in the Project Area or improve
848 connectivity with surrounding neighborhoods. As such, unlike the Action
849 Alternatives, it would not support most relevant local and regional plans.
- 850 ■ It would allow for the full development of the private air rights above the bus facility.
851 The Action Alternatives would require acquiring part of these air rights to
852 accommodate some of the Project elements.
- 853 ■ In areas where the lower limit of the private air rights is at 80 feet, construction of
854 the private air-rights deck would encroach into Federal and Amtrak property and
855 potentially require an agreement with the Federal government and Amtrak.
- 856 ■ It would not provide the opportunity to develop the Federally owned air rights above
857 the rail terminal. Part or all of the Federal air-rights could potentially be developed in
858 all Action Alternatives.

859 Among themselves, the Action Alternatives would differ in several respects:

- 860 ■ **Land Use:** All Action Alternatives would enhance multimodal land uses in the Project
861 Area. However, they would vary regarding how the various Project elements are
862 located in relation to each other. Alternatives A, A-C, B, and E would place all Project
863 elements south of the H Street Bridge or below-ground, making an efficient use of a

864 very constrained area. The other Action Alternatives would have above-ground
865 elements both north and south of the H Street Bridge, resulting in a more spread-out
866 layout and greater distances among elements. Alternative D would be the Action
867 Alternative with the greatest distance between the above-ground parking facility and
868 the front of WUS. Alternative C, East Option would be the alternative with the
869 greatest distance between the bus facility and the front of WUS, followed by
870 Alternative C with the West Option. As a result, while all Action Alternatives would
871 result in a marked improvement in WUS user experience, this improvement would be
872 somewhat less in Alternatives C and D.

873 ■ **Private Property:** All Action Alternatives would require acquiring some of the
874 privately owned air rights above WUS. Amount and spatial distribution would vary
875 depending on the alternative. Alternative A-C would have the smallest impact, with
876 approximately 1.1 acres, all south of the H Street Bridge. Alternative C with the West
877 Option and Alternative D would have the greatest impact, with a total of
878 approximately 4.8 acres on both sides of the bridge.

879 ■ **Federal and Amtrak Property:** In all Action Alternatives, the potential amount of
880 property for which the private air-rights developer would need an agreement with
881 the Federal government would be reduced relative to the No-Action Alternative due
882 to the acquisition for the Project of some of the private air rights within the 80-foot
883 datum area. Alternatives A and B would result in the greatest reduction and
884 Alternatives C and A-C in the smallest one. Only Alternatives C and D would also
885 reduce the potential need for an agreement with Amtrak north of H Street NE.

886 ■ **Federal Air Rights:** All Action Alternatives would allow for the potential development
887 of the Federally owned air rights that would not be needed for Project elements. The
888 size of the maximum developable envelope would vary with the alternative, with
889 Alternative A offering the smallest envelope and Alternative C (either option) the
890 largest one.

Table 5-117. Comparison of Alternatives, Land Use, Planning, and Property

| Impact Category | Type of Impact | No-Action Alternative | Alternative A | Alternative B | Alternative C – East Option | Alternative C – West Option | Alternative D | Alternative E | Alternative A-C (Preferred) | |
|--------------------------|----------------------|--|---|---|---|--|--|--|---|--|
| Zoning | Direct Operational | No Impacts | | | | | | | | |
| | Indirect Operational | No Impacts | | | | | | | | |
| | Construction | No Impacts | | | | | | | | |
| Land Use and Development | Direct Operational | Major Beneficial Impact due to private air rights development. | Major Beneficial Impact due to enhanced multimodal uses and increased connectivity. All WUS uses concentrated south of H Street Bridge. | Major Beneficial Impact due to enhanced multimodal uses and increased connectivity. All WUS uses south of the H Street Bridge or below-ground. | Moderate Beneficial Impact due to enhanced multimodal uses and increased connectivity. Above-ground parking and bus facility to the northeast of H Street Bridge. | Moderate Beneficial Impact due to enhanced multimodal uses and increased connectivity. Above-ground parking and bus facility to the northwest of H Street Bridge. | Moderate Beneficial Impact due to enhanced multimodal uses and increased connectivity. Above-ground parking south of K Street NE. | Major Beneficial Impact due to enhanced multimodal uses and increased connectivity. All WUS uses south of the H Street Bridge or below-ground. | Major beneficial impact due to enhanced multimodal uses and increased connectivity. All WUS uses concentrated south of H Street Bridge. | |
| | Indirect Operational | No impact | Minor beneficial impact from potential Federal air-rights development. | Major beneficial impact from potential Federal air-rights development. | | | | | | |
| | Construction | Minor adverse impact | Moderate adverse impact. Construction of deck-level part of the private air-rights development could not start until approximately 8 years and 4 months from the start of construction. Interim bus and parking facility in private air rights during Phase 4. | Moderate adverse impact. Construction of deck-level part of the private air-rights development could not start until approximately 9 years and 5 months from the start of construction. Interim bus and parking facility in private air rights during Phase 4. | Moderate adverse impact. Construction of deck-level part of the private air-right development could not start until approximately 8 years and 3 months from the start of construction. | Moderate adverse impact. Construction of deck-level part of the private air-right development could not start until approximately 8 years and 3 months from the start of construction. Interim bus and parking facility in private air rights during Phase 4. | Moderate adverse impact. Construction of deck-level part of the private air-right development could not start until 8 years and 3 months from the start of construction. Interim bus and parking facility in private air rights during Phase 4. | Moderate adverse impact. Construction of deck-level part of the private air-right development could not start until approximately 9 years and 5 months from the start of construction. Interim bus and parking facility in private air rights during Phase 4. | Moderate adverse impact. Construction of deck-level part of the private air-rights development could not start until approximately 8 years and 4 months from the start of construction. Interim bus and parking facility in private air rights during Phase 4. | |
| Property | Direct Operational | No impact. Potential encroachment of the private air-rights development deck into Federal and Amtrak property | Moderate adverse impact. Acquisition of approximately 3.1 acres all south of H Street Bridge. | Moderate adverse impact. Acquisition of approximately 2.8 acres all south of H Street Bridge | Major adverse impact. Acquisition of approximately 4.6 acres on both sides of H Street Bridge. | Major adverse impact. Acquisition of approximately 4.8 acres on both sides of H Street Bridge. | Moderate adverse impact. Acquisition of approximately 4.8 acres on both sides of H Street Bridge but limited fragmentation. | Moderate adverse impact. Acquisition of approximately 1.9 acres all south of H Street Bridge. | Moderate adverse impact. Acquisition of approximately 1.1 acres all south of H Street Bridge. | |
| | Indirect Operational | No impacts | | | | | | | | |

| Impact Category | Type of Impact | No-Action Alternative | Alternative A | Alternative B | Alternative C – East Option | Alternative C – West Option | Alternative D | Alternative E | Alternative A-C (Preferred) |
|--------------------------|----------------------|---|---|---------------|-----------------------------|-----------------------------|---------------|---------------|-----------------------------|
| | Construction | No impact | | | | | | | |
| Local and Regional Plans | Direct Operational | Minor adverse impact. Generally inconsistent due to no improvement to connectivity. | Major to minor beneficial impacts depending on the plan. Consistent with the relevant goals and objectives of most plans. | | | | | | |
| | Indirect Operational | No impact | | | | | | | |
| | Construction | No impact | | | | | | | |

5.9.6 Avoidance, Minimization and Mitigation Evaluation

891 During conceptual design of the Action Alternatives, minimization and avoidance measures
892 to land use impacts were considered to the greatest extent possible. The Action Alternatives
893 were designed to be consistent with the zoning, land use, and regional and local plans. All the
894 Action Alternatives would have an adverse impact on private property due to the
895 displacement of approximately 1.1 to 4.8 acres of private air rights. Acquisition of the needed
896 property would be conducted consistent with the applicable provisions of the Uniform
897 Relocation Assistance and Real Property Acquisition Act of 1970, as amended, which would
898 ensure the owner of the air rights received just compensation for the property.³²

899 All Action Alternatives would also potentially result in construction delays for the
900 development of the adjacent private air rights. Such delays would be minimized as much as
901 practicable through coordination with the private air-rights developer by the Project
902 Proponents during construction planning.

5.9.7 Permits and Regulatory Compliance

903 The following regulations and permits may apply to the Project:

904 ■ **District Department of Consumer and Regulatory Affairs (DCRA):** DCRA authorizes
905 the building of a project according to a specific scope of work, including approved
906 plans. Any modification of permit scope or approved plans must also be approved.
907 Applicable regulations include:

- 908 • 12 District of Columbia Municipal Regulations (DCMR), Construction Codes.³³
- 909 • Title 6 Housing and Building Restrictions and Regulations.³⁴
- 910 • Title 42 Real Property.³⁵

911 The following permit may be required:

- 912 • Building Permit.³⁶

³² 49 CFR 24, *Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-Assisted Programs*.

³³ District of Columbia Construction Codes, 12 DCMR. Accessed from <https://dcra.dc.gov/page/dc-construction-codes>. Accessed on March 29, 2020.

³⁴ District of Columbia Title 6 Housing and Building Restrictions and Regulations. Accessed from <https://code.dccouncil.us/dc/council/code/titles/6/>. Accessed on March 29, 2020.

³⁵ District of Columbia Title 42 Real Property. Accessed from <https://code.dccouncil.us/dc/council/code/titles/42/>. Accessed on March 29, 2020.

³⁶ District of Columbia Building Permit Application. Accessed from <https://mybusiness.dc.gov/#/>. Accessed on March 29, 2020.

913 ■ **DDOT:** DDOT manages and maintains the publicly owned transportation
914 infrastructure in the District. It is the lead agency with authority over the planning,
915 design, construction, and maintenance of alleys, bridges, sidewalks, streets, street
916 lights, and traffic signals in DC. The *Right-of-Way Policies and Procedures Manual* to
917 establish a fair and efficient manner to complete the acquisitions or transfers of
918 property, and to issue permits to allow for uses of the right-of-way that is compatible
919 with overall operations.³⁷

920 The following permits may be required (see also **Section 5.5.7, *Permits and Regulatory***
921 ***Compliance***):

- 922 • Public Space Permit- Construction and Occupancy.³⁸
- 923 • Fences and Retaining Walls Permit.³⁹
- 924 • Sidewalk, Curb, and Gutter Permit.⁴⁰

³⁷ District Department of Transportation. 2011. *Right of Way Policies and Procedures Manual*. Accessed from <https://ddot.dc.gov/page/right-way-policies-and-procedures-manual>. Accessed on March 29, 2020.

³⁸ District Department of Transportation Public Space Permit. Accessed from <https://ddot.dc.gov/node/496092>. Accessed on March 29, 2020.

³⁹ District Department of Transportation, Fences and Retaining Walls. Accessed from <https://ddot.dc.gov/node/482312>. Accessed on March 29, 2020.

⁴⁰ District Department of Transportation, Sidewalk, Curb, Gutter. Accessed from <https://ddot.dc.gov/node/482482>. Accessed on March 29, 2020.

5.10 Noise and Vibration

1 This section describes and characterizes the potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on noise and vibration levels. If applicable,
3 this section also recommends measures to avoid, minimize, or mitigate potential adverse
4 impacts and it identifies potential permitting and regulatory compliance requirements.

5.10.1 Regulatory Context and Guidance

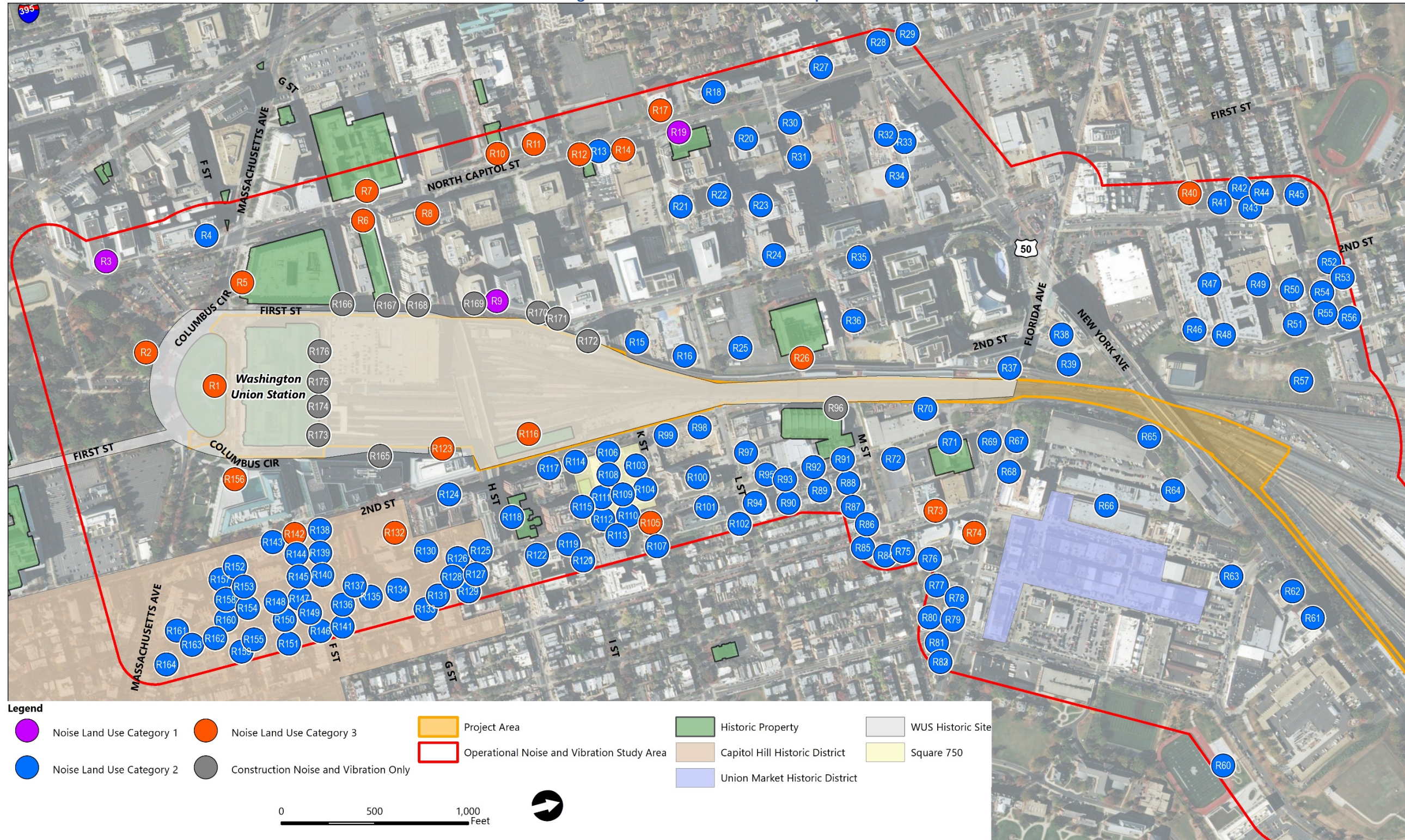
5 Relevant Federal policies, regulations and guidance that pertain to noise and vibration are
6 listed in **Section 4.10.1, Regulatory Context and Guidance**.

5.10.2 Study Area

7 As defined in **Section 4.10.2, Study Area**, the operational noise and vibration study area
8 encompasses the Project Area and nearby noise and vibration-sensitive locations (**Figure 4-**
9 **11**). It includes noise and vibration-sensitive receptors that are within 600 feet of the Project
10 Area or in the traffic study area. The construction noise and vibration study area extends out
11 500 feet from the Project Area (**Figure 4-12**). It is approximately bounded by D Street NE to
12 the south; 3rd Street NE to the east south of M Street; 6th Street NE to the east north of M
13 Street; Brentwood Parkway and New York Avenue to the northeast; R Street NE, Harry
14 Thomas Way NE, and Eckington Place NE to the northwest; and North Capitol Street to the
15 west.

16 Noise and vibration impacts were evaluated at the following receptors, which are shown in
17 **Figure 5-30** and briefly described below.

Figure 5-30. Noise and Vibration Receptors



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- 55
- **West of Union Station, South of K Street NE (Receptors R1 – R11):** Receptors in this area are primarily Federal Transit Administration (FTA) Category 3 institutional land uses.¹ These include Gonzaga College High School (R11), University of the District of Columbia (UDC) Community College (R8), and St. Aloysius Church (R10). The Smithsonian Postal Museum (R5); Lower Senate Park (R2); and Union Station Plaza (R1) are historic properties. The Cable News Network (CNN) (R9), and National Broadcasting Company (NBC) and Fox News (R3) television studios – which are FTA Category 1 land uses – are also located in this area. Since the historic station building and existing parking garage shield receptors in this area from train operations, the primary source of noise is traffic on major nearby roadways such as Massachusetts Avenue and North Capitol Street.
 - **North of K Street NE and South of New York Avenue NE (Receptors R12 – R39):** Receptors in this area are primarily FTA Category 2 land uses, including high-density residential apartment buildings and hotels along First Street NE and North Capitol Street. There are also several planned residential or mixed-use developments in this area. Institutional FTA Category 3 receptors include places of worship such as St. Phillips Baptist Church (R12) and Mt. Airy Baptist Church (R17) as well as U.S. Equal Employment Opportunity Commission (EEOC) historic building (R26). The National Public Radio (NPR) broadcasting studio (R19) is an FTA Category 1 land use. Primary sources of noise in this area are traffic on local roadways such as North Capitol Street and New York Avenue, and train operations for receptors close to the tracks.
 - **North of New York Avenue NE (Receptors R40 – R57):** Receptors in this area consist primarily of FTA Category 2 land uses, including single or multi-family residential buildings; high-density residential apartment buildings; and FTA Category 3 institutional land uses such as the Friendship Public Charter School (R40). Several high-density residential buildings are planned for development in this area. The primary sources of noise are traffic on New York Avenue and WMATA Red Line train operations.
 - **New York Avenue Area (Receptors R58 – R62):** Receptors in this area include primarily FTA Category 2 land uses such as existing and proposed high-density apartment buildings; houses; and hotels. Institutional FTA Category 3 land uses include the Gallaudet University campus (R60). Because the tracks are setback from receptors on New York Avenue, the primary source of noise in this area is traffic on New York Avenue.
 - **Union Market Area (Receptors R63 – R68):** The historic Union Market area includes FTA Category 2 land uses such as high-density residential buildings; several residential and mixed-use developments under construction; and several planned developments. The primary sources of noise in this area are delivery trucks traveling

¹ See Section 4.10.3, *Methodology*, Table 4-10 for a definition of FTA categories.

56 to the area for delivery loading and unloading as well as train operations and traffic
57 on Florida Avenue.

- 58 ■ **South of Florida Avenue NE and North of K Street NE (Receptors R69 – R102):**
59 Receptors in this area are primarily FTA Category 2 land uses, including single or
60 multi-family residential buildings interspersed with a few high-density apartment
61 buildings. There are several high-density apartment buildings planned for
62 development. Institutional land uses include the Two Rivers Public Charter School
63 (R72-R73). The primary sources of noise in this area are traffic on major roadways
64 such as Florida Avenue and train operations.
- 65 ■ **East of Union Station, South of K Street NE (Receptors R103 –R164):** Receptors in
66 this area include FTA Category 2 land uses such as historic residential rowhouses and
67 townhomes along 2nd Street NE and 3rd Street NE between K Street NE and E Street
68 NE as well as high-density residential apartments and condominium buildings.
69 Institutional FTA Category 3 land uses include the Center City Public Charter School
70 within the historic REA Building (R116); the Capitol Hill Montessori School (R132);
71 Community Holiness Church (R105); National Community Church (R142); the historic
72 Thurgood Marshall Building (R156); and the Kaiser Permanente Medical Center
73 (R123). The REA Building/Center City Public Charter School and the Kaiser
74 Permanente Medical Center are particularly susceptible to noise and vibration
75 impacts because they are adjacent to the rail terminal.

5.10.3 Methodology

76 This section summarizes the methodology for evaluating the probable consequences of the
77 alternatives on noise and vibration. **Appendix C3, Washington Union Station Expansion**
78 *Project Environmental Consequences Technical Report, Section 10.4, Methodology* provides a
79 description of the analysis methodology. A summary is below.

5.10.3.1 Operational Impacts

80 The Project may have operational noise and vibration impacts because of modifications to
81 the transportation infrastructure; increases in vehicle traffic volumes; and increases in train
82 operations. Substantial increases in noise can affect people by causing annoyance at sensitive
83 locations (for example residences, medical facilities, places of worship, or parks). Increases in
84 vibration levels can affect people by causing annoyance inside vibration-sensitive buildings.
85 The metrics (ways of measuring) used to quantify noise and vibration levels are explained in
86 **Section 4.10.3, Methodology**.

Operational Noise Prediction Methodology

87 Operational noise impacts from mobile sources (trains, streetcars, and street traffic) were
88 modeled quantitatively using standard computer models and methods used by FTA and
89 FHWA. See **Appendix C3, Washington Union Station Expansion Project, Environmental**

90 *Consequences Technical Report Section 10.4.1.1, Operational Noise Prediction Methodology*
 91 for more information on the models and model inputs used.

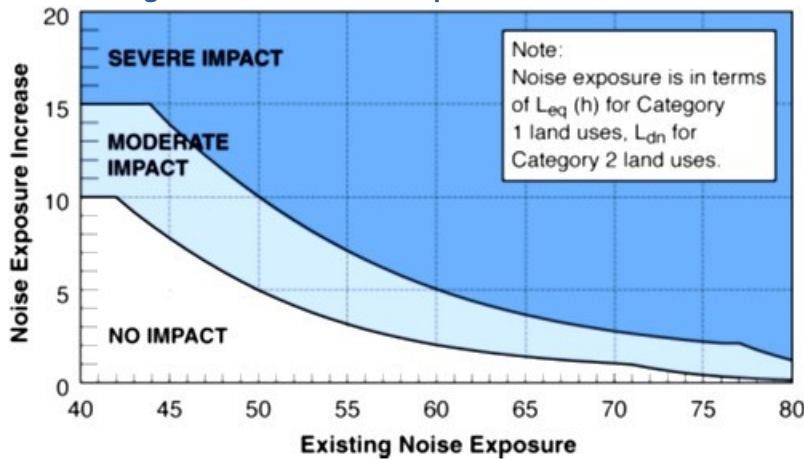
92 The noise analysis generated site-specific results at individual receptors and broader noise
 93 level mapping across the Study Area. The noise level mapping showed absolute sound level
 94 as well as comparative contours showing the change in noise that would occur in each Action
 95 Alternative relative to existing conditions and the No-Action Alternative.

96 The Project would also create new stationary sources of noise such as exhaust fans and
 97 emergency generators. Potential impacts from stationary sources were assessed
 98 qualitatively.

Operational Noise Impact Criteria

99 To assess the intensity of noise impacts, criteria defined by FTA were used. FTA’s criteria
 100 categorize impacts as no impact, moderate impact, or severe impact based on the existing
 101 ambient noise level and the anticipated change caused by a project, as shown in **Figure 5-31**:
 102 the higher the existing noise level, the smaller the change resulting in a moderate or a severe
 103 impact. A severe impact is when a significant percentage of people would be highly annoyed
 104 by the projected noise. A moderate impact is when the change noise level would be
 105 noticeable to most people but generally not sufficient to generate strong, adverse reactions.

Figure 5-31. FTA Noise Impact Increase Criteria



Source: FTA, 2006

107 Based on the FTA impact criteria, NEPA noise impacts assessments were made using the
 108 following scale: FTA severe impacts were considered major adverse impacts and FTA
 109 moderate impacts were considered moderate adverse impacts. No impact per the FTA
 110 criteria was considered no adverse impact under NEPA (although some measurable changes
 111 in noise levels may occur, they would always be below three dBA, which is the lowest
 112 perceptible change). When noise levels would decrease rather than increase, the impact was
 113 considered beneficial without further characterization.

Operational Vibration Prediction Methodology

114 Impacts on vibration levels were evaluated based on increases caused by modifications to
 115 the railroad track infrastructure and increases in the number of vibration events resulting
 116 from more numerous train operations. The analysis included a detailed vibration assessment
 117 consistent with FTA’s approved methodology. See **Appendix C3, Washington Union Station**
 118 *Expansion Project, Environmental Consequences Technical Report Section 10.4.1.2,*
 119 *Operational Vibration Prediction Methodology,* for more information.

120 The analysis considered the risk of structural damage from vibration. However, typically,
 121 vibration from train operations is substantially below the thresholds for potential structural
 122 damage, although historic buildings may be more fragile and susceptible to damage from
 123 vibration than more recent structures.

Operational Vibration Impact Criteria

124 FTA’s has two sets of vibration assessment impact criteria. The general criteria and the
 125 detailed criteria. The general criteria reflect the potential for human annoyance depending
 126 on land use. **Table 5-118** shown the general criteria for ground-borne vibration for the three
 127 land use categories defined by FTA.

Table 5-118. FTA General Ground-Borne Vibration Impact Criteria²

| Land Use Category | Ground-Borne Vibration Levels (Vibration Decibel Level) | | |
|--|--|-----------------------------------|-----------------------------------|
| | Frequent Events ¹ | Occasional Events ² | Infrequent Events ³ |
| 1: Buildings where low vibration is essential for interior operations | 65 | 65 | 65 |
| 2: Residences and buildings where people normally sleep | 72 | 75 | 80 |
| 3: Institutional buildings with primarily daytime use | 75 | 78 | 83 |

- 1. More than 70 events per day.
 - 2. Between 30 and 70 events per day.
 - 3. Fewer than 30 events per day.
- Source: FTA, 2006.

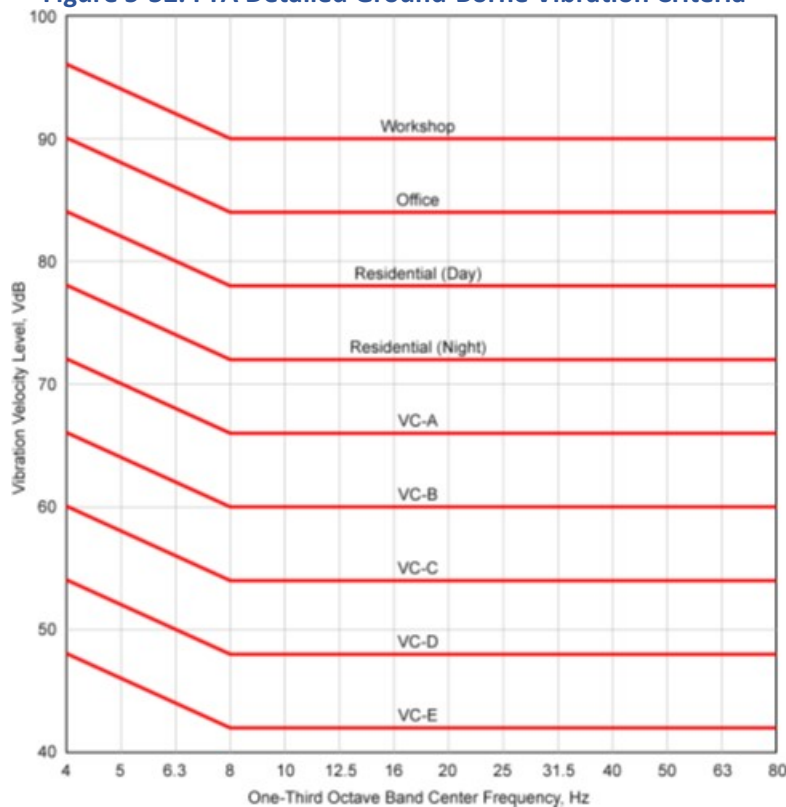
128 In general, 65 Vibration Decibels (VdB) is the threshold of human perceptibility of vibration.
 129 The detailed vibration assessment impact criteria, illustrated in **Figure 5-32**, are used when
 130 vibration data is available through measurements and modeling. The general criteria are

² The general criteria also include criteria for ground-borne noise levels. Ground-borne noise is typically only assessed at locations with subway or tunnel operations where there is no airborne noise path, or for buildings with substantial sound insulation such as a recording studio. The ground-borne noise criteria are shown in **Appendix C3, Washington Union Station Expansion Project, Environmental Consequences Technical Report Section 10.4.1.2, Operational Vibration Prediction Methodology, Table 10-2.**

131 more conservative than the detailed criteria because they are based on vibration levels over
 132 the entire frequency range rather than separated into specific frequency bands.

133 Vibration assessment also depend on existing conditions. For projects in existing railroad
 134 corridors with more than 12 trains per day, a project is considered to cause impacts if (1)
 135 projected vibration levels would exceed the FTA criteria; and (2) the project would
 136 significantly increase the number of vibration events (approximately doubling it) or increase
 137 vibration levels by 3 VdB or more. If a project moves existing railroad tracks, there would be
 138 impacts only if the track relocation results in vibration levels exceeding the FTA criteria and
 139 increasing vibration levels by more than 3 VdB.

Figure 5-32. FTA Detailed Ground-Borne Vibration Criteria³



Source: FTA, 2006.

5.10.3.2 Construction Impacts

140 Noise and vibration from construction activities have the potential to affect nearby receptors
 141 by causing annoyance; perceptible vibration inside buildings; and structural damage to

³ Categories VC-A through VC-E refer to extremely sensitive uses that are not relevant to this analysis.

142 buildings and structures. The methodology for predicting and assessing construction noise
143 and vibration impacts depends on the noise and vibration source.⁴

Methodology for Predicting Construction Noise

144 Construction noise from stationary sources (construction equipment) and mobile sources
145 (trucks and work trains) was modeled quantitatively using computer software and
146 methodologies in accordance with FTA and FHWA's guidance. See **Appendix C3**, *Washington*
147 *Union Station Expansion Project, Environmental Consequences Technical Report Section*
148 **10.4.2.1, Methodology for Predicting Construction Noise** for details.

149 Construction noise was evaluated at 25 feet from the outermost limits of construction, in
150 accordance with the District's noise ordinance and at specific residential, commercial, and
151 industrial receptor locations, in accordance with FTA guidelines. Noise modeling was based
152 on the type of equipment that would be mobilized during each phase of construction and the
153 amount of time, or utilization factor, that the equipment would be used.

154 Construction noise was modeled for support of excavation (SOE) construction, excavation,
155 and for drilling, which generally are the longest-lasting and loudest construction activities.
156 Noise was evaluated assuming open-cut excavation methods at both the start of excavation
157 (highest elevation) and the end of excavation (lowest elevation). As excavation proceeds, the
158 active equipment would be deeper and closer to the bottom, resulting in greater sound
159 attenuation from the SOE structures and lower noise levels at nearby receptors.

160 Construction of the Project would involve substantial excavation and removal of soils and
161 debris for disposal. Excavation spoil removal could occur by dump trucks or gondola trains.
162 Because the removal method is undetermined at this time, the construction noise analysis
163 considered three scenarios for spoil removal: removal by trucks only (120 trucks per day);
164 removal by trucks and work trains (one train and 60 trucks per day); and removal by work
165 trains only (two trains per day). The first scenario yields a conservative, maximum estimate of
166 construction-related mobile source noise. The other scenarios show by how much noise
167 levels could be reduced by using work trains. Regardless of the spoil removal method,
168 approximately 10 to 20 trucks would travel to and from the site for deliveries every day
169 during the construction period. When modeling noise generated by construction trucks and
170 trains, existing noise from traffic and train operations was taken into account.

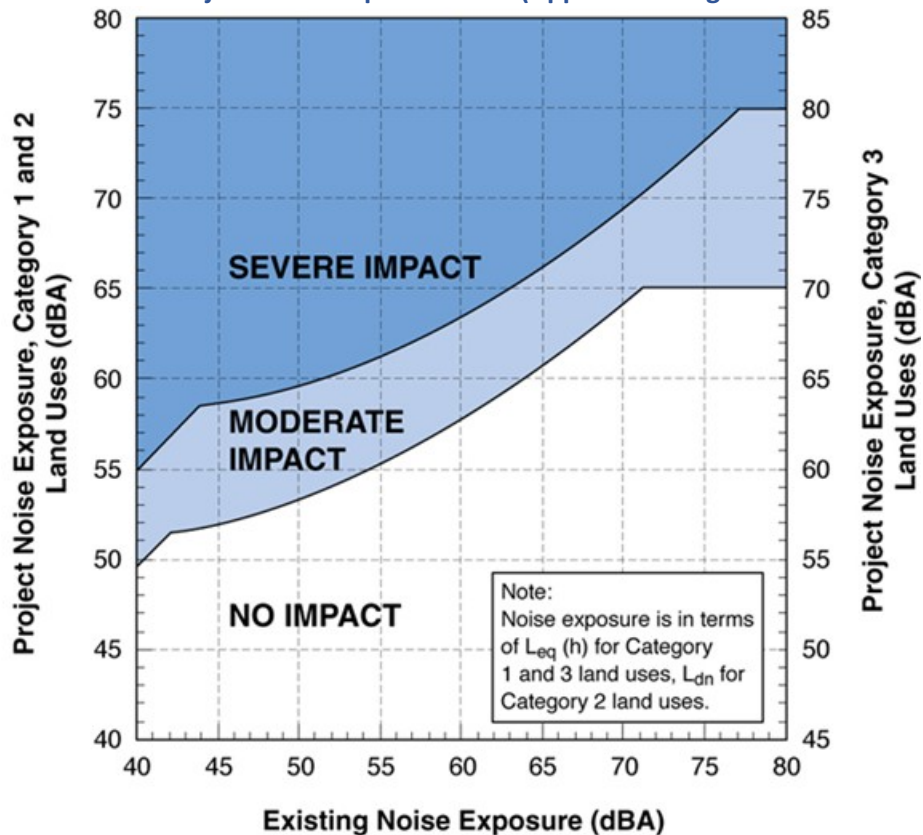
⁴ The construction impact modeling does not include the column removal work. In all Action Alternatives, the contribution of this work to ambient noise levels in the study area would be the same and would be negligible. During Phases 1 and 2 of construction, the column removal work would overlap with the excavation and reconstruction of portions of the rail terminal. However, this work would take place within the historic station building and involve installing temporary supports, removing, and replacing structural elements. These activities are not machine-intensive and would not involve the type of noisy excavation or foundation installation work associated with the reconstruction of the rail terminal. The part of WUS where the work would take place would be walled off from the rest of the building. Given the small scale of the column removal work, the noise and vibration associated with this work has no potential to result in an exceedance of any applicable criterion at any modeled locations.

Construction Noise Impact Criteria

171 FTA has defined construction noise criteria that depend on the type of land use affected and
 172 the time of day. However, because Project construction would take place over a long time
 173 (from more than 10 years to more than 13 years, depending on the Action Alternatives), the
 174 construction noise impact analysis used FTA’s long-term project noise impact criteria instead.
 175 These criteria are more conservative than the construction criteria. They are shown in **Figure**
 176 **5-33**.
 177

178 The District’s Noise Ordinance (Municipal Regulations Chapter 20-27 and 20-28) prohibits
 179 construction sound levels above 80 dBA Leq (except for pile driving) as measured 25 feet
 180 from the outermost limits of the construction site between 7:00 AM and 7:00 PM unless a
 181 variance is granted. From 7:00 PM to 7:00 AM, construction activities are limited to 65 dBA
 182 (Lmax) 25 feet from the outermost limits of the construction site for noise originating in an
 183 industrial zone. These criteria are intended to apply to stationary construction sources, not to
 184 construction vehicles.

Figure 5-33. FTA Project Noise Impact Criteria (Applied to Long-term Construction)



Source: FTA, 2006.

Methodology for the Prediction of Construction Vibration

185 The construction vibration analysis was conducted for activities that typically generates
 186 substantial vibration such as use of clam shovels during slurry wall construction; drilling
 187 during secant pile wall construction; vibratory sheet pile driving; caisson drilling; operation of
 188 hoe rams and jackhammers during concrete removal; operation of excavators, backhoes, and
 189 loaded trucks during excavation; and use of vibratory rollers for track re-construction.

190 Impacts were evaluated using FTA’s guidance. FTA’s assessment methodology includes
 191 identifying the types of vibration-generating construction equipment and predicting typical
 192 construction vibration levels at various distances from the equipment. This information
 193 provides a general estimate of construction vibration and potential increase in the risk of
 194 structural damage.

Construction Vibration Impact Criteria

195 Construction vibration can damage nearby structure or generate annoyance among local
 196 residents or workers. The potential for structural damage is typically limited to impact-type
 197 activities, such as drilling and slurry wall construction, that are conducted very close to
 198 buildings (within 25 feet). Potential damage from vibration depends on the specific activity
 199 and how the building is constructed. FTA criteria for potential structural damage are shown
 200 in **Table 5-119**. Criteria for annoyance are the same as for the operational vibration analysis.

Table 5-119. FTA Criteria for Potential Structural Damage

| Building Construction | Criterion for Potential Damage to Structures | |
|--|--|--|
| | Vibration Level (VdB) | Peak-Particle Velocity (inches/second) |
| I. Reinforced-concrete, steel or timber | 102 | 0.5 |
| II. Engineered-concrete and masonry | 98 | 0.3 |
| III. Non-engineered timber and masonry | 94 | 0.2 |
| IV. Buildings extremely susceptible to vibration damage | 90 | 0.12 |

Source: FTA, 2006.

5.10.4 Impact Analysis

201 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
 202 noise and vibration levels.

5.10.4.1 No-Action Alternative

Direct Operational Impacts

203 **Relative to existing conditions, the No-Action Alternative would have beneficial direct**
 204 **operational noise impacts at locations near the private air-rights development. There**
 205 **would be negligible adverse direct operational noise impacts elsewhere in the Study Area**

206 **as noise levels would increase by no more than 3 dBA relative to existing levels. There**
207 **would be negligible adverse direct operational impacts on vibration levels.**

Operational Noise

208 **Figure 5-34** shows modeled noise levels in the No-Action Alternative. Noise levels would
209 range from 60 to 75 dBA (average day-night sound level [Ldn]) at most locations. Such levels
210 are typical of a dense urban area. Predominant sources of noise include the rail terminal,
211 New York Avenue NE, Florida Avenue NE, K Street NE, and Massachusetts Avenue NE.

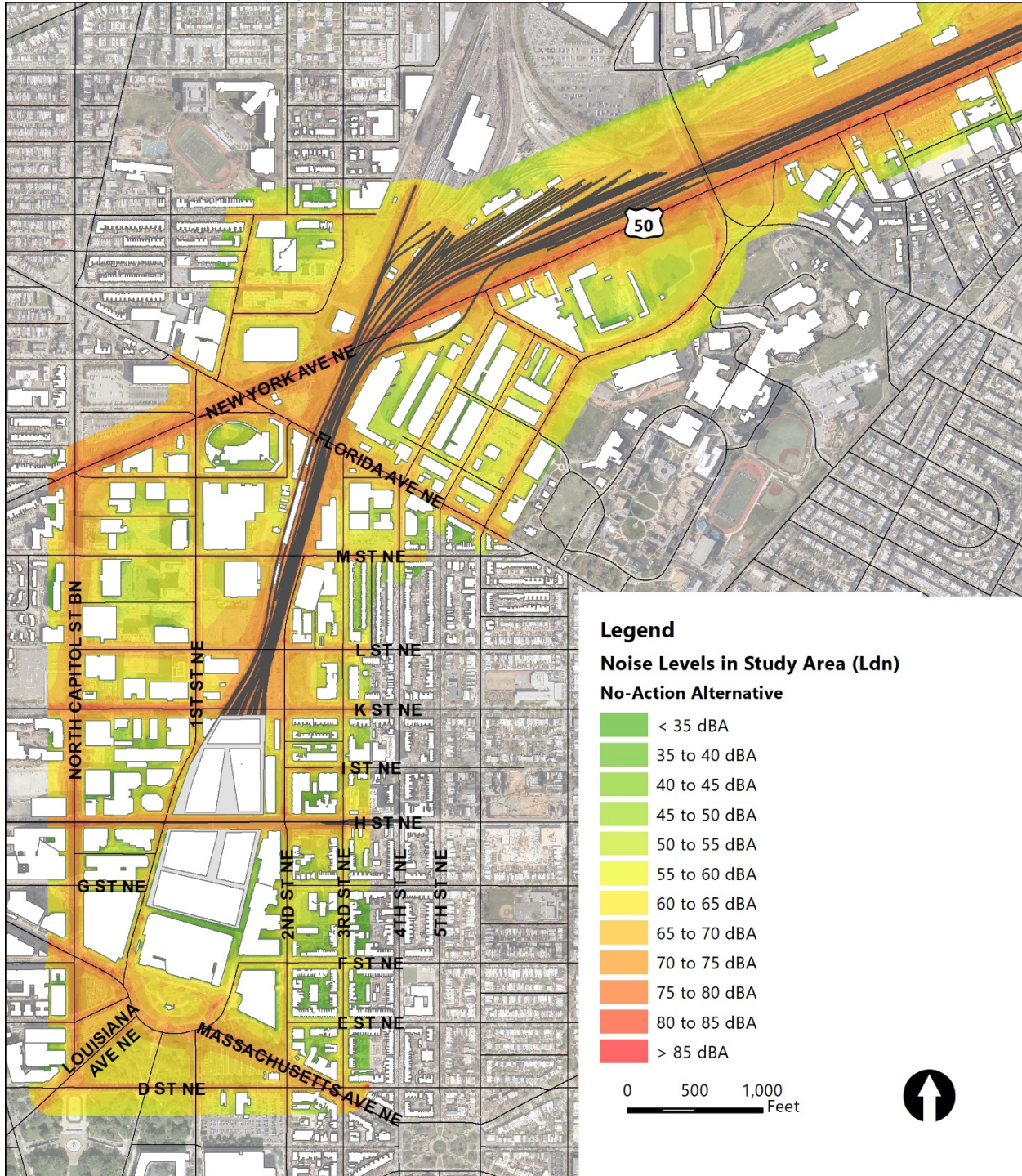
212 There would be a beneficial impact at receptors adjacent to the private air-rights
213 development south of K Street NE. Noise levels there would decrease relative to existing
214 conditions because of the acoustic shielding the development would provide as it would
215 enclose the rail terminal. Reductions would vary depending on the receptor. At the Kaiser
216 Permanente Medical Center (R123) and REA Building/Center City Public Charter School
217 (R116), it would be greater than 10 dBA. A reduction of 10 dBA is generally perceived as a
218 halving of the noise level. Multiple residential receptors along 2nd Street NE and Parker
219 Street NE would experience appreciable sound level reductions as well.

220 At receptors north of K Street NE and away from the private air-rights development, noise
221 from trains and traffic would increase because of greater traffic volumes and more train
222 operations. This would be a negligible adverse impact because everywhere increases would
223 be less than 1 dBA, except in the Union Market area. There, increases could be higher
224 because of the introduction of a new track leading to the new VRE MSR Facility and the
225 operation of non-revenue VRE trains on this track during midday storage. The track would
226 have relatively tight-radius curves, which has the potential to generate wheel squeal and may
227 result in high amplitude, high-frequency noise from the interaction of the wheels with the rail
228 surface. Even assuming that track design would minimize the risk of wheel squeal, modeling
229 shows that noise levels in the Union Market area would increase at some locations. However,
230 the increase would not exceed 3 dBA and remain a negligible impact.

231 Noise impacts from new stationary sources would also be negligible. Several new stationary
232 sources would be introduced in the Project Area in the No-Action Alternative:

- 233 ■ Fan plants in the southern portion of the private air-rights development on the east
234 side of the Project Area, south of H Street NE; and in the northern portion of the
235 private air-rights development on both the east and west sides of the Project Area,
236 south of K Street NE.
- 237 ■ An emergency generator in the private air-rights development on the east side of the
238 Project Area, mid-way between H Street NE and K Street NE.
- 239 ■ A cooling tower in the private air-rights development on the east side of the Project
240 Area, mid-way between H Street NE and K Street NE.

Figure 5-34. Noise Levels, No-Action Alternative



241 This stationary mechanical equipment would likely be located approximately 50 feet from the
242 property line, which would attenuate sound and maintain noise levels below the District’s
243 Noise Ordinance standard.⁵ The equipment would also be required to meet the noise level
244 requirements set forth in the National Fire Protection Association (NFPA) 130 Standard for
245 Fixed Guideway Transit and Passenger rail Systems. As mechanical equipment designs
246 advance, other sound attenuation elements would likely be incorporated, if and as needed.
247 Adverse impacts from stationary noise sources are anticipated to be negligible.

Operational Vibration

248 Impacts from changes in vibration levels would be negligible in the No-Action Alternative.
249 Improvements to the track infrastructure would be completed (including electrifying Tracks
250 8-9; rehabilitating Track 22; and introducing new tracks with the proposed VRE MSRF). These
251 would not affect track location and condition, nor would it affect train operations or speeds
252 at most locations. Vibration levels from train passing by would not change except for
253 receptors in the Union Market area near the new track to the proposed VRE MSRF. While
254 vibration levels at some receptor locations in this area would increase, they would remain
255 below the applicable FTA criteria.

256 **Appendix C3**, *Washington Union Station Expansion Project, Environmental Consequences*
257 *Technical Report Section 10.5.1.1, Direct Operational Impacts, Operational Vibration*,
258 provides a more detailed description of those negligible vibration impacts.

Indirect Operational Impacts

259 **Relative to existing conditions, there would be no indirect noise or vibration effects in the**
260 **No-Action Alternative.**

261 All noise and vibration impacts would take place at the same time as the action and none
262 would occur beyond the Operational Noise and Vibration Study Area.

Construction Impacts

263 **Construction of the projects included in the No-Action Alternative would cause noise and**
264 **vibration impacts. Available information on methods and schedules of construction is**
265 **insufficient to characterize these impacts.**

266 In the No-Action Alternative, the Project would not be constructed and would not cause any
267 construction-related noise or vibration impacts. Construction of the private air-rights
268 development, replacement of the H Street Bridge, and other projects included in the No-
269 Action Alternative would generate noise and vibration from construction equipment and
270 vehicle operations. Noise and vibration levels would depend on the type of equipment and
271 vehicles used as well as the schedule of each project. This information is not currently

⁵ The District’s Noise Ordinance (Chapter 20-2801) limits noise from stationary mechanical equipment such as fan plant rooms, cooling towers, and emergency generators to 60 dBA when measured at the property line or as close to the property lines as practicable if there is an obstruction.

272 available. It can be assumed that noise and vibration levels would be typical of medium- to
273 large-scale construction projects.

5.10.4.2 Alternative A

Direct Operational Impacts

274 **Relative to the No-Action Alternative, in Alternative A noise levels would increase by no**
275 **more than 3 dBA. This would result in moderate adverse operational direct impacts at 14**
276 **locations in the Study Area. Alternative A would have a minor localized adverse direct**
277 **operational impact on vibration near the throat of the rail terminal and negligible adverse**
278 **operational direct elsewhere.**

Operational Noise

279 Noise levels in Alternative A, shown in **Figure 5-35**, would range from approximately 60 to 75
280 dBA (Ldn). Such levels are typical of a dense urban setting. Primary noise sources would
281 include the rail terminal and traffic on streets such as New York Avenue NE, Florida Avenue
282 NE, K Street NE, and Massachusetts Avenue NE.

283 At locations along First Street NE, noise levels would decrease due to a reduction in traffic
284 volumes as First Street NE would change from a two-way to a one-way street. Elsewhere,
285 increases in train operations and traffic would generally cause noise levels to increase
286 relative to the No-Action Alternative. South of K Street NE, increases would be less than 1
287 dBA. North of K Street NE, they would range from 1 to 3 dBA. Changes less than 3 dBA are
288 generally not perceptible. Therefore, anticipated increases in noise levels would result in
289 negligible adverse noise impacts except at locations where they would cause the FTA impact
290 threshold for moderate impact (**Figure 5-31**) to be exceeded. These locations are shown in
291 **Figure 5-36**. Detailed modeling results for those locations where the threshold would be
292 exceeded can be found in **Appendix C3, Washington Union Station Expansion Project,**
293 *Environmental Consequences Technical Report, Section 10.5.2.1, Direct Operational Impacts,*
294 *Operational Noise, Table 10-7.*

295 Moderate noise impacts would occur close to the rail terminal due to the increase in train
296 operations. Affected receptors would include the Equity Residential building (R15); TIAA Flats
297 Apartments (R36); Washington Gateway Elevation Apartments (R38); and Toll Brothers City
298 Living (R98 and R99). Moderate impacts along New York Avenue, at the Hecht Warehouse
299 Lofts (R58) and the Homewood Suites and Hampton Inn (R61), would be due to the projected
300 growth in traffic volumes on this roadway.

Figure 5-35. Noise Levels, Alternative A

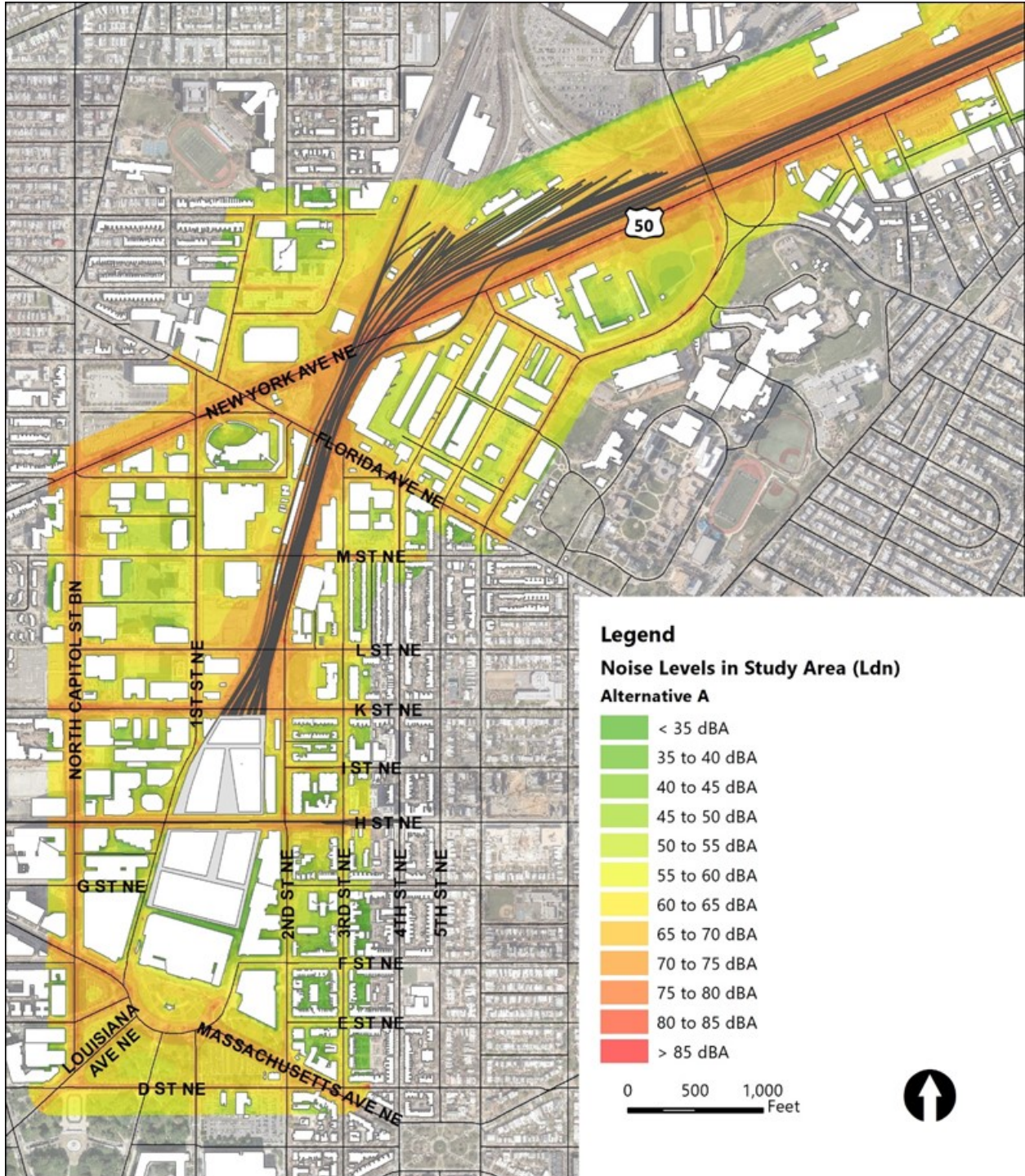
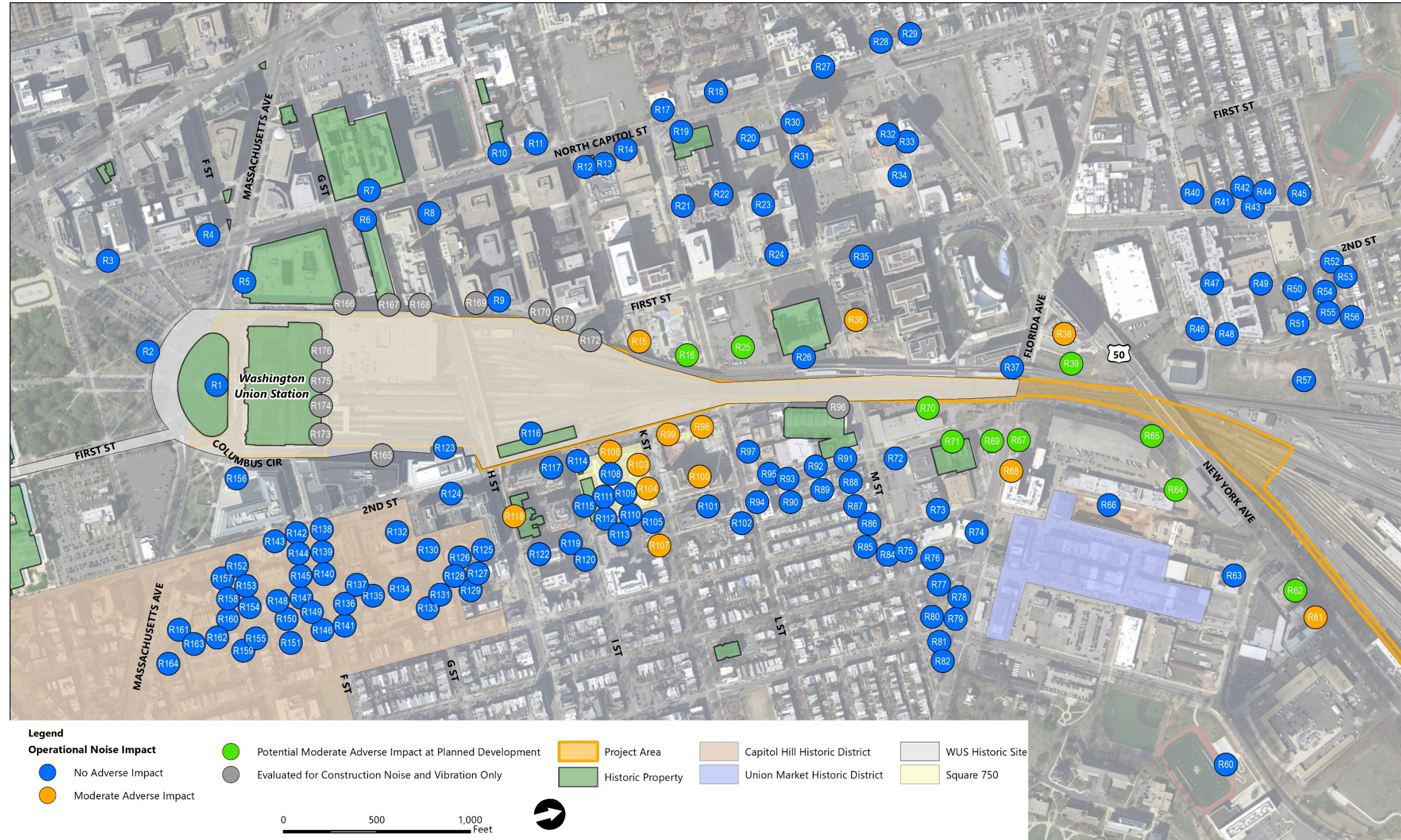


Figure 5-36. Operational Noise Impacts, Alternative A



301 At other locations, such as the Edison building (R58) on Florida Avenue NE and residential
302 receptors along K Street NE, moderate impacts would be due to both train operations and
303 traffic volumes increases. Additionally, the FTA threshold for moderate or severe impacts
304 would be exceeded at ten planned development locations.⁶

305 Impacts from stationary noise sources are anticipated to be negligible. Alternative A would
306 create the same new stationary sources of noise as the No-Action Alternative (**Section**
307 **5.10.4.1, No-Action Alternative, Operational Noise**).

Operational Vibration

308 In Alternative A, although the number of train operations (not including Metrorail and DC
309 Streetcar operations) would approximately triple relative to the No-Action Alternative, the
310 FTA vibration criteria would not be exceeded at any receptor location. Vibration levels would
311 be similar to those in the No-Action Alternative with one exception: there would be an
312 increase in vibration of up to 2 VdB at those receptors closest to Track 43 in the throat of the
313 rail terminal. This would be a minor adverse impact.

Indirect Operational Impacts

314 **Relative to the No-Action Alternative, there would be no indirect noise or vibration**
315 **operational impacts in Alternative A.**

316 All noise and vibration impacts would take place at the same time as the action and none
317 would occur beyond the Operational Noise and Vibration Study Area.

Construction Impacts

Support of Excavation Noise

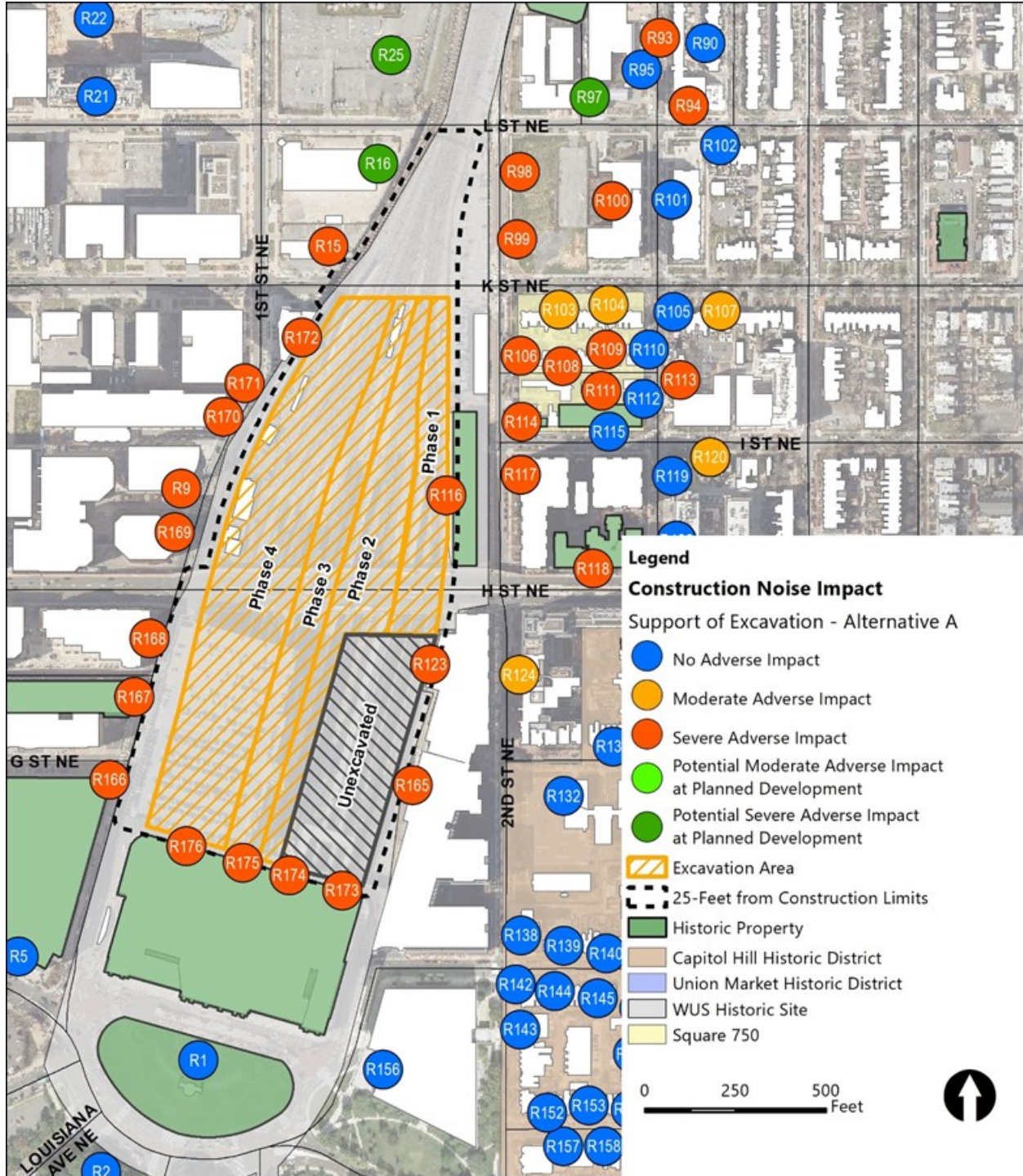
318 **In Alternative A, SOE construction would result in major adverse noise impacts at 26**
319 **locations and moderate adverse noise impacts at six locations.**

320 Construction of the secant pile cut-off wall (64 feet deep) and interior sheet-pile walls (100
321 feet deep) would involve the use of cranes, drill rigs, dump trucks, concrete pump trucks, and
322 vibratory sheet pile drivers that would generate noise while operating. Modeling indicates
323 that the noise generated by SOE construction activities would exceed District or FTA criteria
324 at multiple receptors adjacent to WUS and along 2nd Street NE north of H Street. **Figure 5-37**
325 illustrates these impacts.⁷

⁶ Noise levels at planned developments were modeled but not assessed for impacts. Impacts would occur at these locations only if they have been developed with or permitted for sensitive land uses at the time Project construction occurs.

⁷ Some locations include multiple modeled receptors.

Figure 5-37. Support of Excavation Noise Impacts, Alternative A



326 Detailed modeling results for the affected locations can be found in **Appendix C3**,
327 *Washington Union Station Expansion Project, Environmental Consequences Technical Report*,
328 **Section 10.5.2.3, Construction Impacts, Table 10-8**. Impacts would occur during all four
329 phases of construction at most affected locations.

330 Locations where there would be major adverse noise impacts from SOE construction include:
331 WUS at the south end of the rail terminal (R173-176); the REA Building (R116); the US
332 Securities and Exchange Commission building (R165); and the Kaiser Permanente Medical
333 Center (R123) as well as multiple residential and commercial building along First, 2nd, K, I
334 (Eye), and Parker Streets NE. In addition, the sites of three planned developments (Storey
335 Park [R16], 170 L Street NE [R25], 1109 Congress Street NE [R97]) would experience noise
336 levels in excess of the severe threshold. Impacts would occur at these locations only if they
337 have been developed with or permitted for sensitive land uses at the time Project
338 construction occurs.

Excavation Noise

339 In Alternative A, the rail terminal would be excavated down to the concourse level, with
340 minimal deeper excavation for back of the house space. Excavation equipment would include
341 dump trucks, backhoes, bulldozers, and clam shovels. Spoil removal would be by truck, work
342 train, or a mix of both. As explained in **Section 5.10.3.2, Construction Impacts, Methodology**
343 *for Predicting Construction Noise*, three scenarios were considered: All Truck Scenario (120
344 trucks a day); Work Train Scenario (2 trains a day); and Mixed Scenario (60 trucks and 1 train
345 a day). Trucks would travel along designated truck routes and only use local streets (K Street
346 NE, G Street NE between North Capitol Street and First Street, First Street NE, and 2nd Street
347 NE) to access the construction site. Trucks would travel north and south from and to the
348 Project Area on either First Street or 2nd Street NE; therefore, only approximately half the
349 trucks would operate on each. Farther out, trucks would travel on New York Avenue, North
350 Capitol Street, Massachusetts Avenue, H Street NE, and K Street NE east of 2nd Street NE.
351 Trains would generally move outside of the peak service periods.

Start of Excavation

352 **In Alternative A, at the start of excavation, there would be major adverse noise impacts at**
353 **25 locations (All Truck Scenario), 24 locations (Mixed Scenario), or 20 locations (Work Train**
354 **Scenario). There would be moderate adverse noise impacts at seven locations (All Truck**
355 **Scenario and Mixed Scenario) or eight locations (Work Train Scenario).**

356 The start of excavation is when noise impacts would be greatest because equipment would
357 be operating at street level. Noise levels generated by start of excavation activities would
358 vary according to methods of spoil removal. Noise levels would be highest in the All Truck
359 Scenario (60 to 91 dBA [Ldn]) and lowest in the Work Train Scenario (50 to 88 dBA [Ldn]).
360 **Figure 5-38 and Figure 5-39** illustrate anticipated impacts under these two scenarios. Noise
361 levels under the Mixed Scenario (57 to 90 dBA [Ldn]) would fall in-between.

Figure 5-38. Start of Excavation Noise Impacts (All Truck Scenario), Alternative A

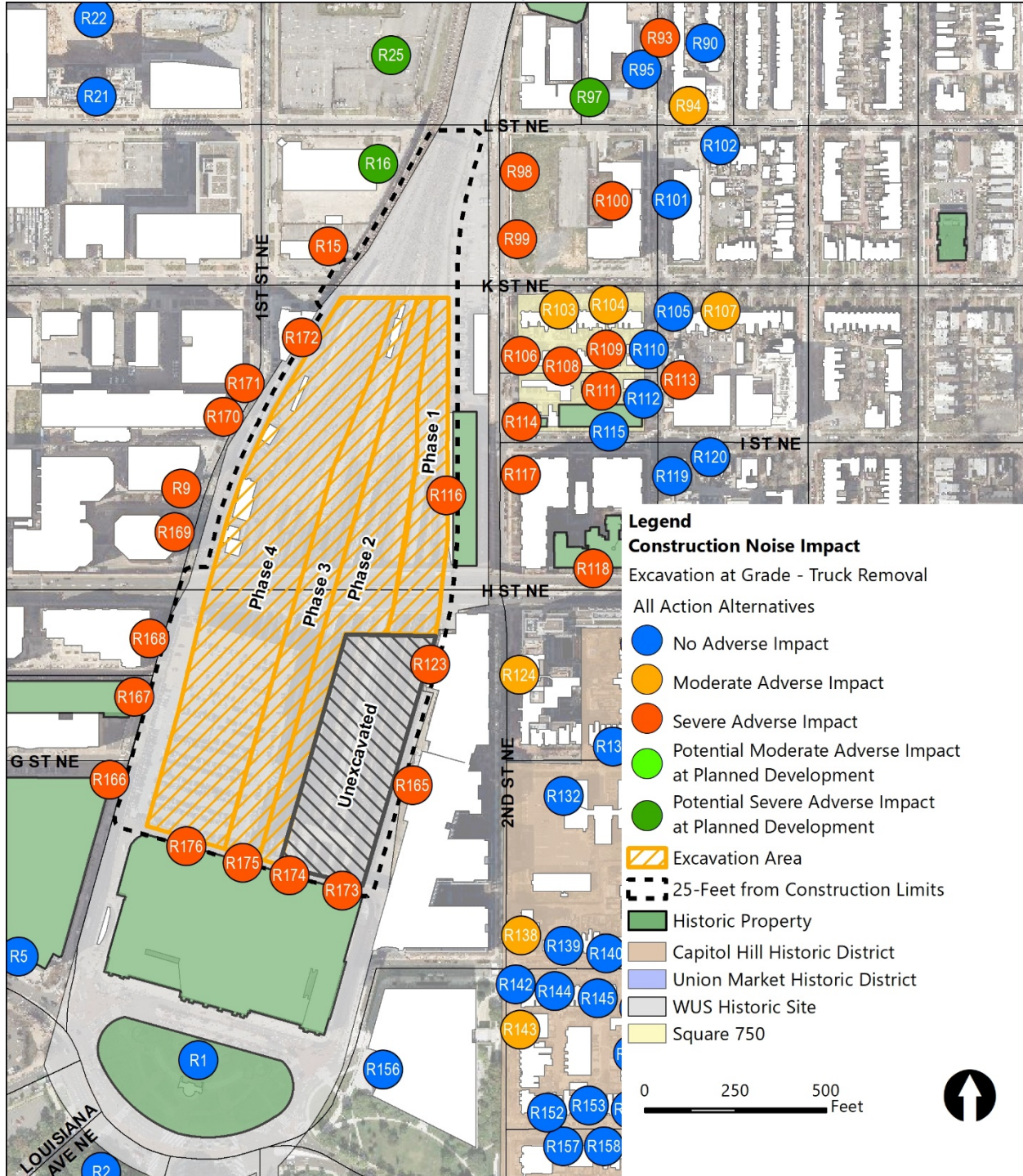
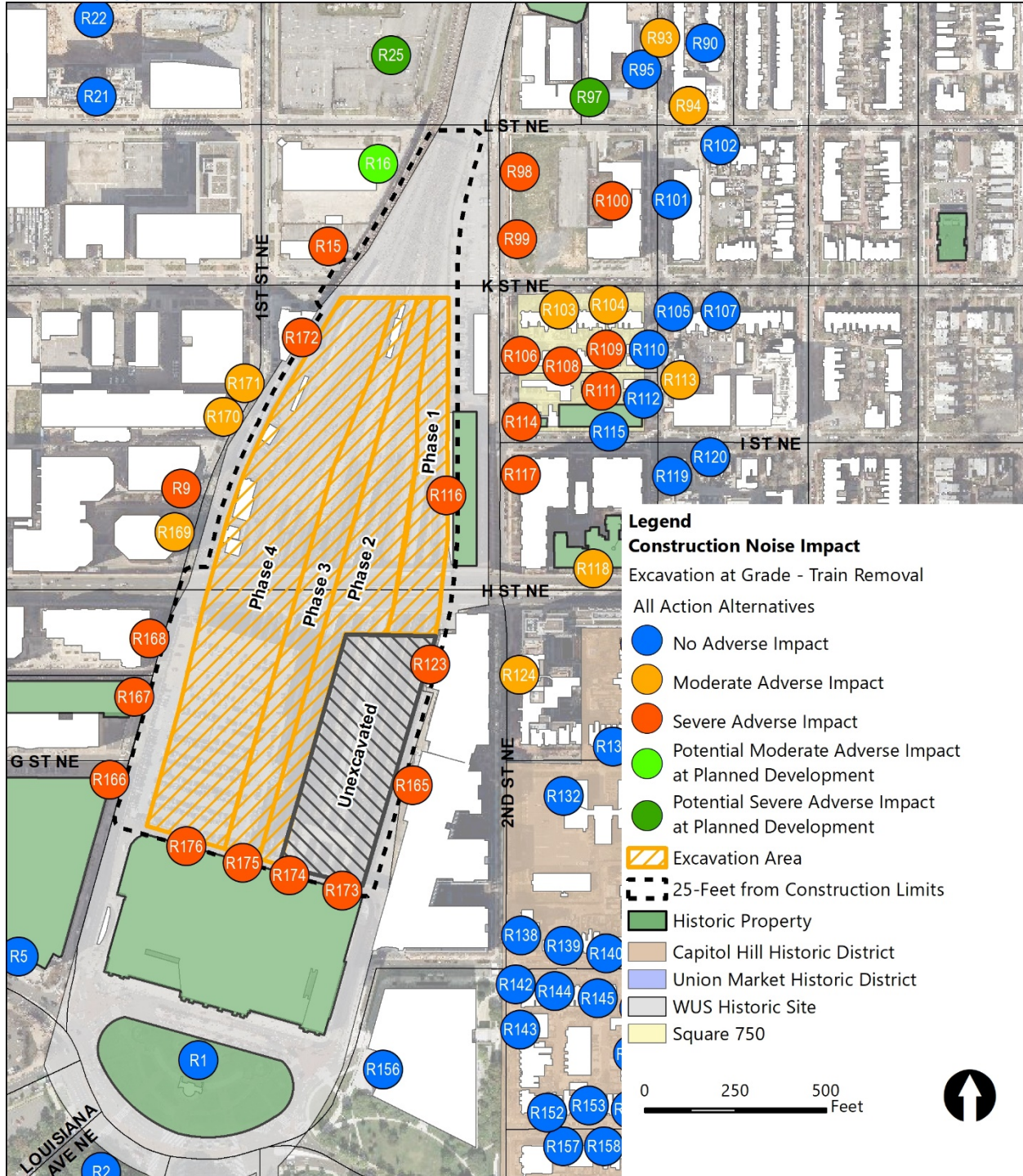


Figure 5-39. Start of Excavation Noise Impacts (Work Train Scenario), Alternative A



362 Detailed modeling results for the affected locations under all three scenarios can be found in
363 **Appendix C3**, *Washington Union Station Expansion Project, Environmental Consequences*
364 *Technical Report*, **Section 10.5.2.3**, *Construction Impacts*, **Table 10-9**. Generally, construction
365 noise levels would be approximately 4 dBA (Ldn) higher in the All Truck Scenario than in the
366 Work Train Scenario. The difference would be due to trucks operating during the nighttime
367 hours of the 20-hour daily construction period. Primary sources of noise during excavation
368 would be on-site dump trucks, clam shovels, and excavators; noise exposure from these
369 sources would be steadier than exposure from dump truck passing by.

370 At multiple locations, in all three scenarios, noise levels would exceed the long-term
371 construction noise impact criteria for severe or moderate impacts or the District's noise
372 ordinance standard, resulting in major and moderate noise impacts. Locations adjacent to
373 the rail terminal, such as the north side of the historic station building (R173-176); the REA
374 Building (R116); the US Securities and Exchange Commission Building (R165); and the Kaiser
375 Permanente Medical Center (R123) as well as multiple commercial and residential uses along
376 K Street NE, First Street NE, 2nd Street NE north of H Street, and Parker Street NE, would
377 experience major adverse impacts in all three scenarios. Most locations that would
378 experience lesser impacts in the Work Train Scenario are located along the streets that trucks
379 would use to travel in and out of the Project Area: First Street NE, 2nd Street NE, and K Street
380 NE. The most notable difference would be on 2nd Street NE south of H Street, where several
381 locations that would experience moderate adverse impacts in the All Truck Scenario would
382 drop below the threshold in the Work Train Scenario. On First Street NE north of H Street,
383 several locations would drop below the severe impact criteria but remain above the
384 moderate criteria.

385 The criteria for severe or moderate impact would also be exceeded at three locations
386 planned for development (Storey Park [R16], 1170 L Street NE [R25], and 1109 Congress
387 Street NE [497]). There would be impacts at those locations only if they have been developed
388 with or permitted for sensitive uses by the time construction occurs.

End of Excavation

389 **In Alternative A, at the end of excavation, there would be major adverse noise impacts at**
390 **five locations (All Truck Scenario and Mixed Scenario) or four locations (Work Train**
391 **Scenario). There would be moderate adverse noise impacts at 19 locations (All Truck**
392 **Scenario), 15 locations (Mixed Scenario), or 12 locations (Work Train Scenario).**

393 As excavation proceeds, noisy equipment would be located closer to the bottom, resulting in
394 greater sound attenuation. By the end of the excavation, noise levels would be significantly
395 lower than at the start. In the All Truck Scenario, they would range from 56 to 88 dBA (Ldn);
396 in the Mixed Scenario, they would range from 55 to 87 dBA (Ldn); and in the Work Train
397 Scenario, they would range from 48 to 85 dBA (Ldn). Noise levels would be approximately 4
398 dBA (Ldn) higher in the All Truck Scenario than in the Work Train Scenario. **Figure 5-40** and
399 **Figure 5-41** illustrate anticipated impacts under the All Truck and the Work Train Scenarios.

Figure 5-40. End of Excavation Noise Impacts (All Truck Scenario), Alternative A

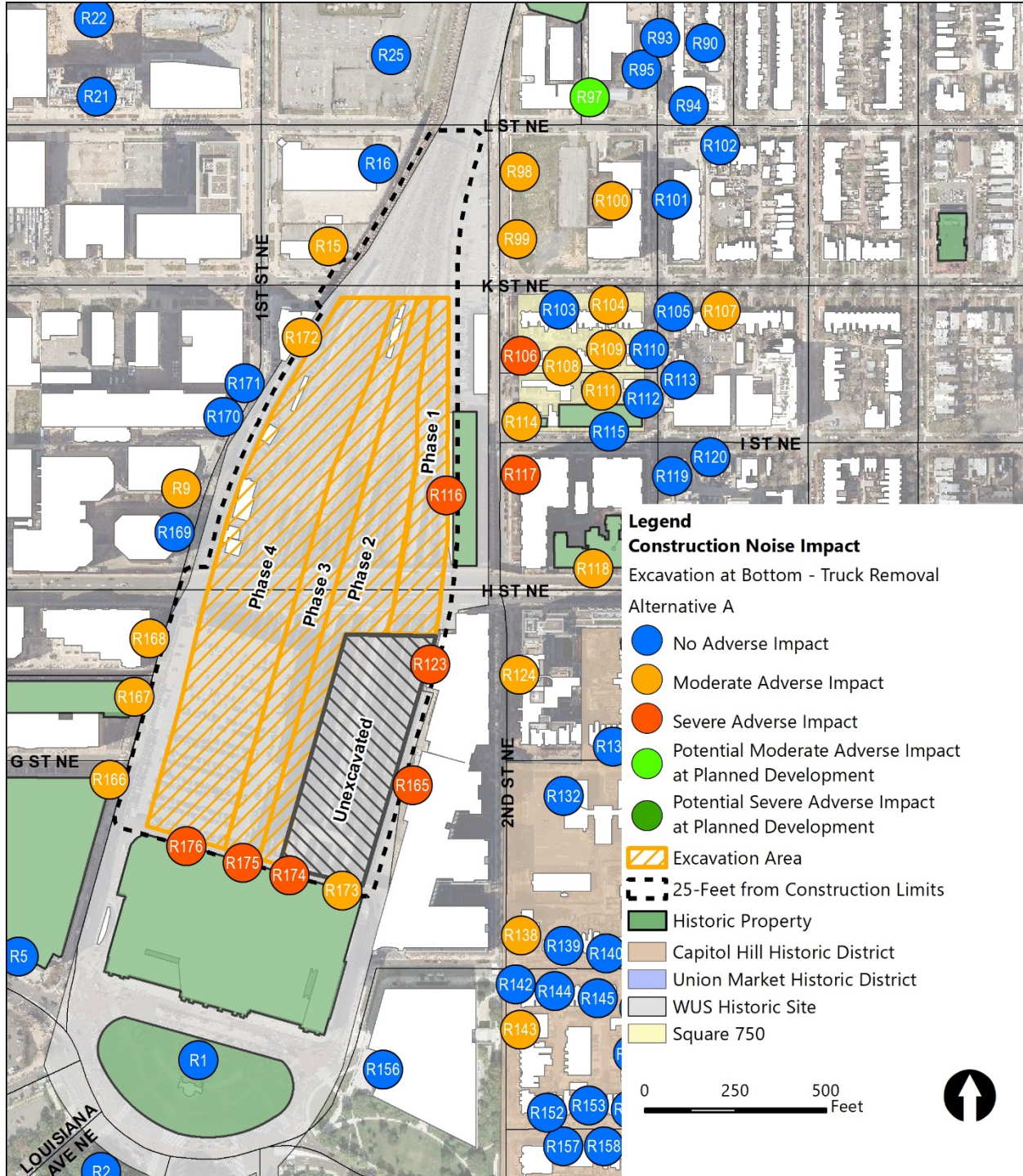
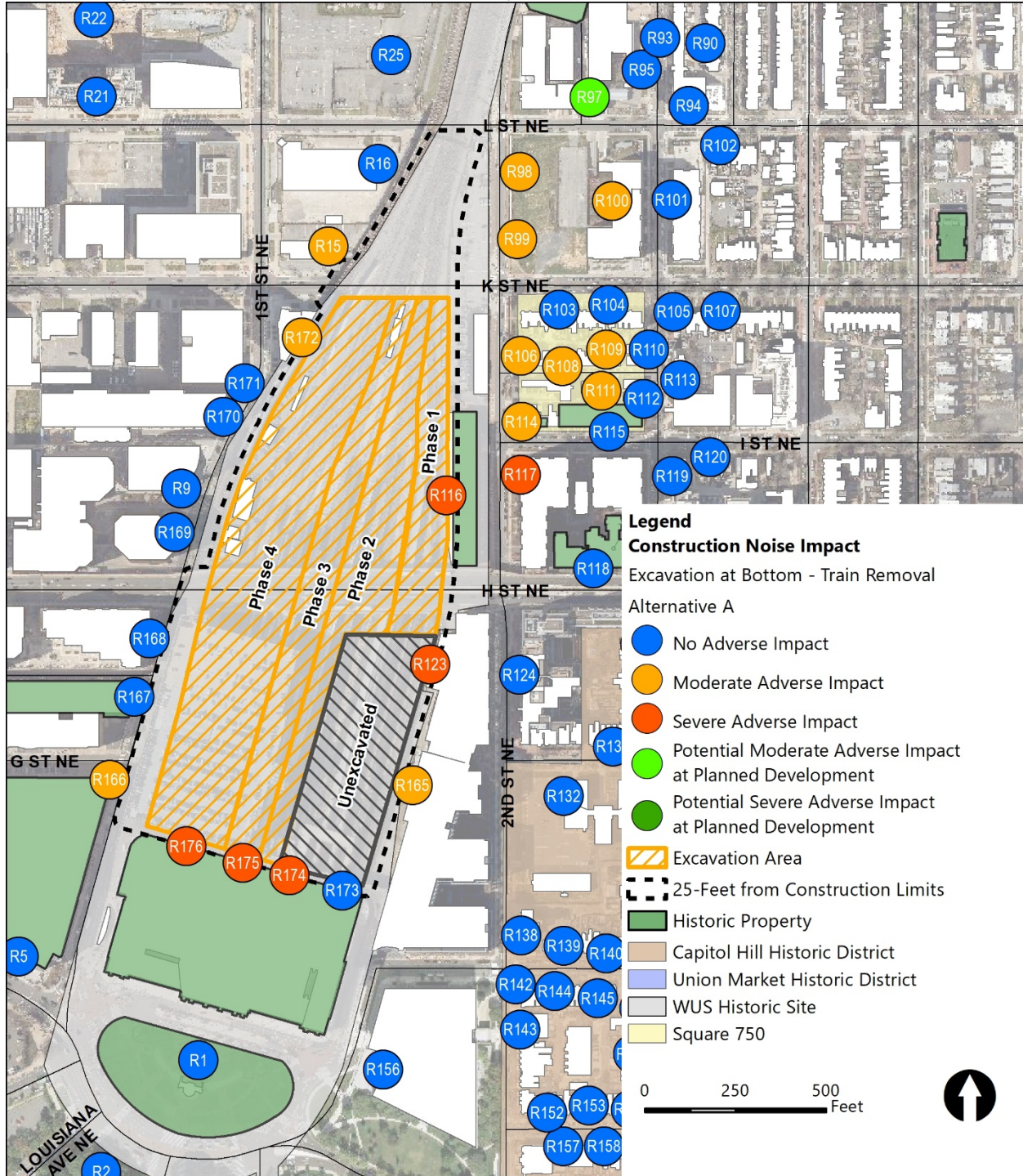


Figure 5-411. End of Excavation Noise Impacts (Work Train Scenario), Alternative A



400 Detailed modeling results for the affected locations under all three scenarios can be found in
401 **Appendix C3, Washington Union Station Expansion Project, Environmental Consequences**
402 **Technical Report, Section 10.5.2.3, Construction Impacts, Table 10-10.**

403 Major adverse impacts would occur in all three scenarios at the north side of the historic
404 station building (R173-176); the REA Building (R116); the Kaiser Permanente Medical Center
405 (R123); and the Senate Square Apartments on I (Eye) Street NE (R117). The US Securities and
406 Exchange Commission Building (R165) would experience a major adverse impact in the All
407 Truck and Moderate Scenarios, but a moderate adverse impact only in the Work Train
408 Scenario. The criteria for moderate impact would be exceeded at one location with a planned
409 development (1109 Congress Street NE [R97]) in all three scenarios. There would be a
410 moderate impact at this location if it has been developed with or permitted for sensitive uses
411 by the time construction occurs.

Construction Vibration Impacts

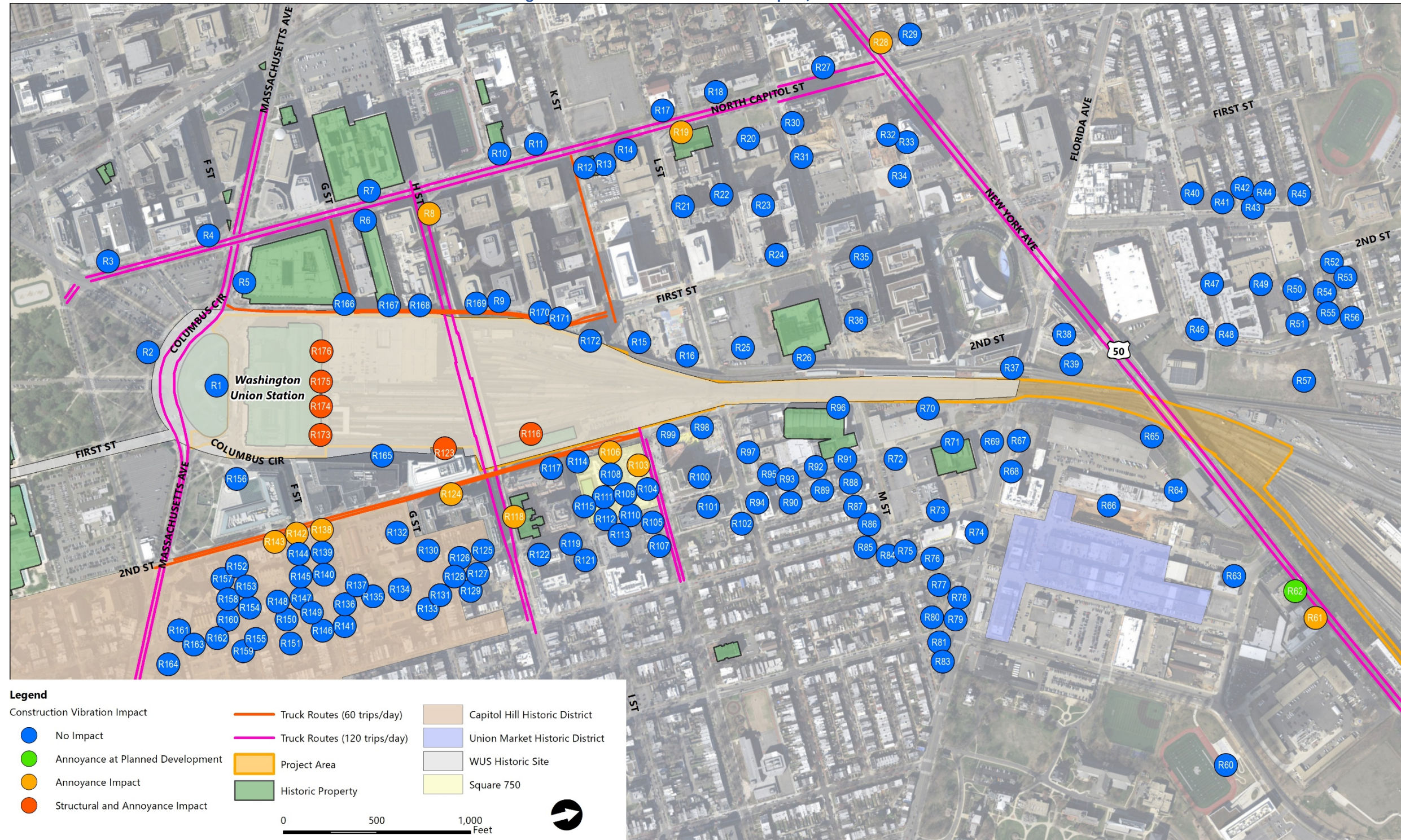
412 **In Alternative A, there would be a major adverse impact from vibration during SOE**
413 **construction on the REA Building, the Kaiser Permanente Medical Center, and the Union**
414 **Station historic station building due to potential risk of structural damage. There would be**
415 **moderate adverse impacts from truck-generated vibration at 12 locations due to**
416 **annoyance.**

417 Construction equipment-caused vibration has the potential to cause structural damage to
418 buildings near the construction site and annoy persons in nearby buildings. Vibration-
419 generating activities would include drilling during secant pile wall construction; vibratory
420 sheet pile driving; concrete removal with hoe rams and jackhammers; excavation with
421 excavators, back hoes, and loaded trucks; and track reconstruction with vibratory rollers.

422 **Figure 5-42** shows the receptors that would experience vibration impacts during construction
423 of Alternative A. Detailed modeling results for these locations are provided in **Appendix C3,**
424 **Washington Union Station Expansion Project, Environmental Consequences Technical Report,**
425 **Section 10.5.2.3, Construction Impacts, Table 10-11.**

426 Vibratory pile driving associated with the sheet pile wall construction has the potential to
427 cause structural damage within 31 feet of the most fragile buildings and within 13 feet of
428 buildings with reinforced concrete, steel, or timber frames. Drilling associated with secant
429 pile wall SOE has the potential to cause structural damage within 20 feet of the most fragile
430 buildings and within 8 feet of buildings with reinforced concrete, steel, or timber frames.
431 Vibratory pile driving would occur within 10 to 16 feet of the REA Building (R116), the Kaiser
432 Permanente Medical Center (R123), and the Union Station historic station building (R173-
433 176), with vibration levels of approximately 0.33 to 0.67 in/s. In its initial stages, the column
434 removal work may generate vibration impacts within the eastern part of the historic station
435 building if jackhammers are to break the existing flooring and access girders and column from
436 above. Such impacts would be of brief duration.

Figure 5-42. Construction Vibration Impact, Alternative A



437 Vibration levels at the three buildings may exceed the criterion for increased risk of structural
438 damage but this would depend on building sensitivity, which in turn is a function of the type
439 of construction (see **Table 5-119** above). All three buildings were designed within the context
440 of an active rail terminal and are all large masonry structures. Therefore, they can be
441 expected to have low sensitivity, reducing the risk of structural impact. However, as historic
442 structures, the REA Building and the historic station building may warrant the application of a
443 lower criterion than the one applicable to buildings of similar construction but more recent.
444 The sensitivity of the buildings would have to be assessed in the Construction Noise and
445 Vibration Plan that would be prepared for the Project (see **Section 5.10.6, Avoidance,**
446 *Minimization, and Mitigation Evaluation*).

447 Interior vibration conditions at the same three receptors may range from 80 to 90 VdB, which
448 would exceed the threshold for human annoyance. This would only occur when vibration-
449 generating work is conducted near the buildings, however. Vibration annoyance typically
450 would not occur beyond 50 feet of the vibration source.

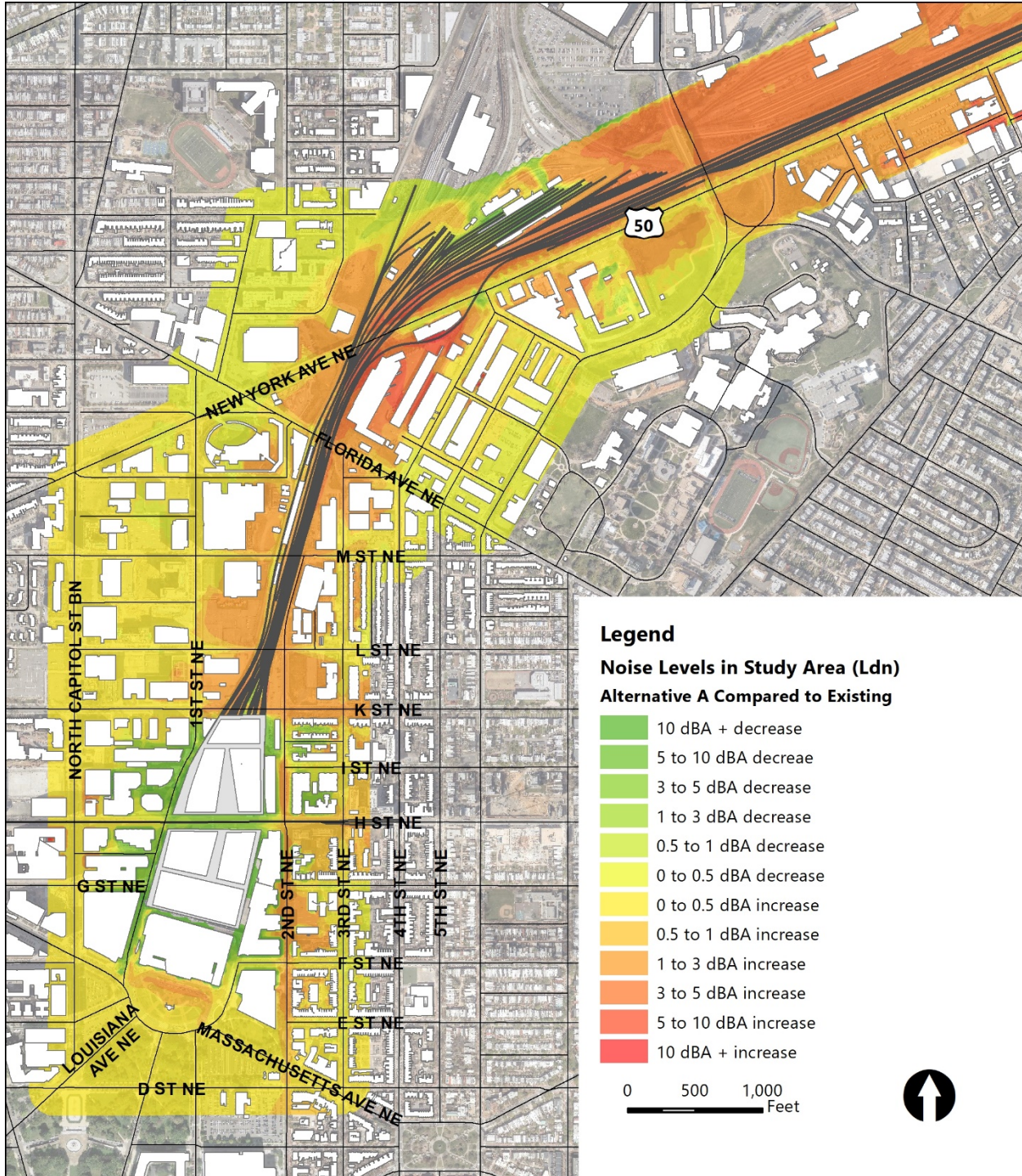
451 Vibration from truck traffic would cause moderate adverse impacts by exceeding the
452 threshold for annoyance at 12 locations close to New York Avenue, North Capitol Street and
453 2nd Street NE. These locations include UDC Community College (R8); the C&P Telephone
454 Company/NPR Studio building (R19); the Hecht Warehouse lofts (R58); residential units in the
455 Square 750 block (203-219 K Street NE, 917-923 2nd Street NE) (R103 and R106); residential
456 and institutional receptors on the edge of the Capitol Hill Historic District (603-607 2nd Street
457 NE [R138], 205 F Street NE [R142], 521-527 2nd Street NE [R143]); and Landmark Lofts (R118)
458 in the historic St. Joseph's Home building. One planned development location at 411 New
459 York Ave NE (R62) also would be moderately impacted if the development has been
460 completed at the time of construction. These impacts would occur in the All Truck and Mixed
461 Scenarios but would be less noticeable in the Work Train Scenario.

Comparison to Existing Conditions

462 **Figure 5-43** shows changes in noise levels in Alternative A relative to existing conditions. In
463 most locations, Alternative A would result in negligible adverse operational impacts from
464 increase in noise levels not exceeding 3 dBA (Ldn) (less than 3 dBA changes are commonly
465 imperceptible). These negligible impacts would be the result of increases in street traffic and
466 rail operations.

467 In locations closest to the rail terminal south of K Street NE, Alternative A would have a
468 beneficial impact on noise levels relative to existing conditions. Noise would decrease
469 substantially (from approximately 5 to 10 dBA) because the Project elements and the private
470 air-rights development would cover the currently open rail terminal. Reductions in traffic
471 volumes on First Street NE, which would become a one-way road, would also contribute to
472 the reduction.

Figure 5-43. Comparison of Alternative A and Existing Noise Conditions



473 There would be minor adverse operational impacts due to increases in vibration in
474 Alternative A relative to existing conditions. The greatest potential for increase in vibration
475 would come from the re-introduction of Track 43 and the VRE MSRF tracks (a separate
476 project). Re-introducing Track 43 would shift the easternmost track up to 10 feet closer to
477 receptors on the east side of WUS. For the closest receptors, approximately 50 feet away
478 from the nearest track, Track 43 would increase vibration by approximately up to 2 VdB, a
479 minor impact.

480 Given the track improvements proposed in Alternative A, all vibration-sensitive receptors
481 would be below the FTA vibration impact criteria in all areas, except the Union Market area.
482 At the planned Kettler development (300 Morse Street NE) (R65), interior vibration levels
483 would be 77 VdB (maximum in any 1/3-octave band) due to the new VRE MSRF tracks, which
484 exceeds the FTA vibration criteria. The developer is working with VRE to address potential
485 noise and vibration effects.

5.10.4.3 Alternative B

Direct Operational Impacts

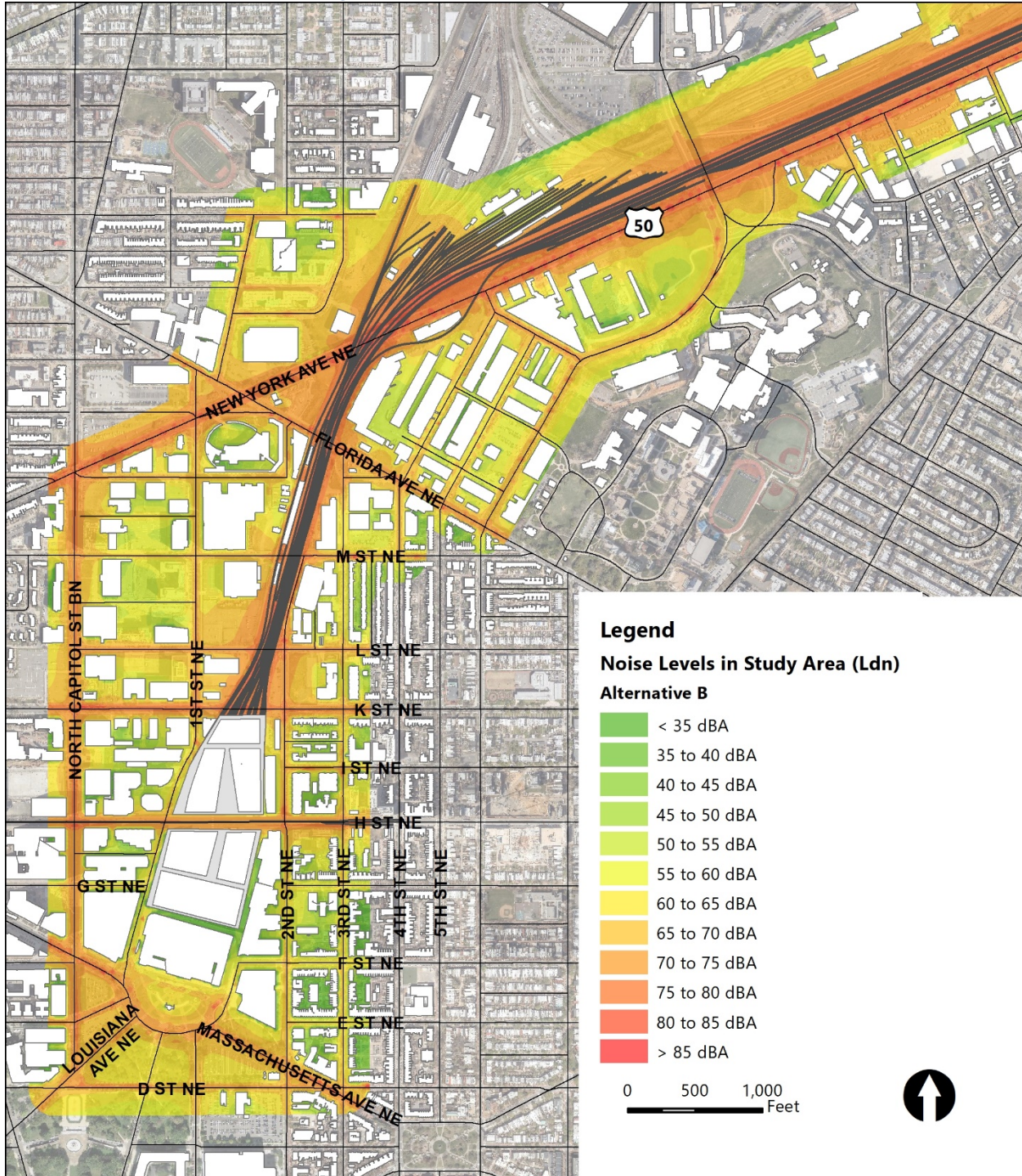
486 **Relative to the No-Action Alternative, in Alternative B, noise levels would increase by no**
487 **more than 3 dBA. This would result in moderate adverse operational direct impacts at 14**
488 **locations in the Study Area. Alternative B would have a minor, localized adverse direct**
489 **operational impact on vibration near the throat of the rail terminal and negligible adverse**
490 **operational direct elsewhere.**

Operational Noise

491 **Figure 5-44** shows modeled operational noise levels in Alternative B. Impacts would generally
492 be the same as in Alternative A (**Section 5.10.4.2, Alternative A, Direct Operational Impacts**
493 **and Figure 5-36**).⁸ Noise levels would range from 60 to 75 dBA (Ldn), which is typical for a
494 dense urban setting. Detailed modeling results for those locations where the moderate
495 threshold would be exceeded can be found in **Appendix C3, Washington Union Station**
496 **Expansion Project, Environmental Consequences Technical Report, Section 10.5.3.1, Direct**
497 **Operational Impacts, Operational Noise, Table 10-12**. Stationary noise sources would be the
498 same in Alternative B as in Alternative A. The same negligible impacts would occur
499 (**Section 5.10.4.2, Alternative A, Direct Operational Impact**).

⁸ Rail operations would be the same in all Action Alternatives as would be the overall increase in road traffic relative to the No-Action Alternative. Because in Alternative B, the parking entrance would be on K Street NE rather than H Street NE, traffic volumes on these streets would be different in Alternative A and Alternative B. However, the resulting difference in noise levels would be within 0.2 dBA, which would be imperceptible.

Figure 5-44. Noise Levels, Alternative B



Operational Vibration

500 Operational vibration impacts in Alternative B would be the same as in Alternative A
501 (**Section 5.10.4.2, Alternative A, Direct Operational Impact**).

Indirect Operational Impacts

502 **Relative to the No-Action Alternative, there would be no indirect noise or vibration**
503 **operational impacts in Alternative B.**

504 All noise and vibration impacts would take place at the same time as the action and none
505 would occur beyond the Operational Noise and Vibration Study Area.

Construction Impacts

Support of Excavation Noise

506 **In Alternative B, SOE construction would result in major adverse noise impacts at 28**
507 **locations and moderate adverse noise impacts at nine locations.**

508 Alternative B's SOE would include a slurry wall down to bedrock; secant pile walls (64 feet
509 deep) around the easternmost edge of the Project Area; and interior sheet pile walls (up to
510 100 feet deep).

511 Construction of the SOE structures would involve slurry wall construction with clam shovels;
512 secant pile wall construction using drill rigs; vibratory pile driving for sheet pile wall
513 construction; and operation of cranes, dump trucks, and excavators.

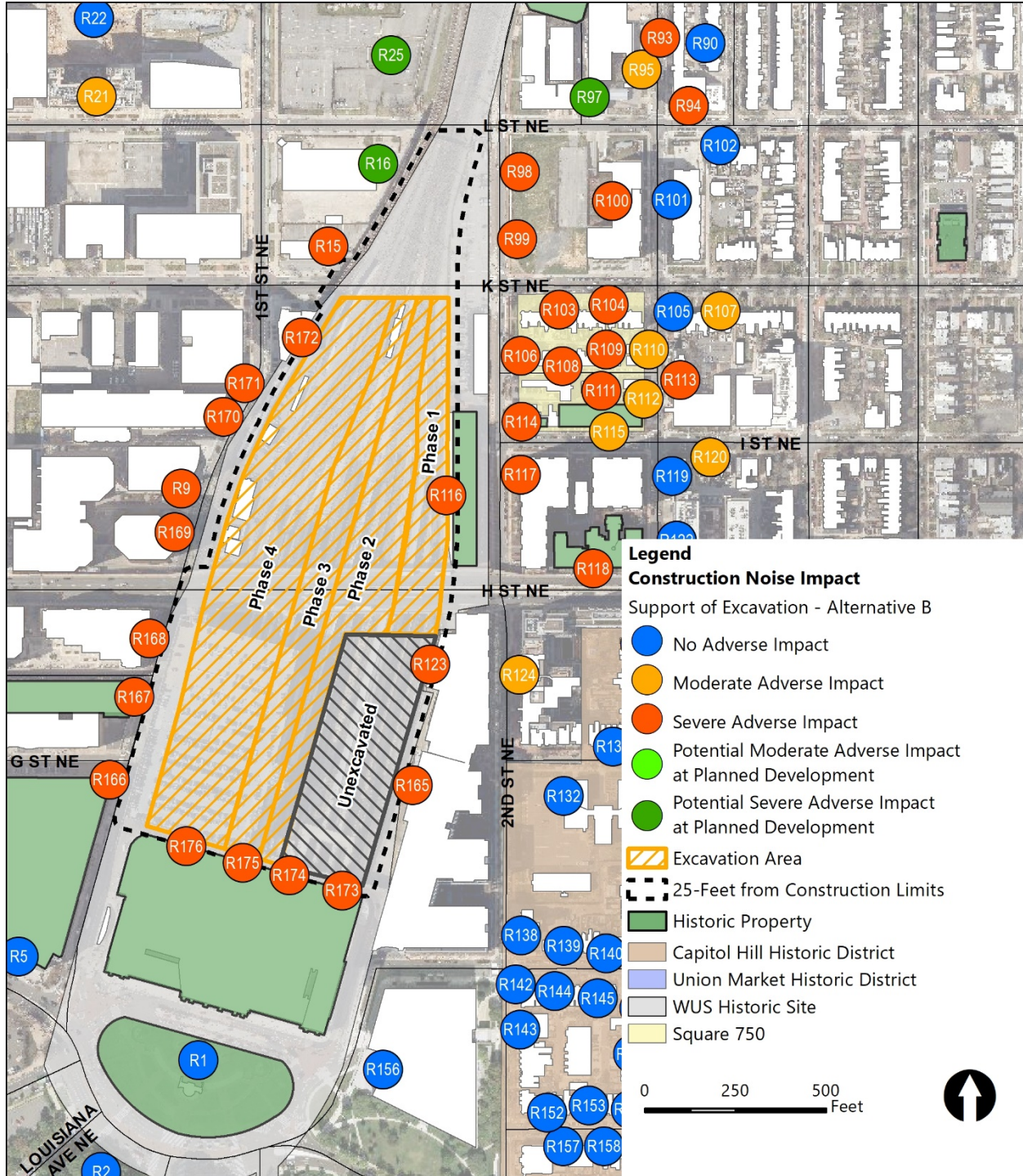
514 In Alternative B, the noise generated by SOE construction activities would exceed applicable
515 District or FTA criteria at multiple receptors adjacent to WUS and along 2nd Street NE north
516 of H Street, resulting in major adverse noise impacts at 28 locations and moderate adverse
517 impacts at nine locations. Affected receptors are shown in **Figure 5-45**.⁹ Detailed modeling
518 results for these receptors can be found in **Appendix C3, Washington Union Station**
519 **Expansion Project, Environmental Consequences Technical Report, Section 10.5.3.3,**
520 **Construction Impacts, Table 10-13.**

521 Locations where there would be major adverse noise impacts from SOE construction include:
522 WUS at the south end of the rail terminal (R173-176); the REA Building (R116); the US
523 Securities and Exchange Commission building (R165); and the Kaiser Permanente Medical
524 Center (R123) as well as several residential and commercial building along First Street NE,
525 2nd Street NE, I (Eye) Street NE, and Parker Street, NE. In addition, the sites of three planned
526 developments (Storey Park [R16], 170 L Street NE [R25], 1109 Congress Street NE [R97])
527 would experience noise levels in excess of the severe impact threshold.¹⁰

⁹ Some locations include multiple modeled receptors.

¹⁰ Noise levels at planned developments were modeled but not assessed for impacts. Impacts would occur at these locations only if they have been developed at the time Project construction occurs.

Figure 5-45. Support of Excavation Noise Impacts, Alternative B



Excavation Noise

Start of Excavation

528 **In Alternative B, at the start of excavation, there would be major adverse noise impacts at**
529 **25 locations (All Truck Scenario), 24 locations (Mixed Scenario), or 20 locations (Work Train**
530 **Scenario). There would be moderate adverse noise impacts at seven locations (All Truck**
531 **Scenario and Mixed Scenario) or eight locations (Work Train Scenario).**

532 At the beginning of excavation, there would be no difference in the noise produced by the
533 various Action Alternatives. The same equipment would perform the same activities at street
534 level, resulting in similar noise levels. Impacts would be as described in **Section 5.10.4.2,**
535 *Alternative A, Construction Noise Impacts.*

End of Excavation

536 **In Alternative B, at the end of excavation, there would be major adverse noise impacts at**
537 **five locations (All Truck Scenario) or four locations (Mixed Scenario and Work Train**
538 **Scenario). There would be moderate adverse noise impacts at 13 locations (All Truck**
539 **Scenario), seven locations (Mixed Scenario), or two locations (Work Train Scenario).**

540 At the end of excavation in Alternative B, noise-producing equipment would operate at the
541 bottom of a pit deep enough to accommodate two levels of below-ground parking, resulting
542 in significant attenuation and street-level noise substantially lower than at the start of
543 excavation. Noise levels would range from 56 to 86 dBA (Ldn) in the All Truck Scenario; from
544 55 to 85 dBA (Ldn) in the Mixed Scenario; and from 48 to 83 dBA (Ldn) in the mixed Scenario.
545 They would be approximately 4 dBA (Ldn) higher in the All Truck Scenario than in the Work
546 Train Scenario.

547 **Figure 5-46** and **Figure 5-47** illustrate end-of-excavation impacts in the All Truck Scenario and
548 in the Work Train Scenario, respectively. Detailed modeling results for the affected locations
549 under all three scenarios can be found in **Appendix C3, Washington Union Station Expansion**
550 **Project, Environmental Consequences Technical Report, Section 10.5.3.3, Construction**
551 **Impacts, Table 10-14.**

552 The north side of the historic station building (R173-176), the REA Building (R116), the Kaiser
553 Permanente Medical Center (R123), and the Senate Square Apartments on I (Eye) Street NE
554 (R117) would experience major adverse impacts in all three scenarios. The US Securities and
555 Exchange Commission Building (R165) would experience a major adverse impact in the All
556 Truck Scenario and a moderate impact only in the other two scenarios. The criteria for
557 moderate impact would be exceeded at one location with a planned development (1109
558 Congress Street NE [R97]) in the All Truck Scenario. There would be a moderate adverse
559 impact at this location under this scenario if it has been developed with or permitted for
560 sensitive uses by the time construction occurs.

Figure 5-46. End of Excavation Noise Impacts (All Truck Scenario), Alternative B

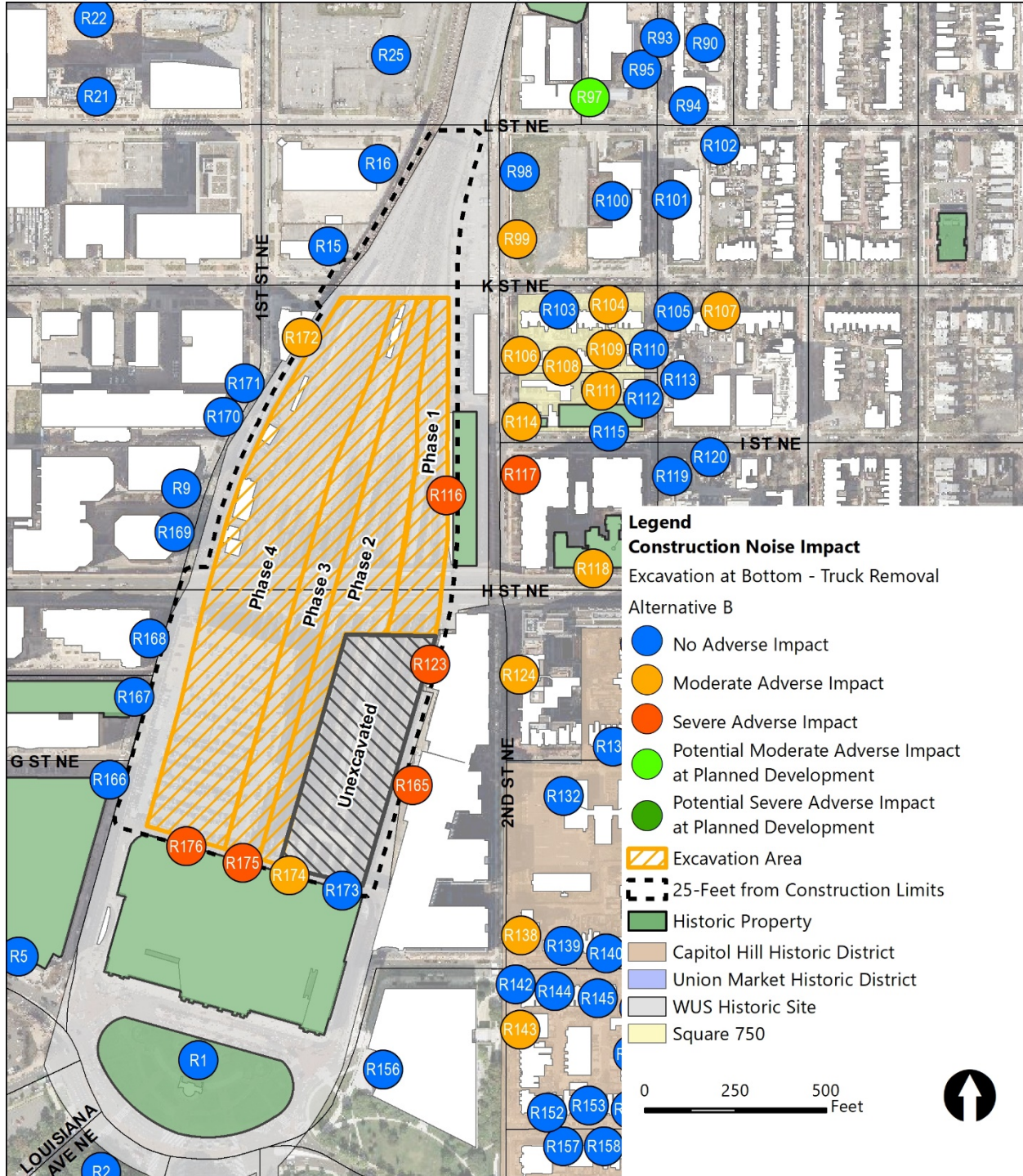
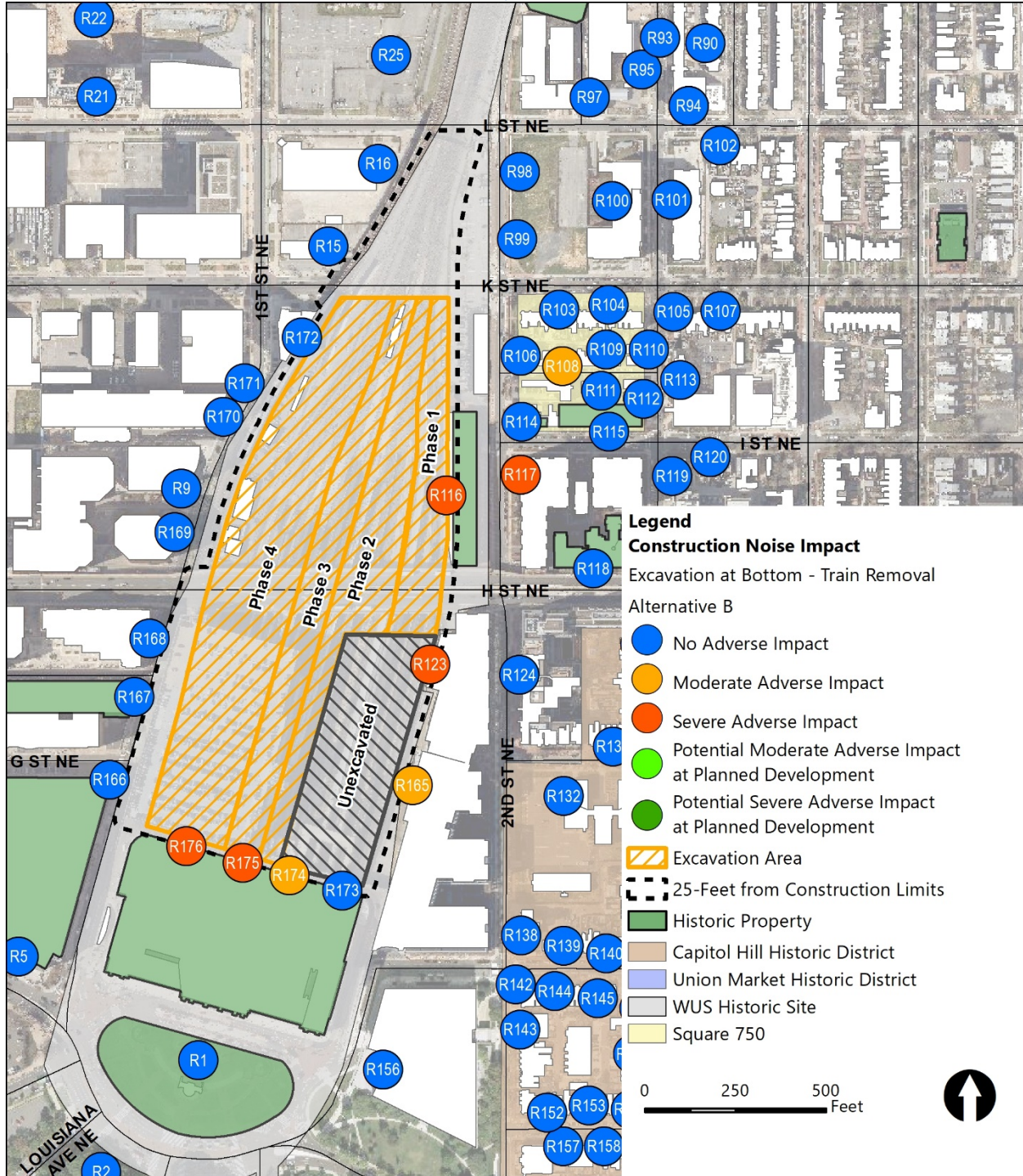


Figure 5-47. End of Excavation Noise Impacts (Work Train Scenario), Alternative B



Construction Vibration Impacts

561 **In Alternative B, there would be a major adverse impact from vibration during SOE**
562 **construction on the REA Building, the Kaiser Permanente Medical Center, the National**
563 **Association of Student Personnel Administrators (NASPA) building, and the Union Station**
564 **historic station building due to potential risk of structural damage. There would be**
565 **moderate adverse impact from truck-generated vibration at 12 locations due to**
566 **annoyance.**

567 **Figure 5-48** shows the receptors that would experience vibration impacts during construction
568 of Alternative B. Detailed modeling results for these locations are provided in **Appendix C3,**
569 *Washington Union Station Expansion Project, Environmental Consequences Technical Report,*
570 **Section 10.5.3.3, Construction Impacts, Table 10-15.**

571 Vibration from construction activities would potentially cause major adverse impacts on the
572 Union Station historic station building (R173-176) and NASPA building (R172) because clam
573 shovel drops associated with slurry wall construction may occur within 10 feet of the former
574 and 35 feet of the latter, resulting in vibration levels of approximately 0.12 to 0.8 in/s. Drilling
575 for secant pile walls may occur within 10 to 16 feet of the REA building (R116) and Kaiser
576 Permanente Medical Center (R123), resulting in vibration levels of approximately 0.17 to 0.35
577 in/s. Vibratory sheet pile driving may occur within 10 to 16 feet of the REA building and
578 Union Station historic station building, resulting in vibration levels of 0.33 to 0.67 in/s.

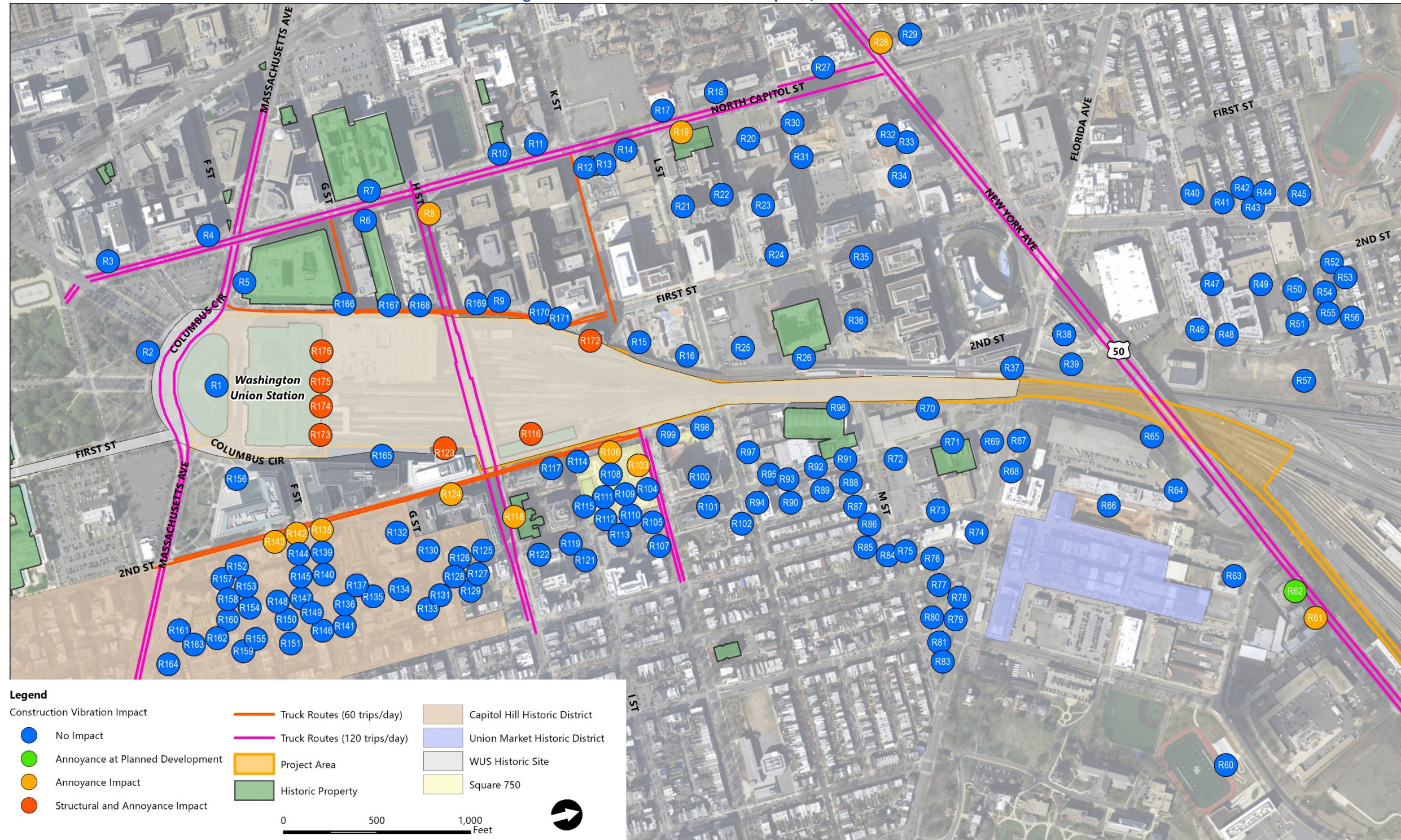
579 In its initial stages, the column removal work may generate vibration impacts within the
580 eastern part of the historic station building if jackhammers are to break the existing flooring
581 and access girders and column from above. Such impacts would be of brief duration.

582 Vibration levels at the four buildings may exceed the criterion for increased risk of structural
583 damage but this would depend on building sensitivity, which in turn is a function of the type
584 of construction (see **Table 5-119** above). All four buildings were designed within the context
585 of an active rail terminal and are all large masonry structures. Therefore, they can be
586 expected to have low sensitivity, reducing the risk of structural impact. However, as historic
587 structures, the REA Building and the historic station building may warrant the application of a
588 lower criterion than the one applicable to buildings of similar construction but more recent.
589 The sensitivity of the buildings would have to be assessed in the Construction Noise and
590 Vibration Plan that would be prepared for the Project (see **Section 5.10.6, Avoidance,**
591 *Minimization, and Mitigation*).

592 Interior vibration conditions at the same receptors may exceed 75 VdB, which would be
593 above the threshold for human annoyance. This would only occur when vibration-generating
594 work is conducted near the buildings, however. Vibration annoyance typically would not
595 occur beyond 50 feet of the vibration source.

Alternative B would have moderate adverse impacts from truck traffic vibration at the same
12 locations and one planned development as Alternative A. These are described in
Section 5.10.4.2, Alternative A, Construction Impacts.

Figure 5-48. Construction Vibration Impacts, Alternative B



Comparison to Existing Conditions

596 Because the operational noise impacts of Alternative B on noise and vibration levels relative
597 to the No-Action Alternative would be indistinguishable from those of Alternative A, its
598 impacts relative to existing conditions would also be the same. These are described in
599 **Section 5.10.4.2, Alternative A, Comparison to Existing Conditions.**

5.10.4.4 Alternative C

Direct Operational Impacts

600 **Relative to the No-Action Alternative, in Alternative C (either option), noise levels would**
601 **increase by no more than 3 dBA. This would result in moderate adverse operational direct**
602 **impacts at 14 locations in the Study Area. Alternative C (either option) would have a minor,**
603 **localized adverse direct operational impact on vibration near the throat of the rail terminal**
604 **and negligible adverse operational direct elsewhere.**

Operational Noise Impacts

605 **Figure 5-49 and Figure 5-50** show modeled operational noise levels in Alternative C with the
606 East Option and the West Option, respectively.

607 There are no measurable differences between the two options. Impacts would generally be
608 the same as in Alternative A (**Section 5.10.4.2, Alternative A, Direct Operational Impacts** and
609 **Figure 5-36**).¹¹ Noise levels would range from 60 to 75 dBA (Ldn), which is typical for a dense
610 urban setting.

611 Detailed modeling results for those locations where the moderate threshold would be
612 exceeded can be found in **Appendix C3, Washington Union Station Expansion Project,**
613 **Environmental Consequences Technical Report, Section 10.5.4.1, Direct Operational Impacts,**
614 **Operational Noise, Table 10-16** (East Option) and **Table 10-17** (West Option). Stationary noise
615 sources would be the same in Alternative C as in Alternative A. The same negligible impacts
616 would occur (**Section 5.10.4.2, Alternative A, Direct Operational Impact**).

Operational Vibration Impacts

617 Operational vibration impacts in Alternative C would be the same as in Alternative A
618 (**Section 5.10.4.2, Alternative A, Direct Operational Impact**).

¹¹ Rail operations would be the same in all Action Alternatives as would be the overall increase in road traffic relative to the No-Action Alternative. Because in Alternative C, access to parking would be split between K Street NE and H Street NE, traffic volumes on these streets would be different in Alternative A and Alternative C. However, the resulting difference in noise levels would be within 0.2 dBA, which would be imperceptible.

Figure 5-49. Noise Levels, Alternative C East Option

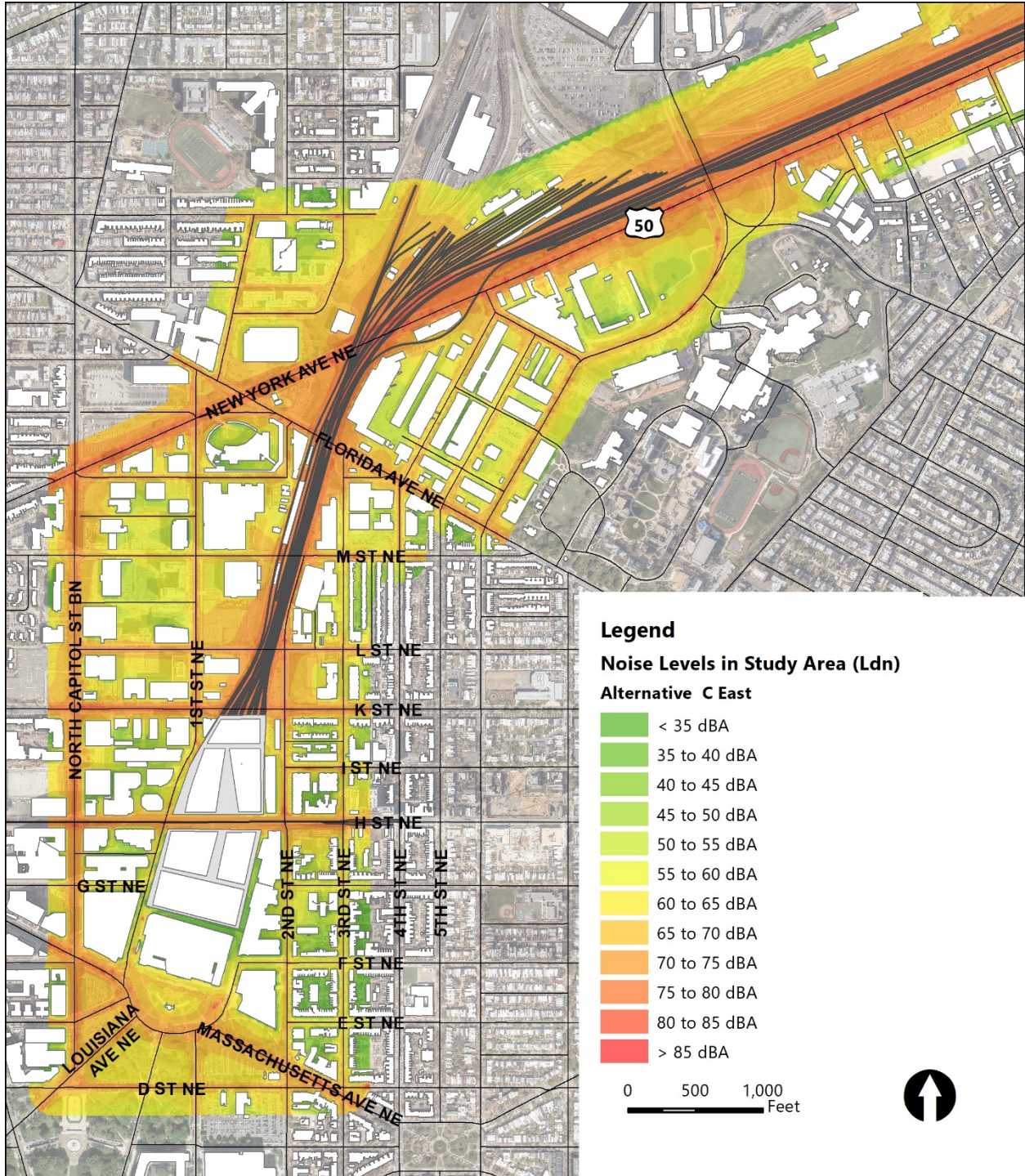
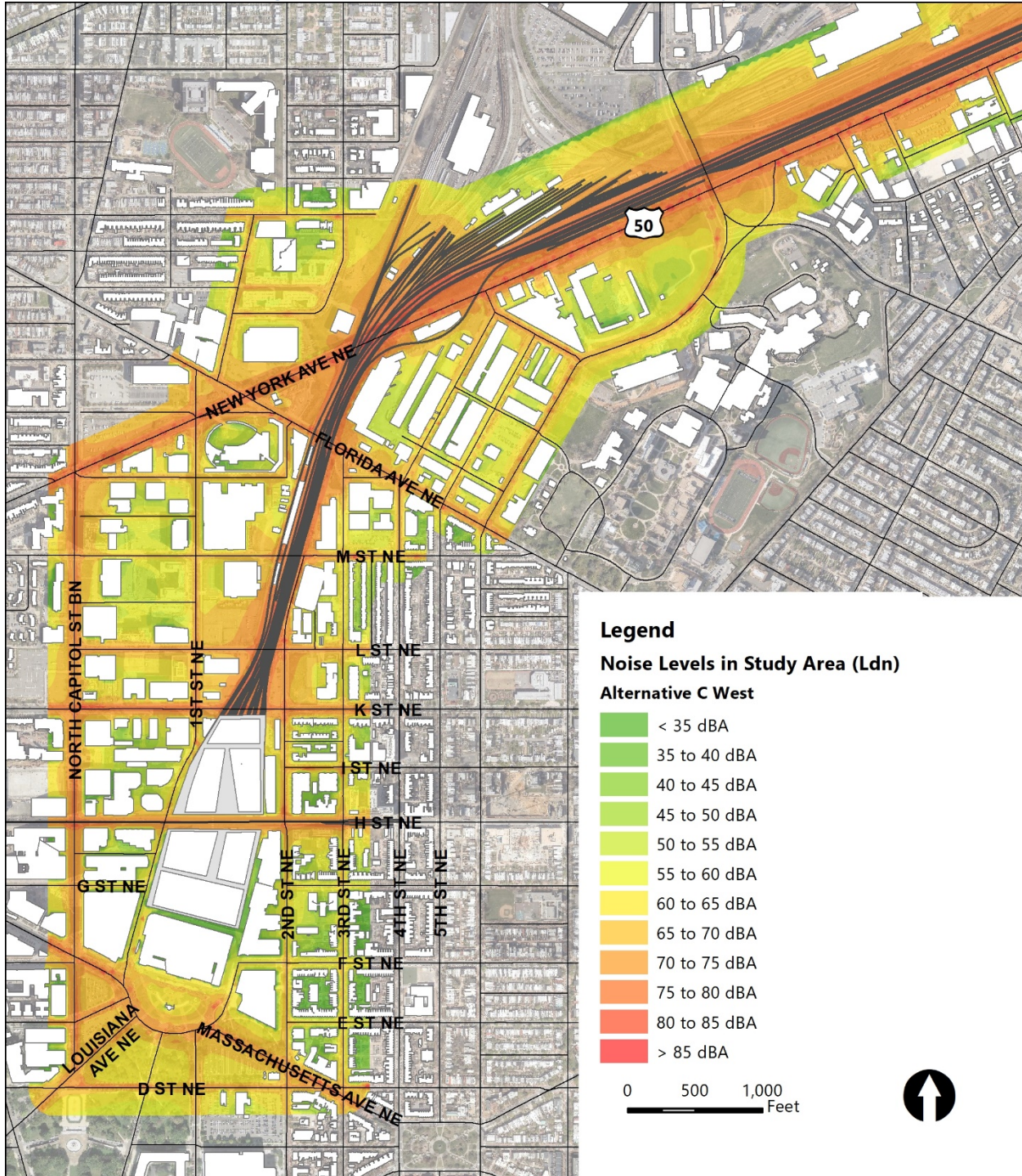


Figure 5-50. Noise Levels, Alternative C West Option



Indirect Operational Impacts

619 **Relative to the No-Action Alternative, there would be no indirect noise or vibration**
620 **operational impacts in Alternative C.**

621 All noise and vibration impacts would take place at the same time as the action and none
622 would occur beyond the Operational Noise and Vibration Study Area.

Construction Impacts

Support of Excavation Noise

623 **In Alternative C (either option), SOE construction would result in major adverse noise**
624 **impacts at 25 locations and moderate adverse noise impacts at four locations.**

625 In either option, the Alternative C SOE would include sheet pile walls 100 and 64 feet around
626 and inside the Project Area. Construction of the SOE structures in all phases would involve
627 the use of vibratory sheet pile drivers, cranes, drill rigs, dump trucks, and excavators.

628 In Alternative C, the noise generated by SOE construction activities would exceed applicable
629 District or FTA criteria at multiple receptors adjacent to WUS and along 2nd Street NE north
630 of H Street, resulting in major adverse noise impacts at 25 locations and moderate impacts at
631 four locations. The affected receptors are shown in **Figure 5-51**.¹²

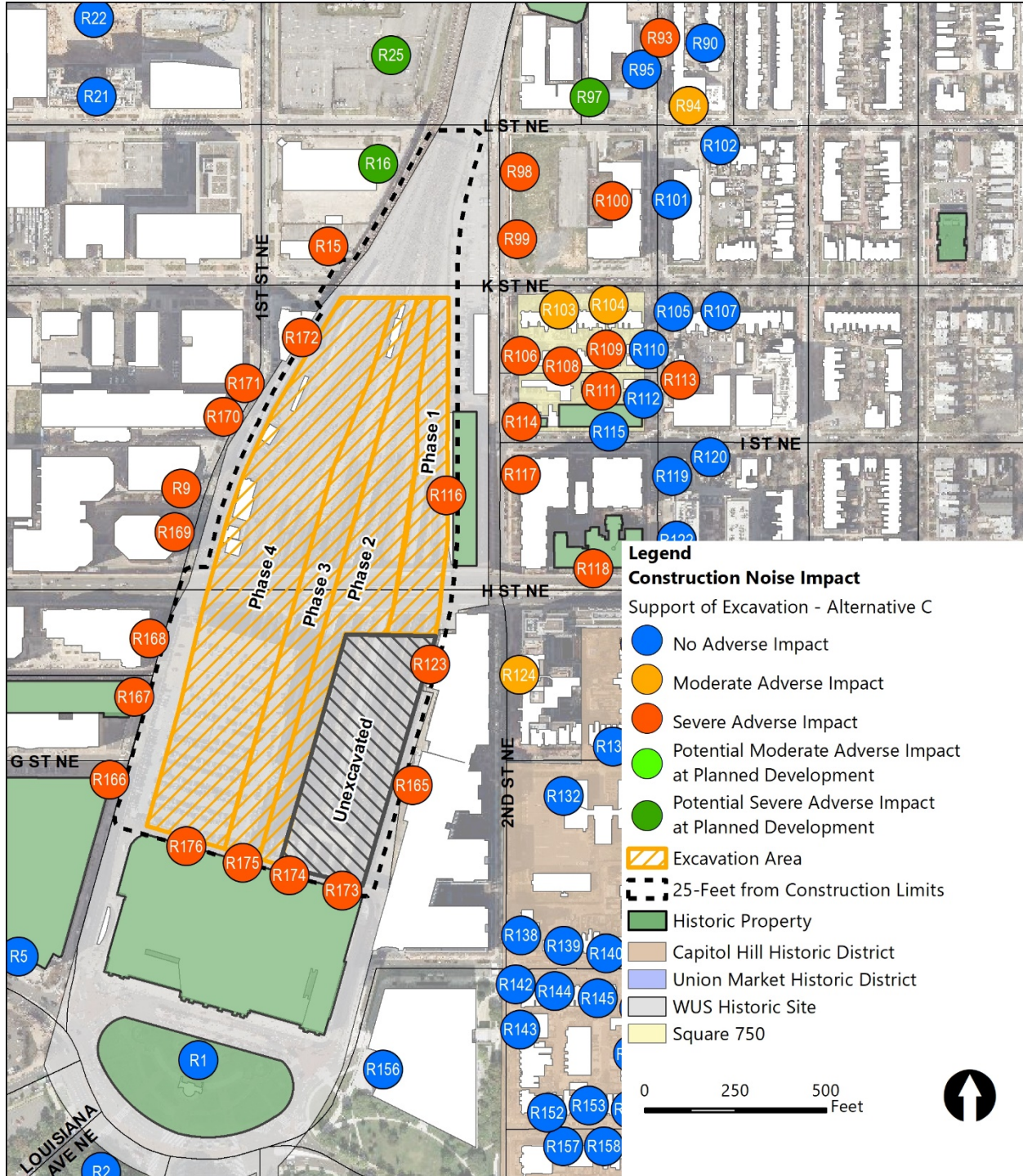
632 Detailed modeling results for these receptors can be found in **Appendix C3**, *Washington*
633 *Union Station Expansion Project, Environmental Consequences Technical Report*, **Section**
634 **10.5.4.3, Construction Impacts, Table 10-18**.

635 Locations where there would be major adverse noise impacts from SOE construction in
636 Alternative C include: WUS at the south end of the rail terminal (R173-176); the REA Building
637 (R116); the US Securities and Exchange Commission building (R165); and the Kaiser
638 Permanente Medical Center (R123) as well as several residential and commercial building
639 along First Street NE, 2nd Street NE, and Parker Street, NE. Additionally, the sites of three
640 planned developments (Storey Park [R16], 170 L Street NE [R25], and 1109 Congress Street
641 NE [R97]) would experience noise levels in excess of the threshold for severe impacts.¹³

¹² Some locations include multiple modeled receptors.

¹³ Noise levels at planned developments were modeled but not assessed for impacts. Impacts would occur at these locations only if they have been developed at the time Project construction occurs.

Figure 5-51. Support of Excavation Noise Impacts, Alternative C



Excavation Noise

Start of Excavation

642 **In Alternative C (either option), at the start of excavation, there would be major adverse**
643 **noise impacts at 25 locations (All Truck Scenario), 24 locations (Mixed Scenario), or 20**
644 **locations (Work Train Scenario). There would be moderate adverse noise impacts at seven**
645 **locations (All Truck and Mixed Scenarios) or eight locations (Work Train Scenario).**

646 At the beginning of excavation, there would be no difference in the noise produced by the
647 various Action Alternatives. The same equipment would perform the same activities at street
648 level, resulting in similar noise levels. Impacts would be as described in **Section 5.10.4.2,**
649 *Alternative A, Construction Noise Impacts.*

End of Excavation

650 **In Alternative C (either option), at the end of excavation, there would be major adverse**
651 **noise impacts at five locations (All Truck Scenario) or four locations (Mixed Scenario and**
652 **Work Train Scenario). There would be moderate adverse noise impacts at 17 locations (All**
653 **Truck Scenario), 11 locations (Mixed Scenario), or five locations (Work Train Scenario).**

654 At the end of excavation in Alternative C, noise-producing equipment would operate at the
655 bottom of a pit deep enough to accommodate one level of below-ground parking, causing
656 noise attenuation and reducing street-level noise relative to the start of excavation. Noise
657 levels would range from 56 to 86 dBA (Ldn) in the All Truck Scenario; from 55 to 85 dBA (Ldn)
658 in the Mixed Scenario; and from 49 to 83 dBA (Ldn) in the mixed Scenario. They would be
659 approximately 4 dBA (Ldn) higher in the All Truck Scenario than in the Work Train Scenario.

660 **Figure 5-52 and Figure 5-53** illustrate end-of-excavation noise impacts in the All Truck
661 Scenario and in the Work Train Scenario, respectively.

662 Detailed modeling results for the affected locations under all three scenarios can be found in
663 **Appendix C3, Washington Union Station Expansion Project, Environmental Consequences**
664 *Technical Report, Section 10.5.4.3, Construction Impacts, Table 10-19.*

665 The north side of the historic station building (R173-176), the REA Building (R116), the Kaiser
666 Permanente Medical Center (R123), and the Senate Square Apartments on I (Eye) Street NE
667 (R117) would experience major adverse impacts in all three scenarios. The US Securities and
668 Exchange Commission Building (R165) would experience a major adverse impact in the All
669 Truck Scenario and a moderate impact only in the other two scenarios.

Figure 5-52. End of Excavation Noise Impacts (All Truck Scenario), Alternative C

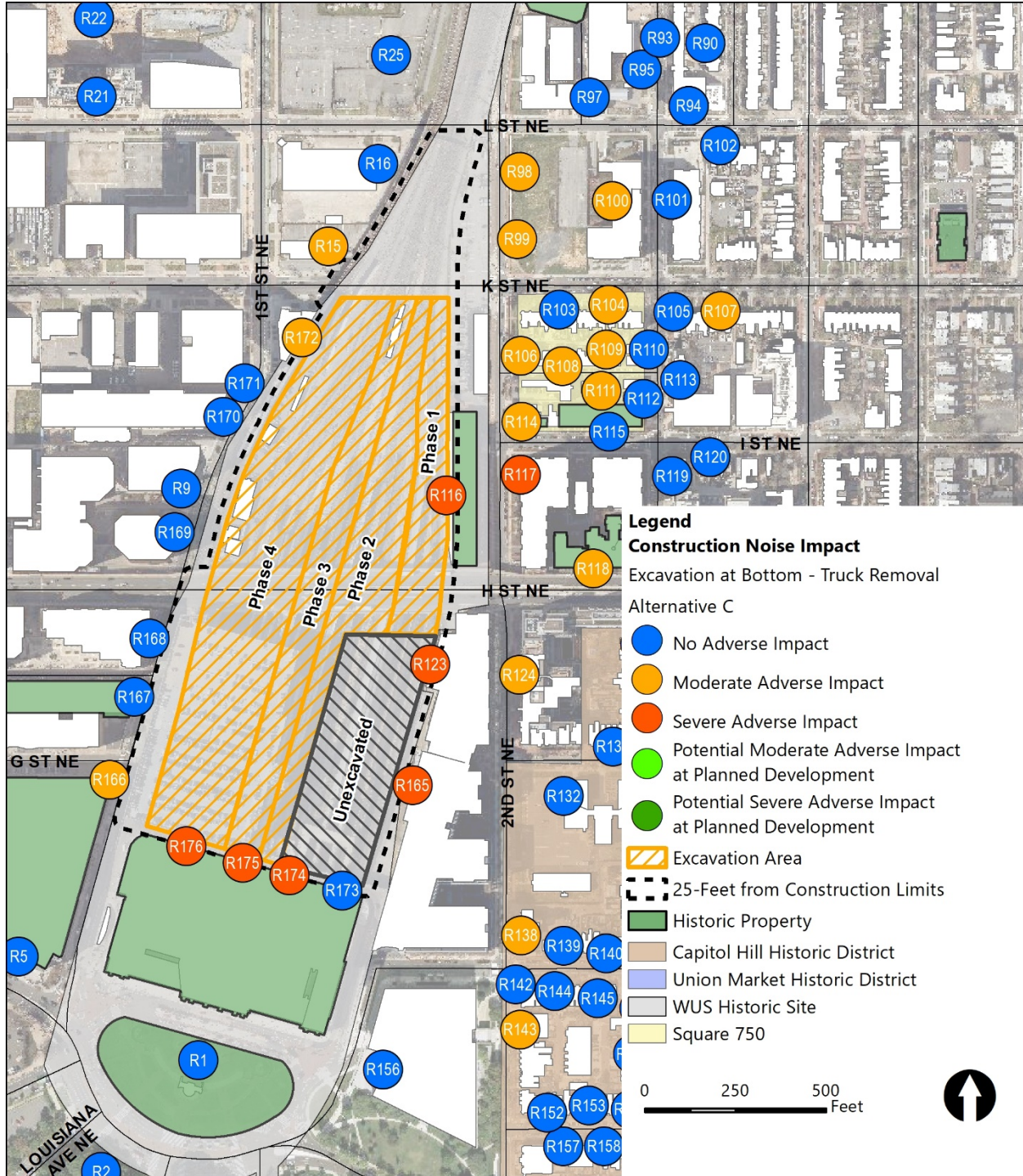
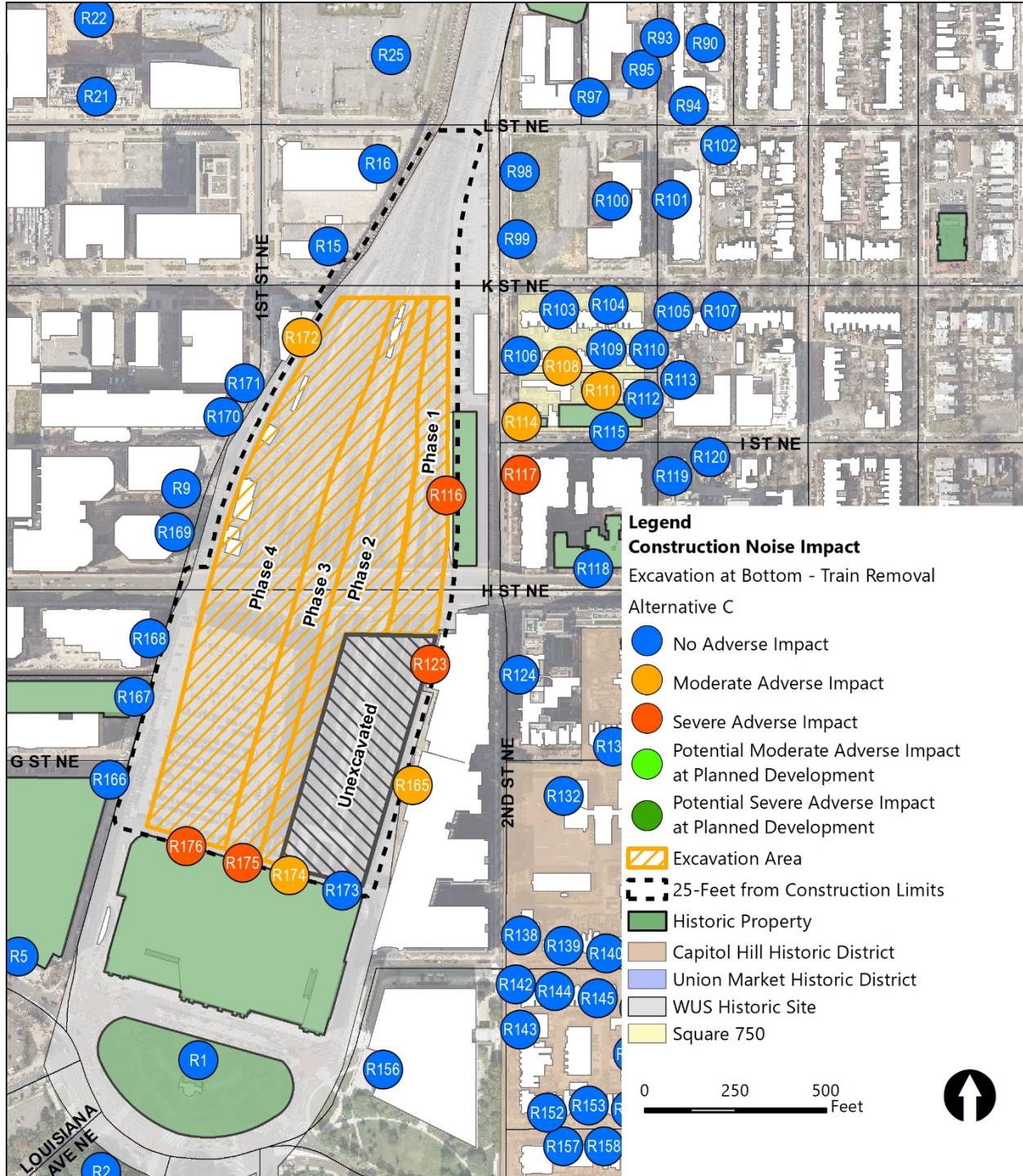


Figure 5-53. End of Excavation Noise Impacts (Work Train Scenario), Alternative C



Construction Vibration Impacts

670 **In Alternative C (either option), there would be a major adverse impact from vibration**
671 **during SOE construction on the REA Building, the Kaiser Permanente Medical Center, and**
672 **the Union Station historic station building due to potential risk of structural damage. There**
673 **would be moderate adverse impact from truck-generated vibration at 12 locations due to**
674 **annoyance.**

675 **Figure 5-54** shows the receptors that would experience vibration impacts during the
676 construction of Alternative C. Detailed modeling results for these locations are provided in
677 **Appendix C3, Washington Union Station Expansion Project, Environmental Consequences**
678 **Technical Report, Section 10.5.4.3, Construction Impacts, Table 10-20.**

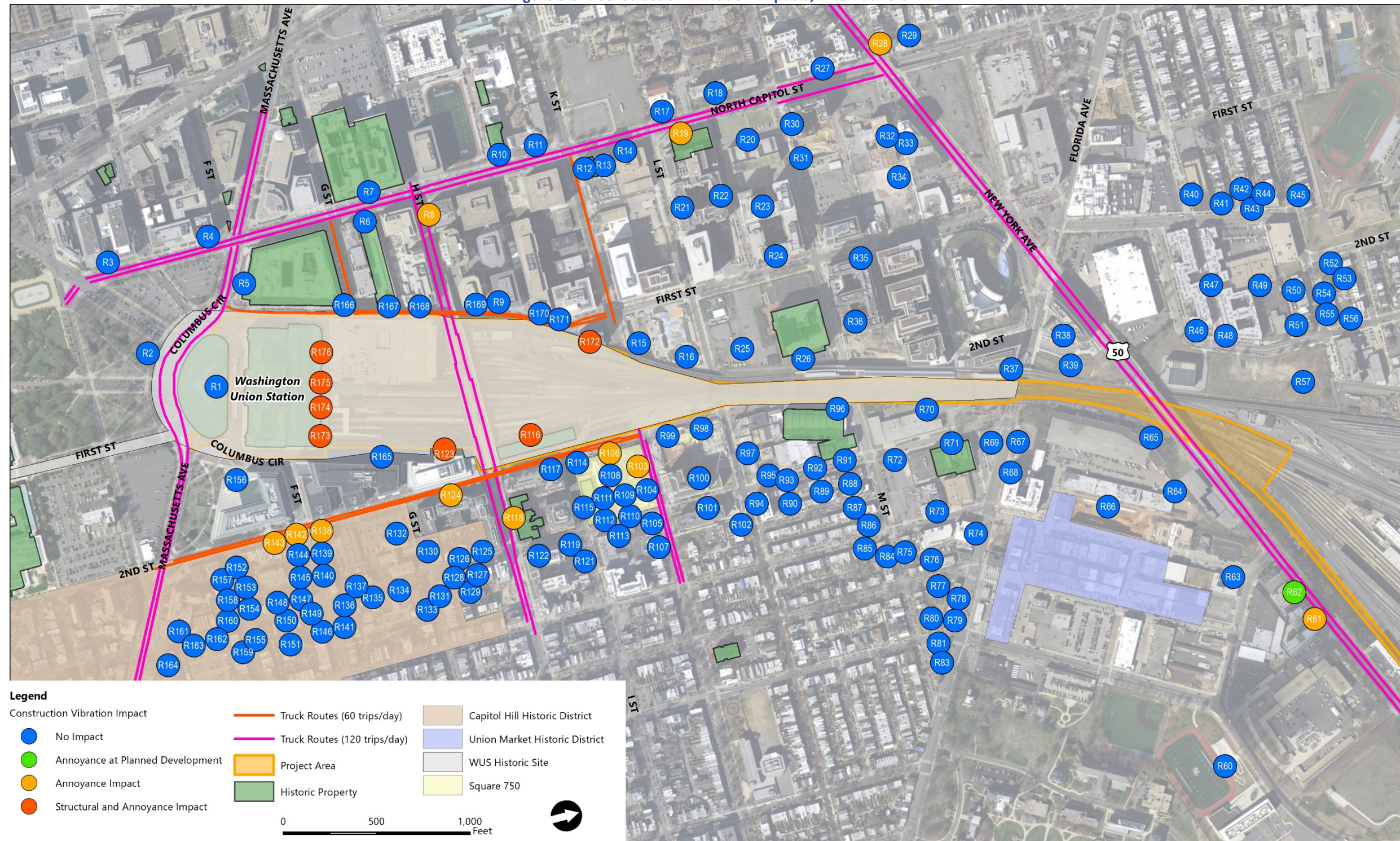
679 There would be major adverse impacts on the Union Station historic station building (R174-
680 176), REA Building (R116), and Kaiser Permanent Medical Center (R123) because sheet pile
681 driving may occur within 10 to 16 feet of these buildings, resulting in vibration levels of
682 approximately 0.33 to 0.67 in/s. As in all Action Alternatives, in its initial stages, the column
683 removal work may generate vibration impacts within the eastern part of the historic station
684 building if jackhammers are to break the existing flooring and access girders and column from
685 above. Such impacts would be of brief duration.

686 Vibration levels at the three buildings may exceed the criterion for increased risk of structural
687 damage but this would depend on building sensitivity, which in turn is a function of the type
688 of construction (see **Table 5-119** above). All three buildings were designed within the context
689 of an active rail terminal and are all large masonry structures. Therefore, they can be
690 expected to have low sensitivity, reducing the risk of structural impact. However, as historic
691 structures, the REA Building and the historic station building may warrant the application of a
692 lower criterion than the one applicable to buildings of similar construction but more recent.
693 The sensitivity of the buildings would have to be assessed in the Construction Noise and
694 Vibration Plan that would be prepared for the Project (see **Section 5.10.6, Avoidance,**
695 **Minimization, and Mitigation**).

696 Interior vibration conditions at the same receptors may exceed 75 VdB, which would be
697 above the threshold for human annoyance. This would only occur when vibration-generating
698 work is conducted near the buildings, however. Vibration annoyance typically would not
699 occur beyond 50 feet of the vibration source.

700 Alternative C would cause moderate adverse impacts from truck traffic vibration at the same
701 12 locations and one planned development, as in Alternative A. These are described in
702 **Section 5.10.4.2, Alternative A, Construction Impacts.**

Figure 5-54. Construction Vibration Impacts, Alternative C



Comparison to Existing Conditions

703 Because the operational noise impacts of Alternative C on noise and vibration levels relative
704 to the No-Action Alternative would be indistinguishable from those of Alternative A, it
705 impacts relative to existing conditions would also be the same. They are described in **Section**
706 **5.10.4.2, Alternative A, Comparison to Existing Conditions.**

5.10.4.5 Alternative D

Direct Operational Impacts

707 **Relative to the No-Action Alternative, in Alternative D, noise levels would increase by no**
708 **more than 3 dBA. This would result in moderate adverse operational direct impacts at 14**
709 **locations in the Study Area. Alternative D would have a minor localized adverse direct**
710 **operational impact on vibration near the throat of the rail terminal and negligible adverse**
711 **operational direct elsewhere.**

Operational Noise Impacts

712 **Figure 5-55** shows modeled operational noise levels in Alternative D. Impacts would generally
713 be the same as in Alternative A (**Section 5.10.4.2, Alternative A, Direct Operational Impacts**
714 **and Figure 5-36**).¹⁴ Noise levels would range from 60 to 75 dBA (Ldn), which is typical for a
715 dense urban setting.

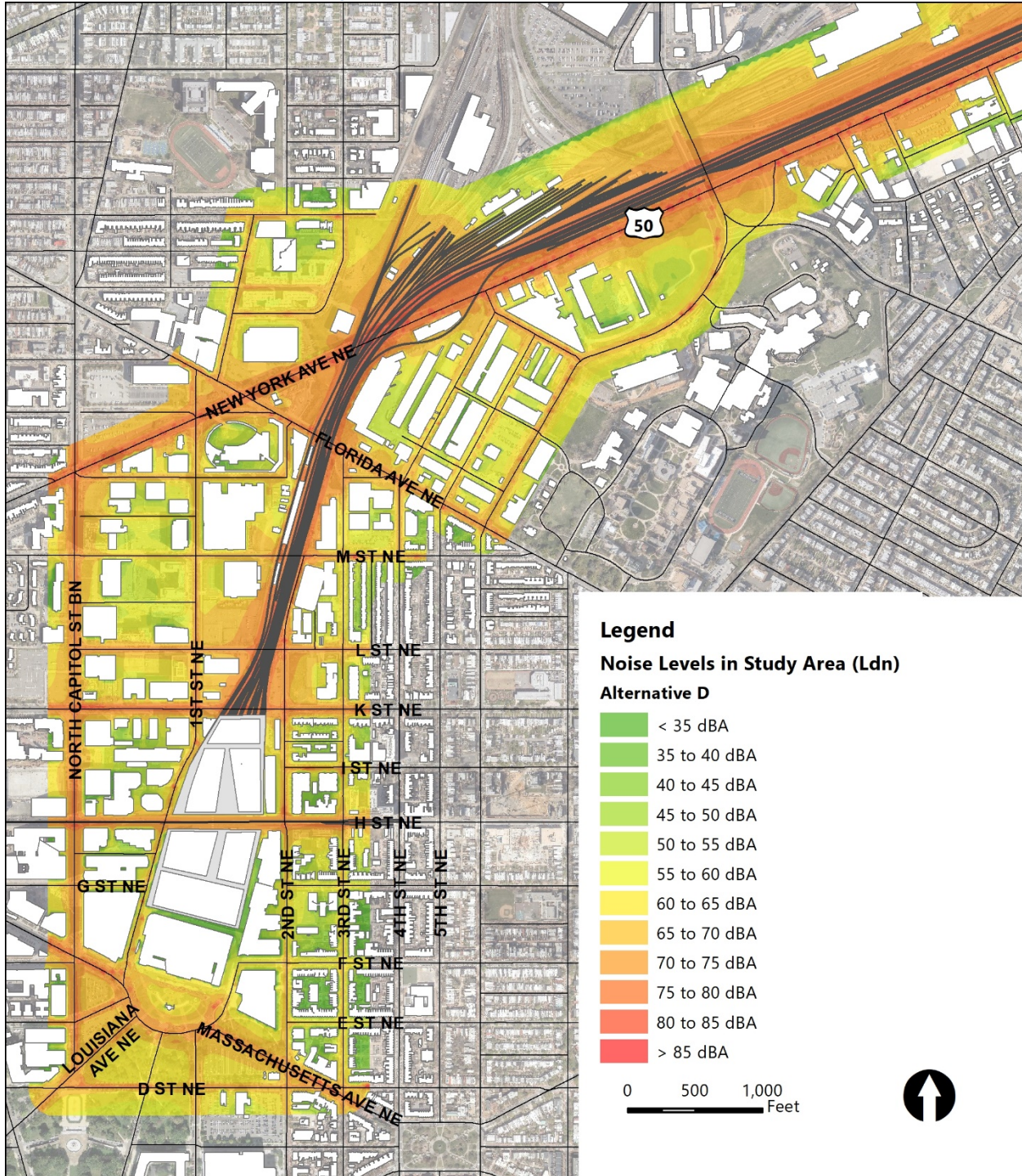
716 Detailed modeling results for those locations where the moderate threshold would be
717 exceeded can be found in **Appendix C3, Washington Union Station Expansion Project,**
718 **Environmental Consequences Technical Report, Section 10.5.5.1, Direct Operational Impacts,**
719 **Operational Noise, Table 10-21.** Stationary noise sources would be the same in Alternative D
720 as in Alternative A. The same negligible impacts would occur (see **Section 5.10.4.2,**
721 **Alternative A, Direct Operational Impact**).

Operational Vibration Impacts

722 Operational vibration impacts in Alternative D would be the same as in Alternative A. These
723 impacts are described in **Section 5.10.4.2, Alternative A, Direct Operational Impact.**

¹⁴ Rail operations would be the same in all Action Alternatives as would be the overall increase in road traffic relative to the No-Action Alternative. Because in Alternative D, access to parking would be split between K Street NE and H Street NE, traffic volumes on these streets would be different in Alternative A and Alternative D. However, the resulting difference in noise levels would be within 0.2 dBA, which would be imperceptible.

Figure 5-55. Noise Levels, Alternative D



Indirect Operational Impacts

724 **Relative to the No-Action Alternative, there would be no indirect noise or vibration**
725 **operational impacts in Alternative D.**

726 All noise and vibration impacts would take place at the same time as the action and none
727 would occur beyond the Operational Noise and Vibration Study Area.

Construction Impacts

Support of Excavation Noise

728 **In Alternative D, SOE construction would result in major adverse noise impacts at 25**
729 **locations and moderate adverse noise impacts at four locations.**

730 Construction of Alternative D would involve the same SOE as construction of Alternative C.
731 Impacts would be the same and are described in **Section 5.10.4.4, *Alternative C, Construction***
732 ***Impacts.***

Excavation Noise

Start of Excavation

733 **In Alternative D, at the start of excavation, there would be major adverse noise impacts at**
734 **25 locations (All Truck Scenario), 24 locations (Mixed Scenario), or 20 locations (Work Train**
735 **Scenario). There would be moderate adverse noise impacts at seven locations (All Truck**
736 **and Mixed Scenarios) or eight locations (Work Train Scenario).**

737 At the beginning of excavation, there would be no difference in the noise produced by the
738 various Action Alternatives. The same equipment would perform the same activities at street
739 level, resulting in similar noise levels. Impacts would be as described in **Section 5.10.4.2,**
740 ***Alternative A, Construction Noise Impacts.***

End of Excavation

741 **In Alternative D, at the end of excavation, there would be major adverse noise impacts at**
742 **five locations (All Truck Scenario) or four locations (Mixed Scenario and Work Train**
743 **Scenario). There would be moderate adverse noise impacts at 17 locations (All Truck**
744 **Scenario), 11 locations (Mixed Scenario) or five locations (Work Train Scenario).**

745 The depth of excavation and noise impacts in Alternative D would be the same as in
746 Alternative C and impacts on noise levels would be the same. These impacts are described in
747 **Section 5.10.4.4, *Alternative C, Construction Impacts.***

Construction Vibration Impacts

748 **In Alternative D, there would be a major adverse impact from vibration during SOE**
749 **construction on the REA Building, the Kaiser Permanente Medical Center, and the Union**
750 **Station historic station building due to potential risk of structural damage. There would be**
751 **moderate adverse impact from truck generated vibration at 12 locations due to annoyance.**

752 Construction of Alternative D would involve the same vibration-generating activities and
753 impacts as construction of Alternative C. Impacts are described in **Section 5.10.4.4,**
754 *Alternative C, Construction Impacts*.

Comparison to Existing Conditions

755 Because the operational noise impacts of Alternative D on noise and vibration levels relative
756 to the No-Action Alternative would be indistinguishable from those of Alternative A, its
757 impacts relative to existing conditions would also be the same as those of this alternative
758 (**Section 5.10.4.2, Alternative A, Comparison to Existing Conditions**).

5.10.4.6 Alternative E

Direct Operational Impacts

759 **Relative to the No-Action Alternative, in Alternative E, noise levels would increase by no**
760 **more than 3 dBA. This would result in moderate adverse operational direct impacts at 14**
761 **locations in the Study Area. Alternative E would have a minor localized adverse direct**
762 **operational impact on vibration near the throat of the rail terminal and negligible adverse**
763 **operational direct elsewhere.**

Operational Noise Impacts

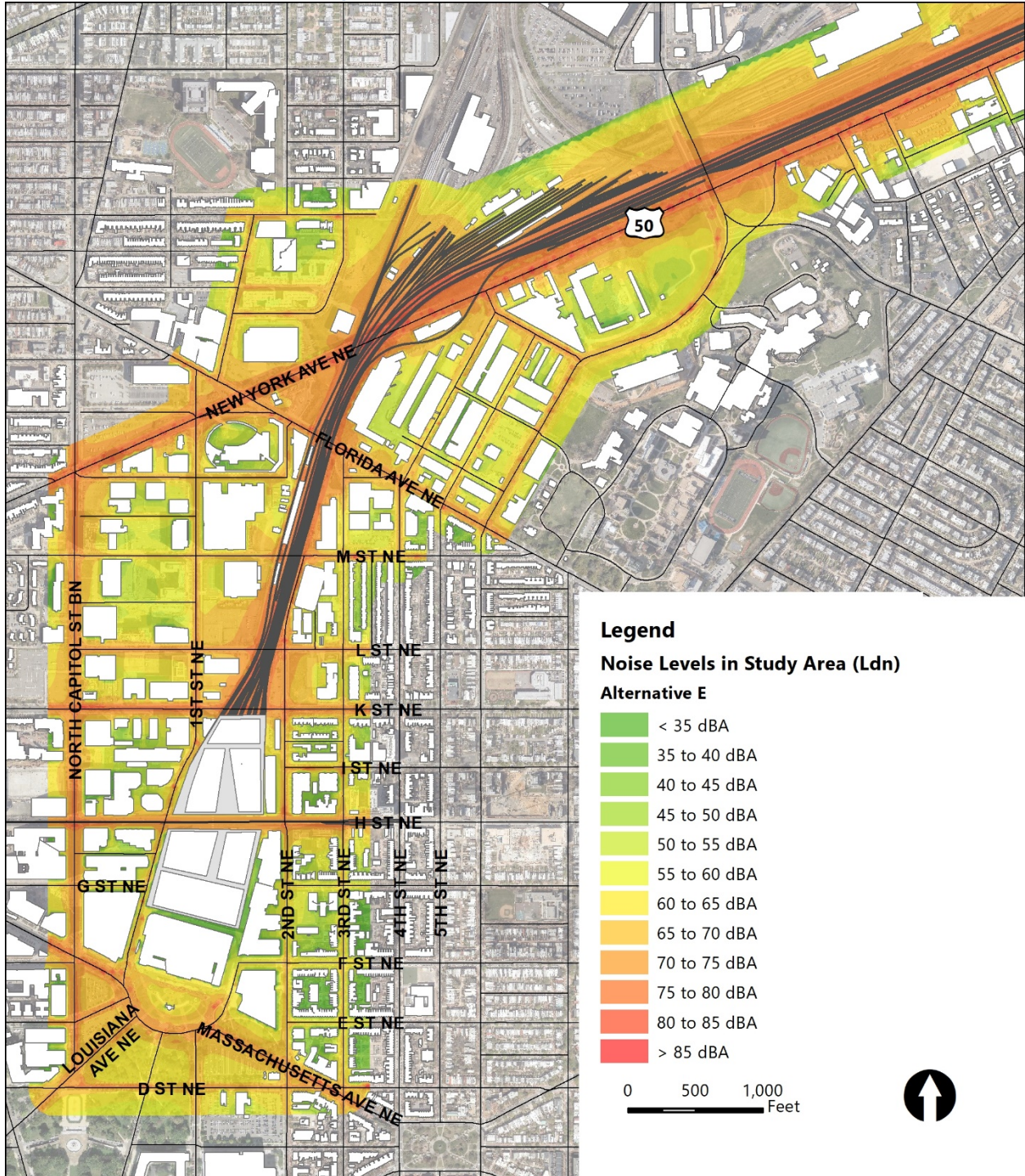
764 **Figure 5-56** shows modeled operational noise levels in Alternative E. Impacts would generally
765 be the same as those of Alternative A (**Section 5.10.4.2, Alternative A, Direct Operational**
766 **Impacts** and **Figure 5-36**).¹⁵ Noise levels would range from 60 to 75 dBA (Ldn), which is typical
767 for a dense urban setting. Detailed modeling results for those locations where the moderate
768 threshold would be exceeded can be found in **Appendix C3, Washington Union Station**
769 **Expansion Project, Environmental Consequences Technical Report, Section 10.5.6.1, Direct**
770 **Operational Impacts, Operational Noise, Table 10-22**. Stationary noise sources would be the
771 same in Alternative E as in Alternative A. The same negligible impacts would occur (see
772 **Section 5.10.4.2, Alternative A, Direct Operational Impact**).

Operational Vibration Impacts

773 Operational vibration impacts in Alternative E would be the same as in Alternative A. These
774 impacts are described in **Section 5.10.4.2, Alternative A, Direct Operational Impact**.

¹⁵ Rail operations would be the same in all Action Alternatives as would be the overall increase in road traffic relative to the No-Action Alternative. Because in Alternative E, the parking entrance would be on K Street NE rather than H Street NE, traffic volumes on these streets would be different in Alternative A and Alternative E. However, the resulting difference in noise levels would be within 0.2 dBA, which would be imperceptible.

Figure 5-56. Noise Levels, Alternative E



Indirect Operational Impacts

775 **Relative to the No-Action Alternative, there would be no indirect noise or vibration**
776 **operational impacts in Alternative E.**

777 All noise and vibration impacts would take place at the same time as the action and none
778 would occur beyond the Operational Noise and Vibration Study Area.

Construction Impacts

Support of Excavation Noise

779 **In Alternative E, SOE construction would result in major adverse noise impacts at 28**
780 **locations and moderate adverse noise impacts at nine locations.**

781 Construction of Alternative E would involve the same SOE as construction of Alternative B.
782 Impacts would be the same and are described in **Section 5.10.4.3, *Alternative B, Construction***
783 ***Impacts.***

Excavation Noise

Start of Excavation

784 **In Alternative E, at the start of excavation, there would be major adverse noise impacts at**
785 **25 locations (All Truck Scenario), 24 locations (Mixed Scenario), or 20 locations (Work Train**
786 **Scenario). There would be moderate adverse noise impacts at seven locations (All Truck**
787 **and Mixed Scenarios) or eight locations (Work Train Scenario).**

788 At the beginning of excavation, there would be no difference in the noise produced by the
789 various Action Alternatives. The same equipment would perform the same activities at street
790 level, resulting in similar noise levels. Impacts would be as described in **Section 5.10.4.2,**
791 ***Alternative A, Construction Noise Impacts.***

End of Excavation

792 **In Alternative E, at the end of excavation, there would be major adverse noise impacts at**
793 **five locations (All Truck Scenario) or four locations (Mixed Scenario and Work Train**
794 **Scenario). There would be moderate adverse noise impacts at 17 locations (All Truck**
795 **Scenario), seven locations (Mixed Scenario), or two locations (Work Train Scenario).**

796 The depth of excavation in Alternative E would be the same as in Alternative B. Excavation
797 activities and noise impacts would be the same. Impacts would be as described in **Section**
798 **5.10.4.3, *Alternative B, Construction Impacts.***

Construction Vibration Impacts

799 **In Alternative E, there would be a major adverse impact from vibration during SOE**
800 **construction on the REA Building, the Kaiser Permanente Medical Center, the NASPA**
801 **building, and the Union Station historic station building due to potential risk of structural**

802 **damage. There would be moderate adverse impact from truck-generated vibration at 12**
803 **locations due to annoyance.**

804 Construction of Alternative E would involve the same vibration-generating activities and
805 impacts as construction of Alternative B. Impacts are described in **Section 5.10.4.3,**
806 *Alternative B, Construction Impacts.*

Comparison to Existing Conditions

807 Because the operational noise impacts of Alternative E on noise and vibration levels relative
808 to the No-Action Alternative would be indistinguishable from those of Alternative A, its
809 impacts relative to existing conditions would also be the same. They are described in **Section**
810 **5.10.4.2, Alternative A, Comparison to Existing Conditions.**

5.10.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

811 **Relative to the No-Action Alternative, in Alternative A-C, noise levels would increase by no**
812 **more than 3 dBA. This would result in moderate adverse operational direct impacts at 14**
813 **locations in the Study Area. Alternative A-C would have a minor localized adverse direct**
814 **operational impact on vibration near the throat of the rail terminal and negligible adverse**
815 **operational direct elsewhere.**

Operational Noise

816 Operational noise impacts in Alternative A-C would be the same as in Alternative A (see
817 **Section 5.10.4.2, Alternative A, Direct Operational Impacts**). The location of the relevant
818 Project elements (such as the parking facility) and the vehicular routes to and from those
819 elements would be the same under both alternatives. Vehicular volumes along those routes
820 may vary slightly due to differences in parking capacity and pick-up and drop-off locations
821 between the two alternatives. However, this has no potential to result in perceptibly
822 different noise levels, as evidenced by the lack of perceptible differences among Alternatives
823 A through E in spite of the different locations and sizes of the Project elements in those
824 alternatives.

Operational Vibration

825 Operational vibration impacts in Alternative A-C would be the same as in Alternative A (see
826 **Section 5.10.4.2, Alternative A, Direct Operational Impacts**). Alternative A-C includes the
827 same improvements to the track infrastructure of the rail terminal and the throat. The
828 number of trains, train types operating on each track, and train speeds would be the same.

Indirect Operational Impacts

829 **Relative to the No-Action Alternative, there would be no indirect noise or vibration**
830 **operational impacts in Alternative A-C.**

831 All noise and vibration impacts would take place at the same time as the action and none
832 would occur beyond the Operational Noise and Vibration Study Area.

Construction Impacts

Support of Excavation Noise

833 **In Alternative A-C, construction of the SOE structures would result in major adverse noise**
834 **impacts at 26 locations and moderate adverse noise impacts at six locations.**

835 Construction of Alternative A-C would involve the same SOE as construction of Alternative A.
836 Impacts would be the same: see **Section 5.10.4.2, Alternative A, Construction Impacts.**

Excavation Noise

Start of Excavation

837 **In Alternative A-C, at the start of excavation, there would be major adverse noise impacts**
838 **at 25 locations (All Truck Scenario), 24 locations (Mixed Scenario), or 20 locations (Work**
839 **Train Scenario). There would be moderate adverse noise impacts at seven locations (All**
840 **Truck and Mixed Scenarios) or eight locations (Work Train Scenario).**

841 At the beginning of excavation, there would be no difference between the Action
842 Alternatives. The noise impacts of Alternative A-C would be the same as those of Alternative
843 A: see **Section 5.10.4.2, Alternative A, Construction Impacts.**

End of Excavation

844 **In Alternative A-C, at the end of excavation, there would be major adverse noise impacts at**
845 **five locations (All Truck Scenario and Mixed Scenario) or four locations (Work Train**
846 **Scenario). There would be moderate adverse noise impacts at 19 locations (All Truck**
847 **Scenario), 15 locations (Mixed Scenario) or 12 locations (Work Train Scenario).**

848 The depth of excavation in Alternative A-C would be the same as in Alternative A. Therefore,
849 noise impacts at the end of excavation in this alternative would be the same as in Alternative
850 A: see **Section 5.10.4.2, Alternative A, Construction Impacts.**

Construction Vibration

851 **In Alternative A-C, there would be a major adverse impact from vibration during SOE**
852 **construction on the REA Building, the Kaiser Permanente Medical Center, and the Union**
853 **Station historic station building due to potential risk of structural damage. There would be**
854 **moderate adverse impact from truck generated vibration at 12 locations due to annoyance.**

855 Construction of Alternative A-C would involve the same vibration-generating activities as
856 Alternative A's construction. Impacts would be the same: see **Section 5.10.4.2, Alternative A,**
857 **Construction Impacts.**

Comparison to Existing Conditions

858 Because the operational noise impacts of Alternative A-C on noise and vibration levels
859 relative to the No-Action Alternative would be the same as those of Alternative A, it impacts
860 relative to existing conditions would also be the same. **Section 5.10.4.2, *Alternative A,***
861 *Comparison to Existing Conditions*, characterizes these impacts.

5.10.5 Comparison of Alternatives

862 The following sections and **Table 5-120** compare the No-Action Alternative and the Action
863 Alternatives with respect to operational and construction-related noise and vibration
864 impacts.

5.10.5.1 Operational Noise and Vibration

Noise

865 All Action Alternatives would result in moderate adverse operational noise impacts on 14
866 locations. Noise levels would also exceed the threshold for a moderate or severe impact at
867 10 planned development locations. Ambient noise levels in the Operational Noise and
868 Vibration Study Area would range from 60 to 75 dBA (Ldn) at most receptor locations. Such
869 noise levels are typical of a dense urban area.

870 In all Action Alternatives, relative to the No-Action Alternative, operational noise levels south
871 of K Street NE would generally increase by less than 1 dBA. North of K Street NE, they would
872 increase by 1 to 3 dBA. Changes of 3dBA or smaller are generally not perceptible. The
873 primary sources of noise would be vehicular traffic and, near the tracks north of K Street NE,
874 and train operations. Along First Street NE, which would become a one-way street in all
875 Action Alternatives, traffic volumes and associated noise would decrease.

876 Ambient noise levels would also increase in the No-Action Alternative relative to existing
877 conditions except near the rail terminal south of K Street NE. There, construction of the
878 private air-rights development would enclose the terminal and reduce noise from train
879 operations. At locations adjacent to the rail terminal, such as the REA Building and the Kaiser
880 Permanente Medical Center, noise would decrease by more than 10 dBA, which is generally
881 perceived as a halving of the noise level. At most other locations in the Operational Noise
882 and Vibration Study Area, the No-Action Alternative would see increases in traffic that would
883 cause higher noise level. The change would remain within 1 dBA, except in the area of Union
884 Market, where the new VRE MSRF facility would generate increases of up to 3 dBA. As noted
885 above, however, changes of 3dBA or smaller are generally not perceptible.

Table 5-120. Comparison of Alternatives, Noise and Vibration

| Type of Impact ¹ | No-Action Alternative | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative A-C (Preferred) |
|---|--|--|--|--|--|--|---|
| Direct Operational Noise Impacts | <p>Beneficial impacts: Decreases in noise south of K Street NE due to private air-rights development.</p> <p>Negligible Adverse impacts: Noise increases typically less than 1 dBA further away from private air-rights development.</p> | <ul style="list-style-type: none"> ▪ Moderate adverse impacts at 14 locations. ▪ Potential moderate or severe impacts at 10 planned development locations. ▪ Increases up to 3 dBA over existing due to projected increase of train operations and traffic conditions. | | | | | |
| Construction Noise Impacts during SOE Construction | N/A | <p>Major adverse impacts at 26 commercial and residential receptors. Moderate adverse impacts at six receptors. Potential severe impact at three planned developments.</p> | <p>Major adverse impacts at 28 commercial and residential receptors. Moderate adverse impacts at nine receptors. Potential severe impact at three planned developments.</p> | <p>Major adverse impacts at 25 commercial and residential receptors. Moderate adverse impacts at four receptors. Potential severe impact at three planned developments.</p> | <p>Major adverse impacts at 25 commercial and residential receptors. Moderate adverse impacts at four receptors. Potential severe impact at three planned developments.</p> | <p>Major adverse impacts at 28 commercial and residential receptors. Moderate adverse impacts at nine receptors. Potential severe impact at three planned developments.</p> | <p>Major adverse impacts at 26 commercial and residential receptors. Moderate adverse impacts at six receptors. Potential severe impact at three planned developments.</p> |

| Type of Impact ¹ | No-Action Alternative | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative A-C (Preferred) |
|--|-----------------------|---|--|---|---|--|--|
| | | All Action Alternatives would exceed: <ul style="list-style-type: none"> 80 dBA (equivalent sound level [Leq]) 25 feet from the outermost limits of the construction site along the east side of the site during Phase 1; and The 65 dBA (Lmax) District noise ordinance limit for nighttime construction. | | | | | |
| Construction Noise Impacts at Start of Excavation | N/A | Major adverse impacts at 25/24/20 residential and commercial receptors. Moderate impacts at 7/7/8 Potential severe impacts at 3/1/2 planned developments. ² In all Action Alternatives, construction noise would: <ul style="list-style-type: none"> Be approximately four dBA (Ldn) higher removing excavation by trucks than by trains; Exceed 80 dBA (Leq) 25 feet from the outermost limits of the construction site along the east side of the site during Phase 1 of construction; and Exceed the 65 dBA (Lmax) District noise ordinance limit for nighttime construction. | | | | | |
| Construction Noise Impacts at End of Excavation | N/A | Major adverse impacts at 5/5/4 residential and commercial receptors. Moderate adverse impacts at 19/15/12 Potential moderate impacts at 1/1/1 planned development. ² | Major adverse impacts at 5/4/4 residential and commercial receptors. Moderate adverse impacts at 13/7/2 Potential moderate impacts at 1/0/0 planned development. ² | Major adverse impacts at 5/4/4 residential and commercial receptors. Moderate adverse impacts at 17/11/5. ² | Major adverse impacts at 5/4/4 residential and commercial receptors. Moderate adverse impacts at 17/11/5. ² | Major adverse impacts at 5/4/4 residential and commercial receptors. Moderate adverse impacts at 13/7/2 Potential moderate impacts at 1/0/0 planned development. ² | Major adverse impacts at 5/5/4 residential and commercial receptors. Moderate adverse impacts at 19/15/12 Potential moderate impacts at 1/1/1 planned development. ² |
| | | In all Action Alternatives, construction noise levels: <ul style="list-style-type: none"> Would be approximately 4 dBA (Ldn) higher for removing excavation by trucks compared to trains; Would exceed 80 dBA (Leq) 25 feet from the outermost limits of the construction site along the east side of the site during Phase 1; and Would exceed the 65 dBA (Lmax) District noise ordinance limit for nighttime construction. | | | | | |

| Type of Impact ¹ | No-Action Alternative | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative A-C (Preferred) |
|---|--|--|---------------|---------------|---------------|---------------|-----------------------------|
| Direct Operational Vibration Impacts | <p>Negligible Adverse Impacts: Vibration would be similar to existing conditions at most locations and would remain below the FTA criteria. Vibration may exceed the FTA vibration criteria at the planned Kettler development associated with the re-introduction of tracks for the proposed VRE MSRF.</p> | <p>Minor adverse impacts: The number of vibration events would increase throughout due to increased train operations, but vibration levels would remain below the FTA criteria.</p> | | | | | |

| Type of Impact ¹ | No-Action Alternative | Alternative A | Alternative B | Alternative C | Alternative D | Alternative E | Alternative A-C (Preferred) |
|---------------------------------------|-----------------------|---|--|---|---|--|---|
| Construction Vibration Impacts | N/A | Major adverse impacts from potential risk of structural damage and annoyance at three buildings: REA Building, Kaiser Permanente Medical Center, and Union Station. Vibration levels 0.17 to 0.67 in/s during SOE. | Major adverse impacts from potential risk of structural damage and annoyance at four buildings: REA Building, Kaiser Permanente Medical Center, NASPA, and Union Station. Vibration levels 0.12 to 0.8 in/s during SOE. | Major adverse impacts from potential risk of structural damage and annoyance at three buildings: REA Building, Kaiser Permanente Medical Center, and Union Station. Vibration levels 0.33 to 0.67 in/s during SOE. | Major adverse impacts from potential risk of structural damage and annoyance at three buildings: REA Building, Kaiser Permanente Medical Center, and Union Station. Vibration levels 0.33 to 0.67 in/s during SOE. | Major adverse impacts from potential risk of structural damage and annoyance at four buildings: REA Building, Kaiser Permanente Medical Center, NASPA, and Union Station. Vibration levels 0.12 to 0.8 in/s during SOE. | Major adverse impacts from potential risk of structural damage and annoyance at three buildings: REA Building, Kaiser Permanente Medical Center, and Union Station. Vibration levels 0.17 to 0.67 in/s during SOE. |
| | | Moderate adverse impacts from truck-generated vibration that may cause annoyance at 12 receptors and one planned development close to the routes along New York Avenue, North Capitol Street, and 2nd Street. | | | | | |

1. None of the alternatives would have indirect operational impacts. 2. All Truck Scenario/Mixed Scenario/Work Train Scenario.

Vibration

886 All Action Alternatives would have minor localized adverse operational impacts on vibration
887 near the throat of the rail terminal and negligible adverse operational direct elsewhere in the
888 Operational Noise and Vibration Study Area. The Action Alternatives would not affect the
889 types of trains operating on each track or train speeds. Therefore, vibration conditions would
890 remain similar to what they would be in the No-Action Alternative with one partial exception.
891 Re-introduction of Track 43, which would shift the easternmost track up to 10 feet closer to
892 receptors on the east side of WUS, could increase vibration by approximately up to 2 VdB, a
893 minor impact.

894 The No-Action Alternative would have negligible adverse operational impacts on vibration
895 levels at receptors in the Union Market Area near the new track leading to the proposed VRE
896 MSRF. Vibration levels elsewhere in the Operational Noise and Vibration Study Area would
897 not change.

5.10.5.2 Construction Noise and Vibration

Noise

898 All Action Alternatives would cause major noise impacts at several locations during SOE
899 construction. The number of locations affected would depend on the type of SOE used. In
900 Alternative A and Alternative A-C, there would be major SOE construction noise impacts at 26
901 locations and moderate SOE construction noise impacts at six locations. In Alternatives B and
902 E, there would be major SOE construction noise impacts at 28 locations and moderate SOE
903 construction noise impacts at nine locations. In Alternatives C (either option) and D, there
904 would be major construction SOE noise impacts at 25 locations and moderate SOE
905 construction noise impacts at four locations.

906 All Action Alternatives would cause major and moderate adverse noise impacts at multiple
907 locations at the start of excavation. The number of affected locations would depend on the
908 method used to transport excavation spoil from the Project Area. In all Action Alternatives,
909 transport by trucks only would cause major adverse noise impacts at 25 locations and
910 moderate adverse noise impacts at seven. Mixed transport by train and trucks would cause
911 major adverse noise impacts at 24 locations and moderate adverse noise impacts at seven.
912 Transport by work trains only would cause major adverse noise impacts at 20 locations and
913 moderate adverse noise impacts at eight.

914 At the end of excavation, noise impacts would be much reduced in all Action Alternatives. In
915 Alternatives A and A-C, there would be major adverse impacts at five or four locations and
916 moderate adverse impacts at 12 to 19 locations, depending on how spoil would be
917 transported. In Alternatives B and E, there would be major adverse impacts at the same
918 number of locations and moderate adverse impacts at two to 13 locations. In Alternatives C
919 and D, there would be major adverse impacts at the same number of locations and moderate
920 adverse impacts at five to 17 locations.

921 In the No-Action Alternative, the Project would not be constructed and would not cause any
922 construction noise impacts. The construction of other projects included in the No-Action
923 Alternative would generate noise. Information is insufficient to estimate the resulting
924 impacts.

Vibration

925 In all Action Alternatives, construction vibration would result in a potential risk of structural
926 damage at three locations, a major adverse impact: the WUS historic station building, the
927 REA Building, and the Kaiser Permanent Medical Center. In Alternatives B and E, there would
928 additionally be a similar major adverse impact on a fourth location, the NASPA building.
929 Alternatives B and E would have greater adverse impacts than the other Action Alternatives
930 because of the type of SOE (slurry cut-off wall construction instead of secant pile or sheet
931 pile cut-off wall in the other Action Alternatives).

932 In all Action Alternatives, construction vibration would be high enough to cause annoyance at
933 12 locations near New York Avenue, North Capitol Street and 2nd Street NE, a moderate
934 adverse impact.

935 In the No-Action Alternative, the Project would not be constructed and would not cause any
936 construction vibration impacts. The construction of other projects included in the No-Action
937 Alternative would generate vibration but, as with noise, information is insufficient to
938 estimate the resulting impacts.

5.10.6 Avoidance, Minimization, and Mitigation Evaluation

939 The potential for permanent, operational noise impacts warrants a consideration of
940 avoidance, minimization measures, and mitigation measures. None of the Action Alternatives
941 would result in operational vibration impacts requiring the consideration of such measures.

942 All Action Alternatives would also cause major and moderate construction noise and
943 vibration impacts. These impacts would cease when construction is complete, but they would
944 occur at various times during a long period, from approximately 11 years and 5 months to
945 approximately 14 years and 4 months depending on the Action Alternative. Mitigation
946 measures and best management practices would be warranted to reduce major noise and
947 vibration impact due to construction. The measures being considered by FRA are described
948 below.

949 Noise mitigation depends on the need, feasibility, reasonableness, and effectiveness of the
950 potential options. Moderate impacts are caused by changes in the cumulative noise level that
951 are noticeable to most people but may not be sufficient to generate strong, adverse
952 reactions. Severe impacts are expected to highly annoy a significant percentage of the local
953 population. The anticipated level of noise impact is an important factor in determining the
954 need for mitigation. Severe noise impacts create the most compelling need for mitigation,

955 though moderate noise impacts should also be considered for mitigation, especially when
956 they are anticipated to last for a significant period.

957 For severe noise impacts, most rail infrastructure projects implement mitigation measures
958 that account for safety, constructability, acoustical effectiveness, and cost effectiveness. For
959 moderate noise impacts, mitigation is implemented accounting for the same factors but also
960 considering where the impacts stand within the range of moderate noise impact criteria and
961 the sensitivity of the affected receptors. The following sections describe mitigation measures
962 FRA is considering for severe and moderate adverse impacts.

5.10.6.1 Operational Noise and Vibration

963 In all Action Alternatives, there would be moderate noise impacts at 14 locations and noise
964 levels would increase to moderate or severe levels at 10 planned development locations.
965 These impacts would primarily be caused by increases in train operations and traffic. Future
966 noise levels would typically be within 3 dBA or less of existing and No-Action Alternative
967 levels, which is at the lower end of the moderate impact range.

968 Options for mitigating increases in traffic noise in an urban setting are very limited. Speed
969 restrictions would not substantially reduce traffic noise and further truck route restrictions
970 are generally not warranted. Noise barriers along the railroad corridor to reduce train noise
971 would be ineffective at most upper-floor receptors and would conflict with planned
972 developments and urban design considerations.

973 When developments within the Study Area are planned, developers would be able to design
974 their buildings to incorporate noise reducing features such as providing windows and walls
975 that attenuate sound in interior spaces; placing outdoor spaces away from the tracks; and
976 using the building or other architectural features to provide acoustic shielding. Based on
977 these considerations, FRA is not proposing to mitigate the moderate operational noise
978 impacts of the Action Alternatives.

5.10.6.2 Construction Noise and Vibration

979 Construction noise impacts would occur during SOE construction and throughout excavation
980 in all Action Alternatives. Construction noise levels would exceed the District's noise
981 ordinance and FTA long-term construction noise impact criteria. Without mitigation, this
982 would result in major adverse impacts. Construction vibration would potentially create a risk
983 of structural damage at up to four buildings adjacent to SOE activities, depending on the
984 Action Alternative, resulting in a major adverse impact without mitigation. All Action
985 Alternatives would cause moderate vibration impacts from truck traffic, potentially causing
986 human annoyance at 12 receptors and one planned development close to New York Avenue,
987 North Capitol Street, and 2nd Street NE.

988 Given the long duration of construction activities in all Action Alternatives and the proximity
989 of sensitive receptors to the Project Area, the Project Proponents would require the

990 construction contractor to prepare and implement a *Construction Noise and Vibration*
991 *Control Plan*. This plan would include detailed predictions of construction noise and vibration
992 levels; requirements for conducting construction noise and vibration monitoring; and, if
993 necessary, detailed approaches to mitigate potential construction-period noise and vibration
994 impacts. The plan would set acceptable vibration limits and address the need to conduct pre-
995 construction crack surveys; install crack detection monitors; and conduct vibration
996 monitoring. The plan would define a process to alert the contractor of any limit exceedances
997 and implement corrective actions. It would also contain a public engagement plan specifying
998 measures that would be implemented to inform neighbors of anticipated noisy activities,
999 noise or vibration level exceedances, and measures to be taken to remedy these
1000 exceedances.

1001 The following are typical construction noise mitigation measures known to be effective in
1002 minimizing noise from both stationary equipment and truck traffic. At a minimum, these
1003 measures would be included in the *Construction Noise and Vibration Control Plan* unless
1004 equivalent but more Project-or location-specific measures are identified during the
1005 preparation of the plan:

- 1006 ■ Ensuring equipment is properly functioning and equipped with mufflers and other
1007 noise-reducing features.
- 1008 ■ Locating especially noisy equipment as far from sensitive receptors as possible.
- 1009 ■ Using quieter construction equipment and methods, as feasible.
- 1010 ■ Using path noise control measures such as temporary noise barriers or portable
1011 enclosures for small equipment (such as, jackhammers and concrete saws).
- 1012 ■ Replacing backup alarms with strobes, if and as allowed by Occupational Safety and
1013 Health Administration (OSHA) regulations.
- 1014 ■ Maintaining smooth truck route surfaces within and next to the Project Area.
- 1015 ■ Establishing and implementing procedures to maintain strong communications with
1016 neighbors.

1017 If warranted by the projections in the *Construction Noise and Vibration Control Plan*, a
1018 temporary noise wall approximately 12 feet tall would be constructed along the perimeter of
1019 the Project Area where there are not adjacent buildings. Such a wall would be effective in
1020 reducing construction noise at ground level by up to 10 dBA at receptors close to the Project
1021 Area.

1022 Construction vibration from drilling during secant pile wall construction, vibratory sheet pile
1023 driving, and clam shovel operation during slurry wall construction may increase the risk of
1024 structural damage at three to four buildings, including the historic station building and the
1025 REA Building. As part of the preparation of the *Construction Noise and Vibration Control Plan*,
1026 the buildings at risk would be assessed to determine the appropriate threshold applicable to
1027 each based on its type of construction and condition. The plan would define measures to be

1028 taken to minimize the risk of damage based on these thresholds. As warranted by the
1029 assessment and projections in the *Construction Noise and Vibration Control Plan*, and as
1030 technically feasible, alternative construction methods would be implemented, including but
1031 not limited to:

- 1032 ■ Using a hydromill instead of a clam shovel for slurry wall construction when working
1033 close to a building. A clam shovel may increase the risk of damage to fragile buildings
1034 within 34 feet, as opposed to eight feet for a hydromill.
- 1035 ■ Using push-in type sheeting equipment rather than vibratory equipment to install
1036 sheet-pile walls.
- 1037 ■ Using sonic drill rigs instead of traditional drill rigs. Sonic rigs help break up the soil,
1038 can speed up the drilling process, and reduce vibration levels at nearby buildings.

1039 If possible without major disruptions to rail operations, Amtrak would allow the use of work
1040 trains rather than trucks to haul away excavation spoils to reduce noise and vibration from
1041 passing trucks. Construction trucks would not generate sufficient vibration to risk causing
1042 structural damage but there is a potential for human annoyance at 12 receptors and one
1043 planned development. Other measures that would be included in the *Construction Noise and*
1044 *Vibration Control Plan* and implemented to minimize annoyance from truck traffic if
1045 warranted and practicable include:

- 1046 ■ Among the potential truck routes to and from the Project Area, using those routes
1047 with fewer residential receptors.
- 1048 ■ Limiting truck speeds or directing trucks to use travel lanes farther from receptors on
1049 multi-lane roads such as New York Avenue.

5.10.7 Permits and Regulatory Compliance

1050 There are no formal permits required to demonstrate regulatory compliance with regard to
1051 operational noise and vibration impact assessment. Since construction of the proposed
1052 Project may result in exceedances of the District's noise ordinance limits, a variance may be
1053 required.

5.11 Aesthetics and Visual Quality

1 This section describes and characterizes the potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on aesthetics and visual quality. If
3 applicable, this section also recommends measures to avoid, minimize, or mitigate potential
4 adverse impacts and identifies relevant permitting and regulatory compliance requirements.

5.11.1 Regulatory Context and Guidance

5 Relevant Federal policies, regulations and guidance that pertain to aesthetics and visual
6 quality are listed in **Section 4.11.1, Regulatory Context and Guidance**.

5.11.2 Study Area

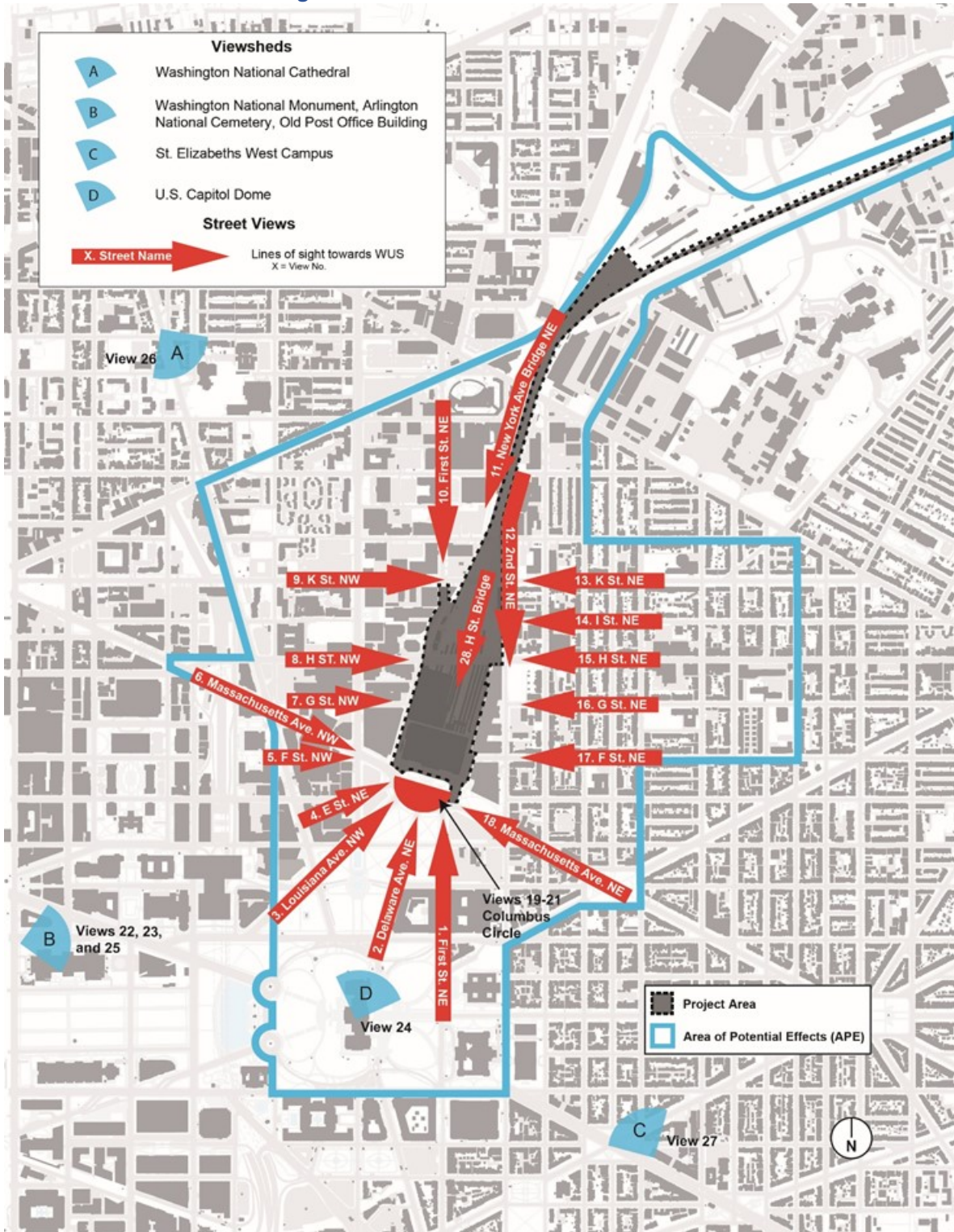
7 As defined in **Section 4.11.2, Study Area**, the Local Study Area for aesthetics and visual
8 quality is same as that for cultural resources (**Figure 4-18**). It coincides with the Section 106
9 Area of Potential Effects (APE). There is no Regional Study Area because there is no potential
10 for visual impacts outside the Local Study Area.

5.11.3 Methodology

11 This section summarizes the methodology for evaluating the impacts of the alternatives on
12 aesthetics and visual quality. **Appendix C3, Washington Union Station Expansion Project**
13 *Environmental Consequences Technical Report, Section 11.4, Methodology*, provides a
14 description of the analysis methodology. A summary is below.

15 The assessment of impacts on aesthetics and visual quality was conducted based on 22
16 significant street views and six culturally significant viewsheds with views toward the Project
17 Area, for a total of 28 views as shown in **Figure 5-57** (viewsheds A, C, and D contain one view
18 each and viewshed B containing three views). To assess the visual impacts of the alternatives,
19 visual simulations were developed by superimposing building volumes onto photographs of
20 the 28 views. These simulations convey building mass, height, and setback. Building volumes
21 reflect the anticipated size of the Project elements or maximum allowable zoning volumes.
22 They do not incorporate specific design elements, which are not known at this time. The
23 simulations can be found in **Appendix C3a, Washington Union Station Expansion Project**
24 *Aesthetics and Visual Quality: Visual Assessment*.

Figure 5-57. Street Views and Viewsheds



25 Impacts were assessed based on the sensitivity and visibility of anticipated changes.
26 Sensitivity refers to how much the anticipated change would affect defining elements of the
27 view in a way that would change a viewer’s experience. Sensitivity measures how much the
28 massing and height of new elements would change general visual and cultural character of
29 the environment.

30 The intensity of visual impacts for each of the 28 views were measured by the degree of
31 visibility and sensitivity. Impact intensities were defined as follows:

- 32 ■ **No Impact:** Changes would not be visible and would not alter the visual or cultural
33 character of the view.
- 34 ■ **Negligible Adverse Impact:** Changes would be just noticeable but have little to no
35 potential to alter the visual or cultural character of the view.
- 36 ■ **Minor Adverse Impact:** Changes would be readily noticeable but would alter the
37 visual and cultural character of the view to only a low degree.
- 38 ■ **Moderate Adverse Impact:** Changes would be very noticeable but would alter the
39 visual and cultural character of the view to only a low or moderate degree.
- 40 ■ **Major Adverse Impact:** Changes would be very noticeable and alter the visual and
41 cultural character of the view to a high degree.
- 42 ■ **Beneficial Impact:** Changes would be noticeable but would alter the visual character
43 of a view in such a way as to return an impacted view to its original state or change
44 the view to be less impactful than the existing condition.

5.11.3.1 Operational Impacts

45 The operational, permanent long-term impacts of the Project were evaluated based on the
46 simulations, and the sensitivity and visibility of anticipated changes as described above.

5.11.3.2 Construction Impacts

47 Construction impacts were evaluated based on the anticipated visibility of the construction
48 site and equipment such trailers, machinery, and material stockpiles.

5.11.4 Impact Analysis

49 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
50 aesthetics and visual quality. It summarizes the more detailed analyses (including visual
51 simulations) presented in **Appendix C3**, *Washington Union Station Expansion Project*,
52 *Environmental Consequences Technical Report*, **Section 11.5**, *Impact Analysis* and **Appendix**
53 **C3a**, *Washington Union Station Expansion Project Aesthetics and Visual Quality: Visual*
54 *Assessment*. This section focuses on views that would be affected. See **Appendix C3a** for a
55 detailed assessment of all views, including those that would experience no impacts.

5.11.4.1 No-Action Alternative

Direct Operational Impacts

56 **Relative to existing conditions, the No-Action Alternative would result in direct operational**
 57 **impacts on 21 out of 28 views, as shown in Table 5-121.**

Table 5-121. Direct Operational Visual Impacts, No-Action Alternative

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|--|
| Major Adverse | 6 | First Street NE (#1), Delaware Avenue NE (#2), Louisiana Avenue NE (#3), New York Avenue Bridge (#11), 2nd Street NE (#12), H Street Bridge (28) |
| Moderate Adverse | 6 | E Street NE (#4), First Street NE (#10), K Street NE (#13), I (eye) Street NE (#14), Columbus Circle Drive (#20), U.S. Capitol Dome (#24) |
| Minor Adverse | 5 | H Street NW (#8), K Street NW (#9), H Street NE (#15), G Street NE (#16), Columbus Plaza (#19) |
| Negligible Adverse | 4 | F Street NE (#17), Massachusetts Avenue NE (#18), Washington Monument (#22), Old Post Office Building (#25) |

1. # refers to the number assigned to the view in **Figure 5-57**.

58 In the No-Action Alternative, aesthetics and visual quality in the Study Area would be
 59 primarily affected by the construction of the private air-rights development above the rail
 60 terminal. The development would be built on a deck over the entire rail terminal between H
 61 and K Streets NE and the eastern part of the terminal between H Street and the historic
 62 station building. As the design of the private air-rights development has not yet been
 63 defined, its impacts can only be assessed based on the maximum buildable volume allowed
 64 by zoning regulations.¹

65 The views most affected would be those looking directly onto the rail terminal and those
 66 along the corridors adjacent to the terminal. There, the private air-rights development would
 67 cause highly visible changes that would alter the character of the views and result in major to
 68 moderate adverse impacts. The view along H Street, in particular, would be affected, as the
 69 perceived openness beyond the barrier wall looking south towards WUS would disappear
 70 and the private development facing the bridge would be highly visible.

71 Views from the east toward the back of WUS would also be affected. The most noticeable
 72 change would be to the view along I (Eye) Street NE, which currently terminates at the low-
 73 rise REA Building. The private air-rights development would close out the view and result in a
 74 moderate adverse impact. Other adverse impacts on east-west views from either side of
 75 WUS, north of the historic station building, would range from minor to moderate, depending
 76 on how visible the new development would be. Visible changes to the H Street Corridor from

¹ See **Appendix C2**, *Washington Union Station Expansion Project, Affected Environment Technical Report, Section 9.5, Affected Environment*.

77 both the east and the west, where the existing gap on both sides of the H Street Bridge
78 would be replaced with new streetscape, would result in a minor adverse impact. Views from
79 the east, along Massachusetts Avenue and F Street, would experience barely visible changes
80 and negligible adverse impacts. Seen from these directions, the historic station building
81 would hide most of the development to its north.

82 Views from the south of WUS toward the historic station building would also be affected.
83 Louisiana and Delaware Avenues, and First Street NE provide direct views of WUS, visually
84 connecting it with the U.S. Capitol and Capitol Grounds. The existing view is characterized by
85 the uninterrupted silhouette of the barrel-vault roof of the historic station building and wide
86 tree-lined streets used for U.S. government parking. The private air-rights development
87 would be visible from various points along Louisiana Avenue, Delaware Avenue, and First
88 Street, in addition to views from E Street NE and from the east and west sides of Columbus
89 Circle Drive. Views where the development would interrupt the silhouette of WUS at the
90 barrel vault would cause major or moderate adverse impacts depending on how much of the
91 development would be seen above the station's roofline.

92 The private air-rights development would be barely visible from the Washington Monument
93 and Old Post Office Building and cause negligible impacts to views from these monuments. It
94 would be highly visible from the U.S. Capitol Dome, resulting in a moderate adverse impact.

Indirect Operational Impacts

95 **Relative to existing conditions, there would be no indirect operational visual impacts in the**
96 **No-Action Alternative.**

97 All visual impacts are direct impacts. The projects included in the No-Action Alternative
98 would not cause visual impacts after their completion or outside the areas from which they
99 would be visible.

Construction Impacts

100 **In the No-Action Alternative, there would be a moderate adverse impact on one view,**
101 **minor adverse construction impacts on 10 views, and negligible adverse construction**
102 **impacts on nine views, as shown in Table 5-122.**

103 In the No-Action Alternative, the primary cause of visual impacts would be the construction
104 of the private air-rights development above the rail terminal. Distance, perspective, and the
105 location and height of heavy construction equipment and activities would influence the
106 character and intensity of the impacts.

Table 5-122. Visual Construction Impacts, No-Action Alternative

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|--|
| Moderate Adverse | 1 | H Street Bridge (#28) |
| Minor Adverse | 10 | First Street NE (#1), H Street NW (#8), K Street NW (#9), First Street NE (#10), New York Avenue Bridge NE (#11), 2nd Street NE (#12), K Street NE (#13), I (Eye) Street NE (#14), H Street NE (#15), U.S. Capitol Dome (#24). |
| Negligible Adverse | 9 | Delaware Avenue NE (#2), Louisiana Avenue NE (#3), E Street NE (#4), G Street NE (#16), Massachusetts Avenue NE (#18), Columbus Plaza (#19), Columbus Circle Drive (#20), Washington Monument (#22), and Old Post Office Building (#25). |

1. # refers to the number assigned to the view in **Figure 5-57**.

107 Nine views would experience negligible impacts. Although construction would be visible from
 108 these locations, distance or intervening structures (including the historic station building)
 109 would hide or mask most of it. Construction would be more noticeable from ten locations
 110 and impacts on these views would be minor. The Project Area, a rail terminal, has a semi-
 111 industrial appearance. Visually, construction activities would accentuate this aspect and
 112 visual impacts would remain within the range of those typically caused by large-scale
 113 construction projects in the District. Impacts would be greater on the view from the H Street
 114 Bridge (#28) due to the proximity of the construction relative to the bridge and passersby
 115 and, as such, would be of moderate intensity.

5.11.4.2 Alternative A

Direct Operational Impacts

116 **Relative to the No-Action Alternative, Alternative A would result in adverse direct**
 117 **operational impacts on three views and a beneficial impact on one view, as shown in Table**
 118 **5-123.**

Table 5-123. Direct Operational Visual Impacts, Alternative A

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|--|
| Moderate Adverse | 1 | Delaware Avenue NE (#2) |
| Negligible Adverse | 2 | First Street NE (#10), H Street NE (#15) |
| Beneficial | 1 | Columbus Drive (#21) |

1. # refers to the number assigned to the view in **Figure 5-57**.

119 The direct operational impacts of Alternative A would change views from the south. From
 120 Delaware Avenue NE, the Project would rise above the roofline of WUS’s West Pavilion,
 121 causing a moderate adverse impact. Alternative A would have negligible impacts on two
 122 other views. From these locations, either the Project would barely be visible or the mass of
 123 the private air-rights development would obscure or encompass the Project elements.
 124 Impacts on two other views would be negligible as the Project would be just barely visible
 125 against the mass of the private air-rights development.

126 In Alternative A, a new bus facility and parking facility would occupy the footprint to the
 127 existing parking garage but the portion projecting over the service roadway on the west side
 128 of the Project Area would be eliminated, re-establishing views along First Street NE. This
 129 would result in a beneficial impact on the view from the west side of Columbus Circle Drive.

Indirect Operational Impacts

130 **Relative to the No-Action Alternative, Alternative A would result in adverse indirect**
 131 **operational impacts on seven views, as shown in Table 5-124.**

Table 5-124. Indirect Operational Visual Impacts, Alternative A

| Impact | Number of Views Affected | Views Affected ¹ |
|--------------------|--------------------------|--|
| Moderate Adverse | 2 | Louisiana Avenue NE (#3), E Street NE (#4) |
| Minor Adverse | 3 | First Street NE (#1), G Street NW (#7), Columbus Plaza (#19) |
| Negligible Adverse | 2 | F Street NW (#5), Massachusetts Avenue NE (#18) |

1. # refers to the number assigned to the view in **Figure 5-57**.

132 Indirect operational impacts would be caused by the mass and height of the potential Federal
 133 air-rights development. Currently, these impacts can only be assessed based on the
 134 maximum allowed buildable volume consistent with the USN zoning that is anticipated to
 135 apply to the area.²

136 The potential Federal air-rights development would be most noticeable from Louisiana
 137 Avenue NE and E Street NE, as it would rise above the roofline of the west pavilion of the
 138 historic station building. Adverse impacts would be moderate because the views would
 139 remain dominated by the parking facility and the private air-rights development. From the
 140 other affected views, the Federal air-rights development would be less visible against the
 141 background of the existing station and the private air-rights development, resulting in minor
 142 or negligible impacts.

² See **Section 5.9.3.1**, Operational Impacts.

Construction Impacts

143 **Construction of Alternative A would result in a moderate adverse impact on one view,**
 144 **minor adverse impacts on nine views, and negligible adverse impacts on eight views, as**
 145 **shown in Table 5-125.**

Table 5-125. Visual Construction Impacts, Alternative A

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|--|
| Moderate Adverse | 1 | H Street Bridge (#28) |
| Minor Adverse | 9 | E Street NE (#4), G Street NW (#7), First Street NE (#10), New York Avenue Bridge NE (#11), 2nd Street NE (#12), I (Eye) Street NE (#14), H Street NE (#15), Columbus Circle Drive (#21), U.S. Capitol (#24) |
| Negligible Adverse | 8 | Delaware Avenue NE (#2), Louisiana Avenue NE (#3), H Street NW (#8), G Street NE (#16), Massachusetts Avenue NE (#18), Columbus Plaza (#19), Columbus Circle Drive (#20); Washington Monument (#22) |

1. # refers to the number assigned to the view in **Figure 5-57**.

146 Construction of Alternative A would change the appearance of the rail terminal and its
 147 immediate surroundings for the duration of the construction period, approximately 11 years
 148 and 5 months. Features typical of a large construction site would be fully or partially visible
 149 from outside the Project Area. This would affect the visual quality of several views around
 150 WUS.

151 Alternative A would result in negligible adverse impacts on eight views. Distance or
 152 intervening structures would hide most of the construction equipment or activities from
 153 those views. Alternative A would result in minor adverse impacts on nine views. Construction
 154 equipment and activities would be distinctly visible from those views for part of the
 155 construction period. The Project Area, as a rail terminal, already has a semi-industrial
 156 appearance. Construction would accentuate this appearance rather than represent a major
 157 change in visual quality. Impacts on H Street Bridge would be moderate, due the proximity of
 158 the construction to the bridge and passersby.

159 Although construction would take place over approximately 11 years and 5 months, the focus
 160 of activities and the corresponding impacts would change over time. This would make the
 161 impacts of constructing Alternative A on any single view similar to those of most large-scale
 162 construction projects in the District. In general, impacts would be greater during Phases 1
 163 and 4, when the focus would be on the eastern and western edges of the terminal,
 164 respectively, than during Phases 2 and 3, when activities would be in the middle of the
 165 terminal and less visible from outside, or during the 12-month Intermediate Phase, when
 166 only column removal work in the First Street Tunnel would take place.

Comparison to Existing Conditions

167 Relative to existing conditions, Alternative A would have adverse direct and indirect
 168 operational impacts on 20 views. It would also have a beneficial impact on one view, as

169 shown in **Table 5-126**. In general, impacts relative to existing conditions would be greater
 170 than relative to the No-Action Alternative because the changes caused by Alternative A
 171 would be more noticeable against a baseline that does not include the private air-rights
 172 development.

Table 5-126. Direct and Indirect Visual Impacts Relative to Existing Conditions, Alternative A

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|--|
| Major Adverse | 2 | Delaware Avenue NE (#2), H Street Bridge (#28) |
| Moderate Adverse | 6 | First Street NE (#1), Louisiana Avenue NE (#3), E Street NE (#4), First Street NE (#10), New York Avenue Bridge (#11), view from U.S. Capitol Dome (#24) |
| Minor Adverse | 5 | G Street NW (#7), K Street NW (#9), K Street NE (#13), H Street NE (#15), view from Columbus Plaza (#19) |
| Negligible Adverse | 7 | F Street NW (#5), H Street NW (#8), Second Street NE (#12), G Street NE (#16), Massachusetts Avenue NE (#18), Columbus Circle Drive (#20), Washington Monument (#22) |
| Beneficial | 1 | Columbus Circle Drive (#21) |

1. # refers to the number assigned to the view in **Figure 5-57**.

5.11.4.3 Alternative B

Direct Operational Impacts

173 **Relative to the No-Action Alternative, Alternative B would result in adverse direct**
 174 **operational impacts on one view and a beneficial impact on one view, as shown in Table 5-**
 175 **127.**

Table 5-127. Direct Operational Visual Impacts, Alternative B

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|-----------------------------|
| Negligible Adverse | 1 | H Street NE (#15) |
| Beneficial | 1 | Columbus Drive (#21) |

1. # refers to the number assigned to the view in **Figure 5-57**.

176 In Alternative B, all parking would be below ground. There would be no parking above the
 177 bus facility, resulting in a structure that would not be as tall as in the No-Action Alternative.
 178 Only the view from H Street NE looking west (#15) would experience an adverse impact, and
 179 this impact would be negligible due to low building elevation. There would be a beneficial
 180 impact on the view from the west side of Columbus Circle Drive (#21) as in Alternative A
 181 (**Section 5.11.4.2, Alternative A, Direct Operational Impacts**).

Indirect Operational Impacts

182 **Relative to the No-Action Alternative, Alternative B would result in adverse indirect**
 183 **operational impacts on nine views, as shown in Table 5-128.**

Table 5-128. Indirect Operational Visual Impacts, Alternative B

| Impact | Number of Views Affected | Views Affected ¹ |
|--------------------|--------------------------|--|
| Moderate Adverse | 3 | Delaware Avenue NE (#2), Louisiana Avenue NE (#3), E Street NE (#4) |
| Minor Adverse | 3 | First Street NE (#1), G Street NW (#7), View from Columbus Plaza (#19) |
| Negligible Adverse | 3 | F Street NW (#5), First Street NE (#10), Massachusetts Avenue NE (#18) |

1. # refers to the number assigned to the view in **Figure 5-57**.

184 The indirect operational impacts of Alternative B would be similar to those of Alternative A
 185 (see **Section 5.11.4.2, Alternative A, Indirect Operational Impacts**) because the total massing
 186 of the combined bus facility and potential Federal air-rights development would be the same
 187 in both alternatives and affect the same views in a similar fashion (see **Section 5.11.4.2,**
 188 **Alternative A, Indirect Operational Impacts**). However, because the area available for
 189 potential Federal air rights development would be larger, there would be additionally a
 190 moderate indirect operational impact to Delaware Avenue NE (#2) and a negligible indirect
 191 operational impact to First Street NE (#10).

Construction Impacts

192 **Construction of Alternative B would result in a moderate adverse impact on one view,**
 193 **minor adverse impacts on 11 views, and negligible adverse impacts on eight views, as**
 194 **shown in Table 5-129.**

Table 5-129. Construction Visual Impacts, Alternative B

| Impact | Number of Views Affected | Views Affected ¹ |
|--------------------|--------------------------|---|
| Moderate Impact | 1 | H Street Bridge (#28) |
| Minor Adverse | 11 | E Street NE (#4), G Street NW (#7), K Street NW (#9), K Street NE (#13), First Street NE (#10), New York Avenue Bridge NE (#11), 2nd Street NE (#12), I (Eye) Street NE (#14), H Street NE (#15), Columbus Circle Drive (#21), U.S. Capitol (#24) |
| Negligible Adverse | 8 | Delaware Avenue NE (#2), Louisiana Avenue NE (#3), H Street NW (#8), G Street NE (#16), Massachusetts Avenue NE (#18), Columbus Plaza (#19), Columbus Circle Drive (#20); Washington Monument (#22) |

1. # refers to the number assigned to the view in **Figure 5-57**.

195 The impacts of constructing Alternative B would be the same as those of constructing
196 Alternative A (**Section 5.11.4.2, *Alternative A, Construction Impacts***) with two exceptions.³
197 Heavier construction activity in the K Street NE underpass would additionally affect views
198 from K Street NW looking east and west in addition to the views that would be affected in
199 Alternative A. Impacts on these views would be minor for the same reasons as explained for
200 Alternative A.

Comparison to Existing Conditions

201 Relative to existing conditions, Alternative B would result in adverse direct and indirect
202 operational impacts on 20 views and a beneficial impact on one view, like Alternative A (see
203 **Table 5-126** above).

5.11.4.4 Alternative C

Direct Operational Impacts

204 **Relative to the No-Action Alternative, Alternative C (either option) would result in**
205 **beneficial adverse direct operational impacts on two views.**

206 Alternative C's east-west train hall would span the width of the rail terminal. A new bus
207 facility north of H Street would be located on the east or west side of the Project Area with a
208 bus drop-off and pick-up area integrated with the train hall. Parking would be provided
209 above-ground north of H Street, either on the east or west side of the site, and below
210 ground.

211 In Alternative C, the projecting portion of the existing garage and associated service roadway
212 would be removed, resulting in the reestablishment of the view along First Street NE and a
213 beneficial impact on the view from the west side of Columbus Circle Drive (#21). There would
214 also be a beneficial impact on views from G Street NW (#7) because of the reduction in
215 building massing and removal of the existing parking garage. From all other locations, the
216 Project elements would not visually stand out against the background of the private air-rights
217 development.

Indirect Impacts

218 **Relative to the No-Action Alternative, Alternative C (either option) would result in adverse**
219 **indirect operational impacts on five views, as shown in Table 5-130.**

³ Alternative B would take longer to complete than Alternative A (approximately 14 years and 4 months). However, the longer duration would largely be due to the deeper excavation needed to accommodate two levels of below-ground parking. Most of this additional work would take place below grade and, as such, would not cause additional visual disruptions.

Table 5-130. Indirect Operational Visual Impacts, Alternative C

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|--|
| Moderate Adverse | 2 | Delaware Avenue NE (#2), E Street NE (#4) |
| Minor Adverse | 2 | First Street NE (#1), Louisiana Avenue NE (#3) |
| Negligible Adverse | 1 | First Street NE (#10) |

1. # refers to the number assigned to the view in **Figure 5-57**.

220 Indirect visual impacts would be caused by the mass and height of the potential Federal air-
 221 rights development within the approximate footprint of the existing parking garage up to the
 222 maximum height allowed under zoning. The potential Federal air-rights development would
 223 be most noticeable looking northeast from Delaware Avenue NE (#2) and E Street NE (#4), as
 224 it would rise above the roofline of the west pavilion of the historic station building and would
 225 not be obscured by the private air-rights development, resulting in moderate adverse
 226 impacts. There would be minor adverse impacts on the views from First Street NE (#1) and
 227 Louisiana Avenue NE (#3), and negligible adverse impacts on the view from First Street NE
 228 (#10). While visible from there, the Federal air-rights would largely blend in with the private
 229 air-rights development.

Construction Impacts

230 **Construction of Alternative C (either option) would result in a moderate adverse impact on**
 231 **one view, minor adverse impacts on 12 views, and negligible adverse impacts on six views,**
 232 **as shown in Table 5-131.**

Table 5-131. Construction Visual Impacts, Alternative C

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|---|
| Moderate Adverse | 1 | H Street Bridge (#28) |
| Minor Adverse | 12 | E Street NE (#4), G Street NW (#7), H Street NW (#8), K Street NW (#9), First Street NE (#10), New York Avenue Bridge NE (#11), 2nd Street NE (#12), K Street NE (#13), I (Eye) Street NE (#14), H Street NE (#15), Columbus Circle Drive (#21), U.S. Capitol Dome (#24) |
| Negligible Adverse | 6 | Delaware Avenue NE (#2), Louisiana Avenue NE (#3), G Street NE (#16), Columbus Plaza (#19), Columbus Circle Drive (#20), Washington Monument (#22) |

1. # refers to the number assigned to the view in **Figure 5-57**.

233 Like that of the other Action Alternatives, construction of Alternative C would change the
 234 appearance of the rail terminal and its immediate surroundings for the duration of the
 235 construction period, approximately 12 years and 3 months. Based on distance, perspective,
 236 and the anticipated location and height of heavy construction equipment and activities,

237 construction of Alternative C (either option) would result in negligible adverse impacts on six
 238 views. Distance or intervening structures would hide most of the construction equipment or
 239 activities from those views. Alternative C would also result in minor adverse impacts on 12
 240 views. From these viewpoints, construction equipment and activities would be more visible
 241 for at least part of the construction period. Impacts would be minor for the same reasons as
 242 explained for Alternative A (see **Section 5.11.4.2, Alternative A, Construction Impacts**). Also
 243 as in Alternative A, impacts on the H Street Bridge would be moderate, due the proximity of
 244 the construction to the bridge and passersby.

Comparison to Existing Conditions

245 Relative to existing conditions, Alternative C would result in adverse direct and indirect
 246 operational impacts on 17 (East Option) or 16 (West Option) views and a beneficial impact on
 247 two views (**Table 5-132**). As with the other Action Alternatives, the impacts of Alternative C
 248 relative to existing conditions would be greater than relative to the No-Action Alternative
 249 because the changes caused by Alternative C would be more noticeable against a baseline
 250 that does not include the private air-rights development.

Table 5-132. Direct and Indirect Visual Impacts Relative to Existing Conditions, Alternative C

| Impact | Number of Views Affected | Views Affected ^{1,2} |
|---------------------------|------------------------------------|--|
| Major Adverse | 3 | First Street NE (#1), Delaware Avenue NE (#2), New York Avenue Bridge (#11) |
| Moderate Adverse | 6 (East Option) 5 (West Option) | Louisiana Avenue NE (#3), E Street NE (#4), First Street NE (#10), I (Eye) Street NE (#14) ³ , U.S. Capitol Dome (#24), H Street Bridge (#28) |
| Minor Adverse | 4 | H Street NW (#8), K Street NW (#9), K Street NE (#13), H Street NE (#15) |
| Negligible Adverse | 4 | 2nd Street NE (#12), G Street NE (#16), Columbus Circle Drive (#20), Washington Monument (#22) |
| Beneficial | 2 | G Street NW (#7), Columbus Circle Drive (#21) |

- 1. # refers to the number assigned to the view in **Figure 5-57**.
- 2. Both options unless otherwise noted.
- 3. East Option only.

5.11.4.5 Alternative D

Direct Operational Impacts

251 **Relative to the No-Action Alternative, Alternative D would result in beneficial adverse**
 252 **direct operational impacts on two views.**

253 Alternative D’s east-west train hall would cover the rail terminal north of the historic station
 254 building, extending over all tracks and platforms. The bus facility would be integrated with
 255 the train hall and an above-ground parking facility would be provided south of K Street NE.

256 The beneficial impacts of Alternative D would be the same as those of Alternative C (see
 257 **Section 5.11.4.4, Alternative C, Direct Operational Impacts**). As in Alternative C, in Alternative
 258 D the Project elements would not visually stand out against the background of the private
 259 air-rights development and have no adverse impacts on any views.

Indirect Operational Impacts

260 **Relative to the No-Action Alternative, Alternative D would result in adverse indirect**
 261 **operational impacts on five views.**

262 The indirect operational impacts of Alternative D would be the same as those of Alternative C
 263 as the potential Federal air-rights development would be the same (see **Section 5.11.4.4,**
 264 *Alternative C, Indirect Operational Impacts*).

Construction Impacts

265 **Construction of Alternative D would result in a moderate adverse impact on one view,**
 266 **minor adverse impacts on 11 views, and negligible adverse impacts on eight views, as**
 267 **shown in Table 5-133.**

Table 5-133. Construction Visual Impacts, Alternative D

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|--|
| Moderate Adverse | 1 | H Street Bridge (#28) |
| Minor Adverse | 11 | E Street NE (#4), G Street NW (#7), K Street NW (#9), First Street NE (#10), New York Avenue Bridge NE (#11), 2nd Street NE (#12), K street NE (#13), I (Eye) Street NE (#14), H Street NE (#15), Columbus Circle Drive (#21), U.S. Capitol Dome (#24) |
| Negligible Adverse | 8 | Delaware Avenue NE (#2), Louisiana Avenue NE (#3), H Street NW (#8), G Street NE (#16), Massachusetts Avenue NE (#18), Columbus Plaza (#19), Columbus Circle Drive (#20), Washington Monument (#22) |

1. # refers to the number assigned to the view in **Figure 5-57**.

268 Based on distance, perspective, and the anticipated location and height of heavy
 269 construction equipment and activities, construction of Alternative D would result in negligible
 270 adverse impacts on eight views. Distance or intervening structures would hide most of the
 271 construction equipment or activities from those views. Alternative D would also result in
 272 minor adverse impacts on 11 views. From these viewpoints, construction equipment and
 273 activities would be more visible for at least part of the construction period. Impacts would be
 274 minor for the same reasons as explained for Alternative A (see **Section 5.11.4.2, Alternative**
 275 *A, Construction Impacts*). Impacts would be moderate on H Street NE (#28) due to the
 276 proximity of the construction operations to the bridge.

Comparison to Existing Conditions

277 Relative to existing conditions, Alternative D would result in adverse direct and indirect
 278 operational impacts on 16 views and a beneficial impact on two views, as shown in **Table 5-**
 279 **134**. As with the other Action Alternatives, the impacts of Alternative D relative to existing
 280 conditions would be greater than relative to the No-Action Alternative because the changes
 281 caused by Alternative D would be more noticeable against a baseline that does not include
 282 the private air-rights development.

Table 5-134. Direct and Indirect Visual Impacts Relative to Existing Conditions, Alternative D

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|---|
| Major Adverse | 3 | First Street NE (#1), Delaware Avenue NE (#2), New York Avenue Bridge (#11) |
| Moderate Adverse | 7 | Louisiana Avenue NE (#3), E Street NE (#4), First Street NE (#10), 2nd Street NE (#12), K Street NE (#13), U.S. Capitol Dome (#24), H Street Bridge (#28) |
| Minor Adverse | 3 | K Street NW (#9), H Street NE (#15), Columbus Circle Drive (#20) |
| Negligible Adverse | 3 | H Street NW (#8), G Street NE (#16), Washington Monument (#22) |
| Beneficial | 2 | G Street NW (#7), Columbus Circle Drive (#21) |

1. # refers to the number assigned to the view in **Figure 5-57**.

5.11.4.6 Alternative E

Direct Operational Impacts

283 **Relative to the No-Action Alternative, Alternative E would result in beneficial direct**
 284 **operational impacts on two views.**

285 Alternative E’s east-west train hall would cover the rail terminal north of the headhouse,
 286 extending over all tracks and platforms. The proposed bus facility would be integrated with
 287 the train hall. All parking would be below-ground. The existing parking garage would be
 288 removed.

289 The beneficial impacts of Alternative E would be the same as those of Alternative C (see
 290 **Section 5.11.4.4, Alternative C, Direct Operational Impacts**). As in Alternative C, in Alternative
 291 E, the Project elements would not visually stand out against the background of the private
 292 air-rights development and have no adverse impacts on any views.

Indirect Operational Impacts

293 **Relative to the No-Action Alternative, Alternative E would result in adverse indirect**
 294 **operational impacts on five views.**

295 The indirect operational impacts of Alternative E would be the same as those of Alternative C
 296 (see **Section 5.11.4.4, Alternative C, Indirect Operational Impacts**).

Construction Impacts

297 **Construction of Alternative E would result in a moderate adverse impact on one view,**
 298 **minor adverse impacts on 11 views, and negligible adverse impacts on eight views.**

299 Like that of the other Action Alternatives, construction of Alternative E would change the
 300 appearance of the rail terminal and its immediate surroundings for the duration of the
 301 construction period, approximately 14 years and 4 months. Based on distance, perspective,
 302 and the anticipated location and height of heavy construction equipment and activities,
 303 construction of Alternative E would result in adverse impacts on the same views as
 304 Alternative D (see **Section 5.11.4.5, Alternative D, Construction Impacts** and **Table 5-133**
 305 above).

Comparison to Existing Conditions

306 Relative to existing conditions, Alternative E would result in adverse direct and indirect
 307 operational impacts on 16 views and a beneficial impact on two views, as shown in **Table 5-**
 308 **135**. As with the other Action Alternatives, the impacts of Alternative E relative to existing
 309 conditions would be greater than relative to the No-Action Alternative because the changes
 310 caused by Alternative E would be more noticeable against a baseline that does not include
 311 the private air-rights development.

Table 5-135. Direct and Indirect Visual Impacts Relative to Existing Conditions, Alternative E

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|---|
| Major Adverse | 3 | First Street NE (#1), Delaware Avenue NE (#2), New York Avenue Bridge (#11) |
| Moderate Adverse | 5 | Louisiana Avenue NE (#3), E Street NE (#4), First Street NE (#10), U.S. Capitol Dome (#24), H Street Bridge (#28) |
| Minor Adverse | 4 | K Street NW (#9), K Street NE (#13), H Street NE (#15), Columbus Circle Drive (#20) |
| Negligible Adverse | 4 | H Street NW (#8), 2nd Street NE (#12), G Street NE (#16), Washington Monument (#22) |
| Beneficial | 2 | G Street NW (#7), Columbus Circle Drive (#21) |

1. # refers to the number assigned to the view in **Figure 5-57**.

5.11.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

312 **Relative to the No-Action Alternative, Alternative A-C would result in adverse direct**
 313 **operational impacts on three views and a beneficial direct operational impacts on one view**
 314 **as shown in Table 5-136.**

Table 5-136. Direct Operational Visual Impacts, Alternative A-C

| Impact | Number of Views Affected | Views Affected ¹ |
|--------------------|--------------------------|-----------------------------|
| Moderate Adverse | 1 | Delaware Avenue NE (#2) |
| Minor Adverse | 1 | Louisiana Avenue NE (#3), |
| Negligible Adverse | 1 | First Street NE (#10) |
| Beneficial | 1 | Columbus Circle Drive (#21) |

1. # refers to the number assigned to the view in **Figure 5-57**.

315 Alternative A-C would have a moderate adverse impact on the view from Delaware Avenue
 316 NE (#2) because the parking facility would be distinctly visible above the station’s west
 317 pavilion adjacent to the barrel vault roof of the central pavilion. It would be less visible from
 318 Louisiana Avenue NE and First Street NE, resulting in minor and negligible impacts,
 319 respectively. The new bus facility and parking facility would occupy approximately the same
 320 volume as the existing parking garage, but the portion projecting over the service roadway
 321 on the west side would be eliminated, re-establishing views along First Street NE. This would
 322 amount to a beneficial impact on the view from the west side of Columbus Circle Drive (View
 323 #21).

Indirect Impacts

324 **Relative to the No-Action Alternative, Alternative A-C would result in adverse indirect**
 325 **operational impacts on seven views, as shown in Table 5-137.**

Table 5-137. Indirect Operational Visual Impacts, Alternative A-C

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|---|
| Moderate Adverse | 1 | E Street NE (#4) |
| Minor Adverse | 4 | First Street NE (#1), G Street NW (#7), Columbus Plaza (#19), Columbus Circle Drive (#20) |
| Negligible Adverse | 2 | F Street NW (#5), Massachusetts Avenue NE (#18) |

1. # refers to the number assigned to the view in **Figure 5-57**.

326 In Alternative A-C, the potential Federal air-rights development would be most noticeable
 327 from View #4, as it would rise above the roofline of the west pavilion, resulting in a moderate
 328 adverse impact. Views #1, #7, #19, and #20 would experience minor adverse impacts, and
 329 views #5 and #18 negligible adverse impacts because the development, while visible, would
 330 be less noticeable against the background of the existing station and the private air-rights
 331 development.

Construction Impacts

332 **Construction of Alternative A-C would result in a moderate adverse impact on one view,**
 333 **minor adverse impacts on nine views, and negligible adverse impacts on eight views, as**
 334 **shown in Table 5-138.**

Table 5-138. Construction Visual Impacts, Alternative A-C

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|---|
| Moderate Adverse | 1 | H Street Bridge (#28) |
| Minor Adverse | 9 | E Street NE (#4), G Street NW (#7), First Street NE (#10), New York Avenue Bridge NE (#11), 2nd Street NE (#12), I (Eye) Street NE (#14), H Street NE (#15), Columbus Circle Drive (#21), U.S. Capitol Dome (#24) |
| Negligible Adverse | 8 | Delaware Avenue NE (#2), Louisiana Avenue NE (#3), H Street NW (#8), G Street NE (#16), Massachusetts Avenue NE (#18), Columbus Plaza (#19), Columbus Circle Drive (#20), Washington Monument (#22) |

1. # refers to the number assigned to the view in **Figure 5-57**.

335 Based on distance, perspective, and the anticipated location and height of heavy
 336 construction equipment and activities, construction of Alternative A-C would result in
 337 negligible adverse impacts on eight views. Distance or intervening structures would hide
 338 most of the construction equipment or activities from those views. Alternative A-C would
 339 also result in minor adverse impacts on 9 views. From these viewpoints, construction
 340 equipment and activities would be more visible for at least part of the construction period.

341 Impacts would be minor for the same reasons as explained for Alternative A (see **Section**
 342 **5.11.4.2, Alternative A, Construction Impacts**). Impacts would be moderate on H Street NE
 343 (#28) due to the proximity of the construction operations to the bridge.

Comparison to Existing Conditions

344 Relative to existing conditions, Alternative A-C would result in adverse direct and indirect
 345 operational impacts on 20 views and a beneficial impact on one view, as shown in **Table 5-**
 346 **139**. As with the other Action Alternatives, the impacts of Alternative A-C relative to existing
 347 conditions would be greater than relative to the No-Action Alternative because the changes
 348 caused by Alternative A-C would be more noticeable against a baseline that does not include
 349 the private air-rights development.

Table 5-139. Direct and Indirect Visual Impacts Relative to Existing Conditions, Alternative A-C

| Impact | Number of Views Affected | Views Affected ¹ |
|---------------------------|--------------------------|--|
| Major Adverse | 3 | First Street NE (#1), Delaware Avenue NE (#2), New York Avenue Bridge (#11) |
| Moderate Adverse | 5 | Louisiana Avenue NE (#3), E Street NE (#4), First Street NE (#10), U.S. Capitol Dome (#24), H Street Bridge (#28) |
| Minor Adverse | 6 | G Street NW (#7), K Street NW (#9), K Street NE (#13), H Street NE (#15), Columbus Plaza (#19), Columbus Circle Drive (#20) |
| Negligible Adverse | 6 | F Street NW (#5), H Street NW (#8), 2nd Street NE (#12), G Street NE (#16), Massachusetts Avenue NE (#18), Washington Monument (#22) |
| Beneficial | 1 | Columbus Circle Drive (#21) |

1. # refers to the number assigned to the view in **Figure 5-57**.

5.11.5 Comparison of Alternatives

350 A summary of the impacts of the Action Alternatives as compared to the No-Action
 351 Alternative is provided in **Table 5-140**. Among all the alternatives, the No-Action Alternative
 352 would have the greatest visual impacts because of the size and height of the private air-rights
 353 development. Only the No-Action Alternative would result in major adverse impacts on six
 354 views. In general, the Project and the potential Federal air-rights development would be
 355 visually compatible, obscured, encompassed, or balanced by the massing of the private air-
 356 rights development. Therefore, the visual impacts of the Action Alternatives would be
 357 smaller than those of the No-Action Alternative, in terms of both the number of affected
 358 views and intensity.

359 Alternatives C (both options), D, and E would adversely affect the fewest views (5 out of 28)
 360 while Alternatives A, B, and A-C would adversely affect the most (10 out of 28). None of the
 361 Action Alternatives would result in major adverse impacts. With regard to other impacts, the
 362 Action Alternatives fall into two groups: Alternatives A, B, and A-C on the one hand, and

363 Alternatives C through E on the other. Overall, the first group would have greater visual
364 impacts than the second one.

365 While all Action Alternatives would have a moderate adverse impact on views from E Street
366 NE looking northeast (#4) and from Delaware Avenue NE looking northeast (#2), only
367 Alternatives A and B would have a moderate adverse impact to the view from Louisiana
368 Avenue (#3). This is because the potential Federal air-rights development would be highly
369 visible regardless of the presence of the private air-rights development. Alternatives A, B, and
370 A-C would be the only Action Alternatives with minor impacts on the view from Columbus
371 Plaza (#19). All other Action Alternatives would have no impacts because the Project and the
372 potential Federal air-rights development would not be visible from the plaza. Alternative A-C
373 is the only alternative with an adverse impact to the view from the east side of Columbus
374 Circle Drive (#20). This is because a portion of the Federal air rights would be visible
375 extending from the barrel vault roof of the station. This adverse impact would be minor.
376 Finally, Alternatives A and B would have a beneficial impact on only one view, instead of two
377 for the other Action Alternatives.

378 All Action Alternatives would result in a beneficial impact to the view from the west side of
379 Columbus Circle Drive, due to the removal of the existing, visually incompatible parking
380 garage. This would reestablish the open view down First Street NE originally created by the
381 L'Enfant Plan. Only Alternatives C through E would also have a beneficial impact on the view
382 from G Street NW to the east, because of the reduction in building massing and opening of
383 the view resulting from the removal of the existing parking garage and construction of the
384 train hall.

Table 5-140. Comparison of Impacts, Aesthetics and Visual Quality

| View | Alternative and Direct or Indirect Operational Impact ¹ | | | | | | | |
|---|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|
| | No-Action | A | B | C-East | C-West | D | E | A-C (Preferred) |
| 1.First Street NE, looking north | Major Adverse | Minor Adverse | Minor Adverse | Minor Adverse | Minor Adverse | Minor Adverse | Minor Adverse | Minor Adverse |
| 2.Delaware Avenue NE, looking northeast | Major Adverse | Moderate Adverse | Moderate Adverse | Moderate Adverse | Moderate Adverse | Moderate Adverse | Moderate Adverse | Moderate Adverse |
| 3.Louisiana Avenue NE, looking northeast | Major Adverse | Moderate Adverse | Moderate Adverse | Minor Adverse | Minor Adverse | Minor Adverse | Minor Adverse | Minor Adverse |
| 4.E Street NE, looking northeast | Moderate Adverse | Moderate Adverse | Moderate Adverse | Moderate Adverse | Moderate Adverse | Moderate Adverse | Moderate Adverse | Moderate Adverse |
| 5.F Street NW, looking east | No Impact | Negligible Adverse | Negligible Adverse | No Impact | No Impact | No Impact | No Impact | Negligible Adverse |
| 6.Massachusetts Avenue NW, looking east | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 7.G Street NW, looking east | No Impact | Minor Adverse | Minor Adverse | Beneficial | Beneficial | Beneficial | Beneficial | Minor Adverse |
| 8.H Street NW, looking east | Minor Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 9. K Street NW, looking east | Minor Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 10.First Street NE, looking south | Moderate Adverse | Negligible Adverse | Negligible Adverse | Negligible Adverse | Negligible Adverse | Negligible Adverse | Negligible Adverse | Negligible Adverse |
| 11.New York Avenue Bridge NE, looking south | Major Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 12.2nd Street NE, looking south | Major Adverse | No Impact | No Impact | No Impact | No Impact | Minor Adverse | No Impact | No Impact |
| 13.K Street NE, looking west | Moderate Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 14.I Street NE, looking west | Moderate Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 15.H Street NE, looking west | Minor Adverse | Negligible Adverse | Negligible Adverse | No Impact | No Impact | No Impact | No Impact | No Impact |
| 16.G Street NE, looking west | Minor Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 17.F Street NE, looking west | Negligible Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 18.Massachusetts Avenue NE, looking northwest | Negligible Adverse | Negligible Adverse | Negligible Adverse | No Impact | No Impact | No Impact | No Impact | Negligible Adverse |
| 19.Columbus Plaza | Minor Adverse | Minor Adverse | Minor Adverse | No Impact | No Impact | No Impact | No Impact | Minor Adverse |
| 20.Columbus Circle Drive – East Side | Moderate Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | Minor Adverse |
| 21.Columbus Circle Drive – West Side | No Impact | Beneficial | Beneficial | Beneficial | Beneficial | Beneficial | Beneficial | Beneficial |
| 22.Washington Monument | Negligible Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 23.Arlington House at Arlington National Cemetery | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 24.U.S. Capitol Dome | Moderate Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 25.Old Post Office Building | Negligible Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 26.Washington National Cathedral | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 27.St. Elizabeths West Campus | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| 28.H Street Bridge | Major Adverse | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact | No Impact |
| Total Views with No Impact | 7 | 17 | 17 | 21 | 21 | 21 | 21 | 17 |
| Total Views with Negligible Adverse Impact² | 4 (2)(0) | 4 (2)(2) | 4 (1)(3) | 1 (0)(1) | 1 (0)(1) | 1 (0)(1) | 1 (0)(1) | 3 (1)(2) |
| Total Views with Minor Adverse Impact² | 5 (5)(0) | 3 (0)(3) | 3 (0)(3) | 2 (0)(2) | 2 (0)(2) | 2 (0)(2) | 2 (0)(2) | 5 (1)(4) |
| Total Views with Moderate Adverse Impact² | 6 (6)(0) | 3 (1)(2) | 3 (0)(3) | 2 (0)(2) | 2 (0)(2) | 2 (0)(2) | 2 (0)(2) | 2 (1)(1) |
| Total Views with Major Adverse Impact² | 6 (6)(0) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total Views with Beneficial Impacts² | 0 | 1 (1)(0) | 1 (1)(0) | 2 (2)(0) | 2 (2)(0) | 2 (2)(0) | 2 (2)(0) | 1 (1)(0) |

Notes: 1. Italics indicate indirect impact.
2. Total (direct impacts) (indirect impacts).

5.11.6 Avoidance, Minimization and Mitigation Evaluation

385 Visual impacts were assessed by reviewing the compatibility and sensitivity of the visual
386 changes. Due to the still undefined exact massing, form, and materials in the No-Action
387 Alternative and Action Alternatives' design, findings of adverse impacts are conservative.
388 They do not take into account that actual design, particularly as it relates to massing, form,
389 and materials, may affect compatibility and sensitivity and avoid or mitigate the impact. To
390 avoid, minimize, or mitigate adverse impacts, FRA is proposing that, as much as possible, the
391 Project Proponents design the Project with context-compatible architecture and materials,
392 and in a manner that is sensitive to surrounding structures.

393 Adverse impacts to certain views would also be avoided or mitigated if the private air-rights
394 development and the potential Federal air-rights development are designed and constructed
395 to be lower than their maximum buildable volume. This is especially true for the views from
396 Delaware Avenue NE, First Street NE, Louisiana Avenue NE, and E Street NE, where the
397 maximum buildable volume would result in structures rising above the barrel vault and side
398 pavilions of the historic station building. Adverse impacts to views from the south of WUS
399 would be minimized if the private air-rights and potential Federal air-rights developments are
400 constructed to be the same height and of similar form and materials, creating a symmetrical
401 pattern. The overall color of the buildings should also be taken into consideration, as this
402 would also affect visual compatibility. However, decisions regarding the design of the future
403 private air-rights development would be made by the property owner.

5.11.7 Permits and Regulatory Compliance

404 The Project would be reviewed by the National Capital Planning Commission (NCPC) and the
405 Commission of Fine Arts (CFA) for final approval. Typically, NCPC reviews at pre-
406 design/programming, during schematic design (preliminary review), and at design
407 development (final review). CFA reviews at the concept design phase and the final design
408 phase.

409 In addition, any reviews stipulated as part of a Programmatic Agreement resulting from the
410 Section 106 process or as part of the Record of Decision would have to be met. For all views
411 where the Action Alternatives were found to cause an adverse impact, the Project design
412 may contribute to avoiding this impact.

413 The various components of the No-Action Alternative would also be reviewed and would
414 need final approval from NCPC, CFA, and the District's Historic Preservation Review Board. All
415 three bodies would have to approve the final design and site plan information. Approval of
416 each project's design is critical because design would contribute greatly to the compatibility
417 and sensitivity of the aesthetic and visual quality of the Project. For all views where the No-
418 Action Alternative was found to cause an adverse impact, the design may contribute to a
419 reduction in the intensity of the impact or in no impact.

- 420 All further regulatory compliance would follow Federal and District regulations and guidelines
421 concerning aesthetics or changes to visual resources, including:
- 422 ■ The Comprehensive Plan for the National Capital, Federal Urban Design Element;
 - 423 ■ Executive Order 1259: CFA Review of Public Buildings in the District of Columbia
424 Proposed by the Federal or DC governments;
 - 425 ■ Shipstead-Luce Act of 1930 (Public Law 71-231, Public Law 76-248);
 - 426 ■ Executive Order 1862: CFA Review of New Structures and Matters of Art Proposed by
427 the Federal Government in DC;
 - 428 ■ Executive Order 11593: Protection and Enhancement of the Cultural Environment;
 - 429 ■ The Historic Landmark and Historic District Protection Act of 1978 (D. Law 2-144, as
430 amended through October 1, 2016); and
 - 431 ■ The Height of Buildings Act of 1910.

5.12 Cultural Resources

1 This section describes and characterizes potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on cultural resources. If applicable, this
3 section also recommends measures to avoid, minimize, or mitigate potential adverse impacts
4 and it describes permitting and regulatory compliance requirements.

5 “Cultural resources” for the purposes of this section consist of the historic properties
6 evaluated as part of the Section 106 of the National Historic Preservation Act of 1966
7 (Section 106) process for the Washington Union Station (WUS) Expansion Project (Project).
8 They include districts, buildings, sites, structures, and objects included in or eligible for
9 inclusion in the National Register of Historic Places (NRHP) and the District of Columbia
10 Inventory of Historic Sites (DC Inventory); properties that fall within the purview of the
11 Architect of the Capitol (AOC) and are listed as AOC Heritage Assets; and properties that are
12 under the jurisdiction of the National Park Service’s National Mall and Memorial Parks.

13 In March 2019, FRA completed a Draft Assessment of Effects (AOE) in compliance with
14 Section 106 to evaluate how the Project would affect historic properties and provided it for
15 review and comment to the District State Historic Preservation Officer (DC SHPO) and the
16 Section 106 Consulting Parties.¹ On April 30, 2019, FRA hosted a Consulting Party Meeting to
17 present the Draft AOE and receive comments.

18 The March 2019 AOE did not address Alternative A-C, which FRA and the Project Proponents
19 developed and identified as the Preferred Alternative in summer and fall 2019. FRA
20 presented the Preferred Alternative to the Consulting Parties at a meeting held on November
21 19, 2019.

22 Following this meeting, FRA prepared a revised Draft AOE incorporating Alternative A-C and
23 addressing the comments received on the March 2019 Draft AOE. The revised Draft AOE has
24 been submitted for review to the DC SHPO and Consulting Parties at the same time as this
25 DEIS. It is included in the DEIS as **Appendix D1**. The cultural resource impact assessment
26 presented in this section, summarized from **Section 12, Cultural Resources** of **Appendix C3,**
27 *Washington Union Station Expansion Project Environmental Consequences Technical Report,*
28 builds on the findings of the revised Draft AOE.

¹ See **Section 8.4, National Historic Preservation Act Section 106 Consultation**, for a summary of the Section 106 consultation process prior to this date. Consulting Parties are certain individuals and organizations with a demonstrated interest in the undertaking, who may participate in the Section 106 process due to the nature of their legal or economic relation to the undertaking or affected properties, or their concern with the undertaking’s effect on historic properties.

5.12.1 Regulatory Context and Guidance

29 Relevant Federal policies, regulations and guidance that pertain to cultural resources are
30 listed in **Section 4.12.1, Affected Environment, Cultural Resources, Regulatory Context and**
31 *Guidance*.

5.12.2 Study Area

32 As defined in **Section 4.12.2, Affected Environment, Cultural Resources, Study Area**, the Local
33 Study Area consists of the APE (**Figure 4-26**). There is no Regional Study Area because neither
34 the No-Action Alternative nor the Action Alternatives have the potential to affect cultural
35 resources beyond the Local Study Area. The process for developing the APE is available in
36 **Appendix D1, Washington Union Station Expansion Project Draft Section 106 Assessment of**
37 *Effects to Historic Properties*. The inventory of historic properties in the APE is documented in
38 **Appendix D1a, Washington Union Station Expansion Project Appendices to the Draft Section**
39 *106 Assessment of Effects to Historic Properties*.

5.12.3 Methodology

40 This section summarizes the methodology for evaluating the potential impacts of the
41 alternatives on cultural resources. **Appendix C3, Section 12.3, Washington Union Station**
42 *Expansion Project Environmental Consequences Technical Report, Cultural Resources,*
43 *Methodology*, provides a full description of the analysis methodology. A summary is below.

44 The cultural resources impact assessment is based on the Draft AOE prepared in accordance
45 with Section 106, which evaluates effects based on existing conditions.² Therefore, for
46 cultural resources, unlike other resources in this DEIS, impacts are first assessed relative to
47 existing conditions to remain consistent with the Section 106 assessment. A secondary
48 comparison against the No-Action Alternative is provided for each Action Alternative. Only
49 visual impacts vary with the baseline.

50 A major adverse impact on a cultural resource would occur if the Project would cause an
51 adverse effect to the resource under Section 106. An adverse effect is an effect that would
52 alter, directly or indirectly, the integrity of the resource's location, design, setting, materials,
53 workmanship, feeling, or association in a manner that would result in a finding of adverse
54 effect under Section 106.³ Examples of major adverse impacts include:

² **Appendix D1.** In the No-Action Alternative, the Project would not occur and, therefore, there would be no Federal undertaking for the purposes of Section 106. For the purpose of the NEPA assessment, the impacts of the No-Action Alternative on cultural resources were assessed based on available data and, when possible, using a similar approach to the approach used for the Action Alternatives, but there are no corresponding Section 106 findings for this alternative.

³ 36 CFR 800.5.

- 55 ■ Physical destruction of or damage to all or part of the property;
- 56 ■ Alteration of a property that is not consistent with the *Secretary's Standards for the*
- 57 *Treatment of Historic Properties* and applicable guidelines;
- 58 ■ Removal of the property from its historic location;
- 59 ■ Change of character of the property's use or of physical features within the
- 60 property's setting that contributes to its historic significance;
- 61 ■ Introduction of visual, atmospheric, or audible elements that diminish the integrity of
- 62 the property's significant historic features;
- 63 ■ Neglect of a property that causes its deterioration, except where such neglect and
- 64 deterioration are recognized qualities of a property of religious and cultural
- 65 significance to an Indian tribe or Native Hawaiian organization; and
- 66 ■ Transfer, lease, or sale of property out of Federal ownership or control without
- 67 adequate and legally enforceable restrictions or conditions to ensure long-term
- 68 preservation of the property's historic significance.

69 If the Project would change or alter a resource's location, design, setting, materials,
70 workmanship, feeling, or association but not sufficiently to result in an adverse effect under
71 Section 106, a negligible, minor, or moderate adverse impact may occur under NEPA. A
72 negligible, minor, or adverse impact under NEPA does not mean that there would be an
73 adverse effect under Section 106. When adverse impacts may occur but insufficient data are
74 available to determine whether they would in fact occur and what their intensity would be,
75 they are identified only as potential adverse impacts.

5.12.3.1 Operational Impacts

76 Direct operational impacts may be physical, visual, or related to traffic, noise, and vibration.
77 To assess direct operational physical impacts, the alternatives were reviewed to determine
78 whether they would potentially cause the destruction, alteration, or removal of part or whole
79 of a resource and the potential of such changes to diminish the resource's integrity.

80 Visual impacts may affect a resource's integrity of setting, feeling and association by
81 changing the way it relates to its environment and the experience of users, visitors, or
82 passers-by. Visual simulations prepared as part of the Section 106 assessment are the basis
83 for assessing visual impacts on cultural resources.⁴ The assessment of visual impacts on
84 cultural resources was based on the visibility of these changes and the sensitivity of the
85 affected view to such changes. Visibility and sensitivity informed the impact finding as shown
86 in **Table 5-141**.

⁴ The simulations can be found in **Appendix D1**.

Table 5-141. Intensity of Visual Impacts on Cultural Resources⁵

| Visibility | Sensitivity | Intensity of Impact |
|------------|-------------|---------------------|
| None | None | None |
| Low | Low | Negligible |
| Low | High | Minor |
| Low | Moderate | Minor |
| High | Low | Minor |
| Moderate | Low | Minor |
| High | Moderate | Moderate |
| Moderate | Moderate | Moderate |
| Moderate | High | Moderate |
| High | High | Major |

87 Impacts from noise and vibration were assessed based on the analyses presented in
 88 **Section 5.10, *Environmental Consequences, Noise and Vibration***. Impacts from noise and
 89 vibration on a cultural resource’s integrity of setting, feeling, and association were assessed
 90 using the following scale:

- 91 ■ **No Impact:** No measurable change in noise or vibration levels.
- 92 ■ **Negligible Impact:** Change in noise level of less than 3 decibels (dBA)⁶ and resulting
 93 in no impact per FTA criteria; vibration levels below FTA criteria.⁷
- 94 ■ **Minor Impact:** Change in noise level less than 3 dBA and resulting in moderate
 95 impact per FTA criteria; vibration levels below FTA criteria.
- 96 ■ **Moderate Impacts:** Change in noise levels less than 3 dBA resulting in a severe
 97 impact per FTA criteria; vibration levels below FTA criteria.
- 98 ■ **Major Impacts:** Change in noise levels more than 3 dBA resulting in a severe impact
 99 per FTA criteria or vibration levels above FTA criteria.

100 Vehicular traffic would be the main source of noise impacts in all alternatives. Other impacts
 101 from traffic were assessed based on the findings of the traffic impact analysis presented in
 102 **Section 5.5, *Transportation*** and a qualitative estimate of the potential for changes in traffic
 103 volumes to diminish a resource’s integrity of setting, feeling, or association.

104 Indirect operational impacts are those that would result from the potential development of
 105 the Federally owned air rights at WUS not needed for the Project. The only indirect impacts

⁵ For the Action Alternatives, *No Impact* corresponds to *No Effect* under Section 106; *Negligible, Minor, and Moderate Impact* correspond to *No Adverse Effect*; *Major Impacts* corresponds to *Adverse Effect*.

⁶ A change of less than 3 dBA is generally considered barely perceptible (U.S. Department of Transportation. Federal Highway Administration. *Traffic Noise: Analysis and Abatement Guidance* [June 2010] in District Department of Transportation, *Noise Policy* [January 10, 2011], p. 9, Table 4).

⁷ See **Section 10.4.1, *Washington Union Station Expansion Project Environmental Consequences Technical Report, Noise and Vibration, Operational Impacts***, for a definition of the FTA criteria.

106 would be visual. They were assessed using the same approach as that used for direct visual
107 impacts.

5.12.3.2 Construction Impacts

108 Construction impacts were assessed in a similar manner to operational impacts. Assessment
109 of noise and vibration impacts used the FTA thresholds applicable to construction noise and
110 vibration. Steps to evaluate potential construction impacts to cultural resources included:
111 identifying what physical construction effects may occur; potential visual impacts to cultural
112 resources or visual character due to construction activities; and indirect impacts of noise and
113 vibration.

5.12.4 Impact Analysis

114 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
115 cultural resources.

5.12.4.1 No-Action Alternative

Direct Operational Impacts

Physical Impacts

116 **In the No-Action Alternative, relative to existing conditions, projects that would be**
117 **completed in the Project Area would potentially result in adverse direct operational**
118 **physical impacts on WUS and the WUS Historic Site.⁸**

119 Several projects included in the No-Action Alternative (listed in **Section 3.3.1, No Action**
120 **Alternative, Section 3.3.1.3, Near-Term Station and Track Improvements at WUS, Section**
121 **3.3.1.4, Transportation Projects within the Project Area, and Section 3.3.1.5, Private Air-**
122 **rights Development**), could result in direct adverse operational impacts on WUS and the WUS
123 Historic Site.

124 Station improvement projects such as those listed in **Section 3.3.1.3, Near-Term Station and**
125 **Track Improvements at WUS** could result in direct adverse operational impacts on WUS and
126 the WUS Historic Site if not completed in accordance with the Secretary of the Interior's (SOI)
127 Standards. The relocation of Substation 25A would alter the physical and historic integrity of
128 the WUS Historic Site, to which it is a contributing element. The private air-rights
129 development would cover the currently open rail terminal between the historic station
130 building and K Street would involve modifications to the physical layout of the rail terminal
131 that may affect the physical and historic integrity of the WUS Historic Site.

⁸ The WUS Historic Site, as defined in the *Determination of Eligibility Amendment* that FRA prepared in 2017, includes the rail terminal in addition to the historic station building, Columbus Plaza, and the First Street Tunnel.

132 These potential direct adverse impacts could be avoided, minimized, or mitigated through
 133 compliance with Section 106, which require all projects funded, permitted, or authorized by
 134 the Federal government to undergo consultation with the DC SHPO and other parties, as
 135 appropriate. In the case of the private air-rights development, historic preservation
 136 covenants attached to the property require review and approval by the DC SHPO and the
 137 CFA. WUS projects would also be designed and implemented in accordance with the 2015
 138 *Washington Union Station Historic Preservation Plan*.⁹ The plan provides design
 139 considerations and guidelines consistent with the SOI Standards.

Visual Impacts

140 **In the No-Action Alternative, relative to existing conditions, visual changes would result in**
 141 **major adverse direct operational impacts on three cultural resources: WUS, the WUS**
 142 **Historic Site, and the Railway Express Agency (REA) Building. They would result in**
 143 **moderate adverse direct operational impacts on seven cultural resources; minor adverse**
 144 **direct operational impacts on five resources; and negligible adverse direct operational**
 145 **impacts on three resources.**

146 The development of the private air rights above the rail terminal southeast and north of
 147 H Street NE and the construction of several building blocks on a deck within this area would
 148 noticeably change the visual surroundings of WUS, the WUS Historic Site, and the REA
 149 Building. The new visual elements would diminish the integrity of setting, feeling, and
 150 association of these three cultural resources and cause a major adverse impact (**Table 5-142**).
 151 Also as described in **Table 5-142**, other cultural resources and one cultural viewshed would
 152 be affected visually but not in a manner that would alter any of their respective character-
 153 defining features and diminish their integrity of setting, feeling, and association.

Table 5-142. Direct Operational Visual Impacts on Cultural Resources, No-Action Alternative

| Impact | Resources and Summary Description |
|----------------------|---|
| Major Adverse | <p>WUS</p> <ul style="list-style-type: none"> ▪ Private air-rights development north of historic station building would change character of views towards the building. ▪ Top of new buildings would be visible above roof of historic station on east side. ▪ No change on west side. This would disrupt visual symmetry of station’s Beaux Arts design, noticeable from Delaware Avenue NE; First Street and C Street NE; and east side of Columbus Circle Drive. ▪ Disruption of cultural landscape’s open character north of historic station building and sever visual connection to rail terminal. |
| | <p>WUS Historic Site</p> <ul style="list-style-type: none"> ▪ Private air-rights development would replace the existing, open rail terminal south of K Street NE. Change would be noticeable from north (New York Avenue Bridge). |

⁹ Union Station Redevelopment Corporation. 2015. *Washington Union Station Historic Preservation Plan*. Accessed from <https://www.usrcdc.com/projects/historic-preservation-plan/>. Accessed on March 28, 2019.

| Impact | Resources and Summary Description |
|---------------------------|--|
| | <ul style="list-style-type: none"> ▪ The private air-rights development would fully hide the rail terminal and back of the historic station building breaking visual connection between the rail terminal and the historic station building. <p>REA Building</p> <ul style="list-style-type: none"> ▪ Eastern edge of private air-rights deck and development would rise high behind the building, visually cutting it off from the rest of the rail terminal. |
| Moderate Adverse | <p>Square 750 Rowhouse Development; 901 Second Street NE; Thurgood Marshall Federal Judiciary Building; Topham’s Luggage Factory (Former); Woodward and Lothrop Service Warehouse</p> <ul style="list-style-type: none"> ▪ Private air-rights development would be highly to moderately visible from these resources. ▪ They all have moderate sensitivity to changes because other large-scale multi-story and mixed-use developments have already compromised their small-scale setting. <p>L’Enfant-McMillan Plan</p> <ul style="list-style-type: none"> ▪ Private air-rights development would affect vistas along street corridors that are part of the L’Enfant-McMillan Plan. Visibility of the development would vary but not block or interrupt significant perspectives. <p>U.S. Capitol Dome</p> <ul style="list-style-type: none"> ▪ Private air-rights development would be highly visible from the dome but would not interrupt the horizon or any views along North Capitol Street or Delaware Avenue toward Columbus Plaza and the historic station building. |
| Minor Adverse | <p>Senate Parks, Underground Garage, and Fountains; St. Joseph’s Home (Former); Uline Ice Company Plant and Arena Complex; Columbus Plaza; Capitol Hill Historic District</p> <ul style="list-style-type: none"> ▪ Private air-rights development would be moderately or highly visible from these resources. ▪ Low sensitivity to visual changes because integrity of setting, feeling, or association does not depend on the affected visual relationships. |
| Negligible Adverse | <p>Dirksen and Hart Senate Office Buildings; Library of Congress, Thomas Jefferson Building; Russell Senate Office Building</p> <ul style="list-style-type: none"> ▪ Private air-rights development would be barely visible from these resources because of distance and intervening structures or vegetation. ▪ Integrity of setting, feeling, or association does not depend on those slightly changed views. |

Traffic, Noise, and Vibration Impacts

154 **Relative to existing conditions, in the No-Action Alternative, there would be negligible**
155 **adverse direct operational impacts from increases in noise and vibration on 18 cultural**
156 **resources. Increased traffic volumes have the potential to result in adverse direct**
157 **operational impacts on the Capitol Hill Historic District due to visual impacts, conflicts with**
158 **pedestrians and bicyclists, and disturbances affecting access to homes and businesses.**

159 These impacts are described in **Table 5-143**.

Table 5-143. Potential Direct Operational Traffic, Noise, and Vibration Impacts on Cultural Resources, No-Action Alternative

| Impact | Resources and Summary Description |
|---------------------------|---|
| Potential Adverse | <p>Capitol Hill Historic District</p> <ul style="list-style-type: none"> ▪ Peak-time traffic on 2nd Street NE between Massachusetts Avenue and H Street would increase by 12 percent (approximately 1,400 to 1,560 trips); peak-time traffic on F Street NE would increase by 13 percent (approximately 550 to 620 trips). ▪ Increases in traffic volumes on H Street NE, Massachusetts Avenue NE may result in potential for traffic diversion through local streets. |
| Negligible Adverse | <p>WUS, the C&P Telephone Company Warehouse; the Capitol Press Building (Former); the City Post Office /Postal Museum; Government Printing Office (GPO) Warehouse No.4; Holodomor Ukrainian Holocaust Memorial; Square 750 Rowhouse Development; St. Aloysius Catholic Church; St. Joseph’s Home (Former); St. Phillip’s Baptist Church; Thurgood Marshall Federal Judiciary Building; Topham’s Luggage Factory (Former); Uline Ice Company and Arena Complex; Columbus Plaza; Woodward and Lothrop Service Warehouse; 901 Second Street NE; Union Market Historic District; Capitol Hill Historic District (along 2nd Street NE)</p> <ul style="list-style-type: none"> ▪ Change in noise levels caused by greater vehicular traffic ▪ Would not exceed 3 dBA ▪ Vibration levels would not affect the integrity of any cultural resource |

Indirect Operational Impacts

160 In the No-Action Alternative, the Federally owned air rights would not be developed. There
 161 would be no impacts on cultural resources.

Construction Impacts

162 **In the No-Action Alternative, the construction of projects in the Project Area could cause a**
 163 **range of potential construction-related adverse impacts, including potential adverse**
 164 **impacts on undiscovered archaeological resources within the WUS rail terminal.**

165 The private air-rights development would require establishing foundations within the rail
 166 terminal for columns supporting the air-rights decks. Much of the rail terminal has moderate
 167 to high archaeological potential. Although there are no known archaeological resources in
 168 this area, it is possible that excavation and other ground-disturbance may inadvertently
 169 damage or destroy unknown significant archaeological deposits.

170 It is likely that the resources shown in **Table 5-142**, which would experience adverse
 171 operational visual impacts, also would experience construction-related adverse visual
 172 impacts, although information to determine the intensity of these impacts is not available.
 173 Construction of the private air-rights development and other projects in or near the rail
 174 terminal would involve storing, staging, and use of construction equipment and materials
 175 within or next to the Project Area. Although construction equipment and activities may
 176 detract from the visual setting of a cultural resource, they are a common sight in an urban
 177 environment and their presence would not be a permanent condition.

178 Construction activities would also generate noise and vibration from the operation of
179 construction equipment, including trucks that would travel on nearby streets to reach the
180 site, including First Street NE, 2nd Street NE, and H Street NE. It is not possible to assess the
181 intensity of these potential impacts since they would vary with the method and duration of
182 construction for each project, which is unavailable information. However, the private air-
183 rights development has the greatest potential to cause noise and vibration-related impacts
184 and would likely affect the same resources as construction of the Action Alternatives
185 (**Section 5.12.4.2, Alternative A, Construction Impacts**).

5.12.4.2 Alternative A

Direct Operational Impacts

Physical Impacts

186 **Relative to existing conditions, Alternative A would have major adverse direct operational**
187 **physical impacts on WUS and the WUS Historic Site. It would have a potential adverse**
188 **direct operational physical impact on the REA Building.**

189 The physical direct operational impacts of Alternative A on WUS and the WUS Historic Site
190 are presented in **Table 5-144**.

Visual Impacts

191 **Relative to existing conditions, in Alternative A, visual changes would result in major**
192 **adverse direct operational impacts on WUS, the WUS Historic Site, and REA Building; minor**
193 **adverse direct operational impacts on two cultural resources; and negligible adverse direct**
194 **operational impacts on two other cultural resources. They would also result in a beneficial**
195 **direct operational impact on one cultural resource.**

196 The direct operational visual impacts of Alternative A are described in **Table 5-145**.

Table 5-144. Direct Operational Physical Impacts on Cultural Resources, Alternative A

| Impact | Resources and Summary Description |
|--------------------------|---|
| Major Adverse | <p>WUS</p> <ul style="list-style-type: none"> ▪ Removal of the Claytor Concourse, and the construction of Concourse A and the train hall could cause physical impact to the fabric of the historic station building. ▪ North façade of the Retail and Ticketing Concourse could be affected by removal of Claytor Concourse. ▪ A section of entablature supported by the original Doric columns may be encapsulated by the Claytor Concourse and would be affected by construction. ▪ The overall mass of WUS would be increased. ▪ Approximately 15,000 of original floor structure in the Retail and Ticketing Concourse would be demolished and 18 columns removed from the First Street Tunnel. ▪ These impacts would adversely affect the integrity of the overall design of the historic station building. |
| | <p>WUS Historic Site</p> <ul style="list-style-type: none"> ▪ Extensive modifications to the railroad terminal, including the reconstruction of all tracks, platforms, and associated infrastructure. ▪ Reconstruction of rail terminal, construction of the new concourses and of structural deck for the new bus and parking facility and associated roadways would require removal of numerous structures throughout the historic site (K Tower, all existing platforms, umbrella sheds, catenary poles, catenary with cross beam, signal bridges, and pneumatic switch valves). ▪ Ventilation intake may require insertion of vents in the southwest portion of the historic retaining walls (Burnham Wall). ▪ These impacts would be detrimental to the WUS Historic Site’s integrity of design, setting, materials, workmanship, feeling, and association. |
| Potential adverse | <p>REA Building</p> <ul style="list-style-type: none"> ▪ Use of the portion of the historic property parcel that overlaps with the H Street Tunnel (approximately 9,800 square feet out of 63,000) for the H Street Concourse ▪ Modification or elimination of the existing connection between the H Street Tunnel and the basement of the building. ▪ Impacts undetermined at this early stage of design but potentially adverse. |

Table 5-1451. Direct Operational Visual Impacts on Cultural Resources, Alternative A

| Impact | Resources and Summary Description |
|---------------------------|--|
| Major Adverse | <p>WUS</p> <ul style="list-style-type: none"> ▪ Top of new bus and parking facility would be visible above historic station’s roofline from Delaware Avenue at D and C Streets NE, introducing noticeable asymmetry in the view of the station. ▪ New parking facility would be visible from west side of Columbus Circle Drive (massing would be similar to existing garage). ▪ Visual changes would be highly noticeable and the sensitivity of WUS is high, largely due to the loss of symmetry in the view from the south. <p>WUS Historic Site</p> <ul style="list-style-type: none"> ▪ Reconstruction of the rail terminal and construction of the train hall, bus facility, and parking facility would change the appearance of the historic site and alter visual connections. ▪ From north, train hall and new parking facility would partially hide the rail terminal and back of historic station building. ▪ Highly visible changes would likely compromise character-defining features and integrity of setting, feeling, and association. <p>REA Building</p> <ul style="list-style-type: none"> ▪ Reconstruction of the rail terminal would change the character of visual connection with the tracks. ▪ New train hall and parking facility would be visible to the southwest. ▪ Changes in visual environment would be highly noticeable and the REA Building’s sensitivity to these changes is high. |
| Minor Adverse | <p>Thurgood Marshall Federal Judiciary Building; Woodward Lothrop Service Warehouse</p> <ul style="list-style-type: none"> ▪ Moderate to high visibility of the Project elements from these resources. ▪ Low sensitivity to visual changes as they do not derive their significance from visual connections to WUS. |
| Negligible Adverse | <p>Square 750 Rowhouse Development; St. Joseph’s Home (Former)</p> <ul style="list-style-type: none"> ▪ Bus facility, parking facility, and train hall just visible. ▪ Low sensitivity would not affect the resources’ integrity. |
| Beneficial | <p>GPO Warehouse No. 4</p> <ul style="list-style-type: none"> ▪ Less visibility of WUS elements from this resource. |

Traffic, Noise, and Vibration Impacts

197 **Relative to existing conditions, noise and vibration in Alternative A would result in minor**
198 **adverse direct operational impacts on three cultural resources and negligible adverse direct**
199 **operational impacts on 15 other cultural resources. Increased traffic volumes in Alternative**
200 **A have the potential to further result in an adverse direct operational impact on the Capitol**
201 **Hill Historic District from visual impacts, conflicts with pedestrians and bicyclists, and**
202 **disturbances affecting access to homes and businesses.**

203 The direct operational noise, vibration, and traffic impacts of Alternative A on cultural
204 resources are described in **Table 5-146.**

Table 5-146. Direct Operational Traffic, Noise, and Vibration Impacts on Cultural Resources, Alternative A

| Impact | Resources and Summary Description |
|---------------------------|--|
| Potential Adverse | <p>Capitol Hill Historic District</p> <ul style="list-style-type: none"> ▪ Peak-time traffic on 2nd Street NE between Massachusetts Avenue and H Street would increase by 22 percent (approximately 1,400 to 1,700 trips); peak-time traffic on F Street NE would increase by 37 percent (approximately 550 to 750 trips). ▪ Potential for diversion of traffic through the historic district due to increased volumes on H Street and Massachusetts Avenue. ▪ Although the Capitol Hill Historic District, as characterized in the NRHP nomination, primarily derives its significance from its architecture and its contribution to the development of Washington, DC, greater traffic volumes may potentially create visual impacts, conflicts with pedestrians and bicyclists, and other disturbances affecting access to homes and businesses that would detract from peaceful setting some residents consider to be a defining character of their historic neighborhood. |
| Minor Adverse | <p>St. Joseph’s Home (Former); Square 750 Rowhouse Development (K Street NE side); Capitol Press Building (Former)</p> <ul style="list-style-type: none"> ▪ Noise increase relative to existing conditions would exceed FTA criteria but would be less than 3 dBA. ▪ Imperceptible change that would not compromise the resources’ integrity of setting, feeling, or association. |
| Negligible Adverse | <p>WUS; C&P Telephone Company Warehouse; City Post Office/Postal Museum; GPO Warehouse No.4; Holodomor Ukrainian Holocaust Memorial; St. Aloysius Catholic Church; St. Phillip’s Baptist Church; Thurgood Marshall Federal Judiciary Building; Topham’s Luggage Factory (Former); Uline Ice Company and Arena Complex; Columbus Plaza; Woodward and Lothrop Service Warehouse; 901 Second Street NE; Union Market Historic District; and Capitol Hill Historic District (along 2nd Street NE)</p> <ul style="list-style-type: none"> ▪ Noise increases would be less than 3dBA and would not exceed FTA criteria. ▪ Would not compromise the resources’ integrity of setting, feeling, or association. ▪ Changes in vibration levels would be negligible and would not affect the integrity of any cultural resource. |

Indirect Operational Impacts

205 **Relative to existing conditions, with the potential Federal air-rights development, visual**
 206 **changes in Alternative A would have the following indirect operational impacts on cultural**
 207 **resources in addition to the direct impacts: moderate adverse visual impact on one cultural**
 208 **resource; minor adverse visual impacts on five cultural resources; and negligible adverse**
 209 **visual impacts on six cultural resources.**

210 In Alternative A, the potential Federal air-rights development would sit atop the new parking
 211 facility, not exceeding the 130-foot height limit under the anticipated zoning. The change
 212 would be small relative to the scale of the entire structure. The impacts of Alternative A
 213 would remain the same as described in **Section 5.12.4.2, Alternative A, Direct Operational**
 214 **Impacts** with exceptions shown in **Table 5-147.**

Table 5-147. Indirect Operational Visual Impacts on Cultural Resources, Alternative A

| Impact | Resources and Summary Description |
|---------------------------|--|
| Moderate Adverse | <p>U.S. Capitol Dome Viewshed</p> <ul style="list-style-type: none"> ▪ Potential Federal air-right development visible from the dome. ▪ Would not rise above the horizon or block or disrupt any views. ▪ Viewshed is moderately sensitive to these changes. |
| Minor Adverse | <p>L’Enfant-McMillan Plan</p> <ul style="list-style-type: none"> ▪ Potential Federal air-right would affect several street corridors that are part of the plan. ▪ Out of 19 evaluated views, major visual impacts to one, moderate impacts to four, minor impacts to four, negligible impacts to six, beneficial impacts to one. ▪ In the aggregate, visual changes would have limited visibility and would not affect the plan’s integrity. <p>City Post Office/Postal Museum; Senate Parks, Underground Garage and Fountains; Columbus Plaza; Capitol Hill Historic District</p> <ul style="list-style-type: none"> ▪ Low to moderately visible visual changes due to the potential Federal air-rights development. ▪ Resources have low to moderate sensitivity to these changes. ▪ Federal air-rights development would be distinctly visible from Columbus Plaza but would not compromise its integrity of setting as a forecourt to WUS. |
| Negligible Adverse | <p>Dirksen and Hart Senate Office Buildings; GPO; Library of Congress Thomas Jefferson Building; St. Joseph’s Home (Former); Uline Ice Company Plant and Arena Complex; Russel Senate Office Building</p> <ul style="list-style-type: none"> ▪ The potential Federal air-rights development would be visible from these resources. ▪ Because of the distance, and intervening buildings and vegetation, the change would barely be noticeable and would not compromise integrity of setting, feeling, or association. |

Construction Impacts

215 **Alternative A’s construction would potentially result in an adverse impact on unidentified**
216 **archaeological resources within the WUS rail terminal. Visual changes during construction**
217 **would result in moderate adverse impacts on three cultural resources; minor adverse**
218 **impacts on one cultural resource; and negligible adverse impacts on 15 cultural resources.**
219 **Noise and vibration from construction activities would result in major adverse impacts on**
220 **WUS and the REA Building; moderate adverse impacts on five cultural resources; minor**
221 **adverse impacts on two cultural resources; and negligible adverse impacts on ten cultural**
222 **resources.**

223 **Table 5-148** provides details on the construction impacts of Alternative A.

Table 5-148. Construction Impacts on Cultural Resources, Alternative A

| Impact | Resources and Summary Description |
|---------------------------|---|
| Physical | |
| Potential Adverse | <p>WUS Historic Site</p> <ul style="list-style-type: none"> ▪ Excavation of most of the rail terminal to reconstruct the tracks and platforms, construct concourses, and set foundations and columns supporting the overbuild structures. ▪ Much of rail terminal was identified as having moderate to high archaeological potential, although it contains no known archaeological resources. Possible that excavations and ground disturbance could inadvertently damage or destroy unknown significant archaeological deposits. |
| | Visual |
| Moderate Adverse | <p>WUS; WUS Historic Site; REA Building</p> <ul style="list-style-type: none"> ▪ Construction would occur within or directly adjacent next to these resources over the entire construction period of 11 years and 5 months. ▪ WUS Historic Site would become a construction site with highly visible fencing around construction areas (including the interior historic station building during column removal); staging areas; heavy construction equipment; excavated areas; and structures under construction. ▪ Resources have moderate sensitivity: construction is not a permanent condition; phased construction would move the focus of visually disruptive activities over time; visitor experience would be temporarily diminished but not entirely compromised. |
| | Minor Adverse |
| Negligible Adverse | <p>City Post Office/Postal Museum; Dirksen and Hart Senate Office Buildings; GPO; GPO Warehouse No. 4; Library of Congress, Thomas Jefferson Building; Russell Senate Office Building; Senate Parks, Underground Garage, and Fountains; Square 750 Rowhouse Development; St. Joseph’s Home (Former); Thurgood Marshall Federal Judiciary Building; Uline Ice Company Plant and Arena Complex; Columbus Plaza; Woodward and Lothrop Service Warehouse; Capitol Hill Historic District; L’Enfant-McMillan Plan</p> <ul style="list-style-type: none"> ▪ Construction would take place in phases over a duration of approximately 11 years and 5 months. ▪ Resources have low sensitivity due to distance and moving focus of construction activities over time. ▪ Construction sites are a common sight in urban environments and are not be a permanent condition. |
| | Traffic, Noise, and Vibration |
| Major Adverse | <p>WUS; REA Building</p> <ul style="list-style-type: none"> ▪ Vibratory pile driving would occur within 10 to 16 feet of both resources, resulting in vibration levels of approximately 0.33 to 0.67 inches per second (in/s). ▪ Depending on the sensitivity of the buildings, which has not been determined, this could exceed the threshold for structural damage and compromise their physical integrity. |

| Impact | Resources and Summary Description |
|---------------------------|---|
| | <ul style="list-style-type: none"> ▪ During support of excavation (SOE) construction activities, noise levels in the back of WUS and at the REA Building would reach up to 90.1 dBA and 92.9 dBA, respectively. ▪ This would be above the FTA criteria for severe noise impacts. ▪ These noise levels, while elevated, would not compromise the resources' integrity of setting, feeling, or association. WUS's has always been a site of great activity and noise. The REA Building's significance comes from its architectural design and association with WUS, not its quiet setting. |
| Moderate Adverse | <p>City Post Office/Postal Museum; GPO Warehouse No.4; St. Joseph's Home (Former); Square 750 Rowhouse Development (917-923 2nd Street NE; 208-224, 226-242, and 219-231 Parker Street NE); 901 Second Street NE.</p> <ul style="list-style-type: none"> ▪ During SOE construction and at the beginning of excavation activities, noise levels at or near these resources would exceed the FTA criteria for severe noise impacts. ▪ St. Joseph's Home and parts of Square 750 (203-219 K Street NE and 917-923 2nd Street NE) would experience levels of construction vibration above the annoyance threshold. ▪ The significance of none of these resources is dependent on a quiet environment. ▪ All five resources already experience heavy traffic and associated noise and vibration. |
| Minor Adverse | <p>C&P Telephone Company Warehouse</p> <ul style="list-style-type: none"> ▪ Vibration from construction truck traffic would exceed the FTA threshold for annoyance near C&P Telephone Company Warehouse. Vibration would not create risk of structural damage. <p>Capitol Hill Historic District (northwestern edge)</p> <ul style="list-style-type: none"> ▪ If only trucks are used to haul away excavation debris, truck noise and vibration would exceed FTA threshold for moderate impacts and FTA threshold for annoyance. ▪ Impacts would be localized and limited to edge of the district bordering 2nd Street NE. Majority of the historic district would experience no noise or vibration impacts. ▪ Impacts would not be continuous and would stop after excavation is complete. ▪ Excavation operations would last approximately 5 months in Phase 1 (out of a total phase duration of 2 years and 5 months). Phase 1 is the phase that would most affect conditions along 2nd Street NE. Phase 4 would have the longest excavation period (approximately 1 year and 5 months out of a total duration of 3 years and 1 month) but would be the phase furthest from the Capitol Hill Historic District. ▪ Noise and vibration would not compromise or diminish the architectural characteristics of the Capitol Hill Historic District or its significance to the development of the District. |
| Negligible Adverse | <p>Capitol Press Building (Former); Holodomor Ukrainian Holocaust Memorial; St. Aloysius Catholic Church; St. Phillip's Baptist Church; Thurgood Marshall Federal Judiciary Building; Topham's Luggage Factory (Former); Uline Ice Company and Arena Complex; Columbus Plaza; Woodward and Lothrop Service Warehouse; Union Market Historic District</p> |

| Impact | Resources and Summary Description |
|--------|--|
| | <ul style="list-style-type: none"> Any noise and vibration these properties may experience would be negligible and would not affect the integrity of their respective settings. |

Comparison to the No-Action Alternative

224 The physical and noise and vibration-related operational impacts of Alternative A on cultural
 225 resources relative to the No-Action Alternative would generally be the same as those relative
 226 to existing conditions. Column removal, the demolition of the Claytor Concourse, and the
 227 reconstruction of the rail terminal would affect WUS and the WUS Historic Site in the same
 228 manner. Noise-related impacts would also be the same because the operational noise and
 229 vibration impact analysis showed that differences in noise levels in Alternative A would be
 230 within 1 or 2 dBA of what they would be in the No-Action Alternative. This difference is not
 231 likely to be noticeable. For the purposes of the analysis of noise-related impacts on cultural
 232 resources, therefore, the two baselines are equivalent.

233 With regard to traffic impacts on the Capitol Hill Historic District, the proportional increase in
 234 the traffic that would or may travel through the district would be smaller relative to the No-
 235 Action Alternative than relative to existing conditions. During peak time, traffic on F Street NE
 236 east of 2nd Street would increase by approximately 24 percent relative to the No-Action
 237 Alternative (from around 620 trips to around 750) against 37 percent relative to existing
 238 conditions. Peak time trips along 2nd Street NE would increase by 10 percent relative to the
 239 No-Action Alternative (from around 1,560 trips to around 1,700 trips) instead of 22 percent
 240 relative to existing conditions.

241 Visual impacts on cultural resources relative to the No-Action Alternative would generally be
 242 less than relative to existing conditions. The mass of the private air-rights development
 243 above the rail terminal would mask Project elements from certain locations. In Alternative A,
 244 relative to the No-Action Alternative, all visual impacts would be the same with exception of
 245 those listed in **Table 5-149**.

**Table 5-149. Comparison of Alternative A Operational Visual Impacts on Cultural Resources
 Relative to the No-Action Alternative and Existing Conditions**

| Cultural Resource | Relative to Existing Conditions | Relative to No-Action Alternative |
|---|---------------------------------|-----------------------------------|
| Direct Impacts | | |
| WUS Historic Site | Major adverse | Minor adverse |
| REA Building | Major adverse | No impact |
| Woodward and Lothrop Service Warehouse | Minor adverse | No impact |
| Thurgood Marshall Federal Judiciary Building | Minor adverse | No impact |
| St. Joseph’s Home (Former) | Negligible adverse | No impact |
| Square 750 Rowhouse Development | Negligible adverse | No impact |

| Cultural Resource | Relative to Existing Conditions | Relative to No-Action Alternative |
|---|---------------------------------|-----------------------------------|
| Indirect Impacts | | |
| Senate Parks, Underground Garage and Fountains | Minor adverse | Negligible adverse |
| Capitol Hill Historic District | Minor adverse | Negligible adverse |
| Dirksen and Hart Senate Office Building | Negligible adverse | No impact |
| Uline Ice Company Plant and Arena Complex | Negligible adverse | No impact |
| U.S. Dome Viewshed | Moderate adverse | No impact |
| L'Enfant-McMillan Plan | Minor adverse | Negligible adverse |

5.12.4.3 Alternative B

Direct Operational Impacts

Physical impacts

246 **Relative to existing conditions, Alternative B would have major adverse direct operational**
 247 **physical impacts on WUS and the WUS Historic Site. It would have a potential adverse**
 248 **direct operational physical impact on the REA Building.**

249 Alternative B’s physical impacts on WUS would be the same as Alternative A’s as the source
 250 of these impacts, such as the column removal work and the demolition of the Claytor
 251 Concourse and its replacement with Concourse A and a new train hall, would be the same in
 252 both alternatives. Impacts are described in **Table 5-144** above.

253 Similarly, Alternative B’s physical impacts on the WUS Historic Site would be the same as
 254 those of Alternative A, described in Impacts are described in **Table 5-144** above. Additionally,
 255 construction of the access ramp to the below-ground parking facility in Alternative B would
 256 require opening a large portal in the retaining wall (Burnham Wall) under the K Street Bridge.
 257 The wall is a contributing feature of the historic site.

258 The potential adverse physical impact of Alternative B on the REA Building would be the
 259 same as described for Alternative A in **Table 5-144** above.

Visual Impacts

260 **Relative to existing conditions, in Alternative B, visual changes would result in major**
 261 **adverse direct operational impacts on WUS, the WUS Historic Site, and REA Building; minor**
 262 **adverse direct operational impacts on two cultural resources; and negligible adverse direct**
 263 **operational impacts on two other cultural resources. They would also result in a beneficial**
 264 **direct operational impact on one cultural resource.**

265 The direct operational visual impacts of Alternative B are presented in **Table 5-150**. The
 266 intensity of Alternative B’s impacts would be similar to that of Alternative A’s. With regard to

267 visual changes, the only difference between these two alternatives is that in Alternative B,
 268 the new bus facility would not have parking above it, resulting in a lower structure than the
 269 existing parking garage. From the south of WUS, this structure would not be visible above the
 270 roofline of the historic station building but it would be visible from the west side of Columbus
 271 Circle. The replacement of the existing garage with a smaller bus facility would be highly
 272 visible. Given the high sensitivity of WUS and the WUS Historic Site to this change, it would
 273 have the potential to result in a major adverse visual impact on these resources.

Table 5-150. Direct Operational Visual Impacts on Cultural Resources, Alternative B

| Impact | Resources and Summary Description |
|---------------------------|--|
| Major Adverse | <p>WUS</p> <ul style="list-style-type: none"> ▪ New bus facility would be visible from west side of Columbus Circle Drive (massing would be similar to existing garage). ▪ Visual changes would be highly noticeable and the sensitivity of WUS is high. |
| | <p>WUS Historic Site</p> <ul style="list-style-type: none"> ▪ Reconstruction of the rail terminal and construction of the train hall and bus facility would change the appearance of the historic site and alter visual connections. ▪ From the north, the train hall would partially hide the rail terminal and back of historic station building. ▪ Highly visible changes would likely compromise character-defining features and integrity of setting, feeling, and association. |
| | <p>REA Building</p> <ul style="list-style-type: none"> ▪ Reconstruction of the rail terminal would change the character of visual connection with the tracks. ▪ New train hall and bus facility would be visible to the southwest. ▪ Changes in visual environment would be highly noticeable and the REA Building’s sensitivity to these changes is high. |
| Minor Adverse | <p>Thurgood Marshall Federal Judiciary Building; Woodward Lothrop Service Warehouse</p> <ul style="list-style-type: none"> ▪ Moderate to high visibility of the Project elements from these resources. ▪ Low sensitivity to visual changes as they do not derive their significance from visual connections to WUS. |
| Negligible Adverse | <p>Square 750 Rowhouse Development; St. Joseph’s Home (Former)</p> <ul style="list-style-type: none"> ▪ Bus facility and train hall just visible. ▪ Low visibility would not affect the resources’ integrity. |
| Beneficial | <p>GPO Warehouse No. 4</p> <ul style="list-style-type: none"> ▪ Less visibility of WUS elements from this resource. |

Traffic, Noise, and Vibration Impacts

274 **Relative to existing conditions, noise and vibration in Alternative B would result in minor**
 275 **adverse direct operational impacts on three cultural resources and negligible adverse direct**
 276 **operational impacts on 15 other cultural resources. Increased traffic volumes in Alternative**
 277 **B have the potential to further result in an adverse direct operational impact on the Capitol**
 278 **Hill Historic District from visual impacts, conflicts with pedestrians and bicyclists, and**
 279 **disturbances affecting access to homes and businesses.**

280 The traffic, noise, and vibration impacts of Alternative B on cultural resources would be the
281 same as those of Alternative A. These impacts are presented in **Table 5-146**. Operational
282 noise impacts everywhere in Alternative B would be within 0.2 dBA of those predicted for
283 Alternative A, an imperceptible difference. Because of the entrance of the below-ground
284 parking facility on K Street NE, more traffic would travel along K Street and L Street NE and
285 less traffic along H Street NE and North Capitol Street than in Alternative A. The operational
286 noise analysis showed that this would not result in noticeably different ambient noise levels
287 along those roadways.

288 Potential adverse impacts on the Capitol Hill Historic District from traffic would also be as in
289 Alternative A. While the exact volumes of traffic that would travel along K Street NE and H
290 Street NE may differ slightly between Alternative B and Alternative A, the difference would
291 not be great enough to result in measurably greater or less impacts on the historic district.

Indirect Operational Impacts

292 **Relative to existing conditions, with the potential Federal air-rights development, visual**
293 **changes in Alternative B would have the following indirect operational impacts on cultural**
294 **resources in addition to the direct impacts: moderate adverse visual impact on one cultural**
295 **resource; minor adverse visual impacts on five cultural resources; and negligible adverse**
296 **visual impacts on six cultural resources.**

297 In Alternative B, the Federal air rights not needed to build the new bus facility would
298 potentially be developed to the maximum extent allowed by the zoning. The resulting
299 combined massing would be the same as in Alternative A, with the same indirect impacts as
300 presented in **Table 5-147**.

Construction Impacts

301 **Alternative B's construction would potentially result in an adverse impact on unidentified**
302 **archaeological resources within the WUS rail terminal. Visual changes during construction**
303 **would result in moderate adverse impacts on three cultural resources; minor adverse**
304 **impacts on one; and negligible adverse impacts on 15. Noise and vibration from**
305 **construction activities would result in major adverse impacts on WUS and the REA Building;**
306 **moderate adverse impacts on five cultural resources; minor adverse impacts on three**
307 **cultural resources; and negligible adverse impacts on nine cultural resources.**

308 The construction impacts of Alternative B on cultural resources are described in **Table 5-151**.

Table 5-151. Construction Impacts on Cultural Resources, Alternative B

| Impact | | Resources and Summary Description |
|--------------------------------------|--|---|
| Physical | | |
| Potential Adverse | WUS Historic Site | <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |
| Visual | | |
| Moderate Adverse | WUS; WUS Historic Site; REA Building | <ul style="list-style-type: none"> Construction would occur within or directly adjacent next to these resources over the entire construction period of 14 years and 4 months. Otherwise, same as Alternative A (Table 5-148). |
| Minor Adverse | U.S. Capitol Dome Viewshed | <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |
| Negligible Adverse | City Post Office/Postal Museum; Dirksen and Hart Senate Office Buildings; GPO; GPO Warehouse No. 4; Library of Congress, Thomas Jefferson Building; Russell Senate Office Building; Senate Parks, Underground Garage, and Fountains; Square 750 Rowhouse Development; St. Joseph’s Home (Former); Thurgood Marshall Federal Judiciary Building; Uline Ice Company Plant and Arena Complex; Columbus Plaza; Woodward and Lothrop Service Warehouse; Capitol Hill Historic District; L’Enfant-McMillan Plan | <ul style="list-style-type: none"> Construction would take place in phases over a duration of approximately 14 years and 4 months. Otherwise, same as Alternative A (Table 5-148). |
| Traffic, Noise, and Vibration | | |
| Major Adverse | WUS; REA Building | <ul style="list-style-type: none"> Clam shovel drops associated with slurry wall construction may occur within 10 feet of WUS, resulting in vibration levels of approximately 0.12 to 0.8 in/s. Drilling for secant pile walls may occur within 10 to 16 feet of the REA Building, resulting in vibration levels of approximately 0.17 to 0.35 in/s. During SOE construction activities, noise levels in the back of WUS and at the REA Building would reach up to 90.1 dBA and 92.9 dBA, respectively. Otherwise, same as Alternative A (Table 5-148). |
| Moderate Adverse | City Post Office/Postal Museum; GPO Warehouse No.4; St. Joseph’s Home (Former); Square 750 Rowhouse Development (917-923 2nd Street NE; 208-224, 226-242, and 219-231 Parker Street NE); 901 Second Street NE. | <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |
| Minor Adverse | C&P Telephone Company Warehouse; Topham’s Luggage Factory (Former); Capitol Hill Historic District (northwestern edge) | <ul style="list-style-type: none"> Same as Alternative A (Table 5-148), except that excavation operations in Phase 4 would last for approximately 2 years and 7 months out of a total phase duration of 4 years and 11 months. |
| Negligible Adverse | Capitol Press Building (Former); Holodomor Ukrainian Holocaust Memorial; St. Aloysius Catholic Church; St. Phillip’s Baptist Church; Thurgood Marshall Federal Judiciary Building; Uline Ice Company and Arena Complex; Columbus Plaza; Woodward and Lothrop Service Warehouse; Union Market Historic District | <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |

Comparison to the No-Action Alternative

309 The physical and noise and vibration-related operational impacts of Alternative B on cultural
310 resources relative to the No-Action Alternative would be the same as those relative to
311 existing conditions for the same reasons as explained for Alternative A. Differences in traffic
312 impacts on the Capitol Hill Historic District and differences in visual impacts would also be as
313 described for Alternative A; see **Section 5.12.4.2, Alternative A, Comparison to the No-Action**
314 *Alternative*.

5.12.4.4 Alternative C

Direct Operational Impacts

Physical Impacts

315 **Relative to existing conditions, Alternative C (either option) would have major adverse**
316 **direct operational physical impacts on WUS and the WUS Historic Site. It would have a**
317 **potential adverse direct operational physical impact on the REA Building.**

318 Alternative C's physical impacts on WUS would be the same as Alternative A's as the source
319 of these impacts, such as the column removal work and the demolition of the Claytor
320 Concourse and its replacement with Concourse A and a new train hall, would be the same in
321 both alternatives. Impacts are described in **Table 5-144** above.

322 Similarly, Alternative C's physical impacts on the WUS Historic Site would be the same as
323 those of Alternative A, described in Impacts are described in **Table 5-144** above. Additionally,
324 construction of the access ramp to the below-ground parking facility in Alternative C would
325 require opening a large portal in the retaining wall (Burnham Wall) under the K Street Bridge.
326 The wall is a contributing feature of the historic site.

327 The potential adverse physical impact of Alternative C on the REA Building would be the
328 same as described for Alternative A in **Table 5-144** above.

Visual Impacts - East Option

329 **Relative to existing conditions, visual changes in Alternative C with the East Option would**
330 **result in major adverse direct operational impacts on WUS, the WUS Historic Site, and the**
331 **REA Building; minor adverse direct operational impacts on five cultural resources; and**
332 **negligible adverse direct operational impacts on one cultural resource. They would also**
333 **result in beneficial direct operational impacts on two cultural resources.**

334 The visual direct operational impacts of Alternative C with the East Option are described in
335 **Table 5-152.**

Table 5-152. Direct Operational Visual Impacts on Cultural Resources, Alternative C East Option

| Impact | Resources and Summary Description |
|---------------------------|--|
| Major Adverse | <p>WUS</p> <ul style="list-style-type: none"> ▪ Bus pick-up and drop-off area and train hall behind historic station building would be highly visible from First Street and 2nd Street NE. ▪ These changes would alter the visual environment of WUS in a manner that would alter its integrity of setting, feeling, and association ▪ Demolition of the existing parking garage would be highly visible, but removal would not adversely affect WUS since existing garage is incompatible. <p>WUS Historic Site</p> <ul style="list-style-type: none"> ▪ Reconstruction of railroad terminal and construction of the bus pick-up and drop-off area and train hall would change the appearance of the historic site south of H Street Bridge. ▪ Construction of the bus facility and parking facility to northeast of H Street Bridge would create visual obstruction in a currently open part of the rail terminal. ▪ Changes within rail terminal would noticeably alter existing visual connections between components south and north of H Street Bridge. <p>REA Building</p> <ul style="list-style-type: none"> ▪ New bus facility and above-ground parking facility would rise behind the building, blocking visual connections with rail terminal on west side. ▪ Same new facilities would alter views toward REA Building from the east side along I (Eye) Street NE and would be highly visible above the roofline. |
| Minor Adverse | <p>Square 750 Rowhouse Development; 901 Second Street NE; Woodward Lothrop Service Warehouse</p> <ul style="list-style-type: none"> ▪ Bus facility and parking facility would be highly visible. ▪ Resources have low sensitivity as they have lost much of their integrity of feeling, association, and setting due to recent nearby developments. <p>Thurgood Marshall Federal Judiciary Building; Topham’s Luggage Factory (Former)</p> <ul style="list-style-type: none"> ▪ Project elements partially visible from these resources. ▪ Resources have low sensitivity to such changes as they do not derive their significance from visual connections to WUS. |
| Negligible Adverse | <p>St. Joseph’s Home (Former)</p> <ul style="list-style-type: none"> ▪ Project element just visible. ▪ Low sensitivity would not affect the resources’ integrity. |
| Beneficial | <p>GPO; GPO Warehouse No. 4</p> <ul style="list-style-type: none"> ▪ Less visibility of WUS elements from these resources. |

Visual Impacts - West Option

336 **Relative to existing conditions, visual changes in Alternative C with the West Option would**
337 **result in major adverse direct operational impacts on WUS, the WUS Historic Site, and the**
338 **REA Building; minor adverse direct operational impacts on two cultural resources; and**
339 **negligible adverse direct operational impacts on two cultural resources. They would also**
340 **result in beneficial direct operational impacts on two resources.**

341 The visual direct operational impacts of Alternative C with the West Option are described in
342 **Table 5-153.**

Table 5-153. Direct Operational Visual Impacts on Cultural Resources, Alternative C West Option

| Impact | Resources and Summary Description |
|---------------------------|---|
| Major Adverse | WUS <ul style="list-style-type: none"> ▪ Same as East Option. |
| | WUS Historic Site <ul style="list-style-type: none"> ▪ Same as East Option. |
| | REA Building <ul style="list-style-type: none"> ▪ New bus facility and above-ground parking facility would rise behind the building across the rail terminal. ▪ Change would affect the visual relationship of the building to the rail terminal. ▪ The resource has high sensitivity to such a change, which would alter its integrity of setting, feeling, and association. |
| Minor Adverse | Woodward Lothrop Service Warehouse <ul style="list-style-type: none"> ▪ Same as East Option. |
| | Thurgood Marshall Federal Judiciary Building; Topham’s Luggage Factory (Former) <ul style="list-style-type: none"> ▪ Same as East Option. |
| Negligible Adverse | Square 750 Rowhouse Development; St. Joseph’s Home (Former) <ul style="list-style-type: none"> ▪ Project element just visible. ▪ Low sensitivity would not affect the resources’ integrity. |
| Beneficial | GPO; GPO Warehouse No. 4 <ul style="list-style-type: none"> ▪ Same as East Option. |

Traffic, Noise, and Vibration Impacts

343 **Relative to existing conditions, noise and vibration in Alternative C (either option) would**
 344 **result in minor adverse direct operational impacts on three cultural resources and**
 345 **negligible adverse direct operational impacts on 15 cultural resources. Increased traffic**
 346 **volumes in Alternative C have the potential to further result in an adverse direct**
 347 **operational impact on the Capitol Hill Historic District from visual impacts, conflicts with**
 348 **pedestrians and bicyclists, and disturbances affecting access to homes and businesses.**

349 The noise and vibration impacts of Alternative C on cultural resources would be the same as
 350 those of Alternative A (see **Table 5-146** above). Everywhere operational noise impacts in
 351 Alternative C would be within 0.2 dBA of those predicted for Alternative A, an imperceptible
 352 difference. Because of the entrance of the below-ground parking facility on K Street NE, more
 353 traffic would travel along K Street and L Street NE and less traffic along H Street NE and North
 354 Capitol Street than in Alternative A. The operational noise analysis showed that this would
 355 not result in noticeably different ambient noise levels along those roadways.

356 Potential traffic impacts on the Capitol Hill Historic District would also be as in Alternative A.
 357 While the exact volumes of traffic that would travel along K Street NE and H Street NE may
 358 differ slightly between Alternative C and Alternative A, the difference would not be great
 359 enough to result in measurably greater or less impacts on the historic district.

Indirect Operational Impacts

360 **Relative to existing conditions, with the potential Federal air-rights development, visual**
 361 **changes in Alternative C (either option) would have the following indirect operational**
 362 **impacts on cultural resources in addition to the alternative’s direct impacts: moderate**
 363 **adverse visual impacts on one cultural resource; minor adverse visual impacts on three**
 364 **cultural resources; and negligible adverse visual impacts on six cultural resources.**

365 In Alternative C, the Federal air rights where the existing parking garage stands would
 366 potentially be developed consistent with the anticipated zoning. The structure would have
 367 the same height as in Alternative A, with similar impacts. Because the east-west train hall
 368 would push the potential Federal air-rights development further back from the station than
 369 under that alternative, it would be less visible from some resources.

370 With the potential Federal air-rights development, Alternative C would have the additional
 371 visual impacts described in **Table 5-154**.

Table 5-154. Indirect Operational Visual Impacts on Cultural Resources, Alternative C

| Impact | Resources and Summary Description |
|---------------------------|---|
| Moderate Adverse | <p>U.S. Capitol Dome Viewshed</p> <ul style="list-style-type: none"> ▪ Potential Federal air-right development visible from the dome. ▪ Would not rise above the horizon or block or disrupt any views. ▪ Viewshed is moderately sensitive to these changes. |
| Minor Adverse | <p>L’Enfant-McMillan Plan</p> <ul style="list-style-type: none"> ▪ Potential Federal air-right would affect several street corridors that are part of the plan. ▪ Out of 19 evaluated views, major visual impacts to two, moderate impacts to four (East Option) or three (West Option), minor impacts to four, negligible impacts to three, beneficial impacts to one. ▪ In the aggregate, visual changes would have limited visibility and would not affect the plan’s integrity. |
| Negligible Adverse | <p>Senate Parks, Underground Garage and Fountains; Capitol Hill Historic District</p> <ul style="list-style-type: none"> ▪ Low to moderately visible visual changes due to the potential Federal air-rights development. ▪ Resources have low to moderate sensitivity to these changes. |
| Negligible Adverse | <p>Dirksen and Hart Senate Office Buildings; Library of Congress Thomas Jefferson Building; St. Joseph’s Home (Former); Uline Ice Company Plant and Arena Complex; Russel Senate Office Building</p> <ul style="list-style-type: none"> ▪ The potential Federal air-rights development would be visible from these resources. ▪ Because of the distance, and intervening buildings and vegetation, the change would barely be noticeable and would not compromise integrity of setting, feeling, or association. |
| Negligible Adverse | <p>City Post Office/Postal Museum</p> <ul style="list-style-type: none"> ▪ The potential Federal air-rights development would be visible from it but would occupy almost the same space as the existing parking garage. ▪ The resource’s sensitivity to the change would be low. |

Construction Impacts

372 **Construction of Alternative C (either option) would potentially result in an adverse impact**
 373 **on unidentified archaeological resources within the WUS rail terminal. Visual changes**
 374 **during construction would result in moderate adverse impacts on three cultural resources;**
 375 **minor adverse impacts on one cultural resource; and negligible adverse impacts on 16 (East**
 376 **Option) or 14 (West Option) cultural resources. Noise and vibration from construction**
 377 **activities in Alternative C (either option) would result in major adverse impacts on WUS**
 378 **and the REA Building; moderate adverse impacts on five cultural resources; minor adverse**
 379 **impacts on two cultural resources; and negligible adverse impacts on ten cultural**
 380 **resources.**

381 The construction impacts of Alternative C on cultural resources are presented in **Table 5-155.**

Table 5-155. Construction Impacts on Cultural Resources, Alternative C

| Impact | Resources and Summary Description |
|---|---|
| Physical | |
| Potential Adverse | WUS Historic Site <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |
| Visual | |
| Moderate Adverse | WUS; WUS Historic Site; REA Building <ul style="list-style-type: none"> Construction would occur within or directly adjacent next to these resources over the entire construction period of 12 years and 3 months. Otherwise, same as Alternative A (Table 5-148). |
| Minor Adverse | U.S. Capitol Dome Viewshed <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |
| Negligible Adverse (* indicates that impact would occur only in the East Option) | City Post Office/Postal Museum; Dirksen and Hart Senate Office Buildings; GPO; GPO Warehouse No. 4; Library of Congress, Thomas Jefferson Building; Russell Senate Office Building; Senate Parks, Underground Garage, and Fountains; Square 750; St. Joseph’s Home (former); Thurgood Marshall Federal Judiciary Building; Uline Ice Company Plant and Arena Complex; Woodward and Lothrop Service Warehouse; Capitol Hill Historic District; L’Enfant-McMillan Plan; Topham’s Luggage Factory*; 901 Second Street* <ul style="list-style-type: none"> Construction would take place in phases over a duration of approximately 12 years and 3 months. Otherwise, same as Alternative A (Table 5-148). |
| Traffic, Noise, and Vibration | |
| Major Adverse | WUS; REA Building <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |
| Moderate Adverse | City Post Office/Postal Museum; GPO Warehouse No.4; St. Joseph’s Home (Former); Square 750 Rowhouse Development (917-923 2nd Street NE; 208-224, 226-242, and 219-231 Parker Street NE); 901 Second Street NE. <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |
| Minor Adverse | C&P Telephone Company Warehouse; Topham’s Luggage Factory (Former); Capitol Hill Historic District (northwestern edge) <ul style="list-style-type: none"> Same as Alternative A (Table 5-148), except that excavation operations in Phase 4 would last for approximately 2 years out of a total phase duration of 4 years. |

| Impact | Resources and Summary Description |
|--------------------|--|
| Negligible Adverse | <p>Capitol Press Building (Former); Holodomor Ukrainian Holocaust Memorial; St. Aloysius Catholic Church; St. Phillip’s Baptist Church; Thurgood Marshall Federal Judiciary Building; Uline Ice Company and Arena Complex; Columbus Plaza; Woodward and Lothrop Service Warehouse; Union Market Historic District C&P Telephone Company Warehouse; Topham’s Luggage Factory (Former); Capitol Hill Historic District (northwestern edge)</p> <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |

Comparison to the No-Action Alternative

382 The physical and noise and vibration-related operational impacts of Alternative C (either
 383 option) on cultural resources relative to the No-Action Alternative would be the same as
 384 those relative to existing conditions for the same reasons as explained for Alternative A
 385 (Section 12.5.2.4, *Comparison to the No-Action Alternative*). Differences in traffic impacts on
 386 the Capitol Hill Historic District would also be as described for Alternative A.

387 Visual impacts on cultural resources relative to the No-Action Alternative would generally be
 388 less than relative to existing conditions. The mass of the private air-rights development
 389 above the rail terminal would mask Project elements from certain locations. In Alternative C
 390 relative to the No-Action Alternative, all visual impacts would be the same with exception of
 391 those listed in Table 5-156.

Table 5-156. Comparison of Alternative C Operational Visual Impacts on Cultural Resources Relative to the No-Action Alternative and Existing Conditions

| Cultural Resource | Relative to Existing Conditions | Relative to No-Action Alternative |
|--|---|-----------------------------------|
| Direct Impacts | | |
| WUS Historic Site | Major adverse | Minor adverse |
| REA Building | Major adverse | No impact |
| Woodward and Lothrop Service Warehouse | Minor adverse | No impact |
| Thurgood Marshall Federal Judiciary Building | Minor adverse | No impact |
| St. Joseph’s Home (Former) | Negligible adverse | No impact |
| Square 750 Rowhouse Development | Negligible (West Option) or minor (East Option) adverse | No impact |
| Indirect Impacts | | |
| Senate Parks, Underground Garage and Fountains | Minor adverse | Negligible adverse |
| Capitol Hill Historic District | Minor adverse | Negligible adverse |
| Dirksen and Hart Senate Office Building | Negligible adverse | No impact |
| Uline Ice Company Plant and Arena Complex | Negligible adverse | No impact |

| Cultural Resource | Relative to Existing Conditions | Relative to No-Action Alternative |
|------------------------|---------------------------------|-----------------------------------|
| U.S. Dome Viewshed | Moderate adverse | No impact |
| L'Enfant-McMillan Plan | Minor adverse | Negligible adverse |

5.12.4.5 Alternative D

Direct Operational Impacts

Physical Impacts

392 **Relative to existing conditions, Alternative D would have major adverse direct operational**
 393 **physical impacts on WUS and the WUS Historic Site. It would have a potential adverse**
 394 **direct operational physical impact on the REA Building.**

395 Alternative D’s physical impacts on WUS would be the same as Alternative A’s as the source
 396 of these impacts, such as the column removal work and the demolition of the Claytor
 397 Concourse and its replacement with Concourse A and a new train hall, would be the same in
 398 both alternatives. Impacts are described in Table 5-144 above.

399 Similarly, Alternative D’s physical impacts on the WUS Historic Site would be the same as
 400 those of Alternative A, described in **Table 5-144** above. Additionally, construction of the
 401 access ramp to the below-ground parking facility in Alternative D would require opening a
 402 large portal in the retaining wall (Burnham Wall) under the K Street Bridge. The wall is a
 403 contributing feature of the historic site.

404 The potential adverse physical impact of Alternative D on the REA Building would be the
 405 same as described for Alternative A in Table 5-144 above.

Visual Impacts

406 **Relative to existing conditions, visual changes in Alternative D would result in major**
 407 **adverse direct operational impacts on WUS, the WUS Historic Site, and the REA Building;**
 408 **moderate adverse direct operational impacts on one cultural resource; minor adverse**
 409 **direct operational impacts on two cultural resources; and negligible adverse direct**
 410 **operational impacts on two cultural resources. They would also result in beneficial direct**
 411 **operational impacts on two cultural resources**

412 The direct operational visual impacts of Alternative D are presented in **Table 5-157**.

Table 5-157. Direct Operational Visual Impacts on Cultural Resources, Alternative D

| Impact | Resources and Summary Description |
|---------------------------|--|
| Major Adverse | <p>WUS</p> <ul style="list-style-type: none"> ▪ The bus facility and train hall behind the historic station building would be highly visible from First Street and 2nd Street NE. ▪ These changes would alter the visual environment of WUS in a manner that would alter its integrity of setting, feeling, and association ▪ Demolition of the existing parking garage would be highly visible, but removal would not adversely affect WUS since existing garage is incompatible. <p>WUS Historic Site</p> <ul style="list-style-type: none"> ▪ Reconstruction of railroad terminal and construction of the bus facility and train hall would change the appearance of historic site south of H Street Bridge. ▪ Construction of the above-ground parking facility south of K Street NE would create a visual obstruction in a currently open part of the rail terminal. ▪ Changes within the rail terminal would noticeably alter existing visual connections between components south and north of H Street Bridge. <p>REA Building</p> <ul style="list-style-type: none"> ▪ The above-ground parking facility would be highly visible to the north of the building. ▪ Although tracks and platforms would remain visible from the building, the new parking facility would affect the visual relationship of the building to the rail terminal. |
| Moderate Adverse | <p>Square 750 Rowhouse Development</p> <ul style="list-style-type: none"> ▪ The above-ground parking facility would be highly visible from this resource. ▪ It would stand at the western end of Parker Street NE, where it would close the view, instead of Substation 25A, with a noticeable increase in the height of the structure. ▪ The resource’s sensitivity to this change is low as it has lost much of its integrity of feeling, association, and setting due to recent development nearby. |
| Minor Adverse | <p>Thurgood Marshall Federal Judiciary Building; Woodward Lothrop Service Warehouse</p> <ul style="list-style-type: none"> ▪ Project elements would be moderately to highly visible from these resources. ▪ Resources have low sensitivity to such changes |
| Negligible Adverse | <p>St. Joseph’s Home (Former); Uline Ice Company Plant and Arena Complex</p> <ul style="list-style-type: none"> ▪ Project element just visible. ▪ Low sensitivity would not affect the resources’ integrity. |
| Beneficial | <p>GPO; GPO Warehouse No. 4</p> <ul style="list-style-type: none"> ▪ Less visibility of WUS elements from these resources. |

Traffic, Noise, and Vibration Impacts

413 **Relative to existing conditions, noise and vibration in Alternative D would result in minor**
414 **adverse direct operational impacts on three cultural resources and negligible adverse direct**
415 **operational impacts on 15 cultural resources. Increased traffic volumes in Alternative D**
416 **have the potential to further result in an adverse direct operational impact on the Capitol**
417 **Hill Historic District from visual impacts, conflicts with pedestrians and bicyclists, and**
418 **disturbances affecting access to homes and businesses.**

419 The noise and vibration impacts of Alternative D on cultural resources would be the same as
420 those of Alternative A (see **Table 5-146** above). Everywhere operational noise impacts in
421 Alternative D would be within 0.2 dBA of those predicted for Alternative A, an imperceptible

422 difference. Because of the entrance of the below-ground parking facility on K Street NE, more
 423 traffic would travel along K Street and L Street NE and less traffic along H Street NE and North
 424 Capitol Street than in Alternative A. The operational noise analysis showed that this would
 425 not result in noticeably different ambient noise levels along those roadways.

426 Potential traffic impacts on the Capitol Hill Historic District would also be as in Alternative A.
 427 While the exact volumes of traffic that would travel along K Street NE and H Street NE may
 428 differ slightly between Alternative D and Alternative A, the difference would not be great
 429 enough to result in measurably greater or less impacts on the historic district.

Indirect Operational Impacts

430 **Relative to existing conditions, with the potential Federal air-rights development, visual**
 431 **changes in Alternative D would have the following indirect operational impacts on cultural**
 432 **resources in addition to the alternative’s direct impacts: moderate adverse visual impacts**
 433 **on two cultural resources; minor adverse visual impacts on two cultural resources; and**
 434 **negligible adverse visual impacts on five cultural resources.**

435 In Alternative D, the Federal air rights where the existing parking garage stands would
 436 potentially be developed consistent with the anticipated zoning. The structure would have
 437 the same height as in Alternative A, with similar impacts. Because the east-west train hall
 438 would push the potential Federal air-rights development further back from the station than
 439 under that alternative, it would be less visible from some resources.

440 With the potential Federal air-rights development, Alternative D would have the additional
 441 visual impacts described in **Table 5-158**.

Table 5-158. Indirect Operational Visual Impacts on Cultural Resources, Alternative D

| Impact | Resources and Summary Description |
|-------------------------|--|
| | <p style="text-align: center;">U.S. Capitol Dome Viewshed</p> <ul style="list-style-type: none"> ▪ Potential Federal air-right development visible from the dome. ▪ Would not rise above the horizon or block or disrupt any views. ▪ Viewshed is moderately sensitive to these changes. |
| Moderate Adverse | <p>L’Enfant-McMillan Plan</p> <ul style="list-style-type: none"> ▪ Potential Federal air-right would affect several street corridors that are part of the plan. ▪ Out of 19 evaluated views, major visual impacts to two, moderate impacts to five, minor impacts to three, negligible impacts to two, beneficial impacts to one. ▪ In the aggregate, visual changes would be noticeable from several locations. |
| Minor Adverse | <p style="text-align: center;">Senate Parks, Underground Garage and Fountains; Capitol Hill Historic District</p> <ul style="list-style-type: none"> ▪ Low to moderately visible visual changes due to the potential Federal air-rights development. ▪ Resources have low to moderate sensitivity to these changes. |

| Impact | Resources and Summary Description |
|--------------------|---|
| Negligible Adverse | Dirksen and Hart Senate Office Buildings; Library of Congress Thomas Jefferson Building; St. Joseph's Home (Former); Russel Senate Office Building <ul style="list-style-type: none"> The potential Federal air-rights development would be visible from these resources. Because of the distance, and intervening buildings and vegetation, the change would barely be noticeable and would not compromise integrity of setting, feeling, or association. |
| | City Post Office/Postal Museum <ul style="list-style-type: none"> The potential Federal air-rights development would be visible from it but would occupy almost the same space as the existing parking garage. The resource's sensitivity to the change would be low. |

Construction Impacts

442 **Construction of Alternative D would potentially result in an adverse impact on unidentified**
 443 **archaeological resources within the WUS rail terminal. Visual changes during construction**
 444 **would result in moderate adverse impacts on three cultural resources; minor adverse**
 445 **impacts on three cultural resource; and negligible adverse impacts on 12 cultural resources.**
 446 **Noise and vibration from construction activities in Alternative D would also result in major**
 447 **adverse impacts on WUS and the REA Building; moderate adverse impacts on five cultural**
 448 **resources; minor adverse impacts on two cultural resources; and negligible adverse**
 449 **impacts on ten cultural resources.**

450 The construction impacts of Alternative D on cultural resources are presented in **Table 5-159.**

Table 5-159. Construction Impacts on Cultural Resources, Alternative D

| Impact | Resources and Summary Description |
|---|--|
| Physical | |
| Potential Adverse | WUS Historic Site <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |
| Visual | |
| Moderate Adverse | WUS; WUS Historic Site; REA Building <ul style="list-style-type: none"> Construction would occur within or directly adjacent next to these resources over the entire construction period of 12 years and 3 months. Otherwise, same as Alternative A (Table 5-148). |
| | Minor Adverse |
| U.S. Capitol Dome Viewshed <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). | |

| Impact | Resources and Summary Description |
|--------------------------------------|---|
| Negligible Adverse | <p>City Post Office/Postal Museum; Dirksen and Hart Senate Office Buildings; GPO; GPO Warehouse No. 4; Library of Congress, Thomas Jefferson Building; Russell Senate Office Building; Senate Parks, Underground Garage, and Fountains; St. Joseph’s Home (former); Thurgood Marshall Federal Judiciary Building; Uline Ice Company Plant and Arena Complex; Woodward and Lothrop Service Warehouse; Capitol Hill Historic District</p> <ul style="list-style-type: none"> ▪ Construction would take place in phases over a duration of approximately 12 years and 3 months. ▪ Otherwise, same as Alternative A (Table 5-148). |
| Traffic, Noise, and Vibration | |
| Major Adverse | <p>WUS; REA Building</p> <ul style="list-style-type: none"> ▪ Same as Alternative A (Table 5-148). |
| Moderate Adverse | <p>City Post Office/Postal Museum; GPO Warehouse No.4; St. Joseph’s Home (Former); Square 750 Rowhouse Development (917-923 2nd Street NE; 208-224, 226-242, and 219-231 Parker Street NE); 901 Second Street NE.</p> <ul style="list-style-type: none"> ▪ Same as Alternative A (Table 5-148). |
| Minor Adverse | <p>C&P Telephone Company Warehouse; Capitol Hill Historic District (northwestern edge)</p> <ul style="list-style-type: none"> ▪ Same as Alternative A (Table 5-148), except that excavation operations in Phase 4 would last for approximately 2 years out of a total phase duration of 4 years. |
| Negligible Adverse | <p>Capitol Press Building (Former); Holodomor Ukrainian Holocaust Memorial; St. Aloysius Catholic Church; St. Phillip’s Baptist Church; Thurgood Marshall Federal Judiciary Building; Uline Ice Company and Arena Complex; Columbus Plaza; Woodward and Lothrop Service Warehouse; Union Market Historic District; Topham’s Luggage Factory (Former).</p> <ul style="list-style-type: none"> ▪ Same as Alternative A (Table 5-148). |

Comparison to the No-Action Alternative

451 The physical and noise and vibration-related operational impacts of Alternative D on cultural
452 resources relative to the No-Action Alternative would be the same as those relative to
453 existing conditions for the same reasons as explained for Alternative A (Section 12.5.2.4,
454 *Comparison to the No-Action Alternative*). Differences in traffic impacts on the Capitol Hill
455 Historic District would also be as described for Alternative A.

456 Visual impacts on cultural resources relative to the No-Action Alternative would generally be
457 less than relative to existing conditions. The mass of the private air-rights development
458 above the rail terminal would mask Project elements from certain locations. In Alternative D
459 relative to the No-Action Alternative, all visual impacts would be the same with exception of
460 those listed in Table 5-160.

Table 5-160. Comparison of Alternative D Operational Visual Impacts on Cultural Resources Relative to the No-Action Alternative and Existing Conditions

| Cultural Resource | Relative to Existing Conditions | Relative to No-Action Alternative |
|---|---------------------------------|-----------------------------------|
| Direct Impacts | | |
| WUS Historic Site | Major adverse | Minor adverse |
| REA Building | Major adverse | No impact |
| Woodward and Lothrop Service Warehouse | Minor adverse | No impact |
| Thurgood Marshall Federal Judiciary Building | Minor adverse | No impact |
| St. Joseph’s Home (Former) | Negligible adverse | No impact |
| Square 750 Rowhouse Development | Moderate adverse | No impact |
| Uline Ice Company Plant and Arena Complex | Negligible adverse | No impact |
| Indirect Impacts | | |
| Senate Parks, Underground Garage and Fountains | Minor adverse | Negligible adverse |
| Capitol Hill Historic District | Minor adverse | Negligible adverse |
| Dirksen and Hart Senate Office Building | Negligible adverse | No impact |
| U.S. Dome Viewshed | Moderate adverse | No impact |
| L’Enfant-McMillan Plan | Moderate adverse | Negligible adverse |

5.12.4.6 Alternative E

Direct Operational Impacts

Physical Impacts

461 **Relative to existing conditions, Alternative E would have major physical adverse direct**
 462 **operational impacts on WUS and the WUS Historic Site. It would have a potential adverse**
 463 **direct operational physical impact on the REA Building.**

464 Alternative E’s physical impacts on WUS would be the same as Alternative A’s as the source
 465 of these impacts, such as the column removal work and the demolition of the Claytor
 466 Concourse and its replacement with Concourse A and a new train hall, would be the same in
 467 both alternatives. Impacts are described in **Table 5-144** above.

468 Similarly, Alternative E’s physical impacts on the WUS Historic Site would be the same as
 469 those of Alternative A, described in **Table 5-144** above. Additionally, construction of the
 470 access ramp to the below-ground parking facility in Alternative E would require opening a
 471 large portal in the retaining wall (Burnham Wall) under the K Street Bridge. The wall is a
 472 contributing feature of the historic site.

473 The potential adverse physical impact of Alternative E on the REA Building would be the same
 474 as described for Alternative A in **Table 5-144** above.

Visual Impacts

475 **Relative to existing conditions, visual changes in Alternative E would result in major**
 476 **adverse direct operational impacts on WUS, the WUS Historic Site, and the REA Building;**
 477 **minor adverse direct operational impacts on two cultural resources; and negligible adverse**
 478 **direct operational impacts on two cultural resources. They would also result in beneficial**
 479 **direct operational impacts on two resources.**

480 The direct operational visual impacts of Alternative E are presented in **Table 5-161**.

Table 5-161. Direct Operational Visual Impacts on Cultural Resources, Alternative E

| Impact | Resources and Summary Description |
|---------------------------|--|
| Major Adverse | <p>WUS</p> <ul style="list-style-type: none"> ▪ The bus facility and train hall behind the historic station building would be highly visible from First Street and 2nd Street NE. ▪ These changes would alter the visual environment of WUS in a manner that would alter its integrity of setting, feeling, and association ▪ Demolition of the existing parking garage would be highly visible, but removal would not adversely affect WUS since existing garage is incompatible. <p>WUS Historic Site</p> <ul style="list-style-type: none"> ▪ Reconstruction of railroad terminal and construction of the bus facility and train hall would change the appearance of historic site south of H Street Bridge. ▪ From the north, the train hall would hide the rail terminal and back of historic station building. ▪ Highly visible changes would likely compromise character-defining features and integrity of setting, feeling, and association. <p>REA Building</p> <ul style="list-style-type: none"> ▪ Reconstruction of the rail terminal would change the character of visual connection with the tracks. ▪ New train hall and bus facility would be visible to the southwest. ▪ Changes in visual environment would be highly noticeable and the REA Building’s sensitivity to these changes is high. |
| Minor Adverse | <p>Thurgood Marshall Federal Judiciary Building; Woodward Lothrop Service Warehouse</p> <ul style="list-style-type: none"> ▪ Project elements would be moderately to highly visible from these resources. ▪ Resources have low sensitivity to such changes. |
| Negligible Adverse | <p>Square 750 Rowhouse Development; St. Joseph’s Home (Former)</p> <ul style="list-style-type: none"> ▪ Project element just visible. ▪ Low sensitivity would not affect the resources’ integrity. |
| Beneficial | <p>GPO; GPO Warehouse No. 4</p> <ul style="list-style-type: none"> ▪ Less visibility of WUS elements from these resources. |

Traffic, Noise, and Vibration Impacts

481 **Relative to existing conditions, noise and vibration in Alternative E would result in minor**
482 **adverse direct operational impacts on three cultural resources and negligible adverse direct**
483 **operational impacts on 15 cultural resources. Increased traffic volumes in Alternative E**
484 **have the potential to further result in an adverse direct operational impact on the Capitol**
485 **Hill Historic District from visual impacts, conflicts with pedestrians and bicyclists, and**
486 **disturbances affecting access to homes and businesses.**

487 The noise and vibration impacts of Alternative E on cultural resources would be the same as
488 those of Alternative A (see **Table 5-146** above). Everywhere operational noise impacts in
489 Alternative E would be within 0.2 dBA of those predicted for Alternative A, an imperceptible
490 difference. Because of the entrance of the below-ground parking facility on K Street NE, more
491 traffic would travel along K Street and L Street NE and less traffic along H Street NE and North
492 Capitol Street than in Alternative A. The operational noise analysis showed that this would
493 not result in noticeably different ambient noise levels along those roadways.

494 Potential traffic impacts on the Capitol Hill Historic District would also be as in Alternative A.
495 While the exact volumes of traffic that would travel along K Street NE and H Street NE may
496 differ slightly between Alternative E and Alternative A, the difference would not be great
497 enough to result in measurably greater or less impacts on the historic district.

Indirect Operational Impacts

498 **Relative to existing conditions, with the potential Federal air-rights development, visual**
499 **changes in Alternative E would have the following indirect operational impacts on cultural**
500 **resources in addition to the alternative's direct impacts: moderate adverse visual impacts**
501 **on one cultural resource; minor adverse visual impacts on three cultural resources; and**
502 **negligible adverse visual impacts on six cultural resources.**

503 In Alternative E, the Federal air rights where the existing parking garage stands would
504 potentially be developed consistent with the anticipated zoning. The structure would have
505 the same height as in Alternative A, with similar impacts. Because the east-west train hall
506 would push the potential Federal air-rights development further back from the station than
507 under that alternative, it would be less visible from some resources. With the potential
508 Federal air-rights development, Alternative E would have the additional visual impacts
509 described in **Table 5-162**.

Table 5-162. Indirect Operational Visual Impacts on Cultural Resources, Alternative E

| Impact | Resources and Summary Description |
|---------------------------|---|
| Moderate Adverse | <p>U.S. Capitol Dome Viewshed</p> <ul style="list-style-type: none"> ▪ Potential Federal air-right development visible from the dome. ▪ Would not rise above the horizon or block or disrupt any views. ▪ Viewshed is moderately sensitive to these changes. |
| Minor Adverse | <p>L’Enfant-McMillan Plan</p> <ul style="list-style-type: none"> ▪ Potential Federal air-right would affect several street corridors that are part of the plan. ▪ Out of 19 evaluated views, major visual impacts to two, moderate impacts to three, minor impacts to four, negligible impacts to three, beneficial impacts to one. ▪ In the aggregate, visual changes would have limited visibility and would not affect the plan’s integrity. <p>Senate Parks, Underground Garage and Fountains; Capitol Hill Historic District</p> <ul style="list-style-type: none"> ▪ Low to moderately visible visual changes due to the potential Federal air-rights development. ▪ Resources have low to moderate sensitivity to these changes. |
| Negligible Adverse | <p>Dirksen and Hart Senate Office Buildings; Library of Congress Thomas Jefferson Building; St. Joseph’s Home (Former); Russel Senate Office Building; Uline Ice Company Plant and Arena Complex</p> <ul style="list-style-type: none"> ▪ The potential Federal air-rights development would be visible from these resources. ▪ Because of the distance, and intervening buildings and vegetation, the change would barely be noticeable and would not compromise integrity of setting, feeling, or association. <p>City Post Office/Postal Museum</p> <ul style="list-style-type: none"> ▪ The potential Federal air-rights development would be visible from it but would occupy almost the same space as the existing parking garage. ▪ The resource’s sensitivity to the change would be low. |

Construction Impacts

510 **Alternative E’s construction would potentially result in an adverse impact on unidentified**
511 **archaeological resources within the WUS rail terminal. Visual changes during construction**
512 **would result in moderate adverse impacts on three cultural resources; minor adverse**
513 **impacts on one cultural resource; and negligible adverse impacts on 14 cultural resources.**
514 **Noise and vibration from construction activities would result in major adverse impacts on**
515 **WUS and the REA Building; moderate adverse impacts on five cultural resources; minor**
516 **adverse impacts on three cultural resources; and negligible adverse impacts on nine**
517 **cultural resources.**

518 The construction impacts of Alternative E on cultural resources are presented in **Table 5-163.**

Table 5-163. Construction Impacts on Cultural Resources, Alternative E

| Impact | Resources and Summary Description |
|--------------------------------------|---|
| Physical | |
| Potential Adverse | WUS Historic Site <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |
| Visual | |
| Moderate Adverse | WUS; WUS Historic Site; REA Building <ul style="list-style-type: none"> Construction would occur within or directly adjacent next to these resources over the entire construction period of 14 years and 4 months. Otherwise, same as Alternative A (Table 5-148). |
| Minor Adverse | U.S. Capitol Dome Viewshed <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |
| Negligible Adverse | City Post Office/Postal Museum; Dirksen and Hart Senate Office Buildings; GPO; GPO Warehouse No. 4; Library of Congress, Thomas Jefferson Building; Russell Senate Office Building; Senate Parks, Underground Garage, and Fountains; Square 750 Rowhouse Development; St. Joseph’s Home (former); Thurgood Marshall Federal Judiciary Building; Uline Ice Company Plant and Arena Complex; Woodward and Lothrop Service Warehouse; Capitol Hill Historic District; L’Enfant-McMillan Plan <ul style="list-style-type: none"> Construction would take place in phases over a duration of approximately 14 years and 4 months. Otherwise, same as Alternative A (Table 5-148). |
| Traffic, Noise, and Vibration | |
| Major Adverse | WUS; REA Building <ul style="list-style-type: none"> Same as Alternative B (Table 5-11). |
| Moderate Adverse | City Post Office/Postal Museum; GPO Warehouse No.4; St. Joseph’s Home (Former); Square 750 Rowhouse Development (917-923 2nd Street NE; 208-224, 226-242, and 219-231 Parker Street NE); 901 Second Street NE. <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |
| Minor Adverse | C&P Telephone Company Warehouse; Topham’s Luggage Factory (Former); Capitol Hill Historic District (northwestern edge) <ul style="list-style-type: none"> Same as Alternative A (Table 5-148), except that excavation operations in Phase 4 would last for approximately 2 years and 7 months out of a total duration of 4 years and 11 months. |
| Negligible Adverse | Capitol Press Building (Former); Holodomor Ukrainian Holocaust Memorial; St. Aloysius Catholic Church; St. Phillip’s Baptist Church; Thurgood Marshall Federal Judiciary Building; Uline Ice Company and Arena Complex; Columbus Plaza; Woodward and Lothrop Service Warehouse; Union Market Historic District. <ul style="list-style-type: none"> Same as Alternative A (Table 5-148). |

Comparison to the No-Action Alternative

519 The physical and noise and vibration-related operational impacts of Alternative E on cultural
520 resources relative to the No-Action Alternative would be the same as those relative to
521 existing conditions for the same reasons as explained for Alternative A (Section 12.5.2.4,
522 *Comparison to the No-Action Alternative*). Differences in traffic impacts on the Capitol Hill
523 Historic District would also be as described for Alternative A.

524 Visual impacts on cultural resources relative to the No-Action Alternative would generally be
 525 less than relative to existing conditions. The mass of the private air-rights development
 526 above the rail terminal would mask Project elements from certain locations. In Alternative E
 527 relative to the No-Action Alternative, all visual impacts would be the same with exception of
 528 those listed in **Table 5-164**.

Table 5-164. Comparison of Alternative E Operational Visual Impacts on Cultural Resources Relative to the No-Action Alternative and Existing Conditions

| Cultural Resource | Relative to Existing Conditions | Relative to No-Action Alternative |
|--|---------------------------------|-----------------------------------|
| Direct Impacts | | |
| WUS Historic Site | Major adverse | Minor adverse |
| REA Building | Major adverse | No impact |
| Woodward and Lothrop Service Warehouse | Minor adverse | No impact |
| Thurgood Marshall Federal Judiciary Building | Minor adverse | No impact |
| St. Joseph’s Home (Former) | Negligible adverse | No impact |
| Square 750 Rowhouse Development | Negligible adverse | No impact |
| Indirect Impacts | | |
| Senate Parks, Underground Garage and Fountains | Minor adverse | Negligible adverse |
| Uline Ice Company Plant and Arena Complex | Negligible adverse | No impact |
| Capitol Hill Historic District | Minor adverse | Negligible adverse |
| Dirksen and Hart Senate Office Building | Negligible adverse | No impact |
| U.S. Dome Viewshed | Moderate adverse | No impact |
| L’Enfant-McMillan Plan | Minor adverse | Negligible adverse |

5.12.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

Physical Impacts

529 **Relative to existing conditions, Alternative A-C would have major adverse direct**
 530 **operational physical impacts on WUS and the WUS Historic Site. It would have a potential**
 531 **adverse direct operational physical impact on the REA Building.**

532 Alternative A-C would have the same major adverse direct impacts on WUS and the WUS
 533 Historic Site as Alternative A. It would also have the same potential adverse impact on the
 534 REA Building as Alternative A. These impacts are described in **Table 5-144** above.

Visual Impacts

535 **Relative to existing conditions, visual changes in Alternative A-C would result in major**
 536 **adverse direct operational impacts on WUS, the WUS Historic Site, and the REA Building;**
 537 **minor adverse direct operational impacts on two cultural resources; and negligible adverse**
 538 **direct operational impacts on two cultural resources. They would also result in beneficial**
 539 **direct operational impacts on one cultural resource.**

540 The direct operational visual impacts of Alternative A-C are presented in **Table 5-165.**

Table 5-165. Direct Operational Visual Impacts on Cultural Resources, Alternative A-C

| Impact | Resources and Summary Description |
|---------------------------|---|
| Major Adverse | WUS <ul style="list-style-type: none"> ▪ The top of new parking facility would be visible above historic station's roofline from Delaware Avenue and Louisiana Avenue, introducing noticeable asymmetry in the view of the station. ▪ Visual changes would be highly noticeable and the sensitivity of WUS is high. |
| | WUS Historic Site <ul style="list-style-type: none"> ▪ Reconstruction of the rail terminal and construction of the train hall, bus facility, and parking facility would change the appearance of the historic site and alter visual connections. ▪ From the north, train hall and new parking facility would partially hide the rail terminal and back of historic station building. ▪ Highly visible changes would likely compromise character-defining features and integrity of setting, feeling, and association. |
| | REA Building <ul style="list-style-type: none"> ▪ Reconstruction of the rail terminal would change the character of visual connection with the tracks. ▪ New bus facility and parking facility would be visible to the southwest. ▪ Changes in visual environment would be highly noticeable and the REA Building's sensitivity to these changes is high. |
| | Minor Adverse Thurgood Marshall Federal Judiciary Building; Woodward Lothrop Service Warehouse <ul style="list-style-type: none"> ▪ Same as Alternative A (Table 5-145). |
| Negligible Adverse | Square 750 Rowhouse Development; St. Joseph's Home (Former) <ul style="list-style-type: none"> ▪ Same as Alternative A (Table 5-145). |
| Beneficial | GPO Warehouse No. 4 <ul style="list-style-type: none"> ▪ Less visibility of WUS elements from this resource. |

Traffic, Noise, and Vibration Impacts

541 **Relative to existing conditions, noise and vibration in Alternative A-C would result in minor**
 542 **adverse direct operational impacts on three cultural resources and negligible adverse direct**
 543 **operational impacts on 15 other cultural resources. Increased traffic volumes in Alternative**
 544 **A-C have the potential to further result in an adverse direct operational impact on the**
 545 **Capitol Hill Historic District from visual impacts, conflicts with pedestrians and bicyclists,**
 546 **and disturbances affecting access to homes and businesses.**

547 The traffic, noise, and vibration-related impacts of Alternative A-C on cultural resources
548 would be the same as those of Alternative A, presented in **Table 5-146** above.

Indirect Operational Impacts

549 **With the potential Federal air-rights development, relative to existing conditions,**
550 **Alternative A-C would have the following additional indirect operational impacts on**
551 **cultural resources: minor adverse visual impacts on two resources and negligible adverse**
552 **visual impacts on two resources.**

553 In Alternative A-C, the remaining Federal air rights above and next to the bus facility and
554 parking facility would potentially be developed, to a height not exceeding the 130-foot height
555 limit allowing by the anticipated zoning for the area. The change would be small relative to
556 the scale of the entire structure and the volume of space occupied by the entire structure
557 would be similar to what would occur in Alternative A. Therefore, the indirect visual impacts
558 of Alternative A-C would be the same as those of Alternative A: see **Table 5-147** above.

Construction Impacts

559 **Alternative A-C's construction would potentially result in an adverse impact on**
560 **unidentified archaeological resources within the WUS rail terminal. Visual changes during**
561 **construction would result in moderate adverse impacts on three cultural resources; minor**
562 **adverse impacts on one; and negligible adverse impacts on 15. Noise and vibration from**
563 **construction activities would result in major adverse impacts on WUS and the REA Building;**
564 **moderate adverse impacts on five cultural resources; minor adverse impacts on two**
565 **cultural resources; and negligible adverse impacts on ten cultural resources.**

566 Construction of Alternative A-C would involve activities similar to those of Alternative A and
567 would take the same amount of time. Impacts to cultural resources would be the same.
568 These impacts are presented in **Table 5-148** above.

Comparison to No-Action Alternative

569 Because the impacts of Alternative A-C relative to existing conditions would be the same or
570 similar to those of Alternative A, impacts relative to the No-Action Alternative would also be
571 the same. These impacts are addressed in **Section 5.12.4.2, Alternative A, Comparison to the**
572 **No-Action Alternative** above.

5.12.5 Comparison of Alternatives

573 **Section 12.6** of the *Washington Union Station Expansion Project, Environmental*
574 *Consequences Technical Report, Comparison of Alternatives (Appendix C3)* presents a
575 detailed comparison of the impacts of the No-Action Alternative and the Action Alternatives
576 on each of the 55 cultural resources in the Study Area. A summary is below.

577 All Action Alternatives would result in major adverse direct operational physical impacts on
 578 WUS and the WUS Historic Site and a potential adverse operational physical impact on the
 579 REA Building.

580 All Action Alternatives would involve the removal of the Claytor Concourse and construction
 581 of various Project elements (Concourse A, bus facility, train hall) adjacent to the historic
 582 station building as well as partial demolition and replacement of the floor structure in the
 583 Retail and Ticketing Concourse to allow for the removal of columns from the underlying First
 584 Street Tunnel. All Action Alternatives would also involve excavating and reconstructing the
 585 rail terminal, as well as placing overbuilt Project elements within portions of the terminal
 586 that are currently open. Finally, all Action Alternatives would also require using land within
 587 the REA Building historic property parcel to build the H Street Concourse and modifying or
 588 eliminating the connection between the H Street Tunnel and the building.

589 In all Action Alternatives as well, excavation could result in the destruction or damage of
 590 archaeological resources if any are present. The depth of excavation would vary depending
 591 on the Action Alternative (least deep in Alternatives A and A-C, most deep in Alternatives B
 592 and E). However, any archaeological resources, if present, would be just below the fill that
 593 underlies the existing rail terminal. Even the less deep excavation in Alternatives A and A-C
 594 would disturb this potentially sensitive layer. Deeper excavation in the other Alternatives
 595 would not increase the likelihood of encountering archaeological remnants.

596 All Action Alternatives would also have adverse direct and indirect operational visual impacts
 597 on several cultural resources, as shown in **Table 5-166**. All Action Alternatives would result in
 598 major adverse direct visual impacts on WUS, the WUS Historic Site, and the REA Building
 599 because the reconstruction of the rail terminal and construction of above-ground project
 600 elements would substantially alter the visual environment of these resources and alter
 601 significant visual connections.

**Table 5-166. Summary of Direct and Indirect Visual Impacts on Cultural Resources
 by Action Alternative¹**

| Impact | Number of Affected Resources | | | | | | |
|---------------------------|------------------------------|---------------|----------------------------|----------------------------|---------------|---------------|-----------------------------|
| | Alternative A | Alternative B | Alternative C, East Option | Alternative C, West Option | Alternative D | Alternative E | Alternative A-C (Preferred) |
| Beneficial | 1 (0) | 1 (0) | 2 (0) | 2 (0) | 2 (0) | 2 (0) | 1 (0) |
| Negligible Adverse | 2 (6) | 2 (6) | 1 (6) | 2 (6) | 2 (5) | 2 (6) | 2 (6) |
| Minor Adverse | 2 (5) | 2 (5) | 5 (3) | 2 (3) | 2 (2) | 2 (3) | 2 (5) |
| Moderate Adverse | 0 (1) | 0 (1) | 0 (1) | 0 (1) | 1 (2) | 0 (1) | 0 (1) |
| Major Adverse | 3 (0) | 3 (0) | 3 (0) | 3 (0) | 3 (0) | 3 (0) | 3 (0) |

1. First number is direct impacts; number in parentheses is indirect impacts.

602 All Action Alternatives would result in similar impacts from noise and vibration. There would
603 be differences in traffic patterns between the alternatives with only below-ground parking
604 accessed via K Street NE in Alternatives B and E; both below-ground parking accessed via K
605 Street NE and above-ground parking accessed via H Street NE in Alternatives C and D; and
606 only above-ground parking accessed via H Street NE in Alternatives A and A-C. However,
607 noise impact analysis showed that the resulting differences in ambient noise levels would be
608 too small to be perceptible. In all Action Alternatives, construction vibration could exceed the
609 threshold for structural damage at WUS and the REA Building and to result in major adverse
610 impacts. However, this would depend on the sensitivity of the buildings, which has not been
611 determined.

612 All Action Alternatives would generate additional traffic along the northwestern edge of the
613 Capitol Hill Historic District (2nd Street NE and H Street NE) and create a ramp connecting the
614 deck to F Street NE eastbound. Congestion near WUS could potentially also result in some
615 traffic seeking alternative routes through the historic district. The potential for such impacts
616 to affect the Capitol Hill Historic District's integrity of setting or feeling would be the same in
617 all Action Alternatives.

618 As explained in the impact analysis above, the Action Alternatives would all result in greater
619 physical impacts on WUS than the No-Action Alternative. They also would have greater
620 potential to affect undiscovered archaeological resources because they would involve much
621 more excavation in the rail terminal.

622 Visual impacts would be smaller in all Action Alternatives than in the No-Action Alternative.
623 This is because in the No-Action Alternative, the private air-rights development project would
624 cover the entirety of the rail terminal south of K Street NE with highly visible structures.
625 Additionally, the existing WUS parking garage, a structure incompatible with the historic
626 character of WUS, would remain in place in the No-Action Alternative. In the Action
627 Alternatives, it would be either replaced with a new structure or removed.

5.12.6 Avoidance, Minimization, and Mitigation Evaluation

628 Adverse impacts would be avoided, minimized, or mitigated through the Section 106 process.
629 Resources on which the Action Alternatives would have a major adverse impact (WUS, WUS
630 Historic Site, and REA Building) are those that would experience an adverse effect under
631 Section 106. Per 36 CFR 800.6, a finding of adverse effect requires that Section 106
632 consultation continue to avoid, minimize, or mitigate effects to historic properties that would
633 alter the characteristics that qualify the properties for inclusion in the NRHP.

634 Because the design of the Project is in its early stages, FRA anticipates preparing a
635 Programmatic Agreement (PA) to establish a process to resolve the known adverse effects of
636 the Project in accordance with 36 C.F.R. § 800.14(b)(1)(ii). This would include the exploration
637 of avoidance and minimization measures. In addition, the PA would establish a process for
638 on-going consultation and review as the level of design progresses following the Final EIS and

639 a Record of Decision (and subject to funding) to ensure that form, materials, architectural
640 features, and connections (visual and physical) to surrounding development are considered.
641 FRA anticipates the PA would outline coordinated design review in the context of Federal and
642 District regulations and guidelines.

643 FRA would develop the PA in consultation with the DC SHPO and the Section 106 Consulting
644 Parties. Members of the public and the Consulting Parties are being invited to comment on
645 the adverse effects to historic properties documented in the Draft AOE and the impacts on
646 cultural resources presented in this DEIS. They are also invited to express their views on
647 resolving adverse effects.

5.12.7 Permits and Regulatory Compliance

648 Following the Record of Decision (ROD) and execution of the PA, Project design will proceed
649 and undergo further review by the National Capital Planning Commission and the
650 Commission of Fine Arts in the context of Federal and District of Columbia regulations and
651 guidelines, including:

- 652 ■ National Capital Planning Commission, *The Comprehensive Plan for the National*
653 *Capital Urban Design Element and Historic Preservation Element*;
- 654 ■ EO 1259, *Commission of Fine Arts Review of Public Buildings in the District of*
655 *Columbia Proposed by the Federal or DC governments*;
- 656 ■ EO 1862, *CFA Review of New Structures and Matters of Art Proposed by the Federal*
657 *Government in DC*;
- 658 ■ EO 11593, *Protection and Enhancement of the Cultural Environment*;
- 659 ■ The Historic Landmark and Historic District Protection Act of 1978 (D. Law 2-144, as
660 amended through October 1, 2016);
- 661 ■ The Height of Buildings Act of 1910; and
- 662 ■ District of Columbia Municipal Regulations, Zoning Regulations Special Purpose
663 Zones, 11-K DCMR 305.

5.13 Parks and Recreation Areas

1 This section describes and characterizes the potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on parks and recreation areas. If applicable,
3 this section also recommends measures to avoid, minimize, or mitigate potential adverse
4 impacts and identifies relevant permitting and regulatory compliance requirements.

5.13.1 Regulatory Context and Guidance

5 Relevant Federal policies, regulations and guidance that pertain to cultural resources are
6 listed in **Section 4.13.1, *Regulatory Context and Guidance***.

5.13.2 Study Area

7 As defined in **Section 4.13.2, *Study Area***, the Local Study Area for parks and recreation areas
8 includes the Project Area and the areas immediately adjacent to WUS and to the tracks
9 within one to two city blocks (**Figure 4-28**). Impacts on a regional scale were not anticipated
10 and no Regional Study Area was defined.

5.13.3 Methodology

11 This section summarizes the methodology for evaluating the potential impacts of the
12 alternatives on parks and recreation areas. **Appendix C3, *Washington Union Station***
13 ***Expansion Project Environmental Consequences Technical Report***, **Section 13.4, *Methodology***,
14 provides a description of the analysis methodology. A summary is below.

15 Impacts were assessed as major, moderate, minor, or negligible based on the intensity scale
16 defined in **Section 5.1.1, *Definitions***.

5.13.3.1 Operational Impacts

17 Potential operational impacts on parks and recreation areas were qualitatively assessed by
18 reviewing how changes in activities and land use at WUS would affect these resources. The
19 assessment considered physical integrity, usage, access, and visitor experience.

5.13.3.2 Construction Impacts

20 Construction impacts were assessed by reviewing the potential for activities associated with
21 the construction of the alternatives to affect the use of a park or recreation area. Such
22 activities include ground-disturbing work; use of park areas for staging or parking; limitations
23 in use or access; and other factors that may interfere with user experience or the physical
24 integrity of the park.

5.13.4 Impact Analysis

25 This section presents the impacts of the No-Action Alternative and the Action Alternatives on
26 parks and recreation areas.**No-Action Alternative**

Direct Operational Impacts

27 **Relative to existing conditions, the No-Action Alternative would have no direct operational**
28 **impacts on parks and recreation areas.**

29 The projects included in the No-Action Alternative would all take place within the Project
30 Area, which contains no parks or recreation areas. Therefore, there would be no direct
31 operational impacts on these resources.

Indirect Operational Impacts

32 **Relative to existing conditions, the No-Action Alternative would have a minor adverse**
33 **indirect operational impact on parks and recreation areas, including Columbus Plaza, the**
34 **Upper and Lower Senate Parks, and the Metropolitan Branch Trail due to increased usage.**

35 In the No-Action Alternative, WUS would continue to serve as a transportation hub for
36 District residents and visitors. Although the station would not be expanded, the annual
37 number of train and bus passengers would increase from approximately 16.3 million to
38 approximately 20.7 million. WUS is also a major touristic attraction, with approximately 8
39 million tourists visiting it every year. Visits would likely continue to grow. The private air-
40 rights development would bring approximately 2,150 new residents and 6,300 new workers
41 to the Project Area.¹

42 An adverse impact on nearby parks and recreation areas is anticipated because the greater
43 number of people passing through or residing in the Project Area would likely lead to an
44 increase in the number of visitors to these parks and areas. Columbus Plaza and the Upper
45 and Lower Senate Parks would likely see the greatest increase in visits due to their proximity
46 to WUS and because they lie between the station and the U.S. Capitol complex. The
47 Metropolitan Branch Trail may also see an increase in users if WUS commuters or the
48 residents and employees of the private air-rights development use it for local travel or
49 recreation. Private resources open to the public, such as the Plaza at 899 North Capitol Street
50 NE and the Plaza at 750 First Street NE, may also experience some increase in users, as could
51 the planned Plaza at Storey Park, when completed. The planned NoMA Green is too far from
52 the station to be affected. Access to the Capitol Hill Montessori Playground is controlled by
53 the school.

¹ See **Appendix C3, Section 5.14**, *Washington Union Station Expansion Project Environmental Consequences Technical Report, Social and Economic Conditions*.

54 More visits and greater foot traffic would result in accelerated wear and tear of pavements
55 and landscaped areas in the affected parks and would increase maintenance costs. This
56 impact would be minor for the following reasons. Although it is not possible to reliably
57 quantify the increase in park usage that would occur because of the No-Action Alternative, it
58 would be much smaller than the increase in the number of WUS users and private air-rights
59 development residents and employees. This is because most new WUS users would be
60 commuters or travelers passing through the station on their way to another destination and
61 only a portion of the few thousands new residents and employees in the Study Area would
62 likely make use of the local parks and recreation areas at any given time. In the context of the
63 millions of people who visit the District and its parks every year, the contribution of the No-
64 Action Alternative would be small.²

Construction Impacts

65 **The No-Action Alternative would result in minor adverse construction impacts on the**
66 **Metropolitan Branch Trail.**

67 Though the Project would not be constructed in the No-Action Alternative, other projects
68 would be built at various times and on different schedules that are currently unknown. These
69 projects are all located within the Project Area and their construction would not physically
70 affect, or completely block access to, any parks or recreation areas. Construction-related
71 traffic and sidewalk closures may have minor adverse impacts on part of the Metropolitan
72 Branch Trail along 2nd Street NE during construction of the private air-rights development or
73 replacement of the H Street Bridge. Minimization or mitigation of the potential impacts
74 would be the responsibility of the projects' respective owners.

5.13.4.2 Alternative A

Direct Operational Impacts

75 **Relative to the No-Action Alternative, Alternative A would have a minor beneficial direct**
76 **operational impact on Columbus Plaza due to improved access from Columbus Circle.**

77 Alternative A would have no adverse direct operational impacts on parks and recreation
78 areas. It would not physically affect or require using or taking any part of such resources. The
79 First Street NE cycle track to K Street, which connects to the Metropolitan Branch Trail, would
80 be reconstructed along its existing alignment up to K Street. Improvements, such as a railing
81 to separate the track from the new pick-up and drop-off medians, would be included to
82 minimize potential conflicts with pedestrians crossing to or from the new H Street Concourse

² For instance, 3 to 5 million people visit the U.S. Capitol every year (<https://www.aoc.gov/capitol-buildings/about-us-capitol-building>). Accessed on April 13, 2020), many of whom may be reasonably assumed to visit or walk through the Upper and Lower Senate Parks as well.

83 entrance. This reconstruction would not reduce or otherwise affect the overall connectivity
84 or functionality of the trail. It would not have an adverse impact.³

85 Alternative A would have a minor beneficial impact on Columbus Plaza as a result of the
86 improvements to Columbus Circle included in this alternative. These improvements would
87 include eliminating the ramp connecting southbound First Street NE and Massachusetts
88 Avenue. As a result, pedestrians and bicyclists would only have to cross one lane of traffic
89 instead of two, as would be the case in the No-Action Alternative. The removal of the ramp
90 would generally make Columbus Plaza feel more accessible and integrated with WUS,
91 enhancing visitor experience.

Indirect Operational Impacts

92 **Relative to the No-Action Alternative, Alternative A would have a minor adverse indirect**
93 **operational impact on parks and recreation areas, including Columbus Plaza, the Upper and**
94 **Lower Senate Parks, and the Metropolitan Branch Trail.**

95 In Alternative A, approximately 35 million passengers would travel through WUS, against
96 approximately 20.7 million in the No-Action Alternative. The number of visitors may also
97 increase due to additional retail that would be available in the various concourses.

98 Like in the No-Action Alternative, this may result in more people using or passing through
99 nearby parks, especially Columbus Plaza and the Upper and Lower Senate Parks. It may also
100 generate additional traffic along the Metropolitan Branch Trail if visitors or commuters use it
101 for local travel. Additional Bikeshare capacity and bike storage spaces may further encourage
102 use of the trail for local travel to and from WUS. Private resources open to the public, such as
103 the Plaza at 899 North Capitol Street NE and the Plaza at 750 First Street NE, may also
104 experience some increase in users, as could the planned Plaza at Storey Park, when
105 completed. The planned NoMA Green is too far from the station to be affected. Access to the
106 Capitol Hill Montessori Playground is controlled by the school.

107 Increased use would result in accelerated wear and tear of pavements and landscaped areas
108 in the affected parks and in increased maintenance costs. For the same reasons as explained
109 for the No-Action Alternative, this adverse impact would be minor (**Section 5.13.4.1, No-**
110 **Action Alternative, Indirect Operational Impacts**). Most new WUS passengers and visitors
111 would only transit through WUS toward other destinations in and outside the District.
112 Alternative A would be a small contributor to visits to parks and recreation area in the Study
113 Area in the context of the millions of people who visit the District and its parks every year.⁴

³ Impacts pertaining to bicycle safety are addressed in **Section 5.5.4.2, Alternative A, Direct Operational Impacts**.

⁴ For instance, 3 to 5 million people visit the U.S. Capitol every year (<https://www.aoc.gov/capitol-buildings/about-us-capitol-building>. Accessed on April 13, 2020), many of whom may be reasonably assumed to visit or walk through the Upper and Lower Senate Parks as well.

114 **In Alternative A, the potential development of the Federal air rights would have a**
115 **negligible adverse indirect operational impact on parks and recreation areas.**

116 In Alternative A, it is assumed for the purposes of the DEIS impact analyses that the Federal
117 air rights above the new parking facility would potentially be developed as additional parking.
118 This could encourage more people to visit WUS and nearby parks and recreational areas. The
119 increase in park visitors that would result from this development cannot be determined but
120 is likely to be very small as it can be reasonably assumed that only a portion of parkers would
121 visit Study Area parks as part of their trip. In the context of the millions of annual visits to the
122 District and its parks, the adverse impact from these additional visitations would be
123 negligible.⁵

Construction Impacts

124 **Construction of Alternative A would have moderate adverse impacts on Columbus Plaza**
125 **and the Metropolitan Branch Trail.**

126 In Alternative A, construction-related traffic and sidewalk or lane closures 2nd Streets NE
127 would affect the Metropolitan Branch Trail and may lead to temporary closures or rerouting
128 of the trail at this location, diminishing its connectivity to the front of WUS and points south.
129 These disruptions would adversely affect the experience of users at the south end of the trail.
130 Closure of the First Street cycle tract during its reconstruction would also reduce
131 connectivity. However, these impacts would occur at different times, with those along 2nd
132 Street concentrated in Phase 1 (first 2 years and 5 months of construction) and those along
133 First Street concentrated in Phase 4 (last 3 years and 1 month of construction). When one of
134 the two facilities would be closed, the other could provide an alternative route. Only a small
135 portion of the eight-mile trail would be affected. Between Phases 1 and 4 (approximately 6
136 years), disruptions would be minimal, though adjacent construction traffic and activities may
137 detract from user experience. Overall, the anticipated disruptions would be a moderate
138 adverse impact.

139 Alternative A would include realigning the Columbus Circle roadways in front of WUS,
140 adjacent to Columbus Plaza. This would result in a moderate adverse impact. While
141 Columbus Plaza itself would not be physically affected, construction would temporarily limit
142 pedestrian access from the front of WUS to the park. In general, construction activities on
143 the adjacent roadways would make Columbus Plaza less attractive to visit and diminish
144 visitor experience. Although it has not been established how long the construction of the
145 Columbus Circle improvements would take, it would be much less than the entire
146 construction period. All other construction activities associated with Alternative A would take
147 place north of the historic station building and would not cause impacts on Columbus Plaza.

⁵ For instance, 3 to 5 million people visit the U.S. Capitol every year (<https://www.aoc.gov/capitol-buildings/about-us-capitol-building>. Accessed on April 13, 2020), many of whom may be reasonably assumed to visit or walk through the Upper and Lower Senate Parks as well.

Comparison to Existing Conditions

148 The impacts of Alternative A relative to existing conditions would be the same as those
149 relative to the No-Action Alternative. The increase in visitors or users of Columbus Plaza, the
150 Upper and Lower Senate Parks, and the Metropolitan Branch Trail would be proportionately
151 larger relative to existing conditions but the total number would remain small and the
152 resulting adverse impacts would be negligible. The beneficial impact on Columbus Plaza
153 would be the same because there is no difference between the two baselines with respect to
154 this impact.

5.13.4.3 Alternative B

Direct Operational Impacts

155 **Relative to the No-Action Alternative, Alternative B would have a minor beneficial direct**
156 **operational impact on Columbus Plaza due to improved access across Columbus Circle.**

157 The direct operational impacts of Alternative B would be the same as those of Alternative A
158 (Section 5.13.4.2, *Alternative A, Direct Operational Impacts*).

Indirect Operational Impacts

159 **Relative to the No-Action Alternative, Alternative B would have a minor adverse indirect**
160 **operational impact on parks and recreation areas, including Columbus Plaza, the Upper and**
161 **Lower Senate Parks, and the Metropolitan Branch Trail.**

162 The indirect operational impacts of Alternative B from the increase in visitors or users of
163 parks and recreation areas would be the same as Alternative A's (Section 5.13.4.2,
164 *Alternative A, Indirect Operational Impacts*).

165 **Relative to the No-Action Alternative, in Alternative B, the potential development of the**
166 **Federal air rights would have a negligible adverse indirect operational impact on parks and**
167 **recreation areas.**

168 In Alternative B, it is assumed for the purposes of the DEIS impact analyses that the potential
169 development of the Federal air rights would consist of approximately 917,420 square feet of
170 office space. This would bring an additional 3,670 employees to the Project Area.⁶ Some of
171 them may make use of nearby parks and recreation areas during the day. However, at any
172 given time, the number of additional visitors attributable to the development would be a
173 fraction of the few thousands new workers in the Project Area and any adverse impacts
174 would be negligible in the context of the millions of visits to District and its Parks.⁷

⁶ Assumes one employee per 250 square feet of office space.

⁷ For instance, 3 to 5 million people visit the U.S. Capitol every year (<https://www.aoc.gov/capitol-buildings/about-us-capitol-building>. Accessed on April 13, 2020), many of whom may be reasonably assumed to visit or walk through the Upper and Lower Senate Parks as well.

Construction Impacts

175 **Construction of Alternative B would cause moderate adverse impacts on Columbus Plaza**
176 **and the Metropolitan Branch Trail.**

177 The impacts of constructing Alternative B would generally be the same as those of
178 constructing Alternative A (**Section 5.13.4.2, *Alternative A, Construction Impacts***). Impacts
179 would be moderate adverse for the reasons explained for Alternative A, although timing and
180 duration would be slightly different. Disruptions along 2nd Street would be concentrated
181 during parts of Phase 1 (first 2 years and 5 months of construction, as in Alternative A and
182 the other Action Alternatives) and impacts along First Street concentrated during Phase 4
183 (last 4 years and 11 months of construction). Disruptions would be minimal between Phases
184 1 and 4 (approximately 7 years), though adjacent construction traffic and activities may
185 detract from user experience. The Columbus Circle improvements would be the same as in
186 Alternative A and take the same time to construct. Impacts on Columbus Plaza would be as
187 described for Alternative A.

Comparison to Existing Conditions

188 Alternative B would compare to existing conditions like Alternative A (**Section 5.13.4.2,**
189 *Alternative A, Comparison to Existing Conditions*).

5.13.4.4 Alternative C (Either Option)

Direct Operational Impacts

190 **Relative to the No-Action Alternative, Alternative C would have a minor beneficial direct**
191 **operational impact on Columbus Plaza due to improved access across Columbus Circle.**

192 The direct operational impacts of Alternative C would be the same as Alternative A's (**Section**
193 **5.13.4.2, *Alternative A, Direct Operational Impacts***).

Indirect Operational Impacts

194 **Relative to the No-Action Alternative, Alternative C would have a minor adverse indirect**
195 **operational impact on parks and recreation areas, including Columbus Plaza, the Upper and**
196 **Lower Senate Parks, and the Metropolitan Branch Trail.**

197 The indirect operational impacts of Alternative C from the increase in visitors or users of
198 parks and recreation areas would be the same as Alternative A's (**Section 5.13.4.2,**
199 *Alternative A, Indirect Operational Impacts*).

200 **Relative to the No-Action Alternative, in Alternative C, the potential development of the**
201 **Federal air rights would have a negligible adverse indirect operational impact on parks and**
202 **recreation areas.**

203 In Alternative C, it is assumed for the purposes of the DEIS impact analyses that the potential
204 development of the Federal air rights would consist of approximately 952,600 square feet of

205 office space. This would bring an additional 3,800 employees to the Project Area.⁸ For the
206 same reasons as explained for Alternative B (**Section 5.13.4.3, Alternative B, Indirect**
207 *Impacts*), adverse impacts would be negligible.

Construction Impacts

208 **Construction of Alternative C would cause moderate adverse impacts on Columbus Plaza**
209 **and the Metropolitan Branch Trail.**

210 The impacts of constructing Alternative C would generally be the same as those of
211 constructing Alternative A (**Section 5.13.4.2, Alternative A, Construction Impacts**). Impacts
212 would be moderate adverse for the reasons explained for Alternative A, although timing and
213 duration would be slightly different. Disruptions along 2nd Street would be concentrated
214 during parts of Phase 1 (first 2 years and 5 months of construction, as in Alternative A and
215 the other Action Alternatives) and impacts along First Street concentrated during Phase 4
216 (last 4 years of construction). Disruptions would be minimal between Phases 1 and 4
217 (approximately 5 years and 10 months), though adjacent construction traffic and activities
218 may detract from user experience. The Columbus Circle improvements would be the same as
219 in Alternative A and take the same time to construct. Impacts on Columbus Plaza would be as
220 described for Alternative A.

Comparison to Existing Conditions

221 Alternative C would compare to existing conditions like Alternative A (**Section 5.13.4.2,**
222 *Alternative A, Comparison to Existing Conditions*).

5.13.4.5 Alternative D

Direct Operational Impacts

223 **Relative to the No-Action Alternative, Alternative D would have a minor beneficial direct**
224 **operational impact on Columbus Plaza due to improved access across Columbus Circle.**

225 The direct operational impacts of Alternative D would be the same as Alternative A's (**Section**
226 **5.13.4.2, Alternative A, Direct Operational Impacts**).

Indirect Operational Impacts

227 **Relative to the No-Action Alternative, Alternative D would have a minor adverse indirect**
228 **operational impact on parks and recreation areas, including Columbus Plaza, the Upper and**
229 **Lower Senate Parks, and the Metropolitan Branch Trail.**

230 The indirect operational impacts of Alternative D from the increase in visitors or users of
231 parks and recreation areas would be the same as Alternative A's (**Section 5.13.4.2,**
232 *Alternative A, Indirect Operational Impacts*).

⁸ Assumes one employee per 250 square feet of office space.

233 **In Alternative D, the potential development of the Federal air rights would have a**
234 **negligible adverse indirect operational impact on parks and recreation areas.**

235 In Alternative D, it is assumed for the purposes of the DEIS impact analyses that the potential
236 development of the Federal air rights would consist of approximately 688,050 square feet of
237 office space. This would bring an additional 2,800 employees to the Project Area.⁹ Some of
238 them may use nearby parks and recreation areas during the day. For the same reasons as
239 explained for Alternative B (**Section 5.13.4.3, *Alternative B, Indirect Impacts***), adverse
240 impacts would be negligible.

Construction Impacts

241 **Construction of Alternative D would cause moderate adverse impacts on Columbus Plaza**
242 **and the Metropolitan Branch Trail.**

243 The construction-related impacts of Alternative D would be the same as those of Alternative
244 C (**Section 5.13.4.4, *Alternative C, Construction Impacts***). Construction activities and
245 durations would be the same.

Comparison to Existing Conditions

246 Alternative D would compare to existing conditions like Alternative A (**Section 5.13.4.2,**
247 ***Alternative A, Comparison to Existing Conditions***).

5.13.4.6 Alternative E

Direct Operational Impacts

248 **Relative to the No-Action Alternative, Alternative E would have a minor beneficial direct**
249 **operational impact on Columbus Plaza due to improved access across Columbus Circle.**

250 The direct operational impacts of Alternative E would be the same as Alternative A's
251 (**Section 5.13.4.2, *Alternative A, Direct Operational Impacts***).

Indirect Operational Impacts

252 **Relative to the No-Action Alternative, Alternative E would have a negligible adverse**
253 **indirect operational impact on parks and recreation areas, including Columbus Plaza, the**
254 **Upper and Lower Senate Parks, and the Metropolitan Branch Trail.**

255 The indirect operational impacts of Alternative E from increased visitors or users of parks and
256 recreation areas would be the same as Alternative A's (**Section 5.13.4.2, *Alternative A,***
257 ***Indirect Operational Impacts***).

⁹ Assumes one employee per 250 square feet of office space.

258 **Relative to the No-Action Alternative, in Alternative E, the potential development of the**
259 **Federal air rights would have a negligible adverse indirect operational impact on parks and**
260 **recreation areas.**

261 The impact from the potential development of the Federal air rights would be the same as in
262 Alternative D (**Section 5.13.4.5, *Alternative D, Indirect Operational Impacts***). The developable
263 envelope would be the same in both alternatives.

Construction Impacts

264 **Construction of Alternative E would cause moderate adverse impacts on Columbus Plaza**
265 **and the Metropolitan Branch Trail.**

266 The impacts of constructing Alternative E would be the same as those of constructing
267 Alternative B (**Section 5.13.4.3, *Alternative B, Construction Impacts***). Construction activities
268 and durations would be the same.

Comparison to Existing Conditions

269 Alternative E would compare to existing conditions as would Alternative A (**Section 5.13.4.2,**
270 ***Alternative A, Comparison to Existing Conditions***).

5.13.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

271 **Relative to the No-Action Alternative, Alternative A-C would have a minor beneficial direct**
272 **operational impact on Columbus Plaza due to improved access across Columbus Circle.**

273 The direct operational impacts of Alternative A-C would be the same as Alternative A's
274 (**Section 5.13.4.2, *Alternative A, Direct Operational Impacts***).

Indirect Operational Impacts

275 **Relative to the No-Action Alternative, Alternative A-C would have a minor adverse indirect**
276 **operational impact on parks and recreation areas, including Columbus Plaza, the Upper and**
277 **Lower Senate Parks, and the Metropolitan Branch Trail.**

278 The indirect operational impacts of Alternative A-C from the increase in visitors or users of
279 parks and recreation areas would be the same as Alternative A's (**Section 5.13.4.2,**
280 ***Alternative A, Indirect Operational Impacts***).

281 **In Alternative A-C, the potential development of the Federal air rights would have a**
282 **negligible adverse indirect operational impact on parks and recreation areas.**

283 In Alternative A-C, it is assumed for the purposes of the DEIS impact analyses that the
284 potential development of the Federal air rights would consist of approximately 380,000
285 square feet of office space. This would bring an additional 1,520 employees to the Project

286 Area.¹⁰ Some of them may use nearby parks and recreation areas during the day. For the
 287 same reasons as explained for Alternative B (**Section 5.13.4.3, Alternative B, Indirect**
 288 *Impacts*), adverse impacts would be negligible.

Construction Impacts

289 **Construction of Alternative A-C would cause moderate adverse impacts on Columbus Plaza**
 290 **and the Metropolitan Branch Trail.**

291 The construction-related impacts of Alternative A-C would be the same as those of
 292 Alternative A (**Section 5.13.4.2, Alternative A, Construction Impacts**). Construction activities
 293 and durations would be the same.

Comparison to Existing Conditions

294 Alternative A-C would compare to existing conditions like Alternative A (**Section 5.13.4.2,**
 295 *Alternative A, Comparison to Existing Conditions*).

5.13.5 Comparison of Alternatives

296 With regard to impacts on parks and recreation areas, all the Action Alternatives would
 297 generally have the same level of impacts (**Table 5-167**) because these impacts would arise
 298 from features common to all Action Alternatives, including the increase in WUS passengers
 299 and visitors, and the improvements to Columbus Circle. The Action Alternatives would also
 300 have similar construction-related impacts, with impacts on the Metropolitan Branch Trail
 301 varying slightly depending on the duration of the construction period but remaining
 302 moderate.

Table 5-167. Comparison of Alternatives, Parks and Recreation Areas

| Type of Impact | No-Action Alternative | Alternative A | Alternative B | Alternative C (Either Option) | Alternative D | Alternative E | Alternative A-C (Preferred) |
|-----------------------------|--|---|---------------|-------------------------------|---------------|---------------|-----------------------------|
| Direct Operational | No impacts | Minor beneficial impacts on Columbus Plaza. No impacts on other parks | | | | | |
| Indirect Operational | Minor adverse impacts from increased number of visitors; Negligible adverse impacts from the potential Federal air-rights development. | | | | | | |
| Construction | Minor Adverse Impacts | Moderate adverse impacts on Columbus Plaza and Metropolitan Branch Trail | | | | | |

¹⁰ Assumes one employee per 250 square feet of office space.

303 The No-Action Alternative primarily differs from the Action Alternatives in that it would not
304 provide improvements to Columbus Circle and would have fewer construction impacts. In the
305 No-Action Alternative, WUS passengers and visitors would also be less numerous than in the
306 Action Alternatives, resulting in slightly smaller impacts on nearby parks.

5.13.6 Avoidance, Minimization and Mitigation Evaluation

307 To avoid or minimize construction impacts on Columbus Plaza and the Metropolitan Branch
308 Trail, FRA is considering the following measures:

- 309 ■ The Project Proponents would coordinate with NPS during construction planning to
310 develop measures to maintain as much as possible access to Columbus Plaza during
311 the construction of the Columbus Circle improvements.
- 312 ■ The Project Proponents would prohibit the construction contractor from using
313 Columbus Plaza as a staging area during construction.
- 314 ■ The Project Proponents would coordinate with DDOT to plan and maintain
315 alternative routes for users of the Metropolitan Branch Trail when parts of the trail
316 would be closed.
- 317 ■ The Project Proponents would work with DDOT to appropriately advertise
318 construction-related closures of the Metropolitan Branch Trail and establish
319 alternative routes, as needed.

5.13.7 Permits and Regulatory Compliance

320 The Project is subject to Section 4(f) of the United States Department of Transportation
321 (USDOT) Act of 1966, which require avoiding or minimizing effects to public park and
322 recreation lands, wildlife and waterfowl refuges, and public or private historic properties,
323 during the planning and design of transportation projects. A draft Section 4(f) evaluation is
324 included in this DEIS (**Chapter 6, Draft Section 4(f) Evaluation**).

325 Section 6(f) of the Land and Water Conservation Act requires that the conversion to anything
326 other than public outdoor recreational use of lands or facilities acquired with Land and Water
327 Conservation Act (LWCA) funds under the State Assistance program be coordinated with
328 NPS.¹¹ The Project would not require the conversion of any land, including land acquired with
329 LWCA funds. Therefore, a Section 6(f) evaluation is not required.

¹¹ 16 U.S.C 460-4 to 460-11.

5.14 Social and Economic Conditions

1 This section describes and characterizes the potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on social and economic conditions. If
3 applicable, this section also recommends measures to avoid, minimize, or mitigate potential
4 adverse impacts and identifies relevant permitting and regulatory compliance requirements.

5.14.1 Regulatory Context and Guidance

5 Relevant Federal policies, regulations and guidance that pertain to cultural resources are
6 listed in **Section 4.14.1, Regulatory Context and Guidance.**

5.14.2 Study Area

7 As defined in **Section 4.14.2, Study Area** the Local Study Area for social and economic
8 conditions (**Figure 4-29**) includes the Project Area and the twenty-one 2010 U.S. Census block
9 groups within one-half mile of the Project Area. The Regional Study Area consists of the
10 District.

5.14.3 Methodology

11 This section summarizes the methodology for evaluating the potential impacts of the
12 alternatives on social and economic conditions. **Appendix C3, Washington Union Station**
13 **Expansion Project, Environmental Consequences Technical Report, Section 14.4, Methodology**
14 provides a description of the analysis methodology. A summary is below. Impacts were
15 assessed as major, moderate, minor, or negligible based on the intensity scale defined in
16 **Section 5.1.1, Definitions.**

5.14.3.1 Operational Impacts

17 Social and economic impacts were assessed by considering how the No-Action and Action
18 Alternatives would affect: demography; community disruption and benefits; employment;
19 WUS revenue; and other economic measures, as applicable. Operational impacts on
20 demography and employment were quantitatively assessed based on planning multipliers for
21 specific land uses (1 employee per 250 square feet of office space; 3 employees per 1,000
22 square feet of retail use; and 1 employee per 2.67 hotel rooms). Impacts on WUS revenues
23 were assessed using order-of-magnitude estimates based on anticipated changes in the
24 amount of revenue-generating retail and parking at WUS. Other operational impacts were
25 assessed qualitatively.

5.14.3.2 Construction Impacts

26 Construction impacts on socioeconomic factors other than employment were assessed
27 qualitatively. Impacts on employment were assessed quantitatively using IMPLAN, an
28 economic input-output model software system.

29 IMPLAN analysis of construction employment generation encompassed the Washington-
30 Arlington-Alexandria, DC-VA-MD-WV metropolitan statistical area.¹ Construction
31 employment, wages, and economic output were based on estimated construction costs and
32 calculated from multipliers and datasets for various industries. Outputs included direct jobs;
33 indirect jobs; and induced jobs. Also modeled were total wages from generated jobs;
34 combination of labor income, other property type income and indirect business taxes; and
35 value of production.²

5.14.4 Impact Analysis

36 This section presents the potential impacts of the No-Action Alternative and the Action
37 Alternatives on social and economic conditions.

5.14.4.1 No-Action Alternative

Direct Operational Impacts

Demographics

38 **Relative to existing conditions, in the No-Action Alternative, there would be a minor direct**
39 **operational impact on demographic conditions from the private air-rights development.**³

40 The private air-rights development above the WUS rail terminal would include approximately
41 1,050,000 square feet of residential uses. It would add approximately 2,150 residents to the

¹ This area includes: The District of Columbia; Frederick, Montgomery, Calvert, Charles, and Prince George's Counties in Maryland; Arlington, Clarke, Culpeper, Fairfax, Fauquier, Loudoun, Prince William, Rappahannock, Spotsylvania, Stafford, and Warren Counties, and Alexandria City, Fairfax City, Falls Church City, Fredericksburg City, Manassas City, and Manassas Park City in Virginia; and, Jefferson County in West Virginia. These jurisdictions make up the Washington-Arlington-Alexandria, DC-VA-MD-WV metropolitan statistical area as defined by the U.S. Office of Management and Budget and used by the U.S. Census Bureau.

² Construction-impact modeling was performed on the basis of the rough-order-of magnitude combined construction cost estimates developed by Amtrak, which are the only estimates available at the phase level (see **Appendix A8, Action Alternatives Cost Estimates Memorandum**; the combined estimates include costs associated with the private air-rights development deck and potential Federal air-rights development deck.)

³ This demographic impact is not characterized as adverse or beneficial because a proportionately small change in residential population does not in itself represent a favorable or unfavorable outcome.

42 Local Study Area.⁴ This would amount to a minor impact on local demography for the
43 following reasons. According to the 2011-2015 American Community Survey (ACS) 5-Year
44 Estimates, the total population of the Local Study Area in 2015 was 34,895.⁵ The residents of
45 the private air-rights development would increase this total by approximately six percent
46 over 20 years, a minor change. The private air-rights development population would
47 represent a minute fraction of the District's population, projected to be approximately
48 941,000 by 2040.⁶

Community Disruption and Other Social Benefits or Impacts

49 **Relative to existing conditions, the No-Action Alternative would have moderate beneficial**
50 **direct operational impacts on local communities.**

51 The projects in the No-Action Alternative would result in a beneficial impact on local
52 communities because they would improve connectivity between WUS and the surrounding
53 neighborhoods. The Amtrak and USRC-led projects to address ADA compliance and other
54 issues at WUS would improve access to transportation facilities and retail (**Section 3.3.1,**
55 *Near-term Station and Track Improvements at WUS*). WUS would become better integrated
56 with the surrounding areas. None of the projects would reduce access between
57 neighborhoods; erect permanent barriers among communities; or result in any other
58 condition that would permanently disrupt neighborhoods and communities around WUS.
59 The private air-rights development would create new connections between the areas on
60 either side of the rail terminal as well as provide new retail opportunities and other urban
61 amenities.

62 The beneficial impact would be moderate because the No-Action Alternative would leave
63 many existing access and connectivity issues unresolved. Pedestrian connections to WUS
64 from the surrounding neighborhoods are currently inadequate and would remain so. This
65 would also be the case for the private air-rights development, which would not have direct
66 connections to the station. Entrances would remain concentrated on or near the south side
67 of the station. The only entrance from H Street NE would continue to be through the parking
68 garage, making it difficult for travelers to access adjacent neighborhoods and employment
69 centers to the northwest and east of WUS.

⁴ Calculated by deducting square footage for mechanical shafts, articulation and massing, applying a ratio of 950 sf per unit, and using a multiplier of 2.10 persons per household (weighted average of average household size of the census tracts in the Local Study Area based on 2011-2015 ACS 5-year estimates).

⁵ **Section 4.14.4.1, Demographics, Total Population.**

⁶ DCOP. *Forecasting the District's Growth. 2015-2045. Results and Methodology.* November 2016. Accessed from <https://planning.dc.gov/node/1212966>. Accessed on April 3, 2020.

Employment

70 **Relative to existing conditions, the No-Action Alternative would have a moderate**
71 **beneficial direct operational impact on employment.**

72 The new office, retail, and hotel space in the private air-rights development would support
73 approximately 8,500 jobs in the Local Study Area, a beneficial impact. WUS-based
74 employment (currently, there are approximately 400 Amtrak employees working at WUS and
75 624 employees working in the existing retail and commercial space in WUS) would likely
76 remain the same.⁷

77 The beneficial impact on employment would be moderate. As of 2015, there were an
78 estimated 120,032 jobs in the Local Study Area.⁸ The increase attributable to the No-Action
79 Alternative would represent 7 percent of this number.

80 DCOP projections show an estimated 1,012,000 jobs in the District by 2040, with an average
81 growth of 8,995 jobs per year from 2015 to 2035. The jobs associated with the private air-
82 rights development would be equivalent to just under an average year of projected average
83 growth but only 0.8 percent of the total projected 2040 employment.

Washington Union Station Revenue

84 **Relative to existing conditions, the No-Action Alternative would have no direct operational**
85 **impact on WUS Revenue.**

86 USRC, which manages WUS, obtains its revenue from the Union Station Investco (USI)
87 sublease for retail space and from the parking garage, operated by Union Station Parking
88 Garage LLC. In the No-Action Alternative, there would be no change in the amount of retail or
89 parking at WUS relative to existing conditions. Existing leases would continue and there
90 would be no changes in WUS's revenue from those leases other than normal fluctuations or
91 adjustments.

Other Direct Economic Impacts

92 **Relative to existing conditions, the No-Action Alternative would have a minor beneficial**
93 **direct operational impact on retail and parking at WUS.**

94 In the No-Action Alternative, neither the amount of retail nor the number of parking spaces
95 at WUS would change. However, larger numbers of passengers and visitors would likely
96 benefit WUS's retail outlets through sales growth and potentially generate higher demand
97 and rates for the WUS parking garage. Persons living or working in the private air-rights
98 development would also provide an expanded customer base for retail outlets at WUS. This
99 beneficial impact is not readily quantifiable. However, it would be minor because the amount

⁷ Email Correspondence. September 27, 2017. Amtrak to VHB.

⁸ Section 4.14.4.3, *Employment*.

100 of both retail and parking at WUS would remain as it is currently. This would put a limit on
101 the potential growth in revenue for the lease holders.

Indirect Operational Impacts

Demographics

102 **Relative to existing conditions, the No-Action Alternative would have negligible indirect**
103 **operational impacts on demographic conditions.**⁹

104 The private air-rights development project may encourage further development in the Local
105 Study Area, as explained in **Section 5.9.4.1, No-Action Alternative, Indirect Impacts**. Some of
106 that development may be residential and result in an increase in the population of the Local
107 Study Area and the District. The population increase would be very small relative to the
108 District's growth through 2040 and the resulting impact negligible.

Community Disruption and Other Social Benefits or Impacts

109 **Relative to existing conditions, the No-Action Alternative would have no indirect**
110 **operational impacts on local communities, including impacts related to gentrification.**

111 A potential indirect adverse impact of an influx of residential population in an urban area is
112 gentrification. Although gentrification can have benefits, including improved amenities and
113 public services as well as rehabilitated housing, the process is also often associated with
114 displacement of long-time residents out of an area they can no longer afford to live in.

115 One approach to assess potential gentrification impacts involves first determining if an area
116 is eligible to gentrify, based on census tract-level data. A census tract is eligible to gentrify if:
117 (1) it has a population of at least 500 residents; (2) its median household income is in the
118 bottom 40th percentile compared to all tracts of the reference area; and (3) its median home
119 value is in the bottom 40th percentile compared to all tracts of the reference area.¹⁰ The
120 private air-rights development would be in Census Tract (CT) 106 of the District. Based on
121 2013-2017 American Community Survey (ACS) data, and using the District as the reference
122 area, neither CT 106 nor the adjacent CTs meet all three criteria (**Table 5-168**). On this basis,
123 the private air-rights development is not in an area where it could induce gentrification.

⁹ This demographic impact is not characterized as adverse or beneficial because a proportionately small change in residential population does not in itself represent a favorable or unfavorable outcome.

¹⁰ Freeman, L. "Displacement or Succession? Residential Mobility in Gentrifying Neighborhoods." *Urban Affairs Review*, 463-491. 2005; Maciag, M. *Gentrification in America Report*. Accessed from <https://www.governing.com/gov-data/census/gentrification-in-cities-governing-report.html>. Accessed on January 30, 2019.

Table 5-168. Eligibility for Gentrification of Census Tracts in Local Study Area

| Census Tract | At least 500 Residents? | Median Household Income in Bottom 40th Percentile (\$67,171.4)? | Median Home Value in Bottom 40th Percentile (\$438,460)? |
|--------------------|-------------------------|---|--|
| 106 | Yes: 7,167 | No: \$110,469 | No: \$599,300 |
| 47.01 | Yes: 4,888 | Yes: \$40,378 | No: \$513,900 |
| 47.02 | Yes: 3,144 | No: \$101,891 | No: \$478,700 |
| 59 | Yes: 2,682 | No: \$101,553 | No: \$455,200 |
| 62.02 ¹ | No: 72 | N/A | N/A |
| 82 | Yes: 3,056 | No: \$115,742 | No: \$989,800 |
| 83.01 | Yes: 2,423 | No: \$147,989 | No: 798,300 |

Source: American FactFinder, 2013-2017 ACS.

1. This census tract consists of the National Mall and U.S. Capitol grounds.

Employment

124 **Relative to existing conditions, the No-Action Alternative would have a minor beneficial**
 125 **indirect operational impact on employment in the Local Study Area.**

126 A beneficial indirect impact on employment would result from the private air-rights
 127 development. New residents and employees would support new jobs in the Local and
 128 Regional Study Areas through typical household spending and business-to-business spending.
 129 Additionally, the private air-rights development and increased ridership and visits to WUS
 130 may encourage further development near WUS, with a similar beneficial impact. This
 131 beneficial impact cannot be readily quantified but would be minor in the context of the
 132 current and projected future employment in the Local Study Area and the District.

Washington Union Station Revenue

133 **Relative to existing conditions, the No-Action Alternative would have a negligible beneficial**
 134 **indirect operational impact on WUS Revenue.**

135 The No-Action Alternative would have a beneficial impact on WUS revenue if greater activity
 136 in the Project Area (due to both ridership increase and the private air-rights development)
 137 results, in the long term, in an increase in demand for services that generate revenue for
 138 WUS such as retail and parking. This potential impact cannot be quantified but can be
 139 considered to be negligible in the context of WUS’s total revenues.

Other Indirect Economic Impacts

140 **Relative to existing conditions, the No-Action Alternative would have a moderate**
 141 **beneficial indirect operational impact on tax revenues in the District.**

142 The private air-rights development would generate new revenue for the District through new
 143 property taxes from newly developed parcels, income tax from new residents, and sales tax
 144 revenue from new retail and increased patronage at existing retail. Induced residential and
 145 economic growth in the Local Study Area and the District at large would generate further
 146 increases in revenue.

147 While the net increase in tax revenue that would result cannot be estimated, it is likely to
148 amount to a moderate beneficial impact in the context of the District as a whole, whose total
149 tax revenue in fiscal year 2018 was \$7.5 billion.¹¹ Property taxes from the private air-rights
150 development would be new but income taxes may not be if residents moved to the new
151 development from elsewhere in the District. Also, increases in the number of visitors or
152 residents would create new demands on municipal services, whose cost would partially
153 offset the increase in tax revenue.

Construction Impacts

Demographics

154 **Construction of the projects included in the No-Action Alternative would not have impacts**
155 **on demography.**

156 The construction of the No-Action Alternative projects would cause neither an influx nor a
157 displacement of residential populations in the Local or the Regional Study Area.

Community Disruption and Other Social Benefits or Impacts

158 **Construction of the No-Action Alternative projects would have minor adverse impacts on**
159 **local communities.**

160 Construction of the No-Action Alternative projects would create various degrees of
161 disruption within the Local Study Area with adverse impacts on the local communities.
162 Impacts would be minor because they would be spread across several years and varying
163 schedules. They are not likely to keep significant numbers of people from using WUS or to
164 force businesses or residents to relocate.

165 The most noticeable disruption would be from the partial closures of sidewalks and roadways
166 due to various projects. The H Street Bridge replacement would have the most impact, as it
167 would make travel between the east and west sides of the Local Study Area more difficult
168 during the construction period. DDOT would likely implement measures to minimize this
169 impact. The private air-rights development construction would likely require temporary
170 sidewalk and roadway closures along First Street NE (north of H Street) and 2nd Street NE
171 and generate construction vehicle traffic along those streets. No sufficient information is
172 available to assess the intensity and duration of those impacts but they would be those
173 typical of medium- to large-scale urban construction projects.

174 Construction of the private air-rights development and VRE Midday Storage Replacement
175 Facility would take place within the rail terminal and may affect railroad operations. Travelers
176 and commuters may experience delays and increased commuting times. Amtrak must

¹¹ Government of the District of Columbia, Office of Chief Financial Officer, Office of Revenue Analysis. *D.C. Tax Facts. 2018*. Accessed from <https://cfo.dc.gov/node/1351591>. Accessed on April 3, 2019.

177 authorize work in the rail terminal; this process would help minimize impacts to rail
178 operations.

Construction Employment

179 **Construction of the No-Action Alternative projects would have minor beneficial impacts on**
180 **employment.**

181 Construction of the No-Action Alternative projects would beneficially affect employment and
182 support construction jobs. Construction workers would likely support business
183 establishments in the Local Study Area. Businesses throughout the District and metropolitan
184 area would also benefit through additional household spending supported by construction
185 wages and the purchase of construction materials, with a spin-off effect on job generation.
186 This beneficial impact, which would be spread over many years through 2040, would be
187 minor in the context of overall employment and economic activity in the District.

Washington Union Station Revenue

188 **Construction of the projects included in the No-Action Alternative would have minor**
189 **adverse impacts on WUS revenue.**

190 There would be minor adverse impacts on WUS revenue. Construction activities that would
191 modify parking garage access (such as the H Street Bridge replacement) would likely result in
192 a loss of revenue due to fewer cars using the garage. However, the garage would remain
193 open with alternative access points, limiting the loss of revenue. Construction activities could
194 also adversely affect WUS's retail and service establishments if they led to a reduction in
195 visitors and a decrease in spending at the station. Such short-term fluctuations do not affect
196 WUS's revenue from retail, however. Construction activities in the No-Action Alternative are
197 not likely to result in long-term or permanent store closures.

Other Economic Benefits or Impacts

198 **Construction of the project included in the No-Action Alternative would have a moderate**
199 **beneficial impact on the regional economy.**

200 Construction of the various projects included in the No-Action Alternative would have a
201 beneficial economic impact at the regional level from the spending of the income generated
202 by the construction of each project and other jobs it would generate. A quantitative estimate
203 is not possible, but given the scale of several of the projects, especially the private air-rights
204 development and replacement of the H Street Bride, a moderate beneficial impact is likely.

5.14.4.2 Alternative A

Direct Operational Impacts

Demographics

205 **Relative to the No-Action Alternative, Alternative A would have no direct operational**
206 **impact on demographic conditions.**

207 Alternative A would not directly add or displace any residents in the Local or Regional Study
208 Area.

Community Disruption and Other Social Benefits or Impacts

209 **Relative to the No-Action Alternative, Alternative A would have major beneficial direct**
210 **operational impacts on local communities.**

211 Relative to the No-Action Alternative, Alternative A would have a major beneficial impact by
212 improving community cohesion and providing new pedestrian connections between WUS
213 and the surrounding neighborhoods. The new First Street NE, 2nd street NE, and H Street
214 Bridge pedestrian entry points would make WUS easier to access from both the east and
215 west sides while also improving connectivity between neighborhoods on either side of the
216 station and connectivity with the private air-rights development.

217 Alternative A would also provide approximately 72,000 square feet of new retail space in
218 WUS. Additional shopping opportunities and services located in WUS would benefit
219 neighborhood residents, travelers, and commuters. The access improvements described
220 above would also make it easier for local residents to access these new amenities.

221 At the regional level, expanded and improved multimodal connections at WUS would make
222 travel in and out of the District easier and more efficient, benefiting all District residents and
223 visitors.

Employment

224 **Relative to the No-Action Alternative, Alternative A would have a minor beneficial direct**
225 **operational impact on employment.**

226 Alternative A would beneficially impact employment by adding an estimated 1,445 jobs at
227 WUS relative to the No-Action Alternative. The approximately 72,000 square feet of retail
228 space that would be added to WUS would generate approximately 216 new jobs, for a total
229 of approximately 840 WUS retail jobs. The expanded Amtrak support area would be staffed
230 with approximately 1,629 persons, representing a 1,229-employee increase over the No-
231 Action Alternative.¹²

¹² Amtrak. 2018. *WUS-TI Space Program*.

232 This beneficial impact would be minor because it would be small in the larger context of the
233 District. The 1,445 jobs generated would be a 141 percent increase in WUS jobs relative to
234 the No-Action Alternative but only represent about 0.15 percent of the total projected 2040
235 employment in the District (1,012,000 jobs).¹³

Washington Union Station Revenue

236 **Relative to the No-Action Alternative, Alternative A would have a moderate adverse direct**
237 **operational impact on WUS revenue.**

238 Alternative A would reduce the number of revenue-generating parking spaces at the station
239 from approximately 2,205 in the No-Action Alternative to approximately 1,750, a 21 percent
240 reduction. Assuming a proportional reduction in revenue, this would cause a loss of
241 approximately \$1.79 million (2017 dollars) to WUS.¹⁴ Revenue from retail would remain
242 approximately the same as or be less than in the No-Action Alternative. The new retail in
243 Alternative A would be outside the WUS lease area and would generate no additional
244 revenue for the station. Revenue from existing retail could decrease if some of the outlets
245 displaced during construction (see **Section 5.14.4.2, Alternative A, Construction Impacts**) do
246 not return after completion of the work and are not replaced. How this would affect WUS'
247 revenue from retail would depend on current and future lease conditions.

248 Overall, Alternative A would cause a net diminution of WUS revenue. The loss would be a
249 moderate adverse impact because all parking, which is the main source of income for WUS,
250 would continue to generate revenue while the permanent loss of retail, if it occurs, would
251 likely be small.

Other Direct Economic Impacts

252 **Relative to the No-Action Alternative, Alternative A would have a minor beneficial direct**
253 **operational impact on the local and regional economy.**

254 Alternative A would add approximately 72,000 square feet of retail at WUS. This would
255 generate revenue for retail operators as well as new jobs and sales taxes, driving further
256 economic activity. Existing retail and services at WUS would benefit from increased sales due
257 to greater ridership: relative to the No-Action Alternative, approximately 50,700 additional
258 passengers would transit through WUS daily, likely resulting in increased activity and
259 spending. This in turn would stimulate demand for retail space and potentially drive up rents.
260 These beneficial impacts would be minor in the context of the local and regional economy.

¹³ DC Office of Planning. 2017. DC Forecasts. Accessed from <https://planning.dc.gov/publication/dc-forecasts>. Accessed on February 15, 2019.

¹⁴ In fiscal year 2016, WUS revenue from the parking garage operations was \$8,532,403: *USRC Annual Report 2016*. Accessed from <https://www.usrcdc.com/wp-content/uploads/2017/02/usrc-annual-report-2016-final-spreads.pdf>. Accessed on April 3, 2020.

Indirect Operational Impacts

Demographics

261 **Relative to the No-Action Alternative, Alternative A would have a negligible indirect**
262 **operational impact on demography.¹⁵**

263 As explained in **Section 5.9.4.2, Alternative A, Indirect Operational Impacts**, the improved
264 connectivity and activity at WUS promoted by Alternative A, and increased employment
265 opportunities, may indirectly encourage medium- or high-density development near WUS, in
266 addition to what would occur under the No-Action Alternative. This would result in an
267 increase in the population of the Local Study Area and the District. This impact is not readily
268 quantifiable but likely would be very small and negligible relative to the anticipated
269 demographic growth of the District through 2040.

Community Disruption and Other Social Benefits or Impacts

270 **Relative to the No-Action Alternative, Alternative A would have no adverse indirect**
271 **operational impacts on local communities.**

272 Alternative A may indirectly encourage development near WUS. As explained in **Section**
273 **5.9.4.2, Alternative A, Indirect Operational Impacts**, the District's zoning regulations and
274 applicable plans would continue to guide the density and character of potential future
275 development, including the development of the Federal air rights into parking space, as
276 assumed for the purposes of the DEIS. This would avoid developments that could disrupt or
277 dislocate local communities.

Employment

278 **Relative to the No-Action Alternative, Alternative A would have a minor beneficial indirect**
279 **operational impact on employment.**

280 New retail and workers at WUS as well as more passengers and visitors would increase
281 consumer demand for goods and services in the Local and Regional Study Areas. This would
282 support employment both locally and regionally. This beneficial indirect operational impact is
283 not readily quantifiable but it likely would be minor in the context of current and projected
284 future employment in the Local Study Area and the District.

Washington Union Station Revenue

285 **Relative to the No-Action Alternative, Alternative A would have no indirect operational**
286 **impact on WUS Revenue.**

287 Alternative A would have no indirect operational impacts on WUS revenue. The loss of
288 parking and retail revenue described above in **Section 5.14.4.2, Alternative A, Direct**

¹⁵ This demographic impact is not characterized as adverse or beneficial because a proportionately small change in residential population does not in itself represent a favorable or unfavorable outcome.

289 *Operational Impact* would cancel out any marginal increase in revenue that greater activity at
290 the station could generate.

Other Indirect Economic Impacts

291 **Relative to the No-Action Alternative, Alternative A would have a minor beneficial indirect**
292 **operational impact on tax revenues in the District.**

293 The additional retail uses at WUS in Alternative A would generate new sales and new sales
294 tax revenues. Income from jobs directly and indirectly created by Alternative A would likely
295 be spent in the District, also generating sales tax revenue. Some of the employees at WUS
296 may move to the city from other jurisdictions, increasing the District's income tax base.

297 More generally, Alternative A would contribute to expanding tourism and economic activity
298 in the Regional Study Area by allowing WUS to overcome existing capacity constraints and
299 resolve operational inefficiencies. WUS would continue to be a major transportation hub
300 supporting the local and regional economy with attendant tax benefits.

301 The net benefit in tax revenue is not quantifiable but it is likely to amount to a minor
302 beneficial impact compared to the No-Action Alternative. It also would be small in the larger
303 context of the District as a whole, whose total tax revenue in fiscal year 2018 was \$7.5
304 billion.¹⁶

Potential Federal Air-rights Development

305 **Relative to the No-Action Alternative, in Alternative A, the potential development of the**
306 **Federal air rights as additional parking would result in no indirect operational impacts on**
307 **demography, local communities. It would have a negligible beneficial indirect operational**
308 **impact on employment and the regional economy, and a beneficial indirect operational**
309 **impact on WUS revenue.**

310 The assumed provision of additional parking space would not affect demography in the Local
311 or Regional Study Area. It would not cause disruption to local communities, as it would occur
312 within the footprint of a pre-existing facility. It would support a small number of
313 maintenance and management jobs but this would be a negligible beneficial impact in the
314 context of the Local and Regional Study Areas. The development of the remaining Federal air
315 rights would have a beneficial impact on WUS revenue through the lease of the space (or
316 other mechanism through which development would be achieved). This impact cannot be
317 quantified at this time but it would at least partially offset the loss of revenue from the
318 reduction in parking capacity.

¹⁶ Government of the District of Columbia, Office of Chief Financial Officer, Office of Revenue Analysis. *D.C. Tax Facts. 2018*. Accessed from <https://cfo.dc.gov/node/1351591>. Accessed on January 30, 2019.

Construction Impacts

Demographics

319 **Construction of Alternative A would have no impacts on demography.**

320 The construction of Alternative A would cause neither an influx nor a displacement of
321 residential populations in the Local or the Regional Study Area.

Community Disruption and Other Social Benefits or Impacts

322 **Construction of Alternative A would have moderate adverse impacts on local communities.**

323 Construction of Alternative A would take place over approximately 11 years and 5 months
324 (including the 12-month Intermediate Phase when only column removal work would be
325 performed). Throughout, to accommodate construction activities, there would be periods of
326 rerouting passengers, closing off sections of WUS, and closing some retail space. The column
327 removal component of the Project would close part of the Retail and Ticketing Concourse.
328 Retail outlets located within this part of the concourse and the mezzanine above would have
329 to close for at least the duration of the work, which is anticipated to take place over
330 approximately 2 years and 6 months, overlapping with Phases 1 and 2 of construction.¹⁷
331 Parking and bus loading and unloading activities would be displaced between the demolition
332 of the existing garage and the completion of the new bus and parking facilities. Construction
333 traffic and noise as well as partial closures of sidewalks and traffic lanes would adversely
334 affect residents, commuters, and workers. These impacts are described in greater detail in
335 other sections of this DEIS including: **Section 5.5, Transportation, Section 5.9, Land Use, Land**
336 **Planning and Property, Section 5.10, Noise and Vibration, Section 5.13, Parks and Recreation**
337 **Areas, and Section 5.16, Public Health, Elderly and Persons with Disabilities.**

338 The resulting adverse impact on local communities would be moderate. Although various
339 disruptive activities would occur during the entire construction period, most would last for
340 only a part of it. Disruptions would also be localized. The displacement of parking and bus
341 service would occur only in Phase 4 (last 3 years and 1 month of construction). Outside of
342 WUS, disruptions would largely concentrate along 2nd Street NE (south of K Street) during
343 Phase 1 of construction (lasting approximately 2 years and 5 months) and along First Street
344 NE (also south of K Street) during Phase 4. Although adversely affected, access to WUS would
345 remain available throughout the construction period and the phased construction would help
346 minimize reductions in rail operations. While the various inconveniences construction of
347 Alternative A would create would be highly noticeable and would make WUS and the parts of
348 the Local Study Area closest to WUS less attractive to new residents or businesses while
349 construction is ongoing, the directly affected areas would be small and the adverse impacts
350 would decrease quickly with distance.

¹⁷ The retail outlets that would be impacted include UNIQLO, Victoria's Secret, Comfort One Shoes, Verizon, Hudson News, America!, Kashmir, Einstein Bros. Bagels, and Jamba Juice.

Construction Employment

351
 352

Construction of Alternative A would have a minor beneficial impact on regional employment.

353
 354
 355
 356

Construction of Alternative A would support numerous jobs during the entire construction period. While this would be a beneficial impact, it would be minor in the context of regional employment in the Washington-Arlington-Alexandria Metropolitan Statistical Area, where most of the jobs are likely to be located.

357
 358
 359
 360
 361
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 363

Construction activities and costs would vary over the course of construction. Therefore, the number of jobs supported by construction would vary depending on the year of the construction period. **Table 5-169** shows the estimated annual number of jobs construction of Alternative A would support by phase.¹⁸ Direct jobs would occur within the construction, architecture and engineering, and related services industries while the indirect and induced jobs would occur in a wider range of industries such as wholesale trade; restaurants; real estate; architectural; hospitals; retail; and physicians.

Table 5-169. Construction Employment Estimates, Alternative A

| Phase | Construction Year | Direct Employment | Indirect Employment | Induced Employment | Total Employment |
|-----------------------|-------------------|-------------------|---------------------|--------------------|------------------|
| 1 | 1 | 3,466 | 324 | 1,138 | 4,928 |
| 1 | 2 | 3,466 | 324 | 1,138 | 4,928 |
| 1 and 2 | 3 | 4,247 | 401 | 1,395 | 6,043 |
| 2 | 4 | 4,377 | 415 | 1,439 | 6,231 |
| 2 and 3 | 5 | 4,256 | 402 | 1,398 | 6,055 |
| 3 | 6 | 3,708 | 346 | 1,217 | 5,271 |
| 3 | 7 | 3,704 | 350 | 1,217 | 5,271 |
| 3 | 8 | 5,607 | 563 | 1,852 | 8,022 |
| 3 and 4 | 9 | 6,535 | 647 | 2,156 | 9,338 |
| 4 | 10 | 6,547 | 635 | 2,156 | 9,338 |
| 4 | 11 | 2,784 | 214 | 900 | 3,898 |
| Annual Average | | 4,614 | 418 | 1,511 | 6,543 |

Construction Year 11 is a partial year and not included in the annual average.
 Intermediate Phase not included.

364
 365
 366
 367

On average, Alternative A would support annually approximately 4,614 direct jobs and 1,929 indirect and induced jobs, for a total of 6,543 jobs. For purposes of comparison, the total annual average number of direct jobs that Alternative A would support for the duration of the construction period represent approximately 0.6 percent of total employment in the two

¹⁸ As noted above, the modeling of construction impacts was based on Amtrak’s rough-order-of magnitude combined estimates, which include the private and potential Federal overbuild deck but exclude the column removal work (see **Appendix A8, Action Alternatives Cost Estimates Memorandum**).

368 relevant sectors in the Washington-Arlington-Alexandria Metropolitan Statistical Area as of
369 early 2019.¹⁹

Washington Union Station Revenue

370 **Construction of Alternative A would have a major adverse impact on WUS revenue.**

371 Construction of Alternative A would affect the two main sources of WUS revenue: retail and
372 parking. The retail closures due to the column removal work would affect the revenue
373 derived from the USI retail lease. At this stage, it is not possible to quantify the resulting
374 financial impact on the affected retail outlets, USI, and USRC. However, given the duration of
375 the anticipated closure (at least approximately 2 years and 6 months overlapping with Phases
376 1 and 2 of construction), it is likely to be major.

377 Construction-related disruptions in WUS access and the existing parking garage demolition
378 would further cause a major reduction in revenue from parking operations. During the first
379 three phases of construction, parking would remain fully or partially available but changes in
380 access, rerouting, and reduced capacity in Phase 3 would reduce the number of users and the
381 revenue generated. During Phase 4, which would last for approximately 3 years and 1 month,
382 parking would not be available. Based on fiscal year 2016 revenue from parking, this would
383 represent a loss of approximately \$25.5 million for WUS.

Other Economic Benefits or Impacts

384 **Construction of Alternative A would have a moderate beneficial impact on the regional
385 economy.**

386 Income generated by construction jobs of the Project are shown in **Table 5-170**. Depending
387 on the year, Alternative A construction would produce from \$254 to \$609 million in
388 estimated annual labor income. Annual value added (labor income, other property type
389 income and indirect business taxes), would range from \$355 million to \$851 million
390 depending on the year. Annual total output (value of production), would range from \$586 to
391 \$1,405 million depending on the year. These economic outputs would spread benefits
392 throughout the Washington DC metropolitan region. The impact would be moderate in the
393 context of the Washington-Arlington-Alexandria Metropolitan Area, which had a 2017 gross
394 domestic product of approximately \$17.5 trillion.²⁰

¹⁹ Bureau of Labor Statistics. *Economy at a Glance. Washington-Arlington-Alexandria, DC-VA-MD-WV*. Accessed from https://www.bls.gov/eag/eag.dc_washington_md.htm. Accessed on April 13, 2019. The two sectors taken into account in the comparison are Mining, Logging, and Construction (122,800 persons as of January 2019) and Professional and Business Services (632,400 persons as of January 2019).

²⁰ U.S. Bureau of Economic Analysis. *Gross Domestic Product by Metropolitan Area, 2017*. Accessed from <https://www.bea.gov/data/gdp/gdp-metropolitan-area>. Accessed on February 4, 2019.

Table 5-170. Construction Annual Labor Income, Value and Output, Alternative A

| Phase | Construction Year | Annual Labor Income | Annual Value | Annual Total Output |
|---------|-------------------|---------------------|---------------|---------------------|
| 1 | 1 | \$321,467,648 | \$449,408,225 | \$741,851,819 |
| 1 | 2 | \$321,467,648 | \$449,408,225 | \$741,851,819 |
| 1 and 2 | 3 | \$394,174,196 | \$551,051,176 | \$909,636,928 |
| 2 | 4 | \$406,458,676 | \$568,224,743 | \$937,985,858 |
| 2 and 3 | 5 | \$395,012,574 | \$552,223,220 | \$911,571,657 |
| 3 | 6 | \$343,877,491 | \$480,736,938 | \$793,567,078 |
| 3 | 7 | \$343,877,491 | \$480,736,938 | \$793,567,078 |
| 3 and 4 | 8 | \$523,276,372 | \$731,534,593 | \$1,207,566,392 |
| 4 | 9 | \$609,145,078 | \$851,578,096 | \$1,405,725,852 |
| 4 | 10 | \$609,145,078 | \$851,578,096 | \$1,405,725,852 |
| 4 | 11 | \$254,249,209 | \$355,437,588 | \$586,731,632 |

Values presented in 2019 dollars.
 Intermediate Phase not included.

Comparison to Existing Conditions

395 The impacts of Alternative A on socioeconomic conditions would generally be the same
 396 relative to existing conditions as they would be relative to the No-Action Alternative. Because
 397 the District’s economy would grow between the present and 2040, the impacts of Alternative
 398 A would be relatively greater when compared to existing conditions than they would be
 399 when compared to No-Action Alternative conditions. But given the respective size of the
 400 existing economy and the impacts, the difference would be small.

5.14.4.3 Alternative B

Direct Operational Impacts

Demographics

401 **Relative to the No-Action Alternative, Alternative B would have no direct operational**
 402 **impact on demographic conditions.**

403 Alternative B would not directly add or displace any residential populations in the Local Study
 404 Area or the Regional Study Area.

Community Disruption and Other Social Benefits or Impacts

405 **Relative to the No-Action Alternative, Alternative B would have major beneficial direct**
 406 **operational impacts on local communities.**

407 The impacts of Alternative B would be the same as those of Alternative A. They are described
 408 in **Section 5.14.4.2, Alternative A, Direct Operational Impacts.**

Employment

409 **Relative to the No-Action Alternative, Alternative B would have a minor beneficial direct**
410 **operational impact on employment.**

411 The impacts of Alternative B would be the same as those of Alternative A. They are described
412 in **Section 5.14.4.2, *Alternative A, Direct Operational Impacts.***

Washington Union Station Revenue

413 **Relative to the No-Action Alternative, Alternative B would have a major adverse**
414 **operational direct impact on WUS revenue.**

415 Alternative B would eliminate the station's revenue stream from parking, which represent
416 the majority of its revenue. In Alternative B, all parking would be in two below-ground levels,
417 outside the station's lease area. Therefore, WUS would not receive any revenue from the
418 new parking. Based on fiscal year 2016 data, this would represent a loss of approximately
419 \$8.5 million. In that year, parking revenue represented 59 percent of the station's total
420 revenue.²¹

421 Revenue from retail would remain approximately as or be less than in the No-Action
422 Alternative for the same reasons explained for Alternative A in **Section 5.14.4.2, *Alternative***
423 ***A, Direct Operational Impacts.*** Altogether, Alternative B would cause a net loss in revenue for
424 WUS. The loss would be major, as it would represent more than half the station's total
425 revenue.

Other Direct Economic Impacts

426 **Relative to the No-Action Alternative, Alternative B would have a minor beneficial direct**
427 **operational impact on the local and regional economy.**

428 The impact of Alternative B on the local and regional economy from additional retail at WUS
429 would be the same as that of Alternative A. These impacts are described in **Section 5.14.4.2,**
430 ***Alternative A, Direct Operational Impacts.***

Indirect Operational Impacts

431 **Relative to the No-Action Alternative, Alternative B would have a negligible indirect**
432 **operational impact on demography; no adverse indirect operational impact on local**
433 **communities; a minor beneficial indirect operational impact on employment; no indirect**
434 **operational impact on WUS revenue; and a minor beneficial indirect operational impact on**
435 **tax revenues in the District.**

²¹ In fiscal year 2016, WUS revenue from the parking garage operations was \$8,532,403 out of a total revenue of \$14,381,916: *USRC Annual Report 2016*. Accessed from https://www.usrcdc.com/wp-content/uploads/2017/02/usrc_annual_report_2016_final_spreads.pdf. Accessed on April 3, 2020.

436 The indirect operational impacts of Alternative B would be as described for Alternative A in
437 **Section 5.14.4.2, Alternative A, Indirect Operational Impacts** with the exception of the
438 impacts associated with the potential Federal air-rights development, described below.

Potential Federal Air-Rights Development

439 **Relative to the No-Action Alternative, in Alternative B, the potential development of the**
440 **Federal air right as office space would result in a negligible indirect operational impact on**
441 **demography; no indirect operational impact on local communities; a moderate beneficial**
442 **indirect operational impact on employment; a beneficial indirect operational impact on**
443 **WUS revenue; and a minor beneficial indirect operational impact on District tax revenue.**

444 The development of the remaining Federal air rights as approximately 917,420 square feet of
445 office space, as assumed for the purposes of the impact analysis, would have a beneficial
446 impact on WUS revenue through the lease of the space (or other mechanism through which
447 development would be achieved). This impact cannot be quantified at this time but it would
448 at least partially offset the loss of revenue from the reduction in parking capacity.

449 The provision of this office space would have a small and negligible impact on demography in
450 the Local Study Area if some employees move to the area to be closer to their workplace.
451 Given WUS's accessibility by transit and the moderate number of employees at the site, this
452 impact would be small and negligible. Development of the Federal air rights into office space
453 would not cause disruptions to local communities, as it would occur within the footprint of a
454 pre-existing facility. It would bring approximately 3,670 additional new jobs to the Local
455 Study Area, a moderate beneficial impact in the context of the Local and Regional Study
456 Areas. These jobs would generate tax revenue for the District. The beneficial impact on tax
457 revenue would be minor in the context of the District as a whole.

Construction Impacts

Demographics

458 **Construction of Alternative B would have no impacts on demography.**

459 Like the construction of Alternative A and the other Action Alternatives, the construction of
460 Alternative B would cause neither an influx nor a displacement of residential populations in
461 the Local or the Regional Study Area.

Community Disruption and Other Social Benefits or Impacts

462 **Construction of Alternative B would have moderate adverse impacts on local communities.**

463 Construction of Alternative B would take place over approximately 14 years and 4 months
464 (including the 12-month Intermediate Phase when only column removal work would be
465 performed). Throughout, to accommodate construction activities, there would be periods of
466 rerouting passengers, losing off sections of WUS, and closing some retail outlets. As in all
467 Action Alternatives, the column removal component of the Project would close part of the
468 Retail and Ticketing Concourse and displace the retail outlets located there for at least the

469 duration of the work (approximately 2 years and 6 months, overlapping with Phases 1 and 2
470 of construction).²² Parking and bus loading and unloading activities would be displaced
471 between the demolition of existing garage and the completion of the new bus and parking
472 facilities. Construction traffic and noise as well as partial closures of sidewalks and traffic
473 lanes would adversely affect residents, commuters, and workers. These impacts are
474 described in greater detail in other sections of this DEIS including: **Section 5.5,**
475 *Transportation*, **Section 5.9, Land Use, Land Planning and Property**, **Section 5.10 Noise and**
476 *Vibration*, **Section 5.13, Parks and Recreation Areas**, and **Section 5.15, Public Health, Elderly,**
477 *and Persons with Disabilities*.

478 The resulting adverse impact on local communities would be moderate. Although various
479 disruptive activities would take place over the entire construction period, most would last for
480 a shorter time and be localized. The displacement of the parking and bus service would occur
481 only in Phase 4 (last 4 years and 11 months of construction). Outside of WUS, disruptions
482 would largely concentrate along 2nd Street NE (south of K Street) during Phase 1 of
483 construction (lasting approximately 2 years and 5 months as in all Action Alternatives) and
484 along First Street NE (also south of K Street) during Phase 4. There would also be disruptions
485 on K Street NE to construct the below-ground parking facility access ramp in the underpass
486 below the rail terminal. Although adversely affected, access to WUS would remain available
487 throughout the construction period and the phased construction would help minimize
488 reductions in rail operations. While the various inconveniences construction of Alternative B
489 would create would be highly noticeable and would make the parts of the Local Study Area
490 closest to WUS less attractive to new residents or businesses while construction is ongoing,
491 the affected areas would be small and the adverse impacts would fade quickly with distance.

Construction Employment

492 **Construction of Alternative B would have a minor beneficial impact on employment.**

493 Construction of Alternative B would support numerous jobs during the entire construction
494 period. As shown in **Table 5-171**, on average annually, Alternative B would support
495 approximately 4,282 direct jobs and 1,806 indirect and induced jobs, for a total of 6,088
496 jobs.²³

²² The retail outlets that would be impacted includes UNIQLO, Victoria's Secret, Comfort One Shoes, Verizon, Hudson News, America!, Kashmir, Einstein Bros. Bagels, and Jamba Juice.

²³ As noted above, the modeling of construction impacts was based on Amtrak's rough-order-of magnitude combined estimates, which include the private and potential Federal overbuild deck but exclude the column removal work (see **Appendix A8, Action Alternatives Cost Estimates Memorandum**).

Table 5-171. Construction Employment Estimates, Alternative B

| Phase | Construction Year | Direct Employment | Indirect Employment | Induced Employment | Total Employment |
|-----------------------|-------------------|-------------------|---------------------|--------------------|------------------|
| 1 | 1 | 3,439 | 321 | 1,129 | 4,889 |
| 1 | 2 | 3,439 | 321 | 1,129 | 4,889 |
| 1 and 2 | 3 | 4,030 | 376 | 1,323 | 5,729 |
| 2 | 4 | 4,055 | 379 | 1,331 | 5,766 |
| 2 | 5 | 4,055 | 379 | 1,331 | 5,766 |
| 2 and 3 | 6 | 3,743 | 350 | 1,229 | 5,322 |
| 3 | 7 | 3,510 | 328 | 1,152 | 4,990 |
| 3 | 8 | 3,510 | 328 | 1,152 | 4,990 |
| 3 and 4 | 9 | 4,608 | 431 | 1,513 | 6,552 |
| 4 | 10 | 5,320 | 497 | 1,746 | 7,563 |
| 4 | 11 | 5,320 | 497 | 1,746 | 7,563 |
| 4 | 12 | 5,320 | 497 | 1,746 | 7,563 |
| 4 | 13 | 5,320 | 497 | 1,746 | 7,563 |
| 4 | 14 | 1,787 | 167 | 586 | 2,540 |
| Annual Average | | 4,282 | 400 | 1,406 | 6,088 |

Construction year 14 is a partial year and not included in the annual average.
 Intermediate Phase not included.

497 While beneficial, the impact would be minor as the annual average number of direct jobs
 498 that Alternative B would support for the duration of the construction period represents
 499 approximately 0.57 percent of total employment in the two relevant sectors in the
 500 Washington-Arlington-Alexandria Metropolitan Statistical Area as of early 2019.

Washington Union Station Revenue

501 **Construction of Alternative B would have a major adverse impact on WUS revenue.**

502 In Alternative B as in Alternative A (See **Section 5.14.4.2, Alternative A, Construction Impacts**)
 503 construction-related disruptions, including retail closures during column removal work and
 504 the demolition of the parking garage during Phase 4 would reduce WUS revenue. As in all
 505 Action Alternatives, retail closures would at least last for approximately 2 years and 6 months
 506 overlapping with Phases 1 and 2 of construction. While parking would remain available
 507 during the first three phases of construction, limited access and rerouting may reduce the
 508 number of users and parking revenue. During Phase 4, approximately 4 years and 11 months,
 509 parking would not be available. Based on fiscal year 2016 parking revenue, this would be a
 510 loss of approximately \$42.5 million for WUS.

Other Economic Benefits or Impacts

511 **Construction of Alternative B would have a moderate beneficial impact on the regional**
 512 **economy.**

513 Construction of Alternative B would have a moderate regional beneficial economic impact
 514 from the spending of the income generated by the jobs the construction of the Project would
 515 support. **Table 5-172** shows annual estimates of this income. The impact would be moderate
 516 in the context of the Washington-Arlington-Alexandria Metropolitan Area. In 2017, the gross
 517 domestic product of this area was approximately \$17.5 trillion.

Table 5-172. Construction Annual Labor Income, Value and Output, Alternative B

| Phase | Construction Year | Annual Labor Income | Annual Value | Annual Total Output |
|---------|-------------------|---------------------|---------------|---------------------|
| 1 | 1 | \$318,900,192 | \$445,818,949 | \$735,926,892 |
| 1 | 2 | \$318,900,192 | \$445,818,949 | \$735,926,892 |
| 1 and 2 | 3 | \$373,754,159 | \$522,504,189 | \$862,513,550 |
| 2 | 4 | \$376,123,473 | \$525,816,465 | \$867,981,224 |
| 2 | 5 | \$376,123,473 | \$525,816,465 | \$867,981,224 |
| 2 and 3 | 6 | \$347,174,782 | \$485,346,514 | \$801,176,246 |
| 3 | 7 | \$325,502,052 | \$455,048,276 | \$751,162,024 |
| 3 | 8 | \$325,502,052 | \$455,048,276 | \$751,162,024 |
| 3 and 4 | 9 | \$427,422,286 | \$597,531,639 | \$986,363,643 |
| 4 | 10 | \$493,368,671 | \$689,723,957 | \$1,138,548,305 |
| 4 | 11 | \$493,368,671 | \$689,723,957 | \$1,138,548,305 |
| 4 | 12 | \$493,368,671 | \$689,723,957 | \$1,138,548,305 |
| 4 | 13 | \$493,368,671 | \$689,723,957 | \$1,138,548,305 |

Values presented in 2019 dollars.
 Intermediate Phase not included.

Comparison to Existing Conditions

518 Alternative B impacts on socioeconomics relative to existing conditions would be generally
 519 the same as relative to the No-Action Alternative. The District’s economy would grow
 520 between the present and 2040 and the impacts of Alternative B would be relatively greater
 521 when compared to existing conditions than compared to No-Action Alternative conditions.
 522 Given the respective size of the existing economy and impacts, the difference would be small.

5.14.4.4 Alternative C

Direct Operational Impacts

Demographics

523 **Relative to the No-Action Alternative, Alternative C (either option) would have no direct**
 524 **operational impact on demographic conditions.**

525 Alternative C would not directly add or displace any residential populations in the Local Study
 526 Area or the Regional Study Area.

Community Disruption and Other Social Benefits or Impacts

527 **Relative to the No-Action Alternative, Alternative C (either option) would have major**
528 **beneficial direct operational impacts on local communities.**

529 The impacts of Alternative C would be as described for Alternative A in **Section 5.14.4.2,**
530 *Alternative A, Direct Operational Impacts.*

Employment

531 **Relative to the No-Action Alternative, Alternative C (either option) would have a minor**
532 **beneficial direct operational impact on employment.**

533 The impacts of Alternative C would be the same as those of Alternative A. They are described
534 in **Section 5.14.4.2, Alternative A, Direct Operational Impacts.**

Washington Union Station Revenue

535 **Relative to the No-Action Alternative, Alternative C (either option) would have a major**
536 **adverse operational direct impact on WUS revenue.**

537 Like Alternative B, and for the same reason (**Section 5.14.4.3, Alternative B, Direct**
538 *Operational Impacts*), Alternative C would eliminate the station's revenue stream from
539 parking. Revenue from retail would remain approximately as or be less than in the No-Action
540 Alternative for the same reasons a explained for Alternative A in **Section 5.14.4.2, Alternative**
541 *A, Direct Operational Impacts.* The loss in revenue would be a major adverse impact as
542 parking represents the majority of WUS's revenue.

Other Direct Economic Impacts

543 **Relative to the No-Action Alternative, Alternative C (either option) would have a minor**
544 **beneficial direct operational impact on the local and regional economy.**

545 The impact of Alternative C on the local and regional economy from additional retail at WUS
546 would be the same as described for Alternative A in **Section 5.14.4.2, Alternative A, Direct**
547 *Operational Impacts.*

Indirect Operational Impacts

548 **Relative to the No-Action Alternative, Alternative C (either option) would have a negligible**
549 **indirect operational impact on demography; no adverse indirect operational impact on**
550 **local communities; a minor beneficial indirect operational impact on employment; no**
551 **indirect operational impact on WUS revenue; and a minor beneficial indirect operational**
552 **impact on tax revenues in the District.**

553 The indirect operational impacts of Alternative C would be as described for Alternative A in
554 **Section 5.14.4.2, Alternative A, Indirect Operational Impacts** except for the indirect impacts
555 associated with the potential development of the Federal air rights, described below.

Potential Federal Air-rights Development

556 **Relative to the No-Action Alternative, in Alternative C (either option), the potential**
557 **development of the Federal air right as office space would result in a negligible indirect**
558 **operational impact on demography; no indirect operational impact on local communities; a**
559 **moderate beneficial indirect operational impact on employment; a beneficial indirect**
560 **operational impact on WUS revenue; and a minor beneficial indirect operational impact on**
561 **District tax revenue.**

562 The development of the remaining Federal air rights as approximately 952,600 square feet of
563 office space, as is assumed for the purposes of the impact analysis, would have a beneficial
564 impact on WUS revenue through the lease of the space (or other mechanism through which
565 development would be achieved). This impact cannot be quantified at this time but it would
566 at least partially offset the loss of revenue from the reduction in parking capacity. The
567 provision of this office space would have an impact on demography in the Local Study Area if
568 some employees move to the area to be closer to their place of work. Given WUS's
569 accessibility by transit and the moderate number of employees at the site, this impact would
570 be small and negligible. Development of the Federal air rights into office space would not
571 cause disruptions to local communities, as it would occur within the footprint of a pre-
572 existing facility. It would bring approximately 3,810 additional new jobs to the Local Study
573 Area, a moderate beneficial impact in the context of the Local and Regional Study Areas.
574 These jobs would generate tax revenue for the District. The beneficial impact on tax revenue
575 would be minor in the context of the District as a whole.

Construction Impacts

Demographics

576 **Construction of Alternative C (either option) would have no impacts on demography.**

577 Like the construction of all Action Alternatives, the construction of Alternative C would cause
578 neither an influx nor a displacement of residential populations in the Local or the Regional
579 Study Area.

Community Disruption and Other Social Benefits or Impacts

580 **Construction of Alternative C would have moderate adverse impacts on local communities.**

581 Construction of Alternative C would take place over approximately 12 years and 3 months
582 (including the 12-month Intermediate Phase when only column removal work would be
583 performed). Throughout, to accommodate construction activities, there would be periods of
584 rerouting passengers and closing off sections of WUS. As in all Action Alternatives, column
585 removal work would close part of the Retail and Ticketing Concourse and displace the retail
586 outlets located there for the duration of the work (approximately 2 years and 6 months,

587 overlapping with Phases 1 and 2 of construction).²⁴ Parking and bus loading and unloading
588 activities would be displaced between the demolition of the existing garage and the
589 completion of the new bus and parking facilities. Construction traffic and noise as well as
590 partial closures of sidewalks and traffic lanes would adversely affect residents, commuters,
591 and workers. These impacts are described in greater detail in other sections of this DEIS
592 including: **Section 5.5, Transportation, Section 5.9, Land Use, Land Planning and Property,**
593 **Section 5.10 Noise and Vibration, Section 5.13, Parks and Recreation Areas, and Section 5.15,**
594 **Public Health, Elderly, and Persons with Disabilities.** The resulting adverse impact on local
595 communities would be moderate for the same reasons as explained in **Section 4.14.4.3,**
596 **Alternative B, Construction Impacts.**

597 The resulting adverse impact on local communities would be moderate. Although various
598 disruptive activities would take place over the entire construction period, most would last for
599 a shorter time and would be localized. The displacement of the parking and bus facility would
600 occur only in Phase 4 (last 4 years of construction). It would be total under the West Option
601 but partial under the East Option, as the new bus facility and above-ground parking facility
602 would be operational by the time the existing structures are demolished. Outside of WUS,
603 disruptions would largely concentrate along 2nd Street NE (south of K Street) during Phase 1
604 of construction (lasting approximately 2 years and 5 months, as in all Action Alternatives) and
605 along First Street NE (also south of K Street) during Phase 4. There would also be disruptions
606 on K Street NE to construct the below-ground parking facility access ramp in the underpass
607 below the rail terminal. Although adversely affected, access to WUS would remain available
608 throughout the construction period and the phased construction would help minimize
609 reductions in rail operations. While the various inconveniences construction of Alternative C
610 would create would be highly noticeable and would make WUS and the parts of the Local
611 Study Area closest to WUS less attractive to new residents or businesses while construction is
612 ongoing, the affected areas would be small and the adverse impacts would fade quickly with
613 distance.

Construction Employment

614 **Construction of Alternative C (either option) would have a minor beneficial impact on**
615 **employment.**

616 Construction of Alternative C would support numerous jobs during the entire construction
617 period. As shown in **Table 5-173**, on average annually, Alternative C would support
618 approximately 4,483 direct jobs and 1,891 indirect and induced jobs, for a total of 6,374 jobs.
619 ²⁵ While beneficial, the impact would be minor as the annual average number of direct jobs

²⁴ The retail outlets that would be impacted includes UNIQLO, Victoria's Secret, Comfort One Shoes, Verizon, Hudson News, America!, Kashmir, Einstein Bros. Bagels, and Jamba Juice.

²⁵ As noted above, the modeling of construction impacts was based on Amtrak's rough-order-of magnitude combined estimates, which include the private and potential Federal overbuild deck but exclude the column removal work (see **Appendix A8, Action Alternatives Cost Estimates Memorandum**).

620 that Alternative C would support represent approximately 0.6 percent of total employment
 621 in the two relevant sectors in the Washington-Arlington-Alexandria Metropolitan Statistical
 622 Area as of early 2019.

Table 5-173. Construction Employment Estimates, Alternative C

| Phase | Construction Year | Direct Employment | Indirect Employment | Induced Employment | Total Employment |
|-----------------------|-------------------|-------------------|---------------------|--------------------|------------------|
| 1 | 1 | 3,251 | 304 | 1,067 | 4,621 |
| 1 | 2 | 3,251 | 304 | 1,067 | 4,621 |
| 1 and 2 | 3 | 4,219 | 394 | 1,385 | 5,999 |
| 2 | 4 | 4,476 | 418 | 1,469 | 6,364 |
| 2 and 3 | 5 | 4,254 | 397 | 1,396 | 6,048 |
| 3 | 6 | 3,624 | 339 | 1,190 | 5,153 |
| 3 | 7 | 3,624 | 339 | 1,190 | 5,153 |
| 3 and 4 | 8 | 5,288 | 494 | 1,736 | 7,517 |
| 4 | 9 | 5,777 | 539 | 1,896 | 8,212 |
| 4 | 10 | 5,777 | 539 | 1,896 | 8,212 |
| 4 | 11 | 5,777 | 539 | 1,896 | 8,212 |
| 4 | 12 | 1,427 | 133 | 468 | 2,028 |
| Annual Average | | 4,483 | 419 | 1,472 | 6,374 |

Intermediate Phase not included.

Washington Union Station Revenue

623 **Construction of Alternative C (either option) would have a major adverse impact on WUS**
 624 **revenue.**

625 In Alternative C as in the other Action Alternatives, construction-related disruptions,
 626 including retail closures during column removal work and the demolition of the existing
 627 parking garage during Phase 4 would reduce WUS revenue. As in all Action Alternatives, the
 628 retail closures would last at least for approximately 2 years and 6 months, overlapping with
 629 Phases 1 and 2 of construction. While parking would remain available during the first three
 630 phases of construction, limited access and rerouting may reduce the number of users and
 631 parking revenue. During Phase 4 (approximately 4 years), parking would not be available
 632 (West Option) or would be partially available in the new above-ground parking facility but
 633 outside the lease area (East Option). Based on fiscal year 2016 parking revenue, this would
 634 be a loss of approximately \$42.5 million.

Other Economic Benefits or Impacts

635 **Construction of Alternative C (either option) would have a moderate beneficial impact on**
 636 **the regional economy.**

637 Construction of Alternative C would have a moderate regional beneficial economic impact
 638 from the spending of the income generated by the jobs the construction of the Project would
 639 support. **Table 5-174** shows annual estimates of this income. The impact would be moderate
 640 in the context of the Washington-Arlington-Alexandria Metropolitan Area. In 2017, the gross
 641 domestic product of this area was approximately \$17.5 trillion.

Table 5-174. Construction Annual Labor Income, Value and Output, Alternative C

| Phase | Construction Year | Annual Labor Income | Annual Value | Annual Total Output |
|---------|-------------------|---------------------|---------------|---------------------|
| 1 | 1 | \$301,451,404 | \$421,425,735 | \$695,660,273 |
| 1 | 2 | \$301,451,404 | \$421,425,735 | \$695,660,273 |
| 1 and 2 | 3 | \$391,306,342 | \$547,041,947 | \$903,018,773 |
| 2 | 4 | \$415,145,901 | \$580,369,388 | \$958,033,393 |
| 2 and 3 | 5 | \$394,509,551 | \$551,519,998 | \$910,410,827 |
| 3 | 6 | \$336,127,161 | \$469,902,061 | \$775,681,618 |
| 3 | 7 | \$336,127,161 | \$469,902,061 | \$775,681,618 |
| 3 and 4 | 8 | \$490,353,323 | \$685,508,534 | \$1,131,589,778 |
| 4 | 9 | \$535,730,191 | \$748,944,895 | \$1,236,306,107 |
| 4 | 10 | \$535,730,191 | \$748,944,895 | \$1,236,306,107 |
| 4 | 11 | \$535,730,191 | \$748,944,895 | \$1,236,306,107 |
| 4 | 12 | \$132,271,189 | \$184,913,662 | \$305,242,604 |

Values presented in 2019 dollars.
 Intermediate Phase not included.

Comparison to Existing Conditions

642 The impacts of Alternative C (either option) on socioeconomic conditions would generally be
 643 the same relative to existing conditions as they would be relative to the No-Action
 644 Alternative. As the District’s economy would grow between the present and 2040,
 645 Alternative C’s impacts would be greater when compared to existing conditions than when
 646 compared to the No-Action Alternative conditions. Given the respective size of the existing
 647 economy and the impacts, the difference would be small.

5.14.4.5 Alternative D

Direct Operational Impacts

Demographics

648 **Relative to the No-Action Alternative, Alternative D would have no direct operational**
 649 **impact on demographic conditions.**

650 Alternative D would not directly add or displace any residential populations in the Local Study
651 Area or the Regional Study Area.

Community Disruption and Other Social Benefits or Impacts

652 **Relative to the No-Action Alternative, Alternative D would have major beneficial direct**
653 **operational impacts on local communities.**

654 The impacts of Alternative D would be as described for Alternative A in **Section 5.14.4.2,**
655 *Alternative A, Direct Operational Impacts.*

Employment

656 **Relative to the No-Action Alternative, Alternative D would have a minor beneficial direct**
657 **operational impact on employment.**

658 Alternative D would beneficially impact employment by adding 1,529 jobs at WUS relative to
659 the No-Action Alternative. The approximately 100,000 additional square feet of WUS retail
660 would generate approximately 300 new jobs. Alternative D would also provide approximately
661 297,400 square feet of expanded Amtrak support area, which would be staffed with
662 approximately 1,629 persons, an approximately 1,229-employee increase over the No-Action
663 Alternative.

664 This beneficial impact would be minor in the larger context of the District. The 1,529 jobs
665 Alternative D would support would represent an increase of 149 percent in WUS jobs relative
666 to the No-Action Alternative but only a 0.15 percent of the total projected 2040 employment
667 in the District (1,012,000 jobs).

Washington Union Station Revenue

668 **Relative to the No-Action Alternative, Alternative D would have a major adverse**
669 **operational direct impact on WUS revenue.**

670 Like Alternative B and for the same reason (**Section 5.14.4.3, Alternative B, Direct**
671 *Operational Impacts*), Alternative D would eliminate the station's revenue stream from
672 parking and may eliminate revenue from retail. This would be a major adverse impact.
673 Parking represents the majority of WUS's revenue.

Other Direct Economic Impacts

674 **Relative to the No-Action Alternative, Alternative D would have a minor beneficial direct**
675 **operational impact on the local and regional economy.**

676 Alternative D would add approximately 100,000 square feet of retail at WUS. This would
677 generate revenue for retail operators as well as new jobs and sales taxes, driving further
678 economic activity. Existing WUS retail and services would benefit from increased sales due to
679 greater Amtrak, MARC, VRE, and intercity bus ridership (approximately 50,700 additional
680 daily passengers relative to the No-Action Alternative). These beneficial impacts would be
681 minor in the context of the local and regional economy.

Indirect Operational Impacts

682 **Relative to the No-Action Alternative, Alternative D would have a negligible indirect**
683 **operational impact on demography; no adverse indirect operational impact on local**
684 **communities; a minor beneficial indirect operational impact on employment; no indirect**
685 **operational impact on WUS revenue; and a minor beneficial indirect operational impact on**
686 **tax revenues in the District.**

687 The indirect operational impacts of Alternative D would be the as described for Alternative A
688 in **Section 5.14.4.2, Alternative A, Indirect Operational Impacts** except for the indirect
689 impacts associated with the potential development of the Federal air rights, described below.

Potential Federal Air-Rights Development

690 **Relative to the No-Action Alternative, in Alternative D, the potential development of the**
691 **Federal air right as office space would result in a negligible indirect operational impact on**
692 **demography; no indirect operational impact on local communities; a moderate beneficial**
693 **indirect operational impact on employment; a beneficial indirect operational impact on**
694 **WUS revenue; and a minor beneficial indirect operational impact on District tax revenue.**

695 The development of the remaining Federal air rights in Alternative D as approximately
696 688,000 square feet of office space, as is assumed for the purposes of the impact analysis,
697 would have a beneficial impact on WUS revenue through the lease of the space (or other
698 mechanism through which development would be achieved). This impact cannot be
699 quantified at this time but it would at least partially offset the loss of revenue from the
700 reduction in parking capacity. The provision of this office space would have an impact on
701 demography in the Local Study Area if some employees move to the area to be closer to their
702 workplace. Given WUS's accessibility by transit and the moderate number of employees at
703 the site, this impact would be small and negligible. Development of the Federal air rights into
704 office space would not cause disruptions to local communities, as it would occur within the
705 footprint of a pre-existing facility. It would bring approximately 2,752 additional new jobs to
706 the Local Study Area, a moderate beneficial impact in the context of the Local and Regional
707 Study Areas. These jobs would generate tax revenue for the District. The beneficial impact on
708 tax revenue would be minor in the context of the District as a whole.

Construction Impacts

Demographics

709 **Construction of Alternative D would have no impact on demography.**

710 Like in all Action Alternatives, the construction of Alternative D would cause neither an influx
711 nor a displacement of residential populations in the Local or the Regional Study Area.

Community Disruption and Other Social Benefits or Impacts

712 **Construction of Alternative D would have moderate adverse impacts on local communities.**

713 The impacts of constructing Alternative D would be the same as those of constructing
 714 Alternative C with the West Option. They are described in **Section 5.14.4.4, Alternative C,**
 715 *Construction Impacts.*

Construction Employment

716 **Construction of Alternative D would have a minor beneficial impact on employment.**

717 Construction of Alternative D would support numerous jobs during the entire construction
 718 period. As shown in **Table 5-175**, on average, Alternative D would support annually
 719 approximately 4,513 direct jobs and 1,902 indirect and induced jobs, for a total of 6,416 jobs.
 720

²⁶

Table 5-175. Construction Employment Estimates, Alternative D

| Phase | Construction Year | Direct Employment | Indirect Employment | Induced Employment | Total Employment |
|-----------------------|-------------------|-------------------|---------------------|--------------------|------------------|
| 1 | 1 | 3,193 | 298 | 1,048 | 4,539 |
| 1 | 2 | 3,193 | 298 | 1,048 | 4,539 |
| 1 and 2 | 3 | 4,157 | 388 | 1,364 | 5,909 |
| 2 | 4 | 4,416 | 413 | 1,450 | 6,278 |
| 2 | 5 | 4,213 | 393 | 1,383 | 5,989 |
| 3 | 6 | 3,639 | 340 | 1,195 | 5,174 |
| 3 | 7 | 3,639 | 340 | 1,195 | 5,174 |
| 3 and 4 | 8 | 5,407 | 505 | 1,775 | 7,687 |
| 4 | 9 | 5,929 | 554 | 1,946 | 8,429 |
| 4 | 10 | 5,929 | 554 | 1,946 | 8,429 |
| 4 | 11 | 5,929 | 554 | 1,946 | 8,429 |
| 4 | 12 | 1,464 | 137 | 481 | 2,081 |
| Annual Average | | 4,513 | 421 | 1,481 | 6,416 |

Intermediate Phase not included

721 While beneficial, the impact would be minor. The total annual average number of direct jobs
 722 that Alternative D would support for the duration of the construction period would represent
 723 approximately 0.6 percent of total employment in the two relevant sectors in the
 724 Washington-Arlington-Alexandria Metropolitan Statistical Area as of early 2019.

Washington Union Station Revenue

725 **Construction of Alternative D would result in a major adverse impact on WUS revenue.**

²⁶ As noted above, the modeling of construction impacts was based on Amtrak’s rough-order-of magnitude combined estimates, which include the private and potential Federal overbuild deck but exclude the column removal work (see **Appendix A8, Action Alternatives Cost Estimates Memorandum**).

726 The impact of constructing Alternative D on WUS revenue would be as described in
 727 **Section 5.14.4.4, Alternative C, Construction Impacts** for Alternative C.

Other Economic Benefits or Impacts

728 **Construction of Alternative D would have a moderate beneficial impact on the regional**
 729 **economy.**

730 Construction of Alternative D would have a moderate regional beneficial economic impact
 731 from the spending of the income generated by the jobs the construction of the Project would
 732 support. **Table 5-176** shows annual estimates of this income. The impact would be moderate
 733 in the context of the Washington-Arlington-Alexandria Metropolitan Area. In 2017, the gross
 734 domestic product of this area was approximately \$17.5 trillion.

Table 5-176. Construction Annual Labor Income, Value and Output, Alternative D

| Phase | Construction Year | Annual Labor Income | Annual Value | Annual Total Output |
|---------|-------------------|---------------------|---------------|---------------------|
| 1 | 1 | \$296,124,478 | \$413,978,752 | \$683,367,312 |
| 1 | 2 | \$296,124,478 | \$413,978,752 | \$683,367,312 |
| 1 and 2 | 3 | \$385,485,783 | \$538,904,871 | \$889,586,654 |
| 2 | 4 | \$409,525,993 | \$572,512,819 | \$945,064,315 |
| 2 | 5 | \$390,679,191 | \$546,165,198 | \$901,571,496 |
| 3 | 6 | \$337,542,771 | \$471,881,069 | \$778,948,426 |
| 3 | 7 | \$337,542,771 | \$471,881,069 | \$778,948,426 |
| 3 and 4 | 8 | \$501,439,798 | \$701,007,304 | \$1,157,174,068 |
| 4 | 9 | \$549,865,677 | \$768,706,148 | \$1,268,926,608 |
| 4 | 10 | \$549,865,677 | \$768,706,148 | \$1,268,926,608 |
| 4 | 11 | \$549,865,677 | \$768,706,148 | \$1,268,926,608 |
| 4 | 12 | \$135,761,225 | \$189,792,694 | \$313,296,570 |

Values presented in 2019 dollars.
 Intermediate Phase not included

Comparison to Existing Conditions

735 The impacts of Alternative D on socioeconomic conditions would generally be the same
 736 relative to existing conditions as they would be relative to the No-Action Alternative. The
 737 District’s economy would grow between the present and 2040. Alternative D’s impacts would
 738 be greater when compared to existing conditions than when compared to the No-Action
 739 Alternative conditions but, given the respective size of the existing economy and the impacts,
 740 the difference would be small.

5.14.4.6 Alternative E

Direct Operational Impacts

Demographics

741 **Relative to the No-Action Alternative, Alternative E would have no direct operational**
742 **impact on demographic conditions.**

743 Like Alternative A and the other Action Alternatives, Alternative E would not directly add or
744 displace any residential populations in the Local or Regional Study Area.

Community Disruption and Other Social Benefits or Impacts

745 **Relative to the No-Action Alternative, Alternative E would have major beneficial direct**
746 **operational impacts on local communities.**

747 The impacts of Alternative E would be as described for Alternative A in **Section 5.14.4.2,**
748 *Alternative A, Direct Operational Impacts.*

Employment

749 **Relative to the No-Action Alternative, Alternative E would have a minor beneficial direct**
750 **operational impact on employment.**

751 The impact of Alternative E on employment would be the same as those of Alternative D.
752 They are described in **Section 5.14.4.5, Alternative D, Direct Operational Impacts.**

Washington Union Station Revenue

753 **Relative to the No-Action Alternative, Alternative E would have a major adverse**
754 **operational direct impact on WUS revenue.**

755 Like Alternative B and for the same reason (**Section 5.14.4.3, Alternative B, Direct**
756 *Operational Impacts*), Alternative E would eliminate the station's revenue stream from
757 parking and may eliminate some revenue from retail. The loss of revenue would be a major
758 adverse impact. Parking represent the majority of WUS's revenue.

Other Direct Economic Impacts

759 **Relative to the No-Action Alternative, Alternative E would have a minor beneficial direct**
760 **operational impact on the local and regional economy.**

761 Alternative E would result in the same minor beneficial adverse direct operational impact on
762 the economy as Alternative D (**Section 5.14.4.5, Alternative D, Direct Operational Impacts**).

Indirect Impacts

763 **Relative to the No-Action Alternative, Alternative E would have a negligible indirect**
764 **operational impact on demography; no adverse indirect operational impact on local**
765 **communities; a minor beneficial indirect operational impact on employment; no indirect**

766 **operational impact on WUS revenue; and a minor beneficial indirect operational impact on**
767 **tax revenues in the District.**

768 The indirect operational impacts of Alternative E would be as described for Alternative A in
769 **Section 5.14.4.2, *Alternative A, Indirect Operational Impacts*** except for the indirect impacts
770 associated with the potential development of the Federal air rights, which are addressed
771 below.

Potential Federal Air-Rights Development

772 **Relative to the No-Action Alternative, in Alternative E, the potential development of the**
773 **Federal air right as office space would result in a negligible indirect operational impact on**
774 **demography; no indirect operational impact on local communities; a moderate beneficial**
775 **indirect operational impact on employment; a beneficial indirect operational impact on**
776 **WUS revenue; and a minor beneficial indirect operational impact on District tax revenue.**

777 In Alternative E, the potential Federal air-rights development would be the same as in
778 Alternative D. Associated indirect operational impacts would be the same. They are
779 described in **Section 5.14.4.5, *Alternative D, Indirect Operational Impacts***.

Construction Impacts

Demographics

780 **Construction of Alternative E would have no impact on demography.**

781 Like the construction of all Action Alternatives, the construction of Alternative E would cause
782 neither an influx nor a displacement of residential populations in the Local or the Regional
783 Study Area.

Community Disruption and Other Social Benefits or Impacts

784 **Construction of Alternative E would have moderate adverse impacts on local communities.**

785 The impacts of constructing Alternative E would be the same as those of constructing
786 Alternative B. They are described in **Section 5.14.4.3, *Alternative B, Construction Impacts***.

Construction Employment

787 **Construction of Alternative E would have a minor beneficial impact on employment.**

788 Construction of Alternative E would support numerous jobs during the entire construction
789 period. As shown in **Table 5-177**, on average, Alternative E would support approximately
790 4,314 direct jobs and 1,818 indirect and induced jobs annually, for a total of 6,132 jobs.²⁷

²⁷ As noted above, the modeling of construction impacts was based on Amtrak's rough-order-of-magnitude combined estimates, which include the private and potential Federal overbuild deck but exclude the column removal work (see **Appendix A8, *Action Alternatives Cost Estimates Memorandum***).

Table 5-177. Construction Employment Estimates, Alternative E

| Phase | Construction Year | Direct Employment | Indirect Employment | Induced Employment | Total Employment |
|-----------------------|-------------------|-------------------|---------------------|--------------------|------------------|
| 1 | 1 | 3,448 | 322 | 1,132 | 4,902 |
| 1 | 2 | 3,448 | 322 | 1,132 | 4,902 |
| 1 and 2 | 3 | 4,105 | 384 | 1,348 | 5,836 |
| 2 | 4 | 4,142 | 387 | 1,359 | 5,888 |
| 2 | 5 | 4,142 | 387 | 1,359 | 5,888 |
| 2 and 3 | 6 | 3,815 | 357 | 1,252 | 5,424 |
| 3 | 7 | 3,553 | 332 | 1,166 | 5,052 |
| 3 | 8 | 3,553 | 332 | 1,166 | 5,052 |
| 3 and 4 | 9 | 4,623 | 431 | 1,517 | 6,572 |
| 4 | 10 | 5,312 | 496 | 1,744 | 7,552 |
| 4 | 11 | 5,312 | 496 | 1,744 | 7,552 |
| 4 | 12 | 5,312 | 496 | 1,744 | 7,552 |
| 4 | 13 | 5,312 | 496 | 1,744 | 7,552 |
| 4 | 14 | 1,784 | 166 | 586 | 2,536 |
| Annual Average | | 4,314 | 402 | 1,416 | 6,132 |

Intermediate Phase not included.

791 While beneficial, the impact would be minor. The total annual average number of direct jobs
 792 that Alternative E would support for the duration of the construction period would represent
 793 approximately 0.57 percent of total employment in the two relevant sectors in the
 794 Washington-Arlington-Alexandria Metropolitan Statistical Area as of early 2019.

Washington Union Station Revenue

795 **Construction of Alternative E would result in a major adverse impact on WUS revenue.**

796 The impact of constructing Alternative E on WUS revenue would be as described for
 797 Alternative B in **Section 5.14.4.3, Alternative B, Construction Impacts.**

Other Economic Benefits or Impacts

798 **Construction of Alternative E would have a moderate beneficial impact on the regional
 799 economy.**

800 Construction of Alternative E would have a moderate beneficial impact on the regional
 801 economy from the spending of the income generated by the jobs the construction of the
 802 Project would support. **Table 5-178** shows annual estimates of this income. The impact
 803 would be moderate in the context of the Washington-Arlington-Alexandria Metropolitan
 804 Area. In 2017, the gross domestic product of this area was approximately \$17.5 trillion.

Table 5-178. Construction Annual Labor Income, Value and Output, Alternative E

| Phase | Construction Year | Annual Labor Income | Annual Value | Annual Total Output |
|---------|-------------------|---------------------|---------------|---------------------|
| 1 | 1 | \$319,748,726 | \$447,005,190 | \$737,885,056 |
| 1 | 2 | \$319,748,726 | \$447,005,190 | \$737,885,056 |
| 1 and 2 | 3 | \$380,720,570 | \$532,243,155 | \$878,589,957 |
| 2 | 4 | \$384,085,970 | \$536,947,947 | \$886,356,300 |
| 2 | 5 | \$384,085,970 | \$536,947,947 | \$886,356,300 |
| 2 and 3 | 6 | \$353,840,002 | \$494,664,417 | \$816,557,592 |
| 3 | 7 | \$329,529,172 | \$460,678,146 | \$760,455,421 |
| 3 | 8 | \$329,529,172 | \$460,678,146 | \$760,455,421 |
| 3 and 4 | 9 | \$428,693,711 | \$599,309,077 | \$989,297,713 |
| 4 | 10 | \$492,675,830 | \$688,755,374 | \$1,136,949,434 |
| 4 | 11 | \$492,675,830 | \$688,755,374 | \$1,136,949,434 |
| 4 | 12 | \$492,675,830 | \$688,755,374 | \$1,136,949,434 |
| 4 | 13 | \$492,675,830 | \$688,755,374 | \$1,136,949,434 |
| 4 | 14 | \$165,431,905 | \$231,271,978 | \$381,767,684 |

Values presented in 2019 dollars.
 Intermediate Phase not included.

Comparison to Existing Conditions

805 The impacts of Alternative E on socioeconomic conditions would generally be the same
 806 relative to existing conditions as they would be relative to the No-Action Alternative. The
 807 District’s economy would grow between the present and 2040, and Alternative D’s impacts
 808 would be greater when compared to existing conditions than when compared to the No-
 809 Action Alternative conditions. Given the respective size of the existing economy and the
 810 impacts, the difference would be small.

5.14.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

Demographics

811 **Relative to the No-Action Alternative, Alternative A-C would have no direct operational**
 812 **impact on demographic conditions.**

813 Alternative A-C would not directly add or displace any residential populations in the Local
 814 Study Area or the Regional Study Area.

Community Disruption and Other Social Benefits or Impacts

815 **Relative to the No-Action Alternative, Alternative A-C would have major beneficial direct**
816 **operational impacts on local communities.**

817 The impacts of Alternative A-C would be the same as those of Alternative A. They are
818 described in **Section 5.14.4.2, Alternative A, Direct Operational Impacts.**

Employment

819 **Relative to the No-Action Alternative, Alternative A-C would have a minor beneficial direct**
820 **operational impact on employment.**

821 The impacts of Alternative A-C would be the same as those of Alternative A. They are
822 described in **Section 5.14.4.2, Alternative A, Direct Operational Impacts.**

Washington Union Station Revenue

823 **Relative to the No-Action Alternative, Alternative A-C would have a moderate adverse**
824 **direct operational impact on WUS revenue.**

825 Alternative A-C would reduce the number of revenue-generating parking spaces at the
826 station from approximately 2,205 in the No-Action Alternative to about 1,600, a reduction of
827 approximately 27 percent. Based on USRC's revenue from parking in fiscal year 2016, this
828 would amount to approximately \$2.3 million (2017 dollars) in lost revenue. This order-of-
829 magnitude estimate does not account for the fact that decreasing the total number of spaces
830 may increase the revenue generated by each space due to reduced supply and steady or
831 increasing demand.

832 Revenue from retail would remain approximately the same as or be less than in the No-
833 Action Alternative for the same reasons as explained for Alternative A in **Section 5.14.4.2,**
834 **Alternative A, Direct Operational Impacts.**

835 Altogether, Alternative A-C would cause a net loss in revenue for WUS. The loss would be a
836 moderate adverse impact because all parking, which is the main source of income for WUS,
837 would continue to generate revenue while the permanent loss of retail, if it occurs, would
838 likely be small.

Other Direct Economic Impacts

839 **Relative to the No-Action Alternative, Alternative A-C would have a minor beneficial direct**
840 **operational impact on the local and regional economy.**

841 The impact of Alternative A-C on the local and regional economy from additional retail at
842 WUS would be the same as that of Alternative A. These impacts are described in **Section**
843 **5.14.4.2, Alternative A, Direct Operational Impacts.**

Indirect Operational Impacts

844 **Relative to the No-Action Alternative, Alternative A-C would have a negligible indirect**
845 **operational impact on demography; no adverse indirect operational impact on local**

846 **communities; a minor beneficial indirect operational impact on employment; no indirect**
847 **operational impact on WUS revenue; and a minor beneficial indirect operational impact on**
848 **tax revenues in the District.**

849 The indirect operational impacts of Alternative A-C would be as described for Alternative A in
850 **Section 5.14.4.2, *Alternative A, Indirect Operational Impacts*** with the exception the impacts
851 associated with the potential Federal air-rights development, described below.

Potential Federal Air-Rights Development

852 **Relative to the No-Action Alternative, in Alternative A-C, the potential development of the**
853 **Federal air right as office space would result in a negligible indirect operational impact on**
854 **demography; no indirect operational impact on local communities; a moderate beneficial**
855 **indirect operational impact on employment; a beneficial indirect operational impact on**
856 **WUS revenue; and a minor beneficial indirect operational impact on District tax revenue.**

857 The development of the remaining Federal air rights in Alternative A-C as approximately
858 380,000 square feet of office space, as assumed for the purposes of the impact analysis,
859 would have a beneficial impact on WUS revenue through the lease of the space (or other
860 mechanism through which development would be achieved). This impact cannot be
861 quantified at this time but it would at least partially offset the loss of revenue from the
862 reduction in parking capacity. The provision of this office space would have a small and
863 negligible impact on demography in the Local Study Area if some employees move to the
864 area to be closer to their workplace. Given WUS's accessibility by transit and the moderate
865 number of employees at the site, this impact would be small and negligible. Development of
866 the Federal air rights into office space would not cause disruptions to local communities, as it
867 would occur within the footprint of a pre-existing facility. It would bring approximately 1,520
868 additional new jobs to the Local Study Area, a moderate beneficial impact in the context of
869 the Local and Regional Study Areas. These jobs would generate tax revenue for the District.
870 The beneficial impact on tax revenue would be minor in the context of the District as a
871 whole.

Construction Impacts

Demographics

872 **Construction of Alternative A-C would have no impacts on demography.**

873 Like the construction of the other Action Alternatives, the construction of Alternative A-C
874 would cause neither an influx nor a displacement of residential populations in the Local or
875 the Regional Study Area.

Community Disruption and Other Social Benefits or Impacts

876 **Construction of Alternative A-C would have moderate adverse impacts on local**
877 **communities.**

878 The adverse impacts of the construction of Alternative A-C on local communities would be
879 the same as those of Alternative A (see **Section 5.14.4.2, Alternative A, Construction**
880 *Impacts*).

Construction Employment

881 **Construction of Alternative A-C would have a minor beneficial impact on employment.**

882 Alternative A-C would generate approximately the same number of jobs as Alternative A (see
883 **Section 5.14.4.2, Alternative A, Construction Impacts**) as total cost estimates for both
884 alternatives are approximately the same.

Washington Union Station Revenue

885 **Construction of Alternative A-C would have a major adverse impact on WUS revenue.**

886 The impacts of constructing Alternative A-C on WUS revenue would be the same at those of
887 constructing Alternative A. These impacts are described in **Section 5.14.4.2, Alternative A,**
888 *Construction Impacts*.

Other Economic Benefits or Impacts

889 **Construction of Alternative A-C would have a moderate beneficial impact on the regional**
890 **economy.**

891 Alternative A-C would cost almost the same to construct as Alternative A. Therefore, the
892 economic benefits and impacts of this alternative would be the same as those of Alternative
893 A, described in **Section 5.14.4.2, Alternative A, Construction Impacts**.

Comparison to Existing Conditions

894 Alternative A-C impacts on socioeconomics relative to existing conditions would be generally
895 the same as relative to the No-Action Alternative. The District's economy would grow
896 between the present and 2040 and the impacts of Alternative A-C would be relatively greater
897 when compared to existing conditions than compared to No-Action Alternative conditions.
898 Given the respective size of the existing economy and the impacts, the difference would be
899 small.

5.14.5 Comparison of Alternatives

900 **Table 5-179** presents a comparison of the impacts of the No-Action Alternative and six Action
901 Alternatives on social and economic conditions. **Table 5-180** summarizes the impacts of each
902 alternative in greater detail.

903 For all alternatives, operational impacts would be beneficial with the exception of impacts on
904 WUS revenue in the Action Alternatives, due the partial (Alternatives A and A-C) or total
905 (other Action Alternatives) loss of parking. In all Action Alternatives, the potential
906 development of the Federal air rights could offset this loss. In general, excepting employment

907 in the Project Area, the beneficial operational impacts of the Action Alternatives would be
908 greater than those of the No-Action Alternative.

909 Among the Action Alternatives, the primary differentiator would be the employment and
910 economic impacts from construction, which would be a function of cost and duration. Taking
911 both factors into account, Alternatives B and E would support the most jobs and Alternatives
912 A and A-C the fewest, with Alternatives C and D in the middle. Similarly, Alternatives B and E
913 would generate the greatest total economic output and Alternatives A and A-C the smallest,
914 with Alternative C and D generating a little more than Alternatives A and A-C.

915 Constructing any of the Action Alternatives would cause disruptions to surrounding
916 neighborhoods, but these impacts would remain moderate because of the focus of
917 construction activities on the rail terminal and immediately adjacent areas. Based on
918 duration, Alternatives A and A-C would have the smallest impact and Alternatives B and E the
919 greatest one. In all Action Alternatives, column removal work would displace some existing
920 retail at WUS for approximately 2 years and 6 months at least, overlapping with Construction
921 Phases 1 and 2.

5.14.6 Avoidance, Minimization and Mitigation Evaluation

922 All Action Alternatives would result in a permanent loss of revenue for WUS due to a partial
923 or complete loss of parking. All Action Alternatives except Alternatives A and A-C would
924 eliminate all parking revenue since the new parking would be outside WUS's lease area and
925 generate no revenue for the station under current leasing agreements. Additionally, in all
926 Action Alternatives, construction of the Project would displace some existing retail outlets
927 during column removal work (approximately 2 years and 6 months overlapping with
928 construction Phases 1 and 2) and eliminate parking revenue during Phase 4.

929 Mitigation that FRA is considering for these major impacts on revenue includes extending
930 WUS's lease area to encompass part or all of the new parking and retail areas, which then
931 would generate new revenue for the station. The scope and financial dimension of the
932 impacts from the column removal work on existing retail, and the need for amending existing
933 lease agreements, would need to be evaluated among FRA, USRC, USI, and the affected
934 businesses.

5.14.7 Permits and Regulatory Compliance

935 There are no compliance efforts or permits applicable to socioeconomic conditions.

Table 5-179. Comparison of Alternatives, Social and Economic Conditions

| Impact Category | Type of Impact | No-Action Alternative | Alternative A | Alternative B | Alternative C (Either Option) | Alternative D | Alternative E | Alternative A-C (Preferred) |
|---|---------------------------------------|----------------------------|------------------------------|----------------------------|-------------------------------|---------------|---------------|-----------------------------|
| Demographics | Direct Operational | Minor impact | No impact | | | | | |
| | Indirect Operational | Negligible impact | | | | | | |
| | Federal Air-Rights Development | N/A | No impact | Negligible impact | | | | |
| | Construction | No impact | | | | | | |
| Community Disruption and Other Social Benefits | Direct Operational | Moderate beneficial impact | Major beneficial impact | | | | | |
| | Indirect Operational | No impacts | | | | | | |
| | Federal Air-Rights Development | N/A | No impact | | | | | |
| | Construction | Minor adverse impacts | Moderate adverse impact | | | | | |
| Employment | Direct Operational | Moderate beneficial impact | Minor beneficial impact | | | | | |
| | Indirect Operational | Minor beneficial impact | | | | | | |
| | Federal Air-Rights Development | N/A | Negligible beneficial impact | Moderate beneficial impact | | | | |
| | Construction | Minor beneficial impact | | | | | | |

| Impact Category | Type of Impact | No-Action Alternative | Alternative A | Alternative B | Alternative C (Either Option) | Alternative D | Alternative E | Alternative A-C (Preferred) |
|-------------------------------|---------------------------------------|------------------------------|------------------------------|-------------------------|-------------------------------|---------------|---------------|-----------------------------|
| WUS Revenue | Direct Operational | No impact | Moderate adverse impact | Major adverse impact | | | | Moderate adverse impact |
| | Indirect Operational | Negligible beneficial impact | No impact | | | | | |
| | Federal Air-Rights Development | N/A | Beneficial | | | | | |
| | Construction | Minor adverse impacts | Major adverse impact | | | | | |
| Other Economic Impacts | Direct Operational | Minor beneficial impact | Minor beneficial impact | | | | | |
| | Indirect Operational | Moderate beneficial impact | Minor beneficial impact | | | | | |
| | Federal Air-Rights Development | N/A | Negligible beneficial impact | Minor beneficial impact | | | | |
| | Construction | Moderate beneficial impact | | | | | | |

Table 5-180. Social and Economic Conditions Summary of Impacts

| Alternative | Social Impacts | Employment | WUS Revenue | Construction Social Impacts | Construction Employment ¹ | Construction Economic Impacts ¹ |
|----------------------|--|--|---|---|--|--|
| No-Action | Moderate benefits to community cohesion, connectivity and station circulation. | 8,500 new jobs from office, retail, and hotel development. | No change. | Minor community disruption in and around WUS due to construction. | N/A | N/A |
| Alternative A | Major benefits to community cohesion, connectivity and station circulation. | 1,445 new jobs from retail and Amtrak expansion; no jobs from potential Federal air-rights development. | Partial loss of parking revenue (order of magnitude: \$1.79 million based on fiscal year 2016 revenue). | Moderate community disruption in and around WUS due to construction. Concentrated in Phases 1 (2 years 5 months) and 4 (3 years 1 month). | An annual average of 6,543 jobs supported for 10 years 5 months. | Total construction cost of \$7.23 billion would spur economic output of \$586 to \$1,405 million annually to the region. |
| Alternative B | Major benefits to community cohesion, connectivity and station circulation. | 1,445 new jobs from retail and Amtrak expansion; 3,670 jobs from potential Federal air-rights development. | Total loss of parking revenue (order of magnitude: \$8.5 million based on fiscal year 2016 revenue). | Moderate community disruption in and around WUS due to construction. Concentrated in Phases 1 (2 years 5 months) and 4 (4 years 11 months). | An annual average of 6,088 jobs supported for 13 years 4 months. | Total construction cost of \$8.63 billion would spur economic output of \$382 to \$1,139 million annually to the region. |

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| Alternative | Social Impacts | Employment | WUS Revenue | Construction Social Impacts | Construction Employment ¹ | Construction Economic Impacts ¹ |
|----------------------|---|--|--|---|--|--|
| Alternative C | Major benefits to community cohesion, connectivity and station circulation. | 1,445 new jobs from retail and Amtrak expansion; 3,810 jobs from potential Federal air-rights development. | Total loss of parking revenue (order of magnitude: \$8.5 million based on fiscal year 2016 revenue). | Moderate community disruption in and around WUS due to construction. Concentrated in Phases 1 (2 years 5 months) and 4 (4 years). | An annual average of 6,374 jobs supported for 11 years 3 months. | Total construction cost of \$7.55 billion would spur economic output of \$305 to \$1,236 million annually to the region. |
| Alternative D | Major benefits to community cohesion, connectivity and station circulation. | 1,529 new jobs from retail and Amtrak expansion; 2,752 jobs from potential Federal air-rights development. | Total loss of parking revenue (order of magnitude: \$8.5 million based on fiscal year 2016 revenue). | Moderate community disruption in and around WUS due to construction. Concentrated in Phases 1 (2 years 5 months) and 4 (4 years). | An annual average of 6,416 jobs supported for 11 years 3 months. | Total construction cost of \$7.61 billion would spur economic output of \$313 to \$1,269 million annually to the region. |
| Alternative E | Major benefits to community cohesion, connectivity and station circulation. | 1,529 new jobs from retail and Amtrak expansion; 2,752 jobs from potential Federal air-rights development. | Total loss of parking revenue (order of magnitude: \$8.5 million based on fiscal year 2016 revenue). | Moderate community disruption in and around WUS due to construction. Concentrated in Phases 1 (2 years 5 months) and 4 (4 years 11 months). | An annual average of 6,132 jobs supported for 13 years 4 months. | Total construction cost of \$8.69 billion would spur economic output of \$382 to \$1,137 million annually to the region. |

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| Alternative | Social Impacts | Employment | WUS Revenue | Construction Social Impacts | Construction Employment ¹ | Construction Economic Impacts ¹ |
|------------------------|---|--|--|---|--|--|
| Alternative A-C | Major benefits to community cohesion, connectivity and station circulation. | 1,445 new jobs from retail and Amtrak expansion; 1,520 jobs from potential Federal air-rights development. | Partial loss of parking revenue (order of magnitude: \$2.3 million based on fiscal year 2016 revenue). | Moderate community disruption in and around WUS due to construction. Concentrated in Phases 1 (2 years 5 months) and 4 (3 years 1 month). | An annual average of 6,543 jobs supported for 10 years 5 months. | Total construction cost of \$7.24 billion would spur economic output of \$586 to \$1,405 million annually to the region. |

1. Intermediate Phase not included. Note that construction-economic impact modeling was performed on the basis of the rough-order-of magnitude combined construction cost estimates developed by Amtrak, which are the only estimates available at the phase level (see **Appendix A8, Action Alternatives Cost Estimates Memorandum**; the combined estimates include costs associated with the private air-rights development deck and potential Federal air-rights development deck.)

5.15 Public Safety and Security

1 This section describes and characterizes the potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on public safety and security conditions. If
3 applicable, it also recommends measures to avoid, minimize, or mitigate potential adverse
4 impacts and identifies permitting and regulatory compliance requirements.

5.15.1 Regulatory Context and Guidance

5 Relevant Federal policies, regulations and guidance that pertain to safety and security are
6 listed in **Section 4.15.1, *Regulatory Context and Guidance***.

5.15.2 Study Area

7 As defined in **Section 4.15.2, *Study Area***, the Local Study Area for safety and security is the
8 same as the Local Study Area for socioeconomic conditions (**Figure 4-30**). The Regional Study
9 Area includes the relevant service boundaries for fire, law enforcement, and emergency
10 services in the District (**Figure 4-31**).

5.15.3 Methodology

11 This section summarizes the methodology for evaluating the potential impacts of the
12 alternatives on public safety and security. **Appendix C3, *Washington Union Station Expansion***
13 ***Project, Environmental Consequences Technical Report, Section 15.4, Methodology*** provides a
14 description of the analysis methodology. A summary is below. Impacts were assessed as
15 major, moderate, minor, or negligible based on the intensity scale defined in **Section 5.1.1,**
16 ***Definitions***.

5.15.3.1 Operational Impacts

17 To assess the operational impacts of the alternatives on public safety and security, the
18 relevant aspects of each alternative were reviewed to determine how each would potentially
19 create new or heightened risks (adverse impact) or reduce or eliminate risks (beneficial
20 impact). Relevant considerations included: changes in the number of persons or vehicles that
21 would be able to gain access to WUS; changes in security procedures; changes in or
22 modification of security and safety features; design considerations; and changes in potential
23 demand for police and emergency services.

5.15.3.2 Construction Impacts

24 Assessing potential construction impacts on public safety and security involved reviewing the
25 security and safety risks that construction operations at WUS would potentially create.

26 Factors considered included: changes in access opportunities; changes in security
27 procedures; removal or addition of security and safety features; closures of roads and
28 sidewalks; and construction-related traffic.

5.15.4 Impact Analysis

29 This section presents the potential impacts of the No-Action Alternative and the Action
30 Alternatives on public safety and security.

5.15.4.1 No-Action Alternative

Direct Operational Impacts

31 **Relative to existing conditions, in the No-Action Alternative, there would be major adverse**
32 **direct operational impacts on public safety and security.**

33 In the No-Action Alternative, existing safety and security practices at WUS would remain in
34 place. **Section 4.15, *Public Safety and Security*** describes these practices. They include Amtrak
35 Police Department (APD) canine patrols, security cameras, and random screening and
36 searches.

37 Impacts on safety and security would result from the increase in WUS passengers across all
38 modes of transportation. Average daily passenger numbers would grow from approximately
39 58,400 to 77,500, a 33 percent increase over existing conditions. The number of visitors
40 would also increase and the private air-rights development above the rail terminal would
41 also generate access activity. This would generate additional car and truck traffic next to and
42 above the rail terminal.¹ This would increase the risk of vehicle-related crashes and vehicle-
43 based attacks (such as vehicle-borne improvised explosive devices [VBIED]). Unscreened bus
44 and freight movements would also increase.

45 The private air-rights deck would have to comply with Amtrak's vertical clearance
46 requirements. Amtrak would review and approve plans to ensure that applicable clearances
47 are met. Based on this requirement, no adverse impacts are anticipated on the safety of rail
48 operations.

49 With regard to security, based on currently available concepts, the private air-rights
50 development would include vehicular parking within the overbuild deck structure, above
51 WUS's tracks and platforms.² Public access to areas inside the structural deck for parking
52 would create new VBIED risks at a sensitive location. Such risks have been identified and

¹ Traffic and other transportation impacts are addressed in **Section 5.5, *Transportation***.

² Akridge. November 15, 2017. *Burnham Place and Washington Union Station. Concept Level Podium Structural Systems for 30'x55' Column Grid Areas*.

53 considered in a Threat and Vulnerability Risk Assessment (TVRA).³ This would be a major
54 adverse impact on security at WUS. It is anticipated that FRA, USRC, and Amtrak would work
55 with the private air-rights developer to address such risks consistent with the
56 recommendations of the TVRA including consideration of solutions that would not place
57 parking in the deck.

58 Larger volumes would result in greater potential demands on security and emergency
59 services at WUS. ADP would likely need to add staff to continue effectively policing the
60 station. The local units of the Metropolitan Police Department (MPD) and DC Fire and
61 Emergency Medical Services (EMS) would likely have to respond to a greater number of
62 incidents at and near WUS than currently. The adverse impact would be moderate because
63 the affected services would be able to plan for and evaluate future demand and incorporate
64 it in their respective staffing and operations plans. Minimization or mitigation of the potential
65 impacts would be the responsibility of the Projects' respective owners.

Indirect Operational Impacts

66 **Relative to existing conditions, the No-Action Alternative would result in minor adverse**
67 **indirect operational impacts on public safety and security.**

68 Increases in passenger, visitor, and vehicle volumes would require updating emergency
69 operations plans. They would also likely require hiring new emergency responders such as
70 medical personnel. In the context of the District's growth over the new two decades, the
71 specific impacts of the projects included in the No-Action Alternative would be minor.

Construction Impacts

72 **Construction activities in the No-Action Alternative would result in moderate adverse**
73 **impacts on public safety and security.**

74 Construction of the projects included in the No-Action Alternative would take place according
75 to different schedules and using construction methods currently unknown. In general, each
76 project would have adverse impacts on security to the extent that it would require granting
77 access to WUS or the rail terminal to workers and vehicles during the construction period.
78 Specific security risks would depend on the size of each construction site and the type and
79 duration of construction operations. It would be the responsibility of the respective project
80 owners and their contractors to minimize security risks. Adverse impacts would be moderate
81 based on the size of the projects and because they would not all take place at the same time.

82 Construction activities would have adverse impacts on public safety because construction
83 inherently poses safety risks on and adjacent to the construction site. Impacts on public
84 safety in the No-Action Alternative would be moderate based on the size and location of the
85 projects. On site, work would have to comply with applicable Occupational Safety and Health

³ The TVRA was developed by FRA and the Project Proponents in collaboration with multiple agencies and stakeholders. It was completed in July 2016.

86 Administration (OSHA) requirements and guidelines. Construction activities within the rail
87 terminal would also be subject to Amtrak’s authorization. Construction occurring within 25
88 feet of any track or overhead catenary system requires Amtrak approval and the use of track
89 protection personnel.

5.15.4.2 Alternative A

Direct Operational Impacts

90 **Relative to the No-Action Alternative, Alternative A would have a major beneficial direct**
91 **operational impact on public security and a moderate adverse direct operational impact on**
92 **public safety.**

93 Alternative A could potentially have adverse impacts on security at WUS due to the increase
94 in passenger and visitor volumes. Relative to the No-Action Alternative, combined average
95 daily passenger volumes for Amtrak, MARC, VRE, and intercity buses would increase from
96 77,500 to 128,200, or a 65 percent growth. Relative to the No-Action Alternative, this would
97 generate more car and truck traffic next to and above the rail terminal, increasing the risk of
98 vehicle-related crashes and vehicle-based attacks.

99 This potential impact would be offset by the security improvements that would result from
100 Alternative A, resulting in a net impact that would be beneficial and major. The Project
101 Proponents and FRA coordinated and would continue to coordinate with the Federal
102 Protective Service (FPS) and Department of Homeland Security when planning concourses,
103 new loading dock, and new bus facility. During the early stages of planning for the Project,
104 the Project Proponents completed a TVRA to identify threats to WUS. At a minimum, the
105 design of Alternative A would incorporate recommended safety and security principles, such
106 as clear sightlines, adequate and intuitive access for emergency responders, and spatial
107 flexibility for future security measures. The design of Alternative A would allow for the
108 screening of passengers and their luggage when entering the ticketed area to board trains.

109 The same security risks associated with the potential use of the deck structure for private air-
110 rights development parking identified for the No-Action Alternative (see **Section 5.15.4.1, No**
111 **Action Alternative, Direct Operational Impacts** above) would occur in Alternative A. While
112 these risks would not be an impact of Alternative A relative to the No-Action Alternative,
113 coordination between FRA, the Project Proponents, and the private developer would be
114 needed to address them in a manner consistent with the recommendations of the TVRA,
115 including consideration of solutions that do not place parking in the deck.

116 In contrast to the No-Action Alternative, in which no pre-screening of the goods delivered
117 through the WUS loading docks would occur, FPS would provide screening services at an

118 existing or to-be-constructed screening facility.⁴ Bus operations would be subject to some
119 level of screening through authentication and passenger screening practices, though not
120 through physical screening of buses at WUS. Bus or train maintenance activities would not be
121 affected, as they take place outside the Project Area at facilities owned by the bus and train
122 operators.

123 Increased activity at WUS would also result in greater demands on emergency services at
124 WUS, with potential increases in personnel and equipment maintenance costs. ADP would
125 likely need to add staff in order to continue effectively policing the station. Emergency
126 responders would need to allocate additional resources to firehouses and police service
127 areas to cover the additional passengers. Additionally, medical responders would have to
128 deal with changing traffic patterns and additional entry/exit points. Additional resources
129 would need to be allocated to training personnel in navigating this new geography. While this
130 would adversely affect emergency services, the adverse impact would be moderate because
131 growth would take place over time and the various affected services would have time to plan
132 to avoid personnel shortages or a significant deterioration of response times.

Indirect Operational Impacts

133 **Relative to the No-Action Alternative, Alternative A would have minor adverse indirect**
134 **operational impacts on public safety and security.**

135 Development of the Federal air rights as parking space would cause minor adverse impacts
136 because it would encourage more vehicle trips to WUS. This would further increase the risk
137 of vehicle-based crashes and attacks and potential demand on emergency services.
138 Alternative A may also have a minor adverse indirect operational impact on FPS if demand
139 exceeded FPS's available capacity. FPS would then potentially need to establish a new facility
140 for WUS with attendant staffing and operating costs.

Construction Impacts

141 **Construction of Alternative A would have major adverse impacts on security and moderate**
142 **adverse impacts on public safety.**

143 Construction of Alternative A would have major adverse impacts on security because
144 construction operations would require access to WUS and the rail terminal by a large number
145 of workers and vehicles for approximately 11 years and 5 months. Physical access to the
146 construction site may make it a target for terrorism and criminal activity. Access to
147 construction information, such as scheduling dates, storage locations, and management
148 activities may also make the site vulnerable to criminals.

149 Construction would also affect operational station security. Vehicles and workers may have
150 access to internal station areas not normally accessible to them. Construction vehicles and

⁴ Loading dock deliveries includes those for the Commissary (food and beverage for Amtrak trains), retail (including restaurants), and Package Express, a service that ships packages via Amtrak trains.

151 large construction equipment such as cranes may disrupt video monitoring and patrolling of
152 select areas of WUS, leading to diminished security monitoring.

153 All these security risks would be compounded by the size of the construction site, the
154 sensitivity of WUS as a major transportation hub and potential target, and the duration of the
155 construction, which would involve large numbers of workers on multiple shifts for more than
156 11 years.

157 Construction of Alternative A would also have adverse impacts on public safety because
158 construction inherently poses safety risks. Adverse impacts on safety may arise from the
159 physical disturbance associated with construction. Examples include the excavation of open
160 trenches or pits; the movement and operation of large motorized equipment and trucks; or
161 the closure of sidewalks, disruption of well-used pathways, and changes in traffic patterns.
162 The impacts on public safety would be moderate because most activities would take place
163 within the Project Area, members of the public would not have access to the construction
164 zone, and measures such as those described in **Section 5.15.6, Avoidance, Minimization and**
165 *Mitigation Evaluation*, would be implemented.

166 On site, work would need to comply with applicable OSHA requirements and guidelines for
167 general and construction industries. Construction activities within the rail terminal would
168 also be subject to Amtrak's requirements and authorization. Construction occurring within 25
169 feet of any rail track or overhead catenary system requires Amtrak approval and the use of
170 track protection personnel. Specific clearances to active track and catenary must be
171 maintained during construction. Crane operations are subject to strict policies when
172 operating over live tracks. Construction work in the vicinity of the DC Streetcar would require
173 contractors to comply with the safety training requirements of the DC Streetcar Track
174 Allocation Program.

175 Within WUS, the First Street Tunnel column removal work would potentially involve the
176 demolition of existing flooring and structural elements within parts of the Retail and
177 Ticketing Concourse. As explained in **Section 5.15.6, Avoidance, Minimization and Mitigation**
178 *Evaluation*, Physical risks to persons (for instance trip and fall accidents) would be avoided by
179 closing off the area and ensuring it is only accessible to authorized personnel.

180 Outside the construction site, construction of Alternative A would require operating and
181 moving equipment and other materials on public streets. The movement of heavy trucks and
182 material would pose safety risks and could cause conflicts and accidents with other vehicles,
183 pedestrians, and bicyclists. Sidewalk, bike lane, and road closures as well as the use of
184 temporary drop-off and pick-up areas may cause confusion for drivers, bicyclists and
185 pedestrians, increasing the risk of conflicts. Construction may diminish lines of sight and road
186 closures may affect emergency response services. These risks would be minimized and
187 mitigated as described in **Section 5.15.6, Avoidance, Minimization and Mitigation Evaluation**.

188 Hazardous materials (such as fuel, lubricants, or solvents among others) and hazardous waste
189 would be stored on the construction site. These would be managed in accordance with

190 occupational health and safety regulations. Spills or leaching of hazardous materials can be
191 dangerous to people and property nearby (see **Section 5.4.4, *Solid Waste Disposal and***
192 ***Hazardous Materials, Impact Analysis***). Emergency and security personnel could encounter
193 such materials if they respond to an emergency at WUS during construction.

Comparison to Existing Conditions

194 Relative to existing conditions, Alternative A would have a moderate beneficial direct
195 operational impact on security and moderate adverse direct operational impacts on public
196 safety. Although the increase in passenger and visitor volumes at WUS in Alternative A would
197 be greater when compared to existing conditions than when compared to the No-Action
198 Alternative (from 58,400 to 128,200, or a 120 percent growth instead of 65 percent), the
199 security features included in the alternative would still improve security conditions, as would
200 be the case relative to the No-Action Alternative.

201 The potential increase in demand on police and emergency services would be
202 proportionately greater when compared to existing conditions than when compared to the
203 No-Action Alternative, since existing conditions do not include the private air-rights
204 development and its residential and working population. The adverse impact would be
205 moderate as affected services would have ample time to plan for the increase.

5.15.4.3 Alternative B

Direct Operational Impacts

206 **Relative to the No-Action Alternative, Alternative B would have a major beneficial direct**
207 **operational impact on public security and a moderate adverse direct operational impact on**
208 **public safety.**

209 Alternative B would have the same beneficial and adverse direct operational impacts as
210 described for Alternative A (**Section 5.15.4.2, *Alternative A, Direct Operational Impacts***). In
211 addition, the two levels of below-ground parking under the rail terminal included in
212 Alternative B would create a new security risk by making WUS and parts of the private air-
213 rights development potentially susceptible to a VBIED attack from underneath the rail
214 terminal. This would be taken into account when planning and designing security measures.
215 Net impacts on security would be beneficial and major.

Indirect Operational Impacts

216 **Relative to the No-Action Alternative, Alternative B would have moderate adverse indirect**
217 **operational impacts on public safety and security.**

218 In Alternative B, the potential Federal air-rights development would consist of approximately
219 917,420 square feet of office space. It would cause a moderate adverse impact on safety and
220 security because of the working population it would add to the Project Area (an estimated
221 3,670 employees) and the presence of a large, commercial development above WUS' tracks
222 and platforms. The additional working population and associated vehicular activity would

223 increase the risk of vehicle-based crashes and attacks. It would also potentially generate
224 additional demand on emergency services. These impacts would be moderate in the context
225 of the expanded station and the adjacent private air-rights development.

226 like the other Action Alternatives, Alternative B would potentially result in a minor adverse
227 indirect operational impact on FPS if vehicle screening demand exceeded FPS's available
228 capacity. In such a case, FPS would potentially need a new facility for WUS with attendant
229 staffing and operating costs.

Construction Impacts

230 **Construction of Alternative B would have major adverse impacts on security and moderate**
231 **adverse impacts on public safety.**

232 Construction of Alternative B would take place over approximately 14 years and 4 months.
233 Potential impacts on public safety and security would be as described for Alternative A in
234 **Section 5.15.4.2, Alternative A, Construction Impacts**).

Comparison to Existing Conditions

235 The impacts of Alternative B on safety and security relative to existing conditions would be as
236 described for Alternative A in **Section 5.15.4.2, Alternative A, Comparison to Existing**
237 *Conditions*.

5.15.4.4 Alternative C

Direct Operational Impacts

238 **Relative to the No-Action Alternative, Alternative C (either option) would have a moderate**
239 **beneficial direct operational impact on public security and a moderate adverse direct**
240 **operational impact on public safety.**

241 Alternative C would have the same beneficial and adverse direct operational impacts as
242 described for Alternative B (**Section 5.15.4.3, Alternative B, Direct Operational Impacts**).

243 Alternative C would create an additional risk to WUS by placing a bus pick-up and drop-off
244 area between the historic station building and the train hall. A VBIED or vehicle ramming
245 attack at this location could cause damage to the adjacent Retail and Ticketing Concourse.
246 Alternative C would also adversely affect the private air-rights development because it would
247 place the bus facility and above-ground parking facility north of H Street NE, within the
248 private air rights. The air-rights owner may develop the unused air rights above the facilities.
249 The presence of buses and parking below this development would create safety risks for
250 persons accessing the development and security risks from VBIED for the structure above the
251 parking facility. Although the security features that would be incorporated in Alternative C
252 would result in net beneficial impacts, these two security issues would keep these impacts
253 moderate.

Indirect Operational Impacts

254 **Relative to the No-Action Alternative, Alternative C (either option) would have moderate**
255 **adverse indirect operational impacts on public safety and security.**

256 The indirect operational impacts of Alternative C would be as described in **Section 5.15.4.3,**
257 *Alternative B, Indirect Operational Impacts* for Alternative B. In Alternative C, the Federal air-
258 rights development would be a little larger than in Alternative B, consisting of approximately
259 952,600 square feet of office space and an estimated 3,810 employees, but this would not
260 substantially change the associated impacts.

Construction Impacts

261 **Construction of Alternative C (either option) would have major adverse impacts on security**
262 **and moderate adverse impacts on public safety.**

263 Construction of Alternative C would take place over approximately 12 years and 3 months.
264 Impacts on public safety and security would be as described for Alternative A in **Section**
265 **5.15.4.2, Alternative A, Construction Impacts.**

Comparison to Existing Conditions

266 Relative to existing conditions, Alternative C would have a moderate beneficial direct
267 operational impact on security and moderate adverse direct operational impacts on public
268 safety. Although the increase in passenger and visitor volumes at WUS in Alternative C be
269 greater when compared to existing conditions than when compared to the No-Action
270 Alternative (from 58,400 to 128,200, or a 120 percent growth instead of 65 percent), the
271 security features included in the alternative would offset this increase and improve
272 conditions, as would be the case relative to the No-Action Alternative, and to the same
273 degree. The potential increase in demand on police and emergency services would also be
274 proportionately greater when compared to existing conditions than when compared to the
275 No-Action Alternative, since existing conditions do not include the private air-rights
276 development and its residential and working population. The adverse impact would be
277 moderate as affected services would have ample time to plan for the increase.

5.15.4.5 Alternative D

Direct Operational Impacts

278 **Relative to the No-Action Alternative, Alternative D would have a moderate beneficial**
279 **direct operational impact on public security and a moderate adverse direct operational**
280 **impact on public safety.**

281 Alternative D would have the same direct operational impacts on public safety and security
282 as Alternative C (**Section 5.15.4.4, Alternative C, Direct Operational Impacts**). In this
283 alternative, the parking facility would be within the private air rights north of H Street NE,
284 just south of K Street NE. This would create the same risk to the private air-right

285 development above the facility as in Alternative C. The bus facility integrated with the train
286 hall would create the same risk for WUS as Alternative C's bus pick-up and drop-off area.

Indirect Operational Impacts

287 **Relative to the No-Action Alternative, Alternative D would have moderate adverse indirect**
288 **operational impacts on public safety and security.**

289 The indirect operational impacts of Alternative D would be as described for Alternative B in
290 **Section 5.15.4.3, Alternative B, Indirect Operational Impacts**). In Alternative D, the Federal
291 air-rights development would be smaller than in Alternative B, with approximately 688,050
292 square feet of office space and an estimated 2,752 employees. With regard to public safety
293 and security impacts, this would not make a measurable difference.

Construction Impacts

294 **Construction of Alternative D would have major adverse impacts on security and moderate**
295 **adverse impacts on public safety.**

296 Construction of Alternative D would take place over approximately 12 years and 3 months.
297 Impacts on public safety and security would be as described for Alternative A in **Section**
298 **5.15.4.2, Alternative A, Construction Impacts**.

Comparison to Existing Conditions

299 The impacts of Alternative D on public security and safety relative to existing conditions
300 would be as described for Alternative C in **Section 5.15.4.4, Alternative C, Comparison to**
301 **Existing Conditions**.

5.15.4.6 Alternative E

Direct Operational Impacts

302 **Relative to the No-Action Alternative, Alternative E would have a moderate beneficial**
303 **direct operational impact on public security and a moderate adverse direct operational**
304 **impact on public safety.**

305 Alternative E would have the same major adverse and moderate beneficial direct operational
306 impacts on public safety and security as Alternative B (**Section 5.15.4.3, Alternative B, Direct**
307 **Operational Impacts**). In addition, the integrated bus facility-train hall would create a VBIED
308 risk similar to Alternative C's with the bus drop-off and pick-up area (**Section 5.15.4.4,**
309 **Alternative C, Direct Operational Impacts**). Although the security features that would be
310 incorporated in Alternative E would result in net beneficial impacts, this additional security
311 issue would keep these impacts moderate.

Indirect Operational Impacts

312 **Relative to the No-Action Alternative, Alternative E would have moderate adverse indirect**
313 **operational impacts on public safety and security.**

314 The adverse indirect operational impacts of Alternative E on public safety and security would
315 be as described for Alternative D in **Section 5.15.4.5, *Alternative D, Indirect Operational***
316 ***Impacts***. The potential Federal air-rights development would be the same in both
317 alternatives.

Construction Impacts

318 **Construction of Alternative E would have major adverse impacts on security and moderate**
319 **adverse impacts on public safety.**

320 Construction of Alternative E would take place over approximately 14 years and 4 months.
321 Impacts on public safety and security would be as described for Alternative A in **Section**
322 **5.15.4.2, *Alternative A, Construction Impacts***.

Comparison to Existing Conditions

323 The impacts of Alternative E on public security and safety relative to existing conditions
324 would be as described for Alternative C in **Section 5.15.4.4, *Alternative C, Comparison to***
325 ***Existing Conditions***.

5.15.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

326 **Relative to the No-Action Alternative, Alternative A-C would have a major beneficial direct**
327 **operational impact on public security and a moderate adverse direct operational impact on**
328 **public safety.**

329 Alternative A-C would have the same direct operational impacts on public safety and security
330 as Alternative A (**Section 5.15.4.2, *Alternative A, Direct Operational Impacts***).

Indirect Operational Impacts

331 **Relative to the No-Action Alternative, Alternative A-C would have moderate adverse**
332 **indirect operational impacts on public safety and security.**

333 The indirect operational impacts of Alternative A-C would be as described for Alternative B in
334 **Section 5.15.4.3, *Alternative B, Indirect Operational Impacts***. In Alternative A-C, the Federal
335 air-rights development would be smaller than in Alternative B, with approximately 380,000
336 square feet of office space and an estimated 1,520 employees. With regard to public safety
337 and security impacts, this would not make a measurable difference.

Construction Impacts

338 **Construction of Alternative A-C would have major adverse impacts on security and**
 339 **moderate adverse impacts on public safety.**

340 Construction of Alternative A-C would take place over approximately 11 years and 5 months.
 341 Impacts on public safety and security would be as described for Alternative A in **Section**
 342 **5.15.4.2, Alternative A, Construction Impacts.**

Comparison to Existing Conditions

343 The impacts of Alternative A-C on public security and safety relative to existing conditions
 344 would be as described for Alternative A in **Section 5.15.4.2, Alternative A, Comparison to**
 345 **Existing Conditions.**

5.15.5 Comparison of Alternatives

346 **Table 5-181** summarizes the impacts of the alternatives. The main differences among the
 347 Action Alternatives concern security impacts. Because all Action Alternatives would
 348 incorporate enhanced security features, all would result in net beneficial impacts on security
 349 in spite of the risks born of greater activity at the station. However, because Alternatives C
 350 through E include bus access between the train hall and historic station building, their net
 351 beneficial impacts would be moderate rather than major.

Table 5-181. Comparison of Alternatives, Public Safety and Security

| Resource Category | Type of Impact | No-Action Alternative | Alternative A | Alternative B | Alternative C (Either Option) | Alternative D | Alternative E | Alternative A-C (Preferred) |
|-------------------|----------------------|--------------------------|--------------------------|--------------------------|-------------------------------|---------------|---------------|-----------------------------|
| Security | Direct Operational | Major adverse impacts | Major beneficial impacts | | Moderate beneficial impacts | | | Major beneficial impacts |
| | Indirect Operational | Minor adverse impacts | Minor adverse impacts | Moderate adverse impacts | | | | |
| | Construction | Moderate adverse impacts | Major adverse impact | | | | | |
| Safety | Direct Operational | Moderate adverse impacts | | | | | | |
| | Indirect Operational | Minor adverse impacts | | | | | | |
| | Construction | Moderate adverse impacts | | | | | | |

352 Alternatives C and D would also create more security risks than the other Action Alternatives
353 because they would mix station elements (bus facility and/or parking facility) with private air-
354 rights development buildings north of H Street.

355 Conversely, Alternatives A and A-C would be the only Action Alternatives without below-
356 ground parking and, therefore, without an associated risk of VBIED attack from below. In the
357 No-Action Alternative, impacts on security would be adverse, as risks from increased activity
358 and passenger volumes would not be offset by security enhancements.

359 With regard to public safety, all alternatives would have similar impacts, as these impacts
360 would be the result of increased activity at WUS over time.

5.15.6 Avoidance, Minimization and Mitigation Evaluation

361 Based on the determination of impacts relative to the No-Action Alternative, FRA is
362 considering the following minimization and mitigation measures:

- 363 ■ **Safety and Security Staffing Levels due to Increased Passenger Volumes (All Action**
364 **Alternatives):** The growth in use of WUS would have a major impact on the safety
365 and security of the traveling public. To address the increased risks due to increased
366 passenger volumes, FRA and the Project Proponents, in coordination with relevant
367 Federal agencies, would develop a safety and security operations plan. The plan
368 would identify procedures appropriate to the level of passenger activity; evaluate
369 appropriate passenger screening practices; and identify funding for these purposes.
- 370 ■ **Increased Safety Risks and Threats due to Increased Vehicular Volumes (All Action**
371 **Alternatives):** Growth in the use of WUS would likely result in a proportional growth
372 of vehicular travel in and around WUS which would increase the risk of vehicle-based
373 attacks, traffic accidents, and vehicle-pedestrian accidents. To address this risk, FRA
374 and the Project Proponents, in coordination with Federal law enforcement and
375 security agencies, would identify security features that the Project design would
376 incorporate, including measures recommended in the TVRA, as appropriate.
- 377 ■ **Public Safety and Security Threats Impacts from Construction (All Action**
378 **Alternatives):** Construction activities would pose risks to public safety due to the
379 general nature of construction and WUS's operational constraints. Security threats
380 would arise from the movement of goods, equipment, and people throughout the
381 Project Area. FRA and the Project Proponents would develop a construction safety
382 and security plan for the Project. This plan would include procedures to screen
383 people, equipment, and goods, and to reduce the risk of injury to workers,
384 passengers, and passers-by from construction activities. It may also include
385 background checks for contractors and their employees.
- 386 ■ **Public Safety Risks from Construction Traffic (All Action Alternatives):** Risks to the
387 public would be minimized by requiring the construction contractor to ensure that
388 the movement of heavy motorized equipment and trucks in and out of the

- 389 construction site is through designated access points and designated truck routes
390 only. The construction contractor would be required to use flaggers as needed to
391 prevent conflicts between trucks and street traffic. The construction contractor
392 would ensure that construction-related traffic proceeds in compliance with
393 applicable speed limitations and other District traffic laws.
- 394 ■ **Public Safety Risks from Column Removal Work (All Action Alternatives):** The
395 construction contractor would put in place temporary walls and partitions to close
396 off the portions of the historic station building where the column removal work
397 would be conducted from the areas remaining accessible to the public or to station
398 or Amtrak employees. These walls and partitions would be sufficient to provide fire
399 protection at least equal to that provided by the existing floor and walls. Only
400 authorized personnel would have access to the closed off area.
 - 401 ■ **Potential Risks to WUS from Private Air-rights Development Parking within the**
402 **Deck Structure:** FRA and the Project Proponents would work with the private air-
403 rights developer to address such risks consistent with the recommendations of the
404 TVRA including consideration of solutions that would not place parking in the deck.
 - 405 ■ **Potential Risks to Private Air-rights Development (Alternatives C and D):** The
406 construction of the bus facility and parking facility would pose security risks if the
407 private air-rights owner develops the remaining air rights above the parking facility.
408 In that case, the Project Proponents would refine the facilities' design to reduce risks
409 to the private development.
 - 410 ■ **Indirect Impacts of Federal Air-Rights Development on Safety and Security (All**
411 **Action Alternatives):** To mitigate the impacts of the potential Federal air-rights
412 development, FRA would require that any sale, transfer, or lease of the air rights
413 would include the requirement that the new owner, transferee, or lessee develop a
414 safety and security plan that Amtrak and FRA would review and approve.

5.15.7 Permits and Regulatory Compliance

415 **Table 5-182** below summarizes the regulatory requirements and processes that would apply
416 to the Project.

Table 5-182. Permits and Regulatory Compliance for Safety and Security

| Permitting Entity | Description and Laws/Regulations | Potential Permits and Processes |
|---|---|---|
| FRA | <p>FRA is responsible for the safety of the railroad system.</p> <ul style="list-style-type: none"> ▪ FRA Safety Standards (49 CFR 200 – 299) ▪ US Code on Railroad Safety (49 USC 20101 <i>et seq.</i>) | <ul style="list-style-type: none"> ▪ Compliance with safety standards and railroad safety statute. FRA may inspect the Project for adherence to these regulations. |
| Amtrak | <p>Amtrak is responsible for assessing and implementing safety and security measures for its trains in the Study Area. Commuter services, in collaboration with Amtrak, are responsible for assessing and implementing safety and security measures for their trains in the Study Area.</p> | <ul style="list-style-type: none"> ▪ Meeting Amtrak Safety and Security Regulations. Amtrak would have approval authority over measures taken to address the safety of the railroad operations and Station activity as identified. |
| Transportation Security Administration | <p>TSA oversees the security of the transportation system.</p> <ul style="list-style-type: none"> ▪ Department of Homeland Security/Transportation Security Administration Regulations concerning Rail Transportation Security (49 CFR 1580) | <ul style="list-style-type: none"> ▪ TSA may perform inspections of WUS for compliance with Federal law |

5.16 Public Health, Elderly and Persons with Disabilities

1 This section describes and characterizes the potential direct and indirect impacts of the No-
2 Action Alternative and the six Action Alternatives on public health and the welfare of the
3 elderly and persons with disabilities. In accordance with the FRA's *Procedures for Considering*
4 *Environmental Impacts*, it also considers the impacts of the alternatives on the transportation
5 and general mobility of the elderly and persons with disabilities.¹ If applicable, this section
6 also recommends measures to avoid, minimize, or mitigate potential adverse impacts and
7 identifies permitting and regulatory compliance requirements.

5.16.1 Regulatory Context and Guidance

8 Relevant Federal policies, regulations and guidance that pertain to public health, elderly, and
9 persons with disabilities are listed in **Section 4.16.1, Regulatory Context and Guidance**.

5.16.2 Study Area

10 As defined in **Section 4.16.2, Study Area**, the Local Study Area includes the Project Area and a
11 half-mile buffer (**Figure 4-33**). There is no Regional Study Area because impacts on a regional
12 level are not anticipated.

5.16.3 Methodology

13 This section summarizes the methodology for evaluating the potential impacts of the
14 alternatives on public health, safety, and persons with disabilities. **Appendix C3, Washington**
15 **Union Station Expansion Project, Environmental Consequences Technical Report, Section**
16 **16.4, Methodology**, provides a description of the analysis methodology. A summary is below.
17 Impacts were assessed as major, moderate, minor, or negligible based on the intensity scale
18 defined in **Section 5.1.1, Definitions**.

5.16.3.1 Operational Impacts

19 Potential operational impacts on public health were assessed qualitatively. Operational
20 impacts as described elsewhere in this chapter were reviewed to determine whether they
21 may affect public health or the health of sensitive populations. Impacts may occur via
22 exposure to potentially harmful substances such as ingestion (swallowing), inhalation
23 (breathing), and absorption (penetration through a barrier such as the skin). Potential
24 impacts on the transportation and general mobility of the elderly and persons with
25 disabilities were assessed through a review of the changes in the transportation

¹ FRA. 1999. *Procedures for Considering Environmental Impacts*. 64 Federal Register (FR) 28545, Section 12, May 26, 1999 as updated by 78 FR 2713, January 14, 2013.

26 infrastructure (including WUS) that would result from the Project and how they would affect
27 these persons' movements within and near WUS.

5.16.3.2 Construction Impacts

28 The analysis of construction impacts was conducted using a similar approach to that used for
29 the operational impacts. It included a review of construction impacts and an analysis of how
30 they would affect public health. The analysis also considered how construction activities
31 would affect the way the elderly and persons with disabilities would be able to access WUS
32 and move in and around the station during the construction period.

5.16.4 Impact Analysis

33 This section presents the potential impacts of the No-Action Alternative and the Action
34 Alternatives on public health and the transportation and mobility of the elderly and persons
35 with disabilities.

5.16.4.1 No-Action Alternative

Direct Operational Impacts

36 **Relative to existing conditions, in the No-Action Alternative, there would be no direct**
37 **operational impacts on public health. There would be moderate beneficial direct**
38 **operational impacts on the transportation and mobility of the elderly and persons with**
39 **disabilities.**

40 In the No-Action Alternative, the Project would not take place. Several other public and
41 private projects would be implemented in the Project Area. None of these projects would
42 create conditions that would adversely affect public health. They would support activities
43 and functions typical of a multimodal transportation facility and dense urban environment.

44 Increases in localized air pollutant concentrations due to increased train, bus, and car traffic
45 would not result in adverse public health impacts. As documented in **Section 5.6.4.1, No-**
46 **Action Alternative, Direct Operational Impacts**, growth in train and vehicular traffic would
47 generate local increases in CO and PM_{2.5} concentrations. In the No-Action Alternative,
48 emissions of CO and PM_{2.5} would not exceed the NAAQS applicable to those pollutants even
49 in places where they would be most concentrated (such as near the WUS parking garage).
50 The purpose of the NAAQS is in part to provide public health protection and protect the
51 health of sensitive populations such as asthmatics, children, and the elderly. Increases in
52 pollutant concentrations that do not exceed the NAAQS would not result in adverse health
53 impacts, even on the most sensitive populations.

54 The No-Action Alternative would have beneficial impacts on the transportation and mobility
55 of the elderly and persons with disabilities. These beneficial impacts would be moderate

56 because, while they would make noticeable improvements, they would still leave some
57 known deficiencies unaddressed.

58 WUS has a number of accessibility issues and some station elements do not meet the current
59 standards. Several of the station improvement projects included in the No-Action Alternative
60 would help remedy a few of the known issues. Examples of such projects include the
61 installation of new ADA-compliant elevators to Track 27-28 and the raising of Platform 15-16
62 to 48 inches above track to meet level-boarding ADA requirements. Other projects, such as
63 the Concourse Modernization Project, would improve access for all passengers. However,
64 several of WUS's shortcomings, such the lack of level boarding and excessive gaps between
65 platforms and trains, or the insufficient number of van-accessible spaces in the parking
66 garage, would not be remedied under the No-Action Alternative.

Indirect Operational Impacts

67 **Relative to existing conditions, in the No-Action Alternative, there would be no indirect**
68 **operational impacts on public health and negligible adverse indirect operational impacts on**
69 **the transportation and mobility of the elderly and persons with disabilities outside WUS.**

70 As explained above in **Section 5.6.4.1, No-Action Alternative, Indirect Operational Impacts**,
71 regional emissions of several criteria pollutants would decrease over the coming decades.
72 Emissions of PM₁₀ would increase but would remain below the *de minimis* threshold.
73 Reduction in air emissions may have a global beneficial effect in the long-term but would
74 likely not be noticeable in the Study Area by 2040.

75 There would be no noise-related impacts on public health. The primary public health concern
76 associated with noise is noise-induced hearing loss (NIHL) from long-term exposure to
77 elevated noise levels. Risk of hearing loss becomes a consideration with long and repeated
78 exposure to noise levels of 85 dBA and higher.² There would be no risk of such exposure in
79 the No-Action Alternative. Noise and vibration analysis (**Section 5.10.4.1, No-Action**
80 **Alternative, Direct Operational impacts**) shows that in this alternative, anticipated noise
81 levels near WUS would not exceed 60 to 75 dBA. In areas nearer the station, noise levels
82 would decrease relative to existing conditions following the construction of the private air-
83 rights development.

84 Impacts on transportation and mobility of the elderly and persons with disabilities outside
85 WUS would be negligible. Increased roadway traffic may create a perceived barrier to
86 circulation because of the greater potential for conflict between pedestrians and vehicles.
87 However, most intersections near WUS have high visibility sidewalks across major
88 approaches, with wheelchair ramps and detectable warning surfaces to aid visually impaired
89 individuals. Most intersections also have accessible pedestrian signal (APS) equipment. Those

² National Institute on Deafness and Other Communication Disorders. *Noise-Induced Hearing Loss*. Accessed from <https://www.nidcd.nih.gov/health/noise-induced-hearing-loss>. Accessed on April 3, 2020.

90 that do not currently have such equipment are expected to be rebuilt or retrofitted in a few
91 years.

Construction Impacts

92 **In the No-Action Alternative, there would be minor adverse construction impacts on public**
93 **health and moderate adverse construction impacts on the transportation and mobility of**
94 **the elderly and persons with disabilities.**

95 Construction of the various projects included in the No-Action Alternative, such as the private
96 air-rights development, would inherently generate public health-related risks. Direct impacts
97 may arise from the physical disturbance associated with construction, such as excavation of
98 open trenches or pits; the movement and operation of large motorized equipment and
99 trucks, and associated emissions of air pollutants and dust; or the closure of sidewalks,
100 disruption of well-used pathways, and changes in traffic patterns.

101 Potential adverse impacts on public health from these activities would be minor because best
102 management practices that minimize risks from physical disturbance are a standard feature
103 of all large construction sites. These include, for instance, fencing, clear separation of storage
104 and staging area from the public way; and warning signs and alternative pathways during
105 sidewalk closures.

106 Public health impacts may also arise from accidental spills of fuel or hazardous material. As
107 explained in **Section 5.4.4.1, No-Action Alternative, Construction Impacts**, compliance with
108 applicable regulatory requirements would minimize the risk of spilled materials that could
109 adversely affecting the public.

110 Construction activities would have moderate adverse impacts on the transportation and
111 mobility of elderly persons and persons with disabilities. During the replacement of the H
112 Street Bridge, walking across the bridge would not be possible or would be challenging
113 because of sidewalk closures and the proximity of construction activities. Construction of the
114 various WUS improvement projects included in the No-Action Alternative would close parts
115 of the station or make it challenging to navigate. Installation of the columns supporting the
116 private air-rights deck in the rail terminal may reduce platform space and make the platforms
117 narrower and more crowded. These impacts would occur at different locations and on
118 different schedules and, as such, would be moderate. The majority of WUS would remain
119 accessible most of the time.

5.16.4.2 Alternative A

Direct Operational Impacts

120 **Relative to the No-Action Alternative, Alternative A would have no adverse direct**
121 **operational impact on public health. It would have a major beneficial direct operational**
122 **impact on the transportation and mobility of the elderly or persons with disabilities within**
123 **WUS.**

124 Alternative A would not introduce functions or activities in the study area that could
125 adversely affect public health. It would include an air conditioning strategy that isolates areas
126 within which fumes, heat, and noise associated with operating diesel trains occur from areas
127 where passengers and visitors wait or remain for any significant amount of time. Emissions
128 from increased railroad operations, combined with emissions from greater vehicular traffic
129 on the adjacent roadways, would result in higher localized concentrations of CO and PM_{2.5}.
130 However, concentrations of these two pollutants would not exceed the applicable NAAQS
131 (see **Section 5.6.4.2, Alternative A, Direct Operational Impacts**). Therefore, anticipated
132 increases would not result in health-related impacts, even on the most sensitive populations.

133 Alternative A would make WUS easier to access and navigate. It would bring the station into
134 full compliance with applicable accessibility codes and regulations. It would remedy
135 shortcomings that the No-Action Alternative would not address. Elevators and wheelchair
136 ramps would be provided as required. The new parking facility would contain sufficient
137 handicapped and van space (at least 28 accessible parking spaces, five of which are van-
138 accessible). The new platforms would be wider and would allow for level boarding. By making
139 boarding and alighting easier and reducing congestion in transitional spaces such as
140 concourses, Alternative A would reduce trip and fall risks, a benefit for all users especially the
141 elderly and persons with disabilities.

142 New entrances into WUS on First, 2nd, and H Streets NE would reduce the distance many
143 persons have to travel within WUS to reach their trains or buses. Improved private pick-up
144 and drop-off areas in front of WUS as well as new ones on First and 2nd Streets NE and
145 adjacent to the train hall would also facilitate access.

146 The new concourses and train hall would provide climate-controlled and more spacious
147 transitional spaces than the existing Claytor Concourse (which would remain in the No-Action
148 Alternative). The new bus facility would provide better waiting spaces and other amenities
149 than the existing one, which the No-Action Alternative would keep in its current condition.
150 Because the new bus facility and parking facility would be at the same approximate location
151 as the existing ones, improvements would be a net benefit: the distance to the other
152 elements of the station would not significantly change.

153 Increased accessibility at WUS would also provide better access to the Kaiser Permanente
154 Capitol Hill Medical Center on 700 2nd Street, NE at the corner of 2nd Street NE and H Street

155 NE. The new H Street entrance to the station would provide the public, the elderly, and
156 persons with disabilities using public transportation a new access to the medical center.

Indirect Operational Impacts

157 **Relative to the No-Action Alternative, Alternative A would have no adverse indirect**
158 **operational impacts on public health and minor adverse indirect operational impacts on**
159 **the transportation and mobility of the elderly and persons with disabilities outside WUS.**

160 Alternative A would cause additional regional emissions of all criteria pollutants relative to
161 the No-Action Alternative (**Section 5.6.4.2, Alternative A, Indirect Operational Impacts**).
162 However, Alternative A-related emissions would remain below the applicable *de minimis*
163 levels. As such, there would be no public health impacts. Reduction in region-wide traffic
164 would sufficiently reduce emissions of MSAT to offset any increases due to Alternative A.

165 Relative to the No-Action Alternative, ambient noise levels would increase at several
166 locations under Alternative A (**Section 5.10.4.2, Alternative A, Direct Operational Impacts**).
167 However, increases would not exceed three dBA and would be barely perceptible if at all.
168 Nowhere would noise levels reach levels that could cause NIHL.

169 Increased roadway traffic may create a perceived barrier to the transportation and mobility
170 of the elderly and persons with disabilities near WUS because of the greater potential for
171 conflict between pedestrians and vehicles. This would occur in the No-Action Alternative as
172 well but Alternative A would generate more traffic and potentially greater impacts, especially
173 along H Street NE, 2nd Street NE, North Capitol Street, and the north side of Columbus Circle
174 (traffic impacts are addressed in **Section 5.5.4.2, Direct Operational Impacts, Vehicular**
175 **Traffic**).

176 As in the No-Action Alternative, existing and likely future accessibility features (see
177 **Section 5.16.4.1, No-Action Alternative, Indirect Operational Impacts**) would reduce this risk.
178 Additionally, Alternative A has several features that would contribute to offsetting the risk.
179 These features include additional access points (on First, 2nd, and H Streets, NE), which
180 would reduce the distance some persons would have to walk on public streets to reach the
181 station. Also, the reconfiguration of the multiple pick-up and drop-off lanes in front of WUS
182 and the realignment of First Street NE as a one-way street would facilitate access to WUS,
183 with fewer roadways to cross. The removal of hop-on hop-off and tour bus traffic from that
184 area would also make access to the front of WUS easier.

185 Currently, Gallaudet University runs a shuttle for students between WUS and the campus. In
186 Alternative A, this shuttle would be discontinued because the new bus facility would be
187 unable to accommodate it. This impact would be minor because it would not preclude
188 Gallaudet University from finding another pick-up and drop-off location near WUS for its
189 shuttle. Also, the Gallaudet campus shuttle is a standard service many universities offer
190 rather than a special accommodation required to meet the specific needs of Gallaudet's
191 hearing-impaired students.

Construction Impacts

192 **Construction of Alternative A would result in minor adverse impacts on public health and**
193 **major adverse impacts on the transportation and mobility of the elderly and persons with**
194 **disabilities.**

195 Construction of Alternative A would take approximately 11 years and 5 months to complete
196 and include four phases moving from east to west plus an Intermediate Phase between
197 Phases 1 and 2 when only First Street Tunnel column removal work would be conducted.
198 Direct impacts may arise from the physical disturbance associated with construction such as:
199 the excavation of open trenches or pits; the movement and operation of large motorized
200 equipment and trucks; or the closure of sidewalks, disruption of well-used pathways, and
201 changes in traffic patterns.

202 Potential adverse impacts on public health from these activities would be minor because best
203 management practices implemented on all large-scale construction site would minimize risks.
204 All areas under construction would be fenced, screened, and inaccessible to the public.

205 Public health impacts may arise from the air pollution and noise caused by construction work
206 or if a large spill of fuel or hazardous material occurred. Such impacts would be minor. As
207 explained in **Section 5.4.4.1, No-Action Alternative, Construction Impacts**, compliance with
208 applicable regulations would minimize the risk of spilled materials migrating outside the
209 Project Area and coming into contact with the public. While construction activities would
210 cause air pollutant emissions, the amount of emissions would vary with, and within, each
211 construction phase and with the type of activity. Quantitative estimates of construction-
212 related criteria pollutant emissions in Alternative A are presented in **Section 5.6.4.2,**
213 *Alternative A, Construction Impacts*. The analysis showed that there would be no
214 construction year during which emissions of criteria pollutants would exceed the applicable
215 *de minimis* levels. Therefore, these emissions would not adversely affect public health.

216 During column removal work, when part of the Retail and Ticketing Concourse would be
217 demolished and the tunnel underneath exposed, there is potential for fumes from train
218 engines to enter the station – both public areas and back of house areas – because several
219 tracks would remain active at all times to minimize impacts on train service. These impacts
220 would be avoided by closing off the construction area as described in **Section 5.16.6,**
221 *Avoidance, Minimization and Mitigation Evaluation*.

222 Construction of Alternative A would also cause noise (**Section 5.10.4.2, Alternative A,**
223 *Construction Impacts*). Construction workers who are exposed to noise as part of their
224 occupation have an increased NIHL risk when there is a time-weighted average (TWA) noise
225 exposure of 85 dBA or greater over 8-hours, 83 dBA for 12-hours, and 81 dBA for 20-hours,
226 according to the Occupational Safety and Health Administration (OSHA). Above these noise
227 thresholds, OSHA requires implementation of a hearing conservation program, annually
228 testing employees, sound monitoring, and hearing protection or other engineering noise
229 controls. These requirements would ensure that workers are protected from NIHL if they are

230 exposed to noise above the relevant thresholds. The public would not be at risk of exposure
231 to noise levels capable of causing NIHL. Non-authorized persons would not be allowed within
232 the construction site or near noisy equipment, nor would they be exposed to noise for
233 periods over the NIHL thresholds. The partitions used to close off the part of the station
234 where the column removal work would take place from the rest of the building would be
235 designed to provide an adequate level of noise shielding. There would be no impacts on
236 public health from noise.

237 Construction of Alternative A would have major adverse impacts on the transportation and
238 mobility of elderly persons and persons with disabilities. WUS would continue to operate
239 throughout the construction period of approximately 11 years and 5 months. Depending on
240 the phase of construction, parts of WUS would be closed to the public resulting in congested
241 conditions during periods of peak passenger activity. Areas that would remain publicly open
242 may have to be temporarily reconfigured. Access to and from train platforms, bus facility,
243 and parking facility would be relocated as construction proceeds. The disruption of usual
244 pathways within WUS may be confusing to commuters and may make WUS more challenging
245 to navigate for occasional users. Combined with increased congestion, it could pose a risk for
246 trip and fall accidents or make access by elderly persons or persons with disabilities more
247 difficult. During Phase 4 of construction (approximately 3 years and 1 month), the
248 unavailability of parking and intercity bus service at WUS would restrict regional options for
249 access to WUS. It may be more difficult or costly for the elderly and persons with disabilities
250 than for general users to switch to alternative modes of access such as transit or for-hire
251 vehicles.

252 Temporary sidewalk and lane closures would occur at various times during construction.
253 Temporary relocation of bus stops and rerouting may be necessary. During Phase 1 of
254 construction (approximately 2 years and 5 months), sidewalk or lane closures may make
255 access to the Kaiser Permanente Medical Building (700 2nd Street NE) more challenging.
256 Access to and from WUS during construction, as well as internal circulation, would also be
257 more challenging than normal for the elderly and persons with disabilities. **Section 5.16.6,**
258 *Avoidance, Minimization, and Mitigation Evaluation* identifies potential measures to mitigate
259 this major adverse impact.

Comparison to Existing Conditions

260 The operational impacts of Alternative A relative to existing conditions would generally be
261 similar to the impacts relative to the No-Action Alternative. Alternative A would have no
262 adverse direct operational impact on public health and a major beneficial direct operational
263 impact on the transportation and mobility of the elderly and persons with disabilities. This
264 beneficial impact would be greater relative to existing conditions than relative to the No-
265 Action Alternative.

266 Relative to existing conditions, Alternative A would also have no adverse indirect operational
267 impacts on public health and minor adverse indirect operational impacts on the
268 transportation and mobility of the elderly or persons with disabilities outside WUS.

269 Differences between the No-Action Alternative and existing conditions in this respect are not
270 meaningful.

5.16.4.3 Alternative B

Direct Operational Impacts

271 **Relative to the No-Action Alternative, Alternative B would have no adverse direct**
272 **operational impact on public health. It would have a moderate direct beneficial operational**
273 **impact on the transportation and mobility of the elderly or persons with disabilities within**
274 **WUS.**

275 Alternative B would have no adverse direct operational impacts on public health for the same
276 reasons as Alternative A (**Section 5.16.4.2, Alternative A, Direct Operational Impacts**). With
277 regard to the transportation and mobility of the elderly or persons with disabilities,
278 Alternative B's impacts would also generally be as described in **Section 5.16.4.2** but with one
279 notable difference. Alternative B's parking would be in two below-ground levels along the
280 west side of the rail terminal, between K Street NE and the back of the historic station
281 building. The walking distance from parking spaces to the back of the historic station building
282 would increase by up to approximately 1,000 feet relative to the No-Action Alternative.
283 Navigating the parking facility to the nearest WUS access point could be more challenging to
284 persons with reduced mobility than in the No-Action Alternative. While Alternative B would
285 generally improve conditions at WUS for the elderly and persons with disabilities, resulting in
286 a net beneficial impact, the parking facility location would offset some of the benefits,
287 making the impact moderate.

Indirect Operational Impacts

288 **Relative to the No-Action Alternative, Alternative B would have no adverse indirect**
289 **operational impacts on public health and minor adverse indirect operational impacts on**
290 **the transportation and mobility of the elderly or persons with disabilities outside WUS.**

291 The indirect operational impacts of Alternative B would be as described in **Section 5.16.4.2,**
292 *Alternative A, Indirect Operational Impacts* for Alternative A.

Construction Impacts

293 **Construction of Alternative B would result in minor adverse impacts on public health and**
294 **major adverse impacts on the transportation and mobility of the elderly and persons with**
295 **disabilities.**

296 The construction impacts of Alternative B on public health would be similar to those of
297 Alternative A, described in **Section 5.16.4.2, Alternative A, Construction Impacts**. Although
298 Alternative B would cause higher noise levels during the early phase of construction due to
299 the type of cut-off wall used, the potential for members of the public to be exposed to levels
300 that could cause NIHL would be as limited as in Alternative A. Similarly, construction-related
301 air pollutant emissions in Alternative B would remain below *de minimis* levels. Construction

302 of Alternative B would have the same major adverse impacts on the transportation and
303 mobility of the elderly and persons with disabilities as Alternative A (**Section 5.16.4.2,**
304 *Alternative A, Construction Impacts*) but impacts would occur over approximately 14 years
305 and 4 months. Phase 4, during which parking and intercity bus service would be unavailable
306 at WUS would last for approximately 4 years and 11 months in Alternative B.

Comparison to Existing Conditions

307 The operational impacts of Alternative B relative to existing conditions would be similar to
308 impacts relative to the No-Action Alternative. Alternative B would have no adverse direct
309 operational impact on public health and a moderate beneficial direct operational impact on
310 the transportation and mobility of the elderly or persons with disabilities. Alternative B
311 would represent a greater improvement relative to existing conditions than relative to the
312 No-Action Alternative, but the beneficial impact would remain moderate because of the
313 relocation of parking to a two-level, below-ground facility. Indirect impacts relative to
314 existing conditions would be as described for Alternative A in **Section 5.16.4.2, Alternative A,**
315 *Comparison to Existing Conditions*.

5.16.4.4 Alternative C

Direct Operational Impacts

316 **Relative to the No-Action Alternative, Alternative C (either option) would have no adverse**
317 **direct operational impact on public health. It would have a moderate beneficial direct**
318 **operational impact on the transportation and mobility of the elderly or persons with**
319 **disabilities within WUS.**

320 Alternative C (either option) would not have adverse direct operational impacts on public
321 health for the same reasons as described for Alternative A in **Section 5.16.4.2, Alternative A,**
322 *Direct Operational Impacts*. Beneficial impacts on the transportation and mobility of the
323 elderly or persons with disabilities would generally be the same as those described for
324 Alternative A (**Section 5.16.4.2, Alternative A, Direct Operational Impacts**), with two notable
325 differences.

326 In Alternative C, the bus and above-ground parking facility would be located north of H Street
327 NE, either on the west side (West Option) or east side (East Option) of the rail terminal. More
328 than half the total number of parking spaces would be on one below-ground level along the
329 west side of the rail terminal between K Street and the back of the historic station building.
330 Relative to the No-Action Alternative, this layout would increase the maximum walking
331 distance from the bus facility and a majority of the parking spaces to other parts of WUS. Bus
332 passengers would have to walk approximately an additional 1,100 feet in the East Option and
333 an additional 250 feet in the West Option to reach the back of the historic station building.
334 The connection would be through the new concourses, which would be ADA-compliant but
335 could still represent a challenge for persons with reduced mobility. Persons parking in the
336 below-ground facility could have to walk an additional approximate 1,000 feet to reach the

337 back of the historic station building. As described for Alternative B, navigating the large
338 parking facility to the nearest WUS access point could be challenging for persons with
339 reduced mobility.

340 Alternative C with either option would generally improve conditions at WUS with regard to
341 the transportation and mobility of the elderly and persons with disabilities, resulting in a net
342 beneficial impact. The location of the bus facility and parking facility would offset some of the
343 benefits, making the beneficial impact moderate.

Indirect Operational Impacts

344 **Relative to the No-Action Alternative, Alternative C (either option) would have no adverse**
345 **indirect operational impacts on public health and minor adverse indirect operational**
346 **impacts on the transportation and mobility of the elderly or persons with disabilities**
347 **outside WUS.**

348 The indirect operational impacts of Alternative C would be the same as those described for
349 Alternative A in **Section 5.16.4.2, Alternative A, Indirect Operational Impacts.**

Construction Impacts

350 **Construction of Alternative C (either option) would result in minor adverse impacts on**
351 **public health and major adverse impacts on the transportation and mobility of the elderly**
352 **and persons with disabilities.**

353 The construction impacts of Alternative C on public health would be similar to those of
354 Alternative A (**Section 5.16.4.2, Alternative A, Construction Impacts**). The same measures that
355 would minimize risks from physical disturbances, traffic, and hazardous materials in
356 Alternative A would apply to Alternative C. Although Alternative C would cause higher noise
357 levels during the early phase of construction due to the type of cut-off wall used, the
358 potential for members of the public to be exposed to levels that could cause NIHL would be
359 as limited as in Alternative A. Similarly, construction-related air pollutant emissions in
360 Alternative C would remain below *de minimis* levels.

361 The impacts of constructing Alternative C on the transportation and mobility of the elderly
362 and persons with disabilities would be the same as those of Alternative A (**Section 5.16.4.2,**
363 **Alternative A, Construction Impacts**). They would occur over a longer period of approximately
364 12 years and 3 months. Phase 4, during which parking and intercity bus service would be
365 unavailable at WUS would last for approximately 4 years in Alternative C with the West
366 Option. In Alternative C with the East Option, because of the availability of the new bus
367 facility and above-ground parking during Phase 4 of construction, the reduction in
368 accessibility for the elderly and persons with disabilities would not be as great. However, as
369 explained in **Section 5.16.4.4, Alternative C, Direct Operational Impacts**, the distance to the
370 front of the station would increase relative to existing conditions.

Comparison to Existing Conditions

371 The operational impacts of Alternative C (either option) relative to existing conditions would
372 be similar to its impacts relative to the No-Action Alternative. Alternative C would have no
373 direct adverse operational impact on public health and a moderate direct beneficial
374 operational impact on the transportation and mobility of the elderly or persons with
375 disabilities. Alternative C would represent a greater improvement relative to existing
376 conditions than relative to the No-Action Alternative, but the beneficial impact would remain
377 moderate. Indirect impacts relative to existing conditions would be as described for
378 Alternative A in **Section 5.16.4.2, Alternative A, Comparison to Existing Conditions.**

5.16.4.5 Alternative D

Direct Operational Impacts

379 **Relative to the No-Action Alternative, Alternative D would have no adverse direct**
380 **operational impact on public health. It would have a moderate beneficial direct operational**
381 **impact on the transportation and mobility of the elderly or persons with disabilities within**
382 **WUS.**

383 Alternative D's impacts would generally be the same as those described for Alternative A
384 (**Section 5.16.4.2, Alternative A, Direct Operational Impacts**), with two notable differences. In
385 Alternative D, the above-ground parking facility would be in the north end of the rail
386 terminal, south of K Street NE. Persons parking in the above-ground parking facility would
387 need to use surface streets to reach the nearest access point to WUS on H Street NE,
388 approximately 600 feet away. This would require them to be outside and exposed to weather
389 conditions. This may present a challenge to people with reduced mobility. Once within WUS,
390 they would need to walk another 900 feet or so to reach the back of the historic station
391 building, though this would be in air conditioned concourses. Also, more than half of the
392 parking spaces would be one below-ground level on the west side of the rail terminal
393 between K Street NE and the back of the historic station building. Some parkers would need
394 to walk approximately 1,000 feet to reach the back of the station.

395 The second difference would be the lack of private pick-up and drop-off area adjacent to the
396 train hall. However, by placing the bus facility next to the train hall and the historic station
397 building, Alternative D would also make moving between buses and other modes of
398 transportation easier than in the No-Action Alternative.

399 Overall, like the other Action Alternatives, Alternative D would generally improve conditions
400 at WUS for the transportation and mobility of the elderly and persons with disabilities,
401 resulting in a net beneficial impact. The remote location of the parking facility and lack of
402 private pick-up and drop off area next to the train hall would offset some of the benefits,
403 making the impact moderate.

Indirect Operational Impacts

404 **Relative to the No-Action Alternative, Alternative D would have no adverse indirect**
405 **operational impacts on public health and minor adverse indirect operational impacts on**
406 **the transportation and mobility of the elderly or persons with disabilities outside WUS.**

407 The indirect operational impacts of Alternative D would be the same as described for
408 Alternative A in **Section 5.16.4.2, Alternative A, Indirect Operational Impacts.**

Construction Impacts

409 **Construction of Alternative D would result in minor adverse impacts on public health and**
410 **major adverse impacts on the transportation and mobility of the elderly and persons with**
411 **disabilities.**

412 The construction impacts of Alternative D on public health would be similar to
413 Alternative A's, described in **Section 5.16.4.2, Alternative A, Construction Impacts.** Impacts on
414 the transportation and mobility of the elderly and persons with disabilities would be the
415 same as Alternative C's (**Section 5.16.4.4, Alternative C, Construction Impacts**).

Comparison to Existing Conditions

416 The operational impacts of Alternative D relative to existing conditions would be similar to its
417 impacts relative to the No-Action Alternative. Alternative D would have no adverse direct
418 operational impact on public health and a moderate beneficial direct operational impact on
419 the transportation and mobility of the elderly or persons with disabilities. Alternative D
420 would represent a greater improvement relative to existing conditions than relative to the
421 No-Action Alternative, but the beneficial impact would remain moderate because of the
422 relocation of parking to a location just south of K Street NE or to a below-ground, one-level
423 facility. Indirect impacts relative to existing conditions would be as described for Alternative
424 A in **Section 5.16.4.2, Alternative A, Comparison to Existing Conditions.**

5.16.4.6 Alternative E

Direct Operational Impacts

425 **Relative to the No-Action Alternative, Alternative E would have no adverse direct**
426 **operational impact on public health. It would have a moderate beneficial direct operational**
427 **impact on the transportation and mobility of the elderly or persons with disabilities within**
428 **WUS.**

429 Alternative E would have no adverse direct operational impact on public health for the same
430 reasons as Alternative A (**Section 5.16.4.2, Alternative A, Direct Operational Impacts**). It
431 would generally have the same moderate beneficial operational impact on the transportation
432 and mobility of the elderly or persons with disabilities as Alternative B (**Section 5.16.4.3,**
433 **Alternative B, Direct Operational Impacts**) with two differences. The integration of the new
434 bus facility with the train hall would facilitate the movement of people, including the elderly

435 and persons with disabilities, between the various transportation modes at WUS. There
436 would be no room for a private pick-up and drop-off area next to the train hall. This, and the
437 location and layout of the parking facility would offset some of the benefits (see **Section**
438 **5.16.4.2, Alternative A, Direct Operational Impacts**).

Indirect Operational Impacts

439 **Relative to the No-Action Alternative, Alternative E would have no adverse indirect**
440 **operational impact on public health and minor adverse indirect operational impacts on the**
441 **transportation and mobility of the elderly or persons with disabilities outside WUS.**

442 The indirect operational impacts of Alternative E would be the same as those of Alternative
443 A. They are described in **Section 5.16.4.2, Alternative A, Indirect Operational Impacts**.

Construction Impacts

444 **Construction of Alternative E would result in minor adverse impacts on public health and**
445 **major adverse impacts on the transportation and mobility of the elderly and persons with**
446 **disabilities.**

447 The construction impacts of Alternative E on public health would be similar to Alternative A's,
448 described in **Section 5.16.4.2, Alternative A, Construction Impacts**. Alternative E's
449 construction impacts on the transportation and mobility of the elderly and persons with
450 disabilities would be the same as in Alternative B (**Section 5.16.4.3, Alternative B,**
451 **Construction Impacts**).

Comparison to Existing Conditions

452 The operational impacts of Alternative E relative to existing conditions would be similar to its
453 impacts relative to the No-Action Alternative. Alternative E would have no adverse direct
454 operational impact on public health and a moderate beneficial direct operational impact on
455 the transportation and mobility of elderly or persons with disabilities. Alternative E would
456 represent a greater improvement relative to existing conditions than relative to the No-
457 Action Alternative, but the beneficial impact would remain moderate because of the
458 relocation of all parking to a two-level, below-ground facility. Indirect impacts relative to
459 existing conditions would be as described for Alternative A in **Section 5.16.4.2, Alternative A,**
460 **Comparison to Existing Conditions**.

5.16.4.7 Alternative A-C (Preferred Alternative)

Direct Operational Impacts

461 **Relative to the No-Action Alternative, Alternative A-C would have no adverse direct**
462 **operational impact on public health. It would have a major beneficial direct operational**
463 **impact on the transportation and mobility of the elderly or persons with disabilities within**
464 **WUS.**

465 The direct operational impacts of Alternative A-C would be the same as those of Alternative
466 A, described in **Section 5.16.4.2, Alternative A, Direct Operational Impacts.**

Indirect Operational Impacts

467 **Relative to the No-Action Alternative, Alternative A-C would have no indirect operational**
468 **impacts on public health and minor adverse indirect operational impacts on the**
469 **transportation and mobility of the elderly and persons with disabilities outside WUS.**

470 The indirect operational impacts of Alternative A-C would be the same as those of Alternative
471 A, described in **Section 5.16.4.2, Alternative A, Indirect Operational Impacts.**

Construction Impacts

472 **Construction of Alternative A-C would result in minor adverse impacts on public health and**
473 **major adverse impacts on the transportation and mobility of the elderly and persons with**
474 **disabilities.**

475 The construction impacts of Alternative A-C on public health would be the same as those of
476 Alternative A, described in **Section 5.16.4.2, Alternative A, Construction Impacts.**

Comparison to Existing Conditions

477 The operational impacts of Alternative A-C relative to existing conditions would generally be
478 similar to its impacts relative to the No-Action Alternative. Alternative A-C would have no
479 adverse direct operational impact on public health and a major beneficial direct operational
480 impact on the transportation and mobility of elderly or persons with disabilities. Alternative
481 A-C would represent a greater improvement relative to existing conditions than relative to
482 the No-Action Alternative. Indirect impacts relative to existing conditions would be as
483 described for Alternative A in **Section 5.16.4.2, Alternative A, Comparison to Existing**
484 **Conditions.**

5.16.5 Comparison of Alternatives

485 With regard to public health and the transportation and mobility of elderly and persons with
486 disabilities, all Action Alternatives would have similar impacts, as shown in **Table 5-183.**

Table 5-183. Comparison of Alternatives, Public Health, Elderly and Persons with Disabilities

| Impact Category | Type of Impact | No-Action Alternative | Alternative A | Alternative B | Alternative C (Either Option) | Alternative D | Alternative E | Alternative A-C (Preferred) |
|--|----------------------|----------------------------|-------------------------|----------------------------|-------------------------------|---------------|---------------|-----------------------------|
| Public Health | Direct Operational | No impact | | | | | | |
| | Indirect Operational | No impact | | | | | | |
| | Construction | Minor adverse impact | | | | | | |
| Transportation and Mobility of Elderly and Persons with Disabilities | Direct Operational | Moderate beneficial impact | Major beneficial impact | Moderate beneficial impact | | | | Major beneficial impact |
| | Indirect Operational | Negligible adverse impact | Minor adverse impact | | | | | |
| | Construction | Moderate adverse impact | Major adverse impact | | | | | |

487 The Action Alternatives would have no adverse operational impacts and minor adverse
 488 construction impact on public health. They would all include the same air conditioning
 489 strategy to maintain temperature and air quality within WUS. Outside WUS, increases in air
 490 pollutant emissions from more railroad operations and vehicular traffic would remain below
 491 the applicable NAAQS.

492 All Action Alternatives would have beneficial impacts on the transportation and mobility of
 493 the elderly and persons with disabilities relative to the No-Action Alternative, as they would
 494 all fully bring WUS to applicable ADA standards and facilitate access to the station for all.
 495 **Table 5-184** shows how the No-Action and the Action Alternatives compare with each other
 496 in this respect.

497 In all Action Alternatives except Alternatives A and A-C, average walking distances from and
 498 to the bus facility, parking, or both would increase relative to the No-Action Alternative,
 499 which may adversely affect users with reduced mobility. This is most evident in Alternative C
 500 with the East Option, followed by Alternative C with the West Option. Conversely,
 501 Alternatives D and E would integrate the bus facility with the train hall, facilitating
 502 movements between the various transportation modes. Alternatives A, B, and A-C would also
 503 facilitate these movements by keeping the bus facility approximately at the same location as
 504 in the No-Action Alternative.

Table 5-184. Comparison of Impacts on the Transportation and Mobility of the Elderly and Persons with Disabilities

| Alternative | ADA-Compliance | Parking Location | Bus Facility Location and Distance | Pick-up/Drop-off next to Train Hall? |
|------------------|----------------|---|--|--------------------------------------|
| No-Action | Partial | No change | No change | N/A |
| A | Full | All above ground at existing location. No change in distance | No change | Yes |
| B | Full | All below ground between K Street NE and historic station building. Increased distance (by up to approximately 1,000 feet). | No change | Yes |
| C | Full | Part below-ground between K Street NE and historic station building and part above ground just north of H Street NE. Increased distance (below-ground: by up to approximately 1,000 feet; above-ground: by up to approximately 1,100 feet [East Option] or 250 feet [West Option]). | Just north of H Street NE. Increased distance (by up to approximately 1,100 feet [East Option] or 250 feet [West Option]). | Yes |
| D | Full | Part below-ground between K Street NE and historic station building and part above ground just south of K Street NE. Increased distance (below-ground: by up to approximately 1,000 feet; above-ground: by up to approximately 1,500 feet). | Integrated with train hall. | No |
| E | Full | All below ground between K Street NE and historic station building. Increased distance (by up to approximately 1,000 feet). | Integrated with train hall. | No |
| A-C | Full | All above ground at existing location. No change in distance | No change | Yes |

505 With regard to parking, Alternative D would increase walking distances most, requiring users
506 of the above-ground parking facility to walk outside for approximately 600 feet before
507 reaching the closest WUS access point at H Street NE. Alternatives A and A-C would keep all
508 parking closest to the concourse and historic station building. Alternatives B and C would be
509 in-between.

510 Alternatives D and E, unlike the other Action Alternatives, would have no room for pick-up
511 and drop-off areas next to the train hall. This is because of the integrated bus facility, which
512 would wrap around the train hall.

5.16.6 Avoidance, Minimization, and Mitigation Evaluation

513 To avoid or minimize operational impacts on the transportation and mobility of the elderly or
514 persons with disabilities, FRA is considering the following measures:

- 515 ■ In Alternatives B, C, D, and E, USRC would ensure parking reserved for persons with
516 disabilities is located near the southern end of the below-ground parking facility to
517 minimize the distance between parking spaces and Concourse A.
- 518 ■ In Alternatives B and E, such parking would further be located on the first level of the
519 parking facility.
- 520 ■ In all Action Alternatives, the Project Proponents would ensure that the most direct
521 path from the parking facility or bus facility to the nearest WUS entrance is clearly
522 identified. Adequate signage, lighting, and safety features would be provided.
523 Everywhere, access to elevators, escalators, and emergency exits would be clearly
524 marked. Signs and maps would be clear and concise, with large, high-contrast, and
525 raised lettering for those who rely on tactile capabilities for information. Where
526 possible, audible directions would be incorporated. Joints in walkways and
527 transitions from ramps to walks would be closed and flush to prevent tripping and
528 reduce the risks of canes or small wheels getting trapped in gaps or spaces.
529 Walkways would have a continuous detectable edge to help users navigate paths
530 safely.
- 531 ■ Amtrak would ensure that its Red Cap service remains available and is adequately
532 staffed to assist elderly passengers and passengers with physical, visual, and auditory
533 disabilities in navigating and traversing the station and bus or parking facilities.

534 To avoid, minimize, or mitigate major adverse impacts on public health and transportation
535 and mobility of the elderly or persons with disabilities during construction, the following
536 measures are being considered:

- 537 ■ The Project Proponents would require the construction contractor to install
538 temporary walls and partitions to close off the portions of the Retail and Ticketing
539 Concourse where the column removal work would be conducted from the areas
540 remaining accessible to the public or to station or Amtrak employees. These walls
541 and partitions would be sufficient to prevent the fumes from train operations in the

- 542 tunnel, as well as dust from the demolition or construction work and emissions from
543 construction equipment, from entering these areas. They would also provide
544 adequate shielding from noise.
- 545 ■ The Project Proponents would ensure that within WUS, accessibility is maintained
546 during construction in compliance with ADA requirements and DDOT *Pedestrian*
547 *Safety and Work Zone Standards*.³ Narrow passages, bottlenecks, or areas otherwise
548 difficult for persons with disabilities or elderly persons with reduced mobility to
549 navigate would be avoided or minimized.
 - 550 ■ Outside of WUS, the construction contractor would be required to provide
551 alternative protected pedestrian passages, along with appropriate signage. Signs
552 would be clear and concise and designed to communicate information to visually
553 impaired persons. Where possible, audible direction would be incorporated.
554 Pedestrian pathways would be kept clear of debris and obstructions, adequately
555 drained, and with adequate passing spaces. They would also have detectable edges
556 or channelizing equipment. Pedestrians would be protected from vehicular traffic
557 with crash-worthy barriers. Barriers would use reflective material to delineate the
558 traffic-side.
 - 559 ■ The construction contractor would be required to ensure that lane closures, detours,
560 alternative parking access, or use of metal plates to cover temporary trenches across
561 roadways are appropriately advertised.
 - 562 ■ The construction contractor would be required to notify the owners and occupants
563 of the Kaiser Permanente Medical Building of any planned road or sidewalk closures
564 sufficiently in advance to allow them to publicize these disruptions to their patients
565 and customers as appropriate. Temporary entrances or pathways would be clearly
566 marked and advertised. ADA-compliant access to the building would be maintained
567 at all times.

5.16.7 Permits and Regulatory Compliance

568 In terms of accessibility and mobility for the elderly and persons with disabilities, the Project
569 must comply with ADA regulations, as well as meet standards set forth by the Transportation
570 Services for Individuals with Disabilities (49 CFR 37) and the U.S. Access Board's ADA
571 Accessibility Guidelines (ADAAG) adopted by the U.S. Department of Transportation in 2006.
572 The Project must also meet the District of Columbia Building Code, which includes
573 requirements for accessibility and indoor environmental quality, and is enforced through the
574 building permitting process administered by the District Department of Consumer and
575 Regulatory Affairs.

³ District Department of Transportation. 2010. *Pedestrian Safety and Work Zone Standards: Covered and Open Walkways*. Accessed from <https://ddot.dc.gov/page/pedestrian-safety-and-work-zone-standards-covered-and-open-walkways>. Accessed on April 3, 2020.

5.17 Environmental Justice

3 This section evaluates the potential of the No-Action Alternative and the six Action
4 Alternatives to cause disproportionately high and adverse impacts on environmental justice
5 (EJ) populations in accordance with EO 12898, *Federal Actions to Address Environmental*
6 *Justice in Minority Populations and Low-Income Populations*. EO 12898 requires that Federal
7 agencies identify and address disproportionately high and adverse impacts resulting from
8 Federal projects on minority and low-income communities.

9 If applicable, this section also describes measures to avoid, minimize, or mitigate potential
10 disproportionately high and adverse impacts and identifies permitting and regulatory
11 compliance requirements.

5.17.1 Regulatory Context and Guidance

12 Relevant Federal policies, regulations and guidance that pertain to transportation are listed
13 in **Section 4.17.1, *Regulatory Context and Guidance***.

5.17.2 Study Area

14 Only a Local Study Area was defined for EJ. As explained in **Section 4.17.2, *Study Area***, EJ
15 communities exist at the local level and are generally identified in Census block groups. The
16 Local Study Area includes the Census block groups that are wholly or partially within one-half
17 mile of the Project Area. **Figures 4-34, 4-35, and 4-36** show the Local Study Area and the
18 distribution of minority and low-income populations within it. Census block groups with at
19 least 50 percent minority residents or 27 percent of the population below 150 percent of the
20 poverty line were considered areas of EJ concern. Resources and facilities specifically serving
21 minority or low-income populations were also considered.

5.17.3 Methodology

22 This section summarizes the methodology for evaluating the potential effects of the
23 alternatives on environmental justice populations. **Appendix C3, *Washington Union Station***
24 ***Expansion Project Environmental Consequences Technical Report, Section 17.4, *Methodology****,
25 provides a description of the analysis methodology. A summary is below.

26 The EJ analysis evaluated whether the No-Action Alternative and Action Alternatives would
27 result in disproportionately high and adverse impacts on minority and low-income
28 populations by considering whether:

- 29 ■ Adverse impacts would be predominantly borne or concentrated in minority or low-
30 income populations.

- 31 ■ Adverse impacts to EJ populations would be appreciably more severe or greater in
32 magnitude than those on non-EJ populations.
- 33 ■ Alternatives would affect resources especially important to EJ population (such as
34 social, religious, or cultural functions).
- 35 ■ Any benefits would be accompanied by impacts to environmental justice
36 populations.
- 37 ■ Mitigation measures, enhancements, and betterments are needed.

38 All resource categories considered in this DEIS were reviewed to identify those with potential
39 to result in disproportionately high and adverse effects on EJ populations. Resource
40 categories with no impacts or negligible impacts were dismissed from analysis as, by
41 definition, they would not disproportionately affect EJ populations. Resource categories that
42 would result in more than negligible impacts were then screened to determine whether
43 these impacts had potential to result in disproportionately high and adverse effects on EJ
44 populations. The results of this screening are presented **Table 17-4** of **Appendix C3**,
45 *Washington Union Station Expansion Project Environmental Consequences Technical Report*,
46 **Section 17.4, Methodology**. The following resource categories were identified as having
47 potential to cause disproportionately high and adverse effects and therefore requiring
48 further analysis: Transportation (Metrorail, Intercity Buses, City and Commuter Buses, and
49 Vehicular Traffic); Noise and Vibration; and Social and Economic Conditions (Community
50 Disruption). These categories are the focus of the following sections.¹

5.17.4 Impact Analysis

51 This section describes the impacts of the No-Action Alternative and the Action Alternatives
52 with regard to EJ populations.

5.17.4.1 No-Action Alternative

Operational Impacts

53 **Relative to existing conditions, in the No-Action Alternative, not expanding WUS would**
54 **have a disproportionately high and adverse operational impacts on EJ communities**
55 **because of projected increase in bus facility operations with no improvements to the**
56 **facility and overcrowding on some city buses.**

¹ No distinction is made between direct and indirect operational impacts because the character of the impacts does not affect whether they would affect some populations more than others. Also, for both the No-Action Alternative and the Action Alternatives, EJ determinations were made based on existing demographic and economic conditions (based on 2010 Census data). It is not possible to predict the demographic and economic make-up of the Study Area in 2040.

Transportation

WMATA Metrorail

57 In the No-Action Alternative, there would be an increase in Metrorail ridership at WUS,
58 resulting in capacity exceedances and a moderate adverse operational impact (see **Section**
59 **5.5.4.1, No-Action Alternative, Direct Operational Impacts, WMATA Metrorail**). This adverse
60 impact is not anticipated to be predominantly borne by EJ communities or to be appreciably
61 more severe or greater in magnitude for EJ populations than for non-EJ populations. It would
62 affect all Metrorail riders equally and available data indicate that minorities or low-income
63 persons do not account for a disproportionate number of riders. Based on a 2012 Metrorail
64 passenger survey, minorities (non-white or Hispanic) made up approximately 43 percent of
65 Metrorail riders. Persons with household incomes less than \$30,000 a year accounted for 11
66 percent of passengers.²

Intercity Buses

67 The No-Action Alternative would result in a major adverse operational impact on bus
68 passenger facilities' ability to accommodate projected increases in users at WUS (see **Section**
69 **5.5.4.1, No-Action Alternative, Direct Operational Impacts, Intercity, Tour/Charter, and**
70 **Sightseeing Buses**). Based on a *Northeast Corridor Intercity Travel Study* published in 2015,
71 minorities and low-income persons rely on the bus for intercity travel much more than other
72 demographics.³ The 2015 study found that while racial minorities make up only 4 percent of
73 intercity travelers by car, they make up 45 percent of bus passengers. Similarly, people with
74 household incomes less than \$25,000 represent 2 percent of drivers but 22 percent of bus
75 passengers. On this basis, the major adverse operational impact on intercity bus operations
76 would represent a disproportionately high and adverse impact on EJ populations, as it would
77 be appreciably greater in magnitude for these populations than for the non-EJ population.

City and Commuter Buses

78 In the No-Action Alternative, anticipated increases in ridership and traffic volumes would
79 cause a moderate adverse direct operational impact on city buses due to overcrowding of
80 some buses and likely decreases in average bus speeds and reliability (see **Section 5.5.4.1,**
81 **No-Action Alternative, Direct Operational Impacts, City and Commuter Buses**). According to a
82 2014 Metrobus passenger survey, minorities represent 81.5 percent of Metrobus users and

² Washington Metropolitan Area Transit Authority (WMATA). January 25, 2013. *2012 Metrorail Passenger Survey*. Accessed from <http://www.mwacog.org/asset.aspx?id=committee-documents/ZF1cV1Zb20130125141114.pdf>. Accessed on April 23, 2020.

³ Northeast Corridor Infrastructure and Operations Advisory Commission. 2015. *Northeast Corridor Intercity Travel Study*. Accessed from https://nec-commission.com/app/uploads/2018/04/2015-09-14_NEC-Intercity-Travel-Summary-Report_Website.pdf. Accessed on April 15, 2020.

83 low-income persons 52 percent.⁴ On this basis, the moderate adverse operational impact on
84 city bus operations would be a disproportionately high and adverse impacts on EJ
85 populations, as it would be borne predominantly by members of EJ populations.

Vehicular Traffic

86 In the No-Action Alternative, roadway traffic near WUS would increase because of greater
87 activity at WUS, local developments, and district-wide population and economic growth. As
88 shown by the traffic impact analysis (**Section 5.5.4.1, No-Action Alternative, Vehicular**
89 **Traffic**), this would cause a degradation of operational conditions at multiple intersections.
90 These adverse traffic impacts would not be predominantly borne by EJ populations or be
91 appreciably more severe for these populations than for non-EJ communities. Of the 35 study
92 intersections for the No-Action Alternative, 13 (37 percent) are adjacent to Census blocks or
93 block groups with more than 50 percent minority population or more than 27 percent low-
94 income residents.⁵ Of these 13 intersections of EJ concern, ten would experience a major
95 impact for at least one of the three factors considered in the traffic analysis. This would be
96 half or less of all the intersections that would experience major impacts: 3 out of 6 for
97 degradation to Level of Service [LOS] F; 10 out of 21 for increase in queue length of more
98 than 150 feet; and 7 out of 18 for delay increases of more than 5 seconds. Additionally, none
99 of the ten intersections is located entirely within an EJ community or is of special significance
100 to the well-being of any such community. All border major thoroughfares (such as North
101 Capitol Street and H Street) that already carry large amounts of commuter traffic.

Noise and Vibration

102 As explained in **Section 5.10.4.1, No-Action Alternative, Direct Operational Impacts**, ambient
103 noise near WUS and the rail terminal would decrease in the No-Action Alternative because
104 the private air-rights development would mask train noise. Farther away, small increases in
105 noise would occur because of greater traffic. Slightly greater increases in noise levels would
106 occur near New York Avenue due to the new Virginia Railway Express (VRE) Midday Storage
107 Replacement Facility, but nowhere would increases exceed 3 dBA, which is the threshold of
108 perception. Such changes in noise levels have no potential to result in disproportionately
109 high and adverse impacts on EJ communities.

⁴ WMATA. March 22, 2018. *G9 Title VI Evaluation. Table One. Metrobus Ridership Bus Demographic Profile*. Accessed from <https://www.wmata.com/about/board/meetings/board-pdfs/upload/9A-201959-G9-Title-VI-Evaluation.pdf>. Accessed on April 23, 2020.

⁵ These intersections are : North Capitol Street and K Street; North Capitol Street and H Street; 3rd Street and H Street NE; North Capitol Street and G Street; North Capitol Street and Massachusetts Avenue; North Capitol Street and E Street; 4th Street and H Street NE; First Street and D Street NW; 2nd Street and D Street NW; 3rd Street and E Street NW; 3rd Street, Massachusetts Avenue, and H Street; North Capitol Street (southbound ramp) and New York Avenue; and North Capitol Street (northbound ramp) and New York Avenue.

Social and Economic Conditions

110 Of the No-Action Alternative projects, the private air-rights development has the most
111 potential to disproportionately affect EJ communities. This project would bring
112 approximately 2,150 new residents to the area. This may raise concerns related to
113 gentrification and the involuntary displacement of long-standing minority or low-income
114 residents.⁶ However, the Census tracts around WUS currently do not currently meet key
115 social and demographic criteria commonly used to define areas liable to gentrification.⁷ The
116 private air-rights development would not replace or eliminate any existing housing or other
117 land uses since it would be in what is now open space above the rail terminal.

Construction Impacts

118 **Not constructing the Project has no potential to cause disproportionately high and adverse**
119 **impacts on EJ communities. Construction of the projects included in the No-Action**
120 **Alternative may displace homeless persons.**

121 In the No-Action Alternative, the Project would not take place, which has no potential to
122 generate construction-related disproportionately high and adverse impacts on EJ
123 communities. Construction of the various No-Action Alternative projects would generate
124 transportation and noise impacts. While it is not possible to assess the intensity and duration
125 of these impacts, they would generally be most noticeable immediately adjacent to the
126 respective project sites.

127 The projects with the potential to cause the greatest construction-related impacts are the
128 private air-rights development and the replacement of the H Street Bridge. These would take
129 place within and adjacent to Census blocks with no permanent EJ populations. However,
130 these blocks currently have a homeless population and may have one when these projects
131 begin. For safety and security reasons, it may be necessary to displace homeless persons
132 during the construction of the No-Action projects, or they may leave because of
133 construction-related disturbances. Displaced homeless persons may relocate to nearby areas
134 but it is not possible to predict where they would go and how many would be affected.
135 Nearby homeless assistance resources would remain available to homeless persons. The
136 project owners would have the option to work with these resources if and when it is
137 necessary to remove homeless encampments.

⁶ The US Department of Housing and Urban Development defines gentrification as “the process by which a neighborhood occupied by lower-income households undergoes revitalization or reinvestment through the arrival of upper-income households.”

⁷ Freeman, L. “Displacement or Succession? Residential Mobility in Gentrifying Neighborhoods.” *Urban Affairs Review*, 463-491. 2005. For further analysis, see **Appendix C3**, *Washington Union Station Expansion Project Environmental Consequences Technical Report*, **Section 14.5.1.2**, *Indirect Operational Impacts*.

5.17.4.2 Alternative A

Operational Impacts

138 **Alternative A would not have disproportionately high and adverse impacts on EJ**
139 **communities relative to the No-Action Alternative.**

Transportation

WMATA Metrorail

140 In Alternative A, there would be an increase in Metrorail ridership at WUS due to capacity
141 exceedances (see **Section 5.5.4.2, Alternative A, Direct Operational Impacts, WMATA**
142 **Metrorail**), resulting in a moderate adverse operational impact. This adverse impact is not
143 anticipated to be predominantly borne by EJ communities or to be appreciably more severe
144 or greater in magnitude for EJ populations than for non-EJ populations for the same reason
145 as explained for the No-Action Alternative in **Section 5.17.4.1, No-Action Alternative,**
146 **Operational Impacts, Transportation** above.

Intercity Buses

147 Alternative A would have a moderate adverse direct operational impact on intercity bus
148 operations because of the new 30-minute time limit for buses at WUS, as explained in
149 **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Intercity, Tour/Charter, and**
150 **Sightseeing Buses**. This would result in more trips in and out of the bus facility and may
151 create additional delays for bus operators; buses may also need to lay over at other locations
152 in the District or the region. Although, as explained above for the No-Action Alternative,
153 available, data suggest that EJ populations rely on the bus for intercity travel appreciably
154 more than non-EJ populations do (see **Section 5.17.4.1, No-Action Alternative, Operational**
155 **Impacts, Transportation** above), Alternative A's adverse impacts would predominantly bear
156 on bus operators rather than bus passengers. Passengers would benefit from a new facility
157 with enhanced accommodations and connectivity. The moderate adverse operational
158 impacts on intercity bus operations would not be a disproportionately high and adverse
159 impact on EJ populations.

City and Commuter Buses

160 As explained in **Section 5.5.4.2, Alternative A, Direct Operational Impacts, City and Commuter**
161 **Buses**, Alternative A would have a minor adverse direct operational impact on city and
162 commuter buses, as increases in WUS-generated ridership would incrementally contribute to
163 the overcrowding of some city buses and increases in traffic congestion would incrementally
164 contribute to delays experienced by all city and commuter buses. This would not amount to a
165 disproportionately high and adverse impact on EJ communities. While the impacts would
166 affect members of EJ populations, who make up a large proportion of bus passengers (as
167 noted in **Section 5.17.4.1, No-Action Alternative, Operational Impacts, Transportation** above),
168 the increase attributable to the Project in Alternative A would be small relative to No-Action

169 Alternative conditions and the same bus lines would be affected as in the No-Action
170 Alternative.

Vehicular Traffic

171 In Alternative A, roadway traffic in the Local Study Area would increase, resulting in a
172 degradation of operational conditions at multiple intersections near WUS relative to the No-
173 Action Alternative (see **Section 5.5.4.2**, *Alternative A, Direct Operational Impacts, Vehicular*
174 *Traffic*). These adverse impacts would not be predominantly borne by EJ populations or be
175 appreciably more severe for these populations than for non-EJ communities.

176 There would be a major operational adverse impact during at least one peak period at nine
177 of the 13 study intersections (out of 35) of EJ concern. The nine intersections account for less
178 than half the intersections that would experience a major adverse impact under one of the
179 three factors considered in the traffic impact analysis (2 out of 7 for degradation to LOS F; 7
180 out of 16 for increase in queue length of more than 150 feet; and 8 out of 20 for delay
181 increases of more than 5 seconds). Additionally, none of the nine intersections is located
182 entirely within an EJ community or is of special significance to the well-being of any such
183 community. All border major thoroughfares (such as North Capitol Street and H Street) that
184 already carry large amounts of commuter traffic and would continue to do so under the No-
185 Action Alternative.

Noise and Vibration

186 Alternative A's operational noise and vibration impacts are described in **Section 5.10.4.2**,
187 *Alternative A, Direct Operational Impacts*. Operational vibration impacts would be negligible
188 with no potential to disproportionately affect EJ populations.

189 Adverse noise impacts would not be predominantly borne by EJ populations or be
190 appreciably more severe for these populations than for non-EJ communities. Increased traffic
191 and rail operations would cause increases in operational noise throughout the Local Study
192 Area. Everywhere, including along North Capitol Street and H Street, noise levels would not
193 change by more than 3 dBA, which is generally not perceptible. These small increases would
194 bring noise levels up to the FTA threshold for moderate noise impacts at 14 modeled
195 receptor locations. Noise levels would also increase at 10 planned development locations. Of
196 those receptors, none are within majority minority Census blocks or are of special
197 significance to minority communities. Only two existing receptors and four planned ones are
198 located within a Census block with more than 27 percent of the residents under 150 percent
199 of the poverty threshold.

Social and Economic Conditions

200 Relative to the No-Action Alternative, Alternative A would have a major beneficial impact on
201 local communities by improving community cohesion and providing new pedestrian
202 connections between WUS and the surrounding neighborhoods. Alternative A would result in
203 more and improved bus and train service at WUS. It would provide enhanced connections

204 between the neighborhoods to the east and west of WUS as well as make the station more
205 accessible to pedestrians, bicycles, and persons with reduced mobility. Alternative A would
206 also have positive economic impacts through the addition of new retail space at WUS and the
207 intensification of train operations (see **Section 5.14.4.2, Alternative A, Direct Operational**
208 *Impacts, Community Disruption and Other Social Benefits or Impacts*). Together, this would
209 support an estimated 1,445 jobs over the No-Action Alternative. Minority and low-income
210 persons would enjoy these benefits as much as the general population.

Construction Impacts

211 **Construction of Alternative A would have a disproportionately high and adverse impact on**
212 **EJ communities from the unavailability of intercity bus service at WUS during Phase 4 of**
213 **Construction.**

Transportation

WMATA Metrorail

214 Similar to operational impacts and for the same reason, construction impacts on WMATA
215 Metrorail in Alternative A (see **Section 5.5.4.2, Alternative A, Construction Impacts, WMATA**
216 *Metrorail*) would not be predominantly borne by minorities or low-income persons or be
217 appreciably more severe or greater in magnitude for EJ populations than for non-EJ
218 populations.

Intercity Buses

219 As explained in **Section 5.5.4.2, Alternative A, Construction Impacts, Intercity, Tour/Charter,**
220 *and Sightseeing Buses*, in Alternative A, intercity bus service would not be available at WUS
221 during Phase 4 of construction. As explained in **Section 5.17.4.1, No-Action Alternative,**
222 *Operational Impacts, Transportation* above, data indicate that EJ populations rely on the bus
223 for intercity travel appreciably more than non-EJ populations. Therefore, the displacement of
224 intercity bus service in Phase 4 of construction would be a disproportionately high and
225 adverse impact on EJ populations, as it would be appreciably greater in magnitude for these
226 populations than for the non-EJ population.

227 In Alternative A, Phase 4 would last for approximately 3 years and 1 month. Measures to
228 avoid, minimize, and mitigate this impact are identified in **Section 5.17.6, Avoidance,**
229 *Minimization, and Mitigation Evaluation*.

City and Commuter Buses

230 Construction of Alternative A would have negligible adverse impacts on city and commuter
231 bus operations, as there would only be intermittent and limited disruptions (see **Section**
232 **5.5.4.2, Alternative A, Construction Impacts, City and Commuter Buses**). There would be no
233 potential for disproportionately high and adverse impacts on EJ communities.

Vehicular Traffic

234 As explained in **Section 5.5.4.2, Alternative A, Construction Impacts, Vehicular Traffic,**
235 construction activities at WUS would generate traffic to and from the Project Area
236 throughout the day during the entire construction period, although the volume and nature of
237 this traffic would vary depending on the construction phase and type of activities being
238 conducted. It would be greatest during excavations activities, when up to 120 trucks per 20-
239 hour day could be traveling to and from the site. This is a maximum, conservative estimate
240 that assumes that no work trains would be used to haul spoils away. Trucks would only travel
241 along designated truck routes, with the exception of short stretches of First and 2nd Streets
242 NE to reach the nearest designated route. Trucks would not travel through neighborhoods in
243 a manner that could result in disproportionately high and adverse impacts on EJ
244 communities.

Noise and Vibration

245 Construction of Alternative A would cause noise and vibrations. Construction noise levels in
246 EJ communities would not be consistently higher in EJ communities than in non-EJ
247 communities. As described in **Section 5.10.4.2, Alternative A, Construction Impacts,** there
248 would be major stationary- and mobile-source construction noise impacts at up to
249 33 receptors where noise levels would exceed the FTA criteria for moderate or severe
250 (major) impacts during support of excavation (SOE) construction or at the beginning of
251 excavation.

252 Most of these 33 receptors are located close to the edge of the rail terminal along First and
253 2nd Streets NE south of L Street and west of 3rd Street NE. Three of the affected receptors
254 are in a Census block with more than 50 percent minority population: 1111-1139 3rd Street
255 NE (severe impact) and 300 L Street NE (moderate impact) in Block 2017; and 907-913 3rd
256 Street NE in Block 2043 (severe impact). All three receptors are residential uses. Outside
257 those two blocks, two receptors that would experience moderate adverse noise impacts
258 during excavation activities are Station House Apartments (701 2nd Street NE), an affordable
259 housing complex; and 301-319 K Street NE, close to a predominantly African-American place
260 of worship (Community Holiness, 305 K Street NE). Thus, some minority or low-income
261 persons and locations of significance to EJ populations would experience severe or moderate
262 noise impacts. However, as shown by the total number of locations affected, these impacts
263 would not be predominantly borne by EJ populations or be appreciably more severe for these
264 populations than for non-EJ communities. Measures that would be implemented to avoid,
265 minimize, or mitigate noise impacts (see **Section 5.10.6, Avoidance, Minimization, and**
266 **Mitigation Evaluation**) would reduce impacts at EJ as well as non-EJ locations.

267 The greatest levels of stationary-source vibrations would be experienced along the eastern
268 side of the Project Area (affecting the REA Building and the Kaiser Permanente Medical
269 Center; see **Section 5.10.4.2, Alternative A, Construction Impacts**). Vibration from truck traffic
270 is expected to generate annoyance at 12 locations close to New York Avenue, North Capitol

271 Street and 2nd Street NE. These locations are not in Census blocks or block groups with more
272 than 50 percent minority or more than 27 percent low-income populations.

Social and Economic Conditions

273 There is currently a substantial homeless population near WUS and along First Street NE and
274 such a population may still be present when construction of Alternative A begins. If so,
275 construction would displace these homeless persons and make areas currently used by the
276 homeless inhospitable for many years. Due to the transient, mobile, and changing character
277 of the homeless population, as well as evolving District policies with regard to homeless
278 encampments,⁸ it is not possible to estimate how many people this would affect and
279 whether it would amount to a disproportionately high and adverse impacts on EJ
280 communities. Some homeless persons may relocate to nearby areas while other may travel
281 farther. Nearby homeless assistance resources would remain available to help the area's
282 homeless. The steps described in **Section 5.17.6, Avoidance, Minimization, and Mitigation**
283 *Evaluation* would minimize impacts on this population.

5.17.4.3 Alternative B

Operational Impacts

284 **Alternative B would not have disproportionately high and adverse impacts on EJ**
285 **communities relative to the No-Action Alternative.**

286 The analyses presented in **Section 5.17.4.2, Alternative A, Operational Impacts** for WMATA
287 Metrorail; Intercity Buses; City and Commuter Buses; and Social and Economic Conditions
288 also apply to Alternative B and are not repeated here. The adverse operational impacts of
289 Alternative B on noise and vibration (see **Section 5.10.4.3, Alternative B, Direct Operational**
290 **Impacts**) would vary slightly from those of Alternative A but not in a manner that would
291 change their distribution across the Study Area or their potential to affect EJ communities.
292 Therefore, the same analysis applies to Alternative B as well. It is not repeated here.

Transportation

Vehicular Traffic

293 In Alternative B, roadway traffic in the Local Study Area would increase, resulting in a
294 degradation of operational conditions at multiple intersections near WUS relative to the No-
295 Action Alternative (see **Section 5.5.4.3, Alternative B, Direct Operational Impacts, Vehicular**

⁸ In January 2020, the District enacted and implemented a policy to permanently remove all homeless encampments from the K Street NE underpass. However, the removal policy did not apply to L Street encampments. Heim, Joe and Moyer, Justin Wm., "No Room on the Street: D.C. Orders Homeless out of Underpass in Fast-Developing Neighborhood," *Washington Post*, January 10, 2020. Accessed from https://www.washingtonpost.com/local/no-room-on-the-street-dc-orders-homeless-out-of-underpass-in-fast-developing-neighborhood/2020/01/10/1704d604-319c-11ea-9313-6c8a89b1b9fb_story.html. Accessed on April 24, 2020.

296 *Traffic*). These adverse impacts would not be predominantly borne by EJ populations or be
297 appreciably more severe for these populations than for non-EJ communities.

298 There would be a major operational adverse impact during at least one peak period at seven
299 of the 13 intersections (out of 36) of EJ concern. These seven intersections account for less
300 than half the intersections that would experience a major adverse operational impact under
301 one of the three factors considered in the traffic impact analysis (1 out of 4 for degradation
302 to LOS F; 7 out of 15 for increase in queue length of more than 150 feet; and 7 out of 21 for
303 delay increases of more than 5 seconds). None of the intersections is located entirely within
304 an EJ community or of special significance to the well-being of any such community. All
305 border major thoroughfares (such as North Capitol Street and H Street) that already carry
306 large amounts of traffic and would continue to do so in the No-Action Alternative.

Construction Impacts

307 **Construction of Alternative B would have a disproportionately high and adverse impact on**
308 **EJ communities from the unavailability of intercity bus service at WUS during Phase 4 of**
309 **Construction.**

310 The analyses presented in **Section 5.17.4.2, *Alternative A, Construction Impacts*** for WMATA
311 Metrorail; Intercity Buses; Vehicular Traffic; and Social and Economic Conditions also apply to
312 Alternative B and are not repeated here. In Alternative B, Phase 4 of construction, during
313 which intercity bus service would not be available at WUS would last for approximately 4
314 years and 11 months.

Transportation

City and Commuter Buses

315 Construction of Alternative B would have minor adverse impacts on city and commuter bus
316 operations from lane closures on K Street NE (see **Section 5.5.4.3, *Alternative B, Construction***
317 ***Impacts, City and Commuter Buses***). This would not amount to a disproportionately high and
318 adverse impact on EJ communities. While the impacts would affect members of EJ
319 populations, who make up a large proportion of city bus passengers (see **Section 5.17.4.1,**
320 ***No-Action Alternative, Operational Impacts, Transportation*** above), only one Metrobus line
321 (D4) out of 13 that serve WUS and its surrounding, would be affected and one lane of traffic
322 would remain open in each direction during the day.

Noise and Vibration

323 Construction of Alternative B would cause noise and vibrations, as described in
324 **Section 5.10.4.3, *Alternative B, Construction Impacts***. Construction noise levels in EJ
325 communities would not be consistently higher in EJ communities than in non-EJ
326 communities. In Alternative B, there would be major stationary- and mobile-source
327 construction noise impacts at 38 receptors. Noise levels at these locations would exceed the
328 FTA criteria for moderate or severe (major) impacts during SOE construction or at the
329 beginning of excavation. This would be five more receptors than in Alternative A but none of

330 these additional five would be in areas of EJ concern; therefore, with respect to EJ, the noise
331 impacts of Alternative B would be as described for Alternative A in **Section 5.17.4.2,**
332 *Alternative A, Construction Impacts, Noise and Vibration.*

5.17.4.4 Alternative C

Operational Impacts

333 **Alternative C (either option) would not have disproportionately high and adverse impacts**
334 **on EJ communities relative to the No-Action Alternative.**

335 The analyses presented in **Section 5.17.4.2, Alternative A, Operational Impacts** for WMATA
336 Metrorail; Intercity Buses; City and Commuter Buses; and Social and Economic Conditions
337 also apply to Alternative C (either option). They are not repeated here. The adverse
338 operational impacts of Alternative C (either option) on noise and vibration (see **Section**
339 **5.10.4.4, Alternative C, Direct Operational Impacts**) would vary slightly from those of
340 Alternative A but not in a manner that would change their distribution across the Study Area
341 or their potential to affect EJ communities. Therefore, the same analysis applies to
342 Alternative C as well. It is not repeated here.

Transportation

Vehicular Traffic

343 In Alternative C, roadway traffic in the Local Study Area would increase, resulting in a
344 degradation of operational conditions at multiple intersections near WUS relative to the No-
345 Action Alternative (see **Section 5.5.4.4, Alternative C, Direct Operational Impacts, Vehicular**
346 **Traffic**). These adverse impacts would not be predominantly borne by EJ populations or be
347 appreciably more severe for these populations than for non-EJ communities.

348 There would cause a major operational adverse impact during at least one peak period at ten
349 (East Option) or six (West Option) of the 13 intersections (out of 36) of EJ concern. In
350 Alternative C with the East Option, the ten intersections of EJ concern affected account for
351 less than or just over half the intersections that would experience a major adverse
352 operational impact under one of the three factors considered in the traffic impact analysis (2
353 out of 5 for degradation to LOS F; 9 out of 21 for increase in queue length of more than 150
354 feet; and 10 out of 19 for delay increases of more than 5 seconds). In Alternative C with the
355 West Option, the six affected intersections of EJ concern account for less than half the total
356 affected intersections regardless of the factor (1 out of 4 for degradation to LOS F; 6 out of 15
357 for increase in queue length of more than 150 feet; and 6 out of 20 for delay increases of
358 more than 5 seconds).

359 Additionally, regardless of the option, none of the affected intersections is located entirely
360 within an EJ community or of special significance to the well-being of any such community.
361 All border major thoroughfares (such as North Capitol Street and H Street) that already carry
362 large amounts of traffic and would continue to do so in the No-Action Alternative.

Construction Impacts

363 **Construction of Alternative C with the East Option would not have disproportionately high**
364 **and adverse impacts on EJ communities. Construction of Alternative C with the West**
365 **Option would have a disproportionately high and adverse impact on EJ communities from**
366 **the unavailability of intercity bus service at WUS during Phase 4 of Construction.**

367 The analyses presented in **Section 5.17.4.2, *Alternative A, Construction Impacts*** for WMATA
368 Metrorail; Vehicular Traffic; and Social and Economic Conditions also apply to Alternative C
369 and are not repeated here. The analysis presented in **Section 5.17.4.3, *Alternative B,***
370 ***Construction Impacts*** for City and Commuter Buses also applies to Alternative C and is not
371 repeated here.

Transportation

Intercity Buses

372 The analysis presented in **Section 5.17.4.2, *Alternative A, Construction Impacts*** for Intercity
373 Buses also applies to Alternative C with the West Option. It is not repeated here. In
374 Alternative C, Phase 4 of construction, during which intercity bus service would be
375 unavailable at WUS, would last for approximately 4 years.

376 In Alternative C with the East Option, however, intercity bus service would remain available
377 throughout the construction period because the new bus facility (on the east side of the
378 Project Area) would be operational by the time the existing one is demolished. Therefore,
379 construction of Alternative C with the West Option would not result in a disproportionately
380 high and adverse impact on EJ communities.

Noise and Vibration

381 Construction of Alternative C (either option) would cause noise and vibrations as described in
382 **Section 5.10.4.4, *Alternative C, Construction Impacts***. Construction noise levels in EJ
383 communities would not be consistently higher in EJ communities than in non-EJ
384 communities. There would be major stationary- and mobile-source construction noise
385 impacts at 32 receptors where noise levels would exceed FTA criteria for moderate or severe
386 (major) impacts during SOE construction or at the beginning of excavation. The number of
387 affected receptors in areas of EJ concern would be the same as in Alternative A. Therefore,
388 with respect to EJ, the noise impacts of constructing Alternative C would be as described for
389 Alternative A in **Section 5.17.4.2, *Alternative A, Construction Impacts***. While some minority or
390 low-income persons and locations of significance to EJ populations would experience severe
391 or moderate noise impacts, such impacts would not be predominantly borne by EJ
392 populations or be appreciably more severe for these populations than for non-EJ
393 communities. Measures that would be implemented to avoid, minimize, or mitigate noise
394 impacts (see **Section 5.10.6, *Avoidance, Minimization, and Mitigation Evaluation***) would
395 reduce impacts at EJ as well as non-EJ locations.

5.17.4.5 Alternative D

Operational Impacts

396 **Alternative D would not have disproportionately high and adverse impacts on EJ**
397 **communities relative to the No-Action Alternative.**

398 The analyses presented in **Section 5.17.4.2, Alternative A, Operational Impacts** for WMATA
399 Metrorail; Intercity Buses; City and Commuter Buses; and Social and Economic Conditions
400 also apply to Alternative D. They are not repeated here. The adverse operational impacts of
401 Alternative D on noise and vibration (see **Section 5.10.4.5, Alternative D, Direct Operational**
402 **Impacts**) would vary slightly from those of Alternative A but not in a manner that would
403 change their distribution across the Study Area or their potential to affect EJ communities.
404 Therefore, the same analysis applies to Alternative D as well. It is not repeated here.

Transportation

Vehicular Traffic

405 In Alternative D, roadway traffic in the Local Study Area would increase, resulting in a
406 degradation of operational conditions at multiple intersections near WUS relative to the No-
407 Action Alternative (see **Section 5.5.4.5, Alternative D, Direct Operational Impacts, Vehicular**
408 **Traffic**). These adverse impacts would not be predominantly borne by EJ populations or be
409 appreciably more severe for these populations than for non-EJ communities.

410 There would be a major operational adverse impact during at least one peak period at six of
411 the 13 intersections (out of 36) of EJ concern. These six intersections account for less than
412 half the intersections that would experience a major adverse operational impact under one
413 of the three factors considered in the traffic impact analysis (1 out of 4 for degradation to
414 LOS F; 6 out of 14 for increase in queue length of more than 150 feet; and 6 out of 20 for
415 delay increases of more than 5 seconds).

416 Additionally, regardless of the option, none of the affected intersections is located entirely
417 within an EJ community or of special significance to the well-being of any such community.
418 All border major thoroughfares (such as North Capitol Street and H Street) that already carry
419 large amounts of traffic and would continue to do so in the No-Action Alternative.

Construction Impacts

420 **Construction of Alternative D would have a disproportionately high and adverse impact on**
421 **EJ communities from the unavailability of intercity bus service at WUS during Phase 4 of**
422 **Construction.**

423 The analyses presented in **Section 5.17.4.2, Alternative A, Construction Impacts** for WMATA
424 Metrorail; Intercity Buses; Vehicular Traffic; and Social and Economic Conditions also apply to
425 Alternative D and are not repeated here. In Alternative D, Phase 4 of construction, during
426 which intercity bus service would be unavailable at WUS, would last for approximately 4

427 years. The analysis presented in **Section 5.17.4.3, *Alternative B, Construction Impacts*** for City
428 and Commuter Buses also applies to Alternative D and is not repeated here.

429 The analysis presented in **Section 5.17.4.4, *Alternative C, Construction Impacts*** for Noise and
430 Vibration also applies to Alternative D. Both alternatives would use the same SOE method
431 and involve the same amount of excavation. Construction duration would be the same.

5.17.4.6 Alternative E

Operational Impacts

432 **Alternative E would not have disproportionately high and adverse impacts on EJ**
433 **communities relative to the No-Action Alternative.**

434 The analyses presented in **Section 5.17.4.2, *Alternative A, Operational Impacts*** for WMATA
435 Metrorail; Intercity Buses; City and Commuter Buses; and Social and Economic Conditions
436 also apply to Alternative E. They are not repeated here. The adverse operational impacts of
437 Alternative E on noise and vibration (see **Section 5.10.4.6, *Alternative E, Direct Operational***
438 ***Impacts***) would vary slightly from those of Alternative A but not in a manner that would
439 change their distribution across the Study Area or their potential to affect EJ communities.
440 Therefore, the same analysis applies to Alternative E as well. It is not repeated here.

Transportation

Vehicular Traffic

441 In Alternative E, roadway traffic in the Local Study Area would increase, resulting in a
442 degradation of operational conditions at multiple intersections near WUS relative to the No-
443 Action Alternative (see **Section 5.5.4.6, *Alternative E, Direct Operational Impacts, Vehicular***
444 ***Traffic***). These adverse impacts would not be predominantly borne by EJ populations or be
445 appreciably more severe for these populations than for non-EJ communities.

446 There would be a major operational adverse impact during at least one peak period at seven
447 of the 13 intersections (out of 36) of EJ concern. These intersections account for less than
448 half the intersections that would experience a major adverse operational impact under one
449 of the three factors considered in the traffic impact analysis (1 out of 4 for degradation to
450 LOS F; 7 out of 16 for increase in queue length of more than 150 feet; and 7 out of 20 for
451 delay increases of more than 5 seconds). Additionally, regardless of the option, none of the
452 affected intersections is located entirely within an EJ community or of special significance to
453 the well-being of any such community. All border major thoroughfares (such as North Capitol
454 Street and H Street) that already carry large amounts of traffic and would continue to do so
455 in the No-Action Alternative.

Construction Impacts

456 **Construction of Alternative E would have a disproportionately high and adverse impact on**
457 **EJ communities from the unavailability of intercity bus service at WUS during Phase 4 of**
458 **Construction.**

459 The analyses presented in **Section 5.17.4.2, Alternative A, Construction Impacts** for WMATA
460 Metrorail; Intercity Buses; Vehicular Traffic; and Social and Economic Conditions also apply to
461 Alternative E and are not repeated here. In Alternative E, Phase 4 of construction, during
462 which intercity bus service would be unavailable at WUS, would last for approximately 4
463 years and 11 months. The analysis presented in **Section 5.17.4.3, Alternative B, Construction**
464 **Impacts** for City and Commuter Buses also applies to Alternative E and is not repeated here.

465 The analysis presented in **Section 5.17.4.3, Alternative B, Construction Impacts** for Noise and
466 Vibration also applies to Alternative E. Both alternatives would use the same SOE method
467 and involve the same amount of excavation. Construction duration would be the same.

5.17.4.7 Alternative A-C (Preferred Alternative)

Operational Impacts

468 **Alternative A-C would not have disproportionately high and adverse impacts on EJ**
469 **communities relative to the No-Action Alternative.**

470 The analyses presented in **Section 5.17.4.2, Alternative A, Operational Impacts** for WMATA
471 Metrorail; Intercity Buses; City and Commuter Buses; Noise and Vibration; and Social and
472 Economic Conditions also apply to Alternative A-C. They are not repeated here.

Transportation

Vehicular Traffic

473 In Alternative A-C, roadway traffic in the Local Study Area would increase, resulting in a
474 degradation of operational conditions at multiple intersections near WUS relative to the No-
475 Action Alternative (see **Section 5.5.4.7, Alternative A-C, Direct Operational Impacts, Vehicular**
476 **Traffic**). These adverse impacts would not be predominantly borne by EJ populations or be
477 appreciably more severe for these populations than for non-EJ communities.

478 There would be a major operational adverse impact during at least one peak period at seven
479 of the 13 intersections (out of 35) of EJ concern. These seven intersections account for less
480 than half the intersections that would experience a major adverse operational impact under
481 one of the three factors considered in the traffic impact analysis (2 out of 5 for degradation
482 to LOS F; 7 out of 19 for increase in queue length of more than 150 feet; and 7 out of 22 for
483 delay increases of more than 5 seconds).

484 Additionally, regardless of the option, none of the affected intersections is located entirely
485 within an EJ community or of special significance to the well-being of any such community.

486 All border major thoroughfares (such as North Capitol Street and H Street) that already carry
487 large amounts of traffic and would continue to do so in the No-Action Alternative.

Construction Impacts

488 **Construction of Alternative A-C would have a disproportionately high and adverse impact**
489 **on EJ communities from the unavailability of intercity bus service at WUS during Phase 4 of**
490 **Construction.**

491 The analyses presented in **Section 5.17.4.2, Alternative A, Construction Impacts** for WMATA
492 Metrorail; Intercity Buses; City and Commuter Buses; Vehicular Traffic; Noise and Vibration;
493 and Social and Economic Conditions also apply to Alternative A-C.

5.17.5 Comparison of Alternatives

494 In all Action Alternatives except Alternative C with the East Option, the unavailability of
495 intercity bus service at WUS during Phase 4 of construction would constitute a
496 disproportionately high and adverse effect on EJ communities. Phase 4 would last for
497 approximately 3 years and 1 month in Alternatives A and A-C; 4 years in Alternatives C and D;
498 and approximately 4 years and 1 month in Alternatives B and E.

499 Additionally, all alternatives would likely require the displacement of any homeless persons
500 who would be using the area around WUS when construction begins.

5.17.6 Avoidance, Minimization, and Mitigation Evaluation

501 In all Action Alternatives except Alternative C with the East Option, to mitigate the
502 disproportionately high and adverse impact on EJ communities during Phase 4 of
503 construction due to the displacement of intercity bus service, FRA is considering the
504 following measure:

- 505 ■ In coordination with the District, USRC would identify a location for an adequately-
506 sized interim bus facility or bus loading zones as close to WUS as possible for use
507 during Phase 4 of construction.

508 To minimize potential adverse impacts on the homeless population, FRA is considering the
509 following measure:

- 510 ■ If and when construction contractors encounter homeless persons when staging
511 construction activities and need to relocate these persons, they would be required to
512 contact and coordinate with the appropriate authorities and organizations to ensure
513 the displaced persons are given access to available public and private assistance
514 services, including opportunities for shelter as well as health and mental health care;
515 that they are not deprived of their belongings or otherwise mistreated; and that
516 neither they nor the workers interacting with them are put at risk of harm.

5.17.7 Permits and Regulatory Compliance

517 There are no formal permits required to demonstrate regulatory compliance for EJ.
518 Compliance with local noise and construction ordinances would occur through the
519 construction permitting process, which would minimize noise impacts. Per DOT Order
520 5610.2(a), it must be determined whether transportation activities would have an adverse
521 effect on minority and low-income populations and whether that adverse effect would be
522 disproportionately high.

523 Activities that have a disproportionately high and adverse impact on minority and low-
524 income populations may only be implemented if further mitigation measures or alternatives
525 to avoid or reduce these impacts are not practicable. Effective, meaningful involvement of
526 low-income and minority populations must be undertaken in project planning and
527 development and EJ populations must have fair and equal access to information.

5.17.8 Outreach to Environmental Justice Populations

528 One of the guiding principles of environmental justice is ensuring full and fair access to
529 meaningful involvement by minority and low-income populations in project planning and
530 development. A robust, sustained, and transparent engagement process is essential through
531 the life of the Project.

532 The public participation process for the Project and DEIS focused on engaging potentially
533 affected residents through public meetings and materials, social media, and a Community
534 Communications Committee (CCC). The purpose of the CCC was to improve community
535 engagement during the NEPA process and during the Project planning and development
536 process. The CCC includes representatives of the communities potentially affected by the
537 Project (**Section 8.3.2, Key Constituents for the Engagement Process**). CCC meetings
538 convened at logical points throughout the NEPA process, such as prior to public meetings.

539 Per FTA Circular 4703.1, *Environmental Justice Policy Guidance for Federal Transit*
540 *Administration Recipients*,⁹ public outreach has occurred and will continue to occur through
541 interactive public meetings that communicate information about the Project in a manner
542 that is user-friendly, clear, and concise. To date, four public meetings have been held
543 (**Section 8.3.1, Public Meetings**). The meetings were advertised in several newspapers and
544 news websites, including the *Washington Informer*, which serves the African-American
545 community. Translation services were offered at all the public meetings.

546 A public hearing will be held after the Draft EIS is released to present the findings of the
547 impact analysis and received public comment (See **Section 8.5, Public Review of the DEIS**, for
548 more information). **Appendix C3, Washington Union Station Expansion Project Environmental**

⁹ Available at <https://www.transit.dot.gov/regulations-and-guidance/fta-circulars/environmental-justice-policy-guidance-federal-transit>. Accessed on July 8, 2019.

549 *Consequences Technical Report, **Section 17.9**, Outreach to Environmental Justice Populations*
550 *and **Section 8.3**, Public Involvement During Preparation of the DEIS* provide more details on
551 public engagement activities to date.

5.18 Cumulative Impacts

1 The cumulative impact analysis assesses the incremental impacts of the Project when
 2 considered in conjunction with past, present, and reasonably foreseeable future actions.
 3 Under NEPA, a cumulative impact is defined as “the impact on the environment which results
 4 from the incremental impact of the action when added to other past, present and reasonably
 5 foreseeable future actions regardless of what agency (Federal or non-Federal) or person
 6 undertakes such other actions. Cumulative impacts can result from individually minor but
 7 collectively significant actions taking place over a period of time.”

5.18.1 Regulatory Context and Guidance

8 Guidance documents pertaining to cumulative impacts are listed in **Appendix C3**, Washington
 9 Union Station Expansion Project Environmental Consequences Technical Report, **Section**
 10 **18.2, Regulatory Context**.

5.18.2 Study Area

11 The geographic area across which cumulative impacts are considered varies depending on
 12 the resource. **Table 18-1** in **Appendix C3**, *Washington Union Station Expansion Project*
 13 *Environmental Consequences Technical Report*, identifies the study area corresponding to
 14 each resource. In most cases, the area is either the District as a whole or the Local Study Area
 15 for the resource, as shown in **Table 5-185**.

Table 5-185. Study Areas for Cumulative Impacts

| Resource | Cumulative Impact Study Area | Resource | Cumulative Impact Study Area |
|--|---|---------------------------------------|------------------------------------|
| Natural Ecological Systems | Resource Study Area | Noise and Vibration | Resource Study Area |
| Water Resources and Water Quality | District; Resource Study Area (groundwater) | Aesthetics and Visual Quality | Resource Study Area |
| Solid Waste and Hazardous Materials | District (solid waste); Resource Study Area (Hazardous Materials) | Cultural Resources | Resource Study Area |
| Transportation | Resource Study Area | Parks and Recreation Areas | Resource Study Area |
| Air Quality | District-Virginia-Maryland air quality region | Social and Economic Conditions | District, Resource Study Area, WUS |
| Greenhouse Gas Emissions and Resilience | Global and District (greenhouse gas); District and Resource Study Area (Resilience) | Public Safety and Security | Resource Study Area |

| Resource | Cumulative Impact Study Area | Resource | Cumulative Impact Study Area |
|----------------------------------|------------------------------|---|------------------------------|
| Energy Resources | District | Public Health, Elderly, and Persons with Disabilities | Resource Study Area |
| Land Use, Planning, and Property | Resource Study Area | Environmental Justice | Resource Study Area |

5.18.3 Methodology

5.18.3.1 Analysis

16 The potential cumulative impacts of the Action Alternatives were analyzed for the resources
 17 listed in **Table 5-185**. For each resource, past, present, and reasonably foreseeable future
 18 impacts without the Project were considered. In general, the impacts of past projects are
 19 included in the existing conditions described in Chapter 4 of this DEIS. To minimize
 20 redundancy, these descriptions are not repeated in this section. For each resource, the
 21 discussion focuses on present and future impacts using the projects summarized in **Section**
 22 **5.18.3.2** below (cumulative projects) as an illustration or benchmark. Whenever possible,
 23 quantitative estimates were developed using the same methods as used to quantify the
 24 impacts of the alternatives on the resource under consideration. This is followed by a
 25 description of what the Project would add to present, past, and foreseeable future impacts
 26 and an assessment of the resulting cumulative impacts.

5.18.3.2 Cumulative Projects

27 The cumulative projects were selected to include present and foreseeable future projects
 28 that met the following conditions: having the potential to result in measurable
 29 environmental impacts because of their size, scope, or other key characteristics; having
 30 environmental effects that could cause a cumulative impact; being potentially capable of
 31 generating cumulative impacts that could reasonably be expected to affect the viability,
 32 sustainability, or value of a given resource; undergoing or having completed permitting
 33 actions or NEPA reviews, or being programmed for construction.

34 Refer to **Appendix C3**, *Washington Union Station Expansion Project Environmental*
 35 *Consequences Technical Report*, **Section 18.3**, *Study Area* for a map (**Figure 18-1**) and
 36 descriptions of the cumulative projects, which include:

- 37 ■ Various station and track improvements at WUS.

- 38 ■ The following transportation projects: ¹
- 39 ● DC Streetcar extension;
- 40 ● H Street Bridge Replacement; and
- 41 ● WMATA Union Station Metrorail station enhancements
- 42 ■ Fifty-three private development projects, including:
- 43 ● 15,200 residential units;
- 44 ● 1.13 million square feet of retail;
- 45 ● 6.9 million square feet of office space;
- 46 ● 1,400 hotel rooms; and
- 47 ● 3.2 million square feet of mixed-use space.

5.18.4 Impact Analysis

5.18.4.1 Introduction

48 This section presents the cumulative long-term, operational impacts of the Project when
49 added to those of past, present, future projects. For each resource, the cumulative impacts
50 of the Project are summarized in bold lettering, followed by a more detailed analysis.

¹ For the stated reasons, the following transportation projects are not included in the cumulative impact analysis:

Baltimore-Washington SCMAGLEV Project - In 2016, FRA, jointly with the Maryland Department of Transportation, initiated the preparation of an Environmental Impact Statement (EIS) to evaluate the potential impacts of constructing and operating a high-speed superconducting magnetic levitation (SCMAGLEV) system between the District and Baltimore, MD. After a pause, preparation of the EIS resumed in spring 2020. An Alternative Report completed in late 2018 (available from <http://www.bwmaglev.info/index.php/project-documents/reports>, accessed on March 18, 2020) retained two potential locations for an underground terminus station in the District, both under New York Avenue and west of 5th Street NW, near Mount Vernon Square. Because of the distance to the Project Area and anticipated station access modes (no parking is proposed and the station would be close to the Mount Vernon Square/7th Street-Convention Center Metrorail Station; it is not likely to generate substantial additional traffic near the Project Area), the SCMAGLEV station, considered with the Project, has no potential to generate cumulative impacts that could reasonably be expected to affect the viability, sustainability, or value of the resources considered in this DEIS.

Washington DC to Baltimore Loop Project, Proposed by the Boring Company – The Federal Highway Administration (FHWA) issued a Draft Environmental Assessment (EA) for this project in April 2019 (available from <https://www.dcbaltimoreloop.com/DraftLoopEA.pdf>, accessed on March 18, 2020). The project would consist of an underground system transporting passengers in autonomous, high-speed electric vehicles. The District terminus station would be located near the intersection of New York and Florida Avenues. Although it would be a relatively short distance from the WUS Project Area, the potential Loop station, considered with the Project, is not likely to generate cumulative impacts that could reasonably be expected to affect the viability, sustainability, or value of the resources considered in this DEIS. It would be underground, have limited capacity (no more than 1,000 passengers per day in each direction). The terminus station would be close to the NoMA-Gallaudet U.-New York Avenue Metrorail station and include no parking, which would minimize any traffic the project would generate. The Draft EA does not identify adverse impacts from traffic.

5.18.4.2 Natural Ecological Systems

51 **The Project would have no cumulative impacts on natural ecological systems.**

52 There are no natural ecological systems (such as wetlands, natural vegetative communities,
53 or wildlife habitat) in the Study Area. The Study Area consists entirely of transportation and
54 building infrastructure; dense urban uses such as commercial and residential buildings or row
55 houses; and maintained urban parks. Construction of the Project would require the removal
56 of approximately 26 ornamental trees along First Street NE. These trees would be replaced in
57 accordance with District’s policies on urban forestry. The Project would not affect natural
58 ecological systems and would result in no cumulative impacts on those resources.

5.18.4.3 Water Resources and Water Quality

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

Surface Waters

59 The impacts of past actions in the District generally have had an adverse impact on surface
60 waters. Based on current improving trends and the continued enforcement of and
61 compliance with the District’s water quality regulations and policies, the reasonably
62 foreseeable adverse impacts of present and future actions, including the cumulative projects,
63 on surface waters are anticipated to be negligible.

64 The Project Area is located within the subwatershed of the Lower Anacostia River, a tidal
65 river which flows into the Potomac River and ultimately the Chesapeake Bay. In the 2016
66 Water Quality Integrated Report, DOEE lists the Lower Anacostia River as a Category 4A for
67 multiple pollutants. Water quality within this segment of the Anacostia River does not
68 support the river’s designated uses.

69 The District has regulations and policies in place to address water quality issues. DOEE’s
70 Water Quality Division and the Inspection and Enforcement Division implement the water
71 quality standards established under the authority of the Clean Water Act and the District of
72 Columbia Water Pollution Control Act of 1984. The Watershed Protection Division and
73 Regulatory Review Division manage sediment and stormwater control. The District also
74 conducts stream restoration activities to improve habitat and implements a RiverSmart
75 program that provides financial incentives to help property owners install green
76 infrastructure to reduce polluted runoff. The District also coordinates with the District of
77 Columbia Water and Sewer Authority (DC Water) for the construction of the Anacostia River
78 segment of the stormwater storage tunnel under the Clean Rivers Project. Overall, the
79 quality of the District’s waters has been improving.

Groundwater

80 The impacts of past and present actions in the District generally have had an adverse impact
81 on groundwater in the District. The reasonably foreseeable adverse impacts of future actions,

82 including the cumulative projects, on surface waters are anticipated to be negligible both at
83 the District and local level.

84 As reported in 2018, data indicated declines in hydraulic pressure at several wells in the
85 Patuxent Aquifer although some recovery was measured at certain locations, including on
86 the eastern bank of the Anacostia River. The declines were most likely due to several large
87 DC Water Long Term Control Plan (Clean Rivers) dewatering projects underway along the
88 Anacostia River. Dewatering rates for these projects and other construction sites along the
89 Potomac and Anacostia Rivers typically exceed one million gallons per day at each location.

90 Future actions involving large-scale dewatering may continue to affect global groundwater
91 levels but most urban development projects have no potential to have such effects.

92 However, they may result in local impacts if dewatering is sufficient to create a risk of soil
93 subsidence from local reductions in groundwater pressure. In this regard, the local, adverse
94 impacts of the cumulative projects on groundwater would be negligible. In the vicinity of
95 WUS, the cumulative projects may adversely affect groundwater to the extent that their
96 foundations reach below groundwater levels and cause groundwater displacement or require
97 short-term (construction) or long-term pumping and disposal of groundwater to keep
98 basements or underground parking garages dry. Because these projects are located within a
99 part of the District that is almost entirely developed, they have no potential to measurably
100 affect groundwater recharge. While the impacts of each project would vary depending on its
101 location, size, and design, it can be anticipated that each would be engineered to avoid and
102 minimize the need for costly short-term and long-term groundwater withdrawal as much as
103 possible.

Stormwater

104 The impacts of past and present actions in the District generally have had an adverse impact
105 on stormwater from the large amount of impervious surface typical of an urban environment
106 (43 percent of the District is impervious). Through the enforcement of, and compliance with,
107 District stormwater regulations, the adverse impacts of present and reasonably foreseeable
108 future actions, including the cumulative projects, are expected to be minor.

109 The District manages stormwater through its NPDES permit and the 2013 Stormwater Rule.
110 The 2013 Stormwater Rule applies to major land-disturbing activities and major substantial
111 improvement activities. Major land-disturbing activities must retain the first 1.2 inches of
112 rainfall on site or through a combination of on-site and off-site retention. For major
113 substantial improvement activities, the amount is 0.8 inches of rainfall. Regulated sites have
114 the option to provide off-site retainage for half the amount to be retained under the
115 regulation. The District's *Stormwater Management Guidebook* identifies best management

116 practices that can be used to meet on- and off-site retainage requirements, including green
117 roofs, rainwater harvesting, and permeable pavement systems, among others.²

118 The cumulative projects would occur in a densely developed and mostly impervious area of
119 the District. If currently pervious areas are made impervious, this could result in increased
120 stormwater runoff flows depending on the number of projects subject to the 2013 Rule and
121 the intensity of the storm event. This increase may be offset if regulated project replaced
122 impervious land uses to which the regulation does not apply. Altogether, through the
123 application of the District's stormwater regulations, adverse impacts are anticipated to be
124 minor.

Wastewater

125 The impacts of past actions in the District generally have had an adverse impact on
126 wastewater generation through many decades of growth and development. These impacts
127 have been managed through the development and maintenance of an extensive collection
128 and treatment system. Based on the current condition of this system, the impacts of present
129 and reasonably foreseeable actions are anticipated to be minor.

130 DC Water collect the wastewater produced in the District and treats it at Blue Plains.
131 Altogether, DC Water operates 1,900 miles of sanitary and combined sewers and other
132 conveyance facilities. Blue Plains has an average design capacity of 384 million gpd and peak
133 wet weather capacity of more than one billion gpd. Currently, it treats an average of
134 approximately 290 million gpd.

135 In this context, the reasonably foreseeable adverse impacts of future actions, including the
136 cumulative projects, would be minor. District growth will increase the amount of wastewater
137 produced, mostly through residential and commercial development. Currently, Blue Plains
138 operates at 75 percent of capacity on average, which leaves ample capacity to accommodate
139 regional and District growth. As an illustration of the scale of impact from development
140 projects, based on their size, the cumulative projects would generate approximately
141 3,722,670 gallons of wastewater per day. This order-of-magnitude estimate was developed
142 using the same method used to assess the direct impact of the No-Action Alternative
143 (**Section 5.3.4.1, No-Action Alternative, Direct Operational Impacts, Wastewater**) and is
144 detailed in **Appendix C3, Washington Union Station Expansion Project Environmental**
145 **Consequences Technical Report, Section 18.5.3.1, Impacts of Past, Present, and Foreseeable**
146 **Future Actions (without the Project), Wastewater**). The wastewater generated by the
147 cumulative projects would represent approximately 0.97 percent of Blue Plains' average daily
148 capacity of 384 million gallons per day (gpd).³

² District Department of Energy and Environment. 2018. *The District of Columbia's Stormwater Management Regulations*. Accessed from <https://doee.dc.gov/service/offv>. Accessed on April 3, 2020.

³ DC Water. *Blue Plains Advanced Wastewater Treatment Plant brochure*. Accessed from https://www.dewater.com/sites/default/files/Blue_Plains_Plant_brochure.pdf. Accessed on April 3, 2020.

Drinking Water

149 The impacts of past actions in the District generally have had an adverse impact on drinking
150 water demand through many decades of growth and development. These impacts have been
151 addressed through the development and maintenance of an extensive water treatment and
152 distribution system. Based on the current condition of this system, the impacts of present
153 and reasonably foreseeable actions are anticipated to be minor.

154 DC Water operates the drinking water distribution network in the District, including 1,350
155 miles of pipes, four pumping stations, and five reservoirs. In fiscal year 2016, DC Water
156 pumped an average of 99 million gpd of water, in addition to storing 61 million gallons. DC
157 Water purchases water from the Washington Aqueduct, which withdraws water from the
158 Potomac River and treats it at two drinking water treatment plants in the District. The
159 Aqueduct produces an average of 155 million gpd and serves approximately one million
160 persons in the District and neighboring jurisdictions.⁴

161 District and regional growth will increase demand for drinking water, mostly through
162 residential and commercial development. A 2015 study forecasting demand and resource
163 availability to 2040 estimated that regional demand would increase by 12 percent between
164 2015 and 2040. Recommendations included evaluating potential new storage facilities.

165 In this context, the reasonably foreseeable adverse impacts of future actions, including the
166 cumulative projects, would be minor. Assuming a drinking water consumption amounting to
167 the amount of wastewater generated plus 10 percent, the cumulative projects would
168 generate a daily demand of 4,094,937 gpd. This would represent approximately 2.6 percent
169 of the daily production of the Washington Aqueduct.

Cumulative Impacts of the Project

Surface Waters

170 **In all Action Alternatives, when considered with past, present, and reasonably foreseeable**
171 **future projects, the Project would have negligible adverse cumulative impacts on surface**
172 **waters.**

173 In all Action Alternatives, the Project would generate more wastewater that would be
174 conveyed through DC Water's combined sewer system to either Blue Plains or, during larger
175 storms, CSO outfalls in the Anacostia River. This could result in a slightly greater risk of
176 untreated wastewater being released into the Anacostia River relative to what the
177 cumulative projects would cause. However, the contribution of the Project would be very
178 small and the risk would be substantially reduced by the completion of the Clean Rivers
179 Project. Any adverse cumulative impacts on surface waters would be negligible.

⁴ U.S. Army Corps of Engineers. *Washington Aqueduct*. Accessed from <http://www.nab.usace.army.mil/Missions/Washington-Aqueduct/>. Accessed on April 3, 2020.

Stormwater

180 **In all Action Alternatives, when considered with past, present, and reasonably foreseeable**
181 **future projects, the Project would have no cumulative impacts on stormwater runoff.**

182 Because the Project Area is already impervious, the Project would not add to the amount of
183 stormwater runoff it generates. There would be no cumulative impacts.

Groundwater

184 **In Alternatives A and A-C, when considered with past, present, and reasonably foreseeable**
185 **future projects, the Project would have minor adverse cumulative impacts on groundwater.**
186 **In Alternatives B through E, the Project would have moderate adverse cumulative impacts**
187 **on groundwater.**

188 The Project would add to the adverse impacts of the cumulative projects on groundwater
189 because of the construction-related and operational dewatering that would occur under all
190 Action Alternatives. The scale of the dewatering would vary according to the depth of
191 excavation and support of excavation method. Estimated amounts per alternative are
192 summarized in **Table 5-13**. Alternatives A and A-C would involve the smallest amount (less
193 than 10 gallons per minute [gpm] during both construction and operation). Adverse
194 cumulative impacts under this alternative would be minor.

195 The rate of dewatering in Alternatives C and D would be an estimated 220 to 280 gpm during
196 construction and an estimated 20 to 30 gpm in the long term (operational phase). In
197 Alternatives B and E, the rate of construction-phase dewatering would be 260 to 430 gpm
198 and the operational phase rate would be less than 10 gpm. Locally, these four Action
199 Alternatives have the potential to aggravate the risk of ground settlement in the area near
200 WUS once their impacts are added to those of past, future, and reasonably foreseeable
201 future projects. Based on preliminary analysis, the features at greatest risk for drawdown
202 induced settlement would be shallow utility infrastructure such as sewer lines, gas lines, and
203 water lines in the Project Area and along adjoining public roadways; the WMATA Red Line
204 station; and the adjoining neighborhoods or buildings that are supported by shallow
205 foundation systems. The larger adjacent buildings around WUS likely stand on deep
206 foundations and are therefore unlikely to experience settlement from drawdown, although
207 this may warrant further study.⁵ This increased, but localized, risk of settlement would be a
208 moderate adverse cumulative impact.

⁵ Wood Environment & Infrastructure Solutions. February 19, 2019. *Preliminary Report of Aquifer Pumping Test and Seepage Analysis, Union Station Washington, D.C.*

Wastewater

209 **In all Action Alternatives, when considered with past, present, and reasonably foreseeable**
210 **future projects, the Project would have minor adverse cumulative impacts on wastewater**
211 **generation.**

212 In all Action Alternatives, the Project would generate wastewater because of greater
213 passenger and visitor activity at WUS and the potential development of the Federal air rights
214 above the rail terminal. This wastewater would be conveyed through DC Water’s sewer
215 infrastructure. As summarized in **Table 5-13**, the Project would generate from approximately
216 104,530 gpd to approximately 219,030 gpd of wastewater, depending on the Action
217 Alternative. This would be a small addition to the volume the cumulative projects would
218 generate (approximately 3,722,670 gpd or around 0.97 percent of Blue Plains’ average daily
219 capacity of 385 million gpd), resulting in a total volume ranging from approximately 3,827,
220 200 gpd to 3,941,700 gpd, or around 1 percent of Blue Plains’ current average daily capacity.
221 The adverse cumulative impact of the Project on wastewater flows would be minor in all
222 Action Alternatives.

Drinking Water

223 **In all Action Alternatives, when considered with past, present, and reasonably foreseeable**
224 **future projects, the Project would have minor adverse cumulative impacts on drinking**
225 **water demand.**

226 In all Action Alternatives, the Project would generate demand for drinking water from greater
227 passenger and visitor activity at WUS and from the potential development of the Federal air
228 rights above the rail terminal. As shown in **Table 5.3-13**, projected water demand from the
229 Project would range from approximately 99,143 gpd to approximately 193,443 gpd,
230 depending on the Action Alternative. This would be a small addition to the demand the
231 cumulative projects would generate and result in a total demand ranging from approximately
232 4,194,080 gpd to 4,288,380 gpd, or approximately 2.70 to 2.76 percent of the Washington
233 Aqueduct’s average daily production. The adverse cumulative impact of the Project on
234 drinking water demand would be minor in all Action Alternatives.

5.18.4.4 Solid Waste Disposal and Hazardous Materials

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

Municipal Solid Waste

235 The impacts of past actions in the District generally have had an adverse impact on solid
236 waste generation through decades of growth and development. These impacts have been
237 addressed through the development and maintenance of a collection and disposal system
238 managed by both private and public operators. Based on the current condition of this system
239 and the District’s waste diversion goals and policies, the impacts of present and reasonably
240 foreseeable actions on municipal solid waste are anticipated to be minor.

241 In fiscal year 2016, District-owned waste transfer stations processed approximately 480,000
242 tons of MSW, including refuse, recyclables, and compostables. Of this total, 56 percent
243 (approximately 271,000 tons) was exported to landfills. In fiscal year 2017, the District's
244 transfer stations processed a total of approximately 464,000 tons of waste, 76 percent of
245 which were landfilled. The majority (74 percent) of the landfilled waste was disposed of at
246 facilities in Virginia. At the end of calendar year 2017, total sanitary landfill capacity in
247 Virginia was just under 248 million tons, with an average remaining permitted life of 23.1
248 years.

249 The District has a goal of diverting 80 percent of its waste stream away from landfills and
250 waste-to-energy facilities. Thus, while future growth in the District may increase the quantity
251 of municipal waste it produces, the amount of it that would be landfilled will likely decrease,
252 reducing the impact on regional sanitary landfills. As an illustration, it can be estimated that
253 the cumulative projects would generate approximately 97,143 tons of solid waste. This
254 order-of-magnitude estimate was developed using the same method used to assess the
255 direct impact of the No-Action Alternative (**Section 5.4.4.1, No-Action Alternative, Direct**
256 **Operational Impacts, Municipal Solid Waste**) and is detailed in **Appendix C3, Washington**
257 **Union Station Expansion Project Environmental Consequences Technical Report, Section**
258 **18.5.4.1, Impacts of Past, Present, and Foreseeable Future Actions (without the Project),**
259 **Municipal Solid Waste.** Assuming the District achieves its 80 percent diversion goal, less than
260 20,000 tons would go to sanitary landfills. Adverse impacts from this amount would be
261 minor.

Hazardous Materials and Waste

262 The area around WUS has been impacted by petroleum and hazardous material releases in
263 the past and contain properties that generate small quantities of hazardous waste. The
264 Project Area, in particular, has included an active railroad right-of-way since 1907. Railroad
265 rights-of-way are often impacted with residual hazardous materials, including metals and
266 pesticides, and with petroleum constituents. Depending on their age, some of the buildings
267 in the Study Area may contain ACM or lead-based paint. The cumulative projects may have a
268 beneficial impact on these conditions to the extent that new construction provides the
269 opportunity to address legacy issues from past land uses through compliance with current
270 regulatory requirements (such as the prohibition of ACM or lead-based paints) but this
271 impact would likely be very limited. None of the cumulative projects would introduce new
272 land uses making use of significant amounts of petroleum products or hazardous materials.
273 Rather, they consist of land uses that would only involve the storage and use of the type of
274 hazardous materials found in residential and commercial buildings such as batteries,
275 solvents, paints, or detergents, which are already in common use in the Study Area. If larger
276 quantities of these materials are used or stored than is now the case, it would represent an
277 adverse impact, but given the type of materials involved, this adverse impact would be
278 negligible.

Cumulative Impacts of the Project

Municipal Solid Waste

279 **In all Action Alternatives, when considered along with past, present, and reasonably**
280 **foreseeable future projects, the Project would have minor adverse cumulative impacts on**
281 **municipal solid waste generation.**

282 In all Action Alternatives, the Project would generate MSW from increased numbers of
283 passengers and visitors at WUS as well as from the potential development of the Federal air
284 rights above the rail terminal. As shown in **Table 5-15**, the amount of MSW generated by the
285 Project would range from approximately 2,744 tons per year to approximately 7,447 tons per
286 year, depending on the Action Alternative. This amount would be a small addition to the
287 MSW produced by the cumulative projects (for a total of approximately 99,887 to 104,590
288 tons per year) and the District as a whole. It is not likely to cause capacity problems at
289 disposal facilities. Adverse cumulative impacts would be minor.

Hazardous Materials and Waste

290 **In all Action Alternatives, when considered along with past, present, and reasonably**
291 **foreseeable future projects, the Project would have minor adverse and beneficial**
292 **cumulative impacts on hazardous materials and waste.**

293 All Action Alternatives would involve excavating the rail terminal and disposing of soil that is
294 likely to be contaminated. The amount of spoil would vary according to the alternative, with
295 Alternative A requiring the least excavation and Alternatives B and E the most. The removal
296 and disposal of potentially contaminated soils in accordance with applicable regulations
297 would positively contribute to the cumulative removal or cleaning up of legacy hazardous
298 material issues in the Study Area. This beneficial cumulative impact would be minor because
299 of the likely limited level of contamination that would be encountered and removed.

300 In all Action Alternatives, the Project would increase the amount of hazardous materials
301 stored and used at WUS, in addition to what would be stored and used by the cumulative
302 projects. While this increase would be an adverse cumulative impact, the storage, utilization,
303 and disposal of hazardous materials would continue to be performed in compliance with
304 applicable laws, regulations, and policies. The adverse cumulative impacts would be minor.

5.18.4.5 Transportation

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

305 Past and present actions have shaped the current conditions of the transportation system as
306 it exist in the Transportation Study Area, including WUS. The following paragraphs focus on
307 the reasonably foreseeable impacts of future actions, including the cumulative projects.

Commuter and Intercity Railroads

308 The reasonably foreseeable future impacts of the cumulative projects on commuter and
309 intercity railroad would be adverse and major. These adverse impacts would be partially
310 offset by minor beneficial impacts. The growth in residential and working population that
311 would result from the cumulative projects, along with general District and regional growth,
312 would generate increased demand for commuter and intercity train service at WUS. Without
313 the Project, rail operators and WUS would not be able to adequately meet this demand and
314 there would be a major deterioration of passenger service and experience and major adverse
315 impacts. The beneficial impacts from the station improvements included in the cumulative
316 projects would contribute to ameliorate these conditions but their scope is limited and they
317 would not address capacity issues.

WMATA Metrorail

318 The reasonably foreseeable future impacts of the cumulative projects on WMATA Metrorail
319 at WUS would be adverse and major. The growth in residential and working population that
320 would result from the cumulative projects, along with general District and regional growth,
321 would generate increased demand for Metrorail service at WUS. This would create capacity
322 issues on trains and in the station, as described in **Section 5.5.4.1, No-Action Alternative,**
323 *Direct Operational Impacts, WMATA Metrorail.*

DC Streetcar

324 The reasonably foreseeable future impacts of the cumulative projects on the DC Streetcar
325 would be beneficial and moderate. The growth in residential and working population that
326 would result from the cumulative projects, along with general District and regional growth,
327 would generate increased demand for DC Streetcar service at WUS. As explained in **Section**
328 **5.5.4.1, No-Action Alternative, Direct Operational Impacts, DC Streetcar,** there would be no
329 capacity exceedances. The increase in ridership would be a moderate beneficial impact, as
330 unused capacity would remain.

Intercity, Tour/Charter, and Sightseeing Buses

331 The reasonably foreseeable future impacts of the cumulative projects on intercity buses
332 would be adverse and major. The growth in residential and working population that would
333 result from the cumulative projects, along with general District and regional growth, would
334 generate increased demand for intercity bus service. While this demand could be
335 accommodated, without the Project, existing bus facilities would become overtaxed and
336 passenger experience would degrade, as described in **Section 5.5.4.1, No-Action Alternative,**
337 *Direct Operational Impacts, Intercity, Tour/Charter, and Sightseeing Buses,* resulting in a
338 major adverse impact.

Loading

339 There are no reasonably foreseeable future impacts on loading capacity or activities at WUS.
340 Increased activities at WUS may cause an increase in deliveries but loading facilities are
341 anticipated to be able to accommodate any likely increase.

Pedestrians

342 The reasonably foreseeable future impacts of the cumulative projects on pedestrian activity
343 would be adverse and minor outside WUS. They would be adverse and major within WUS.
344 The cumulative projects, along with District and regional growth and resulting greater
345 numbers of WUS passenger and visitors would result in increased pedestrian volumes in the
346 Study Area, both in and outside WUS. Outside WUS, resulting adverse impacts would be
347 minor. While sidewalks and pedestrian crossings may experience some congestion,
348 maintenance of the existing infrastructure and continued consideration of pedestrian needs
349 in DDOT's planning can reasonably be anticipated to minimize the risk of significant
350 deterioration. Inside WUS, although the station improvement projects included in the
351 cumulative projects would improve circulation in the station, they likely would not be
352 sufficient to prevent frequent congestion in the concourses and access points to the station.
353 This would be a major adverse impact.

Bicycle Activity

354 The reasonably foreseeable future impacts of the cumulative projects on bicycle activity
355 would be adverse and moderate. The cumulative projects, along with the increasing
356 popularity of this mode of transportation and District and regional growth, would result in
357 increased bicycle activity in the Study Area. As explained in **Section 5.5.4.1, No-Action**
358 *Alternative, Direct Operational Impacts, Bicycle Activity*, this may result in a moderate
359 adverse impact due to a shortage of storage spaces or Bikeshare docking stations.

City and Commuter Buses

360 The reasonably foreseeable future impacts of the cumulative projects on city and commuter
361 buses would be adverse and moderate. The growth in residential and working population
362 that would result from the cumulative projects, along with general District and regional
363 growth, would generate increased demand on city and commuter buses, as would greater
364 passenger numbers at WUS. As explained in **Section 5.5.4.1, No-Action Alternative, Direct**
365 *Operational Impacts, City and Commuter Buses*, bus ridership would increase in the Study
366 Area and a total of 16 Metrobus routes would be over capacity. This overcrowding would be
367 a moderate adverse impact.

Vehicular Parking and Rental Cars

368 The cumulative projects would have no foreseeable future impacts on parking at WUS. They
369 would have a minor adverse impact on rental cars. While some of the developments included
370 among the cumulative projects may not include parking due to District zoning restrictions,
371 most would. Therefore, it is not anticipated that increased parking demand from the growth

372 in residential and working population in the Study Area would create a parking shortage at
373 WUS. The WUS parking facility could continue to accommodate WUS-related demand. Local
374 growth, including the cumulative projects and greater WUS ridership, may lead to greater
375 demand for rental cars at the station. This may result in a minor adverse impact on rental car
376 operations at the station because of their already constrained operations (see **Section**
377 **5.5.4.1, No-Action Alternative, Direct Operational Impacts, Vehicular Parking and Rental**
378 **Cars**).

For-hire Vehicles

379 The reasonably foreseeable future impacts of the cumulative projects on for-hire vehicles at
380 WUS would be adverse and major. Increased activity at WUS would generate greater demand
381 for for-hire vehicles to and from the station. As explained in **Section 5.5.4.1, No-Action**
382 **Alternative, Direct Operational Impacts, For-hire Vehicles**, without the Project, this WUS-
383 related demand would create congested conditions and queuing in front of the station,
384 resulting in a major adverse impact. The various developments included in the cumulative
385 projects would also create additional demand for the services of for-hire vehicles, though to
386 a lesser degree than WUS. This demand would be dispersed across the Study Area. All
387 projected demand for for-hire vehicles was incorporated in the vehicular traffic impact
388 analysis (**Section 5.5.4.1, No-Action Alternative, Direct Operational Impacts, Vehicular**
389 **Traffic**).

Private Pick-up and Drop-off

390 The reasonably foreseeable future impacts of the cumulative projects on private pick-ups and
391 drop-offs at WUS would be adverse and major. As with for-hire vehicles, increased activity at
392 WUS would generate greater private pick-up and drop-off activity at the station. As explained
393 in **Section 5.5.4.1, No-Action Alternative, Direct Operational Impacts, Private Pick-up and**
394 **Drop-off**, this WUS-related activity would create congested conditions and queuing in front of
395 the station, resulting in a major adverse impact. The various developments included in the
396 cumulative projects would also create additional private pick-up and drop-off activity, though
397 to a much lesser degree than WUS. This activity would be dispersed across the Study Area. All
398 projected vehicular trips generated by private pick-ups and drop-offs were incorporated in
399 the vehicular traffic impact analysis (**Section 5.5.4.1, No-Action Alternative, Direct**
400 **Operational Impacts, Vehicular Traffic**).

Vehicular Traffic

401 The reasonably foreseeable future impacts of the cumulative projects on traffic operations
402 would be adverse and major. The growth in residential and working population that would
403 result from the cumulative projects, along with general District and regional growth, would
404 generate increased traffic in the Study Area. Foreseeable future conditions without the
405 Project are those described for the No-Action Alternative in **Section 5.5.4.1, No-Action**
406 **Alternative, Direct Operational Impacts, Vehicular Traffic**.

Cumulative Impacts of the Project

Commuter and Intercity Railroads

407 **In all Action Alternatives, when considered with other past, present, and reasonably**
408 **foreseeable projects, the Project would result in a major beneficial cumulative impact on**
409 **commuter and intercity railroads.**

410 All Action Alternatives would allow Amtrak, MARC, and VRE to increase service and
411 accommodate planned growth in ridership through 2040 and beyond, as described in **Section**
412 **5.5.4.2, Alternative A, Direct Operational Impacts, Commuter and Intercity Railroad.** This
413 would fully address the reasonably foreseeable adverse impacts the cumulative projects
414 would cause. Therefore, when added to the impacts of past, present, and reasonably
415 foreseeable projects, the Project would result in a major beneficial cumulative impact.

WMATA Metrorail

416 **In all Action Alternatives, when considered with other past, present, and reasonably**
417 **foreseeable projects, the Project would result in a moderate adverse cumulative impact on**
418 **Metrorail.**

419 The impact analyses presented in **Section 5.5.4.2, Alternative A, Direct Operational Impacts,**
420 **WMATA Metrorail** and corresponding sections for the other Action Alternatives, show that in
421 all Action Alternatives, the Project would have a moderate adverse impact on Metrorail
422 ridership at WUS relative to the No-Action Alternative. The No-Action Alternative
423 incorporates growth anticipated to result from past, present, and foreseeable future
424 projects, including the cumulative projects. Therefore, the impacts analyzed in the
425 referenced sections are cumulative impacts of the Project.

DC Streetcar

426 **In all Action Alternatives, when considered with other past, present, and reasonably**
427 **foreseeable projects, the Project would have a minor beneficial cumulative impact on the**
428 **DC Streetcar.**

429 The impact analysis presented in **Section 5.5.4.2, Alternative A, Direct Operational Impacts,**
430 **WMATA Metrorail** shows that the Project would have a minor beneficial impact on DC
431 Streetcar ridership when compared to the No-Action Alternative. All Action Alternatives
432 would have the same impact. The No-Action Alternative incorporates growth anticipated to
433 result from past, present, and foreseeable future projects, including the cumulative projects.
434 Therefore, the impacts analyzed in the referenced sections are cumulative impacts.

Intercity, Tour/Charter, and Sightseeing Buses

435 **In all Action Alternatives, when considered with other past, present, and reasonably**
436 **foreseeable projects, the Project would have a moderate adverse cumulative impact on**
437 **intercity, tour/charter, and sightseeing bus operations.**

438 As explained above (**Section 5.18.4.5, Transportation, Impacts of Past, Present, and**
439 *Foreseeable Future Actions (without the Project), Intercity, Tour/Charter, and Sightseeing*
440 *Buses*), there would be reasonably foreseeable major adverse impacts on intercity bus
441 operations at WUS from the cumulative projects because the bus facility would not
442 adequately accommodate increased ridership. When added to past, present, and reasonably
443 foreseeable projects, the Project, in all Action Alternatives, would remedy this condition by
444 providing a new bus facility. However, the use of an “active management” approach at the
445 bus facility may create additional delays for bus operators and buses may need to lay over at
446 other locations in the District or the region, resulting in a moderate adverse impact, as
447 described in **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Intercity,**
448 *Tour/Charter, and Sightseeing Buses* (the same analysis applies to the other Action
449 Alternatives). Because the No-Action Alternative incorporates growth anticipated to result
450 from past, present, and foreseeable future projects, including the cumulative projects, the
451 impacts analyzed in the referenced section are cumulative impacts of the Project.

Loading

452 **In all Action Alternatives, when considered with other past, present, and reasonably**
453 **foreseeable projects, the Project would result in no cumulative impact on loading.**

454 As stated above (**Section 5.18.4.5, Transportation, Impacts of Past, Present, and Foreseeable**
455 *Future Actions (without the Project), Loading*), the cumulative projects would have no
456 impacts on loading at WUS. As explained in **Section 5.5.4.2, Alternative A, Direct Operational**
457 *Impacts, Loading*, the Project (in all Action Alternatives) would have no impact on loading.
458 Therefore, there would be no cumulative impacts.

Pedestrians

459 **In all Action Alternatives, when considered with other past, present, and reasonably**
460 **foreseeable projects, the Project would have a minor adverse cumulative impact on**
461 **pedestrian circulation outside of WUS and a major (Alternatives A, B, and A-C) or moderate**
462 **(Alternatives C through E) beneficial cumulative impacts on pedestrian circulation within**
463 **WUS.**

464 As explained in **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Pedestrians**, the
465 Project would generate additional pedestrian trips relative to the No Action Alternative both
466 inside and outside WUS. This would be the case in all Action Alternatives and result in a
467 major or moderate beneficial impact inside WUS and a minor adverse impact outside WUS.
468 The No-Action Alternative incorporates growth in pedestrian traffic anticipated to result from
469 past, present, and foreseeable future projects, including the cumulative projects. Therefore,
470 the impacts analyzed in the referenced section are cumulative impacts.

Bicycle Activity

471 **In all Action Alternatives, when considered with other past, present, and reasonably**
472 **foreseeable projects, the Project would have a minor beneficial (Alternatives A and A-C) or**
473 **minor adverse (Alternatives B through E) cumulative impact on bicycle circulation.**

474 As explained in **Section 5.5.4.2, Alternative A, Direct Operational Impacts, Bicycle Activity**, the
475 Project would generate additional bicycle trips to and from WUS. The new storage and
476 Bikeshare facilities the Project would provide would accommodate these new trips, resulting
477 in a beneficial impact relative to the No-Action Alternative. Increased conflicts with
478 pedestrians and vehicles would partially offset this benefit, resulting in a minor beneficial net
479 impact. In Alternatives B through E, increased vehicular activity on K Street NE due to the
480 new parking facility entrance would further diminish the benefit of added storage without
481 canceling it, resulting in a net impact that would be adverse but minor. The No-Action
482 Alternative incorporates growth in bicycle activity anticipated to result from past, present,
483 and foreseeable future projects, including the cumulative projects. Therefore, the impacts
484 analyzed in **Section 5.5.4, Impact Analysis** for each alternative are cumulative impacts.

City and Commuter Buses

485 **In all Action Alternatives, when considered with other past, present, and reasonably**
486 **foreseeable projects, the Project would cause a minor adverse cumulative impact on city**
487 **and commuter buses.**

488 In All Action Alternatives, the Project would generate additional bus rides. As explained in
489 **Section 5.5.4.2, Alternative A, Direct Operational Impact, City and Commuter Buses**, in the
490 aggregate, city buses serving the Study Area would continue to operate below capacity.
491 While sixteen Metrobus routes would operate over capacity, this also be the case without
492 the Project. The No-Action Alternative incorporates growth in city and commuter bus
493 ridership anticipated to result from past, present, and foreseeable future projects, including
494 the cumulative projects. Therefore, the impacts analyzed in the referenced section are
495 cumulative impacts.

Vehicular Parking and Rental Cars

496 **When considered with other past, present, and reasonably foreseeable projects, the**
497 **Project would cause a minor (Alternatives B and E) or moderate (all other Action**
498 **Alternatives) adverse cumulative impact on vehicular parking at WUS. It would have minor**
499 **beneficial cumulative impacts on rental car operations.**

500 In all Action Alternatives, the Project would result in fewer parking spaces at WUS while the
501 number of WUS passengers and visitors would increase. The reduction in WUS parking
502 spaces, and resulting adverse impact, would vary from minor in Alternatives B and E (450
503 spaces) to moderate in the other Action Alternatives (700 to 850 spaces: see **Table 5-62**).
504 Because the cumulative projects would have no adverse impact on parking at WUS, the
505 Project's adverse impacts are also cumulative impacts. All Action Alternatives would provide

506 a new rental car facility as part of the new parking facility. This new facility would be
507 designed to accommodate anticipated demand and address the issues that would occur
508 without the Project. This beneficial cumulative impact would be minor because it would be
509 partially offset by the increased number of rental car operations at WUS.

For-hire Vehicles

510 **In all Action Alternatives, when considered with other past, present, and reasonably**
511 **foreseeable projects, the Project would cause a moderate beneficial cumulative impact on**
512 **for-hire vehicles at WUS because of the provision of new locations for pick-ups and drop**
513 **offs. It would also cause a major (Alternatives A and B) or moderate (other Action**
514 **Alternatives) adverse cumulative impact due to queuing.**

515 The impact analyses presented in **Section 5.5.4.2, Alternative A, Direct Operational Impacts,**
516 *For-Hire Vehicles* for Alternative A and in the corresponding sections for the other Action
517 Alternatives show that in all Action Alternatives, the Project would generate additional for-
518 hire vehicle trips from increased activity at WUS. These would contribute to adverse
519 cumulative impacts on traffic operations and, as such, were incorporated in the *Vehicular*
520 *Traffic* impact analysis, addressed below. In all Action Alternatives, the Project would result in
521 a beneficial cumulative impact by providing for new pick-up and drop-off locations at and
522 near WUS and an adverse cumulative impact by increase queuing on H Street NE. This
523 adverse impact would be major in Alternatives A and B and moderate in the other Action
524 Alternatives because Alternatives A and B would have less deck-level queuing space due to
525 the north-south train hall.

Private Pick-up and Drop-off

526 **In all Action Alternatives, when considered with other past, present, and reasonably**
527 **foreseeable projects, the Project would cause a moderate beneficial cumulative impact on**
528 **private pick-up and drop-off operations at WUS. It would also cause a major (Alternatives A**
529 **and B) or moderate (other Action Alternatives) adverse cumulative impact due to queuing.**

530 The impact analyses presented in **Section 5.5.4.2, Alternative A, Direct Operational Impacts,**
531 *Private Pick-up and Drop-off* for Alternative A and in the corresponding sections for the other
532 Action Alternatives show that in all Action Alternatives, the Project would generate additional
533 vehicular trips from increased activity at WUS. Along with the trips generated by the
534 cumulative projects, WUS-related trips would contribute to adverse cumulative impacts on
535 traffic operations. As such, they were addressed as part of the *Vehicular Traffic* impact
536 analysis. In all Action Alternatives, the Project would result in a beneficial cumulative impact
537 by providing for new pick-up and drop-off locations at and near WUS and an adverse
538 cumulative impact by increase queuing on H Street NE. This adverse impact would be major
539 in Alternatives A and B and moderate in the other Action Alternatives because Alternatives A
540 and B would have less deck-level queuing space due to the north-south train hall.

Vehicular Traffic

541 **In all Action Alternatives, when considered with other past, present, and reasonably**
542 **foreseeable projects, the Project would result in major adverse cumulative impacts on**
543 **traffic operations.**

544 In all Action Alternative, the Project would generate additional vehicular trips and impacts on
545 the operation of the street and roadway system relative to the No-Action Alternative. The
546 operational intersection analyses performed for the Action Alternatives and presented in
547 **Section 5.5.4.2, Alternative A, Direct Operational Impact, Vehicular Traffic** for Alternative A
548 and corresponding sections for the other Action Alternatives, incorporate the impacts of
549 past, present, and foreseeable future projects, including the cumulative projects. Therefore,
550 the impacts presented in the referenced sections are cumulative impacts.

5.18.4.6 Air Quality

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

551 The impacts of past and present actions in the District generally have had an adverse impact
552 on air quality due to pollutant emissions associated with decades of urban development.
553 Based on current improving trends and continued enforcement of air quality regulations, the
554 reasonably foreseeable adverse impacts of future actions, including the cumulative projects,
555 are anticipated to be minor.

556 The District attainment status describes the impacts of past and present action on the area's
557 air quality. As explained in **Section 5.6.3.1, Criteria Pollutants and General Conformity**, the
558 District is a Marginal Nonattainment area for the 8-hour O₃ standard in an Ozone Transport
559 Region and a Moderate Maintenance area for CO and PM_{2.5}. The District is an attainment for
560 all other criteria pollutants. Foreseeable future projects, including the cumulative projects,
561 would have negligible adverse impacts on regional air quality provided they comply, as
562 applicable, with the State Implementation and Maintenance Plans in place for the District,
563 and associated emission control programs.⁶

564 Locally, near WUS, the primary source of air emissions is and would remain mobile sources
565 (vehicular traffic). A quantitative estimate of future mobile-source air pollutant emissions
566 excluding the Project is presented in **Section 5.6.4.1, No-Action Alternative**. The analysis
567 consisted of a hotspot analysis for CO and PM_{2.5}. It showed that anticipated annual emissions
568 would be well below the NAAQS. A mesoscale analysis of annual criteria pollutant emissions
569 indicated that emissions of CO, PM_{2.5}, PM₁₀, VOC, and NO_x (VOC and NO_x are precursors to
570 ozone) would be below the applicable *de minimis* thresholds for those pollutants. In general,
571 future emissions of VOC, NO_x, CO, and PM_{2.5} would decrease relative to existing conditions
572 because of regulation and improved technology in vehicles and locomotives. PM₁₀ emissions

⁶ District Department of Energy and Environment. *Air Quality Planning*. Accessed from <https://doee.dc.gov/service/air-quality-planning>. Accessed on April 3, 2020.

573 would increase compared to existing conditions because of greater traffic causing brake- and
574 tire-wear emissions, but this adverse impact would be minor.

Cumulative Impacts of the Project

575 **In all Action Alternatives, considered with other past, present, and reasonably foreseeable**
576 **projects, the Project would cause a minor adverse cumulative impact on regional air**
577 **quality.**

578 As explained in the air quality impact analysis presented in **Section 5.6.4.2, Alternative A** for
579 Alternative A, and corresponding sections for the other Action Alternatives, the Project
580 would generate additional emissions of criteria pollutants relative to the No-Action
581 Alternative. The No-Action Alternative air quality analysis incorporated emissions associated
582 with mobile sources (vehicular and rail traffic) associated with past, present, and reasonably
583 foreseeable future projects, including the cumulative projects. Therefore, for each Action
584 Alternative, cumulative impacts would consist of the emissions attributable to the alternative
585 added to those of the No-Action Alternative.

586 Locally (hot-spot analysis), emissions would remain well below the NAAQS and cumulative
587 impacts would be negligible. Regionally (mesoscale analysis), the greatest cumulative impact
588 would be on CO emissions, as cumulative traffic within the study area for transportation
589 would generate up to 104.6 tons per year of CO emissions, which is above the 100 ton-per-
590 year *de minimis* threshold applicable to a CO Maintenance Area. While this has no regulatory
591 implication since *de minimis* thresholds apply to individual projects, it suggests a relatively
592 high level of cumulative CO emissions. The most recent available emission inventory for the
593 region (2011) reports CO emissions of 617,710.29 tons per year.⁷ By comparison, cumulative
594 CO emissions from the transportation study area would be minor. Cumulative emissions of all
595 other criteria pollutants would be much less than the corresponding *de minimis* and would
596 also be minor.

5.18.4.7 Greenhouse Gas Emissions and Resilience

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

Greenhouse Gas Emissions

597 GHG emissions and their effect on climate are a global concern that is not adequately
598 described at a local or regional level. Every activity anywhere that directly or indirectly
599 generates GHG emissions has cumulatively contributed, and continues to contribute, to the
600 accumulation of such gases in the Earth's atmosphere and resulting adverse impacts on

⁷ District Department of Energy and Environment *et al.* July 2014. *2011 Base Year Emissions Inventory for the Washington DC-MD-CA 2008 Ozone NAAQS Nonattainment Area*. Accessed from <https://mde.maryland.gov/programs/Air/AirQualityPlanning/Documents/SIPDocuments/BY2011%20EI%20Document.pdf>. Accessed on August 19, 2019.

601 climate conditions. The primary utility of regional, local, or project-level inventories is to
602 provide a baseline against which efforts to reduce current and future GHG emissions can be
603 measured and the impacts of individual actions comparatively assessed.

604 The most recent inventory for the District of Columbia (for 2017) shows total GHG emissions
605 of approximately 7.3 million metric tons of CO₂e.⁸ This represents a 30 percent reduction
606 since the first inventory in 2006. The District has set a goal of reducing District-wide GHG
607 emissions by half between 2006 and 2032 and to be carbon-neutral by 2050. As of 2016, DC
608 had met 56 percent of its 2032 emissions reduction goal. The District's *Clean Energy DC* plan,
609 finalized in 2018, calls for cutting energy use in buildings, shifting to clean energy sources,
610 and changing the way residents, employees, and goods move across the District.⁹

611 Foreseeable future projects, including the cumulative projects, will contribute additional GHG
612 emissions from both stationary and mobile sources. Based on a conservative order-of-
613 magnitude estimate of stationary- and mobile-source emissions (**Appendix C3, Washington
614 Union Station Expansion Project Environmental Consequences Technical Report, Section
615 18.5.7.1** for details), total annual CO₂ emissions associated with the cumulative projects
616 would be approximately 298,125 metric tons. This would amount to approximately 4 percent
617 the District's 2017 GHG emissions and approximately 5.9 percent of the District's 2032
618 annual target (5.05 million metric tons of CO₂e). This order-of-magnitude estimate does not
619 account for reductions in energy consumption and GHG emissions that would result from the
620 implementation of the strategies presented in the District's *Climate and Energy Action Plan*.¹⁰
621 Taking this into consideration, the adverse GHG impact of the cumulative projects would be
622 minor and unlikely to threaten the District's ability to achieve its 2032 GHG goal.

Resilience

623 The District released *Resilient DC. A Strategy to Thrive in the Face of Change* in April 2019.¹¹
624 *Resilient DC* sets forth four goals (Inclusive Growth; Climate Action; Smarter DC; and Safe and
625 Healthy Washingtonians); 16 objectives; and 68 initiatives. In general, with the
626 implementation of the Strategy, the District's ability to withstand change, including change
627 from evolving climate conditions, can be expected to increase in the mid and long term.

⁸ District Department of Energy and Environment. *2006-2017 Greenhouse Gas Inventory*. Accessed from <https://doee.dc.gov/service/greenhouse-gas-inventories>. Accessed on August 20, 2019.

⁹ District Department of Energy and Environment. August 2018. *Clean Energy DC. The District of Columbia Climate and Energy Action Plan*. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/Clean%20Energy%20DC%20-%20Full%20Report_0.pdf. Accessed on August 20, 2019.

¹⁰ District Department of Energy and Environment. August 2018. *Clean Energy DC. The District of Columbia Climate and Energy Action Plan*. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/Clean%20Energy%20DC%20-%20Full%20Report_0.pdf. Accessed on August 20, 2019.

¹¹ Available at: <https://resilient.dc.gov/>. Accessed on April 3, 2020.

628 In the vicinity of WUS, future actions, including the cumulative projects, may contribute to
629 this improvement to the extent that they incorporate features that support the plan’s goals
630 either through regulatory compliance or on a volunteer basis. For instance, the Strategy’s
631 Initiatives include “[ensuring] that all new buildings [are] climate-ready by 2032” and
632 “retrofitting all at-risk buildings by 2050.” Overall, the cumulative projects can be expected to
633 have a beneficial impact on resilience in the District, though this impact would likely be minor
634 in the context of the District and the District’s resilience strategy as a whole.

Cumulative Impacts of the Project

Greenhouse Gas Emissions

635 **In all Action Alternatives, when considered with other past, present, and reasonably**
636 **foreseeable projects, the Project would result in a negligible adverse cumulative impact on**
637 **GHG emissions.**

638 As explained in **Section 5.7.4.2, Alternative A, Indirect Operational Impacts** for Alternative A,
639 and corresponding sections for the other Action Alternatives, the Project would generate
640 additional CO₂ emissions from both stationary and mobile sources relative to the No-Action
641 Alternative ranging approximately from 17,370 to 26,453 metric tons, depending on the
642 alternative. This would add to District-wide emissions, increasing the study area’s
643 contribution approximately from 298,125 metric tons to up to 324,578 metric tons, or about
644 4.4 percent of the District’s 2017 GHG emissions and 6.4 percent of its annual emission target
645 for 2032. These are conservative estimates, which do not take into account reductions to be
646 achieved under the District’s GHG policies. Even on this basis, in the context of the global
647 impact on climate of GHG emissions, the difference made by Project-related emissions, when
648 added to those from past, present, and foreseeable future actions in District, would be
649 negligible.

Resilience

650 **In all Action Alternatives, when considered with other past, present, and reasonably**
651 **foreseeable projects, the Project would result in a major beneficial cumulative impacts on**
652 **resilience.**

653 The Project, when added to past, present, and foreseeable future actions, would increase
654 District-wide resilience, resulting in a major beneficial cumulative impact. Specifically, it
655 would directly contribute to fulfilling one of *Resilient DC’s* initiatives, which is to “call on
656 regional transit providers [...] to improve regional integration (such as coordinated schedule,
657 *increased Union Station capacity and frequency*, fare integration, free transfers) and expand
658 night and weekend service for key residential and employment zones.”¹² To the extent that

¹² District Department of Energy and Environment. August 2018. *Clean Energy DC. The District of Columbia Climate and Energy Action Plan*. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/Clean%20Energy%20DC%20-%20Full%20Report_0.pdf. Accessed on August 20, 2019. Page 73, emphasis added.

659 the design of the Project incorporates features that enhance its ability to withstand climate
660 change-related events, it would also cumulatively contribute to improving local resiliency.

5.18.4.8 Energy Resources

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

661 The impacts of past actions in the District generally have had an adverse impact on energy
662 demand and consumption through many decades of growth and development. These
663 impacts have been addressed through the development and maintenance energy
664 production, acquisition, and distribution systems. Based on the current condition of these
665 systems, and the District's energy goals and policies, the impacts of present and reasonably
666 foreseeable actions can be anticipated to be minor.

667 In 2017, total energy consumption in the District was 168 billion kBtUs.¹³ Most of this energy
668 was produced outside the District. The District has no electrical plants with the exception of
669 the General Services Administration's Central Heating Plant, which supplies various Federal
670 facilities, including WUS, with electricity, steam, and chilled water. Most electricity used in
671 the District comes from outside and is supplied by the local electric utility, Pepco. The *Clean
672 Energy DC* plan aims to reduce energy consumption in the District by 50 percent in 2032
673 through efficient building design and operations; modernized renewable energy supply; and
674 vehicle electrification and fuel switching.¹⁴

675 Future development in the District both has the potential to increase total energy
676 consumption and offers opportunities for improving efficiency and reducing per unit
677 consumption. As an illustration, an order-of-magnitude consumption estimate can be
678 developed for the cumulative projects based on land use. Altogether, without taking into
679 account any future improvements in energy efficiency, the cumulative projects would
680 consume approximately 1.95 billion kBtUs or about approximately 1.16 percent of the total
681 amount of energy consumed in the District in 2017. In the context of the District, this is not
682 likely to cause shortages or other supply issues.

Cumulative Impacts of the Project

683 **In all Action Alternatives, the Project, when considered with other past, present, and**
684 **reasonably foreseeable projects, would cause a minor adverse cumulative impact on**
685 **energy resources.**

¹³ U.S. Energy Information Administration. *District of Columbia Energy Profile*. <https://www.eia.gov/state/print.php?sid=DC>. Accessed on August 21, 2019.

¹⁴ District Department of Energy and Environment. August 2018. *Clean Energy DC. The District of Columbia Climate and Energy Action Plan*. Accessed from: https://doee.dc.gov/sites/default/files/dc/sites/ddoe/page_content/attachments/Clean%20Energy%20DC%20-%20Full%20Report_0.pdf. Accessed on August 20, 2019.

686 The Project would expand WUS and WUS operations and, as such, increase the amount of
687 energy consumed by the station. Depending on the Action Alternative, the contribution of
688 the Project to the District’s total energy consumption would range from approximately
689 41 million kBtus (Alternative A) to approximately 104 million kBtus (Alternative B). This would
690 represent a very small increment (approximately 0.06 percent in Alternative B) relative to the
691 District’s total energy consumption in 2017. As such, the cumulative adverse impact of the
692 Project on energy resources would be minor.

5.18.4.9 Land Use, Land Planning, and Property

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

693 Past and present actions have shaped current land use, planning, and property conditions in
694 the Land Use Study Area. The following paragraphs focus on the reasonably foreseeable
695 impacts of future actions, including the cumulative projects.

Zoning, Land Use, and Development

696 Future actions, including the cumulative projects, would likely have major beneficial impacts
697 on land use. The multiple residential and commercial developments included in the
698 cumulative projects would be subject to District zoning and land use regulations. Compliance
699 with these requirements, as applicable, would ensure that new land uses are compatible with
700 the existing urban fabric and approved city-wide and local plans. The greatest anticipated
701 change in land use in the Study Area would result from the private air-rights development
702 above the WUS rail terminal. This would replace what is currently an open space dominated
703 by railroad infrastructure and the H Street Bridge with a dense mixed-use neighborhood and
704 would improve connectivity between the neighborhoods on either side of WUS.

Property Ownership, Land Acquisitions, and Displacements

705 The cumulative projects would have no impacts on property ownership, land acquisition, or
706 displacement.

Consistency with Local and Regional Plans

707 The reasonably foreseeable future impacts of the cumulative projects on local and regional
708 plans would be beneficial.¹⁵ These projects would be subject to District zoning and land use
709 regulations and permitting requirements. Compatibility with applicable city-wide and local
710 plans would be ensured through these processes. Therefore, it can be anticipated that the
711 cumulative projects would contribute to implementing, or at least would not preclude, the
712 successful implementation of the relevant plans’ goals and objectives.

¹⁵ This beneficial impact is not assigned an intensity because how much the cumulative projects would support the goals and objectives of the relevant plans is difficult to assess in the aggregate.

Cumulative Impacts of the Project

Zoning, Land Use, and Development

713 **In all Action Alternatives, when considered with other past, present, and reasonably**
714 **foreseeable projects, the Project would have a major beneficial cumulative impact on land**
715 **use.**

716 The expansion of WUS in all Action Alternatives would enhance WUS's functionality as a
717 multimodal facility and improve connectivity among the neighborhoods on either side of the
718 rail terminal. The expanded station would accommodate increased intercity and commuter
719 train service, which in turn would support nearby existing and future residential and
720 commercial developments by making the area more accessible. The Project would also make
721 available for potential development between approximately 323,720 and 952,600 square
722 feet of Federal air rights within the footprint of the existing WUS garage and existing Federal
723 Property, depending on the Action Alternative. This would further enhance land use in the
724 Study Area. The Project would contribute and add to the beneficial impacts on land use that
725 would result from the cumulative projects. Cumulative impacts would be major and
726 beneficial.

Property Ownership, Land Acquisitions, and Displacements

727 **When considered with other past, present, and reasonably foreseeable projects, the**
728 **Project would result in a moderate (Alternatives A, B, D, E, and A-C) or major (Alternative**
729 **C) adverse cumulative impact on private property.**

730 As noted above, the cumulative projects would have no impact on property ownership, land
731 acquisition, or displacement. Therefore, the Project's cumulative impacts on these factors are
732 the impacts of the Project. These are described in **Section 5.9.4.2, Alternative A, Direct**
733 *Operational Impacts, property ownership, land acquisition, or displacement* for Alternative A
734 and corresponding sections for the other Action Alternatives.

Consistency with Local and Regional Plans

735 **In all Action Alternatives, when considered with other past, present, and reasonably**
736 **foreseeable projects, the Project would have a beneficial cumulative impact on local and**
737 **regional plans.**

738 As explained for Alternative A in **Section 5.9.4.2, Alternative A, Direct Operational Impacts,**
739 *Consistency with Local and Regional Plans* and corresponding sections for the other Action
740 Alternatives, the Project would be consistent with and support many of the relevant plans'
741 goals and objectives, especially those pertaining to transportation and connectivity. These
742 beneficial impacts, when added to those of past, present, and foreseeable future projects,
743 including the cumulative projects, would result in beneficial cumulative impacts.

5.18.4.10 Noise and Vibration

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

744 Current noise and vibration levels near WUS reflect the impacts of past and present actions.
745 In the foreseeable future, the cumulative projects are anticipated to result in major beneficial
746 or negligible adverse impacts depending on the location. None of the cumulative projects
747 involve the establishment and operation of a significant stationary source of noise and
748 vibration. Any changes in noise and vibration levels in the Study Area would mostly be the
749 result of changes in noise from trains and motor vehicles. **Section 5.10.4.1, No-Action**
750 *Alternative* presents an analysis of future noise levels in the Noise and Vibration Study Area
751 without the Project. Overall, ambient noise levels would range from 60 to 75 A-weighted dBA
752 (Ldn) at most locations. This is typical of a dense urban area and similar to current noise
753 levels. Near WUS, noise and vibration from train operations would decrease because the
754 private air-rights development would be constructed above the rail terminal and cover the
755 tracks that are currently in the open. Noise levels are, and would remain, highest along the
756 non-covered parts of the rail terminal and corridor (north of K Street), New York Avenue,
757 Florida Avenue, North Capitol Street, K Street, H Street, and Massachusetts Avenue.

Cumulative Impacts of the Project

758 **In all Action Alternatives, when considered with other past, present, and reasonably**
759 **foreseeable projects, the Project would cause negligible adverse impacts on noise and**
760 **vibrations in the Noise and Vibration Study Area, except at 14 modeled locations, where it**
761 **would result in moderate adverse cumulative impacts on noise.**

762 In all Action Alternatives, the Project would generate additional noise and vibration in the
763 Study Area because of the associated increase in train and motor vehicle traffic. The noise
764 analysis presented in **Section 5.10.4.2, Alternative A, Direct Operational Impacts** for
765 Alternative A, and in the corresponding sections for the other Action Alternative, is
766 cumulative in that it incorporates noise from past, present, and foreseeable future activities
767 along with that associated with the Project. The analysis showed that noise levels in the
768 Study Area would generally be within 1 to 3 dBA of No-Action Alternative levels, which is an
769 imperceptible difference. Noise levels would continue to range from 60 to 75 dBA (Ldn),
770 typical of an urban environment. Therefore, the cumulative adverse impacts of the Project
771 would be negligible except at 14 modeled locations where this slight increase would bring
772 noise levels above the threshold for a moderate impact (these locations are shown in **Figure**
773 **5-36** of this DEIS). At these locations, cumulative adverse impacts would be moderate.

5.18.4.11 Aesthetics and Visual Quality

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

774 The appearance of the District in the vicinity of WUS is the result of multiple past and present
775 actions that have shaped the neighborhoods on either side of the station. In the foreseeable

776 future, the cumulative projects may have adverse or beneficial, major to negligible impacts
777 on this appearance, depending on location and point of view. Continued development in the
778 Study Area through 2040 will affect the aesthetic and visual environment visual environment
779 will continue to change as a result. Because the Study Area is an already densely developed
780 urban area, future developments mostly will fill in existing gaps in the urban fabric or replace
781 older land uses.

782 The project with the greatest visual impact would be the private air-rights development. By
783 replacing what is now empty space above the tracks with several city blocks, it would change
784 several views and vistas toward WUS. The visual impact analysis presented in **Section**
785 **5.11.4.1, No-Action Alternative, Direct Operational Impacts**, indicates that this project has the
786 potential to adversely impact 20 out of 27 views analyzed. Because the project has not been
787 designed, this analysis is based only on the massing, heights, and densities permitted by the
788 applicable zoning regulations. How the private air-rights development, as well as the other
789 cumulative projects being planned, would actually affect the visual quality of the Study Area
790 depends on their actual design, height, and density. They have the potential to result in
791 beneficial as well as adverse impacts, for instance through the creation or recreation of
792 continuous street walls or the replacement of visually incompatible land uses with visually
793 compatible ones. New developments are subject to the District's zoning regulations,
794 including height and density limits, and can generally be expected to be visually compatible
795 with their immediate environment

Cumulative Impacts of the Project

796 **In all Action Alternatives, when considered with other past, present, and reasonably**
797 **foreseeable projects, the Project would have potential negligible to moderate cumulative**
798 **adverse and beneficial impacts on aesthetics and visual quality, depending on the location.**

799 In general, the Project, when added to past, present, and future reasonably foreseeable
800 actions, would introduce new visual elements in the Project Area, such as a new train hall,
801 bus facility, and, in all but two Action Alternatives (B and E), a new above-ground parking
802 facility in the Project Area. While these elements would be visible from areas near WUS, the
803 private air-rights development would surround, obscure, encompass, or balance them,
804 reducing their visibility.

805 The visual impact analysis presented in **Section 5.11, Aesthetics and Visual Quality**, is
806 cumulative in that it considers the private air-rights development when assessing anticipated
807 changes in views. The analysis, the findings of which are summarized in **Table 5-140**, showed
808 that, depending on the Action Alternative, the Project would adversely affect from 5 to 10 of
809 the 28 views and vistas considered. Adverse impacts would range from moderate to
810 negligible, with no view suffering a major impact.

811 Most of the visual impacts are conservatively described as adverse because the assessment is
812 based only on massing and visibility. At this stage of design, there is not enough information
813 on materials and specific architectural features to allow for a more refined evaluation.

814 However, the Project Proponents are committed to a Project design that is compatible with
815 the design of the historic station building and makes the expanded WUS into a grand
816 gateway into the Nation’s capital. Additionally, the Project would be subject to review and
817 approval by the Commission of Fine Arts (CFA) and the National Capital Planning Commission,
818 which would help ensure that it is in keeping with its visual and cultural environment.

5.18.4.12 Cultural Resources

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

819 Cultural resources near WUS reflect the history of the neighborhoods on either side of the
820 station. The foreseeable impacts of the cumulative projects on these resources have the
821 potential to be adverse and major to negligible. Some of these projects, such as private air-
822 rights development or the various improvement project at WUS, have the potential to have
823 physical and visual adverse impacts on WUS itself, the WUS Historic Site, and the Railway
824 Express Agency (REA) Building. The risk of such impacts would be minimized through
825 compliance with historic preservation regulations. Federally funded projects are subject to
826 review under Section 106 of the National Historic Preservation Act (Section 106). Although
827 the private air-rights development is not a Federal Project, it is subject to review and
828 approval by the District State Historic Preservation Office and CFA.

829 Most of the cumulative projects are private projects and, as such, not subject to Section 106.
830 These projects could result in adverse impacts to cultural resources if they involve the
831 demolition or alteration of a cultural resource such as a historic building; or if they
832 sufficiently change the visual or aural setting of a resource to diminish its integrity of setting,
833 feeling, or association. The risk of impacts on cultural resources would be minimized through
834 compliance with the District’s historic preservation laws and regulations, including review by
835 the Historic Preservation Review Board of projects that may affect cultural resources.

Cumulative Impacts of the Project

836 **In all Action Alternatives, when considered with other past, present, and reasonably**
837 **foreseeable projects, the Project would have potential major cumulative adverse impacts**
838 **on WUS and the WUS Historic Site.**

839 In all Action Alternatives, the Project, when added to past, present, and future reasonably
840 foreseeable actions, would result in major direct adverse impacts on WUS because of the
841 removal of the Claytor Concourse, column removal in the Retail and Ticketing Concourse, and
842 construction of Project elements adjacent to the historic station building. Because of the
843 reconstruction of the rail terminal and column removal work, the Project would also increase
844 the risk of major potential adverse impacts on archaeological resources if any are present. As
845 much as possible, these impacts would be avoided, minimized, or mitigated through the
846 Section 106 process. The Project would also contribute visual and noise-related impacts on
847 multiple cultural resources in the Cultural Resources Study Area additional to those of past,

848 present, and reasonably foreseeable actions. These impacts would range from negligible to
849 moderate, as summarized in **Section 5.12.5, *Comparison of Alternatives***.

5.18.4.13 Parks and Recreation Areas

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

850 The current condition of parks and recreation areas near WUS incorporates the impacts of
851 past and present actions. The foreseeable future impacts of the cumulative projects on these
852 resources likely would be adverse and moderate. There are multiple parks and recreation
853 areas in the Park and Recreation Areas Study Area, including neighborhood and community
854 parks, school recreational facilities, memorials, plazas, and other open areas accessible to the
855 public. The cumulative impact projects would not directly adversely affect these areas, which
856 would remain available to the public. However, growth of the local residential and working
857 population may result in increased use, which may cause accelerated wear and tear of
858 pavements and landscape elements and increase maintenance costs.

Cumulative Impacts of the Project

859 **In All Action Alternatives, when considered with other past, present, and reasonably
860 foreseeable projects, the Project would have minor cumulative adverse impacts on parks
861 and recreation areas.**

862 In all Action Alternatives, the Project would generate more activity at WUS, bringing more
863 people to the area. Some of these people may make use of local park and recreation areas,
864 leading to accelerated wear and tear and increased maintenance costs. The increase in visit
865 and foot traffic attributable to the Project would likely be small, however, and cumulative
866 adverse impacts would be minor.

5.18.4.14 Social and Economic Conditions

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

Demographics

867 The current demographic make-up of the District is the result of past and present actions. In
868 the foreseeable future, the cumulative projects would have a moderate impact on
869 demography. The population of the District would grow through 2040. District of Columbia
870 Office of Planning (DCOP) projections show a total population of approximately 941,000 in
871 2040, with an average growth of 11,000 a year.¹⁶ The cumulative projects would add 15,200
872 residential units to the District. Assuming an average of 2.1 persons per household, this

¹⁶ District of Columbia Office of Planning. *Forecasting the District's Growth. Results and Methodology*. November 2016. Accessed from <https://planning.dc.gov/node/1212966>. Accessed on January 30, 2019.

873 would provide housing for 31,920 persons.¹⁷ This number does not include the residential
874 units that would be constructed as part of the 3.2 million square feet of mixed-use
875 development included in the cumulative projects. The job opportunities created by the
876 cumulative projects may also encourage more people to move to the District. Based on
877 projected 2040 population size and average annual growth, this would represent a moderate
878 impact.¹⁸

Community Disruption and Other Social Benefits or Impacts

879 Current conditions in the neighborhoods around WUS are the result of multiple past and
880 present actions. In the foreseeable future, the cumulative projects may have both adverse
881 and beneficial impacts but these impacts would be moderate. The cumulative projects are
882 part of and continue a long-term trend of densification and redevelopment across the
883 Socioeconomic Study Area. This trend has had beneficial impacts on local communities such
884 as increased employment opportunities; more and better urban amenities; better
885 connectivity among neighborhoods and sub-neighborhoods. The cumulative projects,
886 including the private air-rights development, would contribute to these positive trends.
887 These same projects may also have adverse community impacts to the extent that they
888 would cause an influx of new population and higher housing costs, which may result in the
889 displacement of long-time residents, especially low-income and minority residents, a process
890 generally referred to as gentrification. Because redevelopment and gentrification are long-
891 term trends that the cumulative projects would continue but did not create, their impacts,
892 both beneficial and adverse, can be considered moderate.

Employment

893 Existing levels and types of employment in the District incorporate the impacts of numerous
894 past and present actions. The foreseeable future impacts of the cumulative projects on
895 employment would be beneficial and moderate. Based on the square footage of commercial
896 development, the cumulative projects would support 31, 515 jobs.¹⁹ This number does not
897 include the jobs that would be supported by the commercial uses that would be part of the
898 3.2 million square feet of mixed-use development included in the cumulative projects.
899 According to the 2017 District's Economic Strategy report, as of October 2016, there were an
900 estimated 783,200 jobs in the District.²⁰ The jobs associated with the cumulative projects
901 approximately represent at least 4 percent of this total. They would represent at least 3.1 percent

¹⁷ Household size assumption based on the weighted average of average household size of the census tracts in the Social and Economic Conditions Local Study Area as derived from 2011-2015 ACS 5-year estimates.

¹⁸ This demographic impact is not characterized as adverse or beneficial because a change in residential population does not in itself represent a favorable or unfavorable outcome in the context of the District.

¹⁹ Assumes 1 employee per 250 square feet of office space, 3 employees per 1,000 square feet of retail use, and 1 employee per 2.67 hotel rooms.

²⁰ DC's Economic Strategy report, March 2017. Accessed from http://dceconomicstrategy.com/wp-content/uploads/2017/03/Econ-Strategy_Full-Report-for-Distribution_03.07.17-1-1.pdf. Accessed on April 3, 2020.

902 the 1,012,000 jobs projected by DCOP for 2040. Thus, although beneficial, the impacts would
903 be moderate.

Washington Union Station Revenue

904 Current WUS revenue is the result of past and present action at the station. The reasonably
905 foreseeable future impacts of the cumulative projects on WUS revenue would likely be
906 beneficial but negligible. The cumulative projects would have a beneficial impact on WUS
907 revenue to the extent that the activity they generate results in an increase in demand for
908 services, such as parking, from which WUS derives a revenue. While this potential impact
909 cannot be quantified, it is likely to be small and negligible in the context of WUS's total
910 revenues.

Other Economic Impacts

911 Other reasonably foreseeable future economic impacts of the cumulative projects would be
912 beneficial and moderate. The cumulative projects would create and support economic
913 activity that would generate economic benefits through worker's wages and profit from
914 commercial operations. The spending of private and commercial income would in turn
915 generate more economic activity both locally and regionally. This activity would generate
916 revenue for the District through sales, property, and income taxes. While these economic
917 and fiscal benefit cannot be estimated, they are likely to amount to a moderate beneficial
918 impact in the context of the District as a whole.

Cumulative Impacts of the Project

Demographics

919 **In all Action Alternatives, when considered with other past, present, and reasonably**
920 **foreseeable projects, the Project would result in a negligible cumulative impact on**
921 **demography.**

922 As explained for Alternative A in **Section 5.14.4.2, *Alternative A, Indirect Operational Impacts,***
923 ***Demographics,*** and corresponding sections for the other Action Alternatives, the Project, by
924 improving connectivity and increasing activity at WUS may indirectly cause more people to
925 move to the Socioeconomic Study Area, in addition to the increase in population associated
926 with the cumulative projects. While not quantifiable, this impact would likely be negligible in
927 the context of the District and Study Area.²¹

Community Disruption and Other Social Benefits or Impacts

928 **In all Action Alternatives, when considered with other past, present, and reasonably**
929 **foreseeable projects, the Project would result in a major beneficial cumulative impact with**
930 **regard to community disruption and other social benefits.**

²¹ The demographic impact is not characterized as adverse or beneficial because a small change in residential population does not in itself represent a favorable or unfavorable outcome.

931 In all Action Alternatives, the Project, when added to past, present, and reasonably
932 foreseeable actions, would have a major beneficial impacts by providing more and better
933 intermodal connectivity that would benefit both the Socioeconomic Study Area and the
934 District as a whole. It would make the Study Area more accessible, providing residents and
935 employees with improved commuting options. This would support ongoing and future
936 development and contribute to addressing the consequences of this development on
937 transportation system. The Project would also directly contribute additional economic
938 activity through new retail at WUS, from 72,000 to 100,000 square feet, depending on the
939 Action Alternative. In all Alternative except Alternative A, the Project would also potentially
940 lead to the development of the remaining Federal air rights above the rail terminal, further
941 contributing to the economic development of the Study Area and the District.

Employment

942 **In all Action Alternatives, when considered with other past, present, and reasonably**
943 **foreseeable projects, the Project would have a minor beneficial cumulative impact on**
944 **employment.**

945 As explained for Alternative A in **Section 5.14.4.2, Alternative A, Direct Operational Impacts,**
946 **Employment,** and corresponding sections for the other Action Alternatives, the Project would
947 add to the number of jobs the cumulative projects would support. Depending of the Action
948 Alternative, the Project would support from 1,445 to 5,255 jobs. While this would be a
949 beneficial cumulative impact, it would be minor compared to the jobs supported by the
950 cumulative projects as well as to present and future employment in the District as a whole.

Washington Union Station Revenue

951 **When considered with other past, present, and reasonably foreseeable projects, the**
952 **Project would have a moderate (Alternatives A and A-C) or major (other Action**
953 **Alternatives) adverse cumulative impact on WUS revenue.**

954 In Alternatives A and A-C, the Project would reduce the number of parking spaces at WUS
955 (**Section 5.14.4.2, Alternative A, Direct Operational Impacts, Washington Union Station**
956 **Revenue and Section 5.14.4.7, Alternative A-C (Preferred Alternative), Direct Operational**
957 **Impacts, Washington Union Station Revenue),** thereby reducing the revenue the station
958 derives from parking. In the other Action Alternatives, all parking would be located outside
959 the station's lease area, eliminating the parking revenue stream altogether. Adding these
960 adverse impacts to the negligible beneficial impacts of the cumulative projects would result
961 in a moderate adverse cumulative impact in Alternatives A and A-C, and in a major adverse
962 cumulative impact in the other Action Alternatives.

Other Economic Impacts

963 **In all Action Alternatives, when considered with other past, present, and reasonably**
964 **foreseeable projects, the Project would have a minor beneficial cumulative impact on**
965 **economic conditions.**

966 The Project would have beneficial cumulative impacts on the economy through the economic
967 activity it would support and promote at WUS and in the Study Area, including the provision
968 of new retail at WUS and support of 1,445 to 5,255 jobs, in addition to the activity supported
969 by the cumulative projects. The spending of Project-generated private and commercial
970 income would in turn generate more economic activity both locally and regionally. This
971 activity would generate revenue for the District through sales, property, and income taxes.
972 While these economic and fiscal benefit cannot be estimated, they likely would be
973 proportionately small and minor compared to the benefits of the cumulative projects.

5.18.4.15 Public Safety and Security

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

974 Conditions pertaining to public safety and security at and near WUS are the result of multiple
975 past and present actions. The future foreseeable impacts of the cumulative projects on public
976 safety and security would be adverse and moderate. Development and growth in the Study
977 Area would result in increased demands on police and emergency services. It would also
978 create security risks by offering new targets to potential terrorist attacks. A notable source of
979 risk would be the provision of parking within the private air-rights development deck above
980 the WUS rail terminal. Greater vehicular traffic and pedestrian circulation would increase the
981 risk of conflicts or accidents. In general, however, these are impacts that commonly occur in
982 active urban areas and near large public facilities such as WUS. None of cumulative projects
983 would generate special or unusual public safety concerns. Emergency services would have
984 time to plan for increases in personnel and equipment needs. Adverse impacts would be
985 moderate.

Cumulative Impacts of the Project

986 **In all Action Alternatives, when considered with other past, present, and reasonably**
987 **foreseeable projects, the Project would have moderate beneficial impacts on security and**
988 **moderate adverse impacts on public safety.**

989 In all Action Alternatives, the Project would create new security risks at WUS but also provide
990 the opportunity to enhance security measures at the station, as described in **Section**
991 **5.15.4.2, Alternative A, Direct Operational Impacts**. At WUS, this would result in net
992 beneficial impacts on security that would be major (Alternatives A, B, and A-C) or moderate
993 (other Action Alternatives). When added to the impacts of the cumulative projects, given the
994 prominence of WUS as a potential target of terrorist attacks, this would result in a beneficial
995 cumulative impact, although a moderate one, as it would only affect WUS and its immediate
996 surroundings.

997 The Project would also have an adverse cumulative impact on safety, as it would add further
998 to the demand for emergency services that the cumulative projects would generate. For the
999 same reason as for the cumulative projects (see previous section), this adverse cumulative
1000 impact would be moderate.

5.18.4.16 Public Health, Elderly and Persons with Disabilities

Impacts of Past, Present, and Foreseeable Future Actions (without the Project)

1001 Current conditions pertaining to public health, the elderly, and persons with disabilities at
1002 WUS and nearby incorporate the impacts of past and present actions. In the foreseeable
1003 future, the cumulative projects would have no impacts on public health. They may have
1004 negligible adverse impacts on the mobility of the elderly and persons with disabilities. None
1005 of the cumulative projects would create public health concerns. They are development
1006 projects typical of an active urban environment. Emissions of criteria air pollutants would
1007 remain below the NAAQS (See **Section 5.18.4.6, Impacts of Past, Present, and Foreseeable**
1008 *Future Actions (without the Project)*). Greater density and vehicular circulation may create
1009 challenges to the mobility of the elderly and persons with disabilities. However, it can be
1010 anticipated that such issues would be alleviated through continuing improvements and
1011 upgrades to the transportation system, such as provision of high-visibility sidewalks with
1012 wheelchair ramps and detectable warning surfaces to aid visually impaired individuals and
1013 accessible pedestrian signal equipment. Projects would also have to comply with ADA
1014 requirements, as applicable. Any adverse impacts would be negligible.

Cumulative Impacts of the Project

1015 **When considered with other past, present, and reasonably foreseeable projects, the**
1016 **Project would have a negligible adverse cumulative impact on public health in all Action**
1017 **Alternatives. It would have a major (Alternatives A and A-C) or moderate (other Action**
1018 **Alternatives) cumulative beneficial impacts on the transportation and mobility of the**
1019 **elderly and persons with disabilities at WUS. Outside of WUS, it would have a minor**
1020 **adverse impact in all Action Alternatives.**

1021 The Project would not create conditions that would directly threaten or diminish public
1022 health when considered with other past, present, and reasonably foreseeable projects. As
1023 explained in **Section 5.18.4.6, Cumulative Impacts of the Project**, above, the Project would
1024 result in relatively high cumulative emissions of CO. The potential for this air quality impact
1025 to affect public health is minimal because it would occur at a regional scale. Microscale
1026 emission analysis (**Section 5.6.4.2, Alternative A, Direct Operational Impacts, Microscale**
1027 *Analysis: CO Hotspot* for Alternative A and corresponding sections of this report for the other
1028 Action Alternatives) shows that localized emissions of CO near roadways, which is where
1029 potential adverse health effects from outdoor CO generally occur,²² would remain well below
1030 the NAAQS under all Action Alternatives.

²² U.S. Environmental Protection Agency. July 2010. *Quantitative Risk and Exposure Assessment for Carbon Monoxide – Amended. Section 2.2, Exposure Pathways and Important Microenvironments*. Accessed from <https://www3.epa.gov/ttn/naaqs/standards/co/data/CO-REA-Amended-July2010.pdf>. Accessed on April 3, 2020. Individual exposure to CO primarily occurs indoors, in near-traffic microenvironments, and inside vehicles.

1031 In all Action Alternatives, the Project would have a major cumulative beneficial impact on the
1032 mobility of the elderly and persons with disabilities at WUS in Alternatives A and A-C, and a
1033 moderate cumulative beneficial impact in the other Action Alternatives for the reasons
1034 explained in **Section 5.16.4.2, Alternative A, Direct Operational Impacts** and corresponding
1035 sections of this report for the other Action Alternatives. The Project would also contribute to
1036 increasing pedestrian, bicycle, and vehicular activity that would result in adverse impacts on
1037 the mobility of the elderly and persons with disabilities outside of WUS, but it would also
1038 include improvement that would partially offset these impacts, as described in **Section**
1039 **5.16.4.2, Alternative A, Indirect Operational Impacts**. Therefore, cumulative adverse impacts
1040 on circulation outside of WUS would be minor.

5.18.4.17 Environmental Justice

1041 As explained in **Section 5.17, Environmental Justice**, the Project would not result in
1042 disproportionately high and adverse impacts on EJ communities, nor would EJ communities
1043 be denied any benefits from the Project. Therefore, the Project has no potential to result in
1044 high and adverse cumulative impacts on EJ communities.

5.18.5 Avoidance, Minimization and Mitigation Evaluation

1045 The sections of this chapter covering the individual resource areas document measures being
1046 considered to avoid, minimize, and mitigate the impacts of the Project. These measures
1047 would also serve to avoid, minimize, and mitigate cumulative impacts.

5.19 Commitment of Resources

1 In accordance with NEPA, the CEQ Implementing Regulations for NEPA, and FRA’s Procedures
2 for Considering Environmental Impacts, this section includes an analysis of any irreversible or
3 irretrievable commitment of resources that would occur due to implementation of the
4 Project under any of the Action Alternatives. This section also considers the relationship
5 between the Project’s potential short-term uses of the human environment and the
6 maintenance and enhancement of long-term productivity throughout the life of the Project.

5.19.1 Irreversible and Irretrievable Commitment of Resources

7 An irreversible or irretrievable commitment of resources results from the use of a resource
8 that cannot be replaced or recovered and causes the permanent loss of the resource for any
9 future or alternate use. Chapter 7 of this DEIS lists the measures that FRA is considering
10 avoid, minimize, and mitigate adverse impacts to the various resources affected by the
11 Project.

12 Construction of any Action Alternative would require a greater commitment of natural,
13 human, and monetary resources than the No-Action Alternative. Generally, these resources
14 would be committed irreversibly and irretrievably. Because Alternatives B and E would
15 involve the most extensive and lengthy construction of all Action Alternatives, with
16 excavation of the rail terminal to build two levels of below-ground parking and a duration of
17 approximately 14 years and 4 months, they would require a greater commitment of
18 resources, such as energy, than the other Action Alternatives. Conversely, construction of
19 Alternatives A and A-C, which would involve minimal excavation below the concourse level
20 and have the shortest construction period (approximately 11 years and 5 months) would
21 require a smaller commitment of resources than the other Action Alternatives.

22 Construction materials such as concrete, steel, cement, and glass would be irretrievably
23 expended during construction of all Action Alternatives in addition to what would be used in
24 the No-Action Alternative. Although these materials would be largely irretrievable when
25 used, they are not in short supply and some could be recycled for other projects in the long
26 term, if and when they no longer meet WUS needs. Any of the Action Alternatives would also
27 consume a greater amount of energy in the form of fossil fuels and electricity during
28 construction than the No-Action Alternative. These resources are readily available and their
29 use for construction and operation of any Action Alternative would not affect their continued
30 availability for other purposes.

31 In addition to materials and energy, a greater investment of funds and human labor would be
32 needed to design and construct any of the Action Alternatives than for the No Action
33 Alternative. The funds are irretrievable and would not be available for other projects but the
34 benefits of allowing WUS to better support greater rail and bus activity both locally and along
35 the entire Northeast Corridor is anticipated to outweigh the commitment of monetary
36 resources.

5.19.2 Relationship Between Short-Term Uses of the Environment and the Maintenance and Enhancement of Long-term Productivity

37 Short-term impacts on the environment typically result from construction impacts. Long-
38 term impacts generally relate to the operation and maintenance of a project, including
39 consistency of a project with local and regional economic, social, planning, and sustainability
40 objectives. This section compares the Action Alternatives' short-term uses of the
41 environment with their long-term productivity.

5.19.2.1 Short-term Uses

42 Construction of any Action Alternative would have greater short-term impacts on the
43 environment than the No Action Alternative. Alternatives B and E would have greater short-
44 term impacts than Alternatives C and D, which in turn would have greater short-term impacts
45 than Alternatives A and A-C. This is due to the differences among those alternatives in
46 excavation depth and total construction duration. Although they would occur over a long
47 period (from approximately 14 years and 4 months in Alternatives B and E to approximately
48 11 years and 5 months in Alternatives A and A-C), the intensity of construction impacts would
49 vary over time. It would be lowest during the 12-month Intermediate Phase, during which
50 only column removal work inside WUS would be conducted, and generally greatest during
51 periods of excavation. The shortest excavation period would be during Construction Phase 1
52 (approximately 5 months in all Action Alternatives) and the longest one during Construction
53 Phase 4 (from approximately 1 year and 5 months in Alternatives A and A-C to approximately
54 2 years and 7 months in Alternatives B and E). All construction-related environmental
55 impacts would cease when construction is complete and would be avoided, minimized, and
56 mitigated wherever practicable as discussed in the other sections of this chapter.

5.19.2.2 Long-term Productivity

57 The No-Action Alternative would result in adverse impacts to long-term productivity because
58 it would not address most of the issues that currently make WUS inadequate to meet current
59 or anticipated future passenger and station needs. Cumulative train ridership across Amtrak,
60 MARC, and VRE is anticipated to more than double by 2040. Without the Project, this growth
61 would push WUS beyond its capacity. The No-Action Alternative would constrain future
62 growth in rail operations locally and along the entire Northeast Corridor. Without the Project,
63 only 50 percent of Amtrak's 2040 unconstrained service levels and 68 percent of its
64 unconstrained ridership levels would be realized. Only 42 percent of MARC's service and 53
65 percent of MARC's ridership would be achieved as well as only 37 percent of VRE's service
66 and 36 percent of VRE's ridership.

67 All Action Alternatives would result in benefits to long-term productivity. By providing new
68 tracks and platforms that would support simultaneous boarding of trains, quicker turnaround
69 times for trains, and double berthing, all Action Alternatives would adequately support the

70 anticipated growth in service and ridership at WUS, including future low-cost intercity service
71 (the “Metropolitan”) and MARC’s through-running trains to Virginia. All Action Alternatives
72 would address congestion issues inside WUS by providing more concourse space, more
73 access points, and more amenities, including more retail, for both rail and intercity bus
74 passengers and visitors.

75 The Project would also improve WUS’s accessibility through full ADA compliance; offer
76 opportunities to improve WUS’s resilience; and enhance the connections between the
77 neighborhoods on either side of the rail terminal.

5.19.2.3 Short-Term Uses Versus Long-Term Productivity

78 The short-term impacts that would result from construction of any Action Alternative would
79 vary substantially over the entire period of construction and would cease when construction
80 is complete. They would be offset by the benefits from greater rail and bus capacity at WUS
81 and improved passenger and visitor amenities that would result from the Project. When
82 reviewed in the overall context of the Project and taken in total, the benefits the Project
83 offers are greater than the short-term impacts of construction.