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Final Environmental Impact Statement
& Section 4(f) Evaluation

VIRGINIA AVENUE TUNNEL RECONSTRUCTION

Final Environmental Impact Statement
Final Section 4(f) Evaluation

Federal Highway Administration

District Department of Transportation

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Virginia Avenue Tunnel Reconstruction
Final Environmental Impact Statement &
Section 4(f) Evaluation
Washington, DC

Submitted Pursuant to
42 U.S.C. 4332(2)(c) and 49 U.S.C 303

U.S. Department of Transportation
Federal Highway Administration
and
District of Columbia Department of Transportation

Cooperating Agencies
Federal Railroad Administration
National Capital Planning Commission
National Park Service
U.S. Marine Corps

June 5, 2014
Date of Approval

Matthew T. Brown, Acting Director
District of Columbia Department of Transportation

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Joseph C. Lawson, Division Administrator
Federal Highway Administration, District of Columbia Division

The following persons may be contacted for additional information concerning this document:

Michael Hicks, Environmental Engineer
Federal Highway Administration

District of Columbia Division
1990 K Street NW, Suite 510
Washington, DC 20006-1103
Michael.Hicks@dot.gov
(202) 219-3513

Faisal Hameed, Ph.D.,
Deputy Chief Engineer

Project Development & Environment
District Department of Transportation
55 M Street SE, Suite 400
Washington, DC 20003
Faisal.Hameed@dc.gov
(202) 671-2326

The Federal Highway Administration and the District Department of Transportation are considering approvals for the proposed reconstruction of Virginia Avenue Tunnel. The tunnel is owned by CSX Transportation, Inc. (CSX) and is located beneath eastbound Virginia Avenue SE, with portals located a short distance west of 2nd Street SE and a short distance east of 11th

(over)

Street SE. The proposed project will include reconstruction of the tunnel, including converting the tunnel's single-track to a two-track configuration, and providing vertical clearance for double-stack intermodal container freight trains. Impacts of a no-build (Alternative 1) and three build alternatives (Alternatives 2, 3 and 4) are analyzed in this Final EIS. Alternative 3 was identified as the preferred alternative.

Section 1319 of the Moving Ahead for Progress in the 21st Century Act (MAP-21) requires, to the maximum extent practicable, and unless certain conditions exist, that FHWA develop a single document that combines the Final Environmental Impact Statement (FEIS) and Record of Decision (ROD). FHWA has determined that practicability considerations preclude issuance of the combined document pursuant to section 1319 of MAP-21. Therefore, FHWA is issuing the FEIS as a separate document to allow the agencies to review additional public comments submitted after the FEIS and to convene an additional public meeting after the publication of the FEIS prior to issuing a Record of Decision

A Federal agency may publish a notice in the Federal Register, pursuant to 23 USC §139(l), indicating that one or more Federal agencies have taken final action on permits, licenses, or approvals for a transportation project. If such notice is published, claims seeking judicial review of those Federal agency actions will be barred unless such claims are filed within 150 days after the date of publication of the notice, or within such shorter time period as is specified in the Federal laws pursuant to which judicial review of the Federal agency action is allowed. FHWA intends to issue this 150 days' notice when it will issue the Record of Decision.

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Volume 2
Appendix A

A Federal Register Notices
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Section 7 Correspondence
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CSX/DC Government Memoranda of Agreements
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Volume 3
Appendices B to K

B Concepts Evaluation Technical Report

C Limits of Disturbance of Build Alternatives
Residential Property Mitigation Plan "Front Row" Residences

D Air Quality Technical Report

E Noise Assessment Report

F Vibration Analysis Report

G Modified Phase I Environmental Site Assessment

H Tree Inventory
Composite Species List

I Section 106 Assessment of Effects for Historic Properties

J Transportation Management Plan Report
Traffic Operational Analysis Report

K Project Newsletters
Public Meeting Advertising

Volume 4
Appendix L: Draft EIS Comments and Responses

Volume 5
Appendix M: Construction Phasing Report

Glossary

Advisory Neighborhood Commissions (ANCs) — A District of Columbia local body of government that is made of the residents of the neighborhoods that affected by government action. There are 37 ANCs in the District of Columbia.

Ballast — For freight rail, normally consisting of crushed stone and is used to hold the track in place as trains pass through and to facilitate drainage.

Boring — the act of drilling holes into the earth to obtain soil samples.

Build Alternative — an alternative that requires programming and construction of improvements to fulfill the purpose and need for a project

Clean Water Act — also known as the Federal Water Pollution Control Act of 1972 disallows discharging any pollutant from a point source into navigable waters, unless a permit was obtained beforehand. Section 106 of the Act, provides federal assistance to states and interstate agencies to establish and implement ongoing water pollution control grants.

Coastal Zone Management Act of 1972 — an act administered by the Office of Ocean and Coastal Resource Management of the National Oceanic and Atmospheric Administration, provides for management of the nation's coastal resources, including the Great Lakes, and balances economic development with environmental conservation. The CZMA outlines two national programs, the National Coastal Zone Management Program and the National Estuarine Research Reserve System.

Combined Sewer Overflow (CSO) Tunnel — a tunnel that carries stormwater into the sewer system under normal conditions. In periods of a heavy weather event, when the sewer system cannot accommodate the increase in stormwater, the excess is discharged directly into a water source untreated.

Common Carrier Obligation - The common carrier obligation refers to the statutory duty of railroad companies to provide ``transportation or service on reasonable request'' (49 U.S.C. 11101(a)). A railroad company may not refuse to provide service merely because to do so would be inconvenient or unprofitable.

Council on Environmental Quality (CEQ) – Established in the Executive Office as part of the National Environmental Policy Act of 1969 (NEPA), the council coordinates federal environmental efforts, policies, and initiatives, and ensures that federal agencies meet NEPA requirements.

Cut-and-cover — method used to construct tunnels. This involves digging an open trench (“cut”) and then sealing the top of the tunnel and “covering” it with backfill or other material. The “cut and cover” method is typically cheaper than boring

Environmental Impact Statement (EIS) – A comprehensive study of potential environmental impacts related to federally assisted projects. Projects for which an EIS is required are defined in the National Environmental Policy Act of 1969, as amended.

Environmental Justice — the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. An environmental justice analysis is required in environmental assessments and environmental impact statements to ensure a future project does not disproportionately impact low-income and/or minority areas.

Federal Transit Administration (FTA) – The Federal Transit Administration (FTA) assists in developing improved mass transportation systems for cities and communities nationwide. Through its grant programs, FTA helps plan, build, and operate transit systems with convenience, cost and accessibility in mind.

Hispanic — persons who originate from Spanish-speaking countries, such as those in Latin America. In the U.S. Census, Hispanic is considered an ethnicity, not a race.

Intermodal Shipping Container — A freight container that is transported via multiple modes of transportation (usually between ship and train).

Jurisdictional determination (JD) – Regulatory review of previously identified wetlands and waters of the U.S. by the Army Corps of Engineers in compliance with Section 404 of the Clean Water Act.

Limits of Disturbance (LOD) — The area affected by construction and staging for the Project.

Maintenance of Traffic (MOT) — a plan that illustrates or lays out how traffic can navigate through a project site during an event that interrupts the everyday traffic flow (such as construction).

MARC (Maryland Area Regional Commuter) — Commuter Rail service offered by the Maryland Transit Administration. Service areas include Harford County, Maryland; Baltimore City; Washington D.C.; Brunswick, Maryland; Frederick, Maryland and Martinsburg, West Virginia.

Memorandum of Agreement (MOA) – A document that describes the terms and conditions agreed upon to resolve the potential adverse effects of a federal agency program, under Section 106 of the National Historic Preservation Act.

National Environmental Policy Act of 1969 (NEPA) – The law that requires federal agencies to consider the environmental impacts of major federal projects or decisions, to share information with the public; to identify and assess reasonable alternatives; and to coordinate efforts with other planning and environmental reviews taking place.

National Flood Insurance Program — The National Flood Insurance Program (NFIP) is a Federal Program under the jurisdiction of the Federal Emergency Management Agency (FEMA) that provides floodplain information to local communities, as well as flood insurance for property owners at risk to flooding. The NFIP makes available previously unavailable coverage for flood losses through a cooperative program based on community adoption and enforcement of minimum Federal floodplain management criteria.

National Historic Preservation Act of 1966 (NHPA) – The law that requires federal agencies to preserve historical and archeological sites. The Act created the National Register of Historic Places, the list of National Historic Landmarks, and State Historic Preservation Offices. Section 106 of the Act requires Federal agencies to take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation a reasonable opportunity to comment. (Also see Section 106 terminology)

No Build/ No Action Alternative — The opposite of a Build Alternative, the No Build or No Action Alternative, means the proposed activity would not take place. The resulting environmental effects from the No Build or No Action Alternative serve as a control to compare with the effects of the Build Alternatives.

Project Proponent — the individual or organization that has overall control and responsibility for the project, or an individual or organization that together with others, each of which is also a project proponent, has overall control or responsibility for the project.

Rail Headway — The time between two trains boarded by the same unit at the same point.

Record of Decision (ROD) – The final step in the EIS process under NEPA. Documentation of the lead federal agency's formal decision on the proposed action. This document constitutes the basis for the federal agency's environmental finding on the project.

Right-of-way or rights-of-way (ROW) — Land owned by federal, state, or local agency reserved for transportation or utility uses (such as a road or power transmission lines).

Safe Drinking Water Act — a law originally passed in 1974, amended in 1986 and amended again 1996, to regulate the nation's public drinking water supply.

Washington Metropolitan Area Transit Authority (WMATA) – The agency that plans, builds, operates, and maintains the Washington D.C. metropolitan region's Metrorail and Metrobus transit systems as well as MetroAccess paratransit service.

Section 106 Terminology

Adverse Effect - Found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association. Consideration shall be given to all qualifying characteristics of a historic property, including those that may have been identified

subsequent to the original evaluation of the property's eligibility for the NRHP. Adverse effects may include reasonably foreseeable effects caused by the undertaking that may occur later in time, be farther removed in distance, or be cumulative. Adverse effects may include, but are not limited to physical destruction or damage to all or part of a historic property; alterations that are not consistent with the Secretary of the Interior's Standards for the Treatment of Historic Properties (36 CFR part 68); removal of the property from its historic location; change of the character of the use or physical features that contribute to its significance; and/or introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.

Advisory Council on Historic Preservation (ACHP) - An independent federal agency that promotes the preservation, enhancement, and productive use of our nation's historic resources, and advises the President and Congress on national historic preservation policy.

Area of Potential Effects (APE) - the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking.

Aspects of Integrity - Location; Design; Setting; Materials; Workmanship; Feeling; Association. These aspects influence the property's ability to convey its significance. Eligible and listed properties usually retain several aspects of integrity.

Historic Properties Affected - In accordance with 36 CFR 800.4(d)(2), at least one historic property is present within the APE. Consulting parties should then be invited to provide their views on the effects the undertaking. The federal agency is then responsible for making effect determinations, which are described in Section 4.

No Adverse Effect - In accordance with 36 CFR 800.5(b), an undertaking may be determined to have "No Adverse Effect" to historic properties if the undertaking's effects will impact the historic properties, but the effect would not alter a characteristic that qualifies the resource for inclusion in the NRHP in a manner that diminishes the significant aspect of integrity, then the finding for that aspect of integrity is "No Adverse Effect."

No Effect - In accordance with 36 CFR 800.4(d)(1), if no historic properties are present or an undertaking may have no effect to historic properties present in the APE, a finding of "No Effect" may be determined for an undertaking. This finding indicates that an undertaking would not alter any aspects of integrity or character-defining features for any historic properties.

No Historic Properties Affected - In accordance with 36 CFR 800.4(d)(1), no historic properties are present within the APE or historic properties may be present but the undertaking will have no effect on them. The no effect means the undertaking would not alter any aspects of integrity or character-defining features on any historic property. If the federal lead agencies renders a "no historic properties affected" determination, and the SHPO concurs, the Section 106 process is then concluded.

Historic Property - Properties listed in or determined eligible for listing in the NRHP. The NRHP Criteria is applied to evaluate a property's historic significance.

Memorandum of Agreement (MOA) or Programmatic Agreement (PA): Cooperative written agreement between parties that communicates the agreed upon project or objective. Generally used in the Section 106 process to resolve adverse effects, describe mitigation, or stipulate project procedures.

National Historic Landmark (NHL) - nationally significant historic places designated by the Secretary of the Interior because they possess exceptional value or quality in illustrating or interpreting the heritage of the United States.

National Register of Historic Places (National Register) - Administered by the National Park Service (NPS), the official list of the nation's historic places worthy of preservation. It includes districts, buildings, structures, and objects significant in American history, architecture, archaeology, engineering, and culture.

National Register Criteria - The Criteria state that the quality of significance in American history, architecture, archaeology, engineering, and culture must be present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that:

A. are associated with events that have made a significant contribution to the broad patterns of our history

B. are associated with the lives or persons significant in our past; or

C. embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or

D. have yielded, or may be likely to yield, information important in prehistory or history

Built resources are typically evaluated under Criterion A, B, and C; Criterion D applies primarily to archaeological resources.

State Historic Preservation Officer (SHPO) - Administers the national historic preservation program at the state level, reviews National Register of Historic Places nominations, maintains data on historic properties that have been identified but not yet nominated, and consults with federal agencies during Section 106 review.

Undertaking - In accordance with CFR 800.16(y), a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a federal agency. It includes those carried out by or on behalf of a federal agency; those carried out with federal financial assistance;

those requiring a federal permit, license, or approval; and those subject to State or local regulation administered pursuant to a delegation or approval by a federal agency.

Acronyms and Abbreviations

Acronym/Abbreviation	Full Name
ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
Amtrak	National Passenger Railway Corporation
ANC	Advisory Neighborhood Commission
APE	Area of Potential Effect
AREMA	American Railway Engineering and Maintenance-of-Way
BGS	Below Ground Surface
BTEX compounds	benzene, toluene, ethylbenzene, and xylenes
CAAA	Clean Air Act Amendments
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLRP	Constrained Long Range Plan
CO	Carbon monoxide
CSO	combined sewer overflow
CSX	CSX Transportation, Inc.
CZMA	Coastal Zone Management Act of 1972
CZMP	Coastal Zone Management Plan
dB	Decibel
DBH	Diameter at Breast Height
DC	District of Columbia
DCEPA	District of Columbia Environmental Policy Act
DCOZ	District of Columbia Office of Zoning
DCRA	DC Department of Consumer and Regulatory Affairs
DDOE	DC Department of the Environment
DDOT	District Department of Transportation
DMPED	DC Office of the Deputy Mayor for Planning and Economic Development
DPR	DC Department of Parks and Recreation
DPW	DC Department of Public Works
EIS	Environmental Impact Statement
EJ	Environmental Justice
EO	Executive Order
FAF	Freight Analysis Framework
FAR	Floor Area Ratio
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FIRM	Flood Insurance Rate Map
FTA	Federal Transit Administration
GHG	Greenhouse Gas

HABS ..... Historic American Building Survey
HAER ..... Historic American Engineering Record
HHRAP ..... Human Health Risk Assessment Protocol
ISA ..... International Society of Arboriculture
Ldn ..... day-night sound level
Leq ..... equivalent continuous noise level
LOD ..... Limits of Disturbance
LUST ..... Leaking Underground Storage Tank
MARC ..... Maryland Area Regional Commuter
MAROPs ..... Mid-Atlantic Rail Operations
MOA ..... Memorandum of Agreement
MOT ..... Maintenance of Traffic
MSATs ..... Mobile Source Air Toxics
MWCOG ..... Metropolitan Washington Council of Governments
NAAQS ..... National Ambient Air Quality Standards
NCPC ..... National Capitol Planning Commission
NDW ..... Naval District Washington
NEPA ..... National Environmental Policy Act of 1969
NHL ..... National Historic Landmark
NHPA ..... National Historic Preservation Act of 1966
NO_2 ..... Nitrogen Dioxide
NPS ..... National Park Service
NRCS ..... Natural Resources Conservation Service
NS ..... Norfolk Southern
O_3 ..... Ozone
OP ..... (District of Columbia) Office of Planning
PA ..... Programmatic Agreement
PCBs ..... polychlorinated biphenyls
PM10; PM2.5 ..... Particulate Matter 10/2.5 microns
PPV ..... peak particle velocity
RCRA ..... Resource Conservation and Recovery Act
ROD ..... Record of Decision
SHPO ..... State Historic Preservation Officer
SIP ..... State Improvement Plan
SVOCs ..... semi-volatile organic compounds
TCLP ..... toxicity characteristic leaching procedure
TIP ..... Transportation Improvement Plan
TPB ..... (National Capital Region) Transportation Planning Board
TPH-DRO ..... total petroleum hydrocarbons in the diesel range organics
TPH-GRO ..... total petroleum hydrocarbons in the gasoline range organics
TTI ..... Texas Transportation Institute
FWS ..... U.S. Fish and Wildlife Service
USACE ..... U.S. Army Corps of Engineers
UST ..... Underground Storage Tanks

VdB ..... vibration decibels
VMT ..... Vehicle Miles Traveled
VOCs ..... volatile organic compounds
VRE ..... Virginia Railway Express
WASA ..... District of Columbia Water and Sewer Authority
WMATA ..... Washington Metropolitan Area Transit Authority

Executive Summary

Executive Summary

S.1 Proposed Action

The Federal Highway Administration (FHWA) in conjunction with the District of Columbia Department of Transportation (DDOT) is issuing this Final Environmental Impact Statement (Final EIS) in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, for the proposed reconstruction of the Virginia Avenue Tunnel (the Project). FHWA is the lead federal agency for the development of the EIS while DDOT is the joint lead agency. The Federal Railroad Administration (FRA), the National Park Service (NPS), the National Capital Planning Commission (NCPC) and the U.S. Marine Corps are cooperating agencies for the EIS. The project sponsor is CSX Transportation, Inc. (CSX). The tunnel is owned by CSX and is located in the Capitol Hill neighborhood of the District of Columbia (DC or District) beneath eastbound Virginia Avenue SE from 2nd Street SE to 9th Street SE; Virginia Avenue Park between 9th and 11th Streets; and the 11th Street Bridge right-of-way. The tunnel is also aligned on the south side of Interstate 695 (I-695) previously known as Interstate 295 (I-295) (see Figure S-1). The tunnel portals are located a short distance west of 2nd Street SE and a short distance east of 11th Street SE. The tunnel and rail lines running through the District are part of CSX's eastern seaboard freight rail corridor, which connects Mid-Atlantic and Midwest states.

The reconstruction of the tunnel will require the short-term (approximately a week or less) closure of ramps of an Interstate Highway (I-695) and use of interstate highway air rights which require FHWA approval. Both approvals are federal actions. CSX is also seeking approval from DDOT to allow temporary I-695 ramp closures and interstate highway air rights. DDOT has issued an occupancy permit relative to Virginia Avenue SE and adjacent streets, which is contingent on the selection of a build alternative. The FEIS has identified Alternative 3 as the selected build alternative, also known as the Preferred Alternative. The permit will have no force or effect until a build alternative is approved via a

Double-Stack Intermodal Container Freight Train

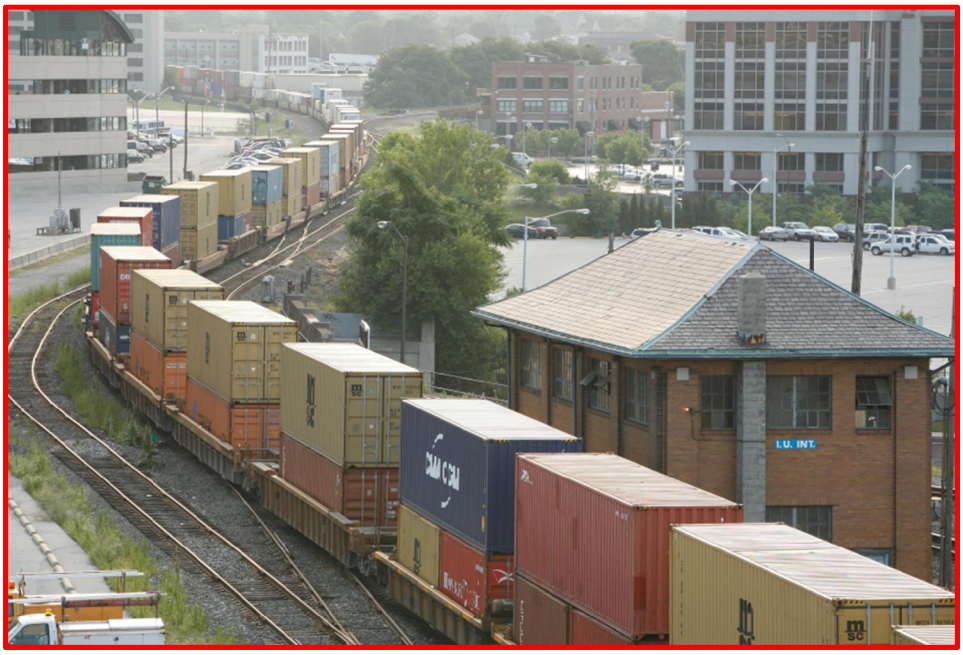
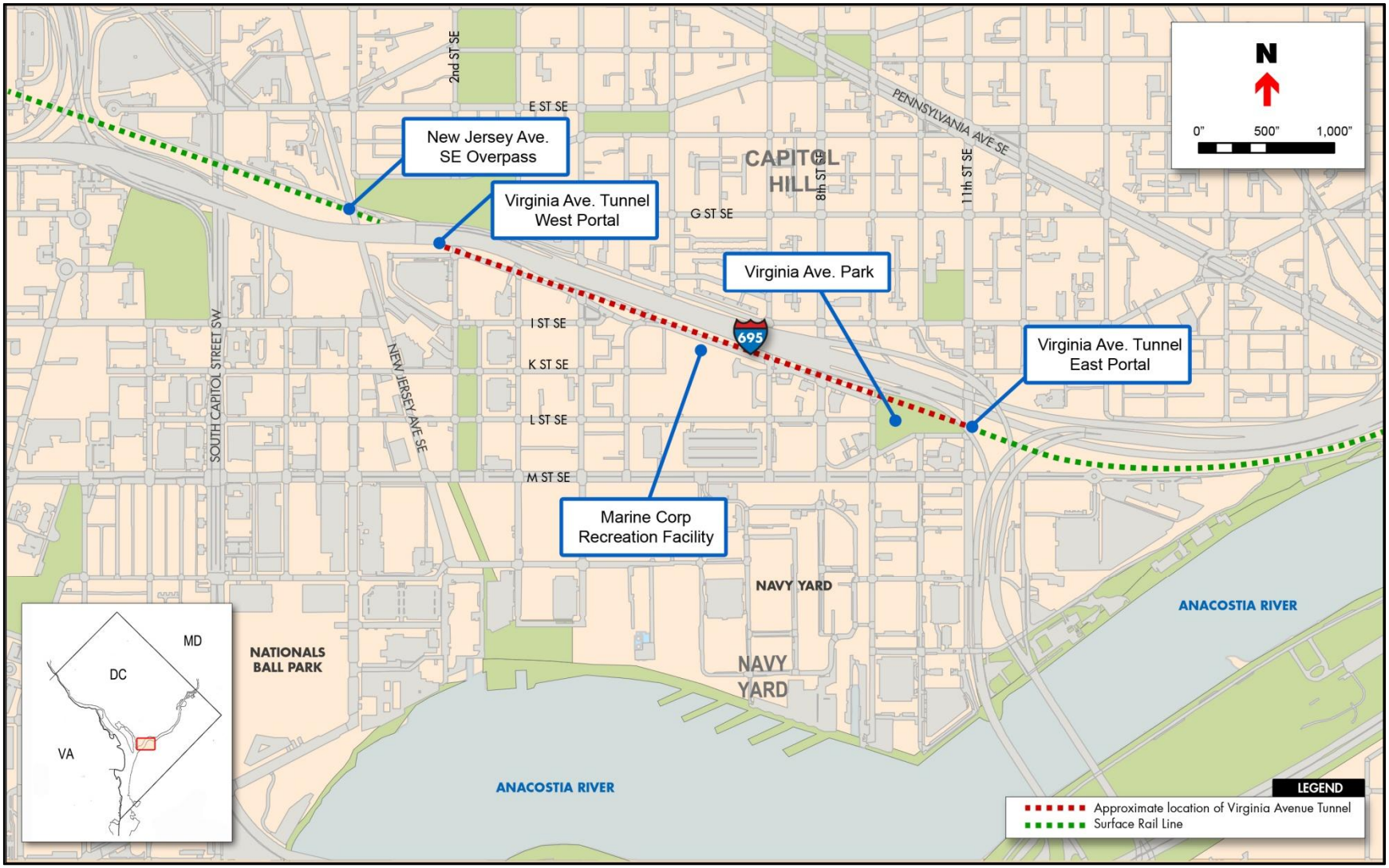


Figure S-1
Project Location



Record of Decision. The reconstruction of the tunnel will require temporary closure of Virginia Avenue SE between 2nd and 9th Streets SE, as well as other interim effects on several adjacent city streets during construction. The Project will also require sub surface use of a small portion of land in the U.S Marine Corps recreational facility located between 5th and 7th Streets SE on Virginia Avenue SE.

The CSX proposal includes the complete reconstruction of the tunnel, which was built over 100 years ago. The Project will transform the tunnel into a two-track configuration and provide the necessary vertical clearance (minimum 21 feet) to allow double-stack intermodal container freight train operations. This will allow more efficient freight movement, especially in light of expected increases in freight traffic. Reconstructing the tunnel to allow double-stack intermodal container freight trains will require the re-grading of the existing tracks west of the new rebuilt tunnel, which will mean that the vertical clearance underneath the New Jersey Avenue SE Overpass will also allow passage of double-stack intermodal container freight trains.

S.2 Purpose and Need

The purpose of the proposed action is to preserve, over the long-term, the continued ability to provide efficient freight transportation services in the District of Columbia, the Washington Metropolitan Area and the eastern seaboard. These services will continue if the following needs are met:

1. Address the structural and operational deficiencies of the century-old Virginia Avenue Tunnel;
2. Accommodate expected increases in freight transportation that, in part, would stem from the Panama Canal expansion scheduled for 2015; and
3. Ensure that during construction freight transportation services remain uninterrupted while the functions of the tunnel are being replaced with a new facility.

Structural and Operational Deficiencies of Virginia Avenue Tunnel

Virginia Avenue Tunnel's horizontal clearance only allows a single railroad track within the tunnel, which causes a bottleneck in the rail network due to the existence of two railroad tracks on both sides of the tunnel. In addition, the tunnel's vertical clearance does not allow the operation of double-stack intermodal container freight trains, a type of operation that CSX and other major railroad companies have adopted as the norm in the freight rail transportation industry where the rail network allows it. Finally, as an aging piece of infrastructure nearing the end of its useful life, the tunnel is increasingly subject to inspection and preventive maintenance for safe rail operations. These frequent inspections and preventive maintenance activities are difficult to conduct without compromising normal rail operations.

Freight Transportation Demand

Virginia Avenue Tunnel and the eastern seaboard freight rail corridor need to accommodate expected increases in freight transportation demand over the next few years, in part due to the Panama Canal expansion scheduled to occur in 2015. The projected increased demand for freight transportation requires taking steps now to modernize the freight rail network, including replacing the tunnel with a more modern facility. By accommodating double-stacked intermodal containers, CSX will be able to transport the expected increase in freight in fewer trains than would otherwise be possible.

Commerce Demands

Reconstructing an existing and vital piece of transportation infrastructure presents challenges in terms of how to maintain freight operations during the construction of the replacement tunnel. The ability to quickly and efficiently move goods to markets throughout the country is vital to the U.S. economy. As one of the nation's major freight railroad companies, CSX provides a valuable service by facilitating the shipment of goods and services to the general public.

S.3 Selection of the Preferred Alternative

After careful consideration of the Project's Purpose and Need, environmental impact analyses and public and agency input, Alternative 3 (see Section S.4) was selected as the Preferred Alternative. This alternative best meets the Project's Purpose and Need while minimizing project impacts and addressing community concerns. This alternative reduces the construction duration for the project to the greatest extent possible as well as accommodates the train operations in a closed tunnel thereby addressing community concerns about operation of trains within an open trench near residents. This alternative also enhances the safety of the tunnel and railroad operations by providing a center wall in the new tunnel separating the two sets of tracks, which will provide the benefit of isolating any derailment within the tunnel. The wall will also provide maintenance flexibility if an operational shutdown is required. Although the outer surface of the southern wall under Alternative 3 will be located approximately 25 feet south of the existing tunnel's outer southern wall, the new enclosed structure, track ballast/bed and concrete floor will serve to prevent proximity effects from train-related vibration to nearby buildings.

Alternative 1 was not selected as the Preferred Alternative because it would not address the Project's Purpose and Need. While Alternatives 2 and 4 would meet the Project's Purpose and Need, they were not selected as the Preferred Alternative. Alternative 2 would employ runaround train operations in an open trench during construction. Although the open trench under Alternative 2 would be completely enclosed within the construction area and would not affect the health and safety of both construction workers and nearby residents, runaround operations raised concerns among residents. Although Alternative 4 also would employ runaround train operations during construction (within the same trench as the tunnel

construction), Alternative 4 was not selected as the Preferred Alternative mainly because it would require substantially longer construction duration than the other Build Alternatives.

S.4 Reasonable Alternatives Considered

Three Build Alternatives are being considered, in addition to a No Action Alternative. They were developed from among 12 preliminary concepts that were considered as candidates for the Project. These 12 concepts were developed through a preliminary assessment of the engineering and physical constraints along the alignment of the existing tunnel, as well as input from DDOT, FHWA and other government agencies, interested parties and the general public. The 12 preliminary concepts are as follows:

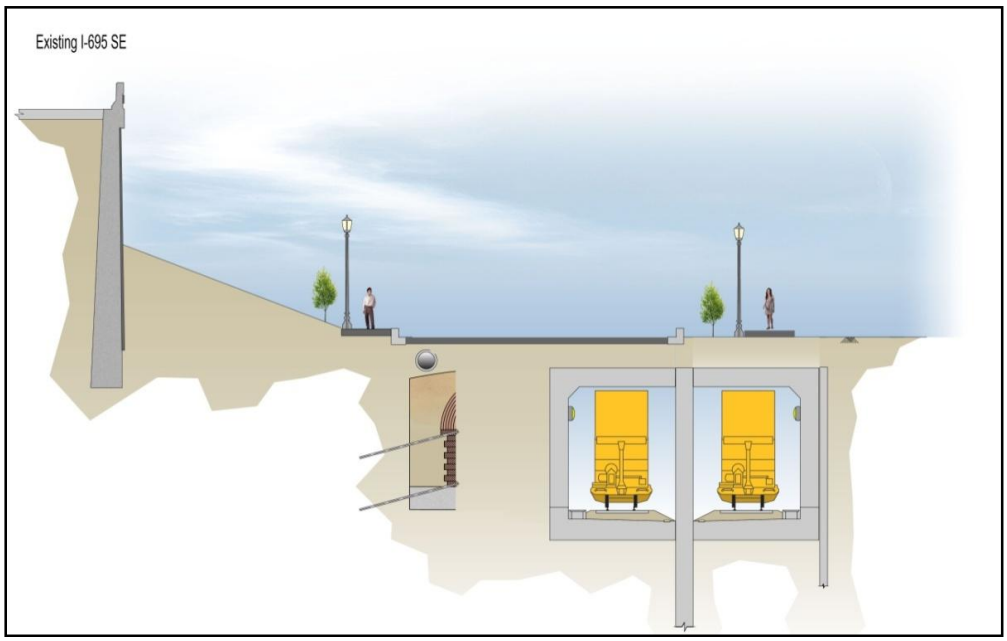
- Concept 1 is the no action or no build condition.
- Concepts 2 through 7 (includes two versions of Concept 3) involve the reconstruction of the Virginia Avenue Tunnel.
- Concepts 8 through 11 involve rerouting the main rail line outside of the existing Virginia Avenue Tunnel, but the tunnel would remain to service Washington Metropolitan Area regional customers.

Following an evaluation of these concepts based largely on their ability to meet the Project's Purpose and Need, the following alternatives were identified for this Final EIS:

Preferred Alternative - Two New Tunnels (originally Concept 5 and identified as Alternative 3 in the Draft EIS): Alternative 3 was selected as the Preferred Alternative. It involves replacing the existing Virginia Avenue Tunnel with two new permanent tunnels constructed sequentially (see Figure S-2). Each new tunnel will have a single railroad track with enough vertical clearance to allow double-stack intermodal container freight trains. A new parallel south side tunnel will be built first as trains continue operating in the existing Virginia Avenue Tunnel. After the south side tunnel is completed, train operations will switch over to the new tunnel and the existing Virginia Avenue Tunnel will be demolished and rebuilt. With the exception of operating in a protected open trench for approximately 230 feet immediately east of the 2nd Street portal (within the Virginia Avenue SE segment between 2nd and 3rd Streets SE), trains will operate in enclosed tunnels throughout construction under the Preferred Alternative. Throughout most of the length of the entire rebuilt tunnel, the two tunnels will be separated by a center wall. This center wall will be the new centerline of the two tunnels, and it will be aligned approximately 25 feet south of the existing tunnel centerline, between 2nd and 9th Streets SE. Due to new columns associated with the rebuilt 11th Street Bridge, the tunnels will be separated on the east end starting just west of Virginia Avenue Park, resulting in two separate single-track tunnels and openings at the east portal.

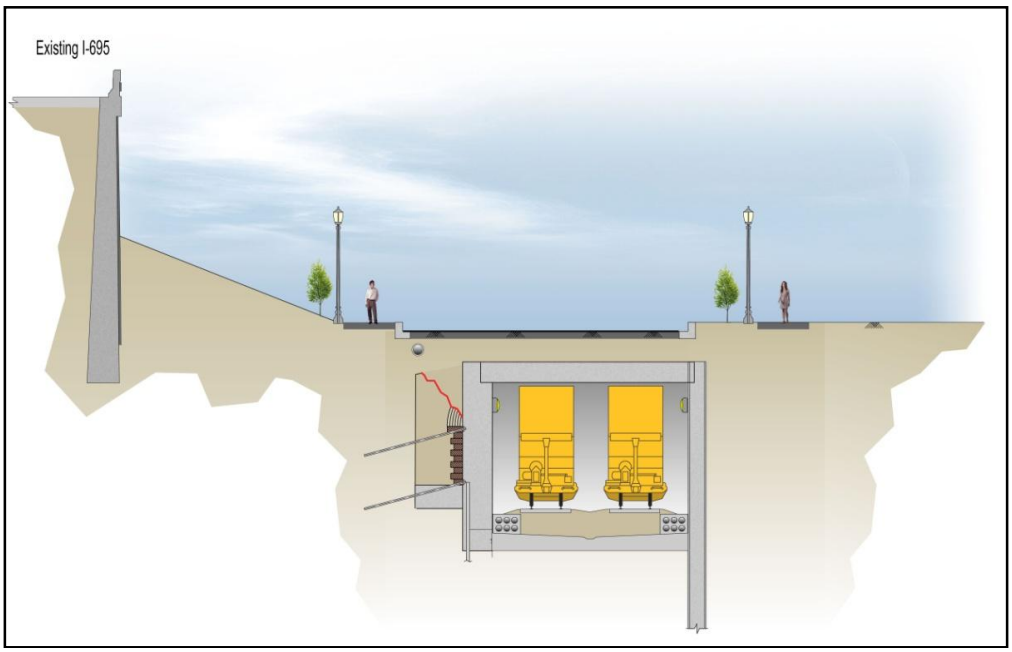
Alternative 1 - No Build (originally Concept 1): The No Build alternative is automatically carried forward into the Final EIS. The tunnel would not be rebuilt under this alternative. However, the railroad would continue to operate trains through the tunnel and at some point, emergency or unplanned major repairs or rehabilitation could be required to this critical, aging infrastructure that might prove equally disruptive to the community than the Build Alternatives.

Figure S-2
Cross Section View of Post-Construction Preferred Alternative
between 3rd and 9th Streets SE



Alternative 2 -Rebuilt Tunnel / Temporary Runaround Track (originally Concept 2): This Alternative involves rebuilding the existing Virginia Avenue Tunnel. It would be rebuilt with two tracks and enough vertical clearance to accommodate double-stack intermodal container freight trains (see Figure S-3). It would be rebuilt in generally the same location, except aligned approximately seven feet to the south of the existing tunnel center line. It would be rebuilt using protected open trench construction methods. During construction, freight trains would be temporarily routed through a protected open trench outside the existing tunnel (runaround track). The runaround track would be aligned to the south and generally parallel to the existing tunnel, and would be located below street level. Due to new columns associated with the rebuilt 11th Street Bridge, the runaround track would slightly separate from the tunnel alignment on the east end starting just west of Virginia Avenue Park. Safety measures such as securing fencing would be used to prevent pedestrians and cyclists from accessing the runaround track.

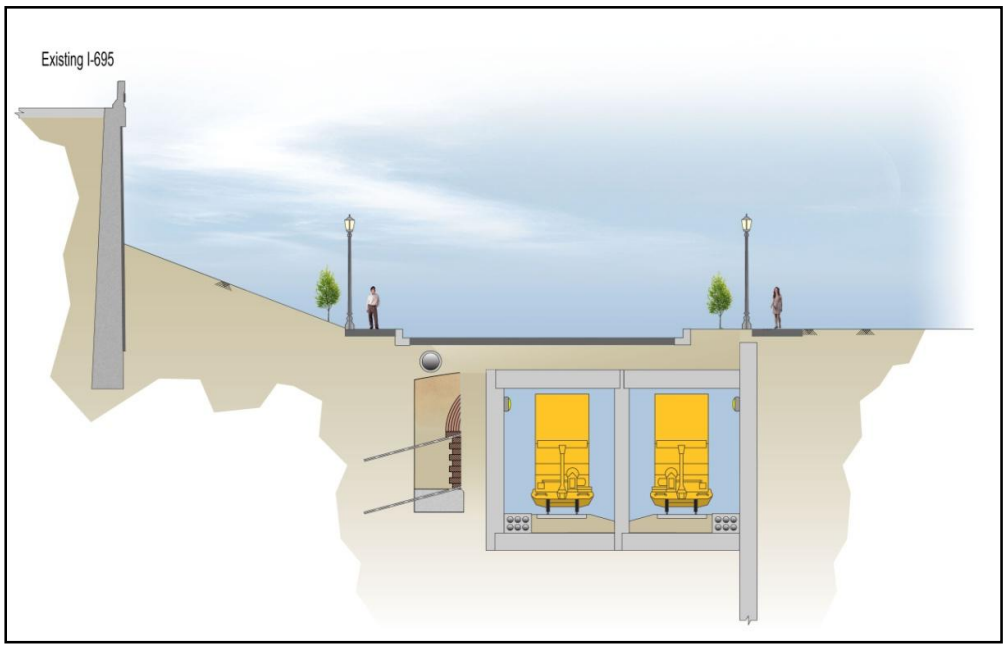
Figure S-3
Cross Section View of Post-Construction Alternative 2
between 3rd Street and 9th Streets SE



Alternative 4 - New Partitioned Tunnel / Online Rebuild (originally *Concept 6*): Alternative 4 would result in a new tunnel with two permanent tracks (see Figure S-4). Similar to the Preferred Alternative, the new tunnel would be partitioned and have enough vertical clearance to allow double-stack intermodal container freight trains. It would be aligned approximately 17 feet south of the existing tunnel's centerline. The new tunnel would be built using protected open trench construction methods. The rebuild would occur 'online' meaning that during the period of construction, the protected open trench would accommodate both construction activities and train operations. Maintaining safe and reliable temporary train operations is a more complicated endeavor under Alternative 4 than under the other two Build Alternatives because of the online rebuild approach.

Regardless of the Build Alternative, the Project would extend the east portal by approximately 330 feet to a location northeast of the 12th Street and M Street T-intersection, and the existing north tunnel wall would largely remain in place after construction as shown on Figures S-2 through S-4. However, Alternative 4 would remove most of the wall on the east end. The wall would serve as an earth retention system, which would reduce the risk of damaging I-695 structures. During final design, the earth retention system would be further evaluated, including determining if portions of the north wall could be removed during construction. In addition, safety measures, such as secured fencing, would be used to prevent unauthorized access to the work area regardless of the Build Alternative.

Figure S-4
Cross Section View of Post-Construction Alternative 4
between 3rd and 9th Streets SE



As used in this Final EIS, the term limits of disturbance (LOD) means all areas where construction will take place, including areas needed for staging, materials stockpiling, utility relocations, and temporary freight train operations. The LOD will be restricted from the general public, except Virginia Avenue's cross streets, which will remain open for public passage throughout construction by means of temporary bridges.

The Preferred Alternative or the other two Build Alternatives will include the restoration of Virginia Avenue SE, and other areas affected by construction, including Virginia Avenue Park and the Marine Corp Recreation Facility. The restoration of Virginia Avenue SE will include the following improvements:

- Improved access to Garfield Park for wheelchair dependent individuals;
- Continuous bike path between 2nd and 9th Streets, which will connect Garfield Park and Virginia Avenue Park;
- Straightened alignment on Virginia Avenue SE within the 400 block to be consistent with the original L'Enfant Plan;
- Improved lane configuration between 5th/6th and 8th Streets to provide safer and calmer traffic conditions;
- Additional landscaping; and
- Improved street lighting, traffic signals and crosswalks.

Outreach to other agencies, stakeholders and the community will be conducted to solicit input regarding the specifics of the improvements.

S.5 Other Nearby Major Governmental Proposed Actions

The following other government actions are currently taking place or would be conducted in the near future in the general vicinity of the LOD:

- 11th Street Bridges project (currently under construction), which will replace two existing bridges with three new bridges and improve the associated interchanges;
- South Capitol Street Corridor Project would include a new Frederick Douglass Memorial Bridge, transform the street into a boulevard to improve safety, multi-modal transportation and community access to support economic development;
- Clean Rivers Project, a multi-billion dollar effort by DC Water, which would include a combined sewer overflow (CSO) tunnel under the Anacostia River, but also includes diversion tunnel beneath M Street SE (currently under construction);
- Garfield-Canal Park Connector would establish a pedestrian and bicycle connection linking Garfield Park and Canal Park;
- Southeast Boulevard, which would convert the segment of the Southeast Freeway from 11th Street Bridge to Barney Circle to an urban boulevard;
- Relocation of Marine Corps Enlisted Bachelors Quarters (Building 20); and
- Other Anacostia Waterfront Initiatives, such as:
  - The Southwest Waterfront with Market Square and Civic Park,
  - Southeast Federal Center and Waterfront Park, and
  - Anacostia Riverwalk and Trail.

S.6 Summary of Environmental Impacts and Proposed Mitigation

Table S-1 summarizes the results of environmental impact studies conducted for the Project. The table includes the entire range of environmental topics covered in this Final EIS from land use to public transportation.

As stated earlier, Alternative 1 does not include any major repairs or rehabilitation of the tunnel in the near future. However, given that the tunnel is over a hundred years old, it could eventually require emergency or unplanned repairs at some point in the future. The Preferred Alternative and Alternatives 2 and 4 would all reconstruct the Virginia Avenue Tunnel in generally the same location and alignment as the existing tunnel. Their differences involve slightly different alignments and how train operations would be conducted during construction.

Following construction, freight train activities will resume back to pre-construction conditions, except for greater service and energy efficiencies due to the provision of two tracks and the minimum 21 feet of vertical clearance within the rebuilt tunnel. Due to the nature of the Project, most of the anticipated impacts of the Project will be related to or occur during

Table S-1
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 4
Land Use				
Construction	None	The LOD within public rights-of-way or CSX property, except the Marine Corps Recreation Facility and Virginia Avenue Park. All areas affected by construction will be restored. No private property will be required.	Same as the Preferred Alternative.	With the exception of the Marine Corps property, Alternative 4's LOD is a few feet narrower along Virginia Avenue SE, and it needs less area within Virginia Avenue Park.
Permanent (Post Construction)	May result in similar impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Continuance of current development trends and realization of government land use plans in the general vicinity of Virginia Avenue SE. The new tunnel will be partially located within the Marine Corps property and will require approval.	Same as the Preferred Alternative, except the tunnel will be located outside the Marine Corps property.	Same as the Preferred Alternative, except the tunnel will be located outside the Marine Corps property.
Mitigation	Not Applicable.	Project sponsors will work with landowner agencies to obtain the necessary approvals to allow construction on their properties.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 4
Social and Community Conditions				
Construction	None.	Certain residences will be in proximity to an active construction site for 30 to 42 months. All schools, and religious, social services and community facilities will be accessible. Emergency response services will be unaffected. No disproportionately high and adverse impact in accordance with Executive Order 12898 on Environmental Justice.	Same as the Preferred Alternative.	Same as the Preferred Alternative, except the duration of construction would be 54 to 66 months.
Permanent (Post Construction)	May result in similar impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Social and community conditions will revert back to pre-construction conditions.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	Project sponsor will provide “front row” residents and others with monetary compensation to offset inconveniences resulting from major construction activities.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Economic Conditions				
Construction	None.	All businesses remain accessible. Traffic detours will displace on-street parking on I Street SE, but this will not affect general business conditions due to other transportation options. Property values of residences adjacent to the LOD may be temporarily affected.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Permanent (Post Construction)	May result in similar economic impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Business conditions will revert back to pre-construction conditions.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	The project sponsor will provide up to $75,000 to owners of “front row” residences if selling their homes under unforeseen circumstances during construction to offset possible loss in market value. Also, see mitigation under Transportation – Parking.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Air Quality				
Construction	None.	Not exceeding the General Conformity (GC) Rule's *de minimis* emission thresholds or the National Ambient Air Quality Standards (NAAQS).	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Permanent (Post Construction)	May result in similar air quality impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Not predicted to exceed the GC Rule's *de minimis* emission thresholds or the NAAQS.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	Employ dust control measures and measures to minimize other air pollutant emissions, where feasible.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Noise				
Construction	None.	Construction activities predicted to cause noise impacts at certain noise sensitive receptors representing Capitol Quarter and Capper Senior Apartments.	Same as the Preferred Alternative.	Requires sheet piling, a construction activity that is predicted to impact all noise sensitive receptors analyzed.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Permanent (Post Construction)	May result in similar noise impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Train operations not predicted to cause noise impacts at noise sensitive receptors.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	Employ measures to reduce construction noise generation, such noise barriers near residences, using techniques that are less noisy and noise monitoring.	Same as the Preferred Alternative.	Sheet piling would be conducted only between 8:30 AM and 4:30 PM on weekdays.
Vibration				
Construction	None.	Certain construction activities near buildings could cause annoyance to occupants. Train operations during construction not predicted to cause human annoyance or building damage.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Permanent (Post Construction)	May result in similar vibration impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Train operations not predicted to cause human annoyance or building damage	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Mitigation	Not applicable.	Pre-construction inspections of buildings. Employ measures that reduce construction vibration, such as phasing vibration-producing activities when feasible so that they do not occur within the same time period.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Site Contamination - Soil				
Construction	None.	Although not widespread, contaminated soil or groundwater handled during construction will be disposed of in accordance with applicable federal and local laws and regulations.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Permanent (Post Construction)	May result in similar size contamination and soil impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Any contaminated water encountered during long term dewatering of the new tunnel (to keep it dry) will be disposed of in accordance with applicable laws and regulations.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Mitigation	Not applicable.	All appropriate regulatory precautions will be taken to properly handle and dispose any contaminated soil or groundwater encountered during construction.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Water Resources				
Construction	None.	No impacts to the quality of nearby surface waters because of construction storm water management measures. A portion of the staging and stockpile area will be within a 500-year floodplain.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Permanent (Post Construction)	May result in similar water related impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Restored Virginia Avenue SE will include a storm water management system.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	Sediment and erosion control measures installed during construction. Spill prevention and control plans prepared. Rail yard managed in accordance with local flood hazard	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Mitigation (cont.)		permit and other requirements.		
Vegetation and Wildlife				
Construction	None.	Removal of 168 street trees, 15 trees in Virginia Avenue Park, 8 trees in Marine Corps property, and trees within CSX property. Short term habitat loss for fauna species adapted to urban environments.	Same as the Preferred Alternative.	Same as the Preferred Alternative except 164 street trees would be removed.
Permanent (Post Construction)	May result in similar impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Landscaping plans, including tree replantings, will be coordinated with pertinent owners and stakeholders.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	Implementation of tree replacement plan at the end of construction.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Historic and Archaeological Resources				
Construction	None.	An "adverse effect" in accordance with Section 106 of the National Historic Preservation Act (NHPA) was rendered due to proposed demolition of the existing tunnel;	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Construction (cont.)		construction-period impacts to the L'Enfant Plan and the Capitol Hill Historic District; and construction-period proximity to St Paul AUMP Church.		
Permanent (Post Construction)	May result in at least partial demolition of the tunnel if tunnel failure occurs.	Restoration of Virginia Avenue SE, which includes straightening the section between 4th and 5th/6th Streets SE, in keeping with the original L'Enfant Plan for the street.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation		Implementation of resolution of the adverse effect identified in the signed Memorandum of Agreement (MOA).	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Parks and Recreational Resources				
Construction	None.	The LOD includes part of Virginia Avenue Park, but not the garden, and the area under I-695 at 2nd Street SE, which will prevent public access to Garfield Park at this location, and displace ad	Same as the Preferred Alternative, except that within Virginia Avenue Park, trains would operate in a protected open trench.	Same as the Preferred Alternative, except that the LOD in the park would be slightly smaller, but occupy the park up to two years longer, and trains would operate in a protected open trench.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Construction (cont.)		hoc recreational activities (skateboarding) under the freeway. In Virginia Avenue Park, trains will operate in a tunnel.		
Permanent (Post Construction)	May result in similar impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Virginia Avenue Park restored according to the DPR direction, the Section 4(f) Evaluation and the requirements of the Section 106 MOA. The area under the freeway at 2nd Street restored, and ad hoc recreation may continue.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation		The project sponsor will enhance Virginia Avenue park. Wayfinding signs provided during construction showing routes to Garfield Park.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Visual and Aesthetic Resources				
Construction	None.	Fencing, and construction equipment and activities will be visible from adjacent buildings and other nearby viewpoints. The duration of this visual	Same as the Preferred Alternative.	Same as the Preferred Alternative, except that the duration would be 54 to 66 months.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Construction (cont.)		impact will be 30-42 months.		
Permanent (Post Construction)	May result in similar visual impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Aesthetic effectiveness of replanted street trees initially marginal because they will be younger with smaller canopies than the existing street trees. Over time, the re-planted street trees will grow and contribute to the visual environment.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	Stockade construction fencing (instead of chain link) to be used in residential areas. Construction site kept orderly, such as daily regular clean-up.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Utilities				
Construction	None.	Relocation and/or protection of dozens of water, sewer and other utilities. The Marine Corps' chiller unit temporarily or permanently repositioned.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Permanent (Post Construction)	May result in similar utility impacts noted under construction for Preferred Alternative if tunnel failure occurs.	None.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	Coordination with utility companies to minimize service disruptions. If unavoidable, effort will be made to conduct the utility work during non-peak usage hours and to protect health.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Transportation-Freight				
Construction	None.	Trains always operating inside a tunnel except for a 230 foot segment within the 200 block of Virginia Avenue SE.	Same as the Preferred Alternative, except that double-stack intermodal container freight trains would operate sooner.	Same as the Preferred Alternative, except that it would pose a greater risk of service disruptions.
Permanent (Post Construction)	May potentially result in substantial freight service disruptions if tunnel failure occurs.	Provision of two tracks eliminates bottleneck. Double-stack intermodal container operations reduce the number of trains in comparison to the No Build condition.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	None required.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Transportation-Roadways				
Construction	None.	Closure of Virginia Avenue SE between 2nd and 9th Streets SE, but cross streets remain open. I-695 ramps closed for about one week. During MOT phase 1, single eastbound lane available between 6th and 8th Streets SE.	Same as the Preferred Alternative.	Same as the Preferred Alternative, except that the first several months of construction would be concentrated in the area between 2nd and 5th/6th Streets SE.
Permanent (Post Construction)	May result in similar roadway impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Virginia Avenue SE will be restored to its pre-construction condition with improvements (see Section S.4).	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	In addition to addressing safety, the MOT plan will address the restoration and maintenance of transportation mobility.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Transportation-Traffic				
Construction	None.	MOT maintains traffic mobility in community and access to all adjacent properties. Peak hour congestion predicted at intersections along MOT	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Construction (cont.)		phase 2 detours on the westbound Virginia Avenue SE. Traffic conditions on I-695 will not be affected.		
Permanent (Post Construction)	May result in disruptions to traffic if tunnel failure occurs.	Traffic flow will return to previous levels.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	Signal optimization used to improve intersection conditions during construction. Intersections will be monitored to determine the effectiveness of the optimization schemes.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Transportation-Parking				
Construction	None.	In MOT phase 1, 63 on-street parking spaces displaced. In phase 2, an additional 48 on-street parking spaces displaced for a total impact of 111 spaces. Applicable fees paid to DDOT for the temporary parking losses.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Permanent (Post Construction)	May result in similar parking impacts noted under construction for Preferred Alternative if tunnel failure occurs.	Restoration and improvements to Virginia Avenue SE results in a net reduction of 19 parking spaces.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	Construction workers provided prioritized parking (i.e., those who carpool). Workers restricted from using on-street parking used by residents. Temporary wayfinding signs provided to direct motorists to available off-street parking.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Transportation-Pedestrian and Bicycle				
Construction	None.	Cross streets and detours accessible for pedestrians and cyclists. East-west movements limited on Virginia Avenue SE, but parallel detours will be established. Access at 2nd Street SE prohibited due to the Tiber Creek Sewer relocation.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

Table S-1 (Continued)
Summary of Environmental Impact Studies and Proposed Mitigation

Resource or Topic / Time Frame	No Build (Alternative 1)	Preferred Alternative (Alternative 3)	Alternative 2	Alternative 3
Permanent (Post Construction)	May disrupt bicycle and pedestrian movements if tunnel failure occurs.	Proposed improvements to Virginia Avenue SE will enhance bike and pedestrian facilities.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	The MOT provisions provide for the safety of pedestrians and cyclists when crossing the construction area on Virginia Avenue. Temporary wayfinding signs provided for pedestrians.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Transportation-Public Transit				
Construction	None.	Metrobus and DC Circulator routes will not be affected.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Permanent (Post Construction)	May result in similar impacts noted under construction for Preferred Alternative if tunnel failure occurs.	None.	Same as the Preferred Alternative.	Same as the Preferred Alternative.
Mitigation	Not applicable.	None required.	Same as the Preferred Alternative.	Same as the Preferred Alternative.

construction. The Project is not anticipated to result in indirect effects to the surrounding community. While the build alternatives would contribute to cumulative impacts to some resources during construction, such impacts would be localized within the LOD and would be temporary in nature.

S.7 Key Issues Raised by Community and Responses

A number of issues were generated from the public and agencies during the project's outreach efforts, or were communicated to the project team through other venues. These issues included:

- Access to adjacent properties;
- Air quality;
- Coordination with other construction projects;
- Damage to residences;
- Right-of-way
- Economic effects to businesses;
- Environmental Justice populations;
- Virginia Avenue Park, including the community;
- Mobility of motorists, pedestrians, cyclists and public transit users;
- Noise (including from temporary freight operations);
- Pest and rodent control;
- Property values of adjacent residences;
- Public safety and security of construction sites and temporary freight operations;
- Soil removal;
- Street tree displacements;
- Utility disruptions;
- Vibration (including from temporary freight operations); and
- Visual appearance of the construction site.

Other issues raised by the public included:

- Alternatives identification;
- CSX and DDOT rights-of-way;
- Freight rail transportation after construction;
- Freight transport of hazardous materials and refuse through the District;
- Future streetscape of Virginia Avenue SE; and
- Post-construction noise and vibration impacts from freight operations.

In order to assist the public in understanding how some of the most important issues raised were addressed, the following Q&A (questions and answers) were developed. The questions are thematic and do not reflect a particular question or comment from any one individual, agency or organization. For each question, answers or responses are provided, some of which include references to sections of the Final EIS where additional information can be obtained.

The questions and responses are categorized in the following manner: Alternatives, Construction Impacts, Freight Train Operations, Right-of-Way and Other Issues.

S.7.1 Alternatives

Q1: Why were none of the reroute alternatives advanced for detailed consideration in the Draft EIS?

A: Among the permanent reroute alternatives considered but dropped from consideration were Concepts 9 and 10, which involved constructing new freight rail routes identified by the National Capital Planning Commission (NCPC) in its 2007 Freight Railroad Realignment Feasibility Study.

Concept 9 would have developed the "Indian Head" alignment and Concept 10 would have developed the "Dahlgren" alignment. These concepts required 31 and 38 miles of new rail lines, respectively, a new bridge over the Potomac River, and would have affected diverse natural resources and several communities. NCPC estimated that constructing either of these alternative alignments would cost between $3.2 and $4.2 billion for the Indian Head alignment and $3.5 and $4.7 billion for the Dahlgren alignment. Therefore, neither alternative would have been a cost effective solution to address the deficiencies of the existing Virginia Avenue Tunnel in comparison to the Preferred Alternative, which is estimated to cost approximately $168 million. Nevertheless, reconstructing Virginia Avenue Tunnel will not preclude establishing a new mainline freight rail route outside of the District if, at a minimum, funding were to become available.

Other reroute concepts considered but dropped from consideration include Concepts 8 and 11. Concept 8 would bore a new tunnel beneath the existing Virginia Avenue Tunnel. In order to maintain a stable foundation in the existing tunnel, the new tunnel would be about 80 feet below the surface or about 45 feet below the existing tunnel. To reach this depth and avoid existing obstructions (e.g., Metrorail tunnels and the rivers), the new tunnel would need to be about nine miles long. Concept 8 was eliminated because it would require acquisition of 14 to 16 acres at the portal locations and would cost about $2 billion. Concept 11 would require substantial upgrades to existing CSX routes spanning several states. In addition to the high cost of upgrading facilities, it would add significant amount of mileage and travel time to major transportation markets, which would likely encourage shippers to switch to other modes of transportation, such as trucking.

Section 3.7 provides further information.

Q2: Why did the rebuild alternatives include freight rail operations through the Virginia Avenue corridor during construction?

A: Freight transportation is an integral part in maintaining the health of the U.S. economy. As one of the nation's major freight railroad companies, CSX facilitates the shipment of goods, equipment and other supplies and commodities to the general public. It is not feasible to stop

freight rail service within the mid-Atlantic region during the period of time when the Virginia Avenue Tunnel is being reconstructed, with an estimated 30 to 42 months construction duration period. Due to the condition of the freight rail network in and around the District of Columbia, closing Virginia Avenue Tunnel would effectively cut off freight transport between the mid-Atlantic and Midwestern states. There are no rail lines available within or near the Washington Metropolitan Area that could serve as an alternate route through or around the District during construction.

Except for one of the preliminary concepts, all of the rebuild concepts provide provisions to maintain freight rail operations through the Virginia Avenue corridor during construction. Concept 7 would not have included this provision. Instead, it would have utilized a combination of other CSX and Norfolk Southern rail lines in southern and western Virginia, North Carolina and Pennsylvania, and the AMTRAK rail line through Union Station. Concept 7 was eliminated from further consideration before release of the Draft EIS because none of the combination of routes identified could effectively accommodate the approximately 20 trains CSX operates through the District on a daily basis. In addition, Concept 7 would have required construction that would affect communities located outside the District.

Sections 2.3, 3.4 and 3.7 provide further information.

Q3: Why was Alternative 3 selected as the Preferred Alternative?

A: After careful consideration of the Project's Purpose and Need, environmental impact analyses and public and agency input, Alternative 3 was selected as the Preferred Alternative. This alternative best meets the Project's Purpose and Need while minimizing project impacts and addressing community concerns. This alternative reduces the construction duration for the project to the greatest extent possible as well as accommodates the train operations in a closed tunnel thereby addressing community concerns about operation of trains within an open trench near residents. This alternative also enhances the safety of the tunnel and railroad operations by providing a center wall in the new tunnel separating the two sets of tracks, which will provide the benefit of isolating any derailment within the tunnel. The wall will also provide maintenance flexibility if an operational shutdown is required. Although the outer surface of the southern wall under Alternative 3 will be located approximately 25 feet south of the existing tunnel's outer southern wall, the new enclosed structure, track ballast/bed and concrete floor will serve to prevent proximity effects from train-related vibration to nearby buildings.

Section 3.7 provides further information.

S.7.2 Construction Impacts

Q4: How will the construction contractor control dust and other types of air pollutants so as to not affect the health and well-being of nearby residents and others who work or pass through the construction area?

A: Construction activities will comply with local and federal regulations for fugitive dust control and mobile source emissions. Dust control measures will be implemented to prevent fugitive dust from excavation and other dust-producing activities from affecting areas beyond the construction site. Such measures include erecting windscreens, using watering trucks and sprinklers for haul roads and other dirt-exposed areas, routinely cleaning public roads covering all trucks during transport of fill materials or soil and stabilizing or covering material stockpiles. In addition, measures will be used to minimize other air pollutant emissions, such as assuring proper equipment operations that will include using appropriate emission-control devices (per EPA regulations) on all construction equipment powered by gasoline or diesel fuel to reduce carbon monoxide, nitrogen oxide and particulate matter emissions in equipment exhaust, and using low or ultra-low sulfur fuels to reduce sulfur emissions. Stationary equipment that generates air emissions, such as compressors, will not be placed in direct proximity to sensitive land uses, such as residences, or where people tend to congregate, such as the Virginia Avenue Community Garden, to the extent feasible.

Section 5.5 provides further information.

Q5: How will the construction contractor control noise so as to not affect the health and well-being of nearby residents and others who work or pass through the construction area?

A: A number of measures to reduce the impacts of construction noise on nearby residents will be employed, including:

- Use of fencing (e.g., wood stockade or type of solid material) near noise sensitive receptors that could also serve as temporary noise barriers and hanging noise dampening blankets on the inside face of the fencing if the effectiveness of the noise barriers need to be improved;
- Where feasible, using drilled installation methods instead of driven methods when installing bearing and temporary support piles near residences;
- Properly maintaining all motorized equipment in a state of good repair to limit wear induced noise (e.g., mufflers are in good working condition); and
- Establishing a community outreach program to notify nearby residents and businesses about upcoming high noise producing activities as well as procedures to address noise complaints.

In addition, noise monitoring will be conducted to determine the effectiveness of these and other measures.

Section 5.6 provides further information.

Q6: What measures will the construction contractor implement to prevent construction-related vibration from damaging my home or building?

A: Vibration monitoring will be an important activity to prevent vibration-producing construction activities from affecting nearby buildings, and to evaluate the effectiveness of mitigation measures that are used to reduce the amount of vibration generated during construction. These mitigation measures will include properly maintaining all motorized equipment in a state of good repair; using drilled piles near residences where the geological conditions permit; limiting the use of high vibration activities, such as vibratory rollers, to weekday daytime hours; and paving or smoothing the surface haul paths within the construction area.

The project team will develop a noise and vibration monitoring program that will include monitoring the adjacent properties. Based on the resident/owner's approval, vibration monitors will be installed to ensure that vibration levels do not exceed established criteria. In case of exceedence, the contractor will be informed immediately and the construction activity causing the condition will be mitigated or monitored.

Section 5.7 provides further information.

Q7: Will construction vibration affect St. Paul AUMP Church?

A: Vibration levels from construction are not predicted to affect St. Paul AUMP Church. However, the church will be monitored for vibration levels during the construction period.

Q8: How will the public be kept safe from construction activities?

A: The project team is committed to keeping the general public safe from construction activities and train operations. Security fencing, barricades, signage and lighting will be used to prevent unauthorized access to construction zones and areas used for trains operations. Furthermore, CSX will be assigning dedicated community police officers specifically to the Project and the Capitol Hill community. The perimeter fencing will be at least eight feet high, and fencing will also be provided at cross streets where vehicles, pedestrians and cyclists will be allowed to cross the construction zone

Section 3.5.5 provides further information.

Q9: Who will provide oversight over the construction activities conducted by CSX's contractor?

A: DDOT will provide oversight and inspection of construction activities. DDOT inspectors will be provided office space at the construction site. Also, the affected utility companies will provide oversight over the utility relocation work.

Q10: Will people be able to cross Virginia Avenue SE throughout construction? What about those with physical disabilities, such as those in wheelchairs?

A: Yes. Throughout construction, all currently available cross streets (3rd to 8th Streets) will be open to motorists, bicyclists and pedestrians. Cross streets will only be closed when installing and removing the temporary bridges. The Project's MOT plan will provide for the needs of those who are wheelchair dependent and others with disabilities. Temporary street crossings will be accessible and usable to wheelchair dependent persons.

Section 3.5.4 provides further information.

Q11: Will the I-695 6th Street Off-Ramp be closed throughout construction?

A: No. The 6th Street Off-Ramp will be closed at most a week when the temporary bridge crossing at the 5th/6th Street intersection is installed and removed. In addition, construction will not affect the future I-695 8th Street On-Ramp currently under construction by the 11th Street Bridges project (the ramp was recently open to traffic).

Section 3.5.4 provides further information.

Q12: Will we be able to access our homes during construction? How will fire, ambulance, and other emergency service responders access our homes in times of emergency?

A: The construction MOT plan will be prepared to address motor vehicle and pedestrian use and ensure access to every residence and property along the project limits, including access to garages and alleyways. However, to ensure continuous access, some properties will require the construction of temporary driveways. Existing driveway access will be restored at the conclusion of construction. The plan will also provide continuous accessibility for local emergency services and first responders to support and protect the communities. The MOT plan will be updated as required in close coordination with DDOT and the District Fire Department and Emergency Management Services throughout the construction period.

Q13: If construction activities damage my home or building, will the damage be repaired?

A: Yes. CSX and its contractor will be responsible to protect adjacent buildings from damage. CSX and its contractor will be responsible for any damage to buildings as a direct result of construction. Owners of buildings located adjacent to the Project's limits of disturbance will be offered pre-construction inspections, which will entail visually identifying all existing signs of exterior, interior and roof damage and any signs of structural settlement. Building owners are highly recommended to allow this inspection in order to expedite the claims process if construction activities do cause damage to buildings. If damage does occur and it is determined that the damage was caused by construction activities, CSX and its contractor will be responsible to make the appropriate repairs after coordinating with the property owner(s).

Section 5.7 provides further information.

Q14: How will the construction contractor prevent pests, rats and other rodents in the tunnel from infecting my home after they have been disturbed by construction of the Project?

A: A rodent control program will be initiated prior to the start of construction and maintained during the entire duration of construction. The rodent control program will be implemented in accordance with District health regulations, using a qualified rodent control company. The program will combine elements of baiting and trapping to achieve the highest rate of success. During construction, food source removal is a key component for successful rodent control. Garbage and food debris will be stored in containers with lids. Spilled food and garbage will be cleaned up regularly. Unorganized or cluttered debris and weedy vegetation, that could provide harborage for rodents, will not be allowed within the construction area or along the perimeter.

Section 5.10 provides further information.

Q15: Will property values of homes along Virginia Avenue SE be affected by construction? What will happen if an affected resident has to sell a home, and how will he or she be compensated for any decreased home value?

A: The degree to which temporary factors, such as construction on city streets and other neighborhood construction projects, affect short-term property values can be subjective and difficult to quantify. Nevertheless, it is possible that construction of the Project can affect the willingness of buyers to enter into purchases of properties adjacent to Virginia Avenue SE, but this affect will diminish near the completion of construction. Therefore, the project sponsor has agreed to compensate up to $75,000 to offset the loss of market value if a "front row" residential property owner must sell his or her home during construction. Appendix C provides the locations and addresses of the "front row" residences.

Section 5.4 provides further information.

Q16: What is the duration of construction?

Construction of the Preferred Alternative will take between 30 to 42 months. Alternative 2 has the same estimate construction duration. Alternative 4's estimate construction duration is between 54 and 66 months.

Section 3.5.6 provides further information.

Q17: Explain how the construction team has the expertise and experience to safely construct the Preferred Alternative in the time frame described in the EIS, and what measures will be taken to assure compliance with the construction schedule?

A: The selection process that will be used to identify the contractor team will include selection criteria covering past experience building large infrastructure projects in dense urban environments, qualifications of key personnel, financial strength, knowledge of the local construction market and past performance on similar sized complex infrastructure projects.

CSX will issue substantial monetary penalties to the selected contractor team for late performance of work. The contractor team will be required to prepare comprehensive weekly, monthly and quarterly reports for CSX and DDOT covering safety, schedule, MOT, train operations, utilities, communications with the community and stakeholders, materials status, staffing, quality, and subcontractor work. One of the main purposes of the reporting is to identify potential challenges to schedule early so they can be mitigated before adversely affecting progress of the Project. A Project office will be established at the New Jersey Yard where a co-located team consisting of staff from the contractor team, CSX, and DDOT will work together to maximize effective communications, streamline permitting and monitor and plan project progress in "real time".

S.7.3 Freight Train Operations

Q18: How will the Preferred Alternative maintain freight train operations during construction?

A: Initially for approximately 16 to 22 months, trains will continue operating within the existing tunnel while the permanent new south side single-track tunnel is being constructed. However, an approximately 230-foot section of the tunnel alignment immediately east of the 2nd Street portal (west segment) will be an open cover trench during construction in the first phase while the train traffic remains on the existing track. Once the south side tunnel is completed, train traffic will switch to the new tunnel for the remainder of the construction period. The second phase of construction will largely involve the demolition of the existing tunnel and the construction of the new north side single-track tunnel. During most of the second phase, the approximately 230-foot west segment will remain open cover even though train traffic is switched to the new south side track.

Section 3.5.2 provides further information.

Q19: What safety and security measures will be taken to protect the public from the 230-foot long open cover trench under the Preferred Alternative?

A: The 230-foot open cover trench will be located entirely within the 200 block of Virginia Avenue SE where there are no residences. Also, the trench will be located entirely within the construction area, which will include perimeter fencing and other security measures.

Safety and security are top priorities for CSX, and all CSX facilities have security plans in place. For example, the existing Virginia Avenue Tunnel is protected and secured using high technology devices, such as closed circuit cameras and motion detectors monitored 24 hours a day, seven days a week. These same measures will be employed during and after construction.

Section 3.5.5 provides further information.

Q20: Can CSX guarantee a train derailment in the trench or tunnel would not cause or threaten property damage or loss of human life?

A: Trains passing through the Virginia Avenue SE construction area will operate at lower speed and a railroad employee-in-charge who will be assigned to the Project during construction with the primary responsibility of ensuring the safe passage of trains through the work zone. The role of the railroad employee-in-charge is primarily to protect the safety of construction workers, but will also have the added benefit of protecting the general public. With the new tunnel, train derailments will be less likely to occur because of the new, more reliable tunnel concrete floor and track ballast. CSX will continue to partner with local first responders of the District and the surrounding jurisdictions in order to coordinate protocols for responding to train derailments. This includes continuing to provide periodic training activities.

Sections 3.5.5, 5.3 and 5.15.1 provide further information.

Q21: Why does CSX appear not to be open in answering questions on how and where it transports hazardous materials in and outside the District of Columbia?

A: CSX trains do not transport explosive, toxic by inhalation (TIH), or poisonous by inhalation (PIH) materials through the District due to a voluntary agreement with the Government of the District of Columbia. For national security reasons, CSX does not disclose how and where it transports these materials to the public. However, this information is provided by CSX to the District and Federal safety and security officials. Construction of a new Virginia Avenue Tunnel will not affect the materials, goods or equipment transported through the District of Columbia.

Q22: I live along the south side of Virginia Avenue SE, and understand that the new Virginia Avenue Tunnel under the Preferred Alternative will be located closer to my home. Will I hear freight trains passing through the new tunnel? Will I feel the vibration from freight trains passing through the new tunnel?

A: Based on detailed noise and vibration studies conducted for the EIS, the residents will not hear nor be able to feel trains passing through the new tunnel.

Sections 5.6 and 5.7 provide further information.

Q23: Will the project result in more freight trains passing through the new Virginia Avenue Tunnel?

A: The provision of two railroad tracks (eliminates the bottleneck) and enough vertical clearance to allow double-stack intermodal container trains (doubles the capacity for this type of freight on a single train) will lead to greater efficiencies of the freight rail network. The ability to operate double-stack intermodal container freight trains will mean that the overall number of trains may be reduced in comparison to not rebuilding the tunnel.

Section 5.15.1 provides further information.

Q24: How much crude oil does CSX transport through the District of Columbia?

A: Any crude oil shipments by CSX through the District of Columbia are individual tank cars, and they are very rare. In 2013, the crude oil shipments through the District of Columbia (Virginia Avenue Tunnel) represent less than 0.006% of all loaded rail cars shipped through the Virginia Avenue Tunnel. Each of these was a single tank car on a separate train. CSX has no current movements of crude oil unit trains through the District of Columbia.

Q25: Will the project result in additional movement of crude oil shipped through the District of Columbia?

A: No. There is no market for CSX to transport crude oil through the District of Columbia now, or in the foreseeable future.

S.7.4 Right-of-Way

Q26: Will private property be acquired, either temporarily or permanently, to construct the new tunnel?

A: No. Construction of the Preferred Alternative does not require the use or acquisition (temporary or permanent) of private property other than properties owned by CSX. All construction will occur within CSX property, DDOT right-of-way, and property within the Marine Corps Recreation Facility and Virginia Avenue Park.

See Section 3.5.1 for further information.

Q27: How was right-of-way issue between DDOT and CSX resolved?

Based on research by both DDOT and CSX, it was agreed that Congress legislated the right for CSX to construct, operate, and maintain two rail tracks beneath Virginia Avenue SE in a tunnel and determining the exact boundaries of the right-of-way is not possible due to lack of documentation. It was also agreed that the specifications of the tunnel beneath the surface should meet current railroad standards regarding vertical and horizontal widths. Therefore, in order to access this subterranean and above surface space, DDOT and CSX have agreed that CSX will seek construction and occupancy permits from DDOT for the Project. DDOT issued an occupancy permit contingent upon the completion of the NEPA process should a build alternative be selected.

Q28: Are there any past agreements between DDOT and CSX that include Virginia Avenue Tunnel?

A: Yes, DDOT and CSX have some agreements regarding a number of projects in the District of Columbia. Agreements related to the reconstruction of the Virginia Avenue Tunnel are included in Appendix A.

Q29: Will DDOT sell its right-of-way to CSX for the project?

A: No. DDOT issued an occupancy permit relative to Virginia Avenue SE and adjacent streets, which is contingent on the selection of a build alternative in the NEPA process.

Q30: What compensation to the Government of the District of Columbia will CSX provide for use of the public rights-of-way for construction?

A: CSX will pay all associated permit and inspection fees associated with the construction of the Preferred Alternative of the Project.

S.7.5 Other Issues

Q31: How will the Virginia Avenue Park, including the Community Garden, be affected by this project?

A: The Preferred Alternative will require temporary use of a portion of Virginia Avenue Park during construction. The construction area will not include the community garden. Affected areas of the park will be restored at the conclusion of construction.

Section 5.12 provides further information.

Q32: What will be the economic impacts on local businesses as a result of construction of this project?

A: The Project's MOT plan will ensure that all businesses remain accessible by auto, bike and walking throughout construction. Only one storefront is anticipated to be affected during construction. The project team has and will continue to work with this business to relocate the storefront during construction. At the conclusion of construction, operation of the new tunnel will have no effect on local businesses.

Section 5.4 provides further information.

Q33: How will I get information about construction activities that may affect my daily routine?

A: The Project website, www.virginiaavenuetunnel.com, will continue as a tool that the public can use to obtain information about the Project throughout the construction period. The website is an integral part of the overall public outreach program established to keep communication open with the community. Information about utility disruptions or activities that may disrupt travel will be disseminated through flyers to nearby residences and email blasts, in addition to having this information posted on the Project website.

Section 5.3 provides for further information.

S.8 Major Unresolved Issues

There are no major unresolved NEPA issues related to the Project.

S.9 Other Federal and Government of the District of Columbia Actions Required

Other than NEPA, the only federal action required before final Project approval in accordance with NEPA is FHWA approval of the Section 4(f) Evaluation for the use of Virginia Avenue Tunnel, L'Enfant Plan, Capitol Hill Historic District and Virginia Avenue Park.

Post-NEPA, the following federal actions will be required:

- Approval to temporarily affect I-695 ramps located at 6th and 8th Streets SE (FHWA)
- Approval associated with construction activities within Virginia Avenue Park and potentially other NPS reservations along Virginia Avenue (NPS)
- Approval associated with construction activities within the Marine Corps Recreation Facility (U.S. Marine Corps)
- Approval associated with the location of the reconstructed tunnel under the Preferred Alternative and any relocated utilities within the Marine Corps Recreation Facility (U.S. Marine Corps)
- NPDES Stormwater Permit for Construction Activities (U.S. Environmental Protection Agency, Region III)

DDOT has issued an occupancy permit relative to Virginia Avenue SE and adjacent streets, which is contingent on the selection of a build alternative in the NEPA process. Construction permits will be issued after the FHWA NEPA Record of Decision and when the design of the Project is submitted to DDOT for review. Once construction is completed, the final right-of-way area will be modified to reflect the as-built location of the reconstructed tunnel.

S.10 Environmental Commitments

Related to the mitigation measures summarized in Table S-1, the following are the commitments of the project sponsor to ensure maintenance of the environmental quality of the area surrounding Virginia Avenue Tunnel during and after construction of the Project:

Construction Related Commitments

These commitments will be conducted to mitigate construction-related impacts:

- Implementing a community outreach program using a project website, email blasts, flyers and other forms of open communication and dialogue for the purposes of informing certain stakeholders (e.g., residents of Capper Senior Apartments and Capitol Quarters) and the general public about construction status and activities that may

disrupt normal daily activities (e.g., temporary disruption of utility service), but also used to solicit any public complaints about construction activities.

- Maintaining a community office located at 861 New Jersey Avenue SE where members of the community can obtain construction information, and ask questions about the Project.

- Ensuring that the LOD will not include private property.

- Ensuring that vehicular, pedestrian and bicycling mobility is maintained throughout construction and that all properties, including those adjacent to the LOD, are accessible through the provision of temporary bridges across Virginia Avenue SE and detours that include converting the westbound Virginia Avenue SE/I Street SE between 6th and 8th Streets to two-way operations and providing the necessary traffic signals.

- Providing all properties with driveways directly adjacent to the LOD with provisions for driveway access so that these properties remain accessible for owners, users and visitors, as appropriate, as well as to fire and emergency response vehicles.

- Providing temporary wayfinding signs to Garfield Park, off-street parking lots and other important gathering places located near the LOD, such as Barracks Row, Eastern Market, and the Washington Navy Yard. The project sponsor will work with local business and civic groups to determine the important gathering places that should be identified by temporary signage.

- Providing fencing of at least eight feet high along the perimeter of the construction area, including areas used for temporary train operations and at cross streets where vehicles, pedestrians and cyclists will be allowed to cross the construction area, in order to prevent unauthorized access. The type of fencing or barrier may vary along the LOD. For those sections near residences and the park, screens will be attached to the chain link fencing or stockade fencing may be used.

- Restricting public access to the LOD to keep the general public from construction activities and temporary freight operations, which will include but not necessarily limited to fencing (as noted above), suitable lighting, and regular patrols by railroad police officers assigned to the Project.

- Using dust control measures to prevent fugitive dust from excavation and other dust-producing activities from affecting areas beyond the construction site. These practices include, but are not necessarily limited to frequent watering, material stockpile stabilization, and good housekeeping, which will also help in the appearance of the construction area.

- Using measures to limit non-dust air pollutant emissions as reasonably practical and feasible. These practices include, but are not necessarily limited to, turning off the

engines of construction vehicles if they are left idling for more than 30 minutes, and using appropriate emission-control devices per U.S. Environmental Protection Agency regulations. In addition, stationary equipment that has air emissions will not be placed in direct proximity to sensitive land uses or where people tend to congregate to the extent feasible.

- Using noise control as reasonably practical and feasible. These practices include, but are not necessarily limited to, using drilled installation methods instead of driven methods when installing support piles near residences, using demolition equipment with crush/shear technology, limiting high noise generating activities to daytime and weekdays, and properly maintaining all motorized equipment in a state of good repair to limit wear induced noise.

- Providing the owner of any building located adjacent to the LOD with pre-construction building inspections to document the condition of the structure.

- Using vibration control as reasonably practical and feasible. These practices include, but are not necessarily limited to, conducting monitoring of vibration-producing activities, maintaining all motorized equipment in a state of good repair to limit wear induced vibration, and limiting pile driving near residences to weekday daytime hours to minimize the number of people who could be annoyed by the vibration of this activity.

- Conducting a vibration monitoring program during construction to determine whether vibration-producing construction activities may be affecting nearby buildings.

- Conducting building inspections of those structures (offers will be extended to the owners) close enough to a construction vibration source that damage to that structure due to vibration may be possible in order to document the pre-construction conditions. The pre-construction survey documents the existing conditions so that it would be evident that any new damage or structural settlement would likely have been caused by construction activities of the Project. If damage does occur due to construction operations, the project sponsor and its contractor will be fully responsible to make the appropriate repairs.

- Taking all appropriate regulatory precautions to properly handle and dispose of any contaminated soil or groundwater encountered during construction. A Health and Safety Plan will be prepared and implemented where contamination is identified and handled.

- Installing erosion control measures and stormwater management systems to reduce or eliminate contamination of surface water runoff resulting from the construction site. In addition, appropriate spill prevention and control plans will be prepared.

- Implementing a rodent control program that will be initiated prior to the start of construction and maintained during the entire duration of construction.

- Preparing a Construction Protection Plan prior to construction to avoid and minimize adverse effects on known historic properties.

- Preparing historic documentation and photographic recordation of Virginia Avenue Tunnel in accordance with the guidelines set forth in Historic American Building Survey (HABS) / Historic American Engineering Record (HAER) Photographs: Specifications and Guidelines", "HABS/HAER Standards", and "HABS Historical Reports" prior to its demolition.

- Establishing a preservation fund in the amount of $200,000.00 for the purpose of carrying out historic preservation-related projects within the District of Columbia.

- Providing interpretive signs that will describe the history of the Virginia Avenue Tunnel, Virginia Avenue SE in relation to the L'Enfant Plan and related historical topics.

- Making the original stones that form the eastern and western portals of the tunnel available to the Friends of Garfield Park, NPS National Capital Parks East, and DPR.

- Conducting exterior rehabilitation of CP Virginia, an historic railroad switching tower located near 2nd Street and Virginia Avenue SW.

- Salvaging and reusing some of the Virginia Avenue Paving (remnants of the original cut-stone block paving used for Virginia Avenue SE) as part of interpretive sign and display relating to Virginia Avenue SE.

- Investigating sections of cross streets proximate to Virginia Avenue SE between 2nd and 11th Street SE to assess the potential and verify the presence of any additional intact historic cut-stone block paving.

- Conducting utility relocation work that requires unavoidable service disruptions during non-peak usage hours. Any utility service disruptions will be announced through the community outreach program noted above.

- Providing incentives to construction workers to carpool or use public transportation for commuting.

- Providing about 90 parking spaces within the west staging area (New Jersey Yard) for construction workers. Parking preferences will be given to those construction workers who carpool. Construction workers will be prohibited from parking at metered or two-hour residential spaces.

- Coordinating with the 11th Street Bridges Project to complete the portion of this project where the reconstruction of the tunnel affects 11th Street SE.

Post-Construction Commitments

Although these commitments will be provided during construction, they will continue to provide benefits after completion of the Project:

- In the restoration of affected areas of Virginia Avenue SE, the streetscape will be improved from existing conditions by straightening the street between 4th and 5th/6th Streets; the green space will be restore and an enlarged, including the replanting of street trees; sidewalks will be widened and more will be provided, such as on the north side of Virginia Avenue between 7th and 8th Streets; new shared use bike paths connecting Garfield and Virginia Avenue Parks will be provided; the lanes between 5th/6th and 8th Streets will be reduced; and the street lighting, traffic signals and crosswalks will be improved. DDOT and the project sponsor will conduct outreach with the community and other stakeholders to plan the specifics of these enhancements.

- In the restoration of the affected areas of Virginia Avenue Park, additional amenities will be included, such as a new dog park. Additional improvements, including landscaping, will be determined through consultation with NPS, DPR and the community. DPR is expected to lead the public outreach to plan the specifics of the dog park and other park enhancements.

- Restoration of the Marine Corps Recreation Facility to at least their pre-construction conditions, including replacing trees displaced by the Project. The tree replacement plan for the Marine facility will be coordinated with the Marine Corps.

- Improving access to Garfield Park at 2nd Street SE in accordance with the Americans with Disabilities Act.

- Although not directly related to the Project, changing the mandatory practice of requiring every train to blow its horn before entering and exiting the tunnel. Engineers will still have the discretion to use the train horn for safety reasons.

- Replacing public street trees displaced by the Project on a one-to-one ratio based on total diameter at breast height impacts. A tree replacement plan will be coordinated with DDOT Urban Forestry Administration during the landscaping plan development.

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Chapter 1
Introduction

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Introduction

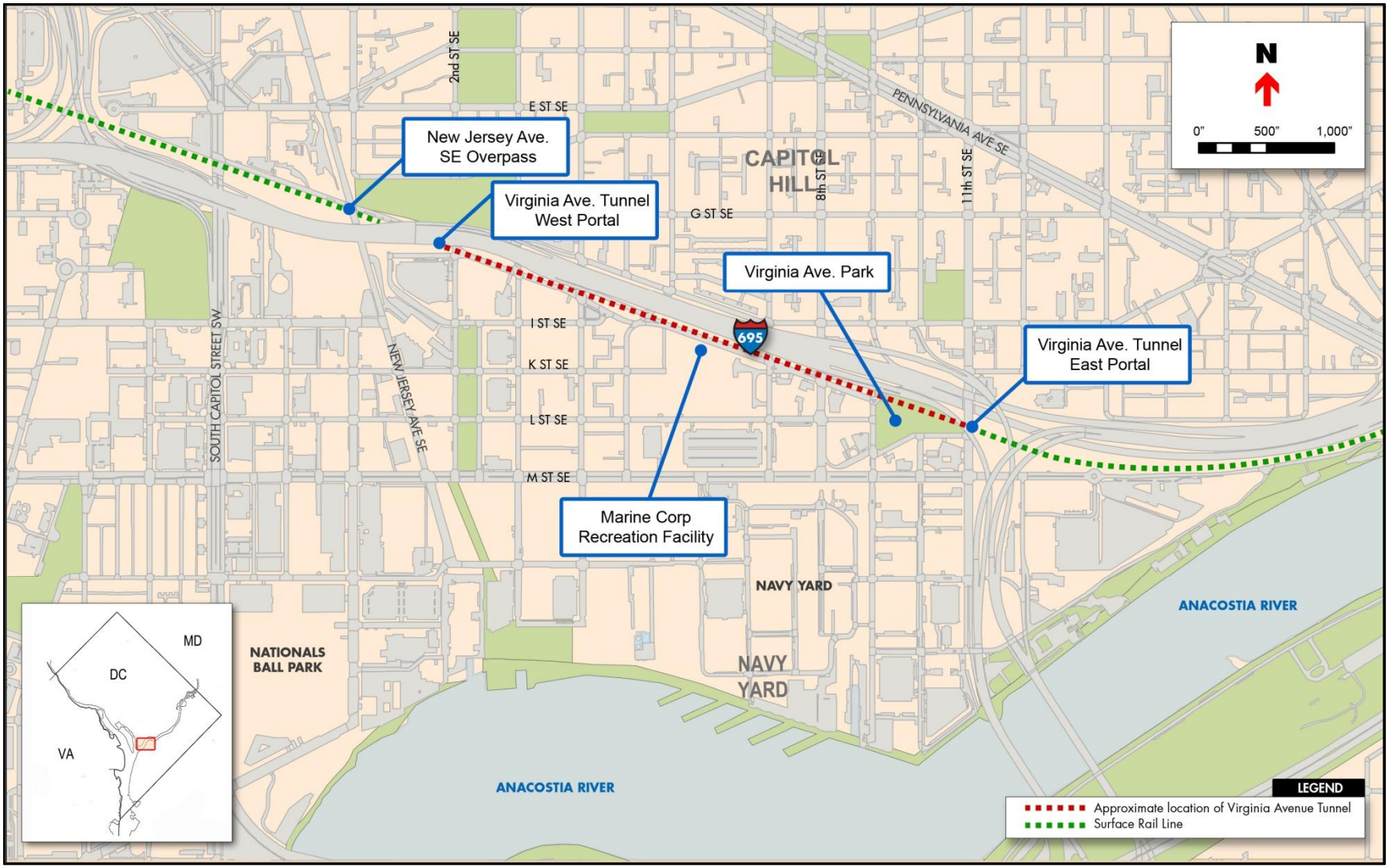
The Federal Highway Administration (FHWA) in conjunction with the District of Columbia Department of Transportation (DDOT) is issuing this Final Environmental Impact Statement (Final EIS) in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, for the proposed reconstruction of the Virginia Avenue Tunnel (the Project). This Final EIS also contains a Final Section 4(f) Evaluation in accordance with the U.S. Department of Transportation Act of 1966. FHWA is the lead federal agency in the development of the EIS. DDOT is the local lead agency. The Federal Railroad Administration (FRA), the National Park Service (NPS), the National Capital Planning Commission (NCPC) and the U.S. Marine Corps are cooperating agencies for the EIS. CSX Transportation, Inc. (CSX), the owner of Virginia Avenue Tunnel, is the project sponsor. The tunnel is located in the Capitol Hill neighborhood of the District of Columbia (DC or District) beneath eastbound Virginia Avenue SE from 2nd Street SE to 9th Street SE; Virginia Avenue Park between 9th and 11th Streets; and the 11th Street Bridge right-of-way (Figure 1-1). The tunnel is also aligned on the south side of Interstate 695 (I-695) previously known as Interstate 295 (I-295). The tunnel portals are located a short distance west of 2nd Street SE and a short distance east of 11th Street SE. The tunnel and rail lines running through the District are part of CSX's eastern seaboard freight rail corridor, which connects Mid-Atlantic and Midwest states.

The reconstruction of the tunnel will require the short-term (approximately a week or less) closure of I-695 ramps and use of Interstate Highway air rights. They require FHWA approval and both are federal actions. CSX is also seeking approval from DDOT for the temporary I-695 ramp closures, interstate highway air rights and for the occupancy, construction and traffic detours on Virginia Avenue SE and adjacent streets in the project area. DDOT has issued an occupancy permit relative to Virginia Avenue SE and adjacent streets, which is contingent on the selection of a build alternative, also known as the Preferred Alternative. The permit will have no force or effect until a build alternative is approved via a Record of Decision. The reconstruction of the tunnel will require temporary closure of Virginia Avenue SE between 2nd and 9th Streets SE, as well as other interim effects on several adjacent city streets during construction. The Project will also require sub surface use of a small portion of land in the U.S Marine Corps recreational facility located between 5th and 7th St, SE on Virginia Avenue SE.

The tunnel is approximately 3,800 feet long and is an integral part of CSX's regional freight rail network that encompasses approximately 21,000 miles of railroad track in the District, 23 states and the Canadian provinces of Ontario and Quebec. Specifically, the tunnel is located along CSX's eastern seaboard freight rail corridor, which stretches from the southeast through the Mid-Atlantic and connecting to the Midwest, thereby making it a key link in the nation's network of major freight rail lines.

If the Virginia Avenue Tunnel were not replaced or reconstructed, it will continue to require increasingly higher levels of investment for maintenance and repair, resulting in more frequent

Figure 1-1
Location of the Existing Virginia Avenue Tunnel



service interruptions and higher risks for localized disturbances. In addition, the tunnel has notable operational deficiencies. Specifically, the tunnel has just a single railroad track, which limits the flow of freight train traffic. Virginia Avenue Tunnel was identified as a bottleneck on the east coast (District of Columbia Freight Forum, Volume 1, Issue 1 [January 2012]). Furthermore, the tunnel does not have sufficient vertical clearance to accommodate rail cars that are loaded with two intermodal containers set one on top of the other, which is called "double-stacking".

The Project will transform the tunnel to a two-track configuration and provide the necessary vertical clearance to allow double-stack intermodal container freight train operations. Reconstruction of the tunnel will allow more efficient freight movement and reduce truck traffic (Freight Forum, January 2012). Because of its inherent efficiencies, freight rail intermodal transportation— transporting goods and equipment in shipping containers and placing them on railroad cars —is the fastest-growing major segment of the U.S. freight rail transportation industry according to the Association of American Railroads. Intermodal transportation is used for a wide variety of perishable and durable consumer goods, and is also used for agricultural and industrial products, such as grain and automobile parts. Reconstructing the tunnel to allow double-stacking will also involve lowering the grade below the rail line's New Jersey Avenue SE Overpass (see Figure 1-1).

If the Project were completed, freight rail transportation through the District will improve substantially, meeting not only the commerce needs of the Washington Metropolitan Area, but also regional and national needs for efficient freight conveyance throughout the Eastern portion of the nation.

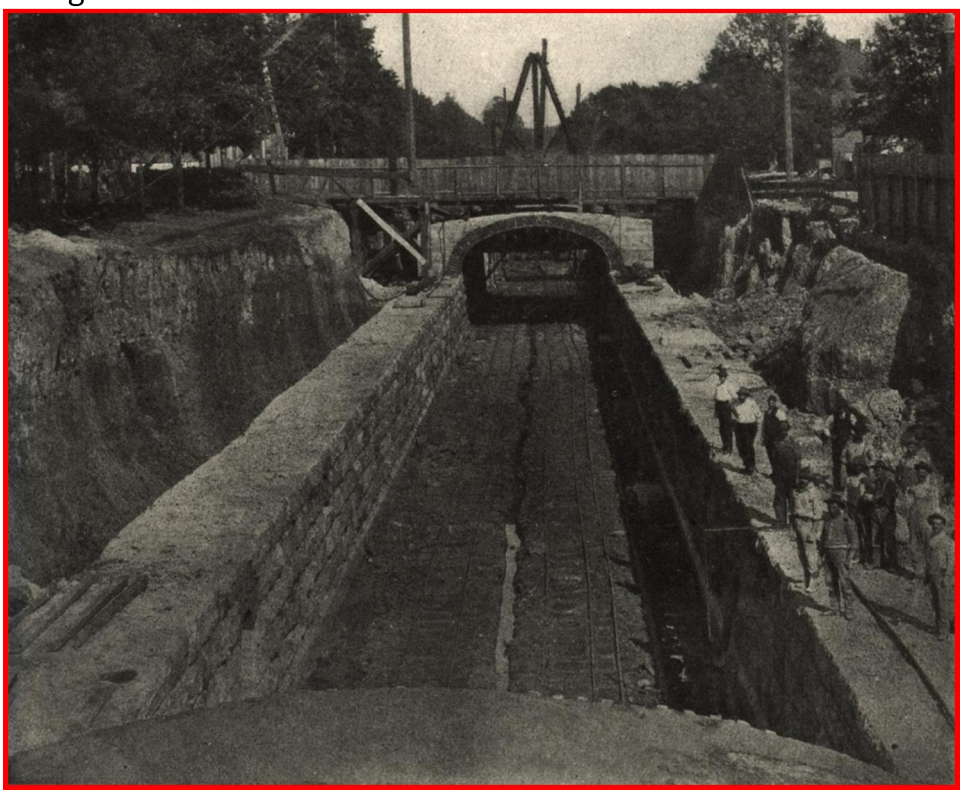
1.1 History

Virginia Avenue Tunnel was constructed in two phases between 1872 and 1904. The Baltimore and Potomac Railroad Company (a predecessor of CSX) built the first phase of the tunnel pursuant to authority granted by an 1869 Act of Congress authorizing the railroad company to enter the District and lay tracks along a route that began at the Potomac River between L and M streets SE and then continued "westwardly. . .to the intersection of Virginia Avenue with South L and East Twelfth streets; thence along said Virginia Avenue northwestwardly to South K Street; thence along said South K Street westwardly to South Fourth Street; thence along the said bank of the canal westwardly to the intersection of South C and West Ninth streets." (16 Stat. at 3, March 18, 1869).

In 1901, Congress directed the removal of the railroad from K Street SE and had them placed in an underground tunnel (rather than on streets) in order to facilitate access between Capitol Hill and the waterfront by allowing north-south streets to run over the tracks, passed 31 Stat 767 (Feb. 12, 1901) entitled, "An Act to provide for eliminating certain grade crossings on the line of the Baltimore and Potomac Railroad Company, . . . and requiring said company to depress and elevate its tracks and to enable it to relocate parts of its railroad therein, and for other

purposes." Based on this 1901 Act, the Baltimore and Potomac Railroad Company completed the second phase of tunnel in 1904.

Virginia Avenue Tunnel Construction



Both phases used "cut-and-cover" construction to build the tunnel, which involved digging down to a depth of about 30 feet (see photograph), building the tunnel walls and roof, and covering the completed tunnel with fill material as top cover. The first phase consisted of the portion of the tunnel from 11th Street SE to a location between 7th and 8th Streets SE. The second phase of construction extended the location of the tunnel's west portal by an additional half-mile to 2nd Street SE. When originally completed in 1904, the tunnel contained two sets of tracks. However, due to modernization of train equipment throughout the 20th Century, the approximately 28 feet of interior horizontal clearance within the tunnel forced the conversion to a single railroad track several decades ago. The rail lines immediately on the east and west ends of the tunnel still contain two tracks.

In 1985, a 350-foot section of the tunnel crown collapsed causing a rotational movement of over 600 feet of the tunnel's wall. The tunnel was shut down for several months so that emergency repairs could be made, which disrupted freight rail operations as well as street level traffic conditions. A 150-foot section of tunnel roof was repaired between 4th and 5th Streets SE, and an additional 300 feet of tunnel was strengthened because it exhibited signs of movement caused by external forces. These repairs involved reinforcement of the sidewalls and replacement of the original brick arch with a new flat roof.

1.2 Background

Today Virginia Avenue Tunnel lies generally beneath eastbound Virginia Avenue SE (except where it is under Virginia Avenue Park and the 11th Street Bridges right-of-way), extending from

just west of 2nd Street SE (west portal) and just east of 11th Street SE (east portal) (see Figure 1-1). The approximately 3,800-foot long tunnel, as well as other CSX rail lines within the District, Virginia and Maryland, is part of CSX's primary mainline freight rail route for freight traffic along the eastern seaboard and Midwest.

As shown in Figure 1-2, Washington, DC is located on the route between east coast ports, such as Norfolk, VA, Charleston, SC, and Savannah, GA, and markets in West Virginia, Pennsylvania, Ohio, Indiana and Illinois. A large percentage of freight carried through this network consists of intermodal containers (goods carried in containers that could also be transported by ship and truck without handling the contents within the containers). However, other types of freight traffic traverse through the Washington, DC and Virginia Avenue Tunnel, such as merchandise, coal and equipment trains.

The CSX rail network through the District as shown on Figure 1-3 was established at the time of the McMillan Plan. From the southwest, the CSX freight rail line enters the District via the Long Bridge, which connects Arlington, VA and southwest DC in the vicinity of the Tidal Basin of the National Mall. Grade-separated from city streets, the rail line is aligned along Maryland Avenue SW, transitioning to Virginia Avenue SW between 9th and 7th Street SW. Between 2nd and 11th Streets SE, the rail line is within the Virginia Avenue Tunnel. Continuing eastward, the rail line is aligned near the Anacostia River, crossing the river via the Anacostia Bridge in the vicinity of the Congressional Cemetery. On the east side of the Anacostia River, the rail line is generally oriented in a southwest-northeast alignment, still grade-separated from city streets, and crossing into Prince George's County, MD at Eastern Avenue NE. CSX also owns rail lines in Northeast and Northwest DC.

As indicated on Figure 1-3, CSX shares some of its rail lines with passenger rail service operated by AMTRAK, Virginia Railway Express (VRE) and Maryland Area Regional Commuter (MARC). AMTRAK provides regional or intra-state service throughout the east coast and the rest of the U.S. VRE and MARC provide commuter train service serving Virginia, Maryland and West Virginia residents, many of whom are employed within the District. Approximately 90 AMTRAK and commuter passenger trains operate on CSX rail lines through the District of Columbia daily (Freight Forum, January 2012). Sharing rail lines with other users limits the number of trains that could use the track at a given time, slowing train speeds and limiting the freight carrying capacity of the affected rail lines. The rail line between Arlington, VA and Southwest DC described above is shared with AMTRAK and VRE trains. However, the passenger service line diverts from the CSX line in the vicinity of 1st Street SW, and continues into a tunnel beneath the U.S. Capitol Grounds, connecting with Union Station on the north side of the Capitol. The section of CSX rail line from this junction (rail split) is exclusively used for CSX freight traffic (see the yellow and green lines in Figure 1-3). This rail line connects with rail lines in Prince George's County, MD.

Although Congress legislated the right for CSX to construct, operate, and maintain two rail tracks beneath Virginia Avenue SE in a tunnel (see Section 1.1), determining the exact boundaries of the CSX right-of-way is not possible due to lack of documentation. Therefore, in

Figure 1-2
CSX Major Rail Network

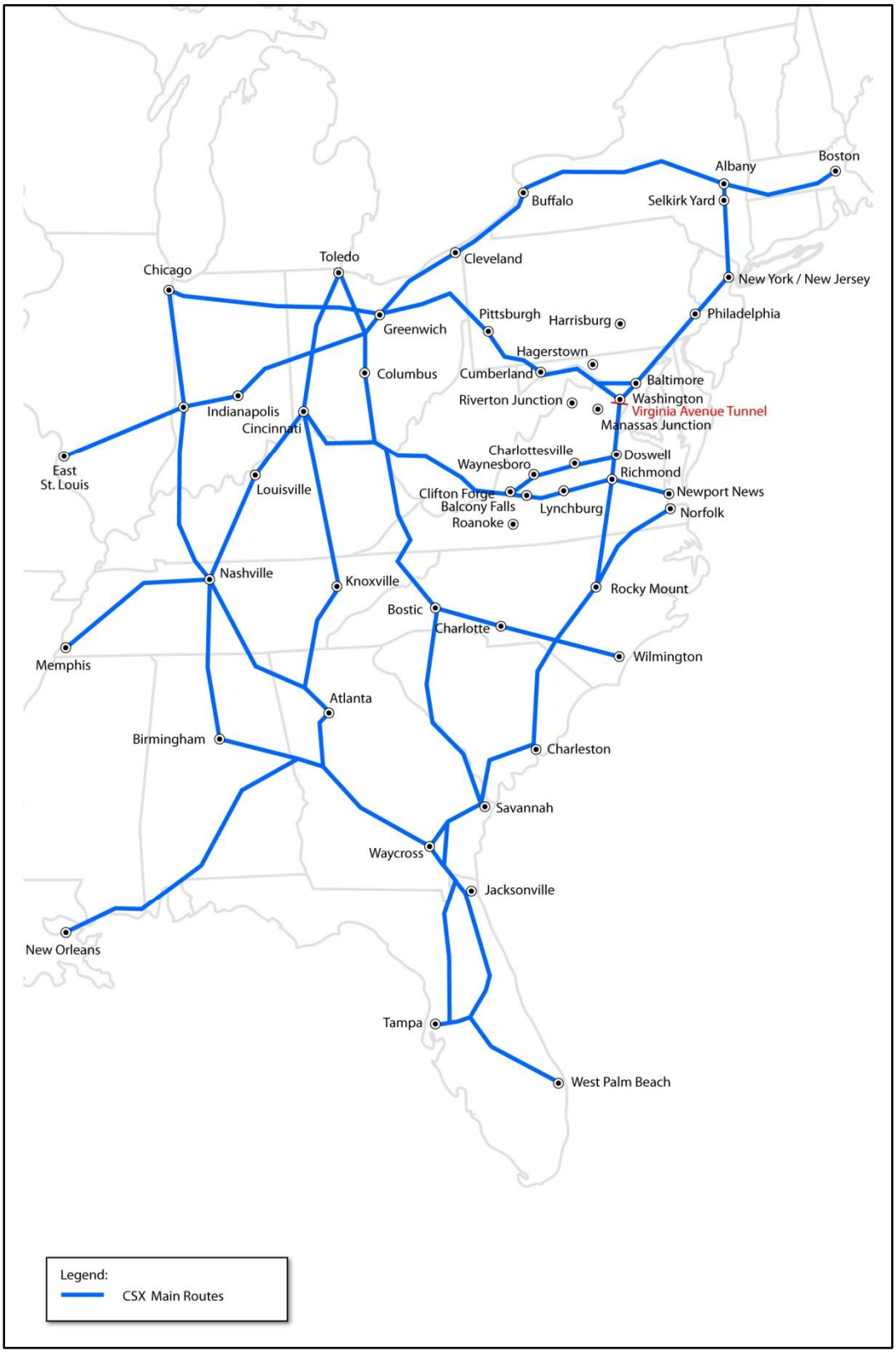
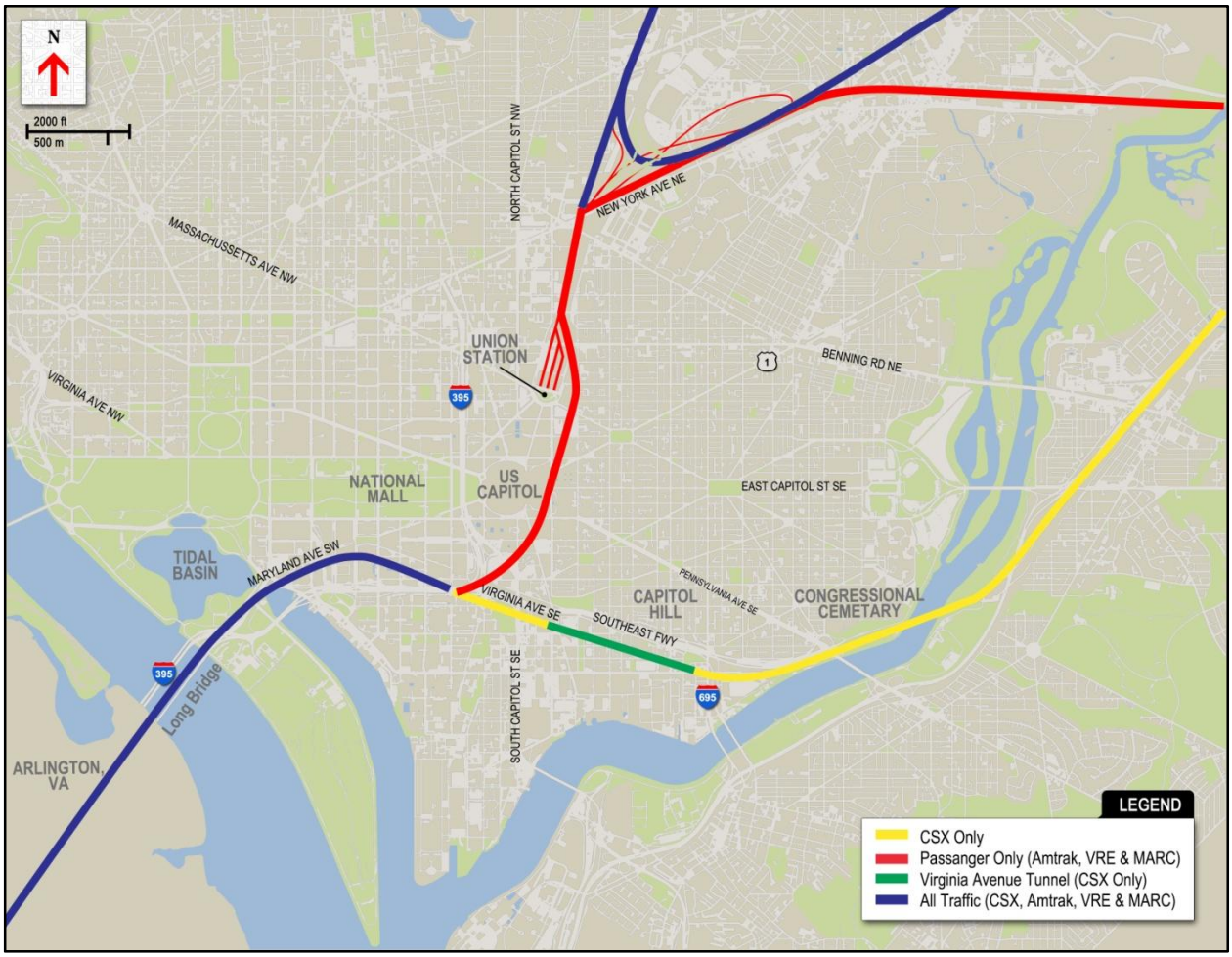


Figure 1-3
Active Rail Lines within the District of Columbia



2012, the Government of the District of Columbia and CSX signed an agreement in which the parties agreed that in order to construct Virginia Avenue Tunnel, CSX will seek construction and occupancy permits from DDOT to access subterranean and above surface space. Based on the 2012 agreement, DDOT issued an occupancy permit relative to Virginia Avenue SE and adjacent streets, which is contingent on the selection of a build alternative in the NEPA process.

1.3 Planning Process

NEPA requires federal agencies to integrate environmental values into their decision making processes by considering the environmental impacts of their proposed actions and reasonable alternatives to those actions. Such actions could include federal funding for a project, issuance

of a federal permit or approval, or allowing use of federal lands on a temporary or long-term basis. The CSX proposed action will require federal approvals and use of federal lands.

Currently, the operation of CSX's rail lines, including the Virginia Avenue Tunnel, through the District does not affect the operation of the Southeast-Southwest Freeway, designated Interstate 695 (I-695) (see Figure 1-1). Despite no expected long-term impacts to the I-695, the Project requires FHWA approval to allow CSX to conduct construction that will temporarily affect I-695 ramps located at 6th and 8th Streets SE. This FHWA approval is subject to the requirements of NEPA.

Following completion of a new Virginia Avenue Tunnel, the surface streets at and surrounding Virginia Avenue SE will return to pre-construction conditions. For example, the operation of the I-695 ramps and the Virginia Avenue SE roadway will be restored back to current conditions, except to the extent that the 8th Street ramp will be modified by 11th Street Bridges project that DDOT is currently undertaking. Specifically, no interference between the rail line and other transportation operations, including that of I-695, will occur following construction.

In addition to the FHWA approval, the Project will require approval from the U.S. Marine Corps to allow construction on its property. The U.S. Marine Corps affected property is a recreational facility located along Virginia Avenue SE between 6th and 7th Streets SE. The approval to allow private construction on federal property is subject to the requirements of NEPA.

Construction of the Project will affect NPS reservations that include Virginia Avenue Park (see Figure 1-1), which is under the jurisdiction of the DC Department of Parks and Recreation. Other affected NPS reservations are located along Virginia Avenue SE, but they are under the jurisdiction of DDOT and the U.S. Marine Corps. A portion of Reservation 122, which is located between 4th and 5th Streets SE, contains a small triangular grassy lawn that is under the jurisdiction of the NPS, but construction will not require the use of the grassy lawn.

The Project may require a formal project review by the NCPC because construction of the Project will affect federally owned lands. This potential NCPC project review is subject to the requirements of NEPA.

Among the federal agencies involved, the FHWA assumed lead agency status for NEPA compliance on May 9, 2011 and invited DDOT as the joint lead agency. FHWA also invited NCPC, NPS and the U.S. Marine Corps to be cooperating agencies under NEPA. In addition, the Federal Railroad Administration (FRA) was invited to be a cooperating agency due to its special expertise related to railroad operations safety. NCPC, NPS, U.S. Marine Corps and FRA all accepted the cooperating agency status.

Due to the closure of certain portions of Virginia Avenue SE during construction for the proposed Project and the need to use and occupy certain public right-of-way for the reconstructed tunnel, DDOT must also provide approval because it has jurisdiction of Virginia Avenue SE and the surrounding streets. Ordinarily, the requirements of the District of Columbia Environmental Policy Act (DCEPA) would apply to the DDOT role and responsibility.

However, because the Project is already subject to the requirements of NEPA, no additional action is needed under DCEPA. In addition, DDOT will provide oversight and inspection of the Project's construction activities.

This Final EIS:

- Describes the Purpose and Need for the Project (Chapter 2);
- Presents the alternatives considered for the Project (Chapter 3), including the Preferred Alternative;
- Describes the environment potentially affected by the Project alternatives (Chapter 4);
- Discloses the potential beneficial and adverse environmental, social and economic impacts that could result from the Project's construction and long-term operation (Chapter 5);
- Presents specific measures to minimize or mitigate adverse impacts to the environment (Chapter 5);
- Documents project compliance with Section 4(f) of the US DOT Act of 1966 (Chapter 6); and
- Documents agency coordination and public involvement activities conducted for the Project (Chapter 7).

This Final EIS also documents compliance with other federal laws that apply to the Project, such as Section 7 of the Endangered Species Act, Section 106 of the National Historic Preservation Act, and applicable Executive Orders.

The Project's Draft EIS was available for agency and public review for 75 days from the date of the Federal Register notice of availability, which was on July 12, 2013. A 45-day public comment period is normally required for Draft EISs. However, based on community request, the FHWA extended the comment period by an additional 30 days. The comment deadline was extended to September 25, 2013. During this comment period, a public hearing was held on July 31, 2013 to provide the general public the opportunity to comment on the Project, its potential impacts and environmental mitigation measures. In preparing this Final EIS, FHWA and DDOT reviewed all comments and testimony received on the Draft EIS for the Administrative Record. This Final EIS contains all comments received on the Draft EIS and responses from the FHWA and DDOT. The comments and responses are provided in Appendix L. Unlike the Draft EIS, this Final EIS identifies the Preferred Alternative for the Project.

Following the Federal Register "notice of availability" of this Final EIS, the FHWA will issue a Record of Decision (ROD) no sooner than 30 days after publication of the Final EIS "notice of availability" in the Federal Register. Issuance of the ROD completes FHWA's NEPA process. The ROD will set forth the basis for the FHWA decision as specified in 40 CFR 1505.2, summarize any mitigation measures that will be incorporated into the Project, and document any required Section 4(f) approval in accordance with 23 CFR 774. NCPC, NPS and the U.S. Marine Corps have the option of adopting the FHWA EIS or preparing their own to complete their NEPA requirements, if needed.

After completion of the NEPA process, other required federal and District approvals and permits will be obtained in order for construction of the Project to proceed, such as approvals from NPS and the Marine Corps to allow construction on their properties, and approvals from DDOT to allow construction on Virginia Avenue SE and other affected streets.

Chapter 2
Purpose and Need

Chapter 2
Purpose and Need

The purpose of the Project is to preserve, over the long-term, the continued ability to provide efficient freight transportation services in the District of Columbia, the Washington Metropolitan Area and the eastern seaboard. These services would continue if the following needs are met:

1. Address the structural and operational deficiencies of the century-old Virginia Avenue Tunnel;
2. Accommodate expected increases in freight transportation that, in part, would stem from the Panama Canal expansion scheduled for 2015; and
3. Ensure that during construction freight transportation services remain uninterrupted while the functions of the tunnel are being replaced with a new facility.

Each of these needs is discussed in this chapter.

2.1 Virginia Avenue Tunnel Deficiencies

The existing Virginia Avenue Tunnel is deficient for the following reasons:

- With a horizontal clearance (i.e., width distance between the interior tunnel walls) that only allows a single railroad track, the tunnel is a major bottleneck for freight rail movement not only within the District, but also on the eastern seaboard generally;
- The tunnel has insufficient vertical clearance (i.e., height distance between the tunnel floor and ceiling) to operate double-stack intermodal container freight trains; and
- At over 100 years old, the tunnel is nearing the end of its useful life, and is subject to an ever increasing level of maintenance and repairs and higher risks of structural failure.

2.1.1 Tunnel Width

For a mainline freight rail line, the current industry standard for this type of transportation infrastructure is at least two railroad tracks (to allow for simultaneous two-way traffic) with a minimum operating speed of 40 mph. As described in Section 1.2, the rail route through the Southwest and Southeast areas of DC is an integral part of CSX's mainline freight rail network. Although Virginia Avenue Tunnel was originally constructed to accommodate two railroad tracks, freight trains have increased in size since the original construction and safety clearance requirements for opposing traffic increased, thereby necessitating the conversion of the rails within the existing tunnel to a single railroad track arrangement several decades ago. The existing tunnel is approximately 28 feet wide (inside the tunnel walls). A minimum tunnel width of 33 feet is needed to accommodate two railroad tracks, or five feet more than the existing width of the tunnel.

The Mid-Atlantic Rail Operations Phase II Study (December 2009), prepared for the I-95 Corridor Coalition made up of Departments of Transportation from Delaware, New Jersey, Pennsylvania, Maryland and Virginia, identified Virginia Avenue Tunnel as a primary congestion

point and major bottleneck for both freight and passenger traffic. CSX operates approximately 20 miles of freight rail lines in the District. In addition to freight movement, more than 90 commuter trains operate on CSX tracks through the District daily, including 24 AMTRAK, 30 VRE, and 38 MARC trains (Freight Forum, January 2012).

The single railroad track within Virginia Avenue Tunnel represents the single greatest constraint on rail headway (the frequency of passing trains within a given time period) on CSX's mainline freight rail network. It is a bottleneck to the eastern seaboard freight rail corridor because only a single freight train can pass through the tunnel at any one time. As a train passes through the tunnel, freight trains moving in the opposite direction near the tunnel must stop to allow the oncoming train to safely clear the tunnel, thus, limiting the total number of trains that could pass through the tunnel in a given time period. Freight trains often queue for long periods of time on either end of the tunnel to wait their turn to pass through the tunnel. Ordinarily, just freight trains are affected by this delay. However, if an eastbound train is delayed, the queue could extend beyond the junction at 1st Street SW, which is located just one-half-mile from the Virginia Avenue Tunnel portal at 2nd Street SE, or less than the length of a typical freight train. Trains queued beyond that point will continue to cause delays to passenger rail service traveling between Virginia and Union Station.

2.1.2 Tunnel Height

As a century-old facility, Virginia Avenue Tunnel was not built to accommodate modern freight rail transportation, namely the double-stacking of intermodal containers. Trains pulling double-stacked intermodal container cars have become the industry's operational practice for intermodal freight transportation in the U.S. where the rail networks allow it (i.e., vertical obstructions, such as a roadway overpasses and tunnels, along the entire network allow double-stack intermodal container trains to pass underneath). In order to operate double-stack freight trains through a tunnel or other vertical obstruction, a minimum vertical clearance of at least 21 feet must be provided. The existing vertical clearance within Virginia Avenue Tunnel is about 18 feet, or deficient by about three feet. The complications and inefficiencies created by this aspect of the old tunnel is similar to what the highway transportation industry would experience if an overpass did not meet modern standards for vertical clearance on a heavily-used highway that must accommodate tractor-trailer truck traffic.

The existing Virginia Avenue Tunnel was built to accommodate the industry practices of the late 19th and early 20th centuries. For many years after construction, the tunnel satisfactorily met the needs of the freight transportation in terms of having adequate vertical clearance. However, freight transportation changed dramatically, as noted, with the invention and wide-spread adoption of the intermodal shipping container as the principal means to move goods between manufacturing centers and consumer markets, regardless of whether the transport is between local, regional, national or international markets.

The last several decades have witnessed a steady growth in the demand for freight transportation due to population growth and the increasing globalization of commerce. Consequently, freight railroad companies, such as CSX, are carrying ever increasing quantities of

intermodal freight, but are often still operating on the same rail network established decades or even more than a century ago. In addition, these same rail networks are increasingly being shared with other users, in particular passenger rail service, as noted in Section 1.2. The industry solution to meeting higher freight transportation demands while still operating on the same network is to carry more freight per train. The ability to double-stack intermodal containers allows a single freight train to essentially double its intermodal freight capacity, if needed. In other words, double stacking intermodal containers is a way to increase capacity without increasing the number of trains, or the need to construct new rail lines.

Thus, this inadequate vertical clearance of Virginia Avenue Tunnel effectively prevents CSX from operating double-stack intermodal container freight trains along its eastern seaboard freight rail corridor. As a result, the inadequate vertical clearance of the tunnel represents both a major deficiency of the tunnel and the ability to provide efficient service in the rail corridor. Although there are other locations in the District with inadequate vertical clearances, addressing them would require only minor modifications to the rail line. For example, the inadequate vertical clearance at New Jersey Avenue SE, which is part of the Project area, would be resolved by lowering the grade beneath the crossing, a relatively minor construction activity that would not disrupt the surrounding community. Other crossings with inadequate vertical clearances in Southeast DC would be handled in a similar manner.

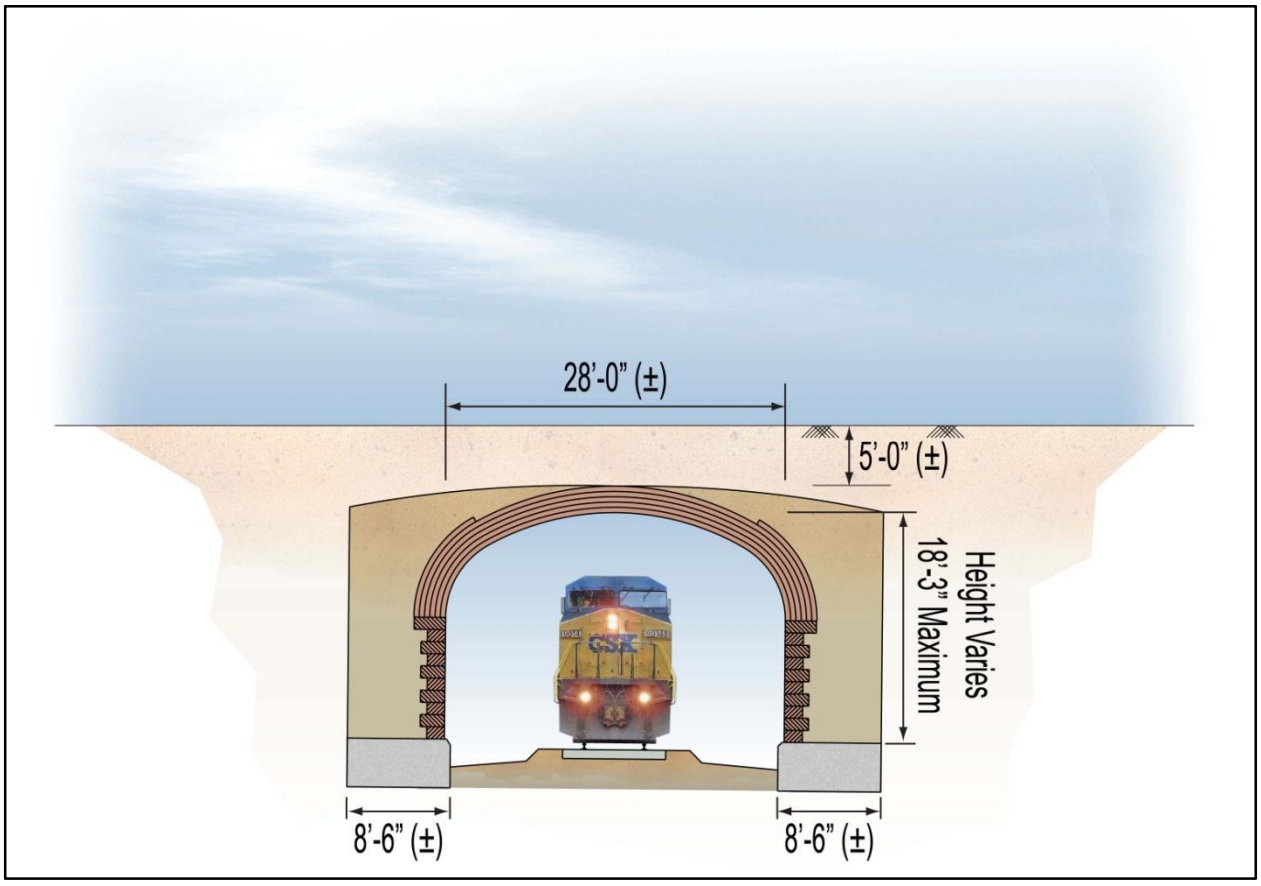
2.1.3 Tunnel Condition

In addition to the capacity and height deficiencies of Virginia Avenue Tunnel, the tunnel is also nearing the end of its useful life. The tunnel requires increasingly frequent inspection and preventive maintenance for safe rail operations. These frequent inspections or preventive maintenance activities are difficult to conduct without compromising normal rail operations, and are likely to increasingly cause service disruptions to become longer than what is acceptable for a mainline freight rail line.

Transportation infrastructures, such as highways, bridges and tunnels, are eventually replaced or undergo major rehabilitation at some point. Alternatively, if a particular element of infrastructure were not replaced, it would continue to require higher levels of investment in maintenance and repair, resulting in more frequent service interruptions and higher risks for localized disturbances.

A typical cross-section of the existing Virginia Avenue Tunnel is shown in Figure 2-1. The tunnel's structural shell consists of walls approximately 8½ feet thick and an arched roof. The walls and roof are of masonry construction. As noted in Section 1.2, the tunnel contains a single set of track (rails and ties) on top of the track ballast. The ballast, which normally consists of a bed of crushed stone, is used to hold the track in place as trains pass through. It is also used to facilitate drainage. The track ballast in and around Virginia Avenue Tunnel consists of crushed stone.

Figure 2-1
Cross-Section of Existing Virginia Avenue Tunnel



Virginia Avenue Tunnel is showing signs of its age. While the overall structure is in relatively good shape, indicators of localized distress are evident, such as cracking in the tunnel's masonry, active water infiltration, spalling (i.e., flaking) of liner brick and the deterioration of mortar in masonry joints. In addition to these tunnel wall conditions, the tunnel's drainage system, made up of a network of ditches, wood trenches, corrugated metal and reinforced concrete pipes, and sump pits and pumps, are severely compromised by overall deterioration and fouling by sediment and debris. This is in part due to the tunnel tracks and drainage system being built directly on top of soil instead of a hard surface, a design no longer used under today's standard engineering practices for most freight rail tunnels. The drainage system is the most critical element in disrepair because this affects the sub-grade load bearing condition of the tunnel floor. The poor drainage system has led to increased moisture in the tunnel and an overall weakening and deterioration of the ground underneath the ballast. Train loadings (i.e., weight of passing trains) are more than double than when the tunnel was first built, which have contributed to the wear and tear on the track bed. Along with the cyclic train loadings, the integrity of the tunnel ballast has also been compromised. In order to maintain safe train passage over areas of substandard track beds, the operating speed limit through the entire

tunnel was reduced to 15 mph (up to 40 mph is allowed immediately outside the tunnel), which has further contributed to the tunnel being a bottleneck of the CSX mainline freight rail network. In addition, poor load bearing of the track bed requires excessive levels of maintenance to ensure the reliable passage of trains.

Just as the techniques for highway and road construction have changed to accommodate the heavier weight of vehicles, so too have railroad construction practices changed to accommodate the increased weight, size and shape of locomotives and rail cars. Not surprisingly, Virginia Avenue Tunnel reflects the engineering practices and construction methods that are more than 100 years old and are effectively obsolete. For example, today's standard engineering practices would recommend a structural floor (e.g., concrete foundation) when the ground of the Virginia Avenue Tunnel is made up of soils.

Despite the signs of distress noted above, the tunnel is in no danger of collapsing in part due to tunnel reinforcements and reconstruction made in late 1985 and early 1986 (see Section 1.1). Nevertheless, even with CSX's active maintenance and inspection program, a major structural deficiency could materialize over the next few decades, possibly due to the continued aging of the tunnel's masonry structure. This would create a major disruption to freight transportation, and would likely disrupt the surface roadway network in the community as CSX would be forced to conduct emergency reconstruction of the affected section of the tunnel.

2.2 Freight Transportation Demand

Currently, an average of 20 freight trains pass through Virginia Avenue Tunnel daily. According to the FHWA's 2011 Freight Analysis Framework (FAF) forecasts, overall freight tonnage would increase by 50 percent in 2040 from 2010 levels. This projection is independent of the Project. According to a U.S. DOT November 3, 2010 press release, freight tonnage is expected to increase 1.6 percent per year, reaching over 27 billion tons by 2040. It was 18.3 billion tons in 2010 back to levels before the U.S. recession in 2008. The press release also noted that intermodal container movement accounted for 18 percent of the value of freight transportation in 2007 and is forecast to grow to nearly 27 percent by 2040. It is likely that rail would accommodate a substantial share of the future increase demand for freight land transportation in the U.S. for the following reasons:

- Highway capacity (freight truck transport) is expanding too slowly to keep up with the FHWA projected demand.
- Certain metropolitan areas have extremely high traffic congestion levels, making highway transport of freight extremely inefficient and time-consuming. For example, according to the 2011 Urban Mobility Report produced by the Texas Transportation Institute (TTI), the Washington Metropolitan Area ranks among the top very large metropolitan areas in the U.S. in terms of congestion.
- Freight trains are almost three times more fuel efficient than freight trucking according to the TTI and the Center for Ports and Waterways in a 2007 report (amended in 2009).
- Greenhouse Gas (GHG) emissions from freight transportation are tied closely to freight energy use. Although energy efficiency improvements have been made in the truck

freight sector, GHG emissions are still growing in this sector because energy efficiencies have not kept pace with growth in freight demand. As noted above, freight rail transportation is approximately three times more energy efficient than freight trucking.

The Panama Canal will soon be expanded to allow vessels carrying 12,000 intermodal containers, more than doubling the maximum freight-carrying capacity (5,000 intermodal containers) of vessels that currently use the canal. Upon its projected completion in 2015, freight throughput from east coast and Gulf of Mexico ports is expected to increase substantially. Freight transporters in Asia could increasingly choose to use east coast and Gulf ports instead of west coast ports to reach inland markets (e.g., Midwest) in the U.S. for their goods due to the cost efficiencies of using larger vessels, even though the water route would be substantially longer than using a west coast port. Currently, it is more economical for shippers of Asian goods to use a west coast port and land transportation (rail and highway) to reach many inland markets in the U.S even though these markets are geographically closer to east coast or Gulf ports. A Panama Canal that could accommodate a 12,000 container vessel may change the equation between east and west coast freight market shares. It may favor a shift in market shares to east and gulf coast ports, notwithstanding other factors affecting freight market shares. Conversely, freight transporters in the U.S. could increasingly choose to use an east coast port to reach destinations in Asia. Ports along the east coast, such as in Savannah, GA and Charleston, SC are investing hundreds of millions of dollars to upgrade their facilities to accommodate the larger intermodal vessels and capture a greater market share.

As the largest freight railroad company on the east coast, CSX is anticipating the impact of an expanded Panama Canal on freight transportation demand from east coast ports, and is anticipating the need to carry a greater amount of freight between east coast ports and Midwest markets. CSX's existing mainline freight rail network in the mid-Atlantic and Midwest would be able to accommodate anticipated demand provided that at least two railroad tracks are provided throughout the network, and CSX is able to operate double-stack freight trains. CSX implemented a National Gateway initiative to improve the flow of rail traffic throughout the nation by increasing the use of double-stack intermodal container freight trains by creating a more efficient rail route that links mid-Atlantic ports with mid-Atlantic and Midwestern markets.

As shown on Figure 1-2, the CSX rail line through the District, including Virginia Avenue Tunnel, is part of the eastern seaboard freight rail corridor, a mainline route linking mid-Atlantic ports with mid-Atlantic and Midwestern markets. Due to the tunnel's "bottleneck" conditions noted in Section 2.1 (single railroad track and its inability to accommodate double-stack intermodal container freight trains), the tunnel represents a constraint to increasing the freight carrying capacity along much of the rail network in order to meet expected increases in freight transportation demand. Due to the integrated nature of freight rail lines, a single point along a freight rail network (e.g., Virginia Avenue Tunnel) could affect the capacity of the entire network.

2.3 Commerce Demands

The ability to quickly and efficiently move goods to markets throughout the country is vital to the U.S. economy. As one of the nation's major freight railroad companies, CSX provides a valuable public service by facilitating the shipment of goods and services to the general public. It is not feasible to stop freight rail service during the period of time when the Virginia Avenue Tunnel is reconstructed. Currently, CSX operates between 20 and 30 trains through the tunnel daily. The railroad's need to meet its Common Carrier Obligation, including the statutory duty to provide ``transportation or service on reasonable request'' (49 U.S.C. 11101(a)) will continue unabated throughout the period of time that the tunnel is rebuilt. This duty means that CSX may not decline to provide common carrier service merely because doing so might be inconvenient or unprofitable, or somehow disruptive to others. As with other aspects of interstate commerce that could have profound economic consequences if interrupted, the preservation and maintenance of these transportation services are in the national interest. Just as service cannot be halted during tunnel reconstruction, it would also be inconsistent with the railroad's Common Carrier Obligation to allow such transportation services to be unduly delayed. An increasing amount of railroad traffic is time-sensitive, reflecting economic decisions by shippers to use "just-in-time" approaches to manufacturing. Just-in-time approaches seek to reduce inventory, and allow for the arrival of critical parts that dependably arrive exactly when they are needed by the manufacturer.

As shown on Figure 1-2, severing the rail network in the District would effectively cut-off freight transport between the mid-Atlantic and Midwestern states because CSX does not own rail lines within or near the Washington Metropolitan Area that could serve as an alternate route through or around the District during construction. In particular, the Long Bridge (see Section 1.2) is CSX's only Potomac River crossing other than in Harpers Ferry, WV, which is located approximately 50 miles northwest of the District.

During construction, CSX will need to continue providing its customers with the same level of timely and efficient freight service as it currently provides today, which includes having a Virginia Avenue Tunnel with a single set of tracks. Any diminution in the ability to provide reliable, consistent, and timely freight rail service would make freight rail transport less competitive than truck transport, and the expected response of many freight customers would be to switch transport modes from rail to truck. A substantial shift in modes may result in worsening the already congested interstate and regional road networks, especially those along the I-95 and I-81 corridor, along with associated environmental and socioeconomic impacts. In addition, some portion of this diversion of freight from train to truck would not revert back to freight rail shipment after completion of the Project because a prolonged disruption in service could force some shippers to make long term changes to industrial production and shipping routines.

2.4 Logical Project Termini

The purpose of the Project is to preserve, over the long-term, the continued ability to provide efficient freight transportation services in the District of Columbia, the Washington Metropolitan Area and the eastern seaboard. These services will continue if the structural and operational deficiencies of Virginia Avenue Tunnel are addressed, capacity is added in preparation for expected increases in freight transportation demand, and commerce remain uninterrupted while the tunnel is replaced with a new facility. For these reasons, the Virginia Avenue Tunnel generally running under Virginia Avenue SE from 2nd Street SE to 11th Street SE and at grade at 12th Street SE represents logical termini of the Project. On the west end, the need to provide proper grading of the existing tracks west of the new rebuilt tunnel will mean that the vertical clearance underneath the New Jersey Avenue SE bridge will also be able to accommodate double-stack intermodal container freight trains. On the east end, the project limits include the extension of the new tunnel from 11th Street SE to 12th Street SE. The construction area for rebuilding the existing tunnel will not change by extending the new tunnel to 12th Street SE because enclosing the section of track between 11th and 12th Street will not affect the new grading of the tracks east of the tunnel.

Chapter 3
Alternatives

Chapter 3
Alternatives

3.1 Overview

This chapter describes the reasonable alternatives considered for the Project, including the 'no action' alternative, as required by the National Environmental Policy Act (NEPA), and the 'build' alternatives that involve the reconstruction of Virginia Avenue Tunnel at its current location. One of the Build Alternatives was selected as the Preferred Alternative. Prior to the development of the alternatives, 12 different design concepts were developed, which were shared with the agencies and the public. Following a detailed screening process, some of the concepts were eliminated from further consideration. Others were carried forward and developed into the four candidate alternatives, all of which underwent rigorous evaluation as documented in this Final EIS.

West Tunnel Portal at 2nd Street SE

East Tunnel Portal at 11th Street SE

In the initial phases of project development, 12 concepts were developed and analyzed to determine whether they meet eight criteria based on the Project's Purpose and Need. After applying these criteria, four of those 12 concepts were retained in the EIS for detailed analysis as formal NEPA alternatives, including a "no build" scenario. The three Build Alternatives underwent additional engineering design modifications largely to ensure that the demolition of existing tunnel structures and the construction of new facilities minimize risks to the structural integrity of I-695, which is aligned immediately to the north of the tunnel. In addition and regardless of the Build Alternative, the Project will extend the east portal by approximately 330 feet to a location northeast of the 12th Street and M Street T-intersection.

The four alternatives retained for detailed analysis in the EIS are as follows:

- Alternative 1 - No Build (originally *Concept* 1): The No Build alternative is automatically carried forward into the NEPA process. The tunnel would not be rebuilt under this alternative. However, the railroad would continue to operate trains through the tunnel and at some point, emergency or unplanned major repairs or rehabilitation could be

required to this critical, aging infrastructure that might prove equally disruptive to the community than the Build Alternatives.

- Alternative 2 -Rebuilt Tunnel / Temporary Runaround Track (originally *Concept 2*): This alternative involves rebuilding the existing Virginia Avenue Tunnel. It would be rebuilt with two railroad tracks and enough vertical clearance to accommodate double-stack intermodal container freight trains. It would be rebuilt in generally the same location, except aligned approximately seven feet to the south of the existing tunnel center line. It would be rebuilt using protected open trench construction methods. During construction, freight trains would be temporarily routed through a protected open trench outside the existing tunnel (runaround track). The runaround track would be aligned to the south and generally parallel to the existing tunnel, and would be located below street level. Due to new columns associated with the rebuilt 11th Street Bridge, the runaround track would slightly separate from the tunnel alignment on the east end starting just west of Virginia Avenue Park. Safety measures such as securing fencing would be used to prevent pedestrians and cyclists from accessing the runaround track.
- Alternative 3 - Two New Tunnels (originally *Concept 5*): Alternative 3 was identified as the Preferred Alternative. Hereinafter, this alternative will be referred to as the Preferred Alternative. The Preferred Alternative involves replacing the existing Virginia Avenue Tunnel with two new permanent tunnels constructed sequentially. Each new tunnel will have a single railroad track with enough vertical clearance to allow double-stack intermodal container freight trains. A new parallel, south side tunnel will be built first as trains continue operating in the existing Virginia Avenue Tunnel. After the south side tunnel is completed, train operations will switch over to the new tunnel and the existing Virginia Avenue Tunnel will be demolished and rebuilt. With the exception of operating in a protected open trench for approximately 230 feet immediately east of the 2nd Street portal (within the Virginia Avenue SE segment between 2nd and 3rd Streets SE), trains will operate in enclosed tunnels throughout construction under the Preferred Alternative. Throughout most of the length of the rebuilt tunnel, the two tunnels will be separated by a center wall. This center wall will be the new centerline of the two tunnels, and it will be aligned approximately 25 feet south of the existing tunnel centerline, between 2nd and 9th Streets SE. Due to new columns associated with the rebuilt 11th Street Bridge, the tunnels will be separated on the east end starting just west of Virginia Avenue Park, resulting in two separate single-track tunnels and openings at the east portal.
- Alternative 4 - New Partitioned Tunnel / Online Rebuild (originally *Concept 6*): Alternative 4 would result in a new tunnel with two permanent tracks. Similar to the Preferred Alternative, the new tunnel would be partitioned and have enough vertical clearance to allow double-stack intermodal container freight trains. It would be aligned approximately 17 feet south of the existing tunnel's centerline. The new tunnel would be built using protected open trench construction methods. The rebuild would occur 'online' meaning that during the period of construction, the protected open trench would accommodate both construction activities and train operations. Maintaining safe and reliable temporary train operations is a more complicated endeavor under Alternative 4 than under the other two Build Alternatives due to the online rebuild approach.

This chapter is organized as follows:

- Rationale for identifying Alternative 3 as the Project's Preferred Alternative;
- Description of the "No Action" or "No Build" alternative, Alternative 1;
- Description of the Build Alternatives
- Construction period descriptions of the Preferred Alternative and the other Build Alternatives, which include:
  - Limits of disturbance needed to construct the Project,
  - Construction phasing,
  - Construction haul routes,
  - Maintenance of traffic plan,
  - Safety and security measures,
  - Cost estimate and duration of construction, and
- Post-construction condition of the new Virginia Avenue SE; and
- Explanation of the process that led to the selection of the three Build Alternatives and the elimination of design concepts from consideration.

3.2 Selection of the Preferred Alternative

Alternative 3 was selected as the Preferred Alternative. The primary reasons for selecting Alternative 3 as the preferred alternative include the ability of this alternative to best meet the project Purpose and Need while minimizing environmental impacts and addressing community concerns. This alternative reduces the construction duration for the Project to the greatest extent possible as well as accommodates the train operations in a closed tunnel thereby addressing community concerns about operation of trains within an open trench near residents. This alternative also enhances the safety of the tunnel and rail road operations by providing a center wall in the new tunnel separating the two sets of tracks, which will provide the benefit of isolating any derailment within the tunnel. The wall will also provide maintenance flexibility if an operational shutdown is required. Although the outer surface of the southern wall under Alternative 3 will be located approximately 25 feet south of the existing tunnel's outer southern wall, the new enclosed structure, track ballast/bed and concrete floor will serve to prevent proximity effects from train-related vibration to nearby buildings.

Alternative 3 was developed in direct response to community concerns about trains temporarily operating in an open trench during construction near neighborhoods. These concerns were repeated and further elaborated upon during the Draft EIS comment period as manifested in a range of air quality, safety, noise, vibration and general quality of life concerns expressed by a number of residents who live near the proposed construction area.

Moreover, although the centerline of the new Virginia Avenue Tunnel under Alternative 3 will be 25 feet south of the existing tunnel centerline or 18 and 8 feet further south than tunnels under Alternative 2 or 4, respectively, the additional design features, such as the new enclosed structure, track ballast/bed and concrete floor, will serve to prevent proximity effects from train-related vibration to nearby buildings. The vibration analysis indicates there will not be building

damage or human annoyance as a result of trains passing through the new tunnel (see Section 5.7). However, it is recognized that these concerns must continue to be addressed.

Alternative 1 was not selected as the Preferred Alternative because it would not address the Project's Purpose and Need. Additionally, ongoing train operations would continue in the current tunnel with emergency or unplanned repairs potentially required at some point in the future. The tunnel's existing and ongoing structural limitations would eventually require major rehabilitation or replacement of the tunnel.

While Alternative 2 would meet the project's Purpose and Need, it was not selected as the Preferred Alternative. Alternative 2 would employ runaround train operations in an open trench during construction (see Sections 3.7.1.1 and 3.4.2). Although the open trench, which would be completely within the construction area, would not affect the health and safety of both construction workers and nearby residents, runaround operations in an open trench raised several concerns. In addition, the new tunnel would not have a center wall separating the two sets of tracks, which as noted above, provides long-term benefits.

While Alternative 4 would meet certain elements of the Purpose and Need, it would do so to a slightly lower degree than the Preferred Alternative and Alternative 2. Alternative 4 would employ train operations during construction, but instead of its own open trench, train operations would occur within the same trench as other tunnel reconstruction activities (see Sections 3.7.1.6 and 3.4.3). This will make the construction of the tunnel far more complicated and would increase construction duration and impacts. Alternative 4 would have substantially longer construction duration (see Section 3.5.6) and hence much longer construction impacts than the other Build Alternatives. Other disadvantages of Alternative 4 in comparison to the other two Build Alternatives include a greater risk of construction delays due to train operations and/or interruptions to train operations due to construction activity, and longer construction duration within Virginia Avenue Park. For the reasons provided above, Alternative 4 was not selected as the preferred alternative

3.3 Alternative **1 -** No Build

Full consideration is given in this Final EIS to the environmental consequences of taking no action to meet Project's Purposes and Need described in Chapter 2. For the purposes of analyzing the impacts of the Project, Alternative 1, or the No Build alternative, provides a baseline condition with which to compare the consequences associated with the proposed action.

Under Alternative 1, the existing single-track tunnel would remain the same, and still in use. It would continue to be part of the mainline eastern seaboard freight rail corridor for commercial freight traffic for the Washington Metropolitan Area and other markets, such as those throughout the Mid-Atlantic and Midwest states. However, the existing Virginia Avenue Tunnel cannot accommodate double-stack intermodal container rail cars -- rail cars that vertically stack two intermodal containers and thus carry twice the load as an ordinary single-stack rail car. Intermodal containers are metal containers that move from ship, to truck, to rail, without any

adjustments needed. Under Alternative 1, modern freight rail operations, which use double-stack intermodal container freight trains, would not be possible along the increasingly busy eastern seaboard freight rail corridor. Virginia Avenue Tunnel would also remain a bottleneck to the network with its single-track configuration, and along with the inability to accommodate double-stack intermodal container trains, makes this single, relatively small segment of the I-95 corridor a limiting factor in preventing substantial improvements to the freight carrying capacity of the entire network in the Mid-Atlantic.

Alternative 1 does not include any major repairs or rehabilitation of the tunnel in the near future. However, given its 100-year plus age, the tunnel could require emergency or unplanned repairs at some point in the future to maintain commercial freight movements and protect the safety of railroad personnel and the public. Such a repair may require closure of at least part of Virginia Avenue SE in order for CSX to make the necessary repairs similar to what occurred in 1985 when a 150-foot section of the tunnel roof collapsed and had to be repaired under emergency conditions. In addition, the tunnel would eventually require rehabilitation or replacement, which may occur under an unplanned condition, and possibly at a time when the surrounding neighborhood is more fully developed with increased traffic as a result. Unplanned repair or rehabilitation would not only inconvenience the surrounding community, but has the potential to severely affect commercial freight rail operations with wide implications to regional and/or national freight movements.

3.4 Build Alternatives

This section provides detailed descriptions of the Preferred Alternative and Alternatives 2 and 4. Together, these alternatives are referred to in this Final EIS as the 'Build Alternatives'. Alternative 1 is referred to as the 'No Action' or 'No Build' Alternative. To meet the Project's Purpose and Need, each of the candidate Build Alternatives will require the demolition of the existing Virginia Avenue Tunnel and the construction of a new Virginia Avenue Tunnel that has two railroad tracks that could accommodate double-stack intermodal container freight trains. Under each of the Build Alternatives, the need to provide proper grading of the existing tracks west of the new rebuilt tunnel will mean that the vertical clearance underneath New Jersey Avenue SE will be able to accommodate double-stack intermodal container freight trains.

The three Build Alternatives were developed from three design concepts, which were among a wider range of design concepts for the Project (see Section 3.7). Following a detailed screening process, some of the concepts were eliminated from further consideration. Concepts 2, 5 and 6 were carried forward as the Project's Build Alternatives (see Section 3.7.3) and subsequent to the series of public meetings leading up to the release of the Draft EIS, additional engineering evaluation was done on the selected Build Alternatives. The notable engineering modifications of the alternatives from their original concepts were made mainly to avoid risking the structural integrity of the nearby and adjacent I-695. In order to assure that the structural integrity of I-695 and associated infrastructure remains intact, most of the existing north wall of the tunnel (the wall nearest to I-695) is expected to remain in place under all three Build Alternatives.

Regardless of Build Alternative, the total length of the rebuilt Virginia Avenue Tunnel will be extended by approximately 330 feet on the east end. The new east tunnel portal will be located northeast of the existing M Street SE / 12th Street SE T-intersection.

Due to the proximity of the new rail line configuration (two tracks) immediately west of the 2nd Street portal, the existing columns supporting the I-695 viaduct near the portal will be strengthened where applicable to meet American Railway Engineering and Maintenance-of-Way (AREMA) requirements for pier protection as well as CSX requirements for pier protection, which are more stringent than the AREMA requirements.

3.4.1 Preferred Alternative (Alternative 3) – Two New Tunnels

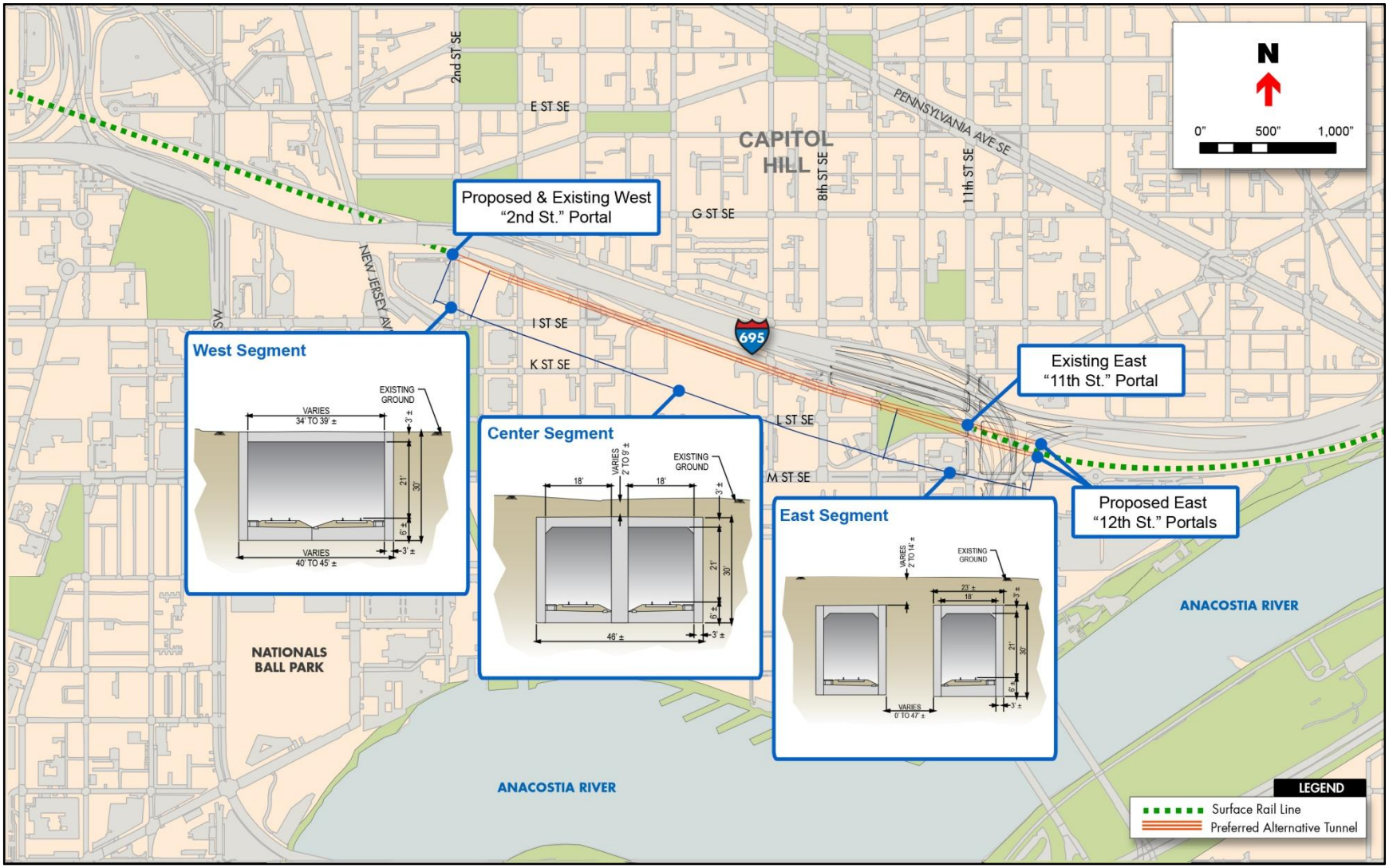
The Preferred Alternative (Alternative 3) was developed from Concept 5 (see Section 3.7.1.5). Essentially, Concept 5 avoids having to construct temporary facilities to maintain freight operations during construction. The south side single-track/double-stack tunnel will be constructed first. During construction of the south side tunnel, freight traffic will continue to use the existing Virginia Avenue Tunnel. After the new south side tunnel is completed, train traffic will cut over to this new tunnel and the existing, older tunnel will be reconstructed and converted into a new single-track/double-stack tunnel.

When developed into Alternative 3, the west portal at 2nd Street SE was changed to a single two-track portal rather than two single-track portals because additional engineering found that there is not sufficient space between the piers of the I-695 viaduct to allow separate tunnels. The double track, single tunnel is shown on Figure 3-1 within the west section, which is approximately 230 feet long and is located immediately east of the 2nd Street portal (within the Virginia Avenue SE section between 2nd and 3rd Streets SE). This modification means that during construction, freight trains will operate in a protected open trench within this west section. Within the remainder of the tunnel limits, freight trains will operate in an enclosed tunnel throughout the construction duration. The construction phasing along the west section of the tunnel is described in Section 3.5.2.

From approximately midway between 2nd and 3rd Streets to just east of 9th Streets SE under Virginia Avenue Park, the two single railroad track tunnels will be separated by a center wall (see center section in Figures 3-1 and 3-2). The centerline of the two tunnels, represented by the center wall, will be aligned approximately 25 feet south of the existing tunnel centerline. The construction phasing along this center section of the tunnel is described in Section 3.5.2.

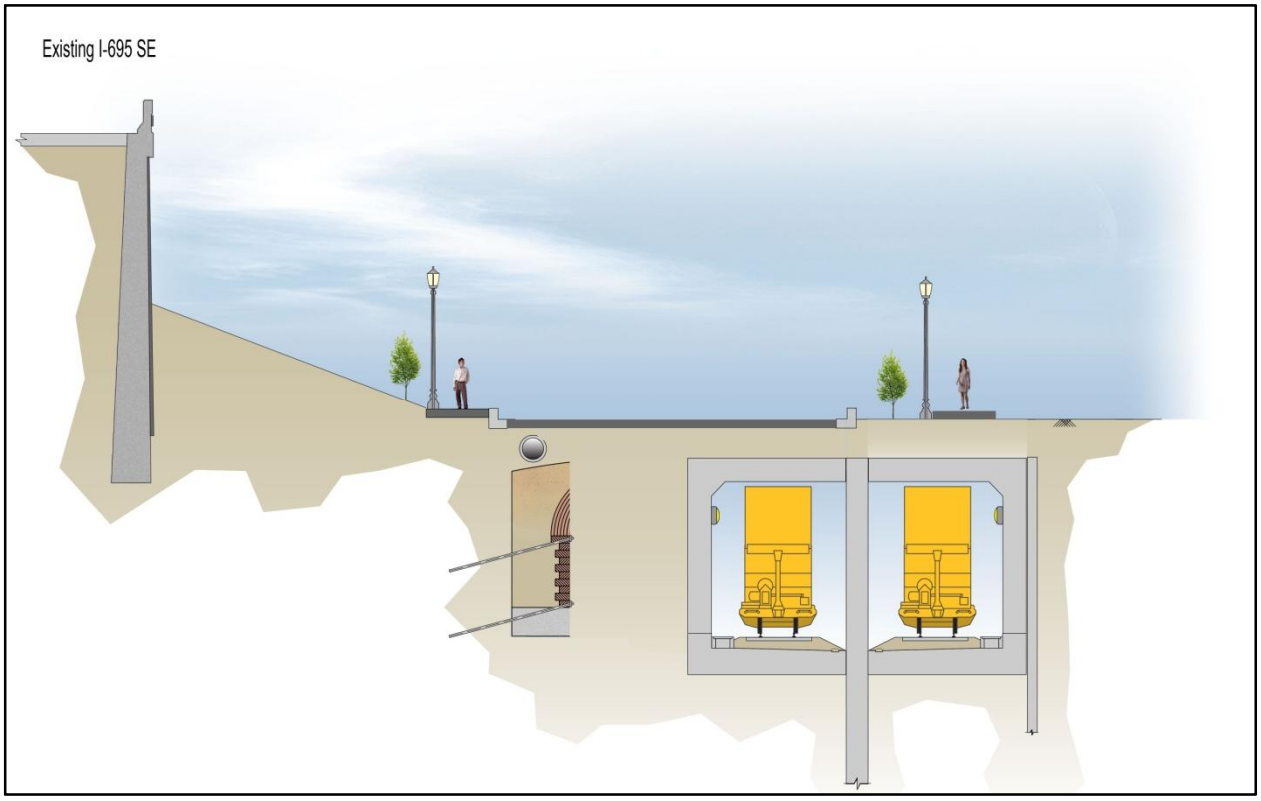
From just east of 9th Street SE to the east portal at 12th Street SE, the tunnels will be separated, resulting in two single-track tunnels (see Figure 3-1). This is due to the locations of new concrete columns associated with the rebuilt 11th Street Bridges. The existing clearance available between these columns does not provide enough space to build a new double track single tunnel box adjacent to the existing tunnel without requiring demolition of the existing tunnel. The existing tunnel needs to remain in place to maintain train operations until construction of the new south tunnel is completed. The separation between the tunnels will be widest at the east tunnel portal where it will be approximately 65 feet centerline to centerline. Therefore, the east

Figure 3-1
Typical Sections of the Preferred Alternative by Section



tunnel portal, at completion, will consist of two single-track tunnel openings and will require more space than under Alternatives 2 and 4.

Figure 3-2
Cross Section View of Post-Construction Preferred Alternative
between 3rd and 9th Streets SE



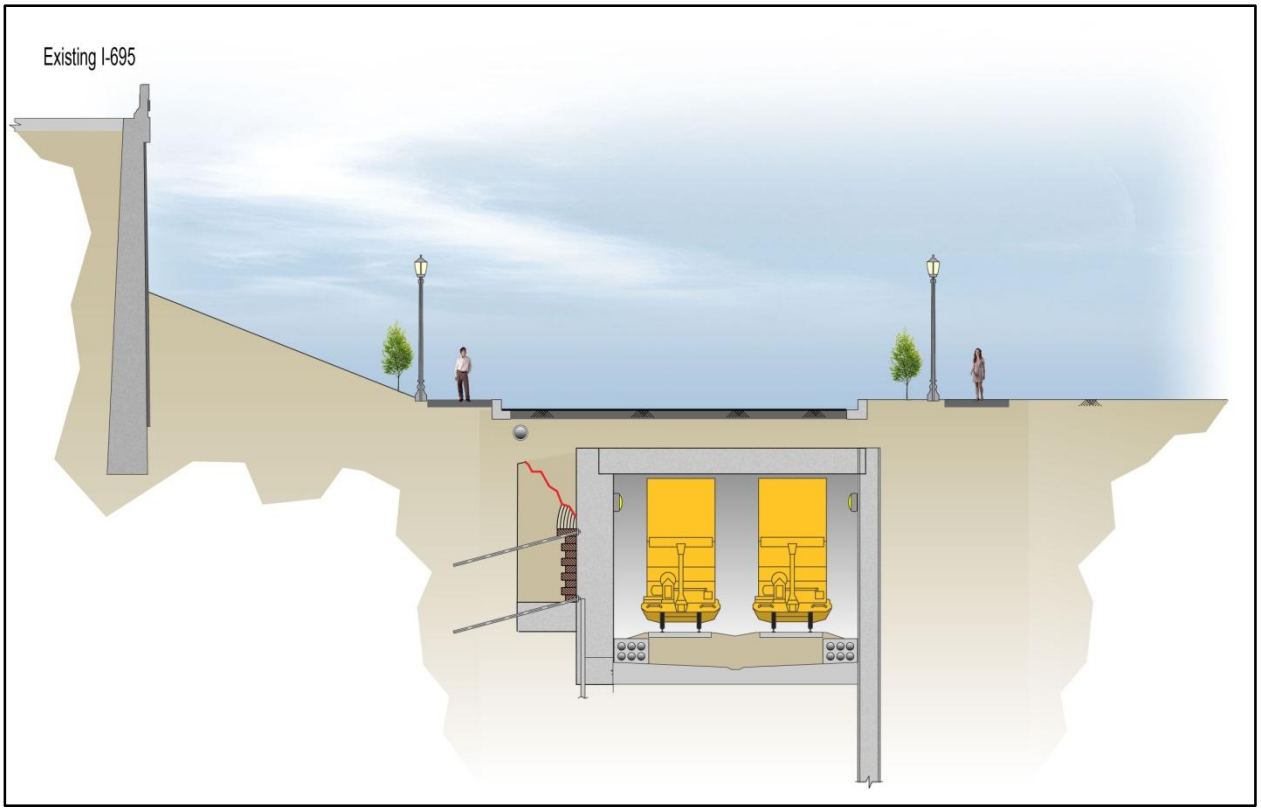
3.4.2 Alternative 2 - Rebuilt Tunnel / Temporary Runaround Track

The Alternative 2 was developed from Concept 2 (see Section 3.7.1.1). Concept 2 maintains freight traffic during construction of the new tunnel by providing a temporary runaround track placed inside a protected trench constructed immediately south of the existing tunnel alignment. While train traffic is shifted to the runaround track, the existing tunnel is demolished and in its place, a new double track tunnel would be constructed. Upon completion of the rebuilt Virginia Avenue Tunnel under Alternative 2, the runaround track would be removed and the protected trench would be backfilled.

When developed into Alternative 2, the temporary runaround track was re-aligned starting just west of Virginia Avenue Park due to new columns associated with the rebuilt 11th Street Bridges. The alignment for the temporary track along this segment would the same as the south side tunnel under the Preferred Alternative. In addition, the centerline of the rebuilt two-track tunnel

would be aligned approximately seven feet south of the existing tunnel centerline. The centerline of the existing tunnel is located approximately at the middle of the existing rails. Concept 2 showed a centerline as being the same as the existing tunnel. The centerline of the rebuilt tunnel under Alternative 2 would be located half way between the two sets of rails. The shift is smallest at the west portal. It becomes approximately 10 feet roughly east of 3rd Street SE. A typical cross section of post-construction Virginia Avenue Tunnel under Alternative 2 between 3rd Street and 9th Street SE is shown at Figure 3-3. Although the surface above the tunnel would vary (e.g., different Virginia Avenue SE streetscapes, restored Virginia Avenue Park, etc.), the cross section of the rebuilt tunnel would be the same from portal to portal, which is unlike the new tunnel under the Preferred Alternative.

Figure 3-3
Cross Section View of Post-Construction Alternative 2
between 3rd and 9th Streets SE



3.4.3 Alternative 4 - New Partitioned Tunnel / Online Rebuild

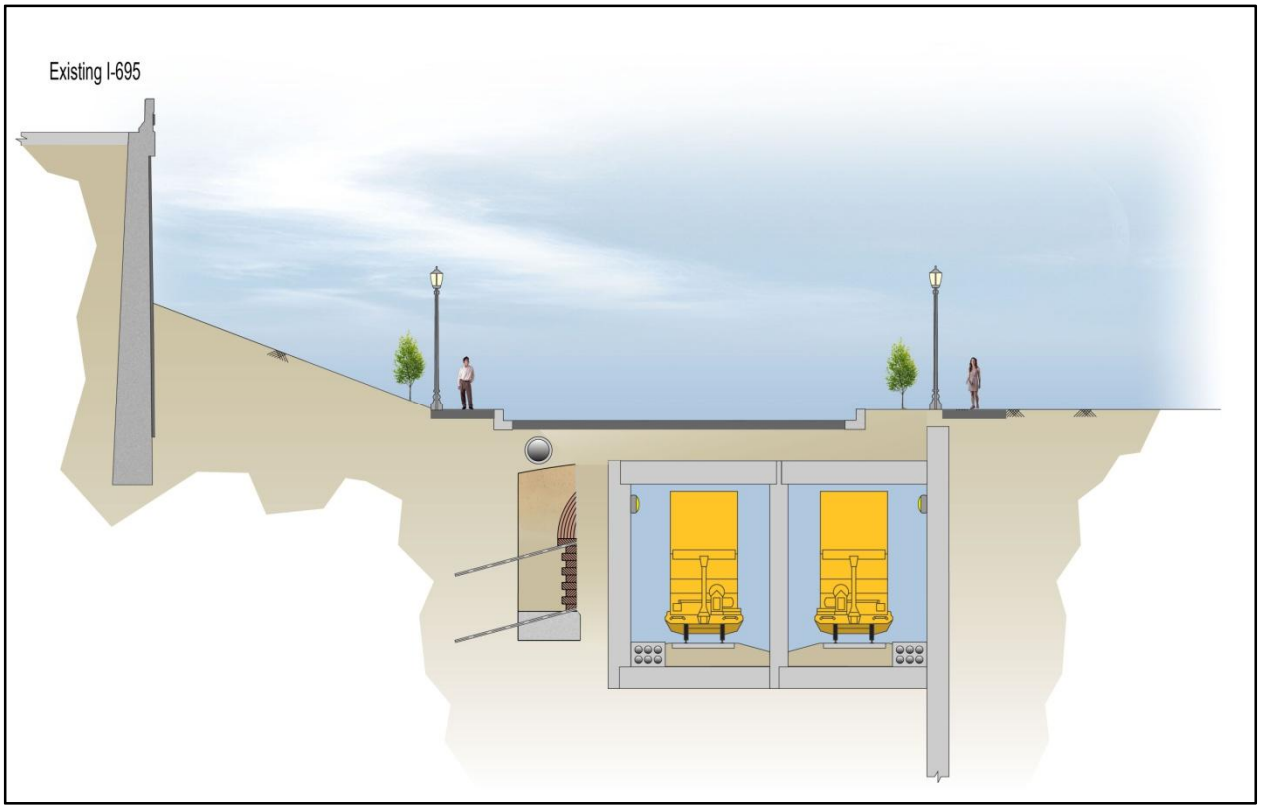
The Alternative 4 was developed from Concept 6 (see Section 3.7.1.6). Concept 6 would involve construction of a new permanent tunnel in short segments while maintaining freight rail traffic in one half of the tunnel or construction trench at all times. Demolition of the old tunnel and construction of the new tunnel would occur in numerous stages with regularly shifting track

alignments and all work occurring in very close proximity to live train traffic, allowing trains to continue to use the tunnel though the construction work area on a daily basis.

When developed into Alternative 4, additional engineering analysis showed that a larger trench would be needed for both maintaining freight rail operations and rebuilding the tunnel. Unlike the other Build Alternatives, Alternative 4 would require removal of the north tunnel wall along the east end of the tunnel in order for this alignment to fit within modifications of the 11th Street Bridges currently being done by DDOT.

From the west portal to the general vicinity of 3rd Street SE, the rebuilt Virginia Avenue Tunnel under Alternative 4 would be the same as under Alternative 2. However, the additional engineering analysis changed the finished tunnel between 3rd Street to the east portal from a single two-track tunnel to a tunnel that would consist of two single-track tunnels separated by a center partition wall (see Figure 3-4). Also, the centerline of the rebuilt tunnel along most of the tunnel length, represented by the center partition wall, would be aligned approximately 17 feet south of the existing tunnel centerline.

Figure 3-4
Cross Section View of Post-Construction Alternative 4
between 3rd and 9th Streets SE



3.5 Construction Period Conditions

Regardless of the Build Alternative, the construction-period conditions will be the same or be very similar. The construction-period description under the Preferred Alternative or the other two Build Alternatives includes:

- Limits of disturbance, which includes the construction staging and stockpiling areas, and identifying streets that will be closed during construction;
- Phasing plan, which describes the general construction methods and activities for each Build Alternative;
- Access points and haul routes for construction vehicles;
- Maintenance of traffic (MOT) plan that will indicate how public traffic will be accommodated with the planned street closures and how properties located along or near street closures will keep their public access;
- Safety and security measures;
- Estimated duration of construction; and
- Estimated construction costs.

3.5.1 Limits of Disturbance

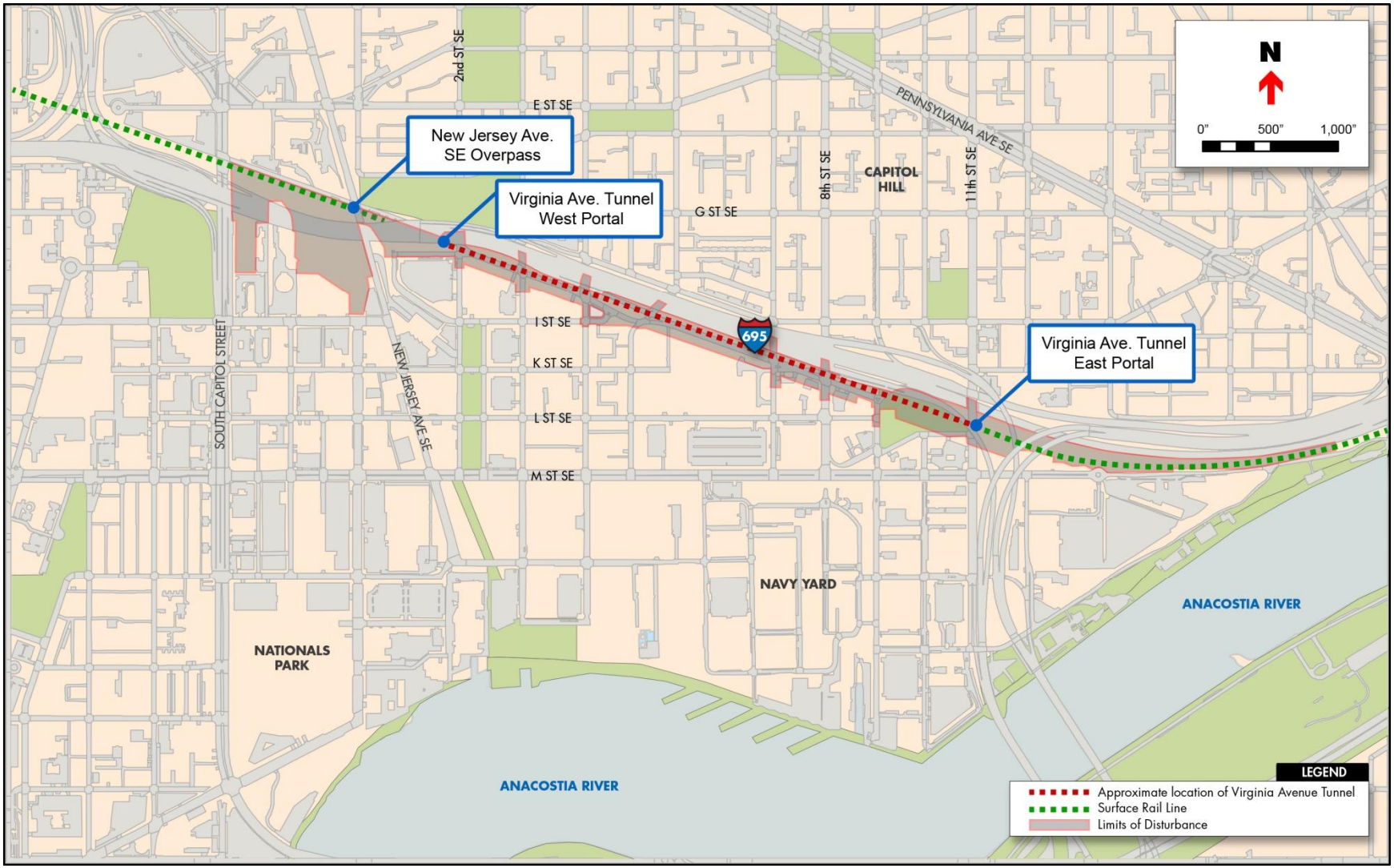
The Limits of Disturbance (LOD), which is depicted in Figure 3-5, means all areas where construction will take place, including areas needed for staging, materials stockpiling, utility relocations, and temporary freight train operations. More detailed depictions of the proposed LOD for the Build Alternatives are provided in Appendix C. The LOD basically represents the areas affected by construction and will be restricted from the general public, except Virginia Avenue's cross streets, which will remain open for public passage throughout construction by means of temporary bridges (see Sections 3.5.2 and 3.5.4). Other areas outside of the LOD will be subject to minor construction work associated with MOT detours, such as re-striping, removing or modifying parking meters, modifying curb lines at intersections for turning movements, modifying existing traffic signal systems including adding temporary signals, widening roadway pavement as required, and resurfacing affected areas. These areas are shown in the depictions provided in Appendix C.

The Preferred Alternative and Alternative 2 have identical LODs because the alignments of the temporary runaround track/trench under Alternative 2 and the new south side single-track tunnel under the Preferred Alternative are the same.

The Preferred Alternative or Alternative 2's LOD will encompass the following areas, and involve various construction activities as noted below:

- CSX-owned rail right-of-way between the South Capitol Street Overpass and the Virginia Avenue Tunnel west portal. For the Preferred Alternative or Alternative 2, this area will be used to convert the single-track configuration to a double-track configuration immediately west of the tunnel portal at 2nd Street SE, and to provide proper grading of the existing tracks west of the new rebuilt tunnel.

Figure 3-5
Limits of Disturbance during Construction under the Preferred Alternative or Alternative 2



- Virginia Avenue SE (eastbound) public right-of-way between 2nd and 9th Streets SE, which will be needed to construct:
  - Temporary runaround track/ protected trench and rebuilt two-track Virginia Avenue Tunnel (Alternative 2), or
  - Partitioned single-track tunnels (Preferred Alternative or Alternative 4).

- Virginia Avenue Park between 9th Street and 11th Street SE: Same as Virginia Avenue SE (eastbound) right-of-way. A portion of the park will be temporarily used for the LOD. This will not include the portion of the park used as a community garden and the picnic benches located along Potomac Avenue SE. For the Preferred Alternative or Alternative 2, the LOD will be wider from just west of Virginia Avenue Park to the 11th Street Bridge right-of-way than under Alternative 4. The alignment of the temporary runaround track (Alternative 2) and the south side permanent single-track tunnel (Preferred Alternative) would bend slightly south to avoid new columns installed for the current 11th Street Bridge Project. This widening will require a section of L Street SE adjacent to the park to be included in the LOD. The park and the affected section of L Street SE will be restored to at least their pre-construction condition at the end of construction.

- Area between Virginia Avenue Park and 11th Street Bridge public right-of-way between I-695 and Potomac Avenue SE: Same as Virginia Avenue SE (eastbound) right-of-way.

- CSX-owned rail right-of-way and DDOT public space between the east tunnel portal and approximately 1700 feet east: For all Build Alternatives, this area will be used to convert the single-track configuration to a two-track configuration immediately east of the tunnel portal just west of 12th Street SE, and to provide for proper grading of the existing tracks east of the tunnel to accommodate the new elevation of the rebuilt tunnel. Under the Preferred Alternative, the two tracks will be split by approximately 75 feet at the two tunnel portals. These tracks will transition back to the existing side-by-side tracks several hundred feet east of the portals, but within the eastern limits noted above.

- Public right-of-way directly beneath the I-695 structure between Garfield Park and Virginia Avenue SE in the vicinity of 2nd Street SE: This area is needed to relocate a large sewer line (Tiber Creek & New Jersey Avenue High Level Intercepting Sewer) under all three Build Alternatives.

- Portions of 2nd to 9th Streets SE public right-of-way at their intersections with Virginia Avenue SE: These areas will be used to maintain surface traffic during construction, including the installation of temporary bridges to maintain cross-street traffic. See Section 3.5.4 for further information.

- L Street between 8th and 9th Streets SE: This area will be used to maintain surface traffic during construction, but no construction will be needed other than installation of

temporary traffic signals and re-striping for two-way operations. This area is not considered part of the LOD. See Section 3.5.4 for further information.

- Approximately 40 feet wide section of U.S. Marine Corps property between Capper Senior Homes and 7th Street SE: This area will be used to construct the temporary runaround track/ protected trench (Alternative 2), or the south side single-track tunnel (Preferred Alternative). The Marine Corps property may also be used to relocate certain utilities affected by the Project. The property will be restored to at least the pre-construction condition at the end of construction.

- Jersey Rail Yard, a CSX-owned property located directly south of the CSX rail right-of-way between New Jersey Avenue SE and South Capitol Street: This area will be used for construction staging, vehicle and equipment storage, worker parking, contractor offices, for the temporary materials stockpiles and a community outreach office.

The LOD for Alternative 4 would be the same as the LOD for the Preferred Alternative or Alternative 2 except along the south edge of Virginia Avenue between 2nd and 11th Streets SE portals, and in Virginia Avenue Park. The Alternative 4's LOD along Virginia Avenue SE would be a few feet narrower and be slightly smaller in the park.

While it is possible that the LOD may be adjusted later during final design or construction due to new information, DDOT will be informed of any adjustment that increases the size of the LOD. Most of the LOD is constrained, especially along Virginia Avenue SE and the CSX right-of-way. The LOD does not include private property, nor will it be expanded into private property during final design.

3.5.2 Phasing

Construction of the Project will be complex. This section provides an explanation of the major steps needed to complete the construction for each of the Build Alternatives, which are illustrated in Tables 3-1 through 3-3. It should be noted that the cross sectional views of the Preferred Alternative and Alternatives 2 and 4 shown on these tables are different than what are described in Sections 2.2.1.1, 2.2.1.5 and 2.2.1.6 for Concepts 2 (Alternative 2), 5 (Preferred Alternative) and 6 (Alternative 4), respectively. This is due to additional engineering design work that was performed specifically on these alternatives. Although completion of final design of the Project is unlikely to change the steps described in Tables 3-1 through 3-3, there may be situations unknown at this time in which deviations from these steps may be necessary.

Table 3-2 shows the construction phasing within the center segment of the Preferred Alternative, which encompasses the majority of the tunnel length (see Figure 3-5). As described in the introduction of this section, the Preferred Alternative's tunnel within the west and east segments will be different from the tunnel in the center segment. Although the east segment tunnels will be spaced apart, the construction phasing as shown in Table 3-2 will be the same, in particular train operations will be within an enclosed tunnel at all times. However, within the 230-foot long west segment, trains will operate within an open trench throughout the majority

Table 3-1
Alternative 2 Construction Phasing

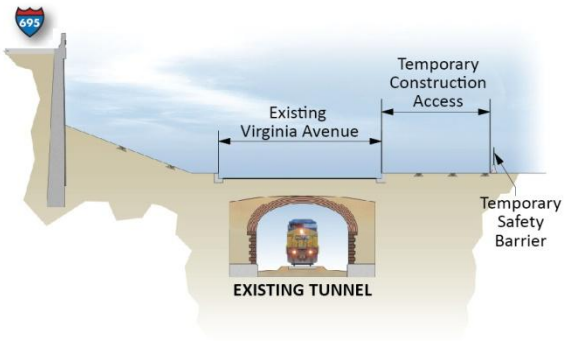
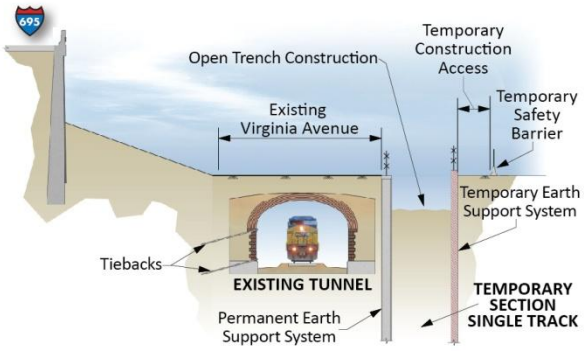
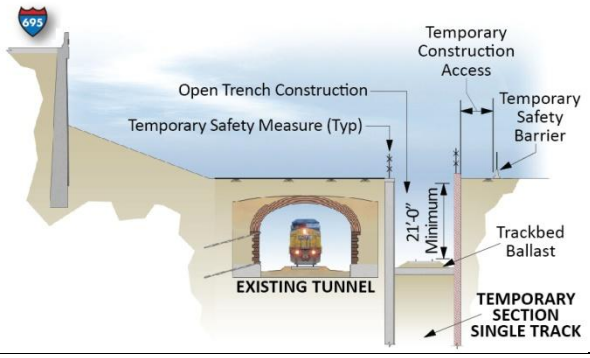
Step	Major Activities
Step 1 	• Set up the maintenance of traffic (MOT) measures • Partially close Virginia Avenue SE to traffic • Initiate utility relocations (concurrent with other activities) • Remove roadway asphalt and other hard surfaces. • Erect temporary bridge crossings at intersections over temporary runaround trench location • Install safety barriers around construction site • Install temporary bridge crossings over runaround trench
Step 2 	• Install a temporary earth support system on the south side of the runaround trench • Install a permanent earth support system on the north side of the runaround trench (this would form the south side wall of the rebuilt tunnel) • Begin excavation of the runaround trench from the top (open trench construction) • Install tiebacks in the existing tunnel's north side wall
Step 3 	• Complete trench excavation • Install track bed ballast, temporary tracks and other train operations signals and communication equipment

Table 3-1 (Continued)
Alternative 2 Construction Phasing

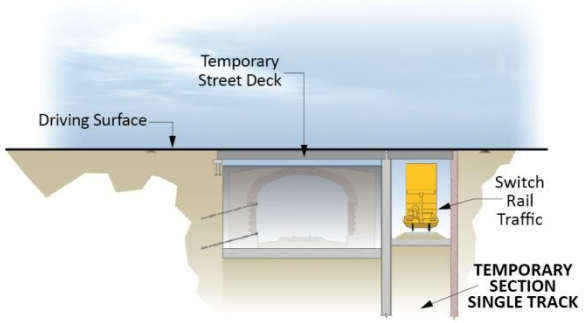
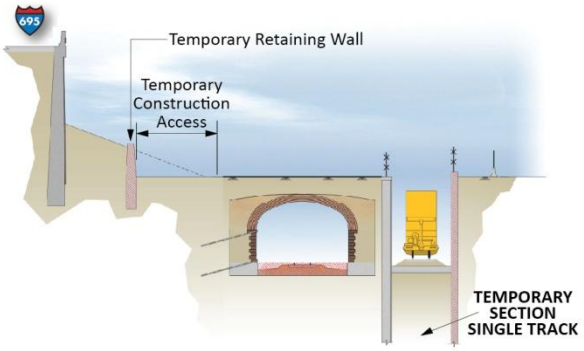
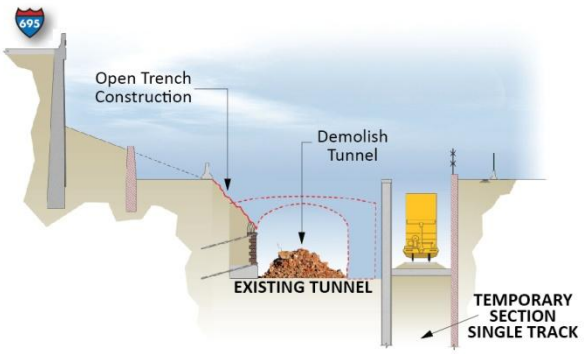
Step	Major Activities
Step 4 	• Install temporary bridge crossings over existing tunnel alignment • Install track cut-over at each end of the tunnel to switch train route from the existing tunnel to the temporary runaround trench • Begin operating trains through the temporary runaround trench and remove all train operations from existing tunnel
Step 5 	• Partially cut toe of embankment slope on the north side of Virginia Avenue SE and install temporary retain wall • Provide construction access on the north side of the existing tunnel
Step 6 	• Demolish the tunnel (roof, south side wall, utilities, track work) from the top (open trench construction); north side wall remain

Table 3-1 (Continued)
Alternative 2 Construction Phasing

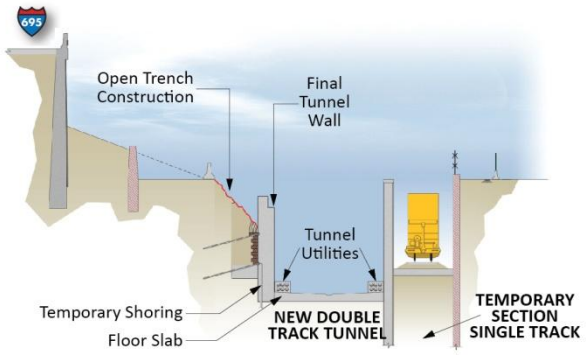
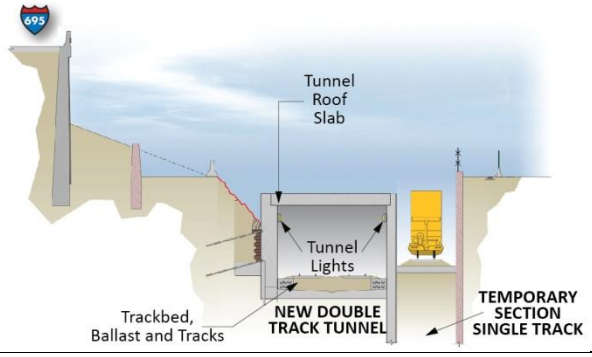
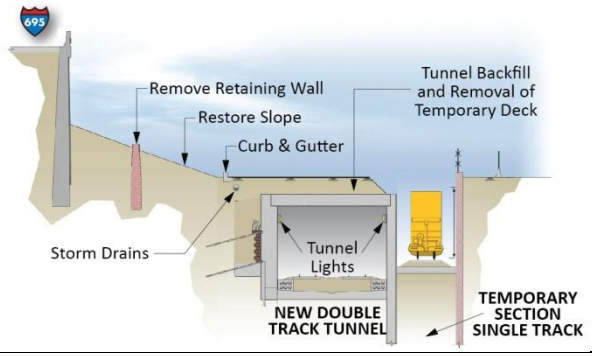
Step	Major Activities
Step 7 	• Install temporary shoring along north side wall • Complete excavation of the new tunnel floor • Install concrete floor • Install new north side wall (inside old north side wall) • Begin utility installations
Step 8 	• Install new track bed and ballast • Install tunnel roof slab • Install new tracks and related equipment (e.g., lighting)
Step 9 	• Backfill on top of tunnel roof • Remove embankment retaining wall and restore slope on the north side of Virginia Avenue SE • Remove temporary street decks over the rebuilt tunnel • Install storm drains • Begin construction of curbs and gutters

Table 3-1 (Continued)
Alternative 2 Construction Phasing

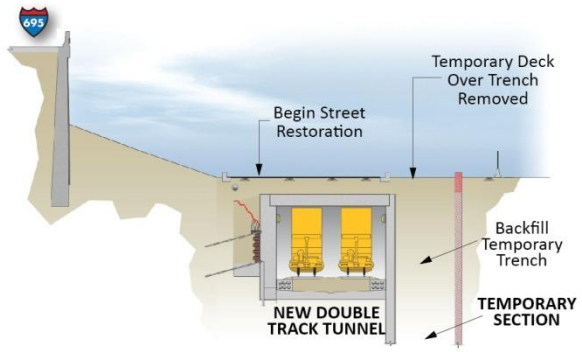
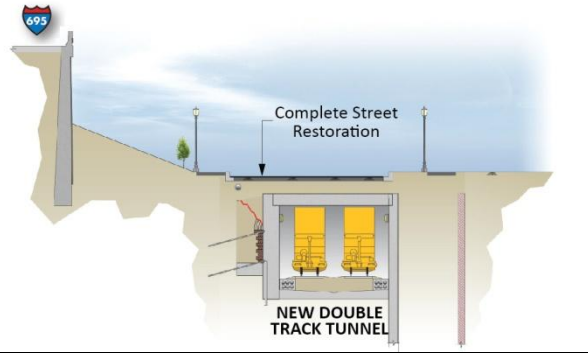
Step	Major Activities
Step 10 	• Move trains to rebuilt tunnel • Remove temporary track work in the runaround trench • Backfill runaround trench and remove upper portion of temporary earth support on the south side of the trench (the bottom portion would remain) • Remove temporary street deck over temporary trench • Begin street restoration • Continue construction of storm drains, curbs and gutters
Step 11 	• Complete roadway surface restoration (street paving, sidewalks, lighting, striping etc.) and landscaping • Remove all remaining temporary barriers • Open Virginia Avenue SE to traffic

Table 3-2
Preferred Alternative Construction Phasing

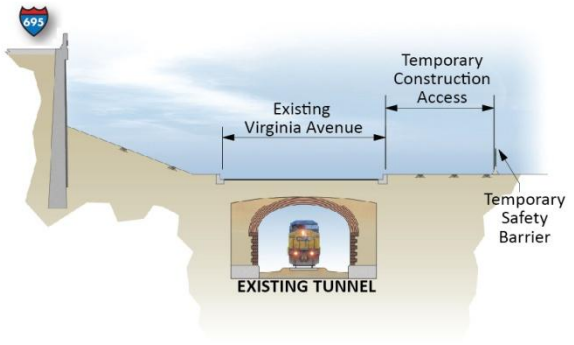
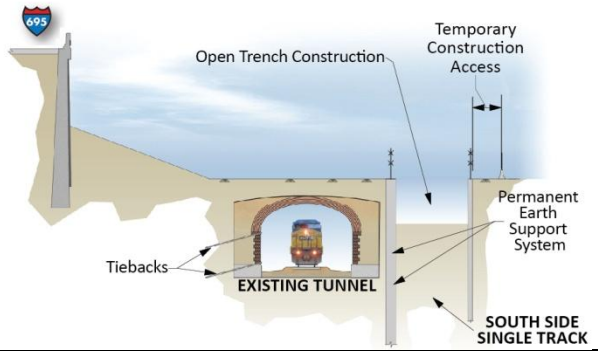
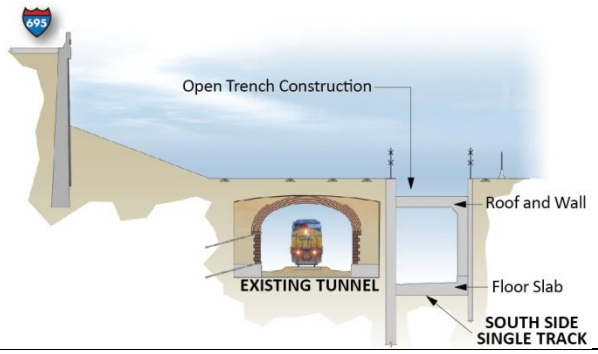
Step	Major Activities
Step 1 	• Set up the maintenance of traffic (MOT) measures • Partially close Virginia Avenue SE to traffic • Initiate utility relocations (concurrent with other activities) • Remove roadway asphalt and other hard surfaces. • Erect temporary bridge crossings at intersections over south side tunnel alignment • Install safety barriers around construction site • Install temporary bridge crossings over excavation of new south side tunnel Estimated Duration: 5 to 6 Months.
Step 2 	• Install permanent earth support systems on both the north and south side of the south side tunnel alignment (north side support system would form the tunnel wall for both the south and north tunnels) • Begin excavation for the south side tunnel from the top (open trench construction) • Install tiebacks in the existing tunnel's north side wall Estimated Duration: 3 to 4 Months.
Step 3 	• Complete excavation needed for the south side tunnel • Install concrete floor slab for the south side tunnel • Install south side tunnel's roof and south wall Estimated Duration: 6 to 8 Months.

Table 3-2 (Continued)
Preferred Alternative Construction Phasing

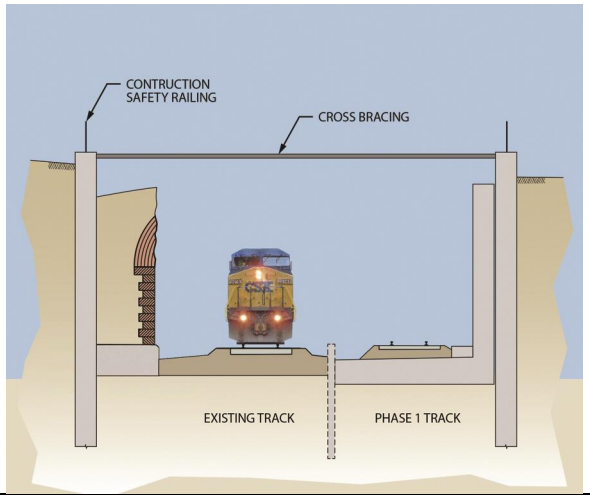
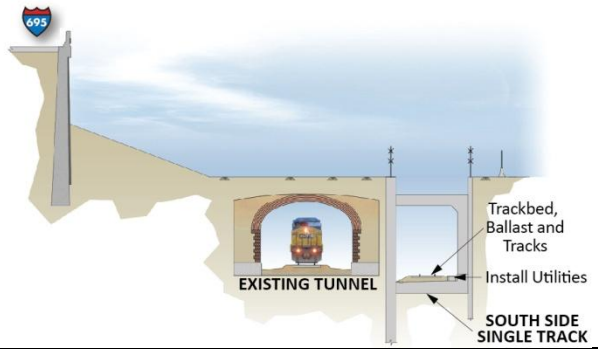
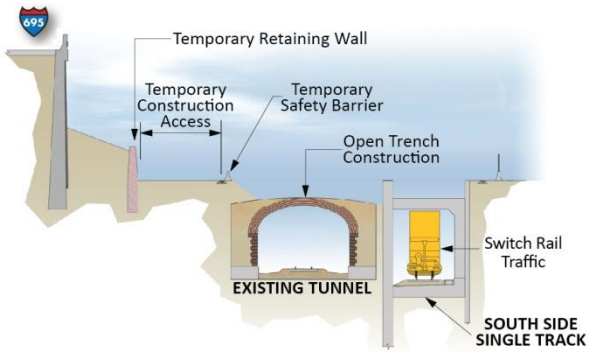
Step	Major Activities
Step 3A (West Segment) 	• For west segment, trains will continue operating on the existing tracks while the portion of tunnel with the new south side track is being constructed
Step 4 	• Install utilities in the tunnel • Install track bed ballast, tracks and other train operations signals and communication equipment for the south side tunnel Estimated Duration: 1 to 2 Months.
Step 5 (Between Intersections) 	• Install track cut-over from existing tunnel to south side at each end of the tunnel • Begin to operate trains through the south side tunnel, and remove all train operations from existing tunnel • Partially cut toe of embankment slope on the north side of Virginia Avenue SE and install temporary retain wall • Provide construction access on the north side of the existing tunnel • Begin excavation over the existing tunnel • Install temporary bridge crossings over existing tunnel alignment at intersections Estimated Duration: 1 to 2 Months.

Table 3-2 (Continued)
Preferred Alternative Construction Phasing

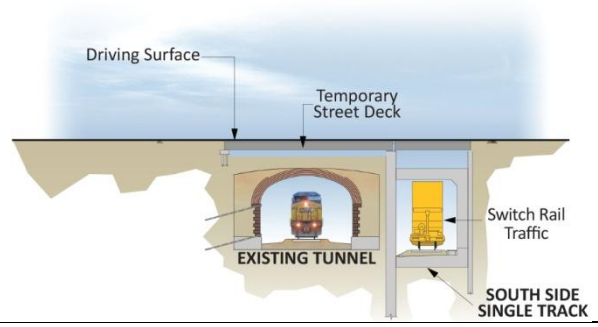
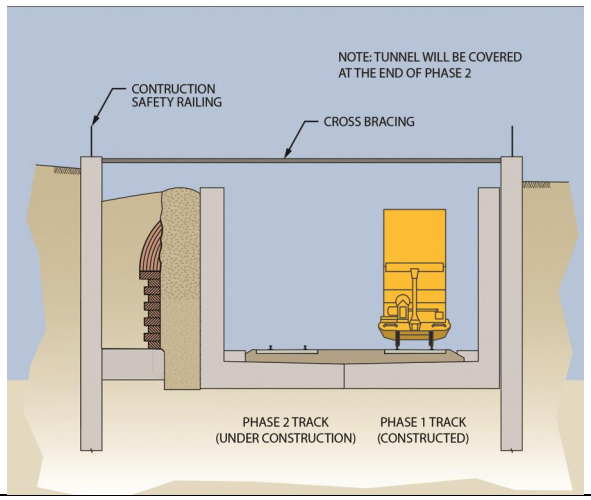
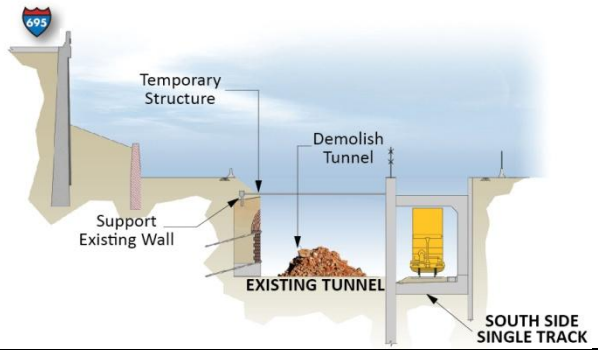
Step	Major Activities
Step 5 (At Intersections) 	
Step 5A (West Segment) 	• At west segment, train traffic will switch to the south side track while the north side of the tunnel and track are being constructed
Step 6 	• Install temporary struts between existing wall and new wall • Demolish the tunnel (roof, south side wall, utilities, track work) from the top (open trench construction); north side wall remain Estimated Duration: 2 to 3 Months.

Table 3-2 (Continued)
Preferred Alternative Construction Phasing

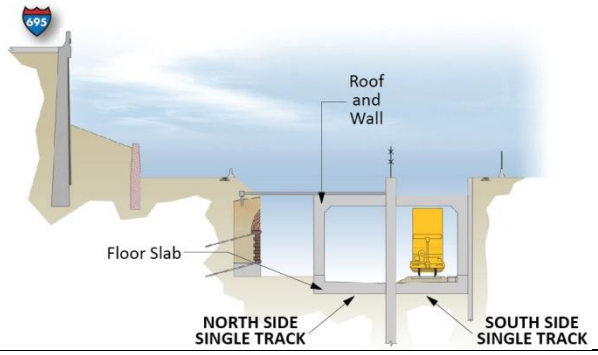
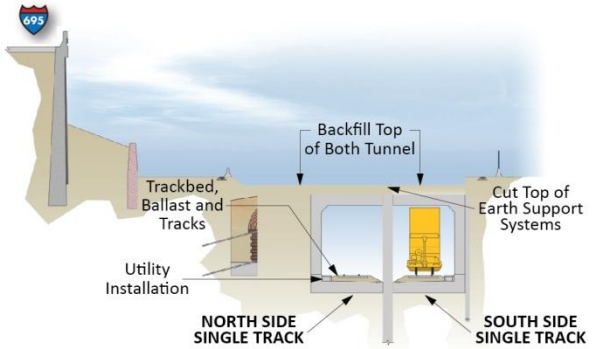
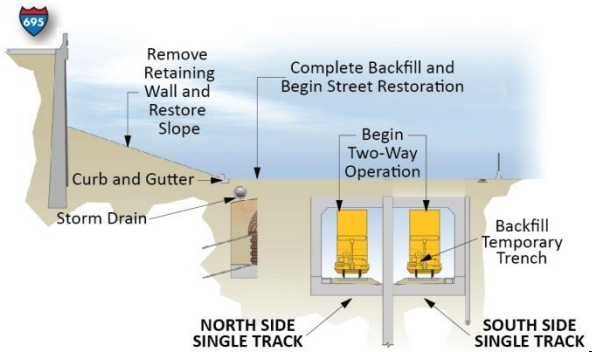
Step	Major Activities
Step 7 	• Install concrete floor slab for the north side tunnel • Install north side tunnel's roof and north wall Estimated Duration: 6 to 8 Months.
Step 8 	• Install track bed ballast, tracks and other train operational signals and communication equipment for the north side tunnel • Complete utility installation in rebuilt tunnel • Remove the temporary struts • Backfill on top of both tunnels' roof • Remove temporary decks over the both tunnels • Cut top of the earth support systems Estimated Duration: 1 to 2 Months.
Step 9 	• Provide track connections for the north side tunnel at both ends of the tunnel portal • Begin two-way train operations utilizing both tunnels • Complete backfill over both tunnels • Remove embankment retaining wall and restore slope on the north side of Virginia Avenue SE • Install storm drains • Begin construction of curbs and gutters • Begin street utility restoration Estimated Duration: 2 to 3 Months.

Table 3-2 (Continued)
Preferred Alternative Construction Phasing

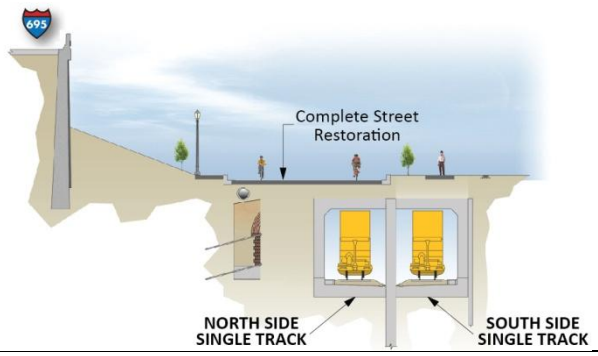
Step	Major Activities
Step 10 	• Complete roadway surface restoration (street paving, sidewalks, lighting, striping etc.) and landscaping • Continue construction of storm drains, curbs and gutters • Remove all remaining temporary barriers • Open Virginia Avenue SE to traffic Estimated Duration: 3 to 4 Months.

Table 3-3
Alternative 4 Construction Phasing

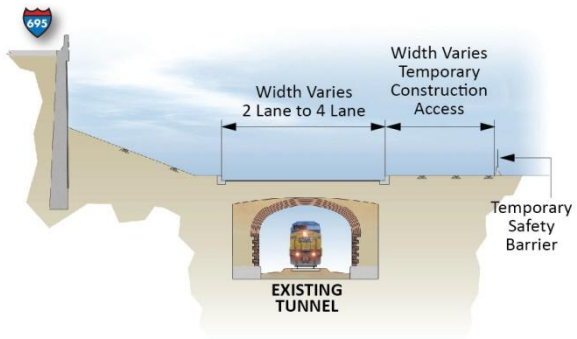
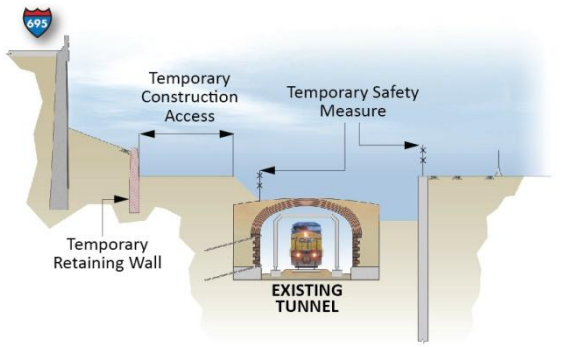
Step	Major Activities
Step 1 	• Set up the maintenance of traffic (MOT) measures • Close Virginia Avenue SE to traffic (section between 4th and 9th Streets SE will remain open in the first several months of construction) • Initiate utility relocations (concurrent with other activities) • Remove roadway asphalt and other hard surfaces. • Erect temporary bridge crossings at intersections • Install safety barriers around construction site
Step 2 	• Install permanent earth support systems on the south side of the existing tunnel alignment • Install temporary anti-fall barrier over existing rail line in the tunnel • Establish temporary construction access on the south side of existing tunnel • Install temporary bridge crossings over trench
Step 3 	• Partially cut toe of embankment slope on the north side of Virginia Avenue SE and install temporary retain wall • Provide construction access on the north side of the existing tunnel • Install tiebacks in the existing tunnel's north side wall • Initiate excavation over the existing tunnel and south up to the earth support system

Table 3-3 (Continued)
Alternative 4 Construction Phasing

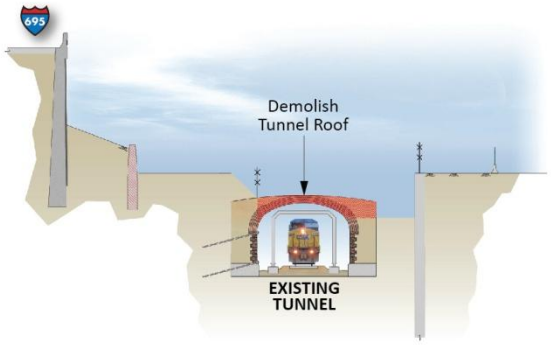
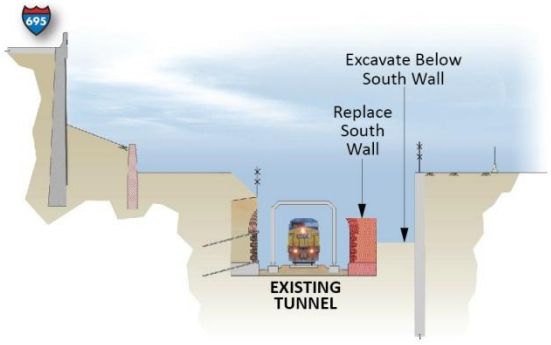
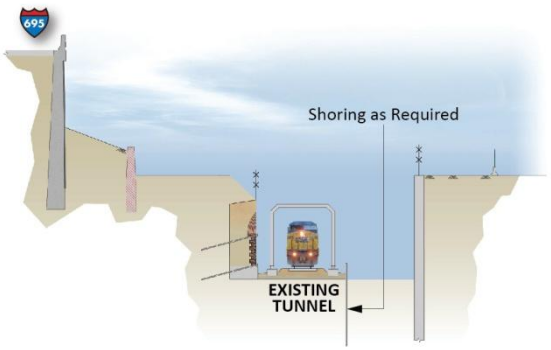
Step	Major Activities
Step 4 	• Demolish tunnel roof (open trench construction)
Step 5 	• Remove south wall of existing tunnel • Excavate below the south wall
Step 6 	• Install track shoring as required to protect the integrity of the existing track bed ballast

Table 3-3 (Continued)
Alternative 4 Construction Phasing

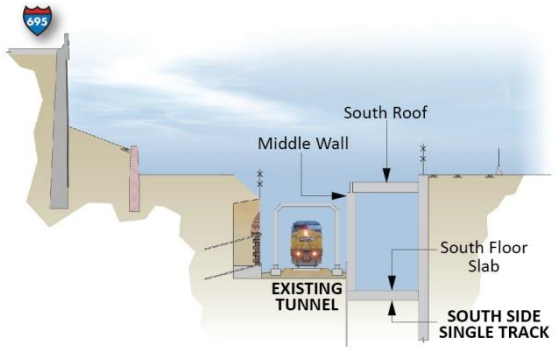
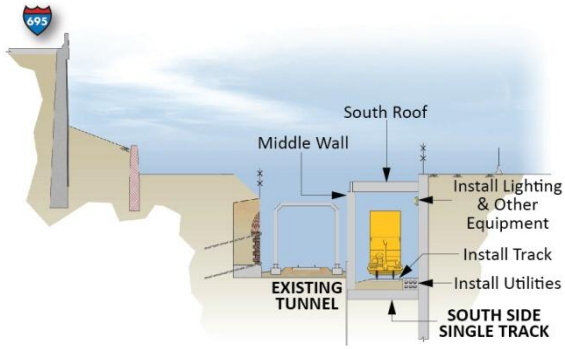
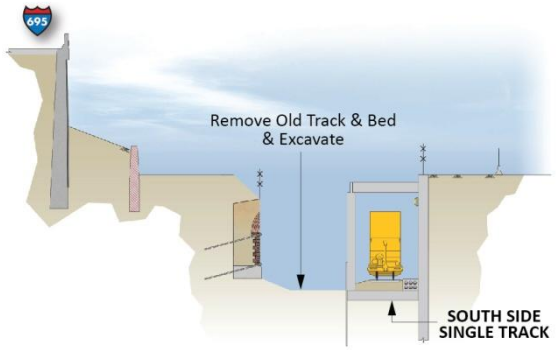
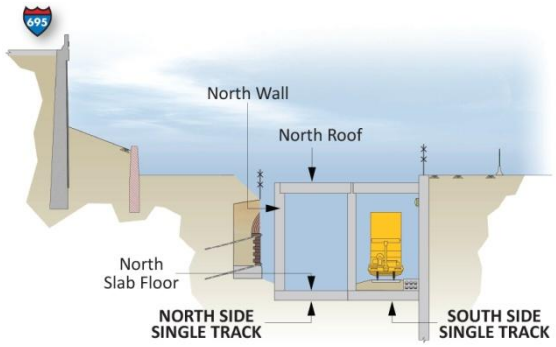
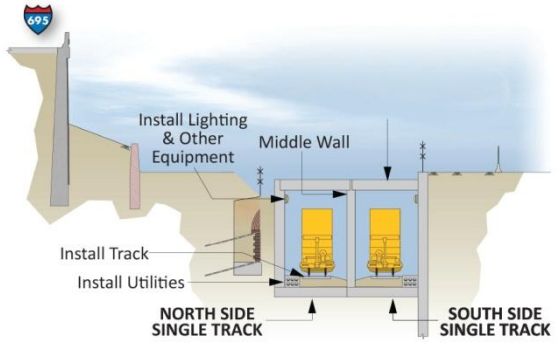
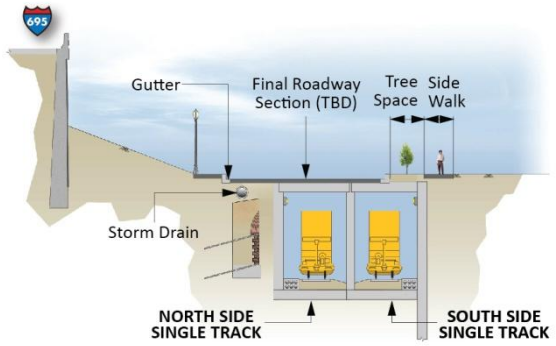
Step	Major Activities
Step 7 	• Construct south side tunnel floor • Construct middle wall and roof for the south side single-track tunnel
Step 8 	• Install track bed ballast, tracks and other train operations signals and communication equipment for the south side tunnel • Install utilities in the south side tunnel • Install track cut-over from existing tunnel to south side at each end of the tunnel • Begin to operate trains through the south side tunnel, and remove all train operations from existing tunnel
Step 9 	• Remove old rails and track bed ballast • Excavate down to a depth matching the depth of the new south side single railroad track tunnel

Table 3-3 (Continued)
Alternative 4 Construction Phasing

Step	Major Activities
Step 10 	• Construct north side tunnel floor • Construct north side wall and roof for the north side single-track tunnel
Step 11 	• Install track bed ballast, tracks and other train operational signals and communication equipment for the north side tunnel • Complete utility installation in the rebuilt tunnel • Provide track connections for the north side tunnel at both ends of the tunnel portal • Begin two-way train operations utilizing both tunnels
Step 12 	• Backfill on top of both tunnels' roof • Remove temporary decks over the both tunnels • Remove embankment retaining wall and restore slope on the north side of Virginia Avenue SE • Install storm drains • Complete roadway surface restoration (street paving, sidewalks, lighting, striping etc.) and landscaping Continue construction of storm drains, curbs and gutters • Remove all remaining temporary barriers • Open Virginia Avenue SE to traffic

of the construction period. The phasing of train operations within the west segment is shown in Table 3-2. Plan views of the west end and other segments in the construction area are provided in Appendices C and M.

Construction of the Project will be accomplished in segments, with some activities being potentially more noticeable than others. Although construction will proceed in phases or segments, the LOD, as described in Section 3.5.1, will remain secured throughout most of construction.

3.5.3 Access and Haul Routes

In addition to the LOD, construction area access points for construction vehicles and designated haul routes were identified and are shown in Figure 3-6. The access points apply to all three Build Alternatives. The haul routes correspond to designated construction area access points at the following locations that match the numbered spots shown in Figure 3-6:

1. South Capitol Street from the Jersey Rail Yard
2. I Street SE from the Jersey Rail Yard
3. 1st Street SE and H Street SE
4. 2nd Street SE at Virginia Avenue SE
5. 3rd Street at Virginia Avenue SE
6. 4th Street at Virginia Avenue SE
7. I Street SE at Virginia Avenue SE
8. 5th and 6th Street SE at Virginia Avenue SE
9. 7th Street SE at Virginia Avenue SE
10. 8th Street SE at Virginia Avenue SE
11. 9th Street SE at Virginia Avenue SE
12. L Street SE between 10th and 11th Streets SE
13. L Street SE and 11th Street SE
14. M Street SE adjacent to the CSX rail right-of-way

The haul trucks will enter or exit the construction area from I-395, South Capitol Street and the 11th Street Bridge (I-695). The latter two roadways provide connections to I-295. I-395 connections will be made through South Capitol Street and I and M Streets SE, in addition to I-695 ramps at 3rd and 6th Streets SE. South Capitol Street connections will be made through I and M Streets SE. 11th Street Bridge connections will be made through M Street SE.

At any given day, haul routes noted on Figure 3-6 could be modified due to a number of reasons, such as road closures and vehicle accidents. Any permanent changes to these designated haul routes will be coordinated with DDOT.

3.5.4 Maintenance of Traffic and Property Access

As described in Section 3.5.1, the Project's construction LOD will include Virginia Avenue SE from 2nd to 11th Streets SE. Within these limits, Virginia Avenue SE will be closed to traffic throughout most of the construction duration. In order to maintain the same level of

Figure 3-6
Construction Haul Routes and Access Points

transportation connectivity during construction, (including ensuring that every property with street access maintains alternative access), a maintenance of traffic (MOT) plan was developed. This section contains a summary of the MOT. Certain properties currently have direct driveway access from Virginia Avenue SE within the LOD. Special provisions will be made during construction to keep access open on these properties for owners, users, and fire and emergency response vehicles.

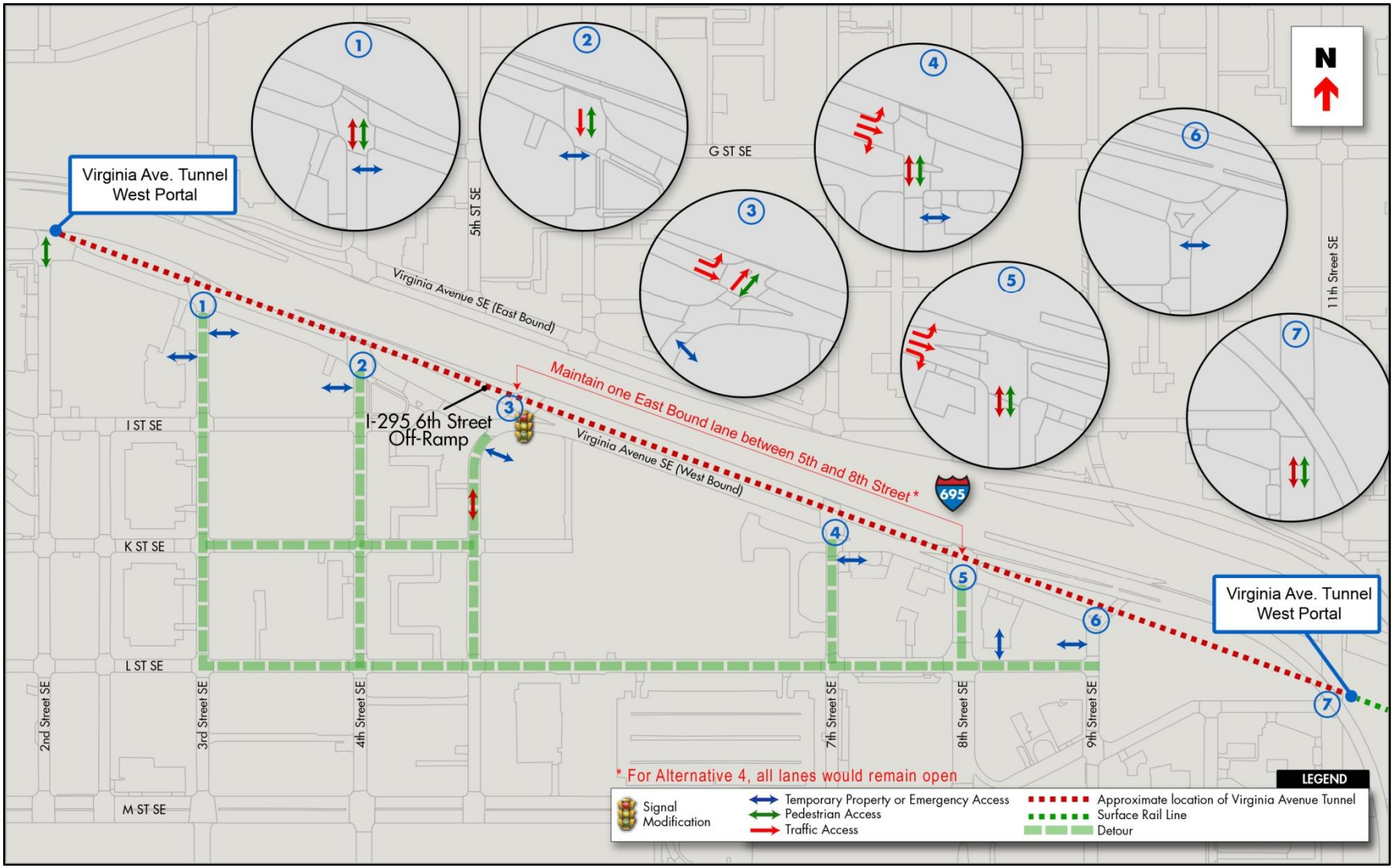
The MOT plan took into account other construction activities located in the general vicinity of the Project that are projected to overlap with the Project's construction, and will be re-evaluated during final design to determine the status of these and other construction projects in the general vicinity of the LOD.

Under the Preferred Alternative or Alternative 2, a two-phased MOT will be implemented because portion of construction dedicated to the building of the temporary runaround track/trench (Alternative 2) or the south side single-track tunnel (Preferred Alternative) does not require closure of all of Virginia Avenue SE. Alternative 4's MOT would have the same phasing, but timed differently than the Preferred Alternative or Alternative 2. Additional detail about Alternative 4's MOT is provided at the end of this section.

Under MOT Phase 1, a single eastbound lane on Virginia Avenue SE (northernmost lane) could be maintained between the I-695 off-ramp at 6th Street SE and the 8th Street SE intersections. Keeping this lane open will allow traffic exiting I-695 to make left turns at 7th and 8th Streets SE from the eastbound Virginia Avenue SE, the same movements currently allowed. For I-695 exiting traffic wishing to proceed to the south of Virginia Avenue SE, they would turn left at 6th Street SE, left on westbound Virginia Avenue SE (north side of I-695) and left on 4th Street SE. The other lanes and pedestrian facilities on Virginia Avenue SE within these limits will be closed. In addition, Virginia Avenue SE from 2nd to 5th Streets SE and from 8th to 9th Streets SE will be closed with traffic diverted to the parallel K and L Streets SE, and temporary decks over the temporary runaround trench (Alternative 2) or south side tunnel (Preferred Alternative) will be provided along all cross streets from 2nd to 8th Streets SE and 11th Streets SE (the deck at 2nd Street SE is only for pedestrians and cyclists). These and other elements of the MOT Phase 1 plan, including how properties adjacent to Virginia Avenue SE within the project limits will maintain access to the street grid, are shown in Figure 3-7.

MOT Phase 2 for the Preferred Alternative or Alternative 2 will start when work on either the two-lane rebuilt tunnel (Alternative 2) or the north side tunnel (Preferred Alternative) begins, which will require closure of all of Virginia Avenue SE between 6th and 8th Streets SE. In order to maintain access for traffic exiting I-695 at the 6th Street off-ramp to the surrounding community, Virginia Avenue SE, on the north side of I-695, will be converted from one-way westbound to two-way operations between 6th and 8th Street SE. Between 6th and 7th Streets SE, one westbound lane and two eastbound lanes will be provided throughout Phase 2. Between 7th and 8th Streets SE, one lane each direction will be provided throughout Phase 2.

Figure 3-7
Maintenance of Traffic Plan, Phase 1



Traffic from the freeway at 6th Street SE will be diverted to the reconfigured Virginia Avenue SE on the north side of I-695. From this location, traffic could proceed into three different directions (currently two directions are available): westbound, northbound or eastbound. For traffic exiting I-695 wishing to proceed to the south of Virginia Avenue SE, they would turn left at 6th Street SE. At the intersection with Virginia Avenue SE (north side of I-695), traffic could either turn left (as noted above under Phase 1) or turn right and make right turns at either 7th or 8th Street SE. The temporary decks at 2nd to 8th Streets SE and 11th Street SE will be extended over the expanded construction area. These and other elements of the MOT Phase 2 plan are shown in Figure 3-8.

As noted above, the MOT for Alternative 4 would be phased. The first several months of construction would be concentrated in the area between 2nd and 5th/6th Streets SE. The I-695 6th Street off-ramp and the section of Virginia Avenue SE between 6th and 9th Streets SE would be unaffected. The MOT for Alternative 4 during these initial months would be similar to the Phase 1 MOT for the Preferred Alternative or Alternative 2 except that all the lanes would be available between 6th and 9th Streets SE. When construction moves east of the 5th/6th Street intersection, the detour for traffic exiting I-695 would start from the Phase 2 MOT plan noted above throughout the rest of construction. Similar to the Preferred Alternative or Alternative 2, temporary decks over the would be provided along all cross streets from 2nd to 8th Streets SE and 11th Streets SE, and all properties adjacent to Virginia Avenue SE within the project limits would maintain access to the street grid through various measures as noted on Figures 3-7 and 3-8.

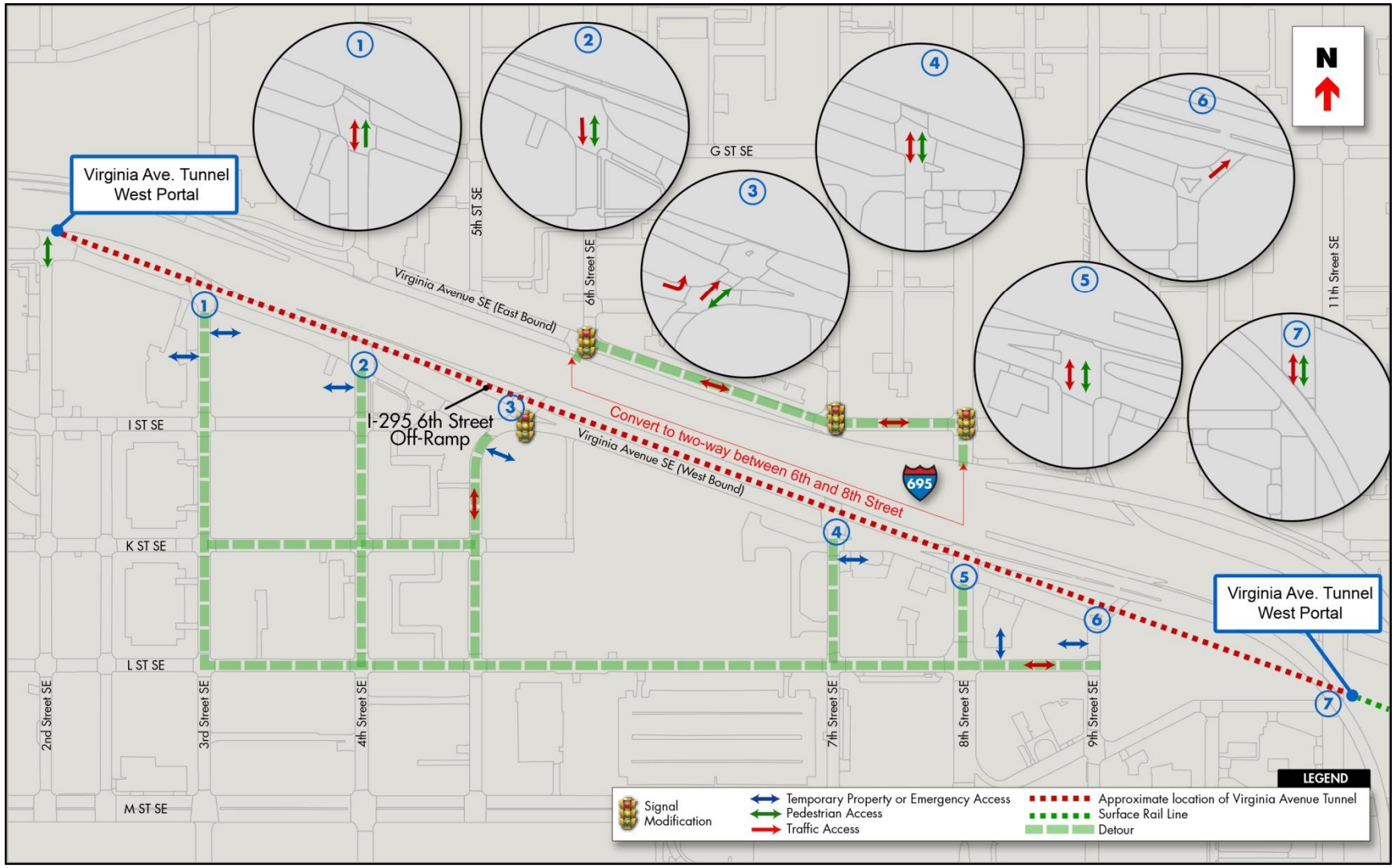
Temporary wayfinding signs will be included among the detours to assist motorists, pedestrians and cyclists in navigating finding their destinations, which may include important gathering places in the community, such as Barracks Row, Eastern Market, the Washington Navy Yard and Garfield Park. The project sponsor will work with the local business and civic groups to determine the important gathering places that should be identified by temporary signage.

3.5.5 Safety and Security

The construction area will be in proximity to residences, many of which have families with children. Therefore, to be consistent with Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, the construction area for the Project will be secured to prevent unintended intrusion, including the areas used for temporary train operations. The general public will not be allowed to access construction areas or areas used for train operations, such as the runaround track/trench under Alternative 2. Safety and security measures will be implemented during construction, such as:

- Secure fencing at least eight feet high along the perimeter of the construction area, including around the areas with trains running in a protected trench, and at cross streets where vehicles, pedestrians and cyclists will be allowed to cross the construction zone (see photographs of sample fencing and barriers around construction sites);
- Suitable lighting for the construction area;
- Regular patrols by railroad police officers assigned to the Project;

Figure 3-8
Maintenance of Traffic Plan, Phase 2



- Access for first response and emergency vehicles to all property fronting the LOD (see Section 3.5.4); and
- Rodent control program initiated prior to the start of construction and maintained during entire duration of construction.

Tunnel safety and stability will be monitored through a comprehensive instrumentation program with devices placed both inside and outside the tunnel as well as on adjacent structures that may be susceptible to vibration damage. In addition, a full-time safety officer will be present at all times when construction activities are taking place to oversee the safety protocols and measures.

The Federal Railroad Administration (FRA) regulates safety procedures of freight trains owned by Class I railroad companies, such as CSX, operating within construction sites. In accordance with FRA safety regulations, the railroad company is required to follow specific protocols to ensure the safety of trains moving through construction sites in order to protect workers involved in construction as well as the general public.

As required by the FRA regulations, all persons (CSX employees and its contractors) working on or near railroad tracks are required to be formally trained in "Roadway Worker Protection Training" (RWT). On an annual basis, all persons must complete the course and pass a written test to work on or near railroad tracks. In addition, all workers will be required to take security training, and those working for contractors must undergo a criminal background check every two years under the requirements of the e-RAILSAFE System program.

For the Project, a CSX employee will be assigned as the "railroad employee-in-charge" and will have all the requisite training, testing and qualifications to properly perform this job. The railroad employee-in-charge will control all train movements through the work limits whenever construction activities are being performed. The work limits encompass the construction site and both approaches to the current/new tunnel.

Stockade Fence Mounted on Traffic Barrier

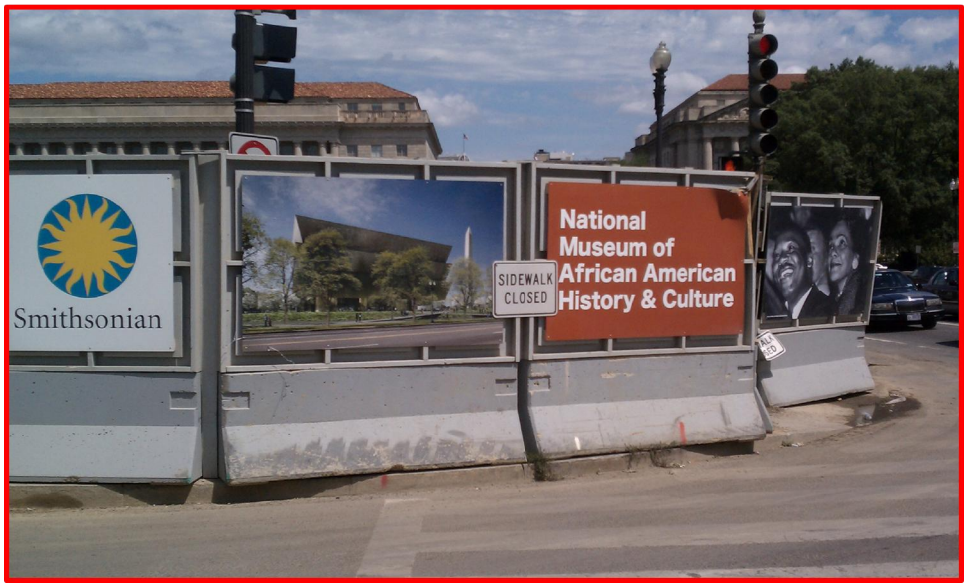
The locomotive operator of trains approaching the work limits will be required to receive permission from the "railroad employee-in-charge" before entering or making any movement within the work limits. Before granting this permission, the

employee-in-charge must check that all workers and equipment are clear from the railroad tracks at a predetermined distance of safety, and confirm that the tracks, tunnel and all supporting structures are in a condition to allow the safe passage of trains.

Chain Link Fence Mounted on Traffic Barrier

Typical Stockade Fencing

Banner-Mounted Fencing



All CSX train crews operating on a route that includes the Project work limits will receive a computer generated message prior to departure from their originating terminal alerting them that they must receive permission from the railroad employee-in-charge for the Project before traversing through the work limits. In addition, signs will be erected no less than two miles from the work limits to provide advance warning to train crews that they are required to stop before entering the work limits unless advised by the railroad employee-in-charge that the work limits are safe for train passage. Conditional stop signs will be placed at each end of the work limits as a reminder to train crews that they must stop unless given permission to enter the work limits by the railroad employee-in-charge.

CSX radios at frequencies dedicated to railroad use will be used for all communications between train crews and the railroad employee-in-charge. All voice communication is repeated to ensure positive identification and an understanding of the specifics with each permission granted. If for some reason the railroad employee-in-charge cannot respond to a train requesting permission to enter the work limits, the train will be required to stop and cannot enter the work limits until such time the employee-in-charge is contacted. All permissions to traverse the work area are recorded and documented.

3.5.6 Duration

For the Preferred Alternative and Alternatives 2 and 4, construction work hours would be the same in accordance with District regulations. Standard construction work hours are between 7 AM and 7 PM, Monday to Friday. Work on Saturday, Sunday or at night would require a permit from the District. The District government would apply its customary criteria, which would

weigh community benefit versus community impacts, in deciding whether to issue such a permit. Based on the standard work hours, estimated construction durations for each alternative were developed and presented on Table 3-4. This table also includes the estimated durations of the MOT phases described in Section 3.5.4.

Table 3-4
Estimated Construction Duration by Alternative

Alternative	MOT Phase		Total Estimated Duration
	Phase 1	Phase 2	
Alternative 1	Not Applicable	Not Applicable	Not Applicable
Alternative 2	10-16 months	20-26 months	30-42 months
Preferred Alternative	16-22 months	14-20 months	30-42 months
Alternative 4	32-38 months	22-28 months	54-66 months

The estimated construction duration for each Build Alternative was based on certain factors including, among others, the proposed sequence of work, access restrictions, allowable work hours, known utility impacts, and available information about comparable construction projects.

The main reason that Alternative 4 is projected to take substantially longer to complete is because construction has to be conducted in a single, linear segment, starting at one end of the tunnel and continuing to the other end so that freight operations and rebuilding activities could be conducted at the same time within the same trench. The other two Build Alternatives are not restricted in such a manner. For example, the Preferred Alternative or Alternative 2 allows for the same or similar construction activities (e.g., excavation) to occur simultaneously along different areas of the LOD, an option not available to Alternative 4. In addition, construction activities are anticipated to be slowed along the entire length of the Alternative 4's construction zone because of the close proximity between active rail operations and construction work areas. Also, additional safety regulations and safe work zone practices would need to be implemented for Alternative 4. These regulations and practices make the construction schedule for Alternative 4 highly dependent on railroad operational needs and customer service requirements.

3.5.7 Cost

As noted on Table 3-5, the total costs for the Preferred Alternative and Alternative 2 would be similar (within approximately $7 million). At approximately $208 million, the total cost for Alternative 4, however, would be approximately 20 to 24 percent higher than Alternative 2 and the Preferred Alternative, respectively. The primary reasons for the higher cost for Alternative 4 is the longer construction duration and the extra safety precautions to accommodate construction and freight rail operations in the same trench.

Table 3-5
Estimated Cost Breakdowns by Alternative

Alternative	Estimated Cost (or Millions)*
Alternative 1	Not Applicable
Alternative 2	$175
Preferred Alternative	$168
Alternative 4	$208

Notes: * Includes site preparation, demolition, construction, track work, MOT, environmental measures, landscaping, roadway restorations, professional services and indirect costs.

3.6 Proposed Virginia Avenue SE Streetscape

Upon completion of tunnel construction, the street and other affected areas, such as Virginia Avenue Park and the Marine Corps Recreation Facility, will be restored. The rebuilding of Virginia Avenue Tunnel provides the opportunity to construct a new streetscape for Virginia Avenue SE and be incorporated as part of the Preferred Alternative or the other two Build Alternatives. In the rebuilding the Virginia Avenue SE streetscape, certain improvements will be made. A plan view of the proposed changes to the Virginia Avenue SE streetscape is provided in Appendix M. Figures 3-9 and 3-9A through 9E show proposed changes to the streetscape of Virginia Avenue SE by block. Descriptions of these changes are provided below.

Between 2nd and 4th Streets, the existing two-way traffic lanes will be maintained as well as the existing on-street parking on both sides of the road (see Figure 3-9A). The only substantive changes will be the conversion of the south-side pedestrian way into a 10-foot wide shared use path, and the provision of a north-side pedestrian way.

Between 4th and 5th/6th Streets, the existing two one-way (eastbound) traffic lanes and south-side pedestrian way will be maintained, but the curved alignment will be straightened to be more consistent with the L'Enfant Plan of Washington D.C. (see Figure 3-9B). The south-side on-street parking will be kept, but the north-side on-street parking will be eliminated. A south-side bike path will be provided between the pedestrian way and the street. Due to the elimination of the north-side on-street parking and the provision of a bike path, the curb to curb space will be narrower within the 400 block than under existing conditions. In addition, I Street SE, which currently curves north to intersect with Virginia Avenue SE, will be converted into a two-way cul-de-sac within the 400 block, with its only function to provide access to the Capitol Quarter driveway. The area reclaimed from roadway paving between Virginia Avenue SE and the Capitol Quarter residences within the 400 block will be converted to vegetative and/or grassy landscaping. A bike path will be provided connecting the I Street cul-de-sac with the new Virginia Avenue SE bike path.

Figure 3-9
Location Key for Proposed Roadway Typical Sections

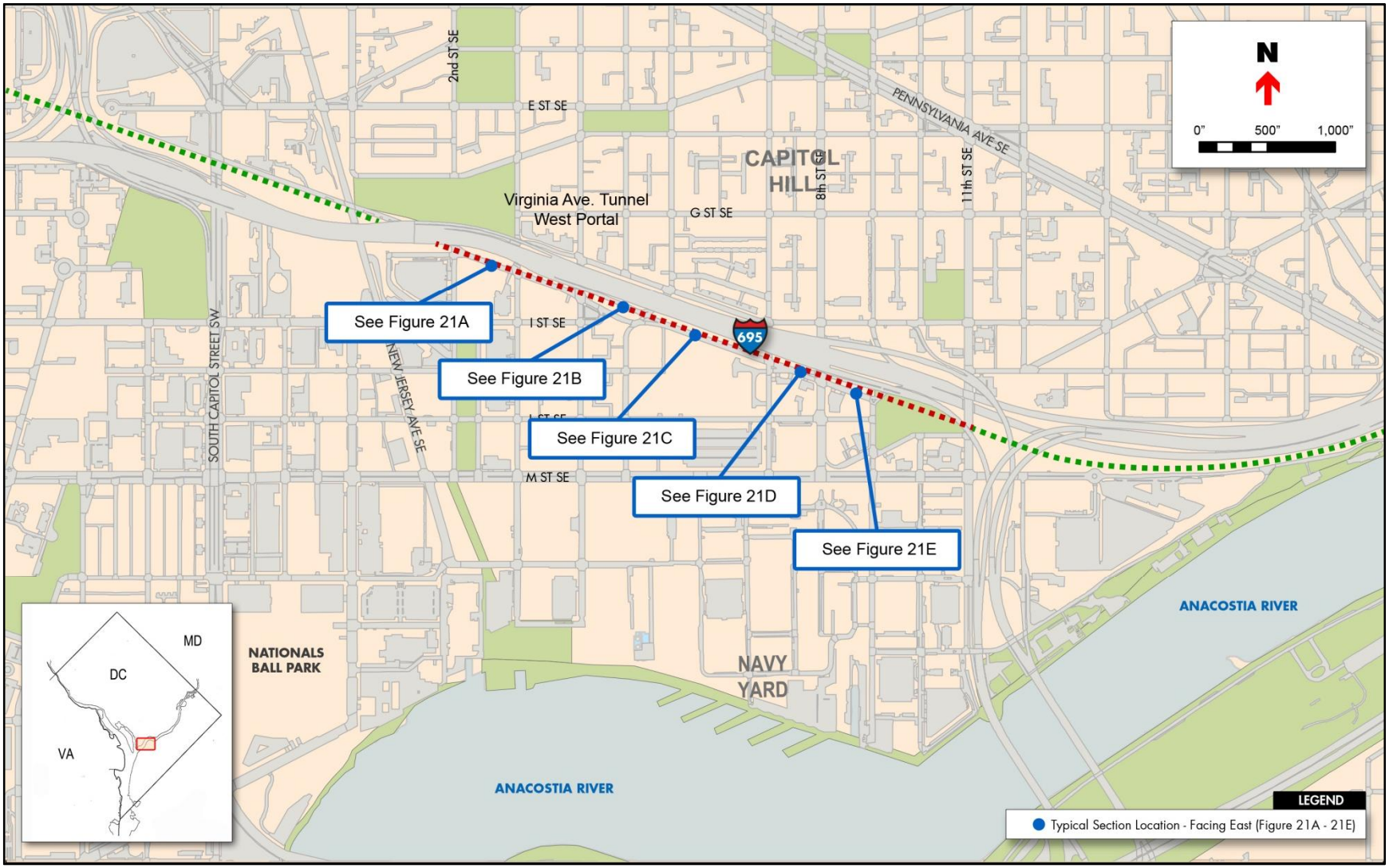


Figure 3-9A
Proposed Typical Section between 2nd and 4th Streets

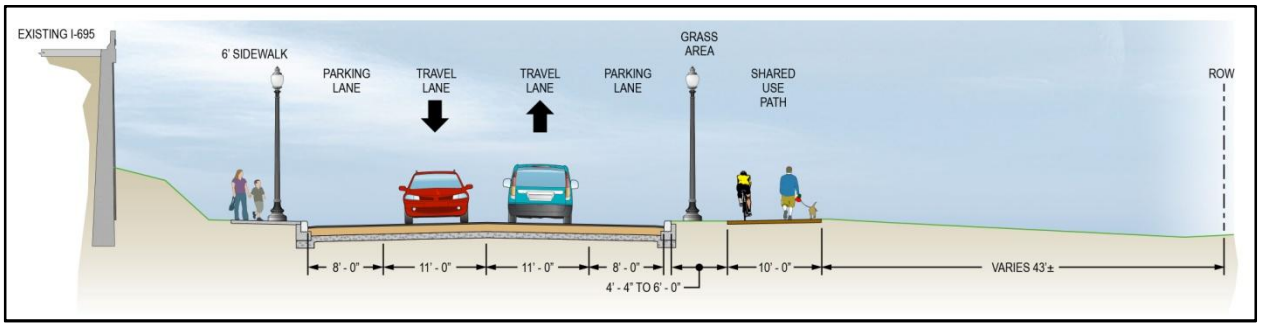


Figure 3-9B
Proposed Typical Section between 4th and 5th/6th Streets

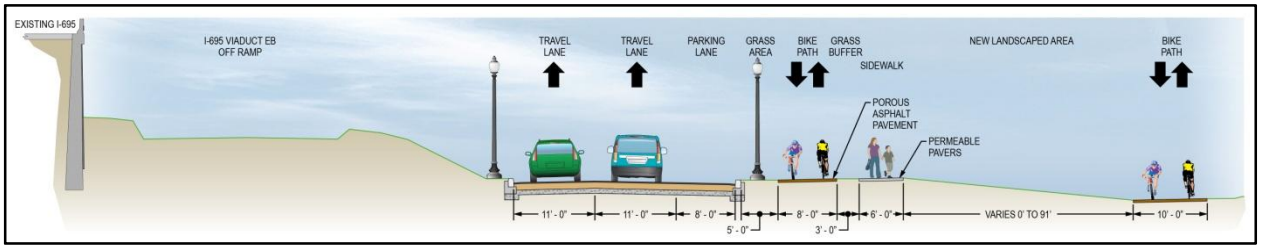


Figure 3-9C
Proposed Typical Section between 5th/6th and 7th Streets

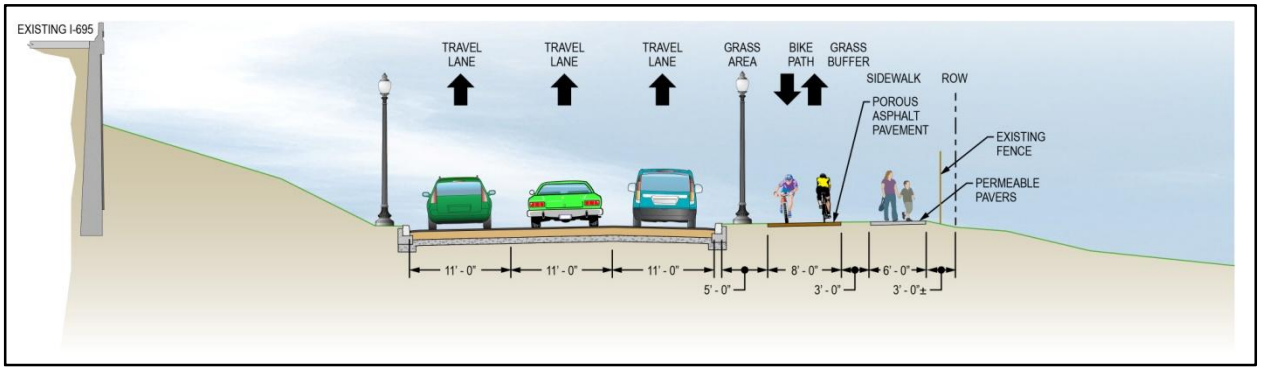


Figure 3-9D
Proposed Typical Section between 7th and 8th Streets

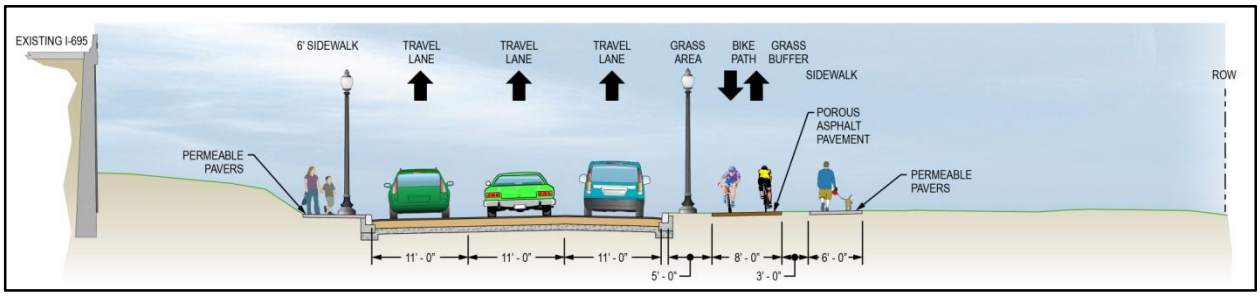
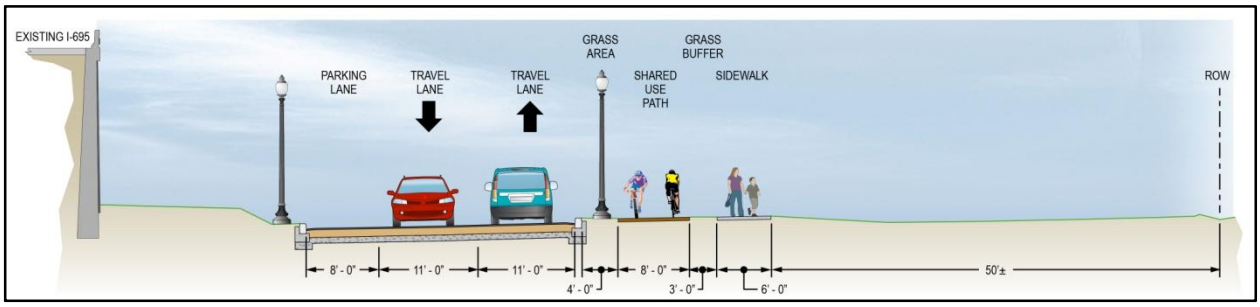


Figure 3-9E
Proposed Typical Section between 8th and 9th Streets



Between 5th/6th and 7th Streets, the number of one-way (eastbound) traffic lanes will be changed from four to three (see Figure 3-9C). Currently, no on-street parking is provided within this block and this will not change under the proposed new streetscape. The existing south-side concrete pedestrian way will remain, but converted to permeable pavers. Between this pedestrian way and the street, a bike path will be provided.

The section between 7th and 8th Streets will be the same as the section between 5th/6th and 7th Streets, except that a pedestrian way will be provided on the north side of the street (see Figure 3-9).

The two lanes between 8th and 9th Streets will be converted from one-way (eastbound) to two-way traffic (see Figure 3-9E). The existing south-side permeable paver pedestrian way will remain. As with other proposed sections along Virginia Avenue SE, a bike path will be provided on the south side of the street, which will make the curb to curb space narrower through the elimination of the south-side on-street parking. The north-side on-street parking will remain.

3.7 Alternative Concepts Considered But Rejected

NEPA requires federal agencies to "rigorously explore and objectively evaluate all reasonable alternatives, and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their having been eliminated (40 CFR §1502.14(a))". According to the Council on Environmental Quality (CEQ) guidance, reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant (CEQ, NEPA's Forty Most Asked Questions). At the same time, when considering a proposal from a private applicant for federal approval, NEPA's "rule of reason" directs federal agencies to look at the general goals of a project in developing an appropriate range of alternatives. Therefore, unlike a proposed public infrastructure project, such as a new public road or bridge, that needs to compete with other projects for public funds, this Project represents CSX's judgment of the action it needs to take to satisfy its common carrier obligation as one of the nation's leading freight rail companies.

This section introduces the 12 preliminary concepts that were considered as candidates for the Project, and describes how the concepts were evaluated to determine which would be developed into alternatives carried forward for a more detailed analysis through the EIS process. The evaluation was based on the following eight criteria, which are based on the Purpose and Need for the Project and economic and feasibility factors:

- Criterion 1: The concept, upon completion, will address the deficiencies of the Virginia Avenue Tunnel.
- Criterion 2: The concept, upon completion, will provide the necessary improvements for operating double-stack intermodal containers and have two railroad tracks for the efficient flow of commercial rail freight through the Washington Metropolitan Area.
- Criterion 3: The concept will avoid major impacts to the structures, traffic or access to or from I-695.
- Criterion 4: The concept must allow for the maintenance of traffic across Virginia Avenue and along adjacent streets throughout the duration of construction.
- Criterion 5: The concept will maintain interstate rail commerce without a substantial negative impact to the level of service during construction.
- Criterion 6: The concept will be implemented in a time frame that accommodates the near term anticipated increase in freight traffic.
- Criterion 7: The concept has a comparatively reasonable duration of construction in the vicinity of the existing tunnel.
- Criterion 8: The concept has a comparatively low cost.

3.7.1 Alternative Concepts Overview

In order to develop reasonable alternatives to address the Project's Purpose and Need, a preliminary assessment of the engineering and physical constraints was conducted along the alignment of the existing tunnel. In addition, DDOT and FHWA sought input from Federal and District agencies, interested parties and the general public. From these activities, the following 12 preliminary concepts were developed.

- Concept 1 is the no action or no build condition. It automatically is carried through the EIS process and was developed as Alternative 1 described in Section 3.3.
- Concepts 2 through 7 involve the rebuilding or reconfiguration of the Virginia Avenue Tunnel. Among these concepts is Concept 3A, which was developed in response to public comment during analysis of the 11 original preliminary concepts, and increased the total number of concepts considered for the Project to 12.
- Concepts 8 through 11 involve rerouting the main rail line outside of the existing Virginia Avenue SE, but the tunnel would remain to service Washington Metropolitan Area regional customers.

The remainder of this section includes descriptions of each of the concepts that were then evaluated, and resulted in the selection of the four NEPA alternatives retained for further detailed consideration.

After the 12 concepts were screened to produce four candidate alternatives, the additional engineering efforts to further develop the candidate alternatives, as described in this chapter, are not of final design level precision with respect to the description of facility locations (e.g., tunnel alignments and portal locations) within the public space (including subsurface) at or near Virginia Avenue. These final design details would be developed after the NEPA process is concluded, and if a Build Alternative for the Project is approved. For this document, each alternative is described with the precision necessary to identify and address reasonably foreseeable environmental and social impacts. Because all three Build Alternatives described in this Final EIS contemplate that the reconstructed tunnel would only be located within CSX-owned or public property, rather than intruding into or under any private property, no additional detail beyond those already presented here is warranted. As the concepts and Build Alternatives were being developed through a series of public meetings and consultation with agencies, additional engineering was conducted for each of the selected Build Alternatives and minor changes continue to be made to their specific descriptions (e.g., construction phasing and tunnel alignments).

Concepts 2 through 7: Rebuild Virginia Avenue Tunnel

Concepts 2 through 7 involve the rebuilding of the existing Virginia Avenue Tunnel generally within the existing tunnel envelope but with sufficient vertical clearance to allow for double-stacking of intermodal containers. Although not all freight trains are double-stacked (only intermodal containers are double-stacked), allowing double-stack intermodal container freight operations during construction will not present any additional impacts as compared to a situation in which only single-stacking were allowed. Following construction, freight traffic would operate more efficiently by the use of double-stack intermodal container cars because at least 21 feet of vertical clearance would be provided within the rebuilt tunnel. In addition, all of these rebuild concepts would provide two sets of permanent tracks within the tunnel corridor to improve the fluidity and operations of the railroad. Trains moving in opposite directions would be able to traverse the rebuilt tunnel simultaneously. Under Concepts 2, 3, 4, 6 and 7, the rebuilt Virginia Avenue Tunnel would largely be the same design, two sets of track

within a single tunnel. Concepts 3A and 5, on the other hand, involve the construction of two tunnels, each containing a single set of tracks, and both having the necessary vertical clearance to accommodate double-stack intermodal container freight trains. (Note that Concept 6, which became Alternative 4, was changed to include a partitioned tunnel.)

The rebuild concepts differ in how each would maintain freight operations during construction. Concepts 2, 3 and 4 would provide a temporary detour or "runaround" track in a protected trench. A range of design options are available to maintain a protected trench, such as various forms of safety barriers to isolate the trench from access by passersby and trespassers. These include stockade and chain link fencing, and Jersey barriers. Additional detail about trench safety and security is provided in Section 3.5.5. Concepts 3A and 5 would not require temporary facilities to maintain freight rail operations. The new single railroad track tunnel would be built outside of the existing tunnel alignment and would accommodate train traffic while the second tunnel would be built within the existing tunnel alignment. Concept 6 would maintain freight operations within the existing envelope of the Virginia Avenue Tunnel. Concept 7 would temporarily reroute freight trains outside the District during construction.

Among the rebuild concepts all have approximately the same layout (i.e., they would cover approximately the same surface area during and after construction). On the west end, the temporary runaround or permanent track would connect with the existing track near the New Jersey Avenue overpass. At the east end, the temporary runaround or permanent track would connect with the existing track in the vicinity of 14th Street SE.

Upon completion of the rebuilt Virginia Avenue Tunnel, the surface of Virginia Avenue SE and other disturbed areas would be restored under all rebuild concepts.

During and following construction, Washington Metropolitan Area regional customers would continue to receive freight transportation service through the Virginia Avenue Tunnel under the rebuild concepts. However, Concept 7 would not be able to maintain the same level of freight service for Washington Metropolitan Area regional customers during construction because train operations through the Virginia Avenue corridor would not be available under this concept.

All temporary measures to maintain freight rail operations within the Virginia Avenue SE corridor during construction (Concepts 2 through 6) would allow for the operation of double-stack intermodal container freight trains.

Brief descriptions of Concepts 2 through 7 are provided in Sections 2.2.1.1 to 2.2.1.7.

Concepts 8 through 11: Reroute Concepts

The "reroute" concepts (Concepts 8 through 11) would all involve rerouting mainline freight rail traffic out of the Virginia Avenue Tunnel at its present depth and location in lieu of near-term reconstruction of the tunnel (Concepts 2 through 7). Under Concepts 8 through 11, new mainline freight rail routes would be constructed within or outside of the District of Columbia.

Concepts 8 through 11 would result in projects of considerable magnitude because they would require either digging an approximately nine-mile deep tunnel (Concept 8) or establishing new mainline freight rail lines that would entirely bypass the District of Columbia (Concepts 9, 10 and 11). Concepts 8 through 10 would require a new Potomac River crossing (tunnel or bridge) because the Long Bridge (see Section 1.2) is the only freight rail bridge crossing the Potomac River, between Harpers Ferry, WV and the Chesapeake Bay.

Upon completion of any of the reroute concepts, freight rail trains would continue to use the Virginia Avenue Tunnel to service customers in the Washington, DC area. Because the existing Virginia Avenue Tunnel must remain operational, Concepts 8 through 11 may involve emergency or unplanned repairs of the tunnel at some point in the future, which might require closure of at least part of Virginia Avenue SE in order to make the repairs. In other words, the tunnel's structural deficiency described in Section 2.1.3 would remain, and the Virginia Avenue Tunnel would eventually require major rehabilitation or replacement, possibly at a time when the surrounding neighborhood is more fully developed and with increased traffic as a result.

Descriptions of Concept 8 through 11 are provided in Sections 3.2.1.8 to 3.2.1.11.

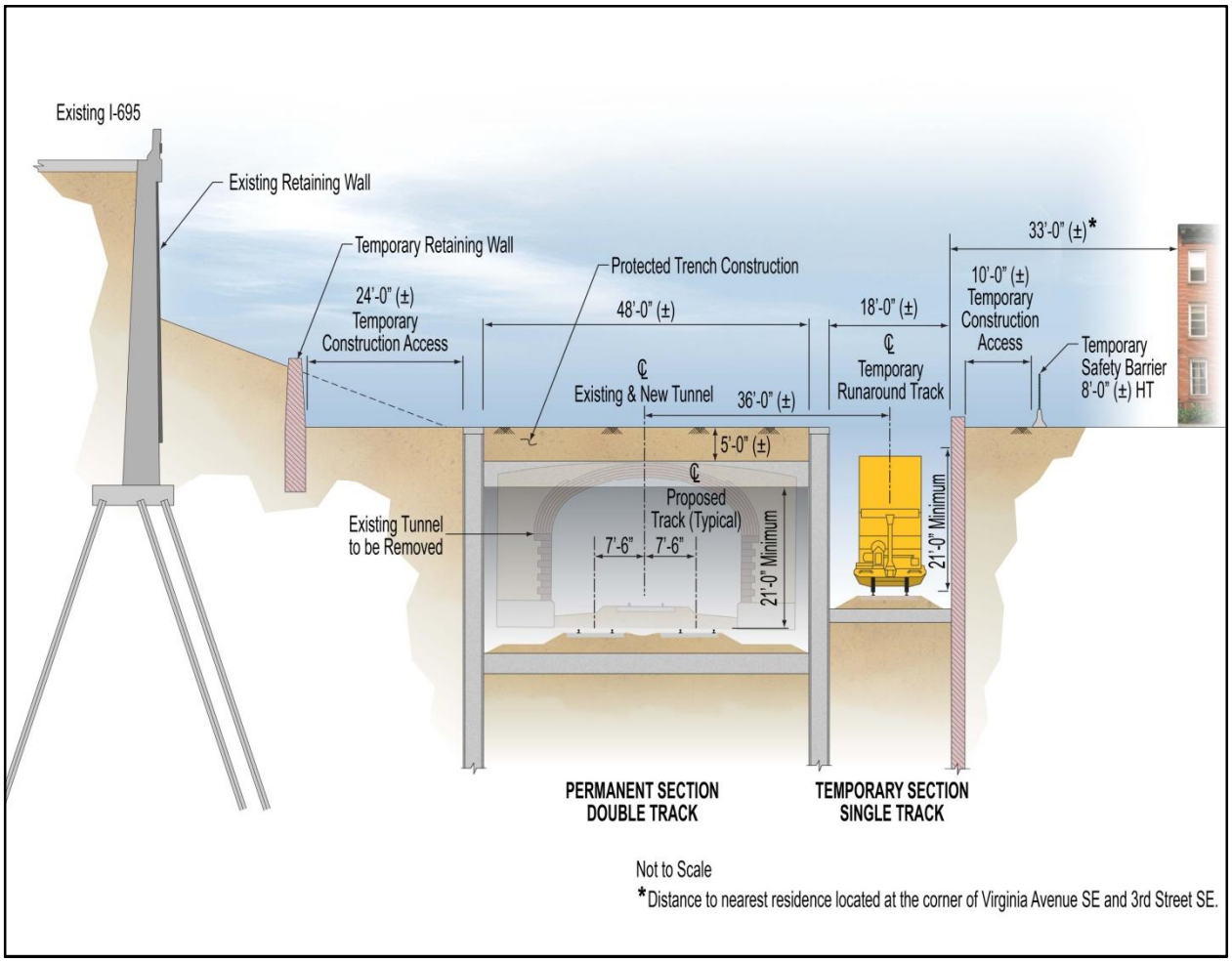
3.7.1.1 Concept 2: Rebuild, Temporary South Side Runaround

The Project under Concept 2 would reconstruct the existing single-track Virginia Avenue Tunnel into a new double track/double stack tunnel within the approximate existing horizontal envelope or alignment of Virginia Avenue Tunnel (see Figure 3-10). To maintain freight traffic during construction of the new tunnel, Concept 2 would provide a temporary runaround track placed inside a protected trench constructed immediately south of the existing tunnel alignment, as shown in Figure 3-10.

I-695 Off-Ramp at 6th Street SE

Placing the temporary runaround track/trench for Concept 2 on the south side of the existing tunnel would avoid the long-term closure of the Interstate 695 (I-695) off- and on-ramps located at 6th and 8th Streets SE (I-695 ramps), respectively, during construction (see photograph of I-695 Off-Ramp). Intermittent short-term closures of the I-695 ramps may be required for maintenance of traffic shifts. Upon completion of the rebuilt Virginia Avenue Tunnel, the runaround track would be removed and the protected trench would be backfilled.

Figure 3-10
Concept 2 Typical Section



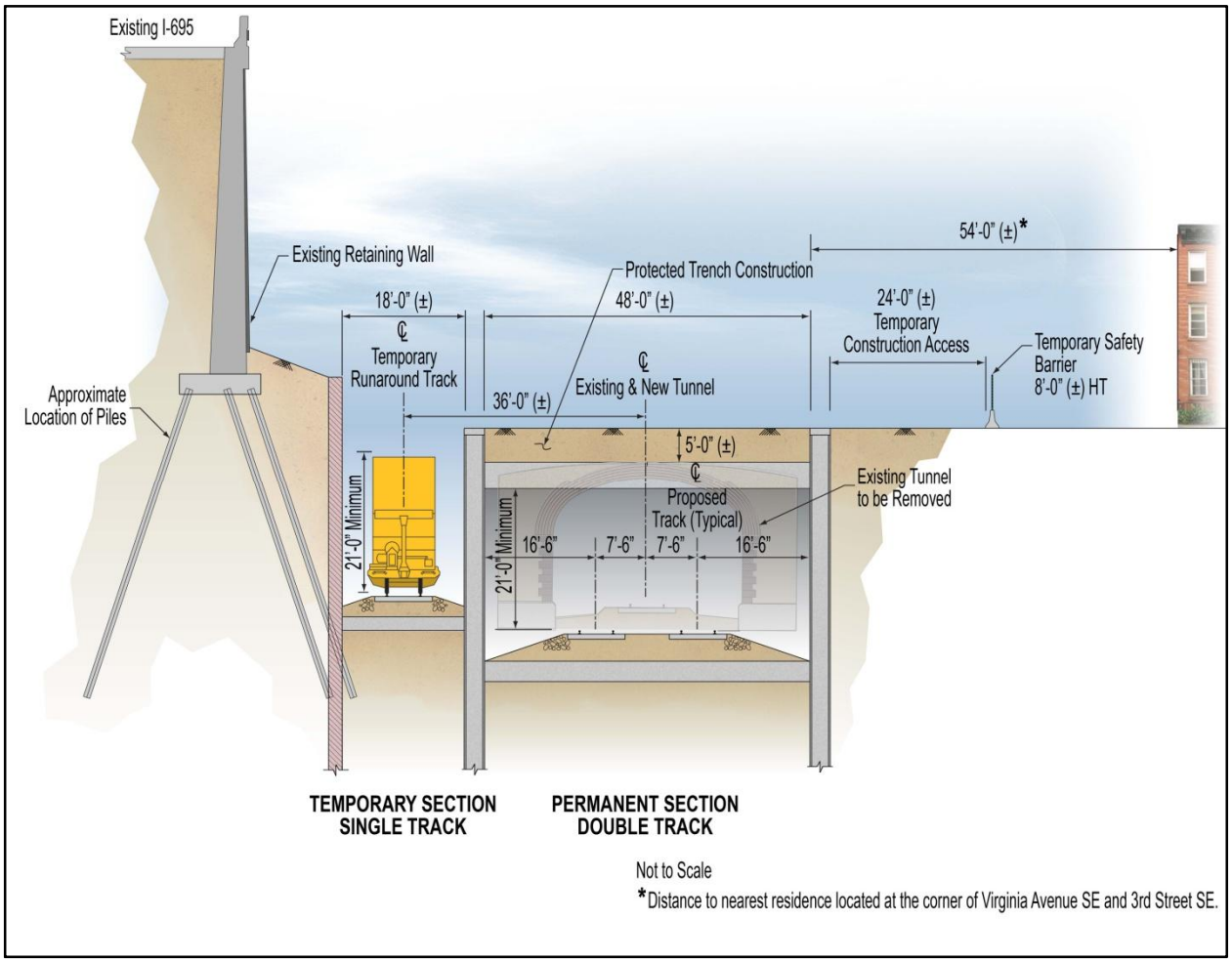
3.7.1.2 Concept 3: Rebuild, Temporary North Side Runaround

Concept 3 is similar to Concept 2, except that instead of placing the temporary runaround track in a protected trench on the south side of the existing tunnel alignment, it would be placed in a protected trench immediately north of the existing tunnel alignment, or located between the existing tunnel and I-695 (see Figure 3-11).

Aligning the temporary runaround track on the north side of the existing tunnel would place temporary freight operations as far as feasibly possible from land uses on the south side of Virginia Avenue, but still within the confines of the public right-of-way. Due to the temporary runaround track's proximity to I-695, long-term (throughout most of the construction duration) closures of the I-695 ramps would be required. It may be possible to stagger these closures so only one of the ramps is closed at a time, but long-term closure and disruptions would still be required. Similar to Concept 2, the runaround track would be removed and the protected

trench would be backfilled upon completion of the rebuilt Virginia Avenue Tunnel. The I-695 ramps would also be reopened.

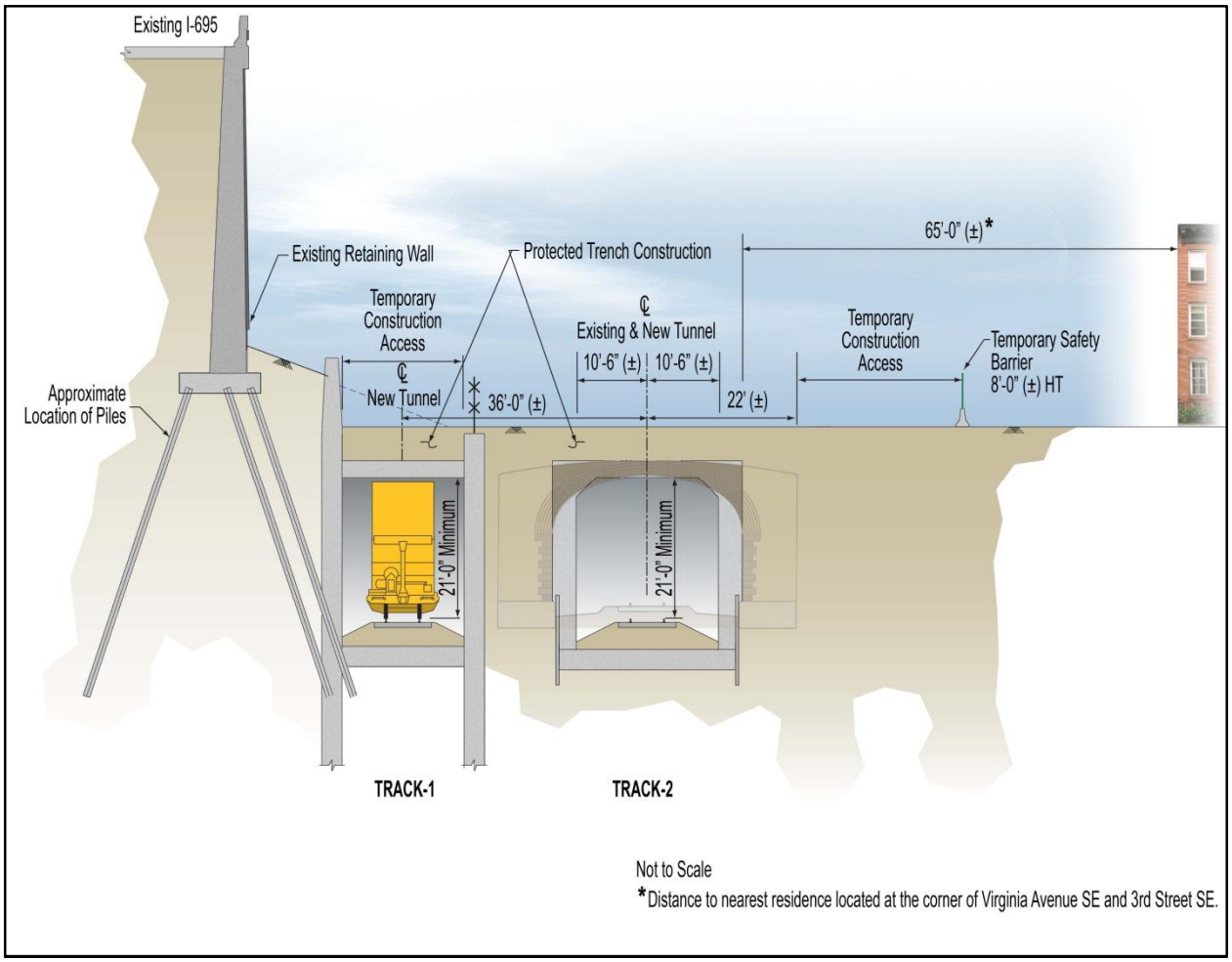
Figure 3-11
Concept 3 Typical Section



3.7.1.3 Concept 3A: Rebuild, Permanent Two Tunnels (New Tunnel on North Side of Existing Virginia Avenue Tunnel)

Concept 3A was developed during discussions with the public during community meetings where the original 11 project concepts were presented. This concept combines the elements of Concepts 3 and 5. Like Concept 5, Concept 3A would result in the construction of two single-track/double-stack tunnels (see Figure 3-12). The new, second single-track/double-stack tunnel would be set along the same alignment as the temporary northern runaround track/trench as presented under Concept 3.

Figure 3-12
Concept 3A Typical Section

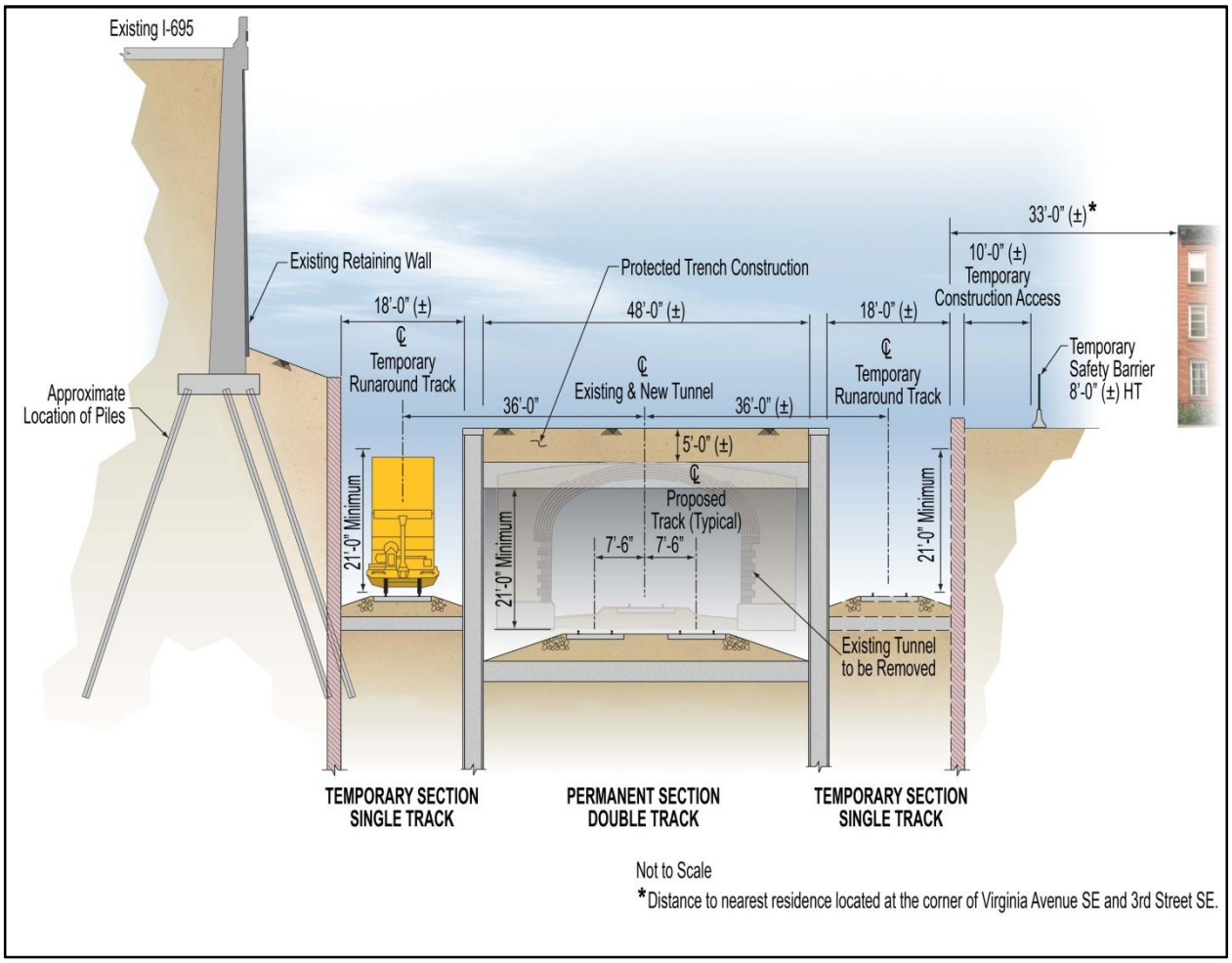


Similar to Concept 5, this second tunnel would be constructed first. On the west end, the new permanent track would connect with the existing track near the New Jersey Avenue overpass. Both permanent tunnels would be constructed using a cut-and-cover method. Due to the proximity of the new tunnel to I-695, long-term (throughout most of the construction duration) closures of the I-695-ramps would be required. It may be possible to stagger these closures so only one of the ramps is closed at a time, but long-term closure and disruptions would still be required. Once completed, the new permanent single-track/double-stack tunnel would serve as a route for two-way train traffic while the existing tunnel is reconstructed and converted into a new single-track/double-stack tunnel. Upon completion of the second single-track/double-stack Virginia Avenue Tunnel, train traffic would be split with one-way traffic in each tunnel.

3.7.1.4 Concept 4: Rebuild, Temporary Combination Runaround

Concept 4 is also similar to the Concepts 2 and 3 in that the rebuilt Virginia Avenue Tunnel would be reconstructed generally within the existing horizontal envelope of the existing tunnel. Instead of placing the temporary runaround track/protected trench on the north or south side of the existing tunnel, it would have a serpentine alignment, crossing the existing tunnel at two locations (see Figure 3-13).

Figure 3-13
Concept 4 Typical Section



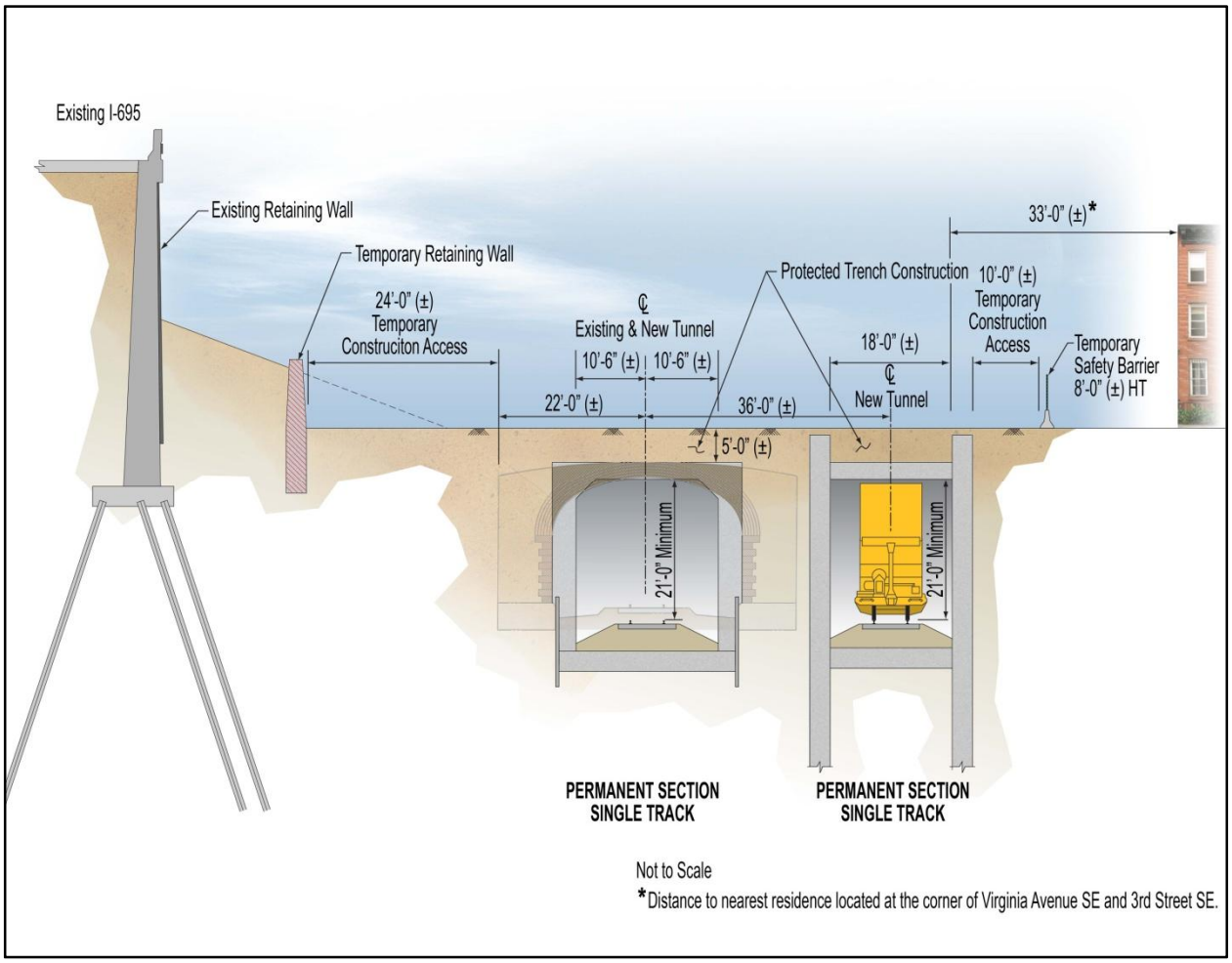
The rationale behind the configuration of the serpentine temporary runaround track under Concept 4 was to explore the possibility of placing temporary freight operations as far as feasibly possible from land uses on the south side of Virginia Avenue, but still within the confines of the public right-of-way, while avoiding the long-term closure of the I-695 ramps on the north side. On the west end, the runaround track would be the same as Concept 2, and

continue on the south side of the existing tunnel between 2nd and 5th Streets SE within a protected trench. At 5th Street SE, the temporary runaround track/trench would transition to the north side of the existing tunnel. At 8th Street SE, the temporary runaround track/trench would transition back to the south side of the existing tunnel. It should be noted that when the runaround track is moved to the north side of the existing tunnel between 2nd and 5th Streets SE, this concept conforms essentially to Concept 3. As is under Concepts 2 and 3, the runaround track would be removed upon completion of the rebuilt Virginia Avenue Tunnel.

3.7.1.5 Concept 5: Rebuild, Permanent Two Tunnels (New Tunnel on South Side of Existing Virginia Avenue Tunnel)

The rebuilt Virginia Avenue Tunnel under Concept 5 would be different than any of the previously described rebuild concepts with the exception of Concept 3A, which was added after the identification of the original 11 concepts. Concept 5 would result in the construction of two single-track/double-stack tunnels (see Figure 3-14).

Figure 3-14
Concept 5 Typical Section



Concept 5 would avoid having to construct temporary facilities to maintain freight operations during construction. One of the single-track/double-stack tunnels would occupy the space generally within the existing tunnel envelope. The other would have an alignment very similar to the alignment of the temporary runaround track/trench under Concept 2, or along the south side of the existing tunnel. The south side single-track/double-stack tunnel would be constructed first. During construction of the south side tunnel, freight traffic would continue to use the existing Virginia Avenue Tunnel. After the new south side tunnel is completed, train traffic would cut over to this new tunnel and the existing, older tunnel would be reconstructed and converted into a new single-track/double-stack tunnel. Both new tunnels would be constructed using a cut-and-cover method. Upon completion of Concept 5, train traffic would be split with traffic in each tunnel.

3.7.1.6 Concept 6: Rebuild with On-Line Construction

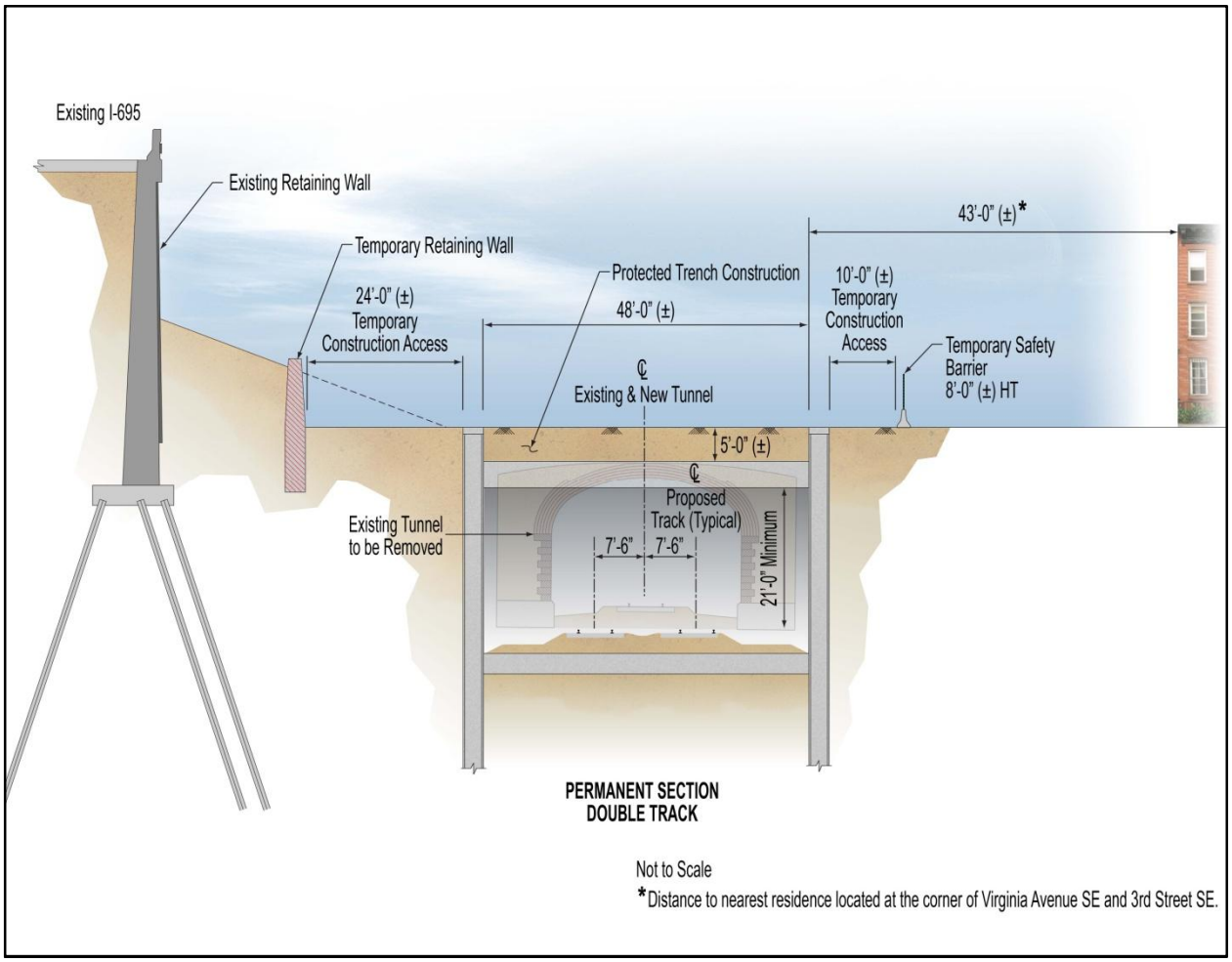
Concept 6 would be similar to Concepts 2, 3 and 4 in that it would result in largely the same kind of new two-track/double-stack tunnel within the existing tunnel envelope (see Figure 3-15). Concept 6 is different from Concepts 2 to 5 in that a runaround track/trench or new single-track tunnel would not be used to maintain freight rail traffic during construction. Instead, Concept 6 would involve construction of a new permanent tunnel in short segments while maintaining freight rail traffic in one half of the tunnel at all times. Demolition of the old tunnel and construction of the new tunnel would occur in numerous stages with regularly shifting track alignments and all work occurring in very close proximity to live train traffic, allowing trains to continue to use the tunnel though the construction work area on a daily basis. (Note that additional engineering analysis on Concept 6, after it was developed into Alternative 4, showed that a larger trench would be needed for both maintaining freight rail operations and rebuilding the tunnel).

Concept 6 would require substantial daily coordination between the train operators and the construction contractor to safely allow trains to pass through the construction zone on set schedules. Inevitably, this extremely complicated coordination has the potential to cause delays to both freight rail operations and construction, as well as increase community impacts because of the increased duration of construction in the Virginia Avenue SE neighborhood. The contractor would be under the daily obligation to ensure the rail lines through the work area are operational at all times.

3.7.1.7 Concept 7: Rebuild, Temporary Reroute

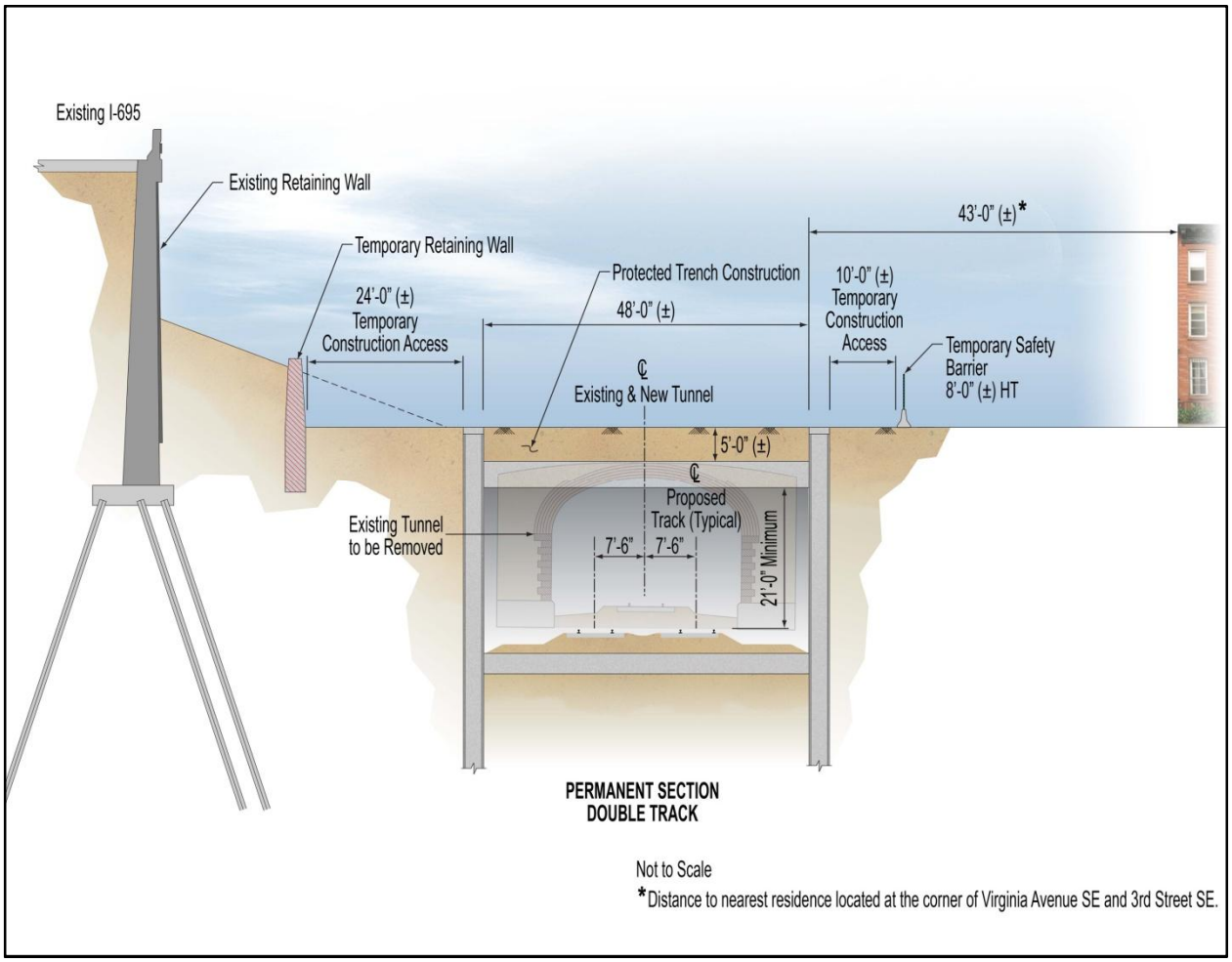
Concept 7 is similar to the Concepts 2, 3, 4 and 6 in that the rebuilt Virginia Avenue Tunnel would be reconstructed generally within the existing horizontal envelope of the existing tunnel (see Figure 3-16). Instead of accommodating the train traffic within the Virginia Avenue SE corridor as would be done under Concepts 2 through 6, Concept 7 would close the tunnel to all traffic during construction. Therefore, Concept 7 unlike the other concepts would not be able to maintain the same level of service to Washington Metropolitan Area regional customers during construction. It would create logistical problems in the rerouting of trains to maintain service to these customers.

Figure 3-15
Concept 6 Typical Section



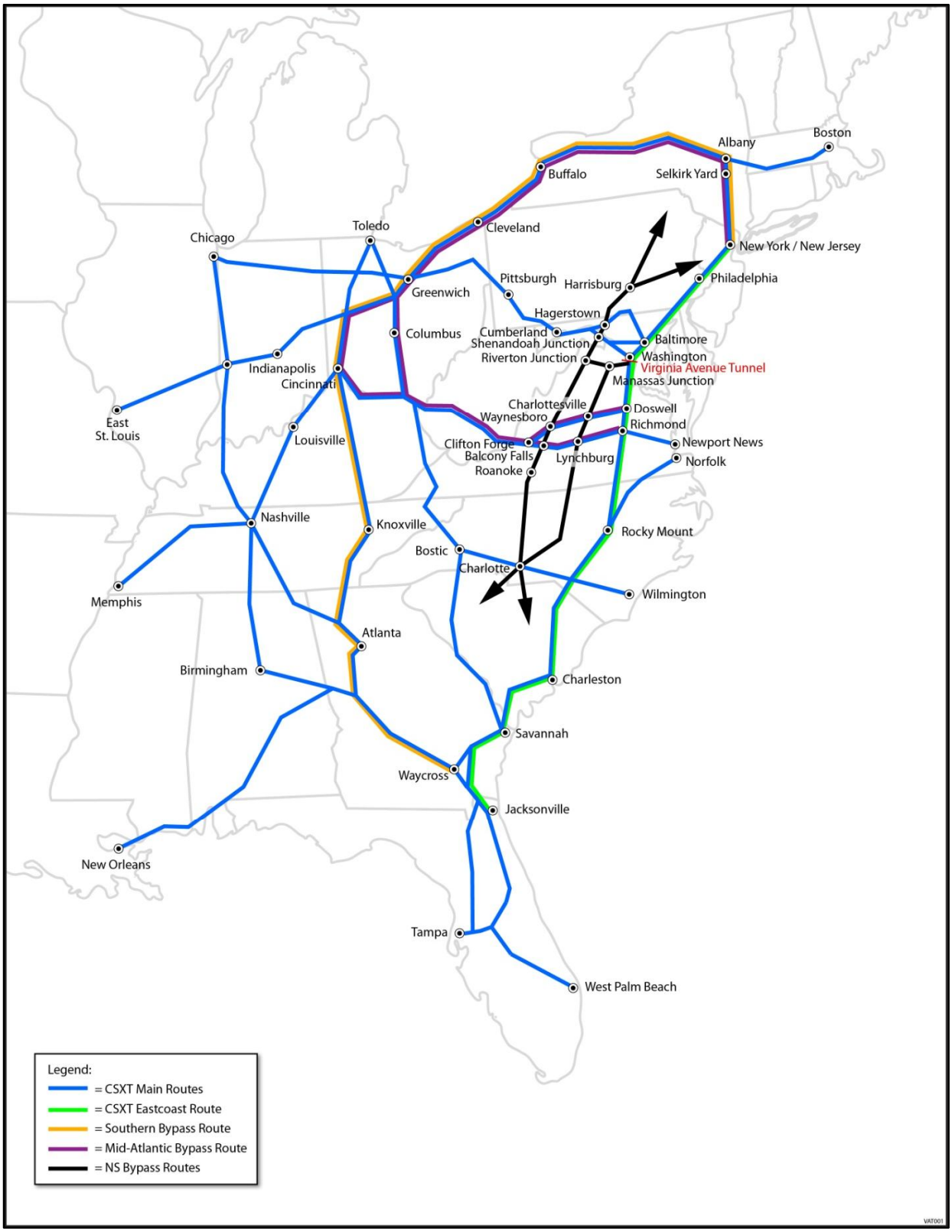
Concept 7 would temporarily detour freight trains through other rail routes within and outside the District. Figure 1-3 in Chapter 1 depicts the existing rail network in the District of Columbia, including the rail lines used by passenger carriers, such as AMTRAK and VRE. Routing freight trains through Union Station (a passenger train station) would maintain the connectivity of the freight rail network through the District. However, a maximum of one freight train per day would be able to move through Union Station in each direction, due to the constraints of existing passenger rail service. In addition, each freight train would require equipment changes before it could traverse Union Station. Because of the capacity constraints of the route through Union Station, freight rail traffic must operate over other principal routes throughout the eastern seaboard. Each of these bypass options involve substantial additional train mileage and transit time. Figure 3-17 displays the potential bypass routes, which are briefly discussed below.

Figure 3-16
Concept 7 Typical Section



CSXT Southern Bypass Route – Northbound trains originating in Florida and destined for northeastern points would divert from the eastern seaboard freight rail corridor route at Waycross, GA and be routed through Atlanta GA, Knoxville TN, Cincinnati and Cleveland OH, Buffalo NY, and into Selkirk Yard (located in the vicinity of Albany NY). Southbound trains originating at Selkirk Yard would use the reverse routing to Waycross GA. From Selkirk Yard, freight trains could access markets in New Jersey, New York City, and New England. Baltimore/Philadelphia markets could be accessed via route running through Pittsburgh PA and Cumberland MD. The segment between Waycross, GA and Cleveland (Greenwich), OH is essentially a single-track rail line with passing sidings, and much of it is already at or near capacity.

Figure 3-17
Temporary Detours outside the District under Concept 7



CSXT Mid-Atlantic Bypass Route - Northbound trains originating in the Carolinas would use the eastern seaboard freight rail corridor route to Richmond VA, then divert to the Mid-Atlantic Route and proceed through Lynchburg and Clifton Forge VA, Huntington WV, Columbus and Cleveland OH, and on to Selkirk Yard. As with the Southern Bypass, the Mid-Atlantic Bypass adds over 800 miles to the overall route to New Jersey points. Half of the segment between Richmond, VA and Huntington, WV is a single-track rail line, and is in mountainous areas used frequently by coal trains. In addition, westbound trains traveling from Richmond have no efficient means to connect with Lynchburg and head north. A complicated and time-consuming maneuver involving the uncoupling of locomotives from one end of the train and coupling the locomotives on the other end would be required. Moreover, each of these train movements requires crossing over mainline tracks that are used by approximately 20 AMTRAK trains daily. Essentially, using the Mid-Atlantic Bypass Route is not a feasible operation for multiple freight trains per day.

CSXT Mid-Atlantic Bypass Route (Doswell) – A variation Mid-Atlantic Bypass would deviate from eastern seaboard freight rail corridor route in Doswell VA, rejoining the bypass route in Clifton Ford, VA. The route segment between Doswell and Clifton Forge is operated by the Buckingham Branch Railroad. Although CSX has rights to use this rail line primarily as a relief route for returning empty coal trains, it is not feasible to support high density freight traffic due to its low speed limit (25 mph), and lack of sufficient siding length and space (distance between each siding) and steep grades.

Norfolk Southern (NS) I-83 Hagerstown Route – Another possible bypass route involves using the NS I-83 freight rail route that traverses the Shenandoah Valley from Charlotte NC through Roanoke VA, Hagerstown MD and Harrisburg PA. Beyond Harrisburg PA, a number of NS routes are available that enable access to the New Jersey area. As a NS route, train movement and track sharing would have to be negotiated before any CSX trains could use it. NS would maintain absolute control of dispatching and the guest railroad trains (CSX) are allowed access as the opportunity permits. Although rerouting is a common railroad practice under emergency conditions that are usually short in duration, negotiating a 2 plus-year operating agreement that would maintain CSX's current level of operational service may not be possible. Notwithstanding agreement issues, using the I-83 NS route presents operational challenges. Essentially, the NS I-83 corridor route has extremely limited in line capacity. The corridor has a single railroad track, a limited number of sidings, and much of the corridor consists of curved track and low speed limits.

3.7.1.8 Concept 8: Reroute, Deep Bore Tunnel

Concept 8 would establish a new two-track/double-stack tunnel approximately 80 feet below the surface of Virginia Avenue SE (i.e. approximately 45 feet below the existing tunnel) (see Figure 3-18). This depth is needed to maintain a stable foundation under the existing tunnel while the new tunnel is being excavated. The purpose of Concept 8 would be to maintain the existing mainline freight rail route through Washington, DC, but avoid the need for construction on Virginia Avenue SE. Rail operations would continue using the existing Virginia Avenue

Tunnel for service Washington Metropolitan Area and regional customers. Constructing this tunnel would require the use of tunnel boring equipment, and would not require any major construction activity on city streets, including Virginia Avenue SE. The diameter of the tunnel would be approximately 44 feet wide, which would be wide enough to accommodate two-track/double-stack facilities. In order to reach a depth of 80 feet in the area of the existing tunnel while also maintaining appropriate separation from other existing features along the route (i.e., river crossings and WMATA tunneling), the portals of the new tunnel would be located no closer than an area near the south of Reagan National Airport in Alexandria, VA on the west end and near the Deanwood Metrorail Station on the east end, making the minimum length of the tunnel approximately nine miles (see Figure 3-19). For the construction of the transition area at each portal, a minimum of 14-16 acres would be required. In addition, numerous ventilation shafts along the entire tunnel length would be needed, most of which would be sited in urban areas.

There are several reasons for the 9-mile tunnel length. The maximum permissible grade for freight trains operating on this corridor is 1.25 percent. The portal would have to be located at least 6,400 feet from the bottom of the slope. With a 1.25 percent grade and with the existing tunnel at approximately 3,800 feet long, a deep bore tunnel would be no shorter than approximately 16,600 feet, or a little more than three miles. Second, several natural and manmade obstructions would prevent the minimum length of a deep bore tunnel with grades of 1.25 percent. The natural obstructions include the Anacostia and Potomac Rivers. For example, because of the relatively close proximity of the Anacostia River to the current east portal, the deep bore tunnel's rise to surface level elevation could not begin until the tunnel is on the east side of the river. The manmade obstructions include underground structures associated with freeway over- and under-passes, underground utilities including large combined sewer overflow (CSO) trunk lines, and underground transportation facilities, such as Metrorail tunnels and the 12th Street, 1st Street and I-395 tunnels. The manmade obstructions would affect the tunnel length and depth on the west side, and would force the deep bore tunnel's rise to surface level elevation to begin on the west side of the Potomac River. Finally, the length of the deep bore tunnel under Concept 8 would be affected by keeping the tunnel within the existing CSX right-of-way within the District, Maryland and Virginia.

3.7.1.9 Concept 9: Reroute NCPC Indian Head Alignment

Concept 9 was taken from a study conducted by the National Capital Planning Commission (NCPC) in 2007 titled, the Railroad Realignment Feasibility Study. The NCPC study identified alternative routes to divert the majority of the freight traffic on the I-95 corridor away from the District, but still within the Washington Metropolitan Area. Concept 9 would use an alignment called the Indian Head Alignment, which was identified in the NCPC study (see Figure 3-20). Under Concept 9, a new mainline rail route would be established through the greater Washington Metropolitan Area.

Figure 3-18
Concept 8 Typical Section

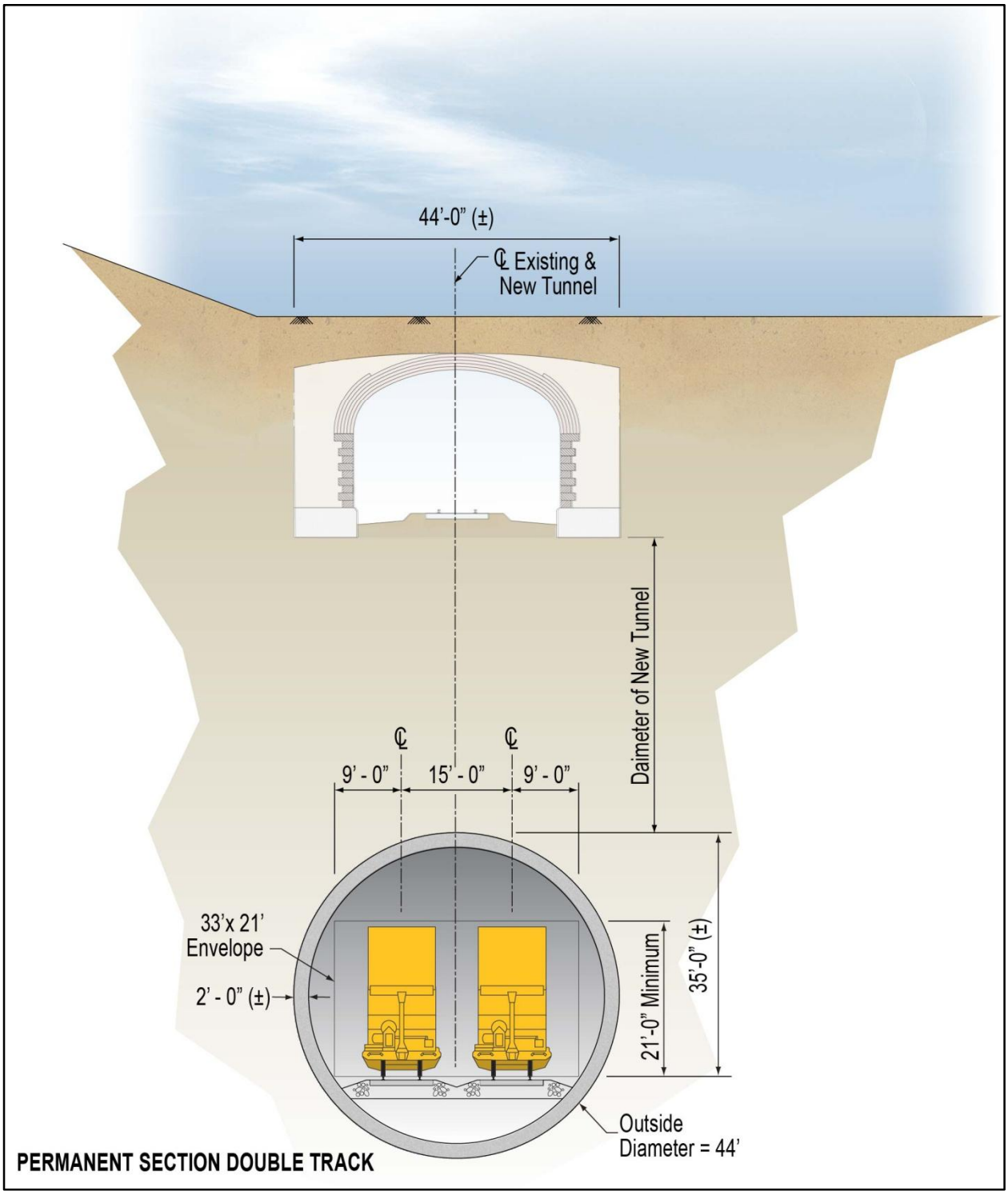
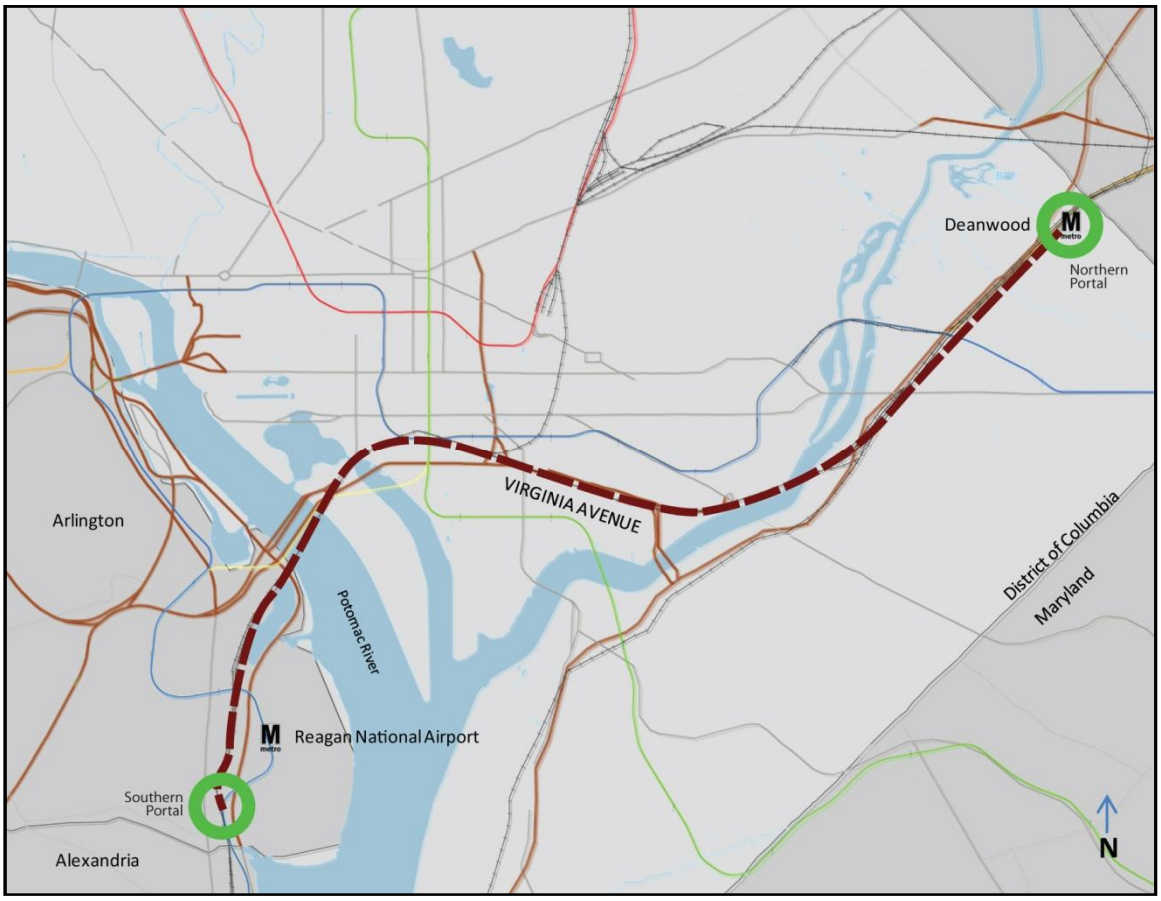
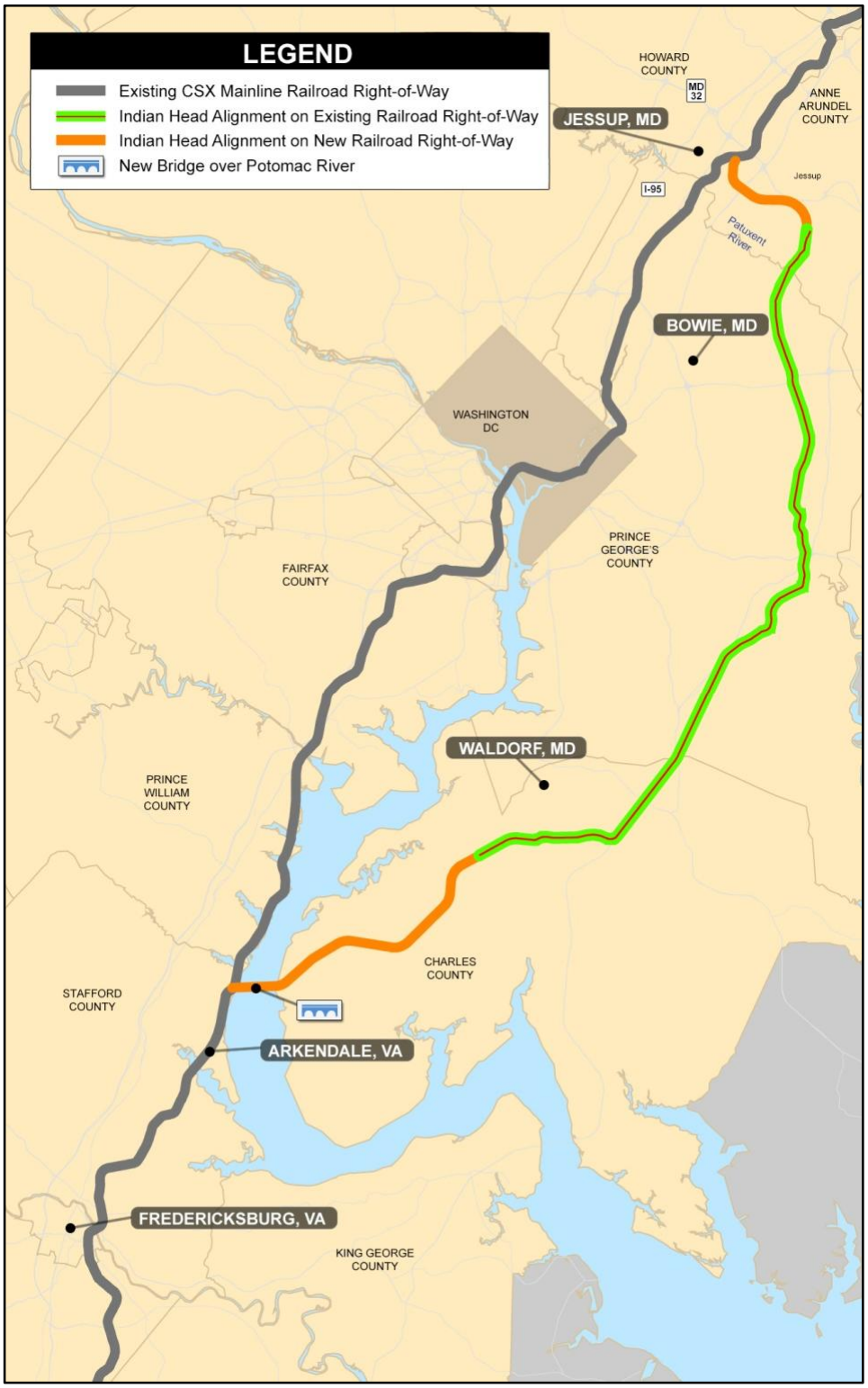


Figure 3-19
Concept 8 Tunnel Alignment and Portal Locations



From Virginia, the Indian Head alignment would diverge from the existing mainline rail tracks north of Arkendale, and cross the Potomac River via a new two-track 2.5-mile-long bridge. On the east side of the river, a new two-track railroad would be built and connect with the existing single-track Indian Head Branch, and the single-track Pope's Creek Branch. The sections of the Indian Head and Pope's Creek Branch affected by this alignment would require two-track expansion, including, where necessary, changes in grades or bridge or overpass structures to allow double-stack operations. North of Bowie, MD the alignment would run parallel to the Amtrak Northeast Corridor, and a new two-track railroad would be built between the Patuxent River and MD 32 to the mainline traversing through Jessup, MD.

Figure 3-20
Concept 9, NCPC Indian Head Alignment



3.7.1.10 Concept 10: Reroute, NCPC Dahlgren Alignment

Concept 10 was also taken from the 2007 NCPC study. It would use an alignment called the Dahlgren Alignment (see Figure 3-21). The purpose of Concept 10 is the same from Concept 9: instead of making the necessary capital improvements to maintain the existing mainline route through Washington, DC, it would establish a new mainline route through the greater Washington Metropolitan Area.

From Virginia, the Dahlgren alignment would diverge from the existing mainline rail tracks just south of Fredericksburg where a new two-track railroad would be constructed that would traverse across King George County. From just south of Fredericksburg, the alignment of Concept 10 would follow an existing utility corridor right-of-way, cross the Rappahannock River and connect with the abandoned Dahlgren rail line, which would be restored to a functioning two-track railroad. This restored rail line would then parallel the recently completed Dahlgren Railroad Heritage Trail for a short distance before establishing new rail line that would partially be aligned with the U.S. 301 to the Potomac River. At the Potomac River, a new two-mile-long railroad drawbridge would be constructed near the existing U.S. 301 Bridge. The alignment would connect with the southern terminus of single-track Pope's Creek Branch, which would require two-track expansion. At and north of Waldorf, the Dahlgren alignment is the same as the Indian Head alignment.

3.7.1.11 Concept 11: Reroute, Permanent Reroute

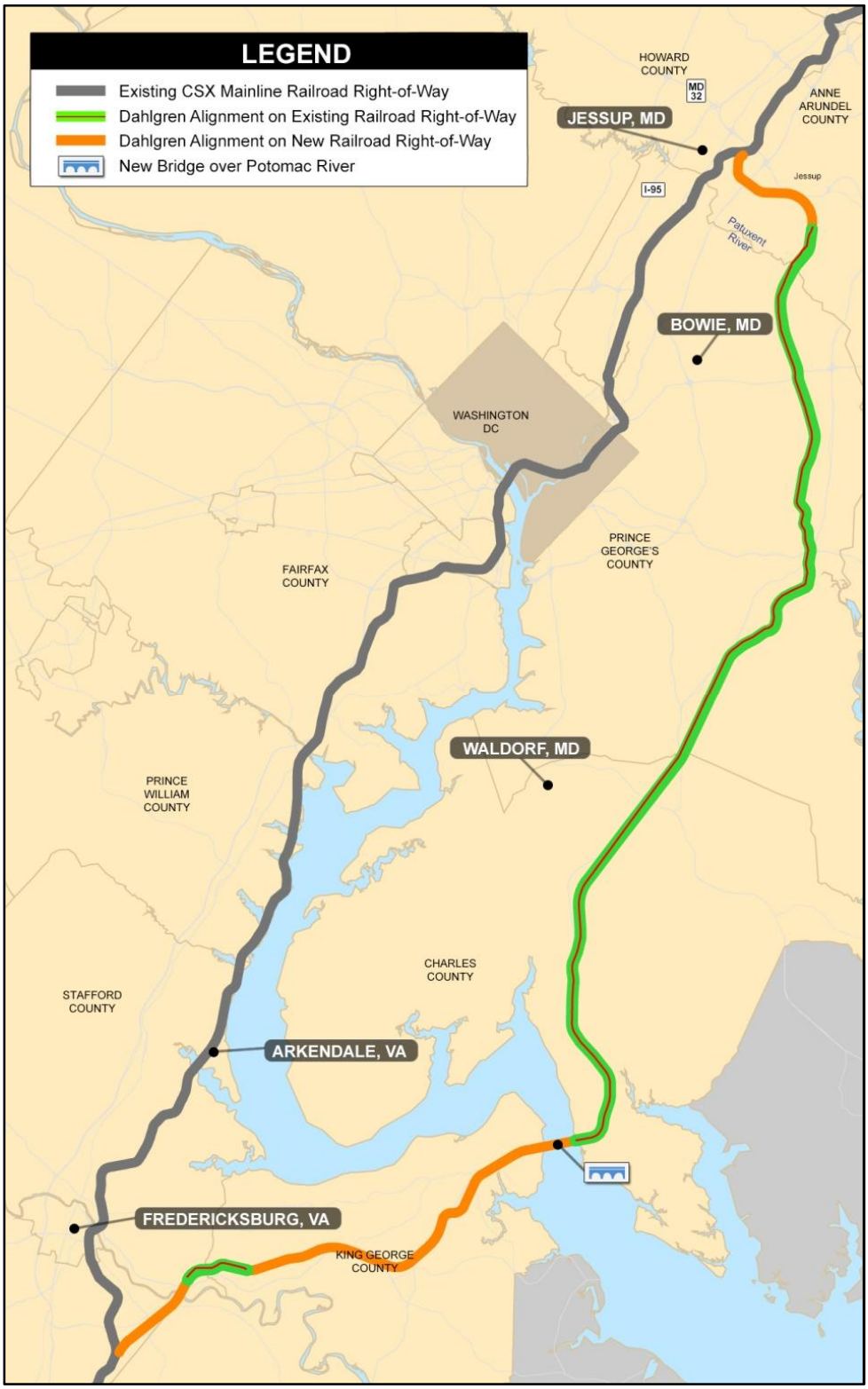
Concept 11 involves no proposed construction or upgrades to the existing Virginia Avenue Tunnel, and would establish new permanent routes using existing railroads owned by CSX throughout the eastern part of the U.S. This concept would continue operations in the existing Virginia Avenue Tunnel SE while permanently routing freight trains outside the District (see Figure 3-17). Concept 11 would use the same routes as Concept 7. However, the reroutes would be permanent under this concept, and would require substantial upgrades.

The differences between Concepts 7 and 11 is the duration of rerouting (temporary versus permanent), and the impacts associated with the durations. Similar to Concept 7, freight traffic must operate over other principal routes and all bypass options involve significant additional train mileage and running time. These potential bypass routes are discussed under Concept 7 and are illustrated in Figure 3-17.

3.7.2 Evaluation Criteria and Screening Process

This section describes the eight evaluation criteria and explains how each concept was measured against the criteria. The project concepts were introduced to the public during the November 30, 2011 public meeting. Following this and other smaller group meetings, the concepts evaluation criteria were developed and applied.

Figure 3-21
Concept 10, NCPC Dahlgren Alignment



Criteria 1 through 4 are based on the Project Purpose and Need described in Chapter 1. Criteria 5 through 8 address issues of technical and economic feasibility, such as impacts on freight traffic and cost, as well as impacts to the community, including the duration of construction along Virginia Avenue SE. Detailed descriptions of the criteria are provided in the Concepts Evaluation Technical Report provided in Appendix B. The criteria and their application are described below.

Criterion 1: The concept, upon completion, will address the deficiencies of the Virginia Avenue Tunnel.

In order for a concept to meet Criterion 1, Virginia Avenue Tunnel must be rebuilt to modern engineering standards, while at the same time eliminating the bottleneck on the I-95 mainline rail corridor, a vital segment of the nation's rail network. The elimination of the bottleneck does not necessarily have to be through the Virginia Avenue corridor in order to partially meet this objective.

Criterion 2: The concept, upon completion, will provide the necessary improvements for operating double-stack intermodal containers and have two tracks for the efficient flow of commercial rail freight through the Washington Metropolitan Area.

In order for a concept to meet Criterion 2, the Project must result in two railroad tracks with sufficient clearance to accommodate double-stack containers on rail cars throughout the Washington Metropolitan Area.

Criterion 3: The concept will avoid major impacts to the structures, traffic or access to or from I-695.

Only rebuild concepts (Concepts 2 through 7) that involve a short-term temporary closure of I-695 ramps meet Criterion 3. Rebuild concepts that involve long-term closure of an I-695 ramp or re-construction of any structural element of I-695 (e.g., columns, retaining walls, etc.) do not meet Criterion 3. Obviously, Concepts 8 through 11, which do not require construction along the surface streets, including Virginia Avenue SE, would meet Criterion 3. However, it is uncertain, and beyond the scope of this analysis, to predict how the massive railroad construction contemplated by any of these concepts (including construction of a new rail bridge across the Potomac River) could affect interstate highways and other major roads.

Criterion 4: The concept must allow for the maintenance of traffic across Virginia Avenue and along adjacent streets throughout the duration of construction.

In order to meet Criterion 4, the concept must have the potential to include effective traffic management measures to maintain cross-street traffic across Virginia Avenue for motorists, pedestrians and cyclists, and vehicle access to and from I-695.

Criterion 5: The concept will maintain interstate rail commerce without a substantial negative impact to the level of service during construction.

This criterion requires a dependable level of timely freight transportation services in the Washington Metropolitan Area throughout the duration of construction. If a concept is unable to maintain the existing level of service, it would fail to meet Criterion 5.

Criterion 6: The concept will be implemented in a time frame that accommodates the near term anticipated increase in freight traffic.

As a practical matter, Criterion 6 requires that double-stack intermodal container train operations be available through the Washington Metropolitan Area by 2015, the year in which the Panama Canal is projected to be expanded allowing passage of larger vessels with higher freight capacity. A concept does not necessarily have to be fully constructed by 2015 in order to meet Criterion 6 if it includes temporary measures that maintain freight operations through the Washington Metropolitan Area with the ability to operate double-stack intermodal container freight trains.

Criterion 7: The concept has a comparatively reasonable duration of construction in the vicinity of the existing tunnel.

In order to determine if a concept meets Criterion 7, the expected length of construction for each of the 12 concepts were compared. The concepts with the shorter construction periods within the Virginia Avenue SE corridor satisfy Criterion 7.

Criterion 8: The concept has a comparatively low cost.

Under Criterion 8, a comparatively low cost essentially means a cost that is practical and feasible from an economic standpoint. To apply Criterion 8, a cost comparison of the 12 concepts was conducted. The concepts in the lower range of overall costs meet Criterion 8. Concepts with costs orders of magnitude greater than the lower cost concepts would not satisfy Criterion 8.

3.7.3 Concepts Dismissed from Further Consideration

This section provides a summary of how each concept was evaluated and rated against the eight criteria described in Section 3.7.2. Table 3-6 summarizes the findings of the concepts screening evaluation. The table qualitatively scores each concept against the eight evaluation criteria. Scoring is based on ability of each concept to either meet the criteria, failure to meet the criteria, or uncertainty in meeting the criteria and where further study would needed through the EIS process. The scores on the table also reflect situations where the criteria are simply not applicable to concepts. The Concepts Evaluation Technical Report in Appendix B contains a point-by-point descriptive evaluation of the alternative concepts against the criteria. It also provides more information on why certain concepts were eliminated from detail study as formal alternatives in the EIS process.

Table 3-6
Concepts Evaluation Matrix

	Project Criteria	No Build	Rebuild Tunnel Concepts							Reroute Freight Traffic Concepts			
		1	2	3	3A	4	5	6	7	8	9	10	11
1	The concept, upon completion, will address the deficiencies of the Virginia Avenue Tunnel.		Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	No
2	The concept, upon completion, will provide the necessary improvements for operating double-stack intermodal containers and have two tracks for the efficient flow of commercial rail freight through the Washington Metropolitan Area.		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
3	The concept will avoid major impacts to the structures, traffic or access to or from I-695.		Yes	No	No	Requires more study	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4	The concept must allow for the maintenance of traffic across Virginia Avenue and along adjacent streets throughout the duration of construction.		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
5	The concept will maintain interstate rail commerce without a substantial negative impact to the level of service during construction.		Yes	Yes	Yes	No	Yes	Requires more study	No	Yes	Yes	Yes	Yes
6	The concept will be implemented in a time frame that accommodates the near term anticipated increase in freight traffic.		Requires more study	Requires more study	Requires more study	Requires more study	Requires more study	Requires more study	No	No	No	No	No
7	The concept has a comparatively reasonable duration of construction in the vicinity of the existing tunnel.		Requires more study	Requires more study	Requires more study	Requires more study	Requires more study	Requires more study	Yes	N/A	N/A	N/A	N/A
8	The concept has a comparatively low cost.		Yes	Requires more study	Requires more study	Requires more study	Yes	Requires more study	Requires more study	No	No	No	No

Legend:
- Yes
- Requires more study
- No
- N/A

Based on the evaluation, all of the reroute concepts (Concepts 8 through 11) were eliminated from further consideration. In summary, the major reasons for eliminating the reroute concepts include:

- Concept 8, Reroute, Deep Bore Tunnel, which failed three of the evaluation criteria, would require acquisition of 14 to 16 acres at portal locations and the construction of ventilation shafts in urban areas. It would have an extremely high cost (estimated to cost approximately $2 billion) and require extensive planning efforts across multiple jurisdictions.
- Concept 9, Reroute, NCPC Indian Head Alignment, which failed three of the evaluation criteria, would require a new bridge over the Potomac River and 31 miles of new rail line. It would traverse several communities, would affect diverse natural resources, would have an extremely high cost (NCPC estimated to cost between $3.2 and $4.2 billion), and would require extensive planning efforts across multiple jurisdictions.
- Concept 10, Reroute, NCPC Dahlgren Alignment, which failed three of the evaluation criteria, would require a new bridge over the Potomac River and 38 miles of new rail line. Like Concept 9, it would traverse several communities, would affect diverse natural resources, would have an extremely high cost (NCPC estimated to cost between $3.5 and $4.7 billion), and would require extensive planning efforts across multiple jurisdictions.
- Concept 11, Permanent Reroute, which failed four of the evaluation criteria, would include substantial diversion of freight traffic to trucks or other modes of transportation, with associated impacts to interstate highway congestion, higher fuel consumption, and increased pollution.

Concepts 3, 3A, 4 and 7 were also eliminated from further consideration. Concepts 3 and 3A failed to meet one of the criteria based on the Project's Purpose and Need. Concept 4 failed to meet Criterion 5. Concept 7 failed to meet Criteria 5 and 6. In summary, the major reasons for eliminating these concepts include:

- Concept 3, Rebuild, Temporary North Side Runaround, would result in major impacts to I-695 during construction.
- Concept 3A, Rebuild, Permanent Two Tunnels (New Tunnel on North Side of Existing Virginia Avenue Tunnel), would also result in major impacts to I-695 during construction.
- Concept 4, Rebuild, Combination Runaround, would require two major disruptions to freight rail operations, causing stoppages of freight train movements for several weeks for each disruption.
- Concept 7, Rebuild, Temporary Reroute, would result in a substantial degradation of freight rail service to growing customer demands in the I-95 corridor

The following remaining concepts were retained as Build Alternatives for detailed evaluation in the EIS process, including further study with regards to Criteria 6 to 8 on Table 3-6:

- Concept 2: Rebuild Virginia Avenue Tunnel, Temporary South Side Runaround

- Concept 5: Permanent Two Tunnels (New Tunnel on South Side of Existing Virginia Avenue Tunnel)
- Concept 6: Rebuild Virginia Avenue Tunnel, Rebuild With On-Line Construction

The retained concepts were developed as project alternatives, and given descriptive names (see Section 3.4):

- Alternative 1: No Build
- Alternative 2: Rebuilt Tunnel / Temporary Runaround Track
- Alternative 3: Two New Tunnels
- Alternative 4: New Partitioned Tunnel / Online Rebuild

Chapter 4
Affected Environment

Chapter 4 Affected Environment

This chapter describes the environment of the areas potentially affected by the alternatives considered in this Final EIS. It provides information on existing environmental resources, including any sensitive features, and the social and economic setting at and surrounding the Project's limits of disturbance (LOD), as described in Section 3.5.1. The geographic parameters used to identify and describe the affected environment are based on the likelihood resources within this area could be affected by at least one of the alternatives, and would vary by environmental topic. For certain topics, this area would encompass a generalized area surrounding the LOD with no specific boundaries, such as land use. However, for other topics the study area would have specific delineations, including that of the LOD to determine "footprint" impacts such as tree displacements. The environmental impacts of the Project on these resources are discussed in Chapter 5.

As described in Section 1.2, the Virginia Avenue Tunnel is approximately 3,800 feet in length and is beneath eastbound Virginia Avenue SE from just west of 2nd Street SE (west portal) to 9th Street SE, Virginia Avenue Park, and the 11th Street Bridge right-of-way between 9th and just east of 11th Streets SE (east portal). The tunnel contains a single railroad track and does not have the minimum 21 feet vertical clearance to allow the operation of double-stack intermodal freight trains. The tunnel is an integral part of CSX's freight rail network to carry goods across Mid-Atlantic and Midwest states.

4.1 Land Use

4.1.1 Existing Land Uses

The Project is located in the southeast quadrant of the District of Columbia in the Capitol Hill community. Capitol Hill encompasses portions of both the District's southeast and northeast quadrants, extending east from the U.S. Capitol to the Anacostia River along the southeast and east edges and to H Street NE and Benning Road NE along its north edge. Capitol Hill contains a wide range of mixed land uses, including retail, office, and commercial businesses; residential uses; industrial uses; and government properties and buildings. The "Hill" is also characterized by its 19th and 20th century brick row houses, which led to the creation of a district that was placed on the National Register of Historic Places (National Register) (see Section 4.10 for further information). Despite the preservation of these historic row houses (many of which were converted from residential to commercial uses), substantial land use changes have occurred over the past several decades. These include, most prominently, the construction of the Southeast-Southwest Freeway (I-695), which bifurcated the community and now presents the dominant visual characteristic along the Virginia Avenue SE (see photograph). In general, the land uses on the north side of I-695 have retained their historical characteristics. The land uses on the south side, however, have been subject to large scale redevelopment that eliminated most of the original structures and buildings.

Figure 4-1 shows the existing land uses surrounding the LOD. Descriptions of these land uses categorized by governmental, institutional, industrial, residential, commercial and recreation are provided below.

Government

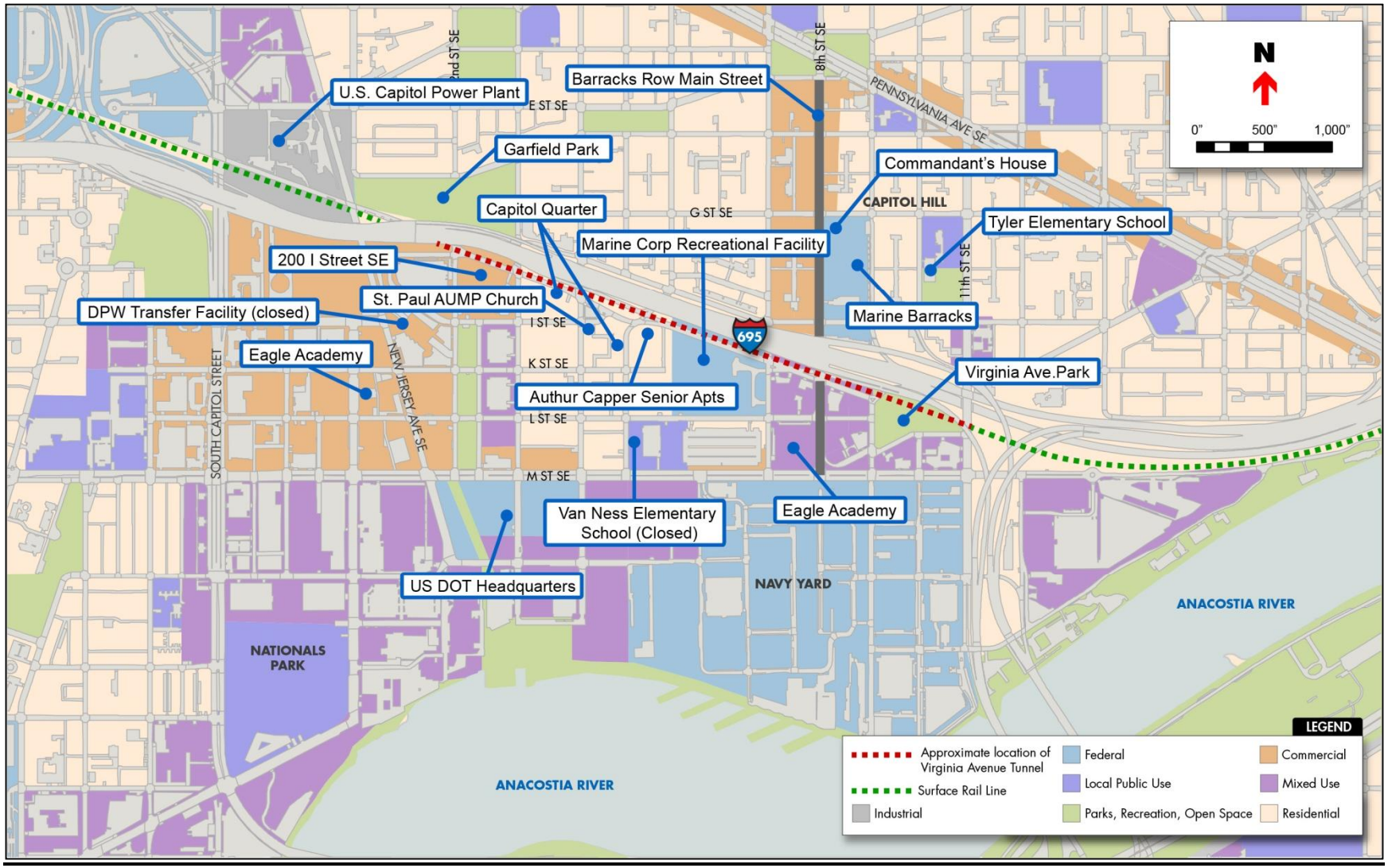
I-695 Viaduct & Virginia Ave. SE, Looking East at 7th Street SE

A number of federal facilities are located near the LOD, such as the Washington Navy Yard, the Marine Barracks, and the U.S. Department of Transportation headquarters.

The 70-acre Washington Navy Yard employs approximately 10,000 Navy employees and 5,000 private contractors. It is the headquarters of Naval District Washington (NDW) and supports a variety of activities (Washington, DC Marketing Center, 2004). The NDW functions as the military coordinator for most of the U.S. Navy units in the Washington, Northern Virginia, and Maryland areas. The U.S. Department of the Interior has designated the Washington Navy Yard as a National Historical Landmark.

The Marine Barracks – the oldest active post in the U.S. Marine Corps -- is located at 8th and I Streets SE. The Barracks supports both ceremonial and security missions within the District. The Barracks is located north of the Southeast/Southwest Freeway along 8th and 9th Streets. The Commandant's House, still standing at the north end of the Barracks, was completed in 1806 and is the oldest public building in continuous use in the nation's capital. The remaining Barracks were rebuilt between 1900 and 1907. Both the Marine Barracks and the Commandant's House were placed on the National Register by the U.S. Department of the Interior in 1976. The Barracks have been expanded to accommodate new housing for 300 Marine personnel, as well as a public park and recreational facilities open to the public (National Capital Planning Commission [NCPC], 1997). These newer facilities, located at 1009 7th Street SE, include bachelor enlisted quarters, the Marine Band practice hall, personnel support, Marine Barracks Turf Field and other recreational facilities.

Figure 4-1
Existing Land Uses



The U.S. Department of Transportation (U.S. DOT) headquarters building, located at 1200 New Jersey Avenue SE, is comprised of two buildings on 11 acres with 1.35 million square feet of office space. The U.S. DOT relocated its headquarters from L'Enfant Plaza to its current location in 2007. The new headquarters is located at the corner of the "Yards", a mixed-use development at the Southeast Federal Center.

In addition to these federal facilities, the Government of District of Columbia also operates facilities near the LOD. Among them is the building located at 200 I Street SE. This building, with the former address of 225 Virginia Avenue SE, began as a printing plant for the *Washington Star* and then the *Washington Post*. After several false starts to convert the building, the Government of the District of Columbia purchased the building and converted the building into new offices for the District of Columbia Child Family Services Agency, the Office of the Chief Technology Officer and the Commission on the Arts and Humanities.

The DC Department of Public Works (DPW) recently closed a refuse transfer facility at 900 New Jersey Avenue SE, and the DC Housing Authority is planning to build housing on this property. This project will also include connecting I Street SE between New Jersey Avenue SE and 2nd Street SE to complete a portion of the street grid. The north side of the I Street SE extension is currently being developed into a four-building mixed use project, which requires a portion of the transfer building site.

Institutional

This category includes land and facilities occupied by schools, hospitals, religious organizations and similar institutions. A number of schools are located near the LOD, including the Tyler Elementary School, Eagle Academy (2 locations), Capitol Hill Day School, and the former Van Ness Elementary School, which is planned to be re-opened. The District Public Schools (DPS) closed Van Ness Elementary, located at 5th and M Streets SE, in 2006 because of a lack of school-age children in the neighborhood (due to the closing of the former Capper/Carrollsburg public housing project). The DPS continues to use the school building for administrative offices until such time as the neighborhood has enough elementary students to warrant re-opening the school, possibly as early as the 2015 school year.

Several churches are also located near the LOD including the St. Paul African Union Methodist Church, located at 401 I Street SE, which is listed on the National Register. There are no hospitals or public libraries in the vicinity of the LOD.

Industrial

This category includes areas characterized by manufacturing, warehousing, wholesale and distribution centers; roads, streets, alleys and other transportation rights-of-way; vehicle storage/maintenance yards; railroad corridors; and similar uses. As a largely residential, commercial, governmental and office community, Capitol Hill contains very few industrial land uses. The U.S. Capitol Power Plant is one of the exceptions. Located near the intersection of

South Capitol Street and E Street SE, the power plant has been in continuous service since 1910. Originally providing both steam and electricity to the 23 buildings in the Capitol Hill area, the electrical generation was decommissioned in 1952. From then on, the reconfigured power plant provides steam and chilled water.

Residential

The District of Columbia contains eight Wards. The Project is in the District's Ward 6. Neighborhoods in Ward 6 are characterized predominantly by moderate-density residential development. As noted in Figure 4-1, residential land uses dominate the areas north of I-695, including social services and community facilities serving the residential areas. In addition to federal buildings and facilities, Capitol Hill is the largest residential historic district in the District with many of its 19th and 20th century row houses listed on the National Register. The Capitol Hill Historic District generally extends from Virginia Avenue SE on the south; South Capitol Street and 2nd Street NE on the west; and F Street NE on the north; and 13th and 14th Streets SE and NE on the east (see Section 4.11 for further information). Although residences near the LOD have market values over the $1 million range, clusters of low income housing, including public housing, are spread throughout the community.

In 2001, the District received a $34.9 million Hope VI grant to redevelop the 23-acre Capper/Carrollsburg public housing site as a mixed-use community with over 700 townhouses, 700,000 square feet of office space, and 50,000 square feet of retail space. Construction on Phase I (a townhouse development called "Capitol Quarter") was completed in the summer of 2010 and is located between 3rd and 5th Streets SE, Virginia Avenue SE, and L Street SE. Phase II, which is located in the blocks between 3rd and 4th Streets SE and I and L Streets SE, was completed in 2012. In total, both phases of Capitol Quarter contain about 320 residential units, most of which are single-family townhouses. The community contains several three-unit apartment buildings as low-income rentals, but these buildings are not readily discernible from the rest of the community.

Arthur Capper Senior Apartments, also part of the Capper/Carrollsburg redevelopment, is an approximately 142,000 square foot affordable senior housing development with 162 units located at the corner of Virginia Avenue SE and 5th Street SE. Also known as "Capper #1," this residential building complements a second senior apartments building with 139 units located on 400 M Street SE, which is known as "Capper #2." The second Seniors Apartments building was completed in 2005.

Commercial

The historic Barracks Row Main Street is the oldest commercial corridor in the city, extending along 8th Street SE from Pennsylvania Avenue SE to the Washington Navy Yard along M Street SE (see Figure 4-1). The portion of 8th Street SE north of I-695 is densely aligned with bars, boutiques, restaurants, and other similar commercial venues. South of I-695, the corridor is less consistent but contains a large concentration of historic structures. Although there are a

few small shops and eating establishments along this stretch, the urban environment is more institutional (charter school) and governmental (Navy Yard).

Recreational Facilities

Two public parks are located within or near the LOD—Virginia Avenue Park and Garfield Park – as are several recreational facilities including the Marine Barracks Turf Field. Section 4.12 contains more information about the parks and recreational facilities in the general vicinity of the LOD.

4.1.2 Land Use and Transportation Plans, Policies and Controls

Existing and future land uses and transportation facilities are controlled by a number of federal, District of Columbia, and other governmental plans, policies and controls. Those relevant to the Project are described in this section.

4.1.2.1 Federal

The National Capital Planning Commission (NCPC) is responsible for long-range planning for federal elements within the District and surrounding counties.

The *Comprehensive Plan for the National Capital* (2004) guides future planning and development for the District and the national capital region. The Comprehensive Plan consists of two parts: Federal Element and District Element. The Federal Element, which is prepared by the NCPC, provides a policy framework for the federal government in managing its operations and activities regarding transportation, federal workplace, parklands, and other related topics. The District Element is described in Section 4.1.2.2.

4.1.2.2 District of Columbia

Comprehensive Plan

The Comprehensive Plan's District Element, prepared by the District's Office of Planning in 2006, includes traditional city planning issues such as land use, housing, and economic development. The District Element is further separated into two parts:

1. The Citywide Elements – Addresses land use, transportation, housing, economic development, educational facilities, historic preservation and other topics that affect the city as a whole.
2. The Area Elements – Addresses the local issues and priorities within 10 geographic areas (and related neighborhoods, business districts, landmarks, etc.) that comprise the District. The Project is located in the Lower Anacostia Waterfront/ Near Southwest Areas.

Table 4-1 presents the elements of the Comprehensive Plan that are relevant to the Project.

The *Anacostia Waterfront Framework Plan* (2003) completed by the District Office of Planning (OP) in cooperation with the Anacostia Waterfront Initiative, envisions a dramatically redeveloped area with a substantial increase in housing, retail, offices and parks; M Street transformed into a vibrant mixed-use corridor; and the extension of existing streets to the Anacostia River.

Table 4-2 presents the goals for future land use for the Near Southeast area.

Table 4-1
Comprehensive Plan Goals Relevant to the Project

Land Use Goal
Ensure the efficient use of land resources to meet long-term neighborhood, citywide, and regional needs; to help foster other District goals; to protect the health, safety, and welfare of District residents and businesses; to sustain, restore, or improve the character and stability of neighborhoods in all parts of the city; and to effectively balance the competing demands for land to support the many activities that take place within District boundaries." (District Element)
Transportation Goal
"Create a safe, sustainable, efficient multi-modal transportation system that meets the access and mobility needs of District residents, the regional workforce, and visitors; supports local and regional economic prosperity; and enhances the quality of life for District residents." (District Element)
Parks Recreation and Open Space Goal
"Preserve and enhance parks and open spaces within the District of Columbia to meet active and passive recreational needs, improve environmental quality, enhance the identity and character of District neighborhoods, and provide visual beauty in all parts of the national capital." (District Element)
Environmental Protection Goal
"Protect, restore, and enhance the natural and man-made environment in the District of Columbia, taking steps to improve environmental quality, prevent and reduce pollution, and conserve the values and functions of the District's natural resources and ecosystems." (Federal Element)
Urban Design Goals
"Enhance the beauty and livability of the city by protecting its historic design legacy, reinforcing the identity of its neighborhoods, harmoniously integrating new construction with existing buildings and the natural environment, and improving the vitality, appearance, and security of streets and public spaces." (District Element) "Preserve and enhance the unique cultural heritage, beauty, and identity of the District of Columbia by respecting the historic physical form of the city and the enduring value of its historic structures and places, recognizing their importance to the citizens of the District and the nation, and sharing mutual responsibilities for their protection and stewardship". (District Element)

Source: National Capital Planning Commission, Comprehensive Plan for the National Capital – Federal Element (2004)
District of Columbia, Office of Planning, Comprehensive Plan for the National Capital – District Element (2006)

Table 4-2
Goals for the Near Southeast Area

Land Use Goals
Development Goal of 10,000 residential units; and 15 million square feet of commercial/office space.
"…A significant increase in residential density, concentrated primarily in the Hope IV development [now Capper/Carrollsburg], at the SEFC [Southeast Federal Center] waterfront, around the Canal Blocks, at the eastern end of M Street, and along 8th Street."
Transportation Goal
"The existing bridges that cross the Anacostia River must be redesigned to serve as great works of urban infrastructure. Reducing the traffic load on existing bridges and avenues is critical for urban design improvements, park access, and economic growth in the area; indeed, for residents' quality of life."
Parks, Recreation and Open Space Goals
Development Goal of 60 acres of open space.
Proposed Canal Blocks Park [now Washington Canal Park]; a waterfront park at the SEFC; and a river walk "that will provide 1.8 miles of continuous, publicly accessible shoreline in the Near Southeast."
Urban Design Goals
"Office development combined with street-level retail is encouraged along M Street [SE] to create a pedestrian-friendly, urban boulevard."
"The Framework recommends the extension of New Jersey Avenue, 3rd Street, and 4th Street [SE] through the SEFC site to facilitate public access to the waterfront."
"Virginia Avenue should serve as a greenway to link Capitol Hill, Garfield Park, and the new Marine Barracks playing field to a gateway where Virginia Avenue meets the Anacostia waterfront."

Source: District of Columbia, Office of Planning, Anacostia Waterfront Initiative, *Anacostia Waterfront Framework Plan* (2003)

Subarea Plans

Nine subareas are located in Ward 6. OP and DDOT are among the various local entities responsible for the planning of these subareas (see Table 4-3).

The plans for these nine subareas recommend continuing revitalization to achieve the land use and urban design goals contained in these plans. Notable initiatives of these plans include:

- Renovating existing dilapidated areas into pedestrian-friendly, mixed-use developments and activities that serve as destinations with a sense of place and that support the needs of the surrounding community;
- Addressing parking and circulation issues; and
- Preserving the historical context of districts and structures.

Table 4-3
Subareas in the General Vicinity of Project

Subarea	Planning Entity
Marine Barracks	Capitol Hill Business Improvement District
Canal Park	Office of the Deputy Mayor for Planning and Economic Development (DMPED)
Washington Navy Yard	U.S. Department of Defense
Southeast Federal Center	Anacostia Waterfront Initiative (Office of Planning)
M Street	District Department of Transportation (M Street Transportation Study)
Capper/Carrollsburg	Office of Planning
South Capitol Gateway	
8th Street SE Historic Area	
WASA Pump Station Area	

Source: District of Columbia, Office of Planning.

4.1.2.3 Other Governmental Plans and Actions

Mid-Atlantic Rail Operations Studies

The 2002 *Mid-Atlantic Rail Operations – Phase I Study* (MAROPs Phase I) examined rail choke points and how they affect the capacity of the rail system serving Mid-Atlantic States. The MAROPs were the joint effort of the I-95 Corridor Coalition, which included the states of New Jersey, Pennsylvania, Delaware, Maryland, and Virginia, and three railroad companies: AMTRAK, CSX and Norfolk Southern. The MAROPs Phase I identified the Virginia Avenue Tunnel as a rail choke point and recommended reconstructing the tunnel and adding tracks to eliminate conflicts between CSX and passenger trains. As noted in Section 1.2, passenger trains do not use Virginia Avenue Tunnel. However, they do share the same tracks as freight trains west of 2nd Street SW junction, which is located one-half-mile from the Virginia Avenue Tunnel's western portal. At this junction, the rails split: east and north bound freight trains proceed towards Virginia Avenue Tunnel and east and north bound passenger trains proceed toward Union Station via a tunnel beneath the U.S. Capitol Grounds. A west bound freight train could force a freight train moving in the opposite direction to stop near this junction, which could also delay passenger trains as well. MAROPs Phase I noted that providing a two-track Virginia Avenue Tunnel would benefit both regional freight rail and passenger system efficiency. The 2009 MAROP's Phase II listed the reconstruction of Virginia Avenue Tunnel as a priority project (top 150 out of 217 projects).

Anacostia Waterfront Initiative

The Anacostia Waterfront Initiative (AWI) integrates a number of transportation, land use and economic development projects within the area surrounding the Anacostia River. The *Anacostia Waterfront Initiative Framework Plan* (OP, 2003) focused on eight areas within which to redevelop nearly 50 acres of neglected waterfront. The AWI envisions replacing parking lots

and underutilized streets with a vibrant mix of new public plazas, cultural venues, restaurants, shops and residences. The proposed program recommends more than two million square feet of new construction including 14 acres of new parks and public open space along the waterfront. The proposed projects include:

- The Southwest Waterfront with Market Square and Civic Park
- South Capitol Street Bridge and Gateway (in progress—the Nationals Park, a Major League baseball stadium, was not included in the original plan, but was incorporated and is consistent with the Plan)
- Southeast Federal Center and Waterfront Park
- Capper Carrollsburg Hope VI Redevelopment and Canal Blocks Park (Phase I complete; Park to open in 2012)
- Reinvestment at East of the River Gateways (i.e. South Capitol and 11th Street Bridges)
- Kingman Island Nature Center
- Waterfront Light Rail Line (now Anacostia Initial Line Segment Streetcar)
- Anacostia Riverwalk and Trail (in progress)
- The Long-Term Control Plan (upgrading of the sewer system) (in progress)

Metropolitan Washington Council of Governments (MWCOG) Long-Range Transportation Plan

The National Capital Region Transportation Planning Board (TPB), a part of the Metropolitan Washington Council of Governments (MWCOG), is the federally-designated Metropolitan Planning Organization for the region. The TPB prepares the *National Capital Region's Financially Constrained Long-Range Transportation Plan* (CLRP) which identifies all regionally important transportation projects and programs that are planned in the Washington Metropolitan Area between 2012 and 2040. In the 2012 update, CLRP identified the following projects in the general vicinity the Project:

- Highway Improvements:
  - 11th Street Bridges reconstruction,
  - Southeast Boulevard, convert the segment of the Southeast Freeway from 11th Street Bridge to Barney Circle to an urban boulevard,
  - South Capitol Street Corridor, bridge reconstruction, including interchange at Suitland Parkway and Martin Luther King Jr. Blvd.;
- Bicycle and Pedestrian Improvements:
  - Garfield Park Canal Park 2nd Street SE, Shared-Use Path,
  - 11th Street SE Bridges and Intersection; and
- Freight Improvements: Virginia Avenue Tunnel project.

Transportation Improvement Program

The *Transportation Improvement Program* (TIP) is a six-year program, updated biannually, that describes the time period in which federal funds should be obligated to state and local projects. The *FY 2013-2018 Transportation Improvement Program* (MWCOG, July 18, 2012) includes the Virginia Avenue Tunnel Project. The project is listed as using private funds. Other notable TIP projects that would be located in the general vicinity of the LOD:

- District-wide Bicycle and Pedestrian Management Program – The goal of this project is to increase the safety and convenience of bicycle and pedestrian travel. It includes the widening of existing routes, curve realignment, grade reduction, and signage and lighting upgrades.
- Garfield-Canal Park Connector – This project would establish an Americans with Disabilities Act (ADA)-compliant pedestrian and bicycle connection beneath I-695 that will link Garfield Park and Canal Park along the 2nd Street SE right-of-way. The project also aims to beautify the civic space beneath the interstate.
- Southwest Freeway (I-695) over S. Capitol Street – This project would remove and replace bridge deck and general structural upgrades.
- South Capitol Street Corridor – Full replacement and realignment of the Frederick Douglass Memorial Bridge and interchanges. Boulevard streetscape treatments along South Capitol Street from between N Street and I-695 and along New Jersey Avenue between I-695 and M Street SE.

South Capitol Street Project

The South Capitol Street Corridor Project will transform the street from an urban freeway into a boulevard while improving safety, multi-modal transportation mobility and community access that will support economic development. Key elements of this project include:

- New Frederick Douglass Memorial Bridge across the Anacostia River;
- New at-grade traffic circle at Suitland Parkway;
- Reconstructed Suitland Parkway/I-295 interchange;
- New Martin Luther King Jr. Boulevard and Suitland Parkway interchange;
- New traffic oval connecting South Capitol Street, Potomac Avenue and Q Street SE;
- Reconstructed South Capitol Street as a six-lane boulevard with an improved streetscape from the oval to Independence Avenue
- Conversion of M Street SE from a grade-separated to an at-grade intersection; and
- Improved bicycle and pedestrian facilities throughout the corridor.

11th Street Bridges Project

The 11th Street Bridges Project, currently under construction, will replace two existing bridges with three new bridges and improve the associated interchanges. When completed, the project will:

- Improve mobility by providing separate freeway and local traffic connections to both directions of the bridge and local streets on both sides of the Anacostia River;
- Provide a shared path for pedestrians and bicycles, as well as rails to allow future streetcar connections;
- Replace the existing functionally deficient and structurally obsolete bridges;
- Provide an additional alternate evacuation route from our Nation's Capital; and
- Include new trail connections, improved drainage and other environmental investments.

DC Water Projects

DC Water has several planned projects, as well as those currently under construction, including a combined sewer overflow (CSO) tunnel under the Anacostia River. According to the DC Water, a third of the District has a combined sewer system, made up of storm water and sanitary sewage. During normal operations, storm water and sanitary sewage flow into the sewer and ultimately to the Blue Plains Advanced Wastewater Treatment Plant. During heavy rain the combined sewer system could become overloaded and untreated sewage could be discharged into the Anacostia and Potomac Rivers. The purpose of the CSO tunnel is to capture this overflow and store it until after the storm event. The CSO tunnel is part of the Clean Rivers Project, a $2.6 billion effort that also includes a future diversion tunnel beneath M Street SE that will divert overflow storm water / sanitary sewage from existing CSO tunnels to the CSO tunnel under the Anacostia River.

Marine Corps Barracks

The Marine Corps Barracks, located just north of I-695 has been at its present location since the 19th Century. One of the newer buildings (Building 20), located between I Streets SE and I-695 and is used as quarters for Marines, is considered vulnerable to terrorist activities and retrofitting at the present location is not considered feasible. Therefore, the Marine Corps decided to relocate the barracks to another location in the neighborhood (in proximity to the Marine Barracks located between 8th and 9 Streets SE), and is considering several locations that are near the LOD. The Marine Corps worked with the community to develop a Community Integrated Master Plan to select possible sites for the marine quarter's relocation.

Virginia Railway Express (VRE) System Plan

The VRE System Plan, adopted in 2014, provides a framework for VRE system investments and actions VRE should pursue through 2040 to best meet regional passenger travel needs. Much of the future growth in the system is in response to projected growth in the Washington Metropolitan Region, focusing on mobility as an essential factor that must be considered.

Three phases of VRE system investment are proposed between now and 2040. The focus of Phase 1 is on projects that maximize the capacity and service currently allowed through VRE's agreements with railroads owned by CSX and Norfolk Southern. Proposed projects include lengthening existing trains to providing more seating capacity; providing an additional round trip on each of the VRE Fredericksburg and Manassas Lines; improving station facilities to accommodate longer trains; and providing more station parking. Phase 2 includes major railroad infrastructure investments at key locations, such as at Long Bridge and tracks south of Alexandria, VA. The final phase of the System Plan includes the implementation of additional capital projects and service enhancements to accommodate continued growth in VRE traffic and sustain the system in a state of good repair. This would include providing an additional track within CSX's main line between Alexandria and Spotsylvania County, VA.

The railroad capacity investments outlined in Phases 2 and 3 are intended to provide additional commuter passenger capacity within the Washington, DC to Richmond, VA corridor and also support future increases in freight traffic, other state-supported regional intercity passenger service, and higher-speed passenger trains planned along Northeast Corridor into Virginia. Integral to the implementation of the VRE System Plan is the coordinated development of an implementation plan for railroad capacity expansion that addresses the needs of all beneficiaries and broad funding participation by not only VRE but also by federal, state and other non-VRE stakeholders.

4.1.3 Zoning

Zoning regulations, administered by the District of Columbia Office of Zoning (DCOZ), control land use, density, height, and bulk characteristics of property in the District. Figure 4-2 illustrates the zoning in the immediate vicinity of the LOD, and Table 4-4 describes the zoning codes. The majority of the area near the Project is currently zoned for commercial and residential uses, although large areas remain un-zoned.

The area surrounding the Project includes three overlay zones that further modify allowable development. The overlay zones establish the use, height, density (including incentives for bonus density and height), combined lot development, and design requirements for a mixture of residential and commercial development.

Figure 4-3 illustrates the following overlay districts in the vicinity of the Project: Eighth Street Southeast Neighborhood Commercial District, the Southeast Federal Center Overlay District, and the Capitol Gateway Overlay District.

The Eighth Street Southeast Neighborhood Commercial Overlay District was established to encourage and allow new business and office development in close proximity to the Navy Yard, with emphasis on firms that will conduct business with the Navy. This overlay district is also intended to serve the neighborhood with retail and service businesses, allow and encourage medium density commercial development. Any development should respect the historic scale of buildings and the entrance to the adjacent Navy Yard and provide for safe and efficient pedestrian movement.

The Southeast Federal Center Overlay District was established to provide for the development of a vibrant, urban, mixed-use waterfront neighborhood, offering a combination of uses that will attract residents, businesses and visitors from across the District and beyond. The Capitol Gateway Overlay District was established to provide development incentives and design requirements to ensure an appropriate mixture and density of residential and commercial uses within the area surrounding South Capitol Street as a monumental boulevard.

Figure 4-2
Zoning in the Immediate Vicinity of the Project

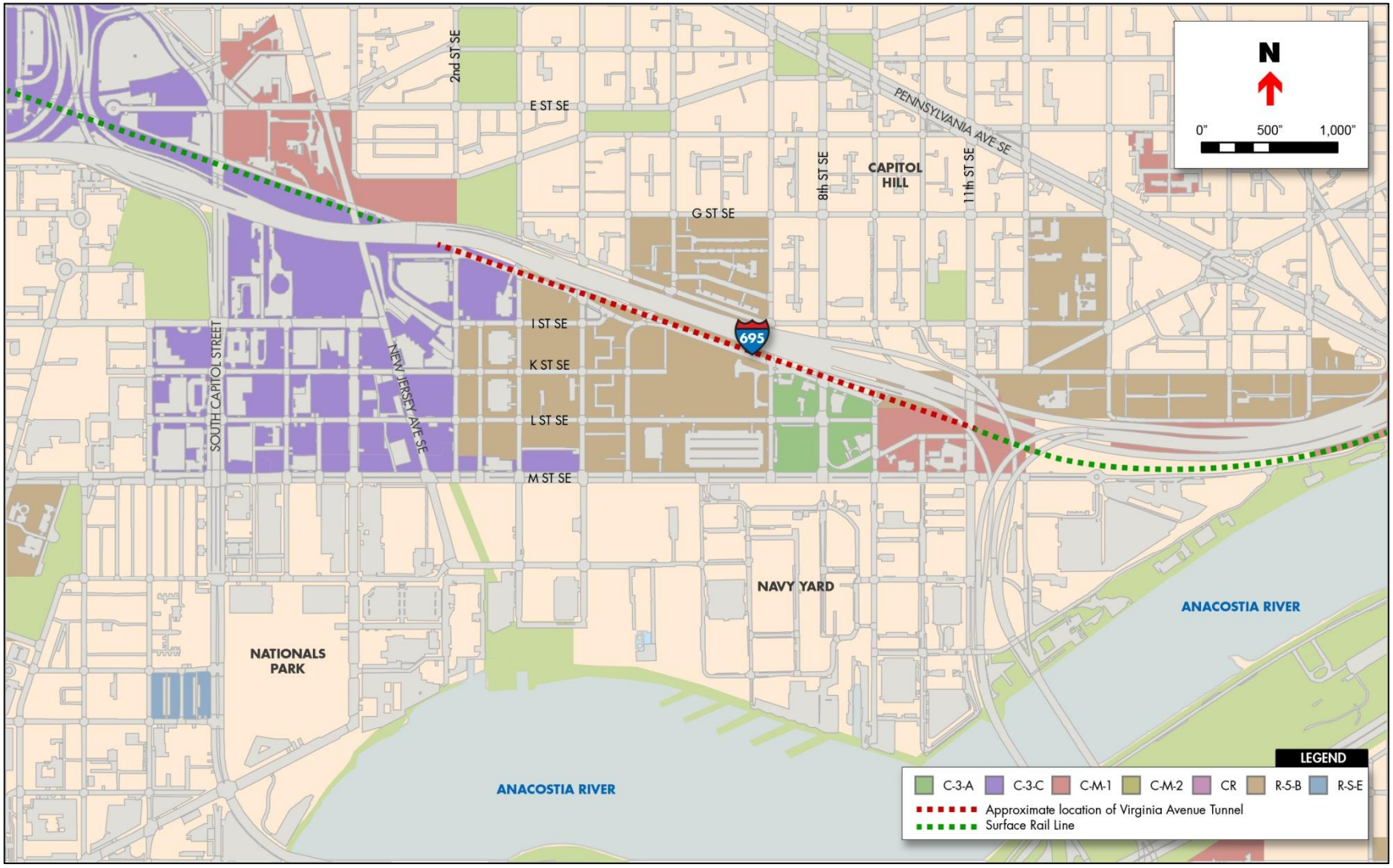


Figure 4-3
Overlay Districts near the Project

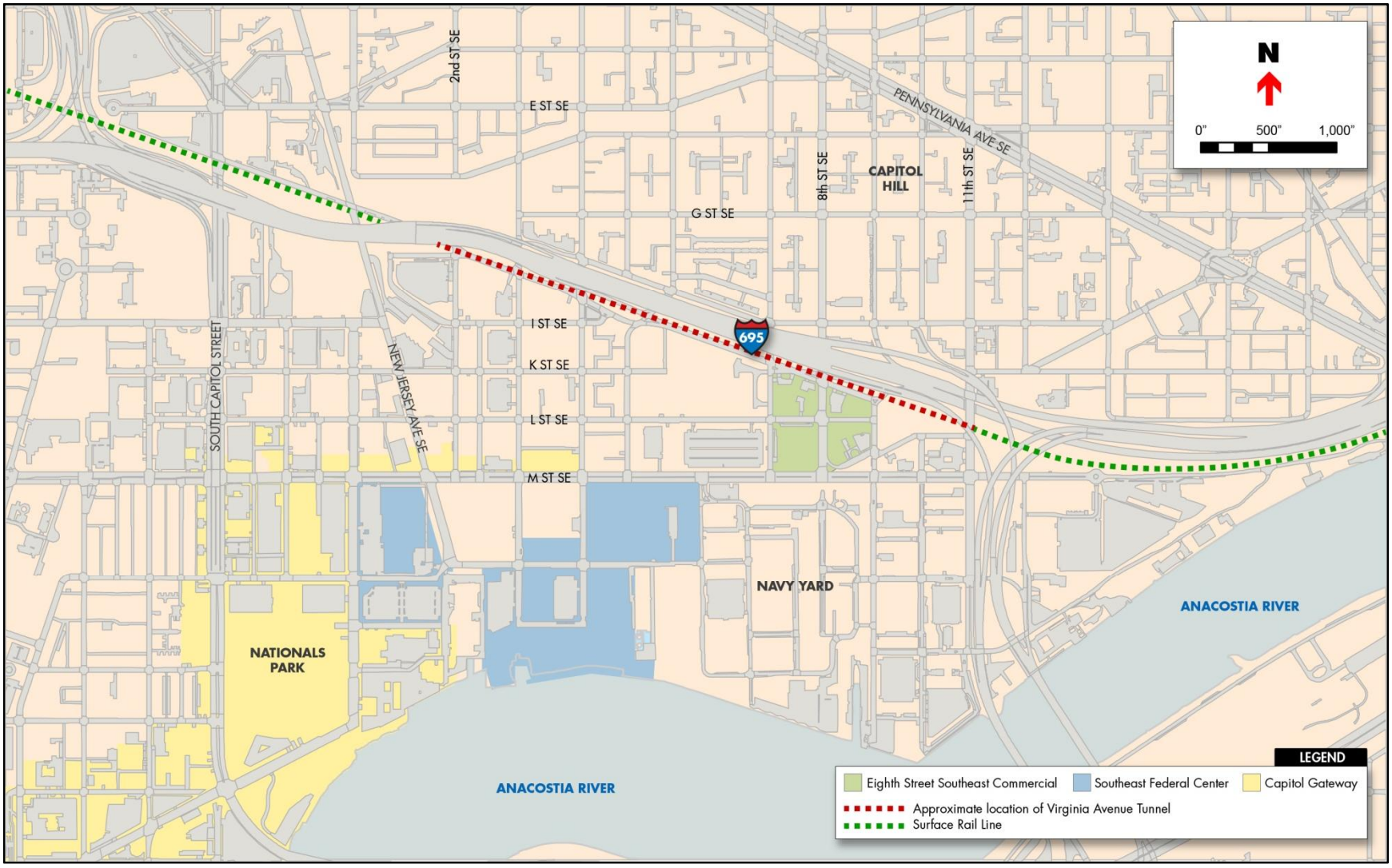


Table 4-4
Zoning Code Descriptions for Parcels Immediately Adjacent to the Project

Zone	Description
C-3-A	Permits matter-of-right development for major retail and office uses to a maximum lot occupancy of 75 percent for residential use, a maximum FAR of 4.0 for residential and 2.5 FAR for other permitted uses, and a maximum height of 65 feet.
C-3-C	Permits matter-of-right development for major business and employment centers of medium/high-density development, including office, retail, housing, and mixed uses, to a maximum lot occupancy of 100 percent, a maximum FAR of 6.5 for residential and for other permitted uses, and a maximum height of 90 feet.
C-M-1	Permits development of low bulk commercial and light manufacturing uses to a maximum FAR of 3.0, and a maximum height of three stories/40 feet with standards of external effects and new residential prohibited.
C-M-2	Permits development of medium bulk commercial and light manufacturing uses to a maximum FAR of 4.0 and a maximum height of 60 feet with standards of external effects and new residential prohibited.
CR	Permits matter-of-right residential, commercial, and certain light industrial development to a maximum lot occupancy of 75 percent for residential use, a maximum FAR of 6.0 for residential and 3.0 for other permitted uses, and a maximum height of 90 feet. Residential recreation space is required.
R-5-B	Permits matter-of-right moderate development of general residential uses, including single-family dwellings, flats, and apartment buildings, to a maximum lot occupancy of 60 percent, a maximum FAR of 1.8, and a maximum height of 50 feet.
R-5-E	Permits matter-of-right high-density development of general residential uses, including single-family dwellings, flats, and apartment buildings, to a maximum lot occupancy of 75 percent, a maximum FAR of 6.0 for apartment houses and hotels and 5.0 for other structures, and a maximum height of 90 feet.

Note: FAR: Floor Area Ratio. A figure determined by dividing the gross floor area of a building(s) on a lot by the area size of that lot. The higher the FAR, the greater the density allowed on the lot.
Source: District of Columbia, Office of Zoning (updated November 5, 2010)

4.2 Farmland

The Project is located in a highly urbanized area that has already been developed or designated as park land. Therefore, no active farms or commercial agricultural production are located near the LOD.

Virginia Avenue Park, which is located on the east end of the project site, contains the half-acre Virginia Avenue Community Garden, which was established in 2004 by volunteers with grant funding and partnerships between the non-profit organization operating the garden and the DC Department of Parks and Recreation. Although technically not a "farmland" due to its non-commercial aspects, the garden offers residents opportunities to grow herbs, vegetables and

fruits. Each participating household is limited of two plots. For further information about Virginia Avenue Park, see Section 4.12.

4.3 Social and Community Conditions

4.3.1 Demographic Conditions

The U.S. Census Bureau provided year 2010 demographic data for the area in the general vicinity of Project. Figure 4-4 shows the relevant census blocks and census tracts. The census tracks extend far beyond the LOD, generally one-half mile to three-quarters of a mile on each side of Virginia Avenue SE. The pertinent census blocks encompass one or two blocks from Virginia Avenue SE. Basic demographic information, such as population, age, and race based on the 2010 Census is available at the block level. Employment and income information is only available on the census tract level. Tables 4-5 through 4-7 summarize the demographic information for the area surrounding the Project. For purposes of comparison, Tables 4-5 through 4-8 include the same information for the District. For descriptive purposes, U.S. Census Bureau terminology is used.

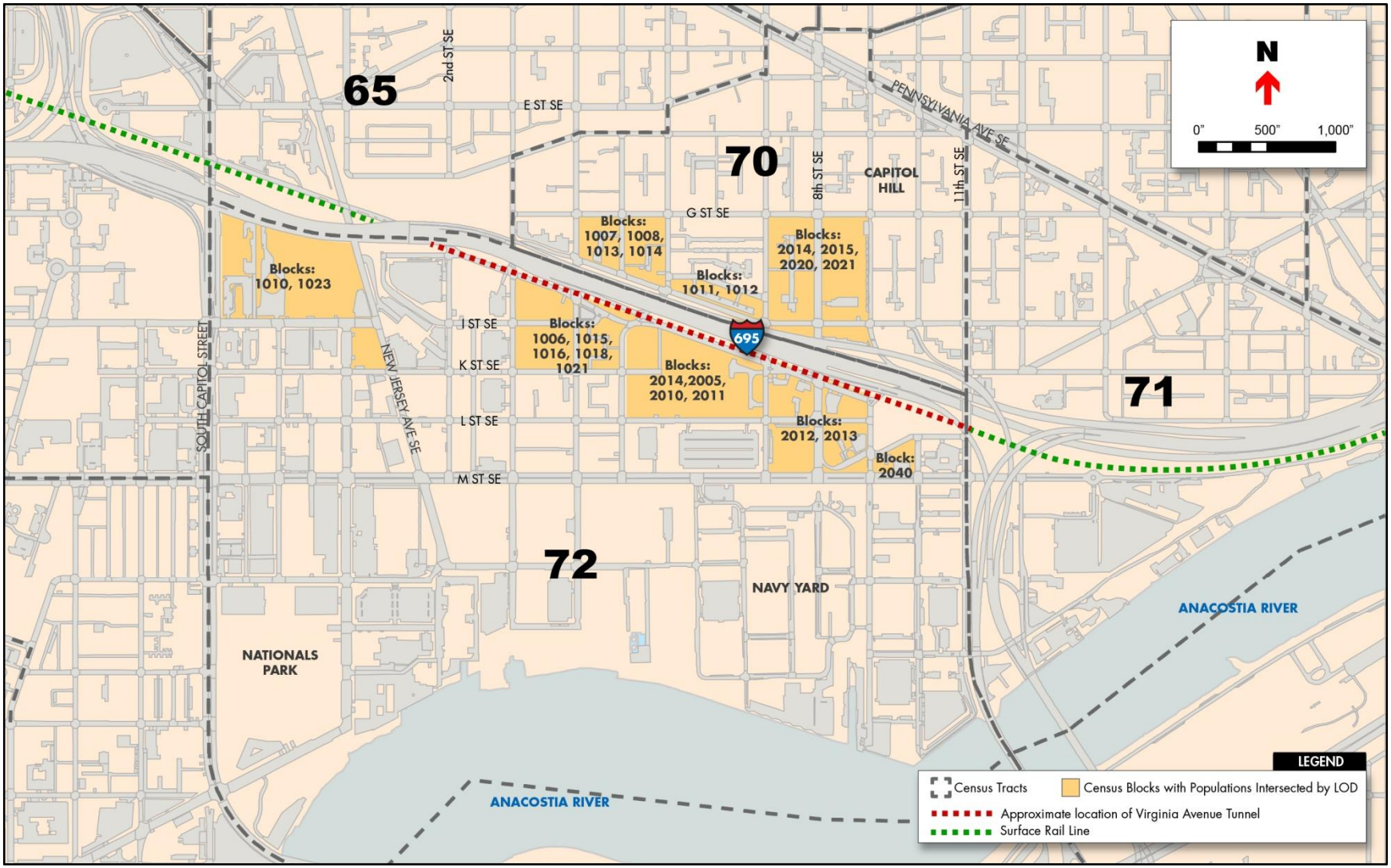
It should be noted that because Phase 1 of Capitol Quarter was not completed until 2010, the information contained in Tables 4-5 through 4-7 does not fully reflect the current residences of this neighborhood. At the time of the census count, many of the residences were not occupied, and therefore, the information in Tables 4-5 through 4-7 does not fully reflect the Capitol Quarter neighborhood as it exists today. In addition, the Marine Recreation Facility located on the south side of Virginia Avenue SE between 7th and 8 Streets SE contains Marine bachelor quarters, and the Census information did not identify this Marine population. According to a representative of ANC 6B, the Marine population of approximately 300 is counted within the area occupied by the historic Marine Barracks adjacent to 8th Street.

As noted in Table 4-5, approximately 2,200 people live near the LOD. However, as noted above, this number does not include most of the current Capitol Quarter residents. In addition, more than half this population is in blocks 1010 and 1023 in Census Tract 72. These areas contain high rise apartment buildings, and would be in proximity to the Jersey Yard where construction staging and storage will take place. They are not in direct proximity to Virginia Avenue SE.

In 2010, the share of white residents among this population was approximately 60 percent, or about 25 percentage points greater than the District overall. With the exception of Asians and Hispanics, all other racial groups, including blacks, were under-represented in comparison to the District overall.

In general, the age cohorts of the population living near the LOD are similar to that of the District overall, except those under 18 years of age (see Table 4-6). The percentage of people under 18 years of age in the area was about 10 percentage points less than the District overall for this age cohort, suggesting fewer households as percentage with children. However, due to the development of Capitol Quarter, which consists of single-family row houses, a larger percentage of households with children would be expected. In terms of the gender, the

Figure 4-4
Census Blocks and Tracks near the Project



male/female ratio among the residents living in the four census tracts shown on Figure 4-4 was 46.4:53.6. This was not substantially different than the District overall, which had a male/female ratio of 47:53 in 2010. In terms of those living near the LOD, this ratio is likely to favor males over females due to the bachelor quarters located at the Marine Recreation Facility.

Table 4-5
Population by Race and Hispanic Origins in 2010

Area	Total	Percent by Race					Percent Minority
		White[2]	Black	Asian	Hispanic	Other	
Project Area[1]							
CT 70, Blocks 1007, 1008, 1013 & 1014	250	83%	8%	2%	2%	4%	17%
CT 70, Blocks 1011 & 1012	144	37%	54%	1%	6%	2%	63%
CT 70, Blocks 2014, 2015, 2020 & 2021	183	61%	25%	9%	4%	2%	39%
CT 72, Blocks 1010 & 1023	1276	69%	16%	5%	7%	3%	31%
CT 72, Blocks 1006, 1015, 1016, 1018 & 1021	195	41%	49%	4%	4%	2%	59%
CT 72, Blocks 2004, 2005, 2010, 2011	173	2%	94%	1%	0%	3%	98%
CT 72, Blocks 2012 & 2013	13	62%	23%	15%	0%	0%	38%
CT 72, Block 2040	14	57%	21%	14%	7%	0%	43%
Total	2,248	60%	27%	5%	5%	3%	40%
District of Columbia	601,723	35%	50%	3%	3%	9%	65%

Notes: [1] Census blocks are shown on Figure 4-4.
[2] Not of Hispanic Origin
CT: Census Tract
Data may not add up to 100 percent due to rounding.
Source: 2010 U.S. Census Bureau.

Table 4-6
Population by Age in 2010

Area	Total	Percent by Age		
		Under 18	18-64	65 & Older
Project Area[1]				
CT 70, Blocks 1007, 1008, 1013 & 1014	250	8%	88%	4%
CT 70, Blocks 1011 & 1012	144	14%	76%	10%
CT 70, Blocks 2014, 2015, 2020 & 2021	183	12%	85%	3%
CT 72, Blocks 1010 & 1023	1,276	3%	96%	1%
CT 72, Blocks 1006, 1015, 1016, 1018 & 1021	195	24%	74%	2%
CT 72, Blocks 2004, 2005, 2010, 2011	173	0%	10%	90%
CT 72, Blocks 2012 & 2013	13	8%	77%	15%
CT 72, Block 2040	14	0%	100%	0%
Total	2,248	7%	85%	9%
District of Columbia	601,723	17%	72%	11%

Notes: [1] Census blocks are shown on Figure 4-4.
CT: Census Tract
Data may not add up to 100 percent due to rounding.
Source: 2010 U.S. Census Bureau

In terms of income and employment (see Table 4-7), the residents living in the four census tracks surrounding the LOD compares favorably against the District overall in some aspects but less favorably in others. The unemployment rate was lower than the District overall and the percent of household earning $100,000 and greater was higher as well. On the other hand, the percent of households earning less than $10,000 was more than double the percentage for the District overall, and the poverty rate was twice as high. Although Capitol Hill contains many high-priced housing units, it also contains several public housing developments, which could explain the comparatively high percentage of low-income households.

In terms of national origin (see Table 4-8), 90 percent of the residents living in the four census tracks surrounding the LOD were born in the United States (91.4 percent if including those born in a U.S. territory with at least one American parent), which was similar to the District overall, which was 85 percent. However, a much greater proportion of this U.S.-born population living in the four census tracts were born in other states as compared to the District overall: 64 versus 47 percent. With such a large U.S.-born population, it is not surprising that over 86 percent of the residents living in four census tracks surrounding the LOD speak English at home. The next most common language spoken at home is Spanish at almost five percent. These percentages are similar to the District overall, which had a slightly lower percentage of English-only speaking households and an about a two-point percentage higher number of household where Spanish is

spoken. Similar to the area covered by the four census tracts, Spanish is the second most common language spoken at home in the District. Information about persons with disabilities was not available from 2010 Census.

Table 4-7
Employment and Income in 2010

Category	District of Columbia		Area[1]	
	Number	Percent	Number	Percent
Civilian Labor Force 16 years and over	328,036	---	5,639	---
Employed	297,189	90.6	5,176	91.8
Unemployed	30,847	9.4	463	8.2
Median Income (dollars)	58,526	---	78,814[2]	---
Total Households (Estimated)	257,317	---	4,441	---
Less than $10,000 (households)	12,497	4.9	553	12.5
$10,000 to $24,999 (households)	20,818	8.1	154	3.5
$25,000 to 49,999 (households)	51,090	19.9	489	11.0
$50,000 to 99,999 (households)	68,706	26.7	1,137	25.6
$100,000 to 199,999 (households)	51,459	20.0	1,440	32.4
$200,000 or more (households)	24,605	9.6	428	9.6
Population for Whom Poverty Status is Known	551,331	---	9,045	---
At or Below Poverty Level[3]	101,767	11.1	1,900	21.0

Notes: [1] Census tracks (4) surrounding the LOD (see Figure 4-4)
[2] Proportional average of means of the four Census Tracts surrounding the LOD
[3] U.S. Dept. of Health & Human Services Poverty Guideline
Source: 2010 U.S. Census Bureau

Table 4-8
National Origin in 2010

Category	District of Columbia		Area[1]	
	Number	Percent	Number	Percent
Born in United States	505,997	85.2%	9,039	90.0%
State (DC) of Residence	226,085	38.1%	2,649	26.4%
Different State	279,912	47.1%	6,390	63.6%
Born in U.S. Territory to American parent(s)	9,051	1.5%	142	1.4%
Foreign Born	78,907	13.3%	865	8.6%

Notes: [1] Census tracks (4) surrounding the LOD (see Figure 4-4)
Source: 2010 U.S. Census Bureau

4.3.2 Neighborhoods and Communities

The District of Columbia is divided into quadrants based on an area's geographic relationship to the U.S. Capitol. The District's local legislative branch, the Council of the District of Columbia, is

comprised of representatives from eight Wards and five at-large seats. The eight wards are comprised of 37 Advisory Neighborhood Commissions (ANCs), with Commissioners elected to their ANC by neighborhood Single Member Districts. This breakdown of land area into basic political units provides the basis for the more than 120 District neighborhoods to remain actively involved in policies and programs for which the District government has responsibility. The ANCs present their opinions and recommendations on issues such as transportation, recreation, economic development, and zoning, as well as the District's annual budget to the District government agencies, the executive branch, and the Council.

The Project is located entirely in Ward 6—a ward with diverse populations, housing styles, and neighborhood characteristics. For example, to the west, Ward 6 covers parts of Downtown and the Penn Quarter, Gallery Place and Chinatown, which are higher density land uses, whereas the eastern part of ward contains mostly lower density row houses. As noted in Section 4.1.2, the southern part of Ward 6 includes new developments as part of the Capitol Riverfront neighborhood, anchored by the Nationals Park.

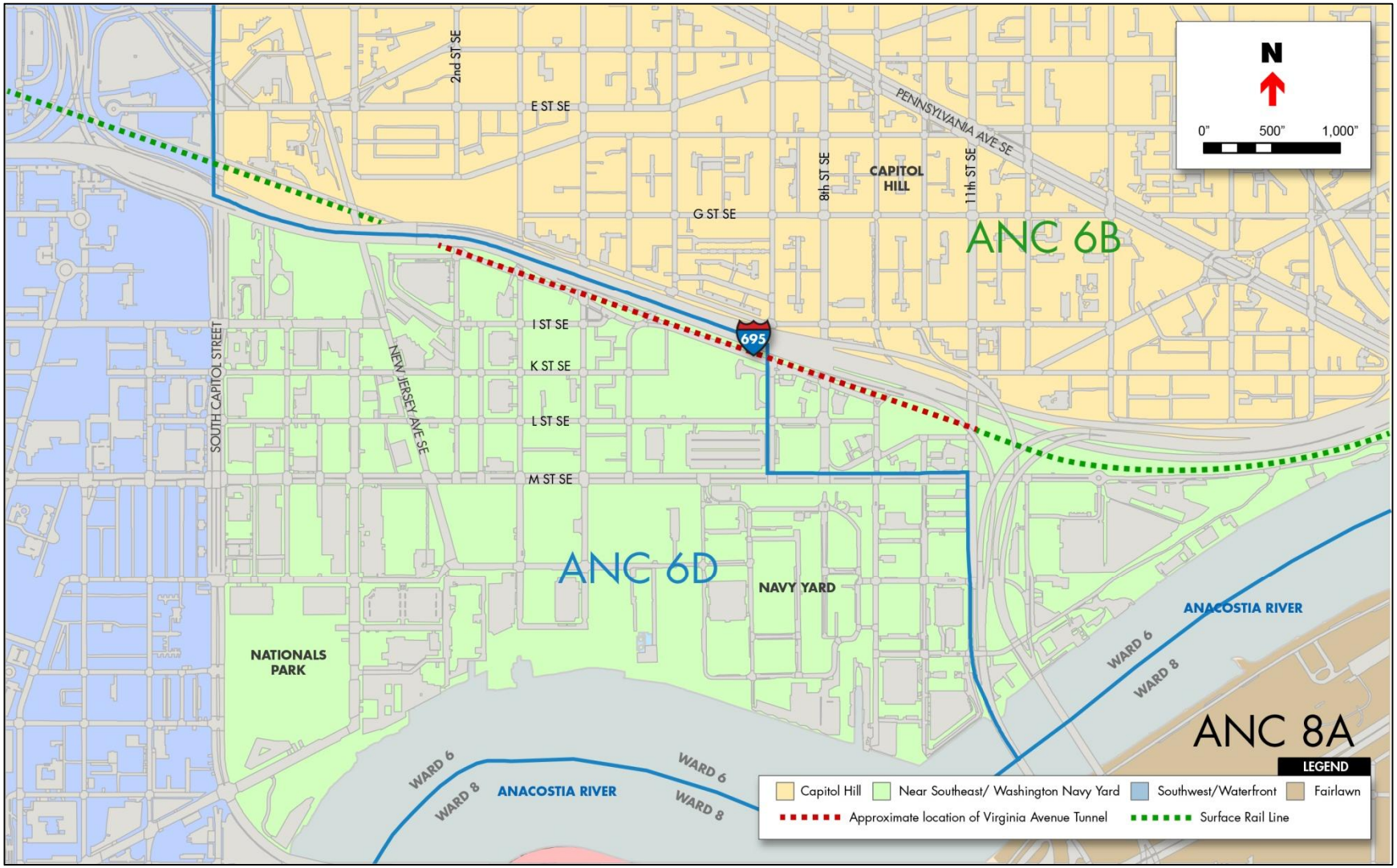
Figure 4-5 identifies the ANCs and neighborhoods surrounding the LOD. Virginia Avenue SE straddles between two of these neighborhoods: Near Southeast / Washington Navy Yard and Capitol Hill.

The Near Southeast/Washington Navy Yard neighborhood consists of former industrial and military areas that are being transformed into residential and commercial properties while maintaining the historic military character. The Near Southeast neighborhood is home to the Washington Navy Yard which has been in continuous operation since 1799. It is currently the headquarters for Naval District Washington and provides support services and military housing for various entities within the Navy. It also contains the Naval Museum. The Southwest neighborhood is located just west of the LOD. This neighborhood predominantly consists of residential and waterfront commercial properties.

The largest and most notable cluster of residences nearest to the LOD is Capitol Quarter, although there are a few residences interspersed along the south side of Virginia Avenue SE. Large clusters of residences, many of which are row houses of Capitol Hill, are located to the north of Virginia Avenue SE but are physically and visually separated from the LOD by I-695. As noted 3.1.2, Capitol Quarter occupies the blocks south of Virginia Avenue SE between 3rd and 5th Streets SE (see Figure 4-1). Phase I was completed in the summer of 2010, and Phase II was completed in 2012.

Adjacent to Capitol Quarter is the Capper Senior Apartments, an assisted living facility with approximately 160 apartments, located at the corner of Virginia Avenue, SE and 5th Street SE. The Southwest neighborhood is located just west of the LOD. This neighborhood predominantly consists of residential and waterfront commercial properties.

Figure 4-5
Neighborhoods and Advisory Neighborhood Commissions near Project



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The largest and most notable cluster of residences nearest to the LOD is Capitol Quarter, although there are a few residences interspersed along the south side of Virginia Avenue SE. Large clusters of residences, many of which are row houses of Capitol Hill, are located to the north of Virginia Avenue SE but are physically and visually separated from the LOD by I-695. As noted 3.1.2, Capitol Quarter occupies the blocks south of Virginia Avenue SE between 3rd and 5th Streets SE (see Figure 4-1). Phase I was completed in the summer of 2010, and Phase II was completed in 2012.

Adjacent to Capitol Quarter is the Capper Senior Apartments, an assisted living facility with approximately 160 apartments, located at the corner of Virginia Avenue, SE and 5th Street SE.

Other large residential communities in areas to the south of the LOD include the Capitol Riverfront (part of the Near Southeast Neighborhood), a mixed-use community stretching along one-and-a-half miles of river frontage. As noted in Section 4.1, many of the land uses along the Capitol Riverfront consists of government facilities, such as the Navy Yard, and the U.S. Department of Transportation Headquarters, but also includes the Nationals Park, a mixed of housing, office and commercial buildings, and parks including waterfront parks, such as the Diamond Teague Park.

4.3.3 Public Facilities, Services and Safety

Figure 4-6 and Table 4-9 identify the emergency facilities, schools, religious facilities, social services located near the LOD. Brief descriptions of these facilities and services are provided below.

Emergency Response and Medical Services

The Project would be located within the First District of the Metropolitan Police Department. The Metro Police station, the First District Station, is located at the 100 block of M Street SW.

Figure 4-6
Public and Emergency Facilities and Services

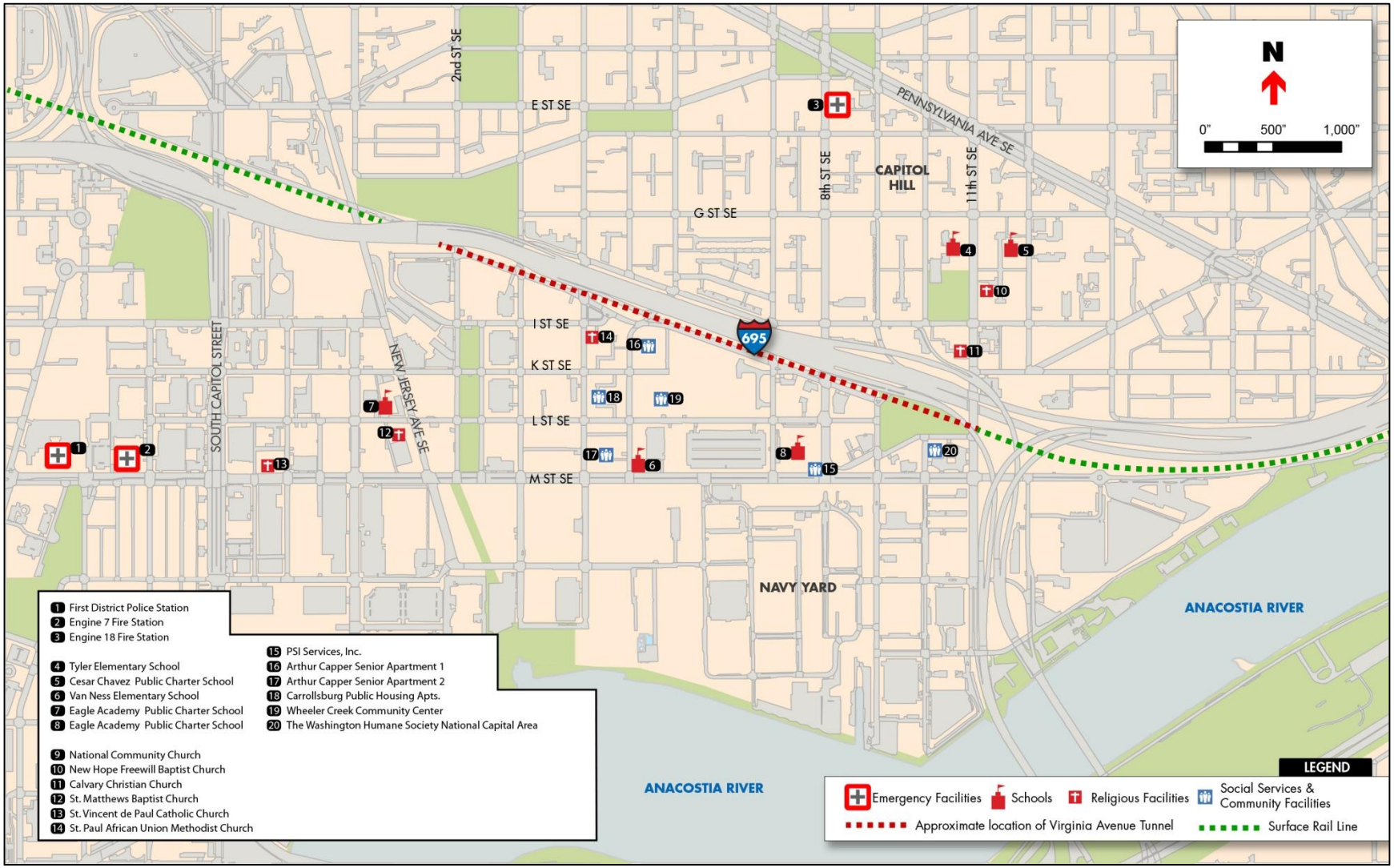


Table 4-9
Public and Emergency Facilities and Services

Name	Location
Emergency Facilities	
First District Police Station	Southwest of LOD
Engine 7 Fire Station	Southwest of LOD
Engine 18 Fire Station	North of LOD
Schools	
Tyler Elementary School	Northeast of LOD
Cesar Chavez Public Charter School	Northeast of LOD
Van Ness Elementary School (closed; soon to be open)	South of LOD
Eagle Academy Public Charter School (New Jersey Avenue Campus)	Southwest of LOD
Eagle Academy Public Charter School (Main Campus)	South of LOD
Religious Facilities	
National Community Church (proposed)	Adjacent to LOD
New Hope Freewill Baptist Church	North of LOD
Calvary Christian Church	North of LOD
St. Matthews Baptist Church	South of LOD
St. Vincent de Paul Catholic Church	Southwest of LOD
St. Paul AUMP Church	Adjacent to LOD
Social Services and Community Facilities	
PSI Services, Inc.	South of LOD
Arthur Capper Senior Apartments 1	Adjacent to LOD
Arthur Capper Senior Apartments 2	South of LOD
Carrollsburg Public Housing Apts.	South of LOD
Wheeler Creek Community Center	South of LOD
The Washington Humane Society National Capital Area (Animal) Spay & Neuter Center	South of LOD

Note: See Figure 4-6 for locations of facilities and services.

The District Fire and Emergency Medical Services Department provides fire and ambulance service for the entire District, including the parcels along Virginia Avenue SE. The Engine 7 Station, located at 1101 Half Street SW and Engine 18 Station, located at 414 8th Street SE, are nearest to the LOD. There are no nearby hospitals.

Educational, Social Service and Religious Facilities

Several educational, social service, and religious facilities are located near the LOD. The "Blue Castle", a historic trolley car barn (Washington & Georgetown Railroad Car House) built in the late 1800s (also see Section 4.11), contains the main campus of Eagle Academy Public Charter School. The Blue Castle is located on block south of Virginia Avenue SE. Other schools near the

LOD include Capitol Hill Day School, an independent school teaching students from Pre-Kindergarten to Eighth grade, and the New Jersey Avenue campus of the Eagle Academy Public Charter School is located on 1017 New Jersey Avenue SE. Van Ness Elementary School is currently closed, but is planned to be re-opened, and Tyler Elementary School is located to the north of LOD on the other side of I-695.

Located within the Blue Castle, PSI Services, Inc. is a health and human services agency that provides training and treatment to individuals and families dealing with mental illness, developmental disabilities, abuse, and neglect. Other social services facilities near the LOD relate to housing for seniors and low-income residents. The Wheeler Creek Community Center houses a non-profit organization that provides public housing residents with support networks and resources to help them become self-sufficient

St. Paul African Union Methodist Protestant (AUMP) Church is located along Virginia Avenue SE at the corner of 5th Street SE. The church is listed on the National Register (see Section 4.11).

Safety

Virginia Avenue Tunnel and other sections of CSX's primary mainline freight rail route located immediately west and east of the tunnel are entirely separated from the city street grid. Therefore, the general public using the street grid by auto, bicycle and walking in southwest and southeast Washington, DC does not interact (e.g., at grade crossings or intersections) with passenger and freight train operations. On the immediate west side of Virginia Avenue Tunnel, the rail right-of-way is situated below the street level. A roadway overpass is provided at New Jersey Avenue SE. The rail line transitions to a structure above the street level throughout southwest Washington, DC. On the immediate east side of Virginia Avenue Tunnel, the rail right-of-way is aligned parallel to and north of M Street SE with no roadway crossings provided within the street grid.

4.3.4 Environmental Justice

Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, signed on February 11, 1994, requires federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income communities or populations. In addition, EO 12898 directs federal agencies not discriminate on the basis of race, color, or national origin and to "promote nondiscrimination in federal programs substantially affecting human health and the environment, and provide minority and low-income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment."

EO 12898 does not define the terms "minority" or "low-income." However, guidance provided by the Council on Environmental Quality (CEQ) describes these terms in the context of an Environmental Justice (EJ) analysis. The following definitions taken from the CEQ guidance are

unique to EJ analysis and were used to identify minority and low-income populations living near the LOD:

Minority Individual. A Minority Individual is classified by the U.S. Census Bureau as belonging to one of the following groups: American Indian or Alaskan Native, Asian or Pacific Islander, Black (not of Hispanic Origin), and Hispanic. Minority Populations – According to the CEQ guidelines, should be identified where either (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis.

Low-income Population. Low-income populations are identified where individuals have incomes below the U.S. Department of Health and Human Services poverty guidelines. A low-income population is either a group of low-income individuals living in proximity to one another or a set of individuals who share common conditions of environmental exposure or effect.

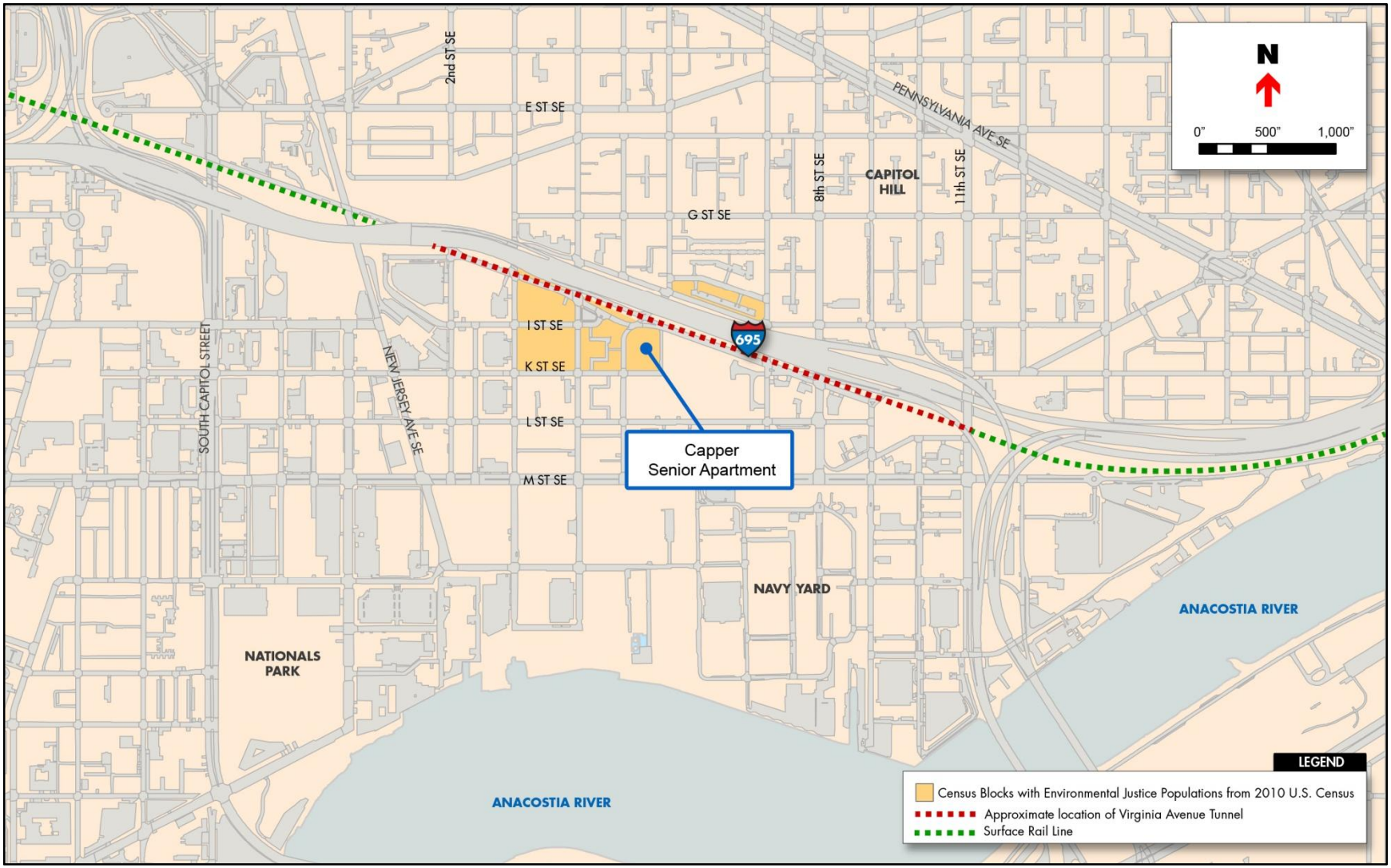
The EJ threshold for further analysis is met in either of the following cases:

- Census block groups where the minority or low-income population in the Census block group equals or exceeds 50 percent of the population in that census block group.
- Census block groups where the percentage of the minority or low-income population is at least 10 percent higher than the minority or low-income population percentage for the District of Columbia. Because the percentage for the District of Columbia was about 65 percent in 2010 (see Table 4-5), this criterion did not apply in the identification of minority populations because the criterion above set the threshold at 50 percent.
- Impacts to census block groups meeting the EJ threshold have the potential to be disproportionately borne by minority or low-income populations. The EJ analysis performed for this project focuses on these areas. No further EJ impact analysis is performed on the areas not meeting the EJ threshold.

Among the census blocks surrounding the LOD, 13 were found to meet the threshold that exceeded 50 percent minority population. These census blocks are shown on Figure 4-7. The 2010 Census does not have income information on census block level, but does have income information on the census tract level. Although no census tracts were found to meet the threshold for low-income populations, this does not rule out the possibility of census blocks meeting this threshold. The areas shown in Figure 4-7 were evaluated further to determine whether they contain EJ populations that could be affected by the Project. These areas include part of the residential community of Capitol Quarter, a strip of residences on the north side of I-695, and the block containing Capper Senior Apartments.

As described in Section 4.3.1, Capitol Quarter, the residential community that occupies the blocks to the south of Virginia Avenue between 3rd and 5th Streets SE are not reflected in the 2010 Census information because this community did not exist at the time of the census. With the exception for a few houses, these blocks underwent a complete redevelopment. As a new residential subdivision, Capitol Quarter was developed in two phases, and contains mostly single-family row houses with market values upwards of several hundred of thousands of

Figure 4-7
2010 Census Blocks Reporting Minority Populations and Actual EJ Populations



dollars. Capitol Quarter was developed under the federal Housing and Urban Development HOPE VI program, and therefore, includes affordable-priced row houses (re-sell restrictions apply) and low-income rental units managed by the District Housing Authority. Capitol Quarter Phase 1, which partially faces the LOD on the 300 and 400 blocks of Virginia Avenue SE (the area shown on Figure 4-7), but also extends south to L Streets SE between 4th and 5th Streets SE, contains ten low-income rental apartment buildings each containing three units (30 units total) and nine row houses that were sold to their owner-occupants as affordable-priced. Phase 2 contains a total of 47 affordable and rental units. The affordable row houses and low-income rental units are not clustered, but interspersed throughout the neighborhood. As noted in Section 4.1.1, the apartment buildings are not readily noticeable from among the other housing of the neighborhood.

Despite existence of affordable and low-income residences, the influx of market priced units and new residents have changed the overall demographic characteristics noted in the 2010 Census within the blocks containing Capitol Quarter. The demographic characteristics are likely now closer to those of the larger Capitol Hill community, which as described in Section 4.3.1, has a smaller percentage of minority residents and overall higher incomes in comparison to the District as a whole. Therefore, even though minority and/or low-income residents live in Capitol Quarter, no part of this residential community meets the threshold of an EJ population because of the much higher percentage of residents who live in market-priced houses.

The population on the north side of Virginia Avenue SE is shielded from the LOD by I-695, and therefore, would not be affected by the construction of the Project.

The only residential community adjacent to the LOD meeting the minority and low-income threshold is the Capper Senior Apartments, an assisted living facility. The facility's 162 apartments are in a single building located within the block directly south of Virginia Avenue SE between 5thStreet SE and the Marine Recreation Facility. According to management, approximately 90 percent of the residents are minority. In addition, residents must meet certain low-income requirements in order to rent an apartment at this facility.

4.4 Economic Conditions

Employment

The U.S. DOT Headquarters and the Navy Yard are the major employment centers in the general vicinity of the LOD. As noted in Section 4.1, the U.S. Department of the Navy employs, directly or indirectly, approximately 15,000 persons at the Navy Yard. The U.S. Department of Transportation employs approximately 7,000 persons at its headquarters. In addition, the Government of the District of Columbia would have hundreds working at the newly renovated building located on Virginia Avenue SE between 2nd and 3rd Streets SE. The Capitol Riverfront also provides an increasing amount of employment near the LOD in the form of office and commercial buildings. With the Nationals Park and commercial development, the actual number of jobs in the general vicinity of the LOD would likely be higher than the forecasts made

by the MWCOG. The number of office jobs would also likely increase due to the new construction office buildings in the area. Employment areas are also found in the commercial areas surrounding the LOD, including the Barracks Row and the Capitol Riverfront.

Commercial

The notable commercial areas near the LOD include Barracks Row, located north of I-695, and the Capitol Riverfront, located to the south of the LOD. Barracks Row is the 8th Street SE commercial district adjacent to the U.S. Marine Corps Barracks. Barracks Row underwent an $8.5 million streetscape improvement several years ago to make this district more pedestrian-friendly and now includes over 30 restaurants in addition to other commercial venues. Within the last few years, the Capitol Riverfront (also known as the Near Southeast) area has been transformed from a largely industrial and warehouse district into a mixed-use entertainment, residential, and commercial district. New government facilities such as the relocated U.S. DOT headquarters augment the number of government employees near in the LOD. Before these recent developments, the Washington Navy Yard in Near Southeast and Marine Barracks, north of I-695, were the main sources of government employment in the general vicinity of the LOD. Other commercial districts located further from the LOD include businesses along Pennsylvania Avenue SE and Eastern Market, which provides a venue for the sale of fresh farm product and handicrafts throughout the week, and is expanded during weekends.

Currently, the Capitol Riverfront contains almost seven million square feet of office space, and 172,000 square feet of retail space, in addition to 2,400 residential units. Furthermore, an additional 362,000 square feet of office space, 54,500 square feet of retail space, and 609 residential units are planned within Capitol Riverfront. The cornerstone of the Capitol Riverfront is the Nationals Park, a 41,000-seat Major League baseball stadium, which began construction in 2006 and completed in 2008. The home of the Washington Nationals, the stadium and environs sit on 21 acres just east of South Capitol Street between Potomac Avenue SE and N Street SE. The stadium is an economic generator for the Riverfront, attracting visitors from throughout the Washington Metropolitan Area, as well as tourists. Properties surrounding the ballpark are being developed into mixed-use commercial and residential uses, such as the strip of land along the Anacostia River south of the stadium that would be called Riverfront on the Anacostia, and two planned and one completed developments on the north of side of the ballpark.

4.5 Climate and Air Quality

Air quality and pollution are general terms that refer to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility. They can also damage property, reduce the productivity or vigor of crops or natural vegetation, or reduce human or animal health.

In addition to summarizing the climate conditions for the area surrounding Virginia Avenue SE, this section introduces the applicable air quality regulations and standards and provides the baseline pollutant levels to evaluate the air quality impacts of the Project.

4.5.1 Applicable Regulations and Standards

The Clean Air Act (CAA), as amended by the Clean Air Act Amendments of 1990 (CAAA) and promulgated by the US Environmental Protection Agency (EPA), implement environmental policies and regulations to promote and ensure acceptable levels of air quality, and were adopted in the Final Conformity Rule (40 CFR Parts 51 and 93).

The Clean Air Act defines conformity as:

> Conformity to an implementations plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards; and that such activities will not:
> - Cause or contribute to any new violation of any NAAQS in any area;
> - Increase the frequency or severity of any existing violation of any NAAQS in any area; or
> - Delay timely attainment of any NAAQS or any required interim emission reductions or other milestones in any area."

The EPA established the NAAQS for the following six major air pollutants, which are known as criteria pollutant: carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} and $PM_{2.5}$), sulfur dioxide (SO_2), and lead.

The federal standards are summarized in Table 4-10. The "primary" standards have been established to protect the public health. The "secondary" standards are intended to protect the nation's welfare and account for air pollutant effects on soil, water, visibility, materials, vegetation and other aspects of the general welfare.

4.5.2 Criteria Pollutants and Effects

Pollutants that have established national standards are referred to as "criteria pollutants". The sources of these pollutants, their effects on human health and the nation's welfare, and their final deposition in the atmosphere vary considerably. Brief descriptions of these pollutants are provided below.

Table 4-10
National Ambient Air Quality Standards

Pollutant		Standard Type	Averaging Time	Level	Form
Carbon Monoxide		primary	8-hour	9 ppm	Not to be exceeded more than once per year
			1-hour	35 ppm	
Lead		primary and secondary	Rolling 3 month average	0.15 $\mu g/m^3$ (1)	Not to be exceeded
Nitrogen Dioxide		primary	1-hour	100 ppb	98th percentile, averaged over 3 years
		primary and secondary	Annual	53 ppb (2)	Annual mean
Ozone		primary and secondary	8-hour	0.075 ppm (3)	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particle Pollution (Particulate Matter)	$PM_{2.5}$	primary	Annual	12 $\mu g/m^3$	annual mean, averaged over 3 years
		secondary	Annual	15 $\mu g/m^3$	annual mean, averaged over 3 years
		primary and secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide		primary	1-hour	75 ppb (4)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

Source: USEPA Office of Air and Radiation, *http://www.epa.gov/air/criteria.html* (updated December 14, 2012).

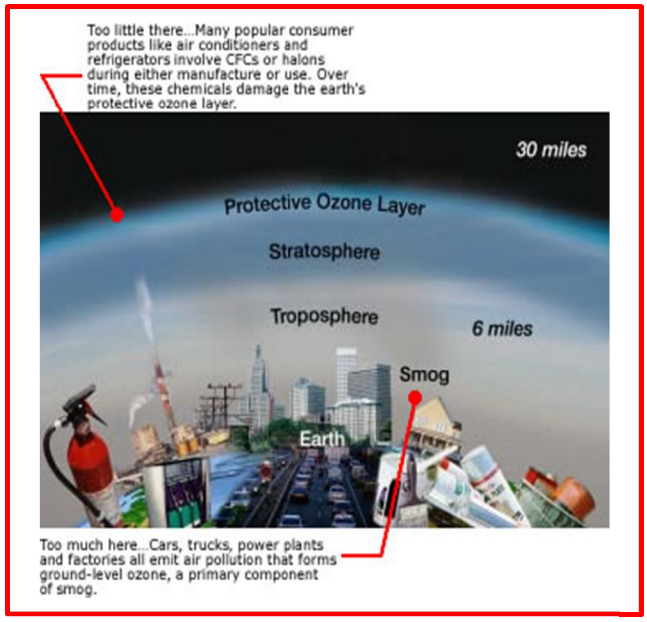
Notes: ppm = parts per million; ppb = parts per billion; std = standard; $\mu g/m^3$ = micrograms per cubic meter.
(1) Final rule signed October 15, 2008. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
(2) The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here for the purpose of clearer comparison to the 1-hour standard.
(3) Final rule signed March 12, 2008. The 1997 ozone standard (0.08 ppm, annual fourth-highest daily maximum 8-hour concentration, averaged over three years) and related implementation rules remain in place. In 1997, USEPA revoked the 1-hour ozone standard (0.12 ppm, not to be exceeded more than once per year) in all areas, although some areas have continued obligations under that standard ("anti-backsliding"). The 1-hour ozone standard is attained when the expected number of days per calendar year with maximum hourly average concentrations

above 0.12 ppm is less than or equal to 1.
(4) Final rule signed June 2, 2010. The 1971 annual and 24-hour SO_2 standards were revoked in that same rulemaking. However, these standards remain in effect until one year after an area is designated for the 2010 standard, except in areas designated nonattainment for the 1971 standards, where the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standard are approved.

Ozone

Ozone (O_3) is a colorless, toxic gas. As shown in the illustration, O_3 is found in both the Earth's upper and lower atmospheric levels. In the upper atmosphere, O_3 is a naturally occurring gas that helps to prevent the sun's harmful ultraviolet rays from reaching the earth. In the lower layer of the atmosphere, O_3 is man-made. Although O_3 is not directly emitted, it forms in the lower atmosphere through a chemical reaction between volatile organic gases (VOCs) and nitrogen oxides (NOx), which are emitted from industrial sources and from automobiles. Substantial O_3 formations generally require a stable atmosphere with strong sunlight, thus high levels of O_3 are generally a concern in the summer. O_3 is the main ingredient of smog. O_3 enters the blood stream through the respiratory system and interferes with the transfer of oxygen, depriving sensitive tissues in the heart and brain of oxygen. O_3 also damages vegetation by inhibiting their growth. The affects of project related changes in ozone precursor (VOCs and NOx) emissions during construction were estimated for conformity purposes.

Ozone in the Atmosphere



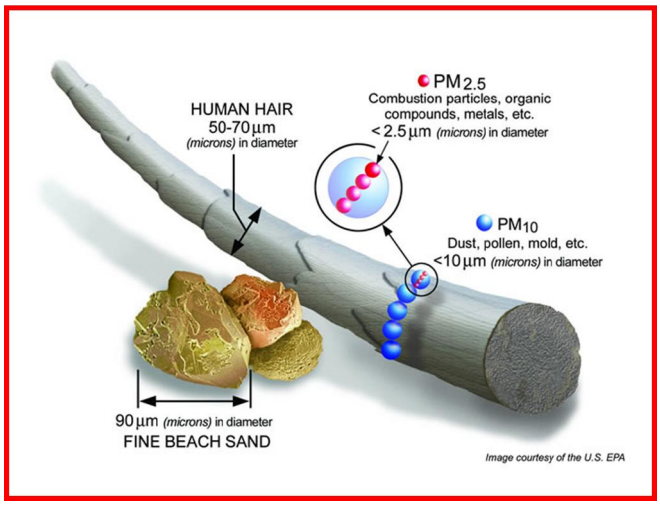
Source: U. S. Environmental Protection Agency

Particulate Matter

Particulate matter (PM) is composed of solid particles or liquid droplets that are small enough to remain suspended in the air. In general, particulate matter includes dust, soot, and smoke. These pollutants can be irritating but usually are not poisonous. It can also include bits of solid or liquid substances that can be toxic. Of particular concern are those particles that are smaller than, or equal to, 10 microns (PM_{10}) and 2.5 microns ($PM_{2.5}$) in size. PM_{10} is about one-seventh the thickness of a human hair (see illustration). Major sources of PM_{10} include motor vehicles; wood burning stoves and fireplaces; dust from construction, landfills, and agriculture; wildfires; windblown dust from open lands; and atmospheric chemical and photochemical reactions. Suspended particulates produce haze and reduce visibility. For $PM_{2.5}$ (roughly 1/28th the diameter of a human hair), a substantial proportion of this pollutant in the atmosphere is attributable to the combustion of fossil fuels. $PM_{2.5}$ can be formed in the atmosphere from

gases such as sulfur dioxide, nitrogen oxides, and volatile organic compounds. When inhaled, PM can penetrate the human respiratory system's natural defenses and damage the respiratory tract. $PM_{2.5}$ is so tiny that they can penetrate deeper into the lungs and damage lung tissues. The affects of project related changes in $PM_{2.5}$ emissions during construction were estimated for conformity purposes.

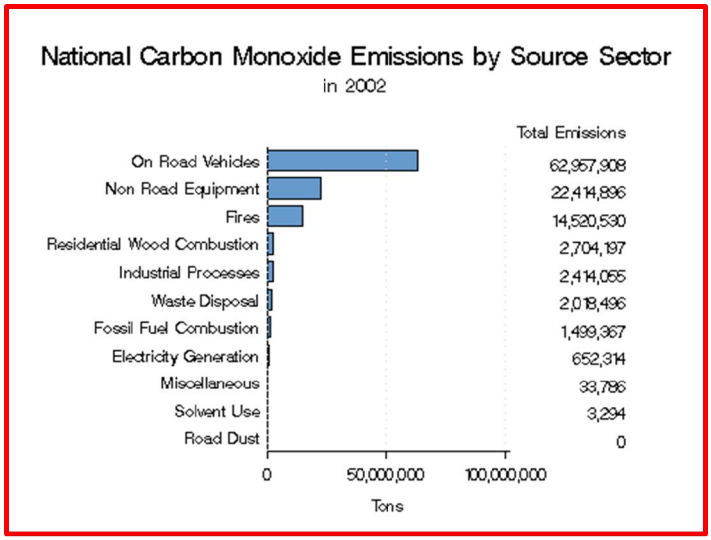
Relative Particulate Matter Size



Carbon Monoxide

Carbon Monoxide (CO), a colorless gas, is emitted almost exclusively from the incomplete combustion of fossil fuels. As shown in the illustration, on-road motor vehicle exhaust is the primary source of CO. Prolonged exposure to high levels of CO can cause headaches, drowsiness, loss of equilibrium, or heart disease. CO levels are generally highest in the colder months of the year when inversion conditions (warmer air traps colder air near the ground) are more frequent. CO concentrations can vary greatly over relatively short distances. Relatively high concentrations of CO are typically found near congested intersections, along heavily used roadways carrying slow-moving traffic, and in areas where atmospheric dispersion is inhibited by urban "street canyon" conditions. Therefore, CO concentration levels near congested roadways and/or intersections affected by a proposed project are usually predicted on a localized or microscale level. The effects of project related changes in CO emissions during construction were estimated for conformity purposes.

Sources of Carbon Monoxide



Source: U. S. Environmental Protection Agency

Nitrogen Dioxide

Nitrogen Dioxide (NO_2), a brownish gas, irritates the lungs and can cause breathing difficulties at high concentrations. Like O_3, NO_2 is not directly emitted, but is formed through a reaction between nitric oxide (NO) and atmospheric oxygen. NO and NO_2 are collectively referred to as nitrogen oxides and are major contributors to ozone formation. NO_2 also contributes to the formation of PM_{10}. In high concentrations, NO_2 results in a brownish-

red cast to the atmosphere and reduced visibility. NO_2 was included in the construction phase analysis for NEPA purposes (i.e., to address community concerns).

Lead

Lead is a stable element that persists and accumulates both in the environment and in animals. Its principal effects in humans are on the blood-forming, nervous, and renal systems. Lead levels in the urban environment from mobile sources have substantially decreased due to the federal prohibition of leaded gasoline. Therefore, the Project analysis did not include lead.

Sulfur Dioxide

Sulfur Dioxide (SO_2) is a product of high-sulfur fuel combustion. The main sources of SO_2 are the burning of coal and oil for power plants and industry and domestic heating. Another source of SO_2 is industrial chemical manufacturing. SO_2 is an irritant gas that affects the throat and lungs. It can cause acute respiratory symptoms, especially in children. SO_2 can also yellow plant leaves and erode iron and steel. It is a precursor to $PM_{2.5}$, and therefore, the effects of project related changes in SO_2 emissions during construction were estimated for conformity purposes.

4.5.3 Other Pollutants and Effects

Mobile Source Air Toxics

In addition to the criteria pollutants, the EPA also regulates air toxics. Most air toxics originate from human made sources, including on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners), and stationary sources (e.g., factories or refineries).

Mobile Source Air Toxics (MSATs) are a subset of the 188 air toxics defined by the CAA. The MSATs are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted into the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The EPA identified the following seven compounds from mobile sources that are among the national and regional-scale cancer risk drivers: benzene, acrolein, formaldehyde, 1,3-butadiene, diesel exhaust; naphthalene; and polycyclic organic matter. Descriptions of these compounds are provided in air quality technical report in Appendix D.

Greenhouse Gases

In 2007, the Supreme Court decided in Commonwealth of Massachusetts v. Environmental Protection Agency that carbon dioxide is a pollutant, subject to regulation under the Clean Air Act. Since then, the federal government has taken a number of steps to regulate carbon dioxide emissions as part of an overall program addressing greenhouse gases (GHG). Thus, for

example, EPA has adopted a GHG Monitoring, Recordkeeping and Reporting Rule requiring certain suppliers of fossil fuels or industrial GHGs to report to EPA on emissions from particular facilities. That rule does not apply to the activities contemplated by the Virginia Avenue Tunnel Project.

Also, a number of federal agencies have concluded that it is not possible to link a project's emissions to particular climatic effects in a NEPA review. In particular, the 2010 Draft Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions, authored by CEQ, states that "it is not currently useful for the NEPA analysis to attempt to link specific climate changes, or the environmental impacts thereof, to the particular project or emissions, as such direct lineage is difficult to isolate and to understand."

4.5.4 Attainment Status and Conformity with Regional Air Quality Planning

Section 107 of the 1977 Clean Air Act Amendment requires that the EPA publish a list of all geographic areas in compliance with the NAAQS, as well as those areas that are not in attainment with the NAAQS. The designation of an area is made on a pollutant-by-pollutant basis. The EPA's area designations are shown in Table 4-11.

Table 4-11
Attainment Classifications and Definitions

Classification	Definition
Attainment	Area is in compliance with the NAAQS
Unclassified	Area has insufficient data to make determination and is treated as being in attainment.
Maintenance	Area once classified as nonattainment but has since demonstrated attainment of the NAAQS.
Nonattainment	Area is not in compliance with the NAAQS

The LOD is part of the National Capital Interstate Air Quality Control Region, and is classified as a maintenance area for CO, a nonattainment area for $PM_{2.5}$ (1997 standard), a marginal nonattainment area for O_3 (2008 standard), and an attainment area for all of the other criteria pollutants.

The District of Columbia is part of the MWCOG, a regional organization of the Washington Metropolitan Area composed of 20 state and local governments surrounding the nation's Capital, in addition to members the U.S. Senate and the U.S. House of Representatives.

As described in Section 4.1.2.3, the MWCOG is responsible for preparing the CLRP and the TIP. The CLRP and the TIP serve as the basis for the regional mobile source air quality analysis, which utilizes vehicle miles traveled (VMT) and emissions factors to determine emissions estimates for

the entire transportation system. The analysis results demonstrate that the CLRP and the TIP are consistent with the goals of the *State Implementation Plan* (SIP). The SIP includes a list of measures to reduce pollution in order for the area to become attainment by a designated date. An Air Quality Conformity Report is prepared that contains emissions ceilings to which the CLRP and TIP must conform. The analysis in the Air Quality Conformity Report demonstrates that mobile source emissions, estimated for the CLRP and TIP and for each analysis year of the long range plan, adhere to all emissions ceilings, which are either approved or found adequate by the EPA.

The TPB approved the 2012 CLRP and FY 2013-2018 TIP on July 18, 2012. The Project is listed as ID # 5959 in the 2013-2018 TIP and as #3079 in the CLRP. As part of an approved CLRP and TIP, the Project is part of the region's plan to meet the required air quality goals as mandated in the Clean Air Act. The Project is part of the *National Capital Region Freight Plan 2010*, which was approved by the TPB on July 21, 2010.

4.5.5 Ambient Air Quality

4.5.5.1 Climate and Local Meteorology

Climatic conditions are an important element in assessing the ambient air quality of an area, with and without the proposed action. Summers in the District of Columbia area are warm and humid and winters are cold, but generally not severe. The summertime temperature is typically in the upper 80s and the winter is typically in the upper 20s. Thunderstorms can occur at any time but are most frequent during the late spring and summer. Annual precipitation has ranged from about 25 inches to more than 55 inches. Rainfalls of over 10 inches in a 24-hour period have been recorded during the passage of tropical storms. The seasonal snowfall is nearly 24 inches, but varies greatly from season to season. Snowfalls of 4 inches or more occur only twice each winter on average. Accumulations of over 20 inches from a single storm are extremely rare. Storm damage results mainly from heavy snows and freezing rains in winter and from hurricanes and severe thunderstorms during the other seasons.

Prevailing winds are from the south except during the winter months when they are from the northwest. The windiest periods are late winter and early spring. Winds are generally less during the night and early morning hours and increase to a high in the afternoon. Winds may reach 50 to 60 miles per hour or even higher during severe summer thunderstorms, hurricanes, and winter storms.

4.5.5.2 Monitored Air Quality

MWCOG collects data from five air quality monitors stationed at various locations throughout the District. The maximum pollutant concentrations collected at these locations for the years 2009-2011 and a comparison of these values with the applicable air quality standards are presented in Table 4-12. As shown on this table, the 8-hour ozone standard was the only violated NAAQS (see Table 4-10) from 2009 through 2011. The recorded values for the other pollutants are less than (within) the NAAQS.

Table 4-12
Ambient Air Quality Monitor Data 2009-2011

		Verizon Phone Co. 2055 L St., NW			420 34th St. NE			Takoma Sc., Piney Branch Road & Dahlia Street			2500 1st Street, N.W.			Park Services Office, 1100 Ohio Drive		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Carbon Monoxide (CO) [ppm]																
1-Hour	Maximum	2.5	2.8	5.0	4.2	3.7	2.7						3.1			
	2nd Maximum	2.5	2.7	4.2	4.2											
	# of Exceedances	0	0	0	0	0	0						0			
8-Hour	Maximum	2.0	2.4	2.2	4.0	3.5	2.5						2.5			
	2nd Maximum	1.9	2.0	1.9	3.38	3.1	2.3						2.4			
	# of Exceedances	0	0	0	0	0	0						0			
Particulate Matter [ug/m3]																
PM10	Maximum 24-Hour				69	91	48				60	99	45			
	# of Exceedances				0	0					0	0	0			
PM2.5	98th Percentile				26.0	28.0	25.0				24.0	26.0	25.0	23.0	23.0	26.0
	Mean Annual				10.5	11.4	10.4				10.2	10.5	10.3	10.1	11.0	10.2
	# of Exceedances				0	0	0				0	0	0	0	0	0
Ozone (O3) [ppm]																
8-Hour	Fourth Highest				0.064	0.086	0.080	0.072	0.079		0.071	0.082	0.085			
	# of Exceedances				2	15	6	1	6		2	16	11			

Table 4-12 (Continued)
Ambient Air Quality Monitor Data 2009-2011

		Verizon Phone Co. 2055 L St., NW			420 34th St. NE			Takoma Sc., Piney Branch Road & Dahlia Street			2500 1st Street, N.W.			Park Services Office, 1100 Ohio Drive		
		2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011	2009	2010	2011
Nitrogen Dioxide (NO_2) [ppm]																
1-Hour	98th Percentile				63	59	55	53	55		62	57	52			
	# of Exceedances				0	0	0	0		0	0	0	0			
Sulfur Dioxide (SO_2) [ppm]																
1-Hour	99th Percentile				39	21	20						5			
	# of Exceedances				0	0	0						0			

Note: Grey shaded blocks represent areas of no measurement.
Source: EPA Office of Air Quality Planning and Standards (AIRSData); http://www.epa.gov/air/data/geosel.html

4.6 Noise

This section reports the findings of noise measurements taken along the LOD. For more information, the complete noise technical report is located in Appendix E.

4.6.1 Description and Characteristics of Noise

Noise level is measured in decibels (dB). Because the human ear does not perceive all pitches or frequencies equally, noise levels are adjusted, or weighted, to correspond to human hearing. This adjusted unit is known as the A-weighted decibel, or dBA, which is measured in a logarithmic scale. This means that a 10 dBA difference is a doubling in noise level. Generally, the average healthy human ear barely perceives noise level changes of 3 dBA. Based on the results of many acoustical studies, it has been further accepted that a 5 dBA change is readily perceptible.

Many sources of high noise, such as a busy highway, tend to fluctuate from moment to moment. Consequently, to measure fluctuating noise accurately, the noise levels are averaged at a set period of time to arrive at single number called the equivalent continuous noise level or Leq. Another noise measure, called the day-night sound level or Ldn, is defined as the cumulative 24-hour noise exposure that accounts for the moment to moment fluctuations in dBA from all sound sources during the 24-hour period.

Rail transit-related noise, such as noise from a moving freight train, is generated by the whine from traction motors, air-turbulence from cooling fans; changes in gearing; and the interaction of wheels with their running surfaces (e.g., tracks). This latter source generates three types of noise:

- Rolling noise due to continuous rolling contact;
- Impact noise when a wheel encounters a discontinuity in the running surface, such as a rail joint, turnout or crossover; and
- Squeal generated by friction on tight curves.

The illustration on the following page provides examples of typical transit noise and background levels in terms of Ldn. Ldn generally ranges between 55 dBA and 75 dBA in most urban communities.

Federal Railroad Administration (FRA) guidelines were used to identify noise sensitive land uses and to characterize the ambient noise conditions at these receptors. A description of these procedures is provided in the noise technical report prepared for this Project.

The FRA guidelines use three categories of noise sensitive land uses:

- Category 1: Places where quiet is an essential element of their intended purpose;
- Category 2: Residences and buildings where people normally sleep; and
- Category 3: Institutional land uses with primarily daytime and evening use.

Categories 1 and 3 use the Leq noise descriptor, whereas Category 2 uses the Ldn descriptor.

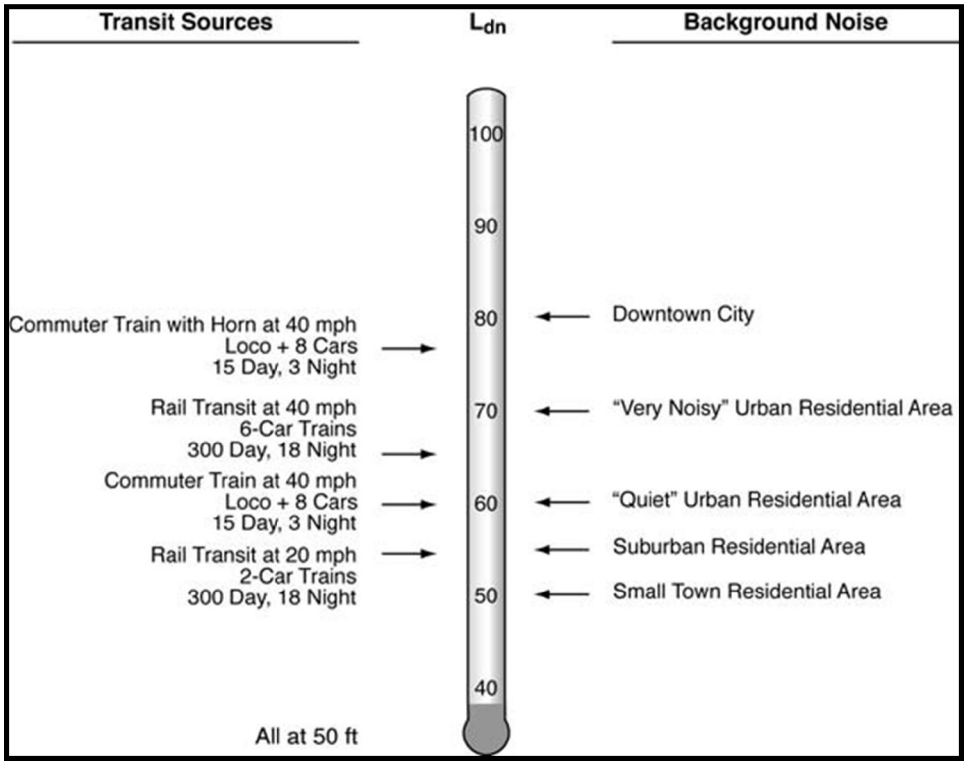
4.6.2 Existing Noise Conditions

Five noise sensitive receptors were identified within the FRA recommended screening distance of 750 feet from the centerline of the proposed facility. All five receptors near the LOD are residences or places where people sleep (Category 2). They include:

- Capitol Quarter residences: 2 sites located within the 300 and 400 blocks of Virginia Avenue SE and identified as M-1 and M-2, respectively;
- Capper Senior Apartments: identified as M-3;
- Bachelors quarters at the Marine Corps Recreation Facility: identified as M-4; and
- Residences along the 900 block of Potomac Avenue SE: identified as M-5.

At each site, existing noise levels were measured in accordance with FRA procedures. The specific locations monitored are considered representative of surrounding properties that share the same land use. The noise measurements taken yield typical ambient noise conditions common among areas surrounding the representative receptors. The noise measurements, which included 24-hour monitoring, were collected and repeated three times at all five sites between May 22, 2012 and June 21, 2012. Table 4-13 shows the results of the measurements conducted at these sites. The locations of the measurement sites are shown on Figure 4-8.

Typical Transit and Background Noise Levels (Ldn)



As shown in Table 4-13, noise levels range from 68 dBA at M-5 (residences along Potomac Avenue SE) to 73 dBA at M-3 (Capper Senior Apartments). In general, the high noise levels (55 dBA is considered the low end for urban communities) reflect the proximity of the receptors to I-695, which generates high noise levels due to high traffic volumes and speed. Those receptors located closest to I-695, such as the Capper Senior Apartments and Capitol Quarter, have the higher ambient noise levels among the five receptors.

Figure 4-8
Noise Monitoring Locations

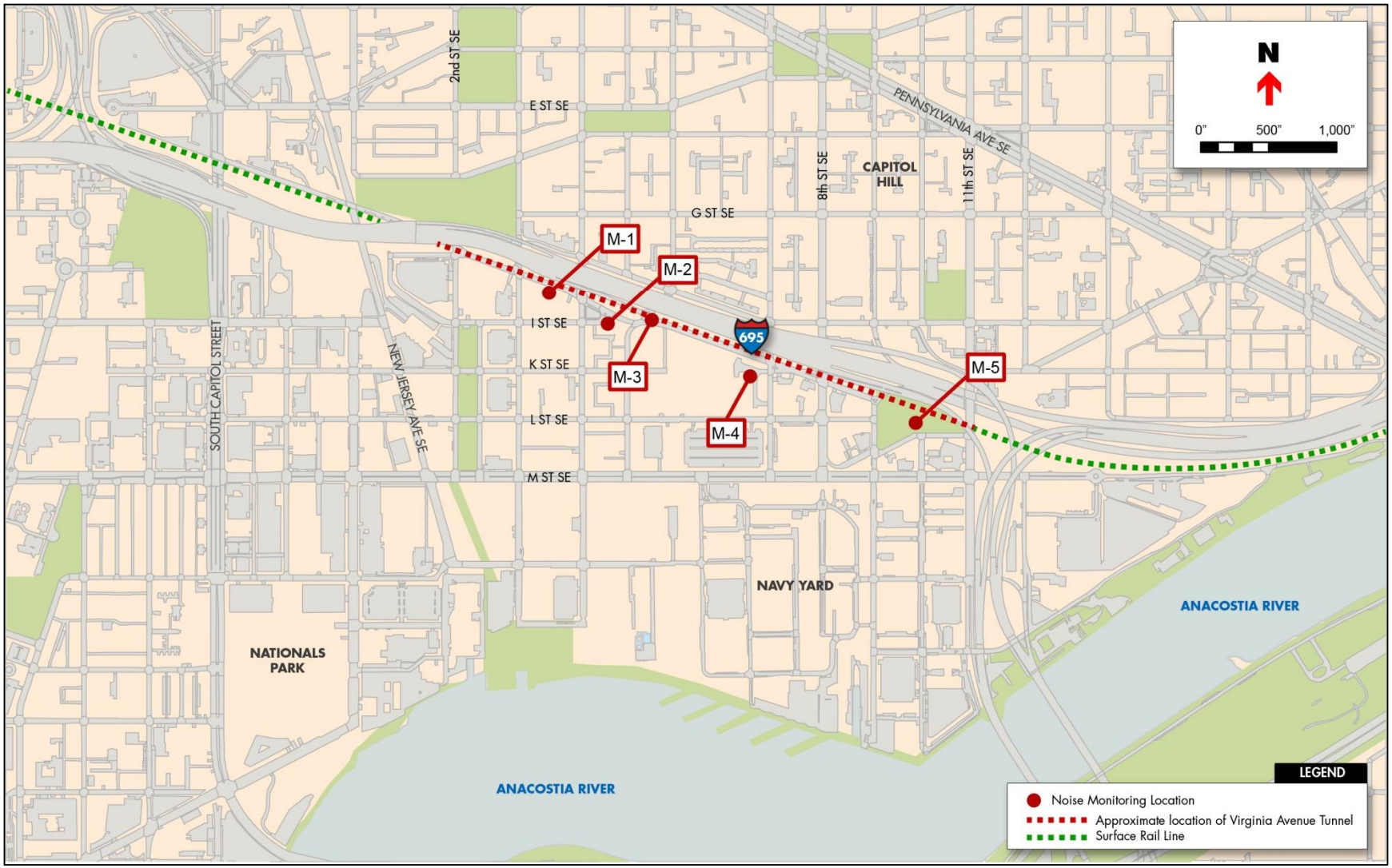


Table 4-13
Existing Measured Sound Levels at Sensitive Receptors

Site ID	Description	Land Use	Noise Levels (dBA)
M-1	Capitol Quarter,300 Block	Residential	70 Ldn
M-2	Capitol Quarter,400 Block	Residential	70 Ldn
M-3	Capper Senior Apartments	Residential	73 Ldn
M-4	Marine Bachelors Quarters	Residential	69 Ldn
M-5	Potomac Avenue SE Residences at 900 Block	Residential	68 Ldn

4.7 Vibration

This section reports the findings of vibration measurements taken along the LOD. For more information, the complete vibration technical report is in Appendix F. Federal Transit Administration (FTA) vibration guidance is used for freight rail projects if a vibration analysis is required.

4.7.1 Description and Characteristics of Vibration

Vibration is oscillatory motion, and is described in terms of displacement, velocity or acceleration. Displacement is simply the distance that a point on the floor or ground moves away from its static position. Velocity is the speed of the floor movement. Acceleration is the rate in which the speed changes. Velocity or acceleration is the typical means to identify vibration responses of humans, buildings, and equipment. Velocity is used in this section to describe ground-borne vibration.

For evaluating the effect of vibration on buildings, peak particle velocity (PPV) is used as the measure to evaluate vibration levels. For human responses, the root mean square (RMS) velocity is used as the measure. The FTA uses the abbreviation, "VdB" for vibration decibels so as to not confuse it with sound decibel ("dB").

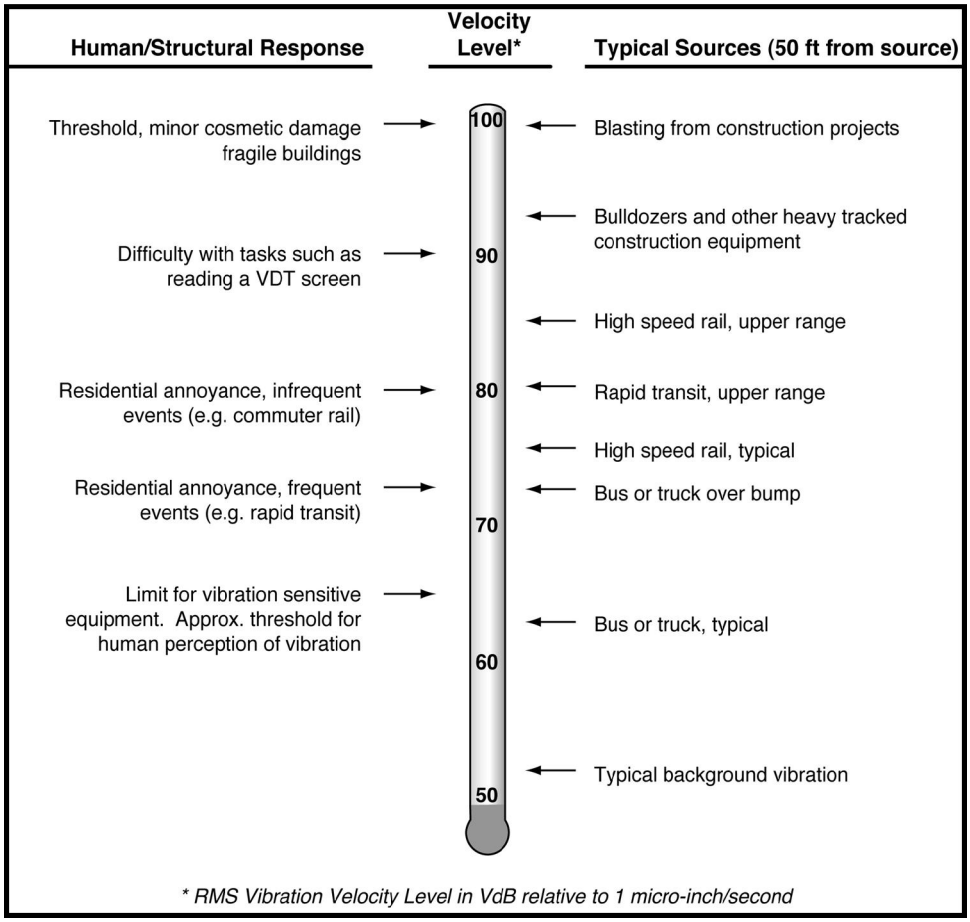
The illustration on the following page provides common vibration sources and the human and structural responses to ground-borne vibration from these sources. The threshold of perception for human response is approximately 65 VdB, but is not usually notable unless the vibration exceeds 70 VdB unless the person is in a highly sensitive location (e.g. concert hall).

4.7.2 Existing Vibration Conditions

Vibration measurements were conducted to determine the vibration levels in structures located adjacent to Virginia Avenue SE or near the LOD from the operation of trains through the tunnel. These measurements were also used to calculate vibration transferability characteristics of the soils along the street, which was then used to predict the vibration levels from construction activities and future train operations within the rebuilt tunnel. To establish

the baseline vibration characteristics (i.e., highest vibration levels possible), measurements were taken next to the rails east of the east portal in May 2012 and December 2013. Figure 4-9 identifies these as Sites 1 through 4. As trains pass by these measurement sites, recorded vibration levels rise accordingly. During each measurement, the speed of the train was recorded using a radar gun and numbers of the locomotives and cars were recorded for each train. This information was used to calculate the vibration propagation characteristics of the soil in the area surrounding the tunnel.

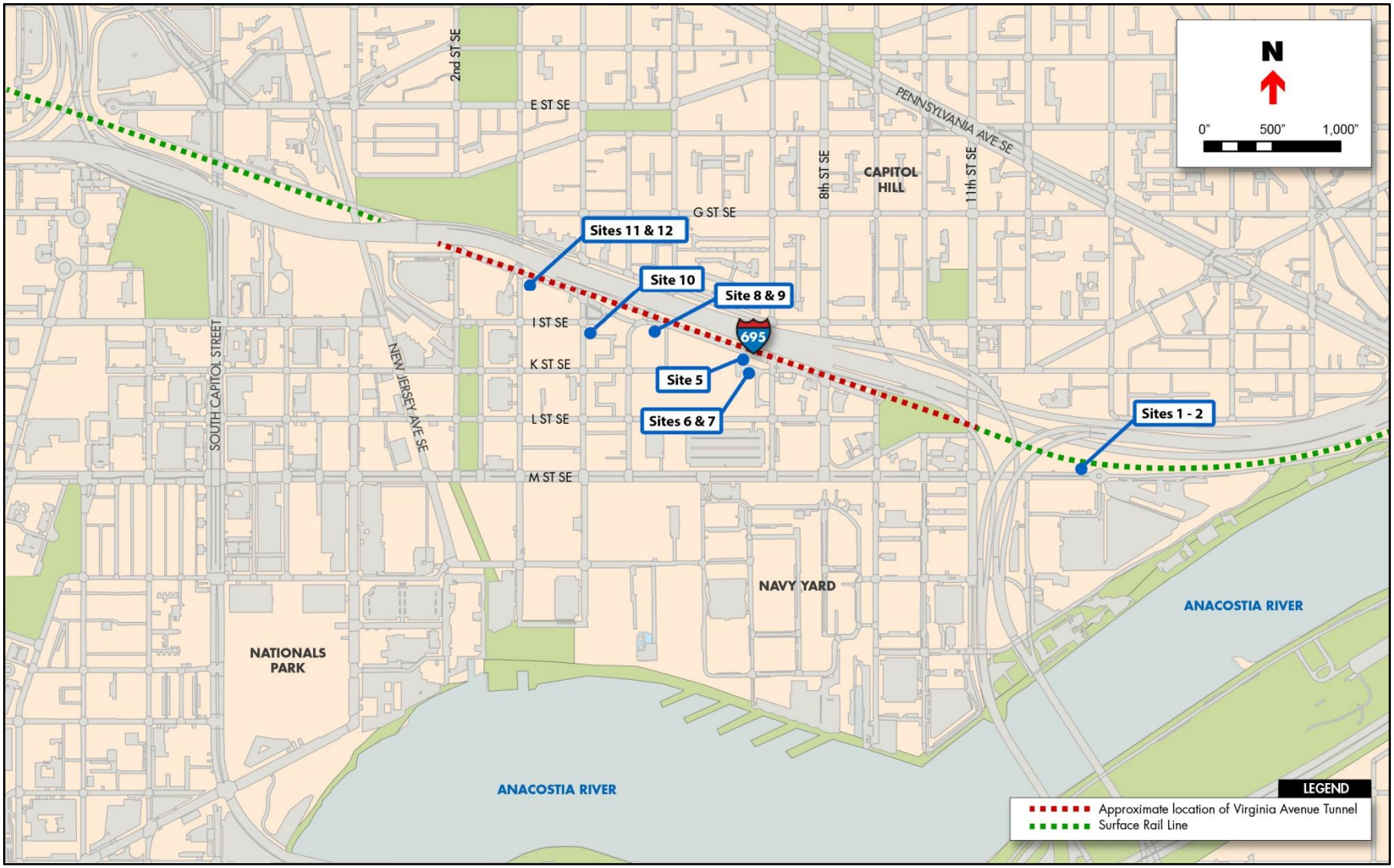
Typical Levels of Ground-Borne Vibration



To characterize existing vibration levels at the most vibration sensitive buildings near Virginia Avenue SE, measurements were taken within the Marine Recreation Facility (Sites 5, 6 and 7), and areas outside of Capper Senior Apartments (Sites 8 and 9), St. Paul AUMP Church (Site 10), and the Capitol Quarter residences (Sites 11 and 12). The Marine Recreation Facility contains two vibration-sensitive uses: U.S. Marine Band practice hall and bachelor enlisted quarters. Indoor measurements were taken within the practice hall. The others were outdoor measurements.

Vibration levels at the Marine Recreation Facility and Capitol Quarters were measured on May 22-23, 2012. Vibration levels at Capper Senior Apartments and St. Paul AUMP Church were measured on December 19-20, 2013. The recorded measurements included at least five train pass-by events. The measurement probe was left overnight at the Marine Band Practice Hall location, which captured additional train pass-by events. Background vibration levels without any trains pass-by events were also recorded at each measurement site for comparative purposes. Background levels include both naturally-occurring vibration and vibration from other manmade sources (e.g., a heavy truck passing by on a nearby road).

Figure 4-9
Vibration Monitoring Locations



At the four receptor locations, the vibration measurements taken during train pass-by events were basically the same as background measurements, with very small variations either up or down. Although residents of Capper Senior Apartments have reported feeling vibration from train pass-by events from the existing tunnel, the measurements taken adjacent to the building did not indicate this impact. The measurements did record vibration spikes during non-train events. However, these spikes were still far below the level of human annoyance. They would not be capable of cosmetic building damage or the rattling of windows.

4.8 Site Contamination - Soil

4.8.1 Geology

The LOD is located entirely within the Coastal Plain Physiographic Province. It is part of the Quaternary (Pleistocene) Age Wicomico Formation. This formation consists of gravel, sand, and silt, and has local basal deposits of carbonaceous clay containing tree stumps and other woody debris. Medium to coarse grained sand and gravel with cobbles and boulders near the base commonly contain reworked Eocene glauconite. Varicolored silts and clays and brown to dark gray lignitic clay contain estuarine to marine fauna in some areas. The thickness of these deposits ranges from zero to 150 feet.

A 1998 material evaluation investigation of the Virginia Avenue Tunnel included the drilling of ten soil borings adjacent to the tunnel using hollow stem augers and split-spoons advanced every five feet (providing intermittent lithologic information). The boring logs showed that fill soil was present in most of the borings at varying thicknesses up to about 26 feet. The fill appeared to consist of a sandy silty clay mixture with rocks and cobbles. Generally, red and gray clay or silty clay layers were below the fill material to the maximum depth of the borings (35 or 40 feet below the ground surface).

According to the *Soil Survey of District of Columbia* (Natural Resources Conservation Service [NRCS], 1976), the soil types within and in the general vicinity of the LOD are classified as urban land or an urban land complex (see Figure 4-10). This indicates disturbances in the past, and is consistent with current and past land uses and human activities. The soils occur on slopes of 0 to 8 percent, and range from well-drained to poorly-drained. None of the soil types are hydric (i.e., suitable for wetland formation).

Urban land (Ub) and Udorthents (U1) comprise most of the LOD. The soil survey describes Urban land as consisting of nearly level or moderately sloping areas that are more than 80 percent covered by asphalt, concrete, buildings or other impervious surfaces. Udorthents, which consist of areas of cut, filled or otherwise disturbed soils, are scattered throughout.

The fill material comprises a mixture of organic and inorganic materials from human activity and sandy, gravelly, clayey, silty, or micaceous soil material. Earthy fill comprises most of the fill material in these areas, although in some areas the fill is composed of non-soil materials such as bricks, trash, wire, metal, boards, cinders and concrete. The variability of the

Figure 4-10
Soils in the General Vicinity of the Project

composition of the fill leads to highly variable soil characteristics. Areas containing only small amounts of coarse fragments are generally high in fertility and available water capacity and have good potential for lawns and landscaping.

4.8.2 Site Contamination

The Project is located in an area that has had over 100 years of commercial and industrial use. Because the Project would involve excavation of soil in the vicinity of the existing tunnel, studies were conducted to determine whether there is potential soil and groundwater contamination that could affect how excavated material is handled and disposed of.

Several sources were used to evaluate the potential for soil or groundwater contamination within the LOD as a result of current and/or historical activities on nearby and adjacent properties. They include:

- Database search of governmental records that list facilities that are known to be contaminated or may potentially be contaminated;
- Review of past topographic maps, aerial photographs, Sanborn fire insurance maps, and street directory information;
- Supplemental library research;
- A 1998 investigation of soil and groundwater conditions surrounding Virginia Avenue Tunnel; and
- Soil and groundwater investigations conducted for this Project (in 2012).

The results of this assessment are detailed in the Modified Phase I Environmental Site Assessment (Phase I ESA), which is provided in Appendix G. A summary of this evaluation is provided below.

4.8.2.1 Database and Historic Mapping Review

<u>Historical Topographic Maps</u>

The historic topographic maps were reviewed for information regarding the location or changes in location of city streets, expressways, railroad lines, and large or landmark buildings near the LOD. Early maps showed a rail line on K Street south of Virginia Avenue SE, extending to Virginia Avenue SE, where it likely entered the original part of the tunnel east of 7th Street SE. Potomac Avenue SE also was depicted as extending through Virginia Avenue. Later maps showed the presence of I-695, and that Potomac Avenue SE was no longer present between 10th and 12th Streets SE.

<u>Historical Aerial Photographs</u>

The aerial photographs easily identified one of the facilities of concern, a bulk petroleum facility, with above-ground storage tanks associated with this facility visible in aerials taken from 1949 to the 1990s. Other features revealed in the aerial photographs included the former

position and extent of various streets and blocks of buildings that were demolished when I-695 was originally constructed.

Historical Sanborn Maps

The Sanborn Maps identified 16 facilities of concern. They include former gas stations, facilities with underground storage tanks, cleaners, auto repair facilities, coal yards, and a bulk petroleum facility.

Historical Street Directories

Review of historic street directories identified 48 facilities of concern. They include dry cleaners and laundries, auto repair facilities, printers, metal works, gas stations, and coal yards.

Governmental Database Search

Using a vendor specializing in querying databases maintained by various state and federal agencies, information about contaminated and potentially contaminated properties in the general vicinity of the LOD was obtained. The database search identified a potential 208 facilities within the search distances specified by the query. Of these, 31 were believed to be close enough to be facilities of concern.

Site Listing Summary

Over 60 facilities of concern were identified adjacent to or near the LOD from the sources described above. Some were identified in multiple sources. The Modified Phase I ESA in Appendix G contains the full list. The identified facilities of concern mostly include former and current gasoline stations, dry cleaners, auto repair shops, industrial buildings, and other commercial properties. Subsurface impacts to soils and groundwater may have resulted from the current and historical usage, material storage practices, spills, fill material, or leakage from storage tanks at these facilities. Current and/or former gasoline stations and automotive repair facilities are examples of facilities that may have subsurface contamination as a result of Leaking Underground Storage Tanks (LUSTs) or general petroleum substance use. Current and/or former dry cleaning operations represent a risk of subsurface contamination as the result of the use of chemicals in the dry cleaning process.

4.8.2.2 Soil and Groundwater Investigations

In addition to the identification of facilities of concern, information regarding the presence of actual soil or groundwater contamination was obtained through the collection of soil and groundwater samples during the 1998 and 2012 investigations.

1998 Material Evaluation Study

A material evaluation study of the Virginia Avenue Tunnel and its surrounding soil and groundwater was conducted in 1998 by Ogden Environmental and Energy Services, Inc. for CSX.

The study included a sampling program of areas within and immediately adjacent to the tunnel, and included collecting samples from 10 soil borings drilled above and adjacent to the tunnel, 10 soil samples collected from the sub grade inside the tunnel, seven water samples from inside the tunnel (seepage of water in the tunnel), five electrical duct liquid/sediment samples inside the tunnel, five electrical duct seal samples from inside the tunnel, and one soot sample collected inside the tunnel.

Soil samples were analyzed for the following types or categories of contaminants:

- Polychlorinated biphenyls (PCBs): a contaminant commonly found in old hydraulic equipment or electrical transformers.
- Petroleum hydrocarbons: organic compounds that commonly come from crude oil. The types of petroleum hydrocarbons analyzed included TPH-GRO (gasoline range organics) and TPH–DRO (diesel range organics), as well as oil and grease.
- BTEX (benzene, toluene. ethylbenzene and xylenes) compounds: aromatic hydrocarbons that are used in the manufacturing of chemicals and other products. Contamination of soil and groundwater from BTEX compounds typically occur near petroleum and natural gas production sites, gasoline stations, and other areas with underground or above ground storage tanks containing gasoline or other petroleum-related products. BTX compounds also have volatile organic characteristics, meaning that they have low boiling points and can evaporate at ordinary room temperature. This is referred to as the toxicity characteristic leaching procedure (TCLP) for volatile and semi-volatile organic compounds (VOCs and SVOCs).
- Eight Resource Conservation and Recovery Act metals (RCRA-8): arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver, which are naturally occurring elements that are used in the manufacturing of products.
- Asbestos, a naturally-occurring but toxic mineral that has been used in a number of building products, such as fire retardant coatings, and pipe and ceiling insulation.

Laboratory analytical results showed that TPH-DRO was present in seven of the 10 soil samples collected within the tunnel at concentrations exceeding method detection limits. The concentrations in six of the seven samples exceeded the soil action limits established by the DC Municipal Regulations.

Inside the tunnel, the samples collected from the electrical duct did not contain PCBs or asbestos. PCBs were commonly used in electrical equipment manufactured prior to 1979. In addition, the tunnel soot sample did not contain TCLP VOCs, SVOCs, or metals.

Of the seven water quality samples collected from inside the tunnel, three of the water samples contained TPH-GRO and TPH–DRO and oil and grease at concentrations requiring proper management. Other surface water samples contained analyzed parameters at concentrations exceeding method detection limits, but below DC action levels. The report concluded that soils outside the tunnel at the seep locations may contain the same constituents detected in the seep samples.

2012 Investigation

In May and June 2012, two phases of soil sampling and one round of water sampling were conducted to help characterize the soils that may be excavated and the groundwater that may be removed during construction activities. The locations of these borings and their numbers are shown in Figure 4-11. This data collection was also used to characterize the soils and groundwater conditions to assist in the engineering of the Project.

Phase I soil sampling was conducted in May 2012, and included a total of 19 sample locations along Virginia Avenue. Three soil samples were collected from each of the soil borings, for a total of 57 soil samples collected from these 19 locations. Phase 2 soil sampling was conducted in June 2012, and consisted of sampling from 10 boring locations inside and just outside of the existing Virginia Avenue Tunnel. Nine soil samples were collected from five boring locations inside the tunnel, and another eight samples were collected from five locations at the tunnel portals.

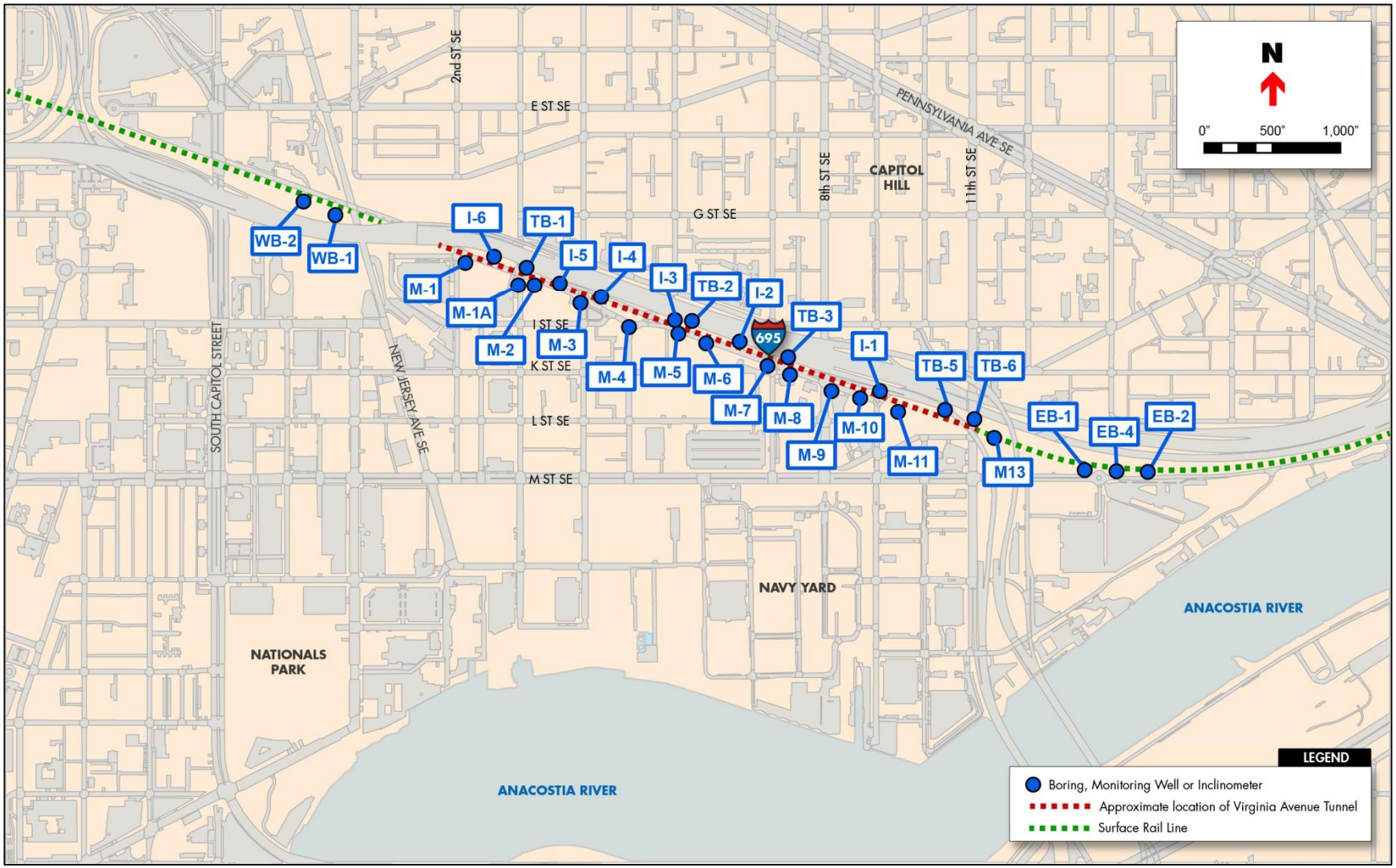
These samples were analyzed for VOCs, SVOCs, TPH-GRO, TPH-DRO, RCRA-8 metals and PCBs. For safety reasons, sampling was not conducted within 0 to 5 feet below ground surface (BGS). Soil samples were collected every five feet beginning 5 feet BGS to a depth of 47 feet BGS and 20 BGS for Phases 1 and 2, respectively. In addition to the soil borings, 16 monitoring wells were installed within the LOD, but only five of these wells contained water (see Figure 4-11). The wells were installed at depths of 58 to 67 feet BGS.

Laboratory results show that nearly all of the soil samples contained arsenic and chromium at concentrations exceeding the residential action levels established by the EPA, but below industrial action levels. As noted above, arsenic and chromium are naturally-occurring metals that are often present (naturally) in the environment at concentrations that exceed regulatory criteria because these criteria are based on the toxicity of the metal.

Despite being above EPA residential action levels, statistical analysis conducted on the arsenic samples indicates that the concentrations are within the typical background concentrations found in the District, and therefore, probably do not indicate a contaminant source(s). This does not necessarily mean that at least some of the concentrations are the result of contaminant sources, but the concentrations found are not statistically different from normal background concentrations.

The originally reported chromium concentrations were unspeciated chromium, and were compared against the action levels for both the chromium III and chromium VI species. Further evaluation of the chromium data was conducted by analyzing the samples for chromium species (Cr^{3+} and Cr^{6+}). Several of the samples were found to contain concentrations of Cr^{6+} at concentrations exceeding the residential action levels. In most cases, the Cr^{6+} exceedances were found in samples collected from the deeper intervals within the borings, not the shallow intervals, which may be indicative of natural background conditions rather than from a contaminant source(s). Nevertheless, the recorded concentrations of chromium, even if naturally occurring, would be an environmental concern if uncovered.

Figure 4-11
Soil and Groundwater Sampling Locations



Samples from borings I-1, I-4, I-5, I-6, M-2, M-5, and M-13 contained at least one SVOC at concentrations exceeding the residential action levels, but below industrial action levels, established by the EPA and the DC Department of the Environment (DDOE). The SVOCs may possibly be indicative of "heavy" petroleum contamination (e.g., diesel fuel). The lateral extent of this contamination has not been fully defined, and does not appear to be the result of migration from a single specific source. Samples from the shallow interval of borings along the entire length of the tunnel contain at least one of these compounds at concentrations exceeding residential action levels.

The laboratory results of the groundwater show that numerous VOCs, SVOCs, and metals are present at concentrations exceeding the method detection limits in monitoring wells M-4, M-8, M-10, and WB-1. Of the parameters detected in these wells, only naphthalene in M-8 was present at a concentration exceeding residential action levels.

The potential for PCB release from the electrical duct was re-evaluated during the 2012 investigations. Samples of materials surrounding the concrete conduits containing the electrical duct were collected during the 2012 investigations to check for the presence of PCBs. The samples were submitted for laboratory analysis, and none of them were found to contain PCBs.

The 2012 investigations confirmed that approximately 8,000 square feet of black felt paper inside the concrete vaults, which extend the entire length of the of the tunnel, contain asbestos.

4.9 Water Resources

Section 404 of the Federal Water Pollution Control Act of 1972, also referred to as the Clean Water Act, provides protection for Waters of the United States. Waters of the United States could be generally defined as all navigable waters and waters that have been or could be used for interstate or foreign commerce, their tributaries, and any waters that, if affected, could affect the former, including wetlands. Water resources are regulated by several federal and local laws and regulations including the Clean Water Act; Title 40 Code of Federal Regulations (CFR) Part 122.26 – Storm Water Discharges; Safe Drinking Water Act of 1974; the District's Water Pollution Control Act of 1984; the District's Storm Water Permit Compliance Amendment Act of 2000; and Title 21 of the District's Municipal Regulations (Chapter 11- Water Quality Standards and Chapter 19 – Water Quality Monitoring Regulations).

A review of existing GIS data showed no Waters of the US or wetlands within the LOD. A field visit confirmed that no water features occur within the LOD other than two small unregulated wet areas, which are discussed below in Section 4.9.3.

In 1974, Congress passed the Safe Drinking Water Act to regulate the public drinking water supply. The 1996 Amendments mandate that states assess, delineate, and map protection areas for their public drinking water sources and determine potential risks to those sources.

The Act does not specifically mandate the protection of source water resources. However, states, tribes, and communities are encouraged to use this information to protect the sources from pollution of major concern and may pass local regulations (EPA, 2004a). Public water resources supply the community surrounding Virginia Avenue SE with drinking water and there are no private wells, source waters, or sole source aquifers located within the LOD.

In compliance with Sections 303(d), 305(b) and 314 of the federal Clean Water Act and the Safe Drinking Water Act, it is the responsibility of the District to develop a prioritized list of water bodies that currently do not meet water quality standards. The Section 303(d) list identifies those water bodies and watersheds that require restoration. The Section 303(d) list does not identify any impaired waters within the LOD. However, local water quality is affected by uncontrolled runoff that causes erosion and allow for roadway contaminates to flow directly into adjacent streams. Outside of the LOD but in the vicinity, the Anacostia and Potomac Rivers are considered impaired due to various pollutants.

4.9.1 Surface Waters

4.9.1.1 Navigable Waters

The nearest navigable water to the LOD is the Anacostia River (see Figure 4-12). The Anacostia River flows into the Potomac River approximately three miles southwest of the LOD. No parts of the Anacostia River are located within the LOD, but the river is located approximately 500 feet from the LOD on the east end. Kayaking, canoeing and fishing are permitted in both rivers.

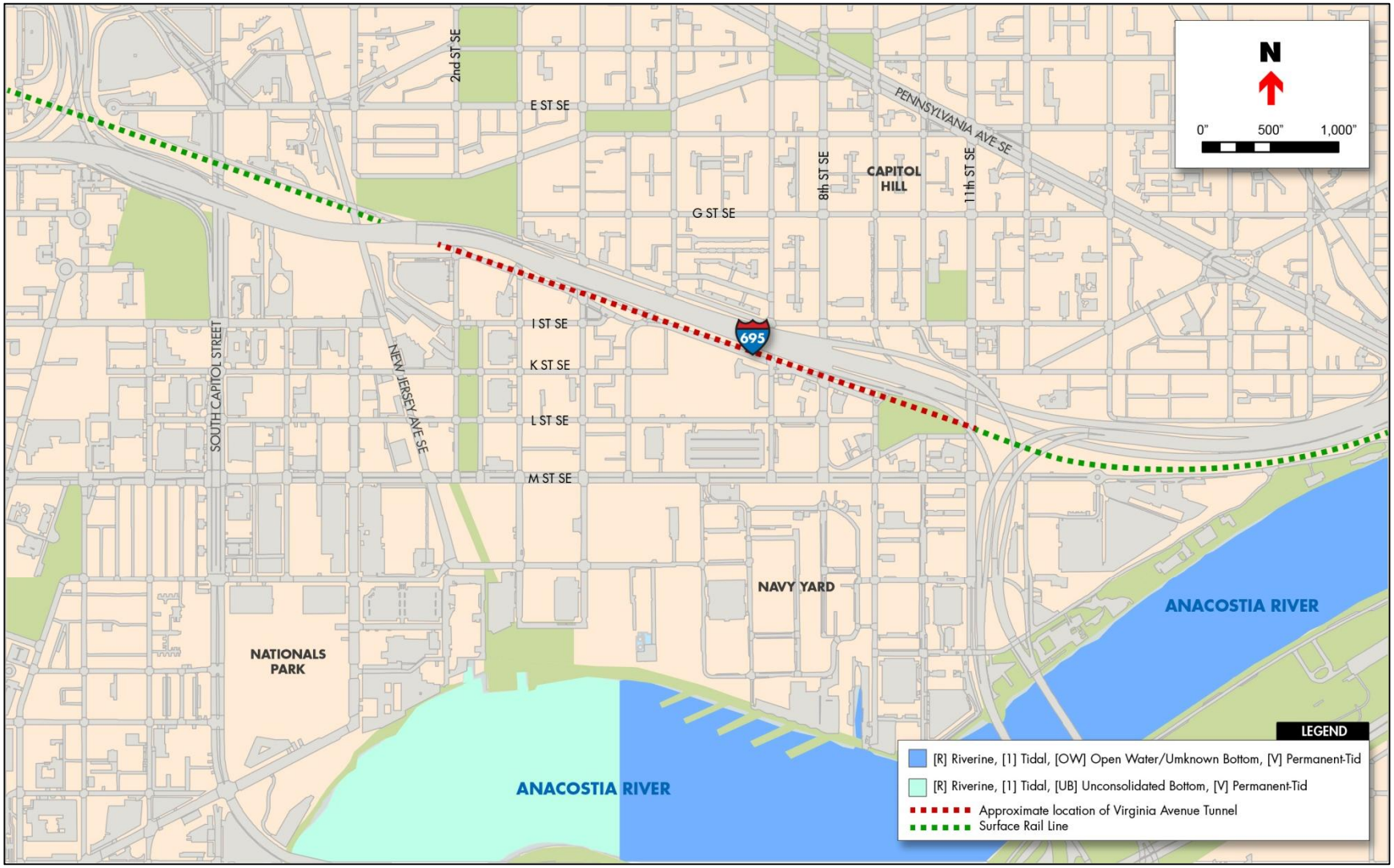
4.9.1.2 Wild and Scenic Rivers

In 1968, Congress passed the Wild and Scenic Rivers Act to preserve rivers with outstanding natural, cultural, and recreational values in a free-flowing condition. In accordance with this law, federal projects are prohibited from supporting actions such as dams or other in-stream activities that would impact a river's free-flowing condition, water quality, or other outstanding resource values. According to the National Park Service (NPS), neither the Anacostia River nor the Potomac River near the LOD is considered to be a Wild or Scenic River System or a Wild or Scenic River.

4.9.1.3 Coastal Zone

The District does not have a designated Coastal Zone and has not developed a Coastal Zone Management Plan (CSMP) under the federal Coastal Zone Management Act of 1972 (CZMA). Federal actions occurring within a designated coastal zone, or with the likelihood to affect any land or water use or natural resource of a designated coastal zone, including cumulative and secondary effects, must be consistent with a federally approved CZMP according to Section 307 of the CZMA and National Oceanic and Atmospheric Administration regulations (15 CFR part 930).

Figure 4-12
Water Resources in the General Vicinity of the Project



4.9.1.4 Chesapeake Bay Protection

The District has been a partner of the EPA's Chesapeake Bay Program since its inception in 1983. President Obama's 2009 Executive Order 13508 on the Chesapeake Bay included goals for restoring clean water by reducing nitrogen, phosphorus, sediment, and other pollutants; recovering habitat by restoring a network of land and water habitats to support priority species and other public benefits; sustaining fish and wildlife; and conserving land and increasing public access. The District achieved its goal of reducing the controllable portion of nitrogen and phosphorus by 40 percent. In June of 2000, partners of the Chesapeake Bay Program adopted the Chesapeake 2000 Agreement in which the District plans to further reduce nutrient loading and control sediment by limiting its contribution of pollutants to 2.4 million pounds/year of nitrogen, 0.34 million pounds/ year of phosphorus, and 0.006 tons/year of sediment (U.S. EPA, 2010).

4.9.2 Groundwater

The availability of groundwater is largely controlled by the geology of the area. Based on published data sources, the LOD is within the Surficial Aquifer of the Coastal Plain. This surficial aquifer consists of alluvium and artificial fill and river terrace deposits. Fill and terrace deposits encountered in the subsurface investigation borings generally consist of clayey or silty sand with trace gravel, while soil strata encountered below the fill and terrace deposits consist of clays and sands. Monitoring wells show that due to low permeability of the underlying clay soil and influence of surface water infiltration, a shallow "perched" groundwater table exists within the river terrace deposits. This perched groundwater above the natural clay deposits is generally deeper than 20 feet below ground surface. Depth to the water table within the clay varies between 30 feet and 45 feet below ground surface. Drinking water is provided via public water sources. Groundwater withdrawals that occur in the general vicinity of the LOD are primarily for commercial and industrial uses.

4.9.3 Wetlands

Wetlands are jointly defined by the EPA, the U.S. Army Corps of Engineers (USACE), and the District of Columbia as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted to life in saturated soil conditions" (USEPA, 40 CFR 230.3 and USACE, 33 CFR 328.3; DC Law 5-188; DC Official Code §§ 8-103.04 and 8-103.20). Wetlands that are connected hydrologically to other waterways are regulated by the USACE.

A review of U.S. Fish and Wildlife Service (USFWS) National Wetland Inventory maps and U.S. Geological Survey (USGS) maps for the Washington West and Washington East Quadrangles showed no wetlands within the LOD (see Figure 4-12). The NRCS Soil Survey of District of Columbia (1975) identified urban land (Ub) and Udorthents (U10) within the LOD, which are not hydric soils.

Field investigations conducted on June 18 and 19, 2012 confirmed the finding that no regulated Waters of the US, including wetlands, exist within the LOD. Two small "wet" areas were identified, but neither was determined to be regulated resources. The first area consists of a drainage feature in a wooded area within CSX's Jersey Rail Yard property. This area did not contain hydric soils or hydrophytic vegetation and would not be considered a regulated wetland. The second area is a small ditch approximately 200 square feet in size located within the rail right-of-way near the eastern end of the LOD. This ditch is dominated by common cattail (*Typha latifolia*) and the soil is comprised of fill (i.e., rail ballast) and is therefore not a hydric soil. Additionally, no hydrological connection was found connecting this rail ditch to another jurisdictional waterway, which is an element in identifying regulated wetlands.

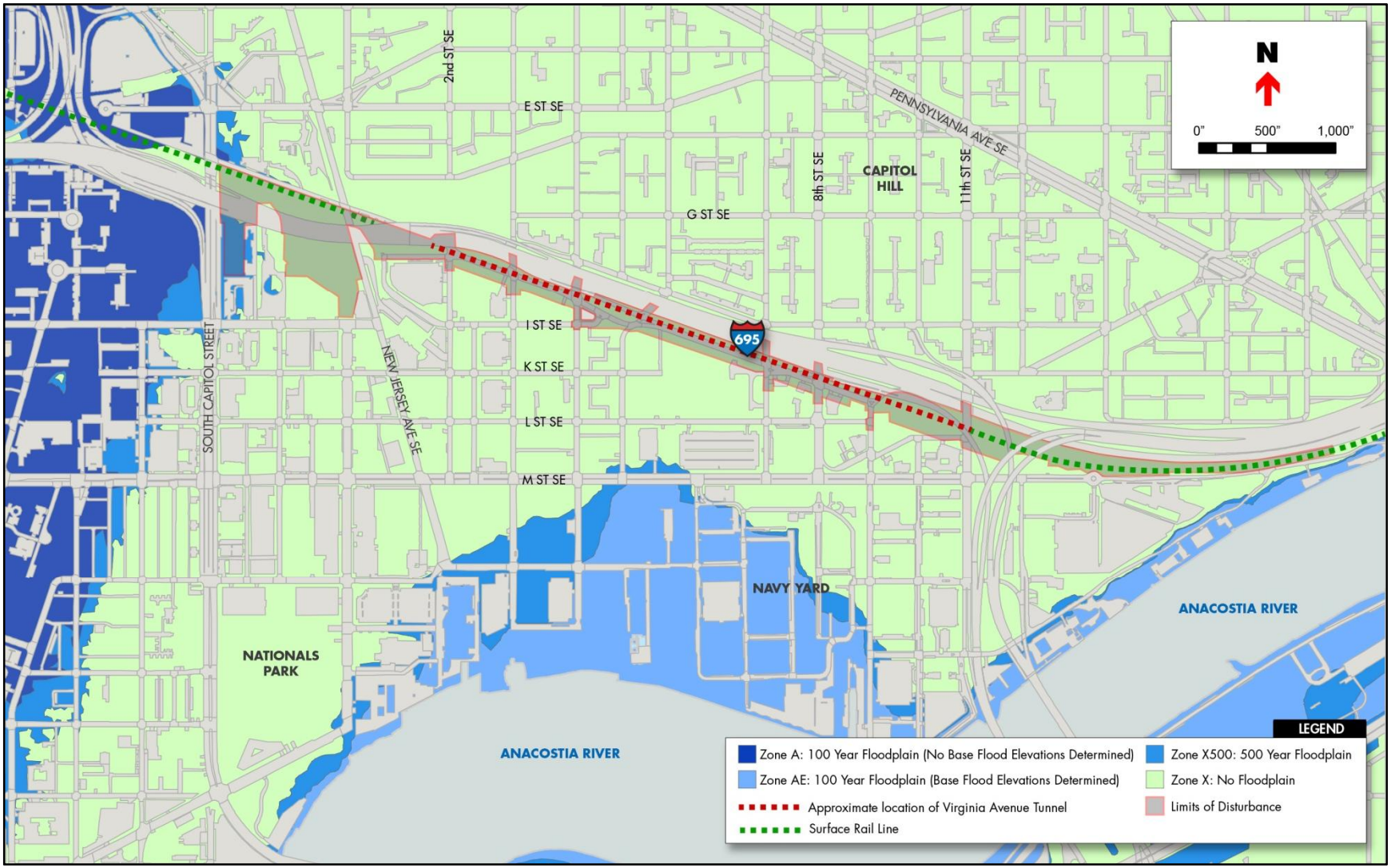
Sporadic railroad ditches at both the eastern and western ends of the LOD along the railroad ballast toe-of-slope were found to sometimes have water. However, these ditch areas did not have hydrophytic vegetation. Additionally, these rail ditches within the LOD were not hydrologically connected to any other jurisdictional waterways. As such, since these rail ditches did not have the three wetland parameters (i.e., hydrophytic vegetation, hydric soils, and hydrology), it was determined that these ditches are not regulated wetlands. Furthermore, as these railroad drainage ditches were not hydrologically connected to a waterway, it was determined that these ditches were also not regulated as Waters of the United States.

4.9.4 Floodplains

The National Flood Insurance Program defines 100-year floodplains as "areas that will be inundated by the flood event having a one percent chance of being equaled or exceeded in any given year." Executive Order 11988 (Floodplain Management) and 23 CFR 650.11 require that federal actions, to the extent possible, avoid short- and long-term impacts to floodplains and avoid direct or indirect support of floodplain development where a practicable alternative exists.

According to the Federal Emergency Management Agency (FEMA) flood boundary mapping, the eastern and central portions of the LOD do not fall within the 100-year floodplain (see Figure 4-13). However, a small portion of the western portion of the LOD occurs within the 100-year and 500-year floodplains of the Potomac River, which is a tidal waterway that is further west of the Washington Channel. The floodplain flows from the Potomac River through the Tidal Basin and reaches the LOD from the northwest via low-lying areas because there is no associated waterway associated with this floodplain. The Flood Insurance Rate Map (FIRM) map specifically states "Flooding Effects [from] Potomac River" for this floodplain area. The western portion of the LOD is within the floodplain of the Potomac River, but the floodplains of the Washington Channel and Anacostia River (which are geographically closer to the LOD than the Potomac River) do not reach the LOD.

Figure 4-13
Floodplains in the General Vicinity of the Project



4.10 Vegetation and Wildlife

4.10.1 Flora

As noted in Section 4.1, the Project is located in an urban area, and therefore, flora species in the general vicinity of the LOD are primarily individually planted street trees, ornamental plantings and grassy lawns associated with landscaping within public rights-of-way, and within Virginia Avenue Park, which also contains a community garden. Additional flora species present include stands of existing volunteer and primarily invasive trees on privately-owned, largely undeveloped, properties adjacent to public right-of-way. Individual street trees are also located within commercial, residential, and institutional properties adjacent to public right-of-way. At the east and west ends of the LOD along the edge of the rail right-of-way, the flora consists of invasive trees and vines, and tall grasses.

A field review of trees within the LOD was conducted in the winter and spring of 2012. All individual trees and tree stands (clusters of trees) within the LOD were identified and evaluated. The tree survey identified 404 individual trees and four tree stands. A summary of the health of 404 individual trees surveyed is provided in Table 4-14. Many of the older individual street trees were found to be in fair to poor condition. Many newly planted street trees of less than two-inch caliper were observed. A summary of tree conditions and quantities observed is provided below.

Table 4-14
Summary of Tree Survey

Condition	Quantity Observed
Excellent	1
Good	148
Fair	121
Poor	52
New	65
Dead, Dying or Withered	17
Total	404

For individual street trees, the tree location was surveyed, and measurements for diameter at breast height (DBH) and diameter of tree canopy were obtained. DBH and diameter of tree canopy measurements were taken using a caliper tape and 200-foot fiberglass measuring tape, respectively. Each individual tree was identified by genus and species. Additionally, the condition of each tree and remarks were noted.

The majority of the individual trees within the LOD are also within public right-of-way (street trees), and Virginia Avenue Park. Of the over 400 street trees observed within the LOD, the

most prevalent species included willow oak (*Quercus phellos*), northern red oak (*Quercus rubra*), pin oak (*Quercus palustris*), scarlet oak (*Quercus coccinea*), black oak *(Quercus veluntina),* thornless honeylocust (*Gleditsia triacanthos inermis*), silver linden, (*Tilia tomentosa*), Chinese elm (*Ulmus parvifolia*), slippery elm (*Ulmus rubra*), southern magnolia (*Magnolia grandiflora*), tree-of-heaven (*Ailanthus altissima*), and red maple (*Acer rubrum*).

The trees in Virginia Avenue Park include Siberian elm (*Ulmus pumila*), eastern red cedar (*Juniperus virginiana*), American holly (*Ilex opaca*), southern magnolia, river birch (*Betula nigra*), mulberry (*Morus sp.*), red maple, Chinese elm, Kwanzan cherry (*Prunus serrulata 'Kwanzan'*), and cherry (*Prunus sp*.). Trees within Virginia Avenue Park were generally in fair condition; however, those trees observed to be the most successful included Kwanzan cherry and Chinese elm.

Three of the four tree stands identified in the survey are in CSX-owned property. The other is within public right-of-way. The four tree stands are identified as Stands A, B, C and D, and their locations are shown on Figure 4-14. Stands A and B are located within the CSX Jersey Rail Yard. Stand C is located south of I-695 between 1st and 2nd Streets and is partially under the Southeast Freeway. Stand D is located on the east end of the LOD within CSX property between the rail line and M Street SE.

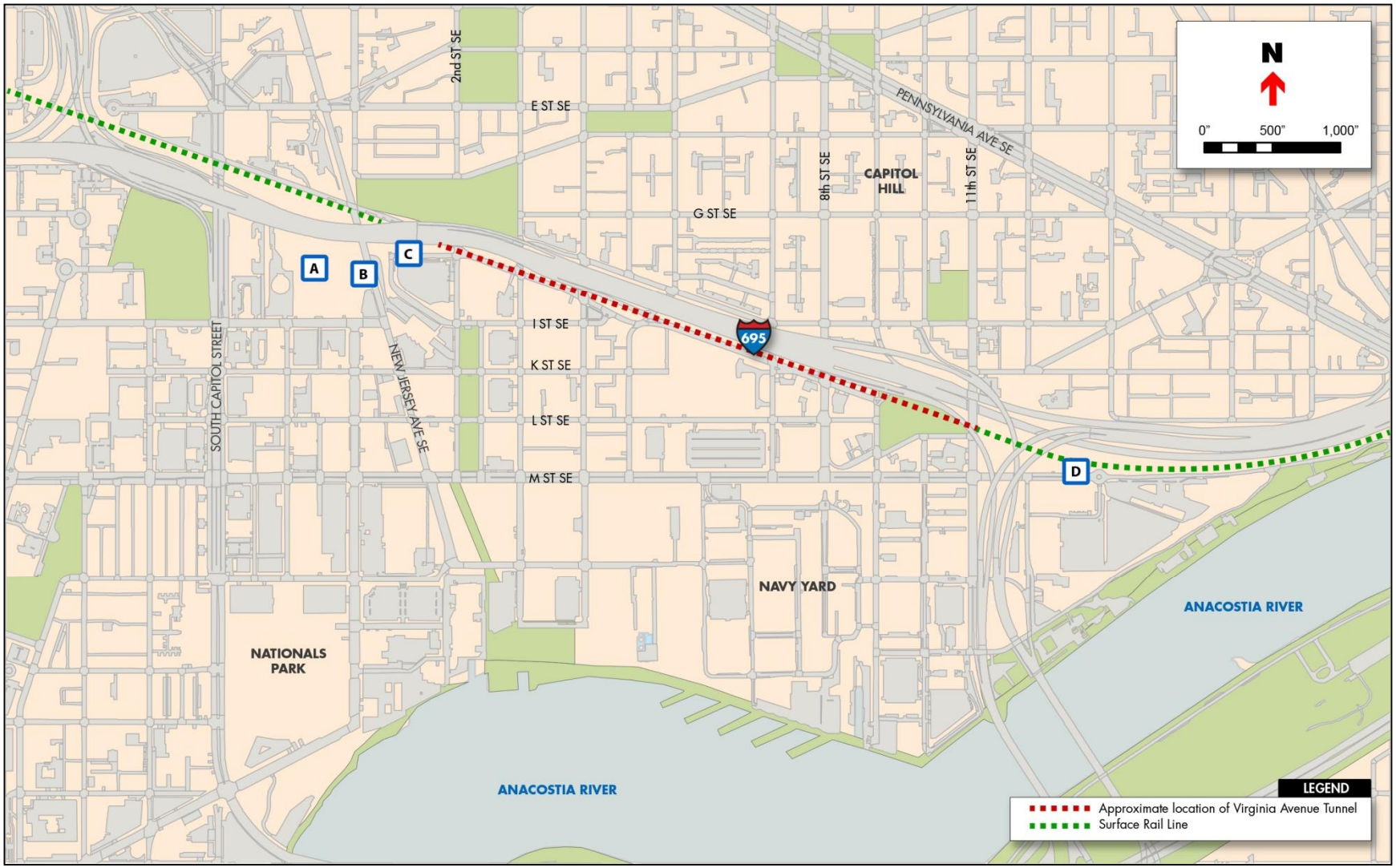
To characterize the tree stands, the stand location was surveyed and the dominant tree species were identified. DBH, diameter of tree canopy, and condition of each tree were documented for Stands A and C. For Stands B and D, which are located within CSX property, the DBH, diameter of tree canopy, and condition were primarily documented for only those trees that are greater than 17.5-inches DBH. A few trees within these stands less than 17.5" were surveyed; however, these smaller trees are not regulated by DDOT's Urban Forestry Administration. Stand A is also located within CSX property, but all trees were documented regardless of size because this stand was less dense than Stands B and D.

Stand A is characterized by volunteer trees consisting of slippery elm (*Ulmus rubra*), mulberry (*Morus sp*.), cottonwood (*Populus deltoides*), and catalpa (*Catalpa speciosa)*. DBH of these trees range between 5 and 18 inches and are generally in good condition. The trees within this stand are labeled on the tree inventory (see Appendix H) as tree nos. 218-235.

Stand B is located within one of the wet areas described above in Section 4.9.3. This stand was characterized by volunteer trees consisting of tree-of-heaven (*Ailanthus altissima)*, red maple, black locust (*Robinia pseudoacacia*), catalpa, American hackberry (*Celtis occidentalis*), and slippery elm. English ivy (*Hedera helix)* and poison ivy (*Toxicodendron radicans*) were also observed growing on many of the trees. Trees within this stand are generally in good to fair condition and of mixed sizes. The trees within this stand are labeled on the tree inventory as tree nos. 250-255 and 379-390, but note that not all trees within this stand were surveyed since only trees greater than 17.5" DBH are regulated by DDOT's Urban Forestry Administration.

Stand C was characterized by volunteer trees consisting of tree-of-heaven and mulberry. Slippery elm is also present within this stand although it is not dominant. This stand is located

Figure 4-14
Tree Stands in Project



beneath I-695 on a steep embankment on the south side of the CSX rail line under the freeway. Trees in this stand are small with an approximate DBH of 2-6 inches and are in fair condition. The trees within this stand are labeled on the tree inventory as tree nos. 282-294 and 378.

Stand D is located on an approximately ten-foot high berm between a dirt roadway along the CSX railroad and M Street SE. This stand consists of slippery elm, black locust, flowering dogwood (*Cornus florida*), Norway maple (*Acer platanoides)*, American sycamore (*Platanus occidentalis)*, and mulberry. Other species observed include poison ivy, *Rubus sp*., and Virginia creeper (*Parthenocissus quinquefolia)*. Trees within Stand D generally have a DBH between 8 and 11 inches and are in fair to good condition. The surveyed trees within this stand are labeled on the tree inventory as tree nos. 356-371, but please note not all trees within this stand were surveyed since only trees greater than 17.5" DBH are regulated by DDOT's Urban Forestry Administration (UFA). UFA requires that an arborist certified by the International Society of Arboriculture (ISA) conduct or certify a tree inventory before tree removal permit could be issued. Typically, the final ISA-certified tree inventory would dictate mitigation requirements.

4.10.2 Fauna

The wildlife species in and near the LOD are adapted to live in highly urbanized areas in proximity to humans. Such species include small mammals, such as opossum (*Didelphis virginiana*), gray squirrel (Sciurus carolinensis), eastern chipmunk (*Tamias striatus*), eastern cottontail (*Sylvilagus floridanus*), raccoon (*Procyon lotor*), striped skunk (Mephitis mephitis), woodchuck (Marmota monax),and eastern mole (*Scalopus aquaticus*). Non- native introduced species likely present in or near the LOD include house mouse (Mus musculus) and Norway rat (*Rattus norvegicus*). Bird species that may be found at or near the LOD include American robin (*Turdus migratorius*), Canada goose (*Branta canadensis*), American crow (*Corvus brachyrhynchos*), red-winged blackbird (A*gelaius phoeniceus*), gray catbird (*Dumetella carolinensis*), Northern cardinal (*Cardinalis cardinalis*), northern mockingbird (Mimus polyglottos), mourning dove (*Zenaida macroura*), blue jay (*Cyanocitta cristata*), song sparrow *(Melospiza melodia),* house sparrow *(Passer domesticus)*, and European starling *(Sturnus vulgaris)*.

Several species of bats are also found throughout the District, and may potentially be found in the general vicinity of the LOD, including within the tunnel. The species most commonly found within the District include big brown bat (*Eptesicus fuscus*), silver-haired bat (*Lasionycteris noctivagans*), red bat (*Lasiurus borealis*), hoary bat (*Lasiurus cinereus*), Eastern small-footed myotis (Myotis leibii), little brown bat (*Myotis lucifugus*), Northern long-eared myotis (*Myotis septentrionalis*), evening bat (*Nycticeius humeralis*), and Eastern pipistrelle (*Pipistrellus subflavus*). Certain bat species roost within caves, such as the big brown bat (*Eptescicus fuscus*), Northern long-eared myotis (*Myotis septentrionalis*), and Eastern pipistrelle (*Pipistrellus subflavus*), while the other bat species within the District roost within trees. No bats were observed within the LOD, including the tunnel, during the field visits. However, this does not necessarily mean that bats do not roost or feed within or near the LOD, including the tunnel.

A field investigation was conducted on June 18 and 19 for wetland identification and tree survey. During these investigations, observations of wildlife in the project corridor were also documented. A Composite Species List that shows the typical species found in the general vicinity of the LOD based on the site's characteristics (i.e. disturbed, urban environment) and which species were actually observed is included in Appendix H.

The LOD is located within the Atlantic Flyway, an important pathway for migratory birds. Many migratory birds rest and feed in the Chesapeake Bay during their annual migration, but some species of birds winter in the Chesapeake Bay while other species breed there during the spring. For example, ospreys have been known to nest on bridges and construction equipment along the Anacostia River and Anacostia Park, which is located east of the Anacostia River. Although the LOD lies is within the Lower Anacostia River Watershed, it does not provide ideal habitat for migratory bird species, which tend to prefer mature forests, fields, and wetlands or as noted above with the osprey, tend to prefer being immediately near river corridor.

4.10.3 Threatened and Endangered Species

The USFWS "Federally Listed Endangered and Threatened Species – District of Columbia" list shows that the only endangered species within the District is Hay's spring amphipod (*Stygobromus hayi*). Amphipods are crustaceans related to lobsters and crabs, but they are much smaller. Hay's spring amphipod is a small aquatic amphipod inhabiting an underground aquifer in an urban area. Habitat for this species does not exist within the LOD.

A field study of the LOD determined that no suitable habitat exists for potential endangered or threatened species as the LOD is mostly developed roadway and freight rail right-of-way.

Correspondence with the USFWS was conducted to determine if any endangered or threatened species are documented within or adjacent to the LOD. In a letter dated June 11, 2012, the USFWS has determined that "except for occasional transient individuals, no proposed or federally listed endangered or threatened species are known to exist within the project impact area", and that no further consultation is required (see Appendix A). Additionally, the USFWS mentioned that while the bald eagle (*Haliaeetus leucocephalus*) has been delisted it is still protected under the Bald and Golden Eagle Protection Act. Bald eagles have increased within the Chesapeake Bay area and have been seen within the District. However, no bald eagles were observed during field visits.

In addition to coordination with the USFWS, DDOT sought input from the NPS and the DDOE through correspondence dated July 12, 2012 and June 22, 2012, respectively (see Appendix A).

The NPS was asked if it had any information regarding protected species within the general vicinity of the LOD, and any if they had any concerns related to protected species. In a letter dated July 18, 2012, the NPS responded that it was not aware of any such species along the LOD.

The DDOE was asked if any District-listed or proposed threatened or endangered plant or animal species and/or any critical habitats that may occur in or adjacent to the LOD and if there are any concerns related to *Species of Greatest Conservation Need (SGCN).* In a letter dated July 13, 2012, the DDOE responded that there are no known or proposed federally-listed threatened or endangered species within the LOD. However, there are several *SGCN* species neighboring the LOD. The following four species are currently designated as SGCN: American toad *(Bufo americanus), r*edbelly turtle (*Pseudemys rubriventris), e*astern small-footed bat *(Myotis lebii),* and little brown bat *(Myotis lucifugus).* Additionally, the following three species are proposed for listing as SGCN species: green frog *(Lithobates clamitans), g*ray treefrog *(Hyla versicolor),* and southern Leopard Frog *(Rana sphenocephala).* DDOE recommended that contractors be alert and considerate of all wildlife species that may be encountered during project implementation. DDOE also identified several non-SGCN birds in the area including northern mockingbird, American robin, song sparrow, house sparrow, and European starling.

4.11 Historic and Archaeological Resources

4.11.1 Section 106 Process

The federal approvals associated with the Project are subject to compliance with the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470 et seq.), and its implementing regulations (36 CFR 800). NHPA Section 106 requires that the federal agency responsible for an undertaking (the Project) consider the effects of its actions on historic properties. Historic properties are those which are listed in or determined eligible for listing in the National Register of Historic Places. Historic properties could include historic-period resources (e.g., existing buildings or structures) as well as below-ground archaeological resources of historic (e.g., early American) or pre-historic (e.g., pre-contact Native American) origins.

In accordance with Section 106 requirements, the lead federal agency, in consultation with the State Historic Preservation Officer (SHPO), designates an area of potential effects (APE), identifies historic properties (i.e., National Register-listed and National Register-eligible) in the APE, and makes determinations of the proposed project's effect on historic properties in the APE. If a property is generally more than 50 years of age and possesses historic significance and integrity, the property is deemed eligible for the National Register during Section 106 review. Properties that are determined eligible and those that are listed in the National Register are afforded the same consideration in the Section 106 process.

Section 106 regulations require that the lead federal agency consult with the SHPO and consulting parties with interests in historic properties during planning and development of the proposed project. The federal Advisory Council on Historic Preservation (ACHP) may participate in the consultation or may leave such involvement to the SHPO and other consulting parties. The consulting parties are provided opportunities to comment on the proposed project and its effects on historic properties, and the federal agency must consider these comments. The federal agency, SHPO, ACHP (if participating), and other consulting parties seek ways to avoid,

minimize, or mitigate adverse effects. If the agency officials, the SHPO and the ACHP agree on how the adverse effect will be resolved, they develop a Memorandum of Agreement (MOA) or Programmatic Agreement (PA). The MOA or PA stipulates the measures to be taken to avoid, minimize or mitigate the adverse effect.

If a National Historic Landmark (NHL) is located within the APE and would be adversely affected by the project, the federal agency must also comply with Section 110(f) of the NHPA. Section 110(f) requires that the agency undertake, to the maximum extent possible, planning and actions to minimize harm to any adversely affected NHL and afford the ACHP an opportunity to comment. In accordance with 36 CFR 800.10(c), the agency must notify the Secretary of the Interior of any consultation regarding an NHL and invite the Secretary and the ACHP to participate in consultation when an adverse effect to an NHL may occur.

With the establishment of the APE, potential historic properties are then identified within this area. If no historic properties are present within the APE or historic properties may be present but the undertaking will have no effect on them, a "no historic properties affected" determination may be rendered by FHWA (36 CFR 800.4(d)(1)).

Historic properties were identified in the Project's APE, and therefore, the "no historic properties affected" determination would not apply to this Project.

The glossary in the Table of Contents provides definitions of the Section 106 terminology used in this section as well as in Section 5.11.

4.11.2 Historic Properties

The APE for the Project was initially developed in consultation with the DC SHPO during a meeting in March 2012, and then subsequently refined to consider recent project refinements and consulting party commentary received in May 2012. The boundary of the APE encompasses all historic properties and other parcels that could potentially be affected by the Project and adheres to the requirements contained in 36 CFR 800. The boundary of the APE encompasses all historic properties and other parcels that could potentially be affected by the Project and adheres to the requirements contained in 36 CFR 800.Effects considered in this APE delineation include direct physical impacts, visual effects, and potential noise and vibration impacts. The APE is shown in Figure 4-15. It is centered to the LOD. Starting from South Capitol Street, the northern boundary of the APE is formed by Virginia Avenue SE, New Jersey Avenue SE, E Street SE and Pennsylvania Avenue SE. The eastern boundary is formed by 13th Street SE and extends into a portion of the CSX rail right-of-way where it is bounded by the Southeast-Southwest Freeway and M Street SE. The southern boundary of the APE encompasses a portion of the Washington Navy Yard and extends along L Street SE until 4th Street SE where it extends along K Street SE. The western boundary of the APE extends along Half Street SW but encompasses Randall Junior High School and Randall Recreation Center, meeting the northern boundary of the APE at Virginia Avenue SE. In addition to the APE, the locations of the historic properties within the APE are shown in Figure 4-15. Table 4-15 provides brief descriptions of each of these historic properties in the APE.

Figure 4-15
Historic and Archaeological Features

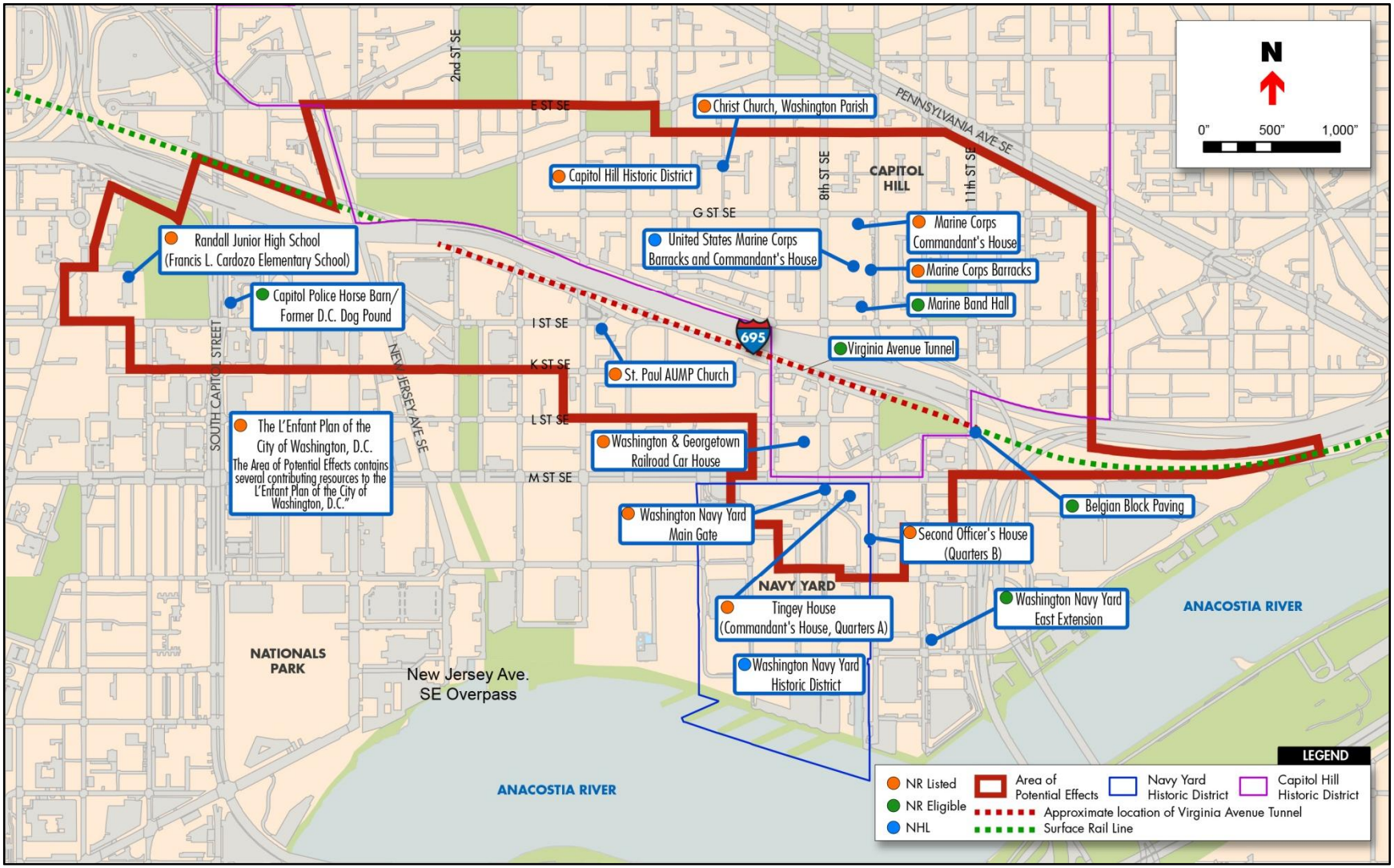


Table 4-15
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
L'Enfant Plan of Washington, D.C. 	Roughly bounded by Florida Avenue from Rock Creek NW to 15 Street NE, south to C Street, and east to the Anacostia River 1792, 1902	Baroque city plan with Beaux Arts modifications. Designed by Pierre L'Enfant. Regular orthogonal grid with numerically and alphabetically designated streets, intersected by diagonal avenues. Historic and contemporary system of parks and medians. 1901-02 McMillan Commission recommendations resulted in physical changes for urban development. Contributing features include, but are not limited to, avenues, parks, and reservations.	Listed A, B, C
Capitol Hill Historic District 	Roughly bounded by the U.S. Capitol; F Street NE and Constitutional Avenue to the north; 14TH, 13th, and 11th streets SW to the east, and the Washington Navy Yard and I-695 to the south Late 18th to mid 20th century	Primarily a residential area with 2 to 4-story row houses and small frame houses in a variety of architectural styles including Federal, Italianate, Greek Revival, Queen Anne, Romanesque Revival, and vernacular interpretations. Began as boarding house community for members of Congress. One of the city's oldest and its largest residential communities. Includes contributing religious, commercial, institutional, and military buildings as well as several parks.	Listed A, C
Randall Junior High School 	*(Francis L. Cardozo Elementary School)* 61 I Street SW 1906, 1912, 1927; later alterations date from 1932-1973	1906 main block building is a 2-story, 7-bay-wide structure clad in red brick. Flemish bond with limestone trim and detailing accessed by a Colonial Revival entrance. Similar freestanding building (1912) in red brick was later attached to the main building via the west wing (1927). One-story red brick east wing (1927) houses the auditorium. Later additions do not contribute to significance.	Listed A, C

Table 4-15 (Continued)
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
Washington Navy Yard Historic District 	8th and M streets SE (Main Entrance); bounded by the Anacostia River to the south 19th to 20th Century	Late Victorian-era 42 acre district, includes approximately 45 major historic buildings and structures as well as numerous support buildings. Design initiated by Benjamin Latrobe—selected by Thomas Jefferson. Served as a site for naval shipbuilding and later for naval gun manufacture. Individually listed properties within the district include the Main Gate, Tingey House (Commandant's House, Quarters A), and Second Officers House (Quarter's B).	Listed (Also NHL) A, B, C
Washington Navy Yard Main Gate 	8th and M streets SE 1805-06	Greek Revival structure that was incorporated into the façade of a 3-story Late Victorian-era building (1880-81). Clad in Flemish bond brick, heavily stuccoed and painted white. Designed by Benjamin Latrobe.	Listed (Contributing Resource to Navy Yard Historic District) A, C
Tingey House (Commandant's House, Quarters A) 	East of the Main Gate and South of M Street SE within the Washington Navy Yard 1804	2.5-story Flemish bond brick structure. Originally a late Georgian townhouse. Altered during the Victorian era by the addition and lengthening of windows.	Listed (Contributing Resource to Navy Yard Historic District) A, B, C

Table 4-15 (Continued)
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
Second Officer's House (Quarters B) 	Charles Morris Avenue within the Washington Navy Yard 1801	2.5-story Federal style gabled roof brick structure painted white; two flat-roof verandas project from the façade; has been substantially enlarged twice (dates unknown).	Listed (Contributing Resource to Navy Yard Historic District) A, C
Washington Navy Yard East Extension 	Bounded by M Street SE to the north, the Anacostia River to the south, and 2nd Street SE to the west 1902-1945	Eastward development of the existing Washington Navy Yard beginning in 1902 with the most comprehensive building campaign dating from circa 1918-1944. Work conducted in this portion of the Navy Yard was critical to naval weapons development and testing during World Wars I and II.	Eligible A, C
Washington & Georgetown Railroad Car House 	770 M Street SE 1891, 1909	Romanesque Revival style building clad in brick with concrete detailing. Original façade is extremely ornate and features semi-circular arches, a parapet, blind arrow slits, and angle towers. An addition is less ornate but mimics the medieval stylistic references of the original building. Only extant Washington & Georgetown Railroad Company facility.	Listed A, C

Table 4-15 (Continued)
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
Christ Church, Washington Parish 	620 G Street SE 1806-07, 1924	2.5-story Gothic Revival style rectangular plan building, stuccoed exterior with a 3-story square bell tower. Has been enlarged and altered since 1806-07. The City's first Episcopal parish designed by Robert Alexander. Often attributed to Benjamin Latrobe.	Listed A, C
St. Paul AUMP Church 	410 I Street SE 1924	1.5-story Gothic Revival style rectangular church, with gabled asphalt roof, arched windows, crenellated battlements, and a tower. Washington's second licensed African American architect, R.C. Archer Jr., designed the church. The only church in Washington that evolved from the oldest incorporated, independent African denomination in the United States.	Listed A, C
United States Marine Corps Barracks and Commandant's House 	Bounded by I Street SE to the north, 8th Street SE to the east, G Street SE to the south, and 9th Street SE to the west Early 19th to early 20th century	Oldest continually active Marine Corps instillation in the United States. Rectangular enclosed site with a central parade ground. Contributing properties include: Commandant's House, Barracks and Band Hall, and Officers' Quarters, a row of five houses located on the west side of the post. Barracks and Band Hall and Officer's Quarters are all clad in red glazed brick.	Listed (Also NHL) A, B, C

Table 4-15 (Continued)
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
Marine Corps Commandant's House 	801 G Street 1801-06, 1840, 1891SE	2.5-story Federal style Flemish bond brick painted white structure. Later historic alterations include the brick addition at the northeast corner (1840) and mansard roof and hooded dormers (1891).	Listed (Contributing resource to Marine Barracks Historic District) A, C
Marine Corps Band Hall 	8th and I Streets SE 1903-07	2.5-story south range of barracks is commonly referred to as the Band Hall. First floor contains a guard shack, band offices, and the Sousa Band Hall.	Eligible A, B, C
Marine Corps Barracks 	8th and I Streets SE 1903-07	Two ranges of barracks border the south and east sides of the rectangular site. Both barracks possess an arcaded loggia, uniform limestone stringcourse, and a hipped roof. 2.5-story east range of barracks feature two 2.5-story pavilions and one 3.5-story pavilion that project beyond the façade. Replaced original barracks that were built in 1802.	Listed (Contributing resource to Marine Barracks Historic District) A, C

Table 4-15 (Continued)
Historic Properties in the Area of Potential Effects

Historic Property	Location & Build Date	Description	National Register Status / Criteria
Virginia Avenue Tunnel 	Located beneath Virginia Avenue between 2nd and 11th Streets SE 1872, 1904	Constructed by the Baltimore & Potomac Railroad with a cut and cover method in 1872. Later extended in 1904; Approximately 3,800 feet in length. Provides railroad access to the District.	Eligible A, C
Capitol Police Horse Barn/Former DC Dog Pound 	Intersection of I Street SW and South Capitol Street Ca. 1915-1925	1-story I-plan utilitarian building clad in brick with a wide entry (infilled) and five stall openings along the west elevation. 1943 map labels building as "DC Pound," but originally built as Capitol Police Horse Barn.	Eligible A, C
Virginia Avenue Paving – Site No. 51SE062 	11th Street Bridges Right-of-Way 1860-1870	Within the previous Virginia Avenue SE right-of-way, the site includes three surviving segments of cut stone block paving. The site probably dates back to the Boss Shepherd period of the District's history and his infrastructure improvement programs. It is significant as a physical part of the L'Enfant Plan of Washington, DC.	Eligible A, B

To determine the potential that Project could affect below-ground archaeological resources, a series of archaeological technical studies were conducted. It should be noted that the APE described above is not the same for identifying below-ground archaeology resources because such resources could only be affected if disturbed by ground-disturbing activities, such as excavation or trenching.

A Phase I Cultural Resources Survey was conducted in 2009 prior to the initiation of the NEPA and Section 106 processes. One of the purposes of this report was to evaluate the potential that certain locations within the LOD may contain archaeological materials with sufficient integrity to be eligible for the National Register. A Phase IB archaeological field survey was conducted in 2011 to determine the presence of buried deposits showing evidence of historic and or prehistoric use (John Milner Associates, Inc., 2011). The sites identified for testing were Reservations 122 and 126 (Virginia Avenue Park), both of which are parks (see Section 4.12). The testing, which involved mechanical borings, revealed that subsurface conditions of these two areas are highly modified urban landscapes with high levels of subsurface disturbance. No intact archaeological deposits were found. The survey recommended that no additional archaeological investigations be conducted. The DC SHPO concurred with the recommendations and conclusions of the survey.

Archaeological investigations conducted as part of the 11th Street Bridges project identified two archaeological sites (51SE057) and (51SE062) within the right-of-way the bridges, and both of which are within the Project's LOD. 51SE057 is a late 19th or early 20th century midden that was determined for the 11th Street Bridges project to not be eligible for the National Register. The SHPO concurred with this finding. 51SE062 is an old section of Virginia Avenue SE, consisting of intact cut block paving probably constructed between 1860 and 1870. The site is significant due to its physical association with the L'Enfant Plan of Washington, DC.

4.12 Public Parks and Recreational Resources

The District contains 9,300 acres of park and open space, almost one quarter of the city's land area. The existing park system comprises a wide variety of park types, sizes, and facilities, and shared jurisdiction between local and federal agencies. The NPS owns the land underlying or controls almost 74 percent of parkland in the District or more than 6,800 acres, which includes Rock Creek Park, the National Mall, Anacostia Park, and smaller parks such as the Virginia Avenue Park. The DC Department of Parks and Recreation (DPR) owns and/or manages four large parks or "conservation-oriented open spaces", 69 recreational centers, 31 swimming pools, and more than 200 neighborhood and triangle parks containing playgrounds, athletic fields and tennis courts. Various federal and local agencies control the remaining 16 percent (1,500 acres) of open space, including the National Zoo, National Arboretum, public school playfields, and cemeteries. The U.S. Department of Defense controls the Marine Barracks Turf Field located at 1009 7th Street, SE, which is near to Virginia Avenue SE.

Figure 4-16 show the locations of parks and recreational facilities in the general vicinity of the LOD. Those that are within or adjacent to the LOD are: Virginia Avenue Park, the Marine Barracks Turf Field, Garfield Park, and an ad hoc skateboard area.

Virginia Avenue Park is the only park or recreational facility within the LOD. The NPS owns the real estate, but the park is maintained and operated by the DPR. The 2.63-acre park is located between 9th Street SE and near 11th Street SE and between I-695 and Potomac Avenue SE / L Street SE. It contains the Virginia Avenue Community Garden, a fenced dog area, and passive recreational amenities that include grassy fields, park benches and picnic tables. The community garden offers residents opportunities to grow herbs, vegetables and fruits. Each participating household is limited of two plots.

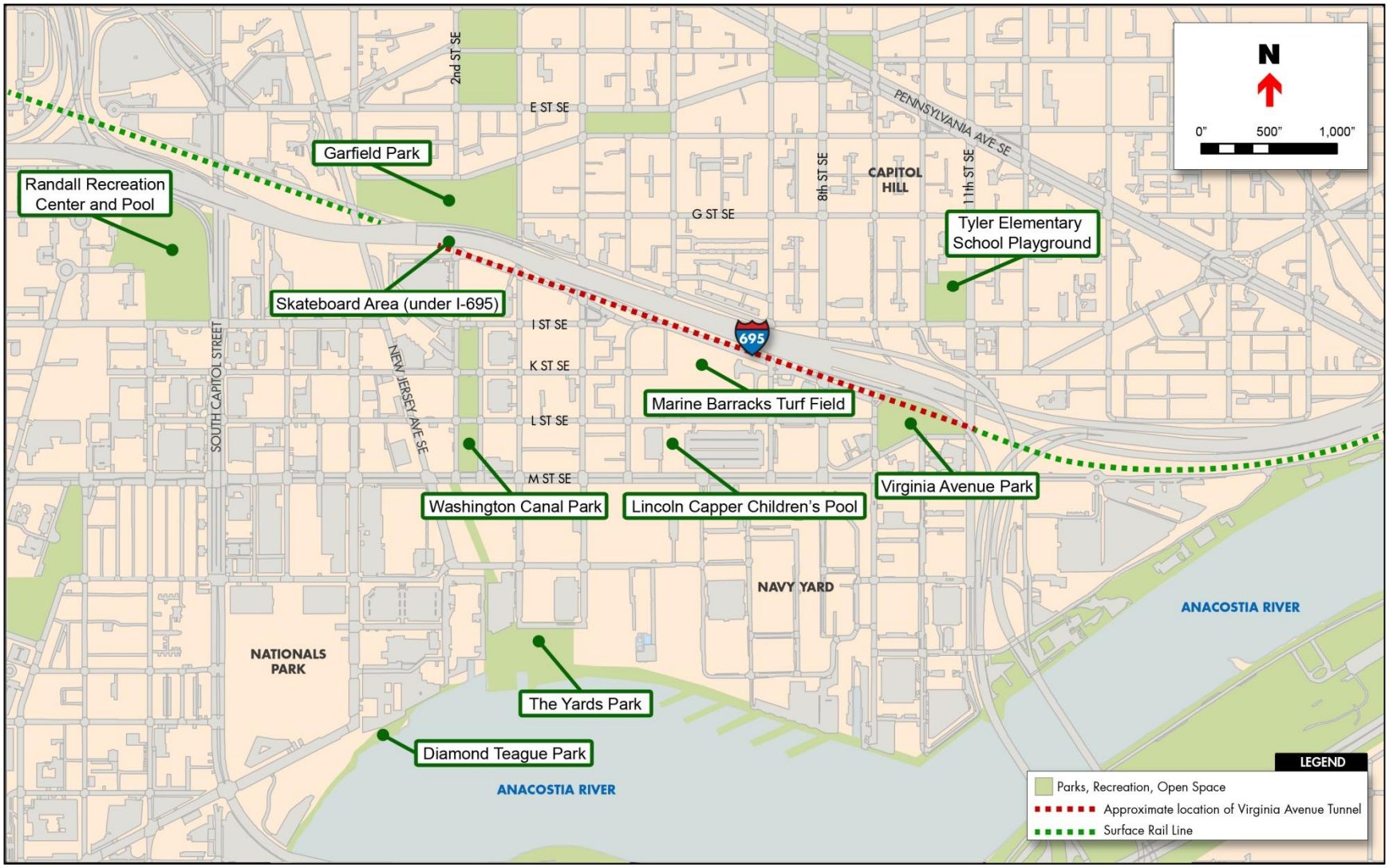
Virginia Avenue Park on north side of Community Garden

The Marine Barracks Turf Field is located within the Marine Corps Recreation Facility, which is adjacent to Virginia Avenue SE within the 700 block. The field is primarily used by Marines for physical fitness and the Marine Band for practice sessions. However, it is also made available to Sports on the Hill, a volunteer youth sports organization, and other visiting recreational teams and spectators with prior approval by the facility.

Garfield Park is located near the LOD at 2nd Street SE. It is one of the 17 original federal appropriations (Reservation 17) purchased by the federal government in 1792 and is described by location and function in a note accompanying Andrew Ellicott's engraving of the L'Enfant Plan. Today, the park features passive recreational amenities, such as park benches, a children's playground, two tennis courts, volleyball area, two bocce ball courts, and historical elements. A Garfield Park connector is proposed by DDOT, which would better connect Garfield Park with the Anacostia Riverfront and Canal Park for cyclists and pedestrians.

An informal or ad hoc skateboarding area is located under the elevated I-695 between Garfield Park and Virginia Avenue SE in the vicinity of 2nd Street SE. In addition, to containing a basketball board and rim, this area under the freeway has several skateboarding accoutrements

Figure 4-16
Parks and Recreation Facilities



erected by the skateboarders themselves, which include quarter pipes, launches and ramps. This area is not listed as an official park or recreation facility by the District or the federal government.

Other parks and recreational facilities in the general vicinity of the LOD include:

- Lincoln Capper Children´s Pool/ Joy Evans Therapeutic Recreation Facility: offers a wide variety of recreation, leisure and educational programs, therapeutic aquatics, and a computer learning center;
- Randall Recreation Center & Pool: includes a pool, tot lot, playground, basketball court, and three tennis courts;
- Washington Canal Park: includes a café, water fountains, ice-skating rink, and programmed attractions such as a farmer's market and holiday festivals;
- The Yards Park: includes a terraced performance venue, biking/jogging trails and seating areas; and
- Tyler Elementary School Playground.

4.13 Visual and Aesthetic Conditions

The visual and aesthetic conditions within the LOD are enhanced by the street trees that line both sides of Virginia Avenue SE between 2nd and 9th Streets SE (see Section 4.10 for further information). Other visually-enhancing elements within the LOD include the open space provided by Virginia Avenue Park, Reservation 122 and other landscaping within the public rights-of-way of Virginia Avenue SE. In addition to its grassy fields, Virginia Avenue Park supports several small to medium sized trees of different species and a community garden that enhances the overall aesthetics of the park and area (see photograph). In other areas of the LOD, in particular the blocks between 3rd and 5th Streets SE, extensive landscaped areas are present between Virginia Avenue SE and the row houses that line the street within these blocks (Capitol Quarter). These landscaped areas are well

Virginia Avenue Park's Picnic Benches along Potomac Ave. SE

manicured and provide setbacks of several dozen feet between the street and the residences depending on the location. A triangular lawn, located at Virginia Avenue SE and 4th Street SE, which is part of Reservation 122, contributes to this setback and visually appealing section of Virginia Avenue SE. The grassy lawn is surrounded recently planted trees. It principally provides roadway landscaping, open space and visual relief from the nearby I-695, which is elevated above Virginia Avenue SE. The urban design, including its size and scale, of the Capitol Quarter row houses is consistent with the urban architecture of the Capitol Hill neighborhood on the north side of the freeway, even though the residences are very new. With its historic two to four-story row houses in a variety of architectural styles, Capitol Hill is considered to be a visually attractive neighborhood.

I-695 to the Left; Capitol Quarter Row Houses to the Right

Within the LOD, I-695 presents the major visual element that detracts from the more enhancing visual and aesthetic characteristics described above. I-695 is located immediately north of and parallel to Virginia Avenue SE, and is elevated above the street grid. It both physically and visually divides the community, and is the most noticeable visual element along Virginia Avenue SE between 2nd and 9th Streets SE. In some locations, I-695 or the retaining walls for the freeway's ramps are located just a few feet from the street's northern curb. From perspectives along Virginia Avenue SE between 3rd and 5th Streets SE, I-695 presents a visual contrast with the residences of Capitol Quarter (see photograph). However, the street trees do provide some level of visual relief between the two differing land uses.

The other visual element within the LOD that detracts from the enhancing visual characteristics described above is where Virginia Avenue SE transitions to one-way operations (between 5th/6th and 8th Streets SE). This section of Virginia Avenue SE presents a visual and aesthetic departure from the more neighborhood or local street characteristics found between 3rd and 5th Streets SE. The reasons for this visual departure include the change in roadway geometrics (conversion to four lanes in one direction), the effects of relatively high traffic volumes existing I-695 at the 6th Street off-ramp, and the change in land use, in particular the Marine Corp Recreation

Facility, which occupies most of the 600 block of Virginia Avenue SE. As a military facility, it has an "institutional" appearance including its iron fencing set along the edge of Virginia Avenue SE, which is needed for security reasons. Because of this change in visual and aesthetic character, I-695 does not present as near a visual contrast as what occurs near Capitol Quarter (see photograph). Again, the street trees do provide some visual relief from the visual impacts of both I-695 and the Marine Corp fencing.

I-695 to the Left; Fencing of the Marine Corp Recreational Facility to the Right

Based on the visually-enhancing elements described above, two viewsheds within the LOD are notable: views within Virginia Avenue SE between 2nd and 5th/6th Streets, and views at or near Virginia Avenue Park. Although the residential portion extends only between 3rd and 5th Streets SE, the block between 2nd and 3rd Streets SE shares many of the same characteristics even though the south side land use is an office building.

4.14 Utilities

The LOD contains several utility infrastructure systems, such as combined sewer overflow (CSO), water, electrical, and natural gas lines, including support facilities (e.g., manholes). Specifically, major utility lines running through the LOD include major CSO lines connecting to the O Street Pump Station and major electric and communication lines running through and in the vicinity of Virginia Avenue Tunnel.

In most cases, each utility infrastructure type is owned and operated by a single organization. For example, gas lines are owned and maintained by Washington Gas; and electric lines are owned and maintained by Pepco. Depending on a number of factors, water and sewer facilities are owned by either the District of Columbia or by DC Water & Sewer Authority (DC Water). However, DC Water operates and maintains all the water and sewer facilities. Most of the communications infrastructure in the general vicinity of the LOD is owned by Verizon. Other communications companies lease conduit space from Verizon or in some cases Pepco. Among

the exceptions is a communications conduit owned by AboveNet that runs along the rail right-of-way and a duct bank that runs along 3rd Street SE that is owned by Level 3.

4.15 Transportation

The section describes the existing transportation conditions in the general vicinity of the LOD. The transportation topics include freight infrastructure and operations, roadway characteristics, traffic, parking, pedestrian and bicycle and facilities, and transit facilities and services.

4.15.1 Freight Infrastructure and Operations

Section 1.2 of this Final EIS provides a general description of the freight and passenger rail network in the District, and describes how the Virginia Avenue Tunnel fits into the freight rail network in the District, the Washington Metropolitan Area and the states in the eastern United States. Section 1.2 also describes how Virginia Avenue Tunnel is an important key link in the rail network connecting ports and markets throughout the Mid-Atlantic and Midwest states. As noted in this section, Virginia Avenue Tunnel is exclusively used for freight operations. In addition to these rail lines, a spur line in the vicinity of South Capitol Street provides service to the U.S. Capitol Power Plant, which needs periodic coal shipments.

Currently, an average 20 freight trains a day pass through the Virginia Avenue Tunnel. In order to meet shipper requirements for pick-up and delivery and to facilitate the overall operation of the network, substantial variations in daily train counts occur depending on the day of week and season. During heavy traffic periods, 20-30 trains pass through the tunnel in a 24 hour period.

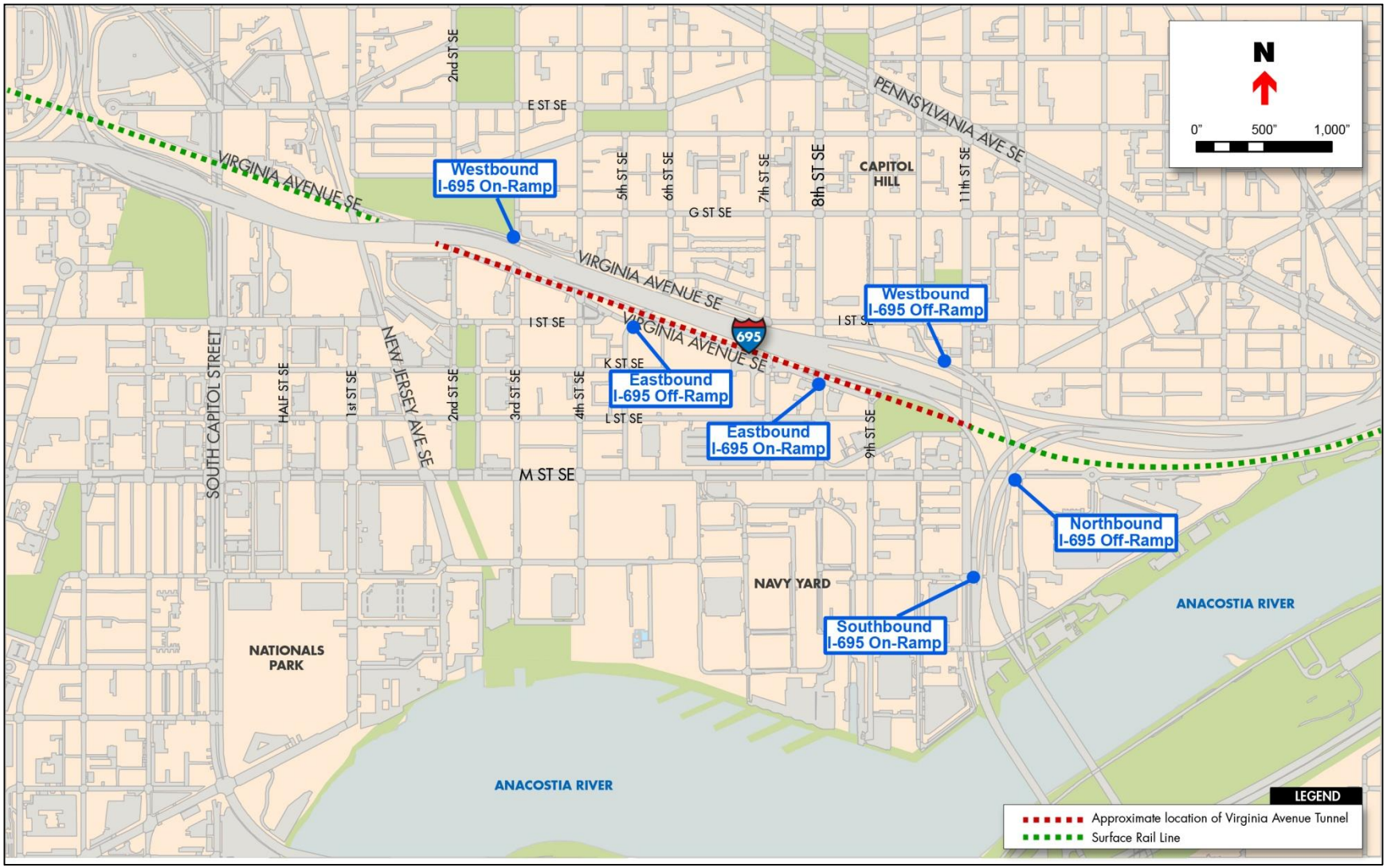
Most of the trains using the Virginia Avenue Tunnel are intermodal container and merchandise trains, accounting for over 80% of the freight loads that transit through the tunnel. CSX does not transport explosive, toxic by inhalation or poisonous by inhalation materials through the District. Customers of freight shipments (many of them are retailers) demand strict service commitments in terms of timeliness, consistency and reliability.

4.15.2 Roadway Network

The area surrounding the Project contains several major roadways that are important transportation corridors not only for traffic moving to and from areas within Washington, DC, but also for traffic moving through Washington, DC to reach other destinations in the Metropolitan Washington Area and throughout the east coast of the U.S. (see Figure 4-17).

Speed limits of the roadways in the general vicinity of the LOD range from 25 mph for most local roads to 45 mph on I-695. In general, the majority of the roadways in the general vicinity of the LOD are two-lane roads (25 mph speed limit) with parking lanes. Within the general vicinity of the LOD, roadway intersections involving larger roadways (i.e., arterial or major collector roads) are typically signalized and intersections involving only minor roadways (i.e. local neighborhood streets) are typically stop-sign controlled.

Figure 4-17
Roadway Network



Descriptions of Virginia Avenue SE and other notable roadways in the general vicinity of the LOD are provided below.

Virginia Avenue SE

As noted previously, Virginia Avenue Tunnel is generally beneath the mostly eastbound Virginia Avenue SE between 2nd and 9th Streets SE on the south side of I-695. As all "state-named" streets indicate in Washington, DC, Virginia Avenue SE is a diagonal-oriented street, and therefore, is not perfectly eastbound. It is oriented in a moderately southeast direction. The westbound Virginia Avenue SE is parallel to the eastbound Virginia Avenue SE, but is aligned along the north side of I-695. The section of Virginia Avenue SE immediately west of 2nd Street SE to South Capitol Street is currently closed off by the Architect of the Capitol. From 2ndto 4th Streets SE, Virginia Avenue SE is a two-lane (two-way) collector road. From 4th to 5th Streets SE, Virginia Avenues SE converts to a two-lane eastbound only collector road with an alignment that arcs slightly south due to the embankment of the I-695 off-ramp at this location. The alignment is re-established at the 5th Street SE intersection. The 5th and 6th Streets SE intersections with Virginia Avenue SE are combined into one intersection, forming a diagonal one-way (northbound) intersection. The 5th/6th Streets intersection also provides a connection for traffic exiting I-695 on the ramp noted above. From 5th/6th to 8th Street SE, Virginia Avenue SE continues as a one-way eastbound collector road, but the number of lanes expands to four.

A connection to the eastbound on-ramp to I-695 is provided at the 8th Street SE intersection. From 8th to 9th Streets SE, Virginia Avenue SE continues as a one-way eastbound collector road, but the number of lanes drops to two.

On the eastbound only segment of Virginia Avenue SE (south of I-695), the intersections with 2nd, 3rd, 4th and 9th Streets SE are controlled by stop signs, while the intersections with 5th/6th 7th and 8th Streets SE are signalized. On the westbound only segment (north of I-695) the intersections with 3rd, 4th, 6th, and 7th Streets SE are all signalized.

The majority of traffic using Virginia Avenue SE are exiting or entering I-695. Users include residents of Capitol Hill and workers traveling between the freeway and places of employment located in the general vicinity of the LOD, such as the Navy Yard.

Interstate 695

I-695 is a six-lane, divided interstate highway with a speed limit of 45 mph. I-695 is a segment of the Southeast/Southwest Freeway that spans approximately two miles, beginning where I-395 enters the Third Street tunnel and extending across the Anacostia River, via the 11th Street Bridges, where it terminates at the interchange with I-295 and DC 295. In the vicinity of Virginia Avenue SE, I-695 is elevated above the street grid, allowing north-south cross streets from New Jersey Avenue SE to 11th Street SE. As noted in Section 4.1.2, the segment of the Southeast/Southwest Freeway located between the 11th Street Bridges and Barney Circle may be converted into a boulevard, but is currently a segment of the Southeast/Southwest Freeway,

which is now closed as part of the 11th Street Bridge Project (see Section 4.1.2). This forced the closure of an on-ramp near the intersection of Virginia Avenue SE and 9th Street SE.

I-695 has the following ramps in the general vicinity of the LOD:

- Two-lane eastbound off-ramp from that connects to the intersection of eastbound Virginia Avenue SE and 5th/6th Street SE intersection;
- One-lane eastbound on-ramp to eastbound I-695 (11th Street Bridges) that begins at the intersection of eastbound Virginia Avenue SE and 8th Street SE (currently closed as part of the 11th Street Bridges project, but is scheduled to reopen at a slightly different alignment in 2014);
- One-lane southbound one-ramp to southbound I-695 (11th Street Bridges) that begins at the intersection of 11th Street SE and N Street SE;
- One-lane westbound on ramp to westbound I-695 that begins at the intersection of westbound Virginia Avenue SE and 3rd Street SE;
- One-lane westbound off-ramp to I Street SE just east of 10th Street SE; and
- Two-lane northbound off-ramp to M Street SE from the 11th Street Bridges aligned along 12th Street SE.

Other Roadways

Other notable roadways in the general vicinity of the LOD include M Street SE, New Jersey Avenue SE, South Capitol Street SE, 8th Street SE and 11th Street SE.

M Street SE is an east-west arterial roadway, with a posted speed limit of 25 mph, with the majority of intersection signalized. It is a six-lane roadway (three lanes each direction) with a divided median along the stretch south of the LOD. The third lane (in each direction) for most of the sections of M Street SE is utilized as on-street parking in the off-peak (non-rush) hours that is converted into a third through lane during the peak (rush) hours.

New Jersey Avenue SE is a diagonal street, but is oriented moderately in a north-south alignment with a speed limit of 25 mph. From Independence Avenue SE to N Street SE, New Jersey Avenue is a two-lane (two-way) collector road with on-street parking on each side. New Jersey Avenue SE passes over Virginia Avenue SE and the CSX rail right-of-way on a concrete bridge. I-695 passes over New Jersey Avenue SE immediately south of the rail underpass.

South Capitol Street is a two-way principal arterial oriented in a north-south alignment. In general, South Capitol Street is a six-lane (three lanes each direction) median divided roadway with a posted speed limit of 25 mph to the west of the LOD. South Capitol serves as a major commuter route between southeast DC/Maryland and downtown DC.

8th Street SE is a two-lane (two-way) minor arterial oriented in a north-south alignment. Between Pennsylvania Avenue SE and M Street SE, 8th Street is known as Barrack Row (see Section 4.1), and provides ample on-street parking to facilitate access to the extensive commercial businesses and restaurants along this street.

11th Street SE is a four-lane (two-way) minor arterial oriented in north-south alignment. The street provides access between Capitol Hill and I-695 at the 11th Street Bridges.

4.15.3 Traffic Conditions

Traffic counts at over 30 intersections (signalized and unsignalized) in the general vicinity of the LOD were conducted in February and March 2012. The collected data was entered into a traffic modeling software (Synchro) that help analyze traffic operations, such as intersection delay and intersection Level-of-Service (LOS). The locations of these intersections are shown on Figure 4-18.

Level-of-service (LOS) is a measure used to describe the quality of the traffic conditions through a given roadway segment or an intersection. The LOS "grades" are based on the delay experienced by motorists traveling through a roadway intersection or segment during the peak or rush hour. The LOS for a given intersection is affected by factors such as existing traffic volumes and the presence of traffic signals or stop signs. The peak-hour LOS is a measure of the adequacy of the intersection or roadway segment for the particular peak hour. LOS is measured on a scale of A through F, with "A" representing the best operating conditions and "F" representing the worst operating conditions.

Tables 4-16 and 4-17 present the results of the Synchro analysis of existing traffic conditions at 24 signalized and 10 un-signalized intersections located in the general vicinity of the LOD. In general, the traffic operations at most signalized intersections are acceptable (LOS C or better), except at five signalized intersections:

- South Capitol Street and M Street (southbound intersection): LOS F during AM peak hour;
- M Street SE and 11th Street SE: LOS D during PM peak hour;
- Virginia Avenue SE (eastbound) and 5th/6th Streets SE: LOS D during PM peak hour;
- Virginia Avenue SE (eastbound) and 8th Street SE: LOS D during PM peak hour; and
- Virginia Avenue SE (westbound) and 3rd Street SE/on-ramp to I-695: LOS F during PM peak hour.

The operational analysis indicates that in general, the un-signalized intersections operate at acceptable LOS. Similarly, that analysis presents that the approaches to these un-signalized intersections also operate under acceptable LOS, with the exception of the southbound approach to the 7th Street SE and M Street SE intersection, which operates at LOS F in the AM and LOS E in the PM. Field observations confirmed the poor condition of traffic operations on this approach.

4.15.4 Parking

On-street parking is available on most streets in the general vicinity of the LOD. In general, on-street parking spaces are mostly of residential permit parking (zone 6), with a two-hour parking limit for non-resident parking. In most cases, non-residential parking is controlled by variable rate meters (see photograph).

Figure 4-18
Analyzed Intersections

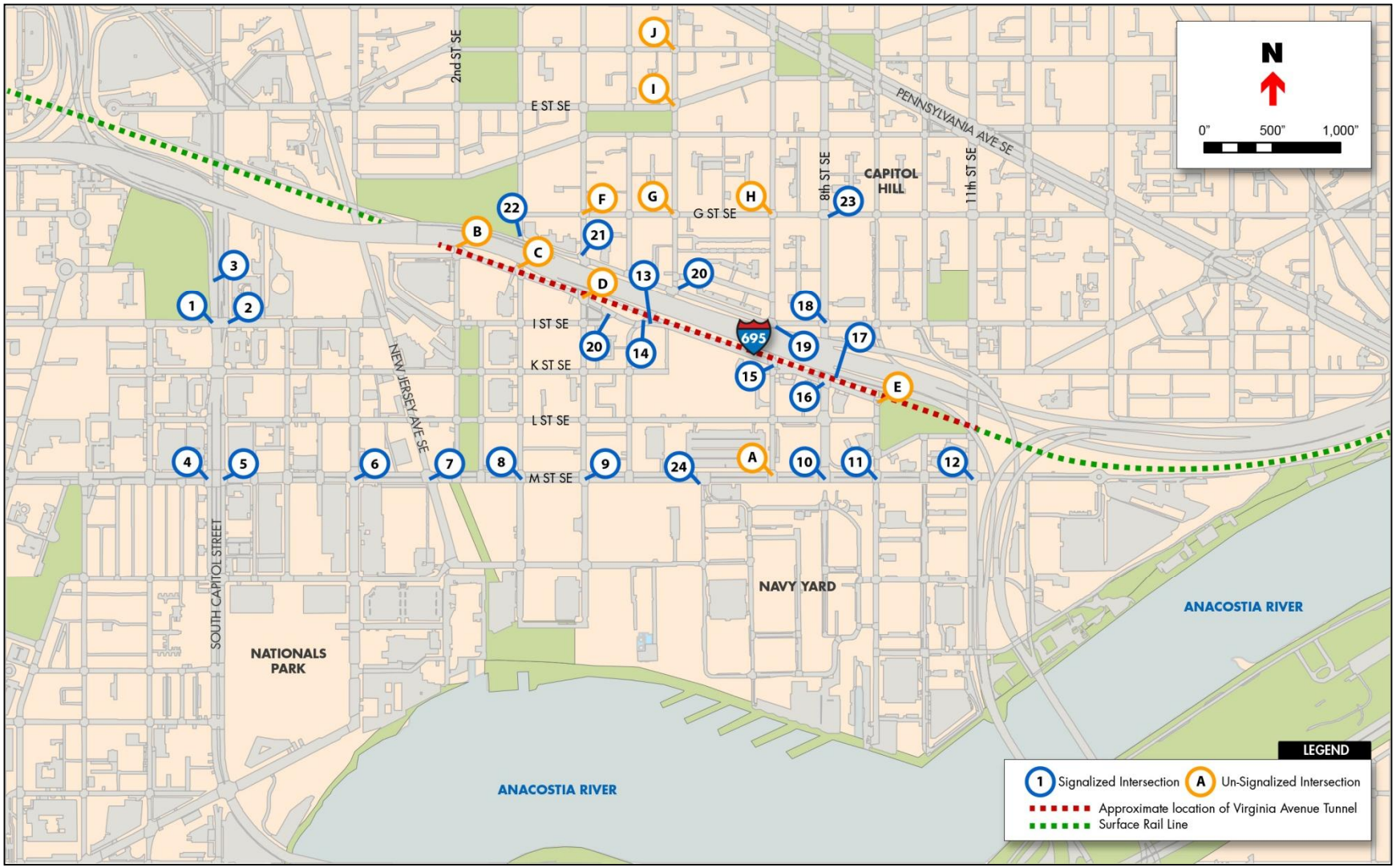


Table 4-16
Existing LOS of Signalized Intersections in the General Vicinity of the Project

Location[1]	Intersection Name	LOS	
		AM Peak Hour	PM Peak Hour
1	South Capitol Street and I (Eye) Street SE (Left)	B	B
2	South Capitol Street and I (Eye) Street SE (Right)	B	B
3	Ramps from freeway at South Capitol Street SB	C	C
4	South Capitol Street at M Street SE - SB Intersection	F	C
5	South Capitol Street at M Street SE - NB Intersection	B	C
6	M Street SE at 1st Street SE	B	B
7	M Street SE at New Jersey Avenue SE	B	B
8	M Street SE at 3rd Street SE	A	A
9	M Street SE at 4th Street SE	C	B
10	M Street SE at 8th Street SE	B	B
11	M Street SE at 9th Street SE	B	B
12	M Street SE at 11th Street SE	C	D
13	Virginia Avenue SE EB at 5th Street SE	C	D
14	SE Freeway off-ramp at 6th St. SE/Virginia Ave. SE EB	B	B
15	Virginia Avenue SE EB at 7th Street SE	A	B
16	Virginia Avenue SE EB at 8th Street SE	C	D
17	Virginia Avenue SE ramp at 8th Street SE	B	B
18	I (Eye) Street SE at 8th Street SE	B	B
19	I (Eye) Street SE at Virginia Ave. SE WB/7th St. SE	A	B
20	I (Eye) Street SE and Virginia Ave. SE WB at 6th St. SE	A	C
21	Virginia Avenue SE WB at 4th Street SE	C	B
22	Virginia Avenue SE WB at 3rd Street SE	C	F
23	G Street SE at 8th Street SE	A	B
24	M Street SE at Isaac Hall Avenue SE	A	C

Notes: [1] See Figure 4-18 for locations of analyzed intersections
EB: eastbound; WB: westbound; SB: southbound; NB: Northbound

Table 4-17
Existing LOS of Un-signalized Intersections in the General Vicinity of the Project

Location[1]	Intersection Name	LOS	
		AM Peak Hour	PM Peak Hour
A	M Street SE at 7th Street SE	N/A[2]	N/A[2]
B	Virginia Avenue SE at 2nd Street SE	A	A
C	Virginia Ave. SE at 3rd Street SE, South of I-695	N/A[2]	N/A[2]
D	Virginia Ave. SE at 4th Street SE, South of I-695	N/A[2]	N/A[2]
E	Virginia Ave. SE at 9th Street SE	A	A
F	G Street SE at 4th Street SE	A	A
G	G Street SE at 6th Street SE	B	A
H	G Street SE at 7th Street SE	A	A
I	E Street SE at 6th Street SE	B	A
J	D Street SE at 6th Street SE	B	A

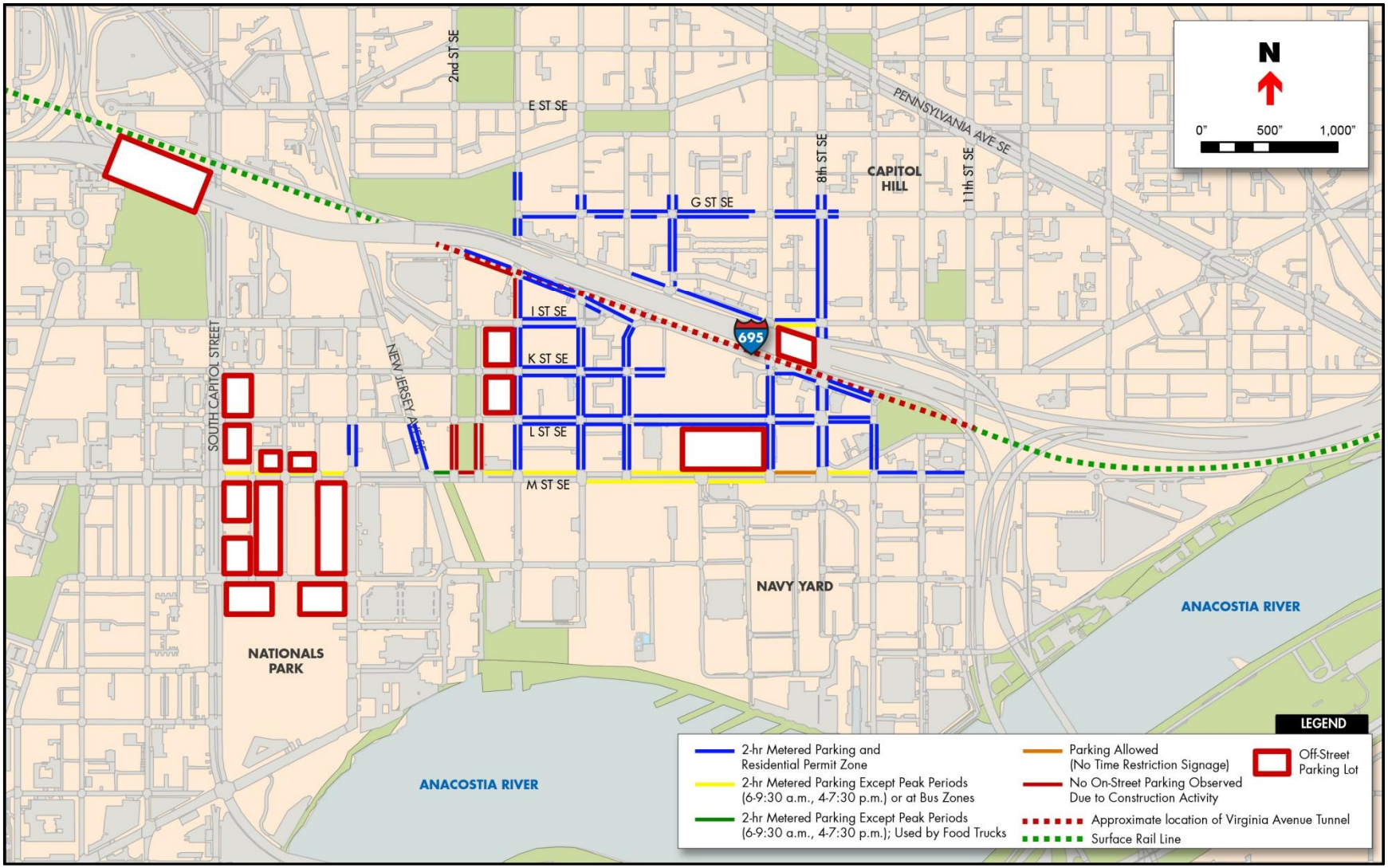
Notes: [1] See Figure 4-18 for locations of analyzed intersections
[2] The HCM procedures does not calculate an overall LOS for two-way stop controlled intersections.

Some streets, such as M Street SE, prohibit on-street parking during rush hours to allow the usage of the parking lane as travel lanes. On some blocks, no signage is provided indicating any restrictions or limitations in allowed parking time. Figure 4-19 show the status of on-street parking in the general vicinity of the LOD. On Virginia Avenue SE, residential and metered parking is provided between 2nd and 5th Streets SE. Between 8th and 9th Streets SE, no parking signage is provided.

In addition to on-street parking zone, Figure 4-19 also identifies off-street parking lots open to the general public in the general vicinity of the LOD. Many of these lots not only provide service to residents and employees working in the area, but they also provide additional parking for attendees of special events, such as Washington Nationals baseball games and the Marine Band summer concerts.

Variable Rate Parking Meter

Figure 4-19
Parking Locations in the General Vicinity of the Project



4.15.5 Pedestrian and Bicycle Facilities

Pedestrian

The District contains over 1,600 miles of sidewalks. Virginia Avenue SE between 2nd and 9th Streets SE provides sidewalks along this entire length. However, the north side of the street, along I-695 lacks sidewalks on most street blocks. Cross walks are provided at every intersection from 2nd to 8th Street SE as shown on Figure 4-20.

Bicycle

The District seeks to develop a comprehensive network of bicycle facilities for recreational and non-recreational use. The District contains on-road bicycle lanes (56 miles); signed routes (84 miles); and off-road trails (56 miles) (DDOT Bicycle Program, July 11, 2012).

Bicycle facilities in the general vicinity of the LOD are shown on Figure 4-21. Bicycle lanes are provided on 1st, 4th, 6th, and 11th Streets SE. Figure 4-21 also shows the location of Capitol Bikeshare Stations. These are locations where patrons pick and drop off shared use bicycles.

Proposed the bicycle facilities in the general vicinity of the LOD include:

- Bicycle trail (off-street) along Virginia Avenue SE from 2nd Street SE (Garfield Park area) to 11th Street SE with an eventual connection to the Anacostia Waterfront;
- Bicycle trail along 2nd Street SE connecting the Anacostia Trail with Garfield Park; and
- Extension of bicycle lanes on 11th Street SE.

4.15.6 Transit Facilities and Services

The Washington Metropolitan Area Transit Authority (WMATA) operates numerous transit services in the general vicinity of the LOD. Figure 4-22 shows these services. The Green Line of the WMATA Metrorail has an underground station (Navy Yard Station) with two entrances located along M Street SE, one at New Jersey Avenue SE and the other at Half Street SE. Other nearby Metrorail stations include Capitol South (1st and C Streets SE) and Eastern Market (Pennsylvania Avenue and 7th Street SE), which are located north of the LOD. Both of these stations are used by Orange and Blue Metrorail lines.

The Metrobus routes operated by WMATA in the general vicinity of the LOD include (see Figure 4-22):

- Routes P1 and P2, which operates along M Street SE during weekdays;
- Routes 90, 92, and 93 (U Street-Garfield Line), which operate along 8th Street SE and M Street SE during weekdays and weekends;
- Routes V7, 8, and 9 (Minnesota Avenue M Street Line), which operate along M Street SE during weekdays and weekends;
- Routes A42, A46, A48, which operate along M Street SE during weekdays and weekend as an afterhours service when Metrorail is not operating;

Figure 4-20
Crosswalks in the General Vicinity of the Project

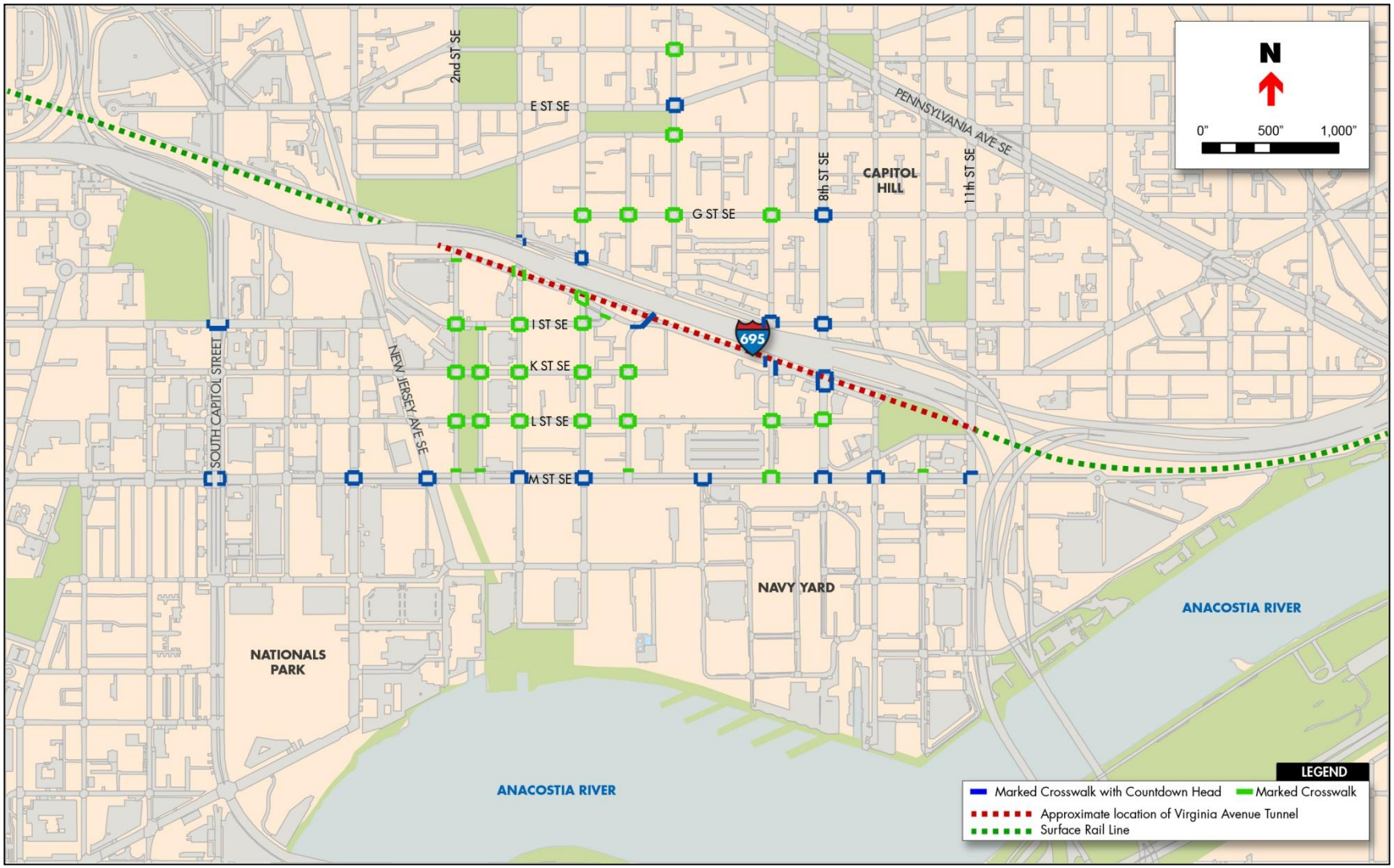


Figure 4-21
Bicycle Facilities in the General Vicinity of the Project

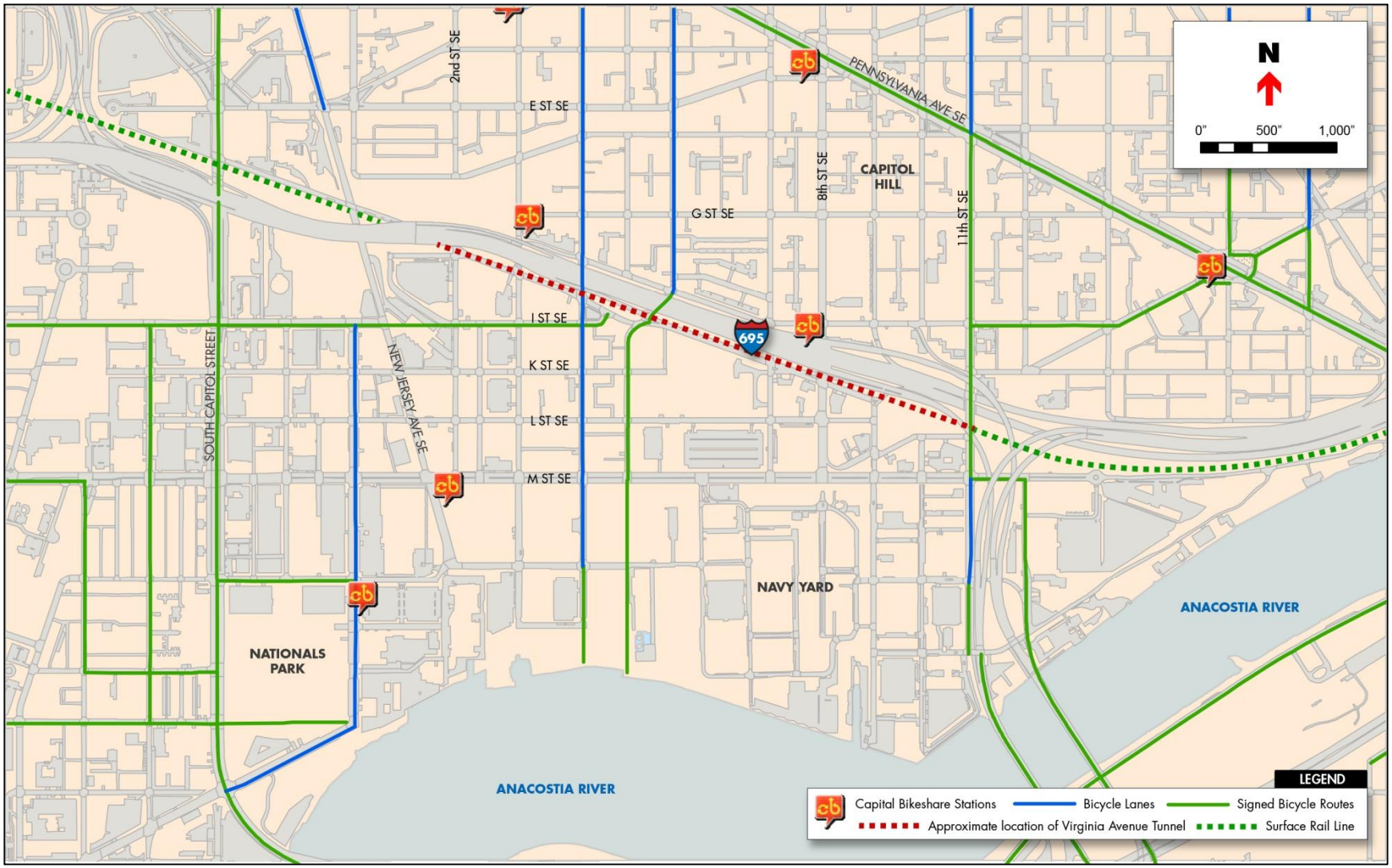
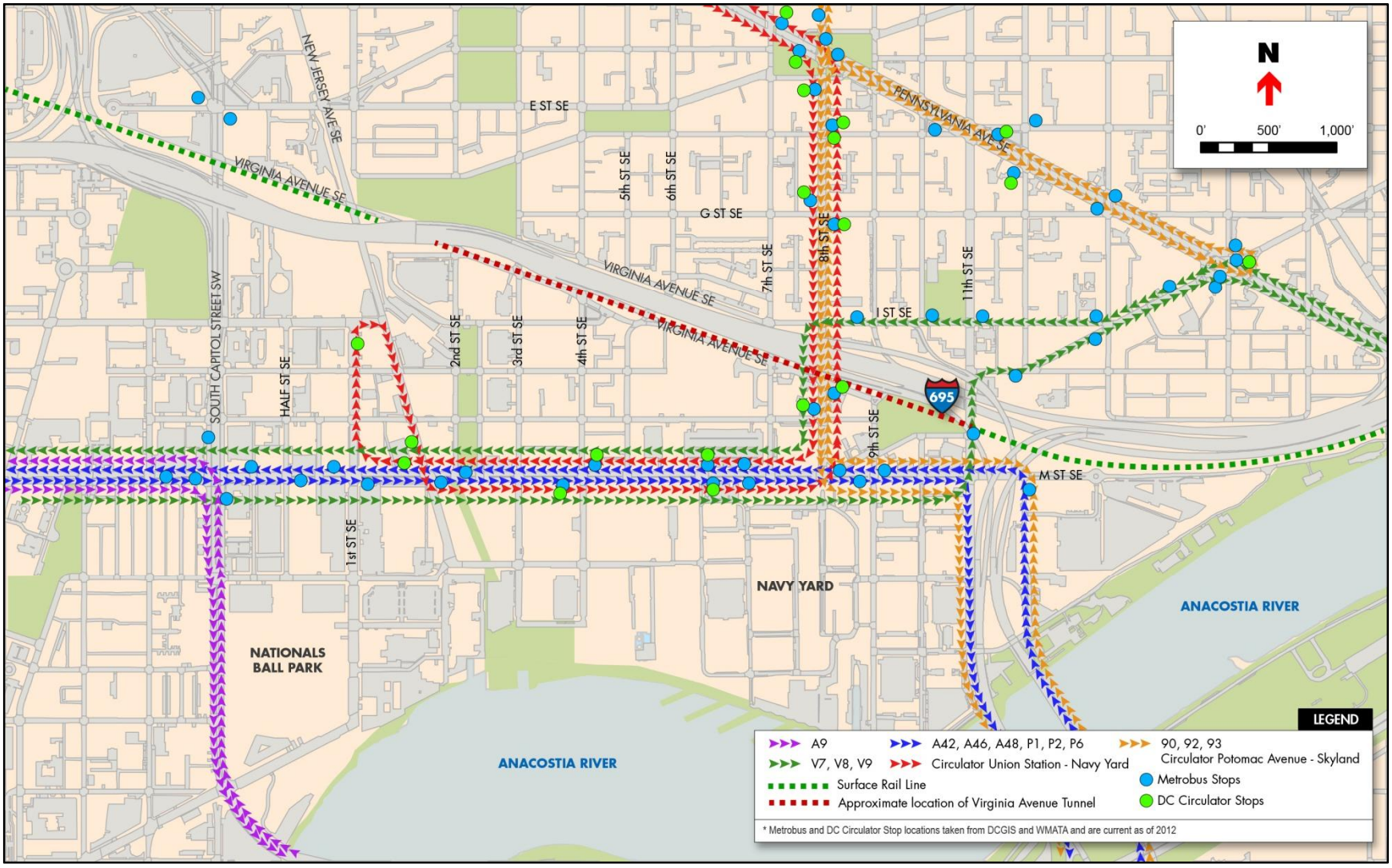


Figure 4-22
Metrobus Routes in the General Vicinity of the Project



- Route A9, which provides rush hour service from southern Anacostia to L'Enfant Metrorail Station, and travels along South Capitol Street and M Street SW; and
- Route P6 (Anacostia-Eckington Line), which operates along M Street SE and was re-routed and re-scheduled in June 2012 from a route that operated on Virginia Avenue SE.

Metrobus routes traveling on I-695 are not are not identified because they do not directly service the areas surrounding the Project.

DDOT operates two DC Circulator routes that pass through the LOD:

- Union Station - Navy Yard: this route links Union Station with the Navy Yard Metrorail Station; and
- Potomac Avenue – Skyland: this route links Potomac Avenue Metrorail Station to Skyland area in Anacostia.

In addition, commuter bus services operate in the area, including companies such as the OmniRide, linking Prince William County to the District of Columbia (including the Navy Yard area).

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Chapter 5
Environmental Consequences

Chapter 5
Environmental Consequences

This chapter includes descriptions of the potential environmental and social impacts of the proposed Virginia Avenue Tunnel Reconstruction Project. Mitigation measures are also presented in this chapter for those potentially unavoidable effects considered to be adverse or negative. Mitigation measures are defined by the Council of Environmental Quality as one of the following: avoiding the impact altogether by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; or compensating for the impact by replacing or providing substitute resources or environments.

Alternative 1 (No Build), does not contemplate any major repairs or rehabilitation of the tunnel in the near future. However, given its 100-year plus age, the tunnel could eventually require emergency or unplanned repairs at some point in the future to maintain commercial freight movements and protect the safety of railroad personnel and the public. For the purposes of analyzing the impacts of the Project, Alternative 1 (No Build), provides a baseline condition with which to compare the consequences associated with the proposed action.

Because the Project is essentially rebuilding existing infrastructure, most of the anticipated impacts described in this chapter are related to or occur during construction. However, some post-construction impacts are anticipated with the Build Alternatives. Therefore, within each topic covered in this chapter, the anticipated impacts of the Alternatives are divided into construction and post-construction impacts.

The Preferred Alternative proposes reconstructing the Virginia Avenue Tunnel in generally the same location and alignment as the existing tunnel. Alternatives 2 and 4 would also reconstruct the tunnel in generally the same location and alignment as the existing tunnel. Therefore, the construction limits of disturbance (LOD) among the Build Alternatives are very similar. Upon completion, the Preferred Alternative or the other two Build Alternatives will increase the number of tracks within the tunnel from one to two, matching the number of tracks on both the west and east sides of the tunnel, and provide a vertical clearance that will allow double-stack intermodal container freight trains to operate in the tunnel. The differences between the Preferred Alternative and Alternatives 2 and 4 are slightly different alignments and how train operations would be conducted during construction. Following construction, freight train activities through Virginia Avenue Tunnel and the District will operate with greater efficiencies due to the provision of two railroad tracks within the rebuilt tunnel. Regardless of the Build Alternative, the Project provides the opportunity to change the Virginia Avenue SE streetscape in keeping with the needs and desires of the District and the community. Upon completion, the portals will remain viewable from very few vantage points (i.e., only at few location at the west and east portals as they are today).

Many of the Project impacts disclosed in this chapter are common to the Preferred Alternative and the other two Build Alternatives and are predicted to occur if any of them is selected in the Federal Highway Administration (FHWA) Record of Decision. Therefore, for descriptive purposes and to avoid repetitive text, the impact descriptions are not divided by alternative. Where there are differences among the Build Alternatives, those differences are noted.

5.1 Land Use

Construction impacts under the land use topic focus on the real estate needs for construction and the influence construction activities may have on any construction or development in nearby properties. For post-construction impacts, the completed new tunnel was analyzed in terms of its public and private right-of-way needs; influence on long-term land use development trends in the general vicinity of Virginia Avenue SE; and consistency with relevant government land use plans and policies and local zoning.

5.1.1 Construction Impacts

Most of the construction-period impacts to land use associated with the limits of disturbance (LOD) of the Preferred Alternative or the other the Build Alternatives will be within public rights-of-way owned by or under the jurisdiction of DDOT, or property owned by CSX (rail right-of-way and Jersey Rail Yard). For instance, the majority of the LOD encompasses Virginia Avenue SE between 2nd and 9th Streets SE because the existing tunnel is located within this street's right-of-way. The parts of the LOD not included in these categories are the Marine Corps Recreation Facility, located on the 600 block of Virginia Avenue SE, and the Virginia Avenue Park, located between 9th and 11th Streets SE within the path of Virginia Avenue SE. These are federal properties that are owned by the U.S. Department of Defense and the National Park Service (NPS), respectively. The park is owned by NPS, however, it is under the jurisdiction of the District, meaning it is maintained and operated by the District, specifically the DC Department of Parks and Recreation (DPR) (see Section 4.12 for further information).

The Preferred Alternative as well as the other two Build Alternatives will require an LOD to some extent within NPS and Marine Corps properties. The LOD within the Marine Corps property may be roughly the same under each of three Build Alternatives (see Section 3.5.1). The LOD within Virginia Avenue Park would be the same for the Preferred Alternative or Alternative 2, but smaller under Alternative 4. The Preferred Alternative or any of the other two Build Alternatives will not require the displacement or relocation of any business or residence. The LOD will also include the following NPS reservations, all of which are triangular-shaped, and are located along Virginia Avenue SE. Unless otherwise noted, most of these properties are part of the roadway network right-of-way under the jurisdiction of DDOT:

- Reservation 122 is located along Virginia Avenue SE between 4th and 5th Streets SE. The majority of this property is used as roadway, under the jurisdiction of DDOT. However, a portion of Reservation 122 is a triangular-shaped grassy lawn with a perimeter sidewalk and contains several young trees, and is under the jurisdiction of the NPS. The lawn will not be part of the LOD.

- Reservation 122A is a relatively small area of land located along Virginia Avenue SE between 4th and 5th Streets SE, and is used for the 6th Street off-ramp embankment.
- Reservation 123 located on the north edge of Virginia Avenue SE between 5th and 7th Streets SE. The portion inside the LOD is used for the I-695 embankment. The remainder of this reservation is used for I-695.
- Reservation 124 is located along Virginia Avenue SE just west of 7th Streets SE. It is used as part of the Marine Corp Recreation Facility, and is under the jurisdiction of the Marine Corps.
- Reservation 124A is used as a traffic island for the intersection of Virginia Avenue SE and 7th Street SE.
- Reservation 127 is located within the 11th Street Bridges right-of-way and Virginia Avenue Tunnel's east portal.

As described in Section 3.5.4 (Maintenance of Traffic and Property Access), access to all properties fronting and near Virginia Avenue SE will be maintained during construction. Therefore, the Project will not preclude construction on any vacant or developable parcel adjacent to or near the LOD. For example, the owner of the vacant parcel located on the 700 block of Virginia Avenue SE may proceed with development of a planned church at any time. However, street access may need to be coordinated depending on the timing of the construction schedules for either project. See Section 5.3 for further details.

Alternative 1 (No Build) would not affect land uses in the short-term during construction because it would not have a LOD and would not require land use approvals for construction.

5.1.2 Post-Construction Impacts

5.1.2.1 Right-of-Way Requirements

Each of the three Build Alternatives proposes a rebuilt Virginia Avenue Tunnel alignment that is, at least partially, outside of the existing tunnel alignment but still largely within the public right-of-way of Virginia Avenue SE.

The Preferred Alternative or the other two Build Alternatives will not require the acquisition of private land. Similar to the project needs within the public rights-of-way, to a limited extent, each of three variations of the rebuilt tunnel would fall outside the existing tunnel alignment under the park. Of the three Build Alternatives, the Preferred Alternative will require the greatest adjustment because under this alternative, the reconstructed tunnel will be split into two separated tunnels between 9th Street SE and the new east portal located just beyond 12th Street SE. Nevertheless, as is described in Section 5.11, the park will not be affected by having a rebuilt tunnel underneath it, similar to how the existing tunnel does not affect the enjoyment of the park. CSX will obtain construction and occupancy permits from DDOT for any work outside the existing tunnel which includes both below and above surface space requirements needed for the Preferred Alternative or any of the other two Build Alternatives.

The reconstructed tunnel under the Preferred Alternative will be partially located under Marine Corps Recreation Facility. As described in Section 5.12, the recreational activities within the Marine Corps facility will be unaffected by the Preferred Alternative tunnel beneath the surface of the property. The reconstructed tunnel under the other two Build Alternatives would not be located within the Marine Corps property, though some utilities may be relocated there (see Section 5.14).

Under Alternative 1 (No Build), Virginia Avenue Tunnel could require a major repair or rehabilitation, or potentially a complete rebuild of the tunnel, at some point in the future. When that occurs, the long-term land use requirements may be similar to those under the Build Alternatives.

5.1.2.2 Land Use Development Trends

Various land use plans for Capitol Hill and the Barracks Row/ Eighth Street Corridor propose to keep these areas vibrant without any substantial changes in development. The *Barracks Row Main Street Initiative*, mentioned in Section 4.1, focuses on attractive streetscapes to attract a vibrant retail mix. Moreover, for the Capitol Riverfront area, an active mixed-use higher-density district is also envisioned, and is well underway. Under the Preferred Alternative or the other two Build Alternatives, Virginia Avenue Tunnel will remain at its current location (largely underneath the right-of-way of Virginia Avenue SE) and largely out of view from the perspective of the surrounding community. Also, the Project will not influence these development trends because it will not provide the amenities typically needed to encourage land use development. Such amenities include the provision of transportation access and infrastructure to designed improve transit riders, pedestrian or motorist experience at an area targeted for development. Conversely, the Project will not take away amenities explicitly or implicitly meant to support current development trends following completion of construction. These factors extend to Alternative 1 (No Build), which like the Build Alternatives, would have no effect on development trends in the vicinity of the LOD.

5.1.2.3 Land Use Plans, Policies and Controls

<u>Comprehensive Plan for the National Capital, Federal and District Elements</u>

All of the alternatives, including Alternative 1 (No Build), would be consistent with the goals of the Comprehensive Plan for the National Capital, Federal and District Elements as described in Section 4.1.2.2.

With respect to the Comprehensive Plan land use goals, none of the Alternatives will affect land resources at or surrounding the LOD, which could be used to "foster goals to protect the health, safety, and welfare of District residents and businesses [and] to sustain, restore, or improve the character and stability of neighborhoods." The Alternatives will not preclude any property owner (public or private) from fully using his or her land in accordance with applicable land use plans and regulations.

Each of the Build Alternatives is consistent with the other relevant goals identified in Section 4.1.2.2, under transportation, recreation, environmental protection and urban design. For instance, each of the alternatives would maintain the surface transportation network and are therefore, consistent with the transportation goals. In addition, upon completion of the Project, Virginia Avenue Park will be restored, and the connectivity between parks for pedestrians and cyclists will be enhanced. Finally, the Build Alternatives provide opportunities to improve Virginia Avenue SE, potentially with urban goals in mind. Improvements to Virginia Avenue SE were specifically mentioned under urban design goals for the Near Southeast Area.

Subarea Plans

The Build Alternatives will support the relevant recommendations from the Subarea Plans by making Virginia Avenue SE into a more pedestrian and cycling friendly facility, thereby supporting mixed-use development and enhancing a sense of place, which are important elements in the subarea plans. The subarea plans are also cognizant of preserving the historical context of Capitol Hill. As described in Section 5.11, the L'Enfant Plan of the City of Washington and the Capitol Hill Historic District will not be affected by the completion of the rebuilt Virginia Avenue Tunnel.

Mid-Atlantic Rail Operations Studies

The Preferred Alternative or the other two Build Alternatives will support the *Mid-Atlantic Rail Operations –Studies* (MAROPs Phase I and II). MAROPs Phase I and II recommended the reconstruction of the existing tunnel and adding additional track to address the bottleneck in the freight rail network, which would meet the freight transportation demands over the next decades. Any of the Build Alternatives will accomplish this recommendation and remove the freight rail system bottleneck at the existing tunnel. The Build Alternatives will also allow more capacity for the rail line due to the tunnel's accommodation of double-stack intermodal container freight trains. Alternative 1 (No Build) would not be consistent with MAROPs Phase I and II because it would not remove the bottleneck. Additionally, Alternative 1 (No Build) would not preclude future emergency or unplanned repairs or reconstruction of the tunnel.

Anacostia Waterfront Initiative

The Preferred Alternative, the other two Build Alternatives and Alternative 1 (No Build) will not preclude the implementation of any of the developments and transportation projects identified in the Anacostia Waterfront Initiative (AWI). These projects are meant to improve community connectivity, in addition to other goals, such as creating a vibrant mix of residences and commercial and cultural activities. The importance of connectivity is discussed in *Extending the Legacy: Planning America's Capitol for the 21st Century*, and to some extent in the *Anacostia Waterfront Framework Plan.* The relocation of the east portal by approximately 330 feet east (this length will be within a tunnel) and future DDOT plans to convert the Southeast Freeway between 11th Street SE and Barney Circle into an urban boulevard, would allow DDOT to connect 12th Street between K and M Streets SE. This will enhance the connectivity between the waterfront area east of the 11th Street SE and the larger Capitol Hill community. Because

establishing this connection is part of the 11th Street Bridges project, the project sponsor is working with DDOT to coordinate these elements of both projects. The project sponsor will also coordinate with the 11th Street Bridges project to complete the section of this project on 11th Street SE where the tunnel will be reconstructed. The Preferred Alternative or the other two Build Alternatives will maintain the current level of connectivity at the surface level, and not interfere with any of the AWI projects.

Long-Range Transportation Plan and Transportation Improvement Program

The Financially Constrained Long-Range Transportation Plan (CLRP) and the Transportation Improvement Program (TIP), both of which are prepared by the Metropolitan Washington Council of Government (MWCOG), identified some major transportation improvement projects in the general vicinity of the LOD. The Preferred Alternative or the other two Build Alternatives will not prevent implementation of these projects, which include the 11th Street Bridges (now under construction) and the South Capitol Street Corridor project, which includes reconstruction of the Frederick Douglas Bridge. The CLRP and TIP also identified bicycle and pedestrian projects meant to improve connectivity between neighborhoods and recreational resources. The Build Alternatives will provide the opportunity to enhance Virginia Avenue SE, a benefit that would not occur under Alternative 1 (No Build). Under the Build Alternatives, an enhanced Virginia Avenue SE could include a bicycle facility to improve the connectivity between Garfield Park and the riverfront.

Major Projects in Project Vicinity

In addition to the 11th Street Bridges and the South Capitol Street Corridor Projects, another major project in the general vicinity of the LOD is the Marine Corps' plans to relocate bachelor quarters located on I Street to another location in the same neighborhood. None of the alternatives will affect the Marine Corps decision in identifying the site for the new quarters.

VRE System Plan

The VRE Strategic Plan provides a framework for VRE system investments and actions VRE should pursue through 2040 to best meet regional passenger travel needs.

The Preferred Alternative or the other two Build Alternatives will not preclude implementation of any of initiatives recommended in the VRE System Plan. A new tunnel will allow CSX to operate more efficiently in comparison to the Alternative 1 (No Build). Improved efficiency may benefit passenger rail service, including VRE, which are using CSX rail lines in Virginia and in the District because more capacity could be allocated to these services. Each of the Build Alternatives will provide a single rail line through the Virginia Avenue Tunnel corridor during construction. The amount of freight passing through the District by rail will be the same regardless of the tunnel being rebuilt. The project will allow CSX to move this freight more efficiently, which may benefit passenger rail service (see Section 5.15.1).

5.1.2.4 Zoning

According to the DC Department of Consumer and Regulatory Affairs (DCRA), the Project, regardless of the Build Alternative, will not require a zoning review or approval (DCRA, February 14, 2013). Because the Project will not influence long-term land use trends (see Section 5.1.2.1), it will not influence others to seek changes in zoning of any parcel along the LOD.

5.1.3 Mitigation Measures

The Project sponsors have and will continue working with DDOT, DPR, and the Marine Corps in obtaining construction-period and post-construction approvals as required by the specific Build Alternative. Section 5.19 has for further information regarding land use approvals or permits needed to allow construction on public rights-of-way and properties owned by DRP, the Marine Corps and NPS. The permits require fees.

5.2 Farmland

5.2.1 Construction Impacts

As described in Section 4.2, no farmlands are located at or near the LOD. Therefore, impacts to farmland cannot occur under any of the Alternatives.

5.2.2 Post-Construction Impacts

None of the Alternatives will lead to or encourage the development of urban agriculture at or near Virginia Avenue SE. The land use plans and policies described in Section 4.1 do not call for the development of urban agriculture, which normally requires favorable market conditions, such as the abundance of vacant land at relatively low cost, and a weak demand for urban development. These market conditions do not exist in the general vicinity of Virginia Avenue SE or elsewhere in the District.

5.2.3 Mitigation Measures

No mitigation measures are required.

5.3 Social and Community Conditions

5.3.1 Construction Impacts

5.3.1.1 Neighborhoods and Communities

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would maintain the existing community characteristics described in Section 4.3.

Under the Preferred Alternative or the other two Build Alternatives, temporary construction impacts are expected that could affect daily routines of residents living in nearby

neighborhoods and communities because these impacts may affect ambient air quality conditions, or substantially change overall noise and vibration levels. Potential construction impacts under these topics are discussed in detail in Sections 5.6, 5.7 and 5.8. In addition, changes in traffic patterns that could affect community life will be prescribed as a result of street closures (notably Virginia Avenue SE between 2nd and 9th Streets) during the construction period. Information on how traffic, bicycle, and pedestrian mobility will be maintained in and around the LOD during construction, or the application of the maintenance of traffic (MOT) plan, is provided in Section 3.5.4. The potential traffic impacts from the implementation of the MOT are discussed in detail in Section 5.15.3. Details of the construction-period impacts of the MOT plan on social and community patterns and resources due to implementation of the MOT plan are described below. These patterns and resources include consideration of the enjoyment and use of the city street grid system to participate in all forms of social activities.

Construction along Virginia Avenue will not sever access between the neighborhoods north and south of I-695 for motorists, pedestrians, and cyclists because, as noted in Section 3.5.4, Virginia Avenue SE crossings at 3rd, 4th, 5th/6th, 7th, and 8th Streets (locations where vehicular, pedestrian, and cycling access are currently available through I-695) will remain open. Nevertheless, a construction site could discourage travelers from maneuvering through the construction area due to possible inconveniences, perceived or real, especially if the traveler is new to the area. Also, east-west movements along Virginia Avenue SE will be curtailed substantially during Phase 1 of the MOT plan and cut-off completely during Phase 2 of the plan. As described in Section 3.5.4, as part of the MOT plan the project sponsor will provide detours and wayfinding signs to assist motorists, pedestrians and cyclists in finding important gathering places, such as business districts (e.g., Barracks Row), parks (e.g., Garfield Park), and major employment areas (e.g., Washington Navy Yard). With proper signage, and the project sponsor's public outreach program to the general public and private retailers or business associations, the potential adverse effects of detours (not being able to find one's destination) could be minimized or eliminated.

Access to residential communities along Virginia Avenue SE will be maintained throughout construction. Capitol Quarter will be provided with temporary entrances on 3rd and 4th Streets SE, and an access road for emergency vehicles will be provided for the Capper Senior Apartments. Based on the traffic impact studies conducted for this Project that evaluated the MOT plan, no substantial delays to vehicular access are expected to occur and that overall mobility will be maintained (see Section 5.15.3). However, certain trips will take longer to complete in comparison to current conditions, in particular those originating from the 6th Street off-ramp heading towards land uses on the south side of Virginia Avenue SE. In the second phase of construction (see Section 3.5.2), these trips will require a more circuitous route (detoured to the Virginia Avenue SE/I Street SE on the north side of I-695) for completion.

5.3.1.2 Public Facilities, Services and Safety

Similar to what is described in Section 5.3.1.1, Alternative 1 (No Build) would maintain the existing level of connectivity with the public facilities and services described in Section 4.3.

The implementation of the MOT plan under the Preferred Alternative or the other two Build Alternatives as described in Section 3.5.4 will ensure that all schools, and religious, social services and community facilities near the LOD, as described in Section 4.3.3, are accessible by auto, walking, and cycling. For instance, access will be maintained to the Eagle Academy Public Charter School and Van Ness Elementary School (soon to be re-opened), which are located to the south of Virginia Avenue SE. Regardless of the Build Alternative, construction of the Project will not affect access to religious worship or other services offered at the St Paul AUMP Church, which is located adjacent to the LOD. Access to the church for parishioners will be available at all times. Although Project construction will displace on-street space that can accommodate six vehicles within I Street SE between 4th Street SE and Virginia Avenue SE (see Section 5.15.4), nearby side and cross will be available for churchgoers to use to park in order to attend service (the church does not provide off-street parking). In addition, unless required for a special reason and permitted by the District, construction will not occur on Sundays, and therefore, construction activities should not interfere with or disrupt regular weekly religious services.

Although the future National Community Church site has yet to be developed, this parcel, located on the 700 block of Virginia Avenue SE, will not be subject to the effects of construction under any of the Build Alternatives other than the provision of driveway access on 7th Street to temporarily replace the existing driveway access on Virginia Avenue SE. A development timetable for this property has not been communicated by the owner, who is aware of the Project and may wait for plans for the tunnel to be finalized to initiate development. Nevertheless, because access to the property will be maintained throughout construction, the owner may proceed with development at any time. However, street access may need to be coordinated depending on the timing of the construction schedules for both projects.

The MOT plan will also ensure that emergency service vehicles, including those coming from Engine 18 Fire Station on 8th Street SE, will be unimpeded when responding to calls. All north-south routes will be open throughout construction. The temporary access provisions that will be provided at Capitol Quarter, Capper Senior Apartments and other properties will be designed to accommodate emergency vehicles.

Maintaining a safe and secure construction area is a commitment of the project sponsor to the neighboring community. The construction area will be in proximity to residences, many of which have families with children. Therefore, to be consistent with Executive Order 13045, Protection of Children from Environmental Health Risks and Safety Risks, safety and security measures as described in Section 3.5.5 will be implemented during construction. Motorists, pedestrians and cyclists will be provided with safe passage along the cross streets of Virginia Avenue SE. The measures will include secure fencing, at least eight feet high, along the perimeter of the construction area, including around the areas with trains running in a protected trench and at cross streets where vehicles, pedestrians, and cyclists will be allowed to cross the construction zone.

With the measures described in Section 3.5.5 (Safety and Security) regarding train operations during construction, such as the assignment of a railroad employee-in-charge who will be

responsible for ensuring the safe passage of trains through the construction area, the level of risk to the safety of train operators and the general public will remain the same as current conditions. Construction worker safety will also be addressed by the operational protocols implemented during construction described in Section 3.5.5. In addition, temporary train operations will remain separated from the street grid, maintaining the condition in which no interactions, such as at-grade crossings, will occur between passing trains and movements made by the general public in the form of motorists, bicyclists and pedestrians.

5.3.2 Post-Construction Impacts

5.3.2.1 Neighborhoods and Communities

Alternative 1 (No Build) could result in an emergency or unplanned major repair or rehabilitation that could cause social impacts in the form of interruption of community cohesion.

The Preferred Alternative or the other two Build Alternatives will restore and improve the streetscape of Virginia Avenue SE. Overall mobility will return to pre-construction conditions. The new streetscape will include improved sidewalks, new bicycle facilities, and more landscaping, and will benefit to the surrounding neighborhood, allowing a pleasant pedestrian and cycling experience.

Once completed, the rebuilt tunnel under the Preferred Alternative or the other two Build Alternatives will return to a condition in which the tunnel, through its portals, will be viewable from very few vantage points, and largely inconspicuous to the larger community. In this community, Capitol Hill's historic preservation with infill development focus along Pennsylvania Avenue and the Eastern Market area (as mentioned in the *Pennsylvania Avenue, SE Corridor Development Plan*) will continue. The Near Southeast neighborhood and Capitol Riverfront area will incorporate more housing, such as the completion of the Capper/Carrollsburg redevelopment and planned residences at the Yards, and the addition of more commercial venues. A rebuilt Virginia Avenue Tunnel under any of the Build Alternatives will not affect nor conflict with these community and neighborhood trends.

5.3.2.2 Public Facilities, Services and Safety

Alternative 1 (No Build) could result in an emergency or unplanned major repair or rehabilitation that could cause social impacts in the form of interruption of access to community, religious, and social-services facilities.

Upon completion of construction under the Preferred Alternative or the other two Build Alternatives, police, fire and emergency services will be able to access properties along Virginia Avenue SE the same way as it does today. Similarly, access to community, religious, and social-services facilities in the general vicinity of the LOD will revert back to their pre-construction conditions as described in Section 4.3.

Under the Preferred Alternative or either of the other two Build Alternatives, the new Virginia Avenue Tunnel and sections immediately west and east of the tunnel will remain separated from the street grid. Therefore, the current condition in which no interactions occur between passing trains and movements made by the general public in the form of motorists, bicyclists and pedestrians will remain.

Train derailments will be less likely to occur in the new tunnel compared to the existing tunnel, despite a higher operating speed than current conditions. The new tunnel will have a more reliable concrete tunnel floor and track ballast.

5.3.3 Environmental Justice

As described in Section 4.3.4, Executive Order 12898, Federal Actions to Address Environmental Justice in Minority and Low-Income Populations, requires federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse human health or environmental effects of their actions on minority and low-income communities or populations, and directs federal agencies not discriminate on the basis of race, color, or national origin.

Section 4.3.4 identified one Environmental Justice (EJ) population adjacent to the Project's LOD: Capper Senior Apartments located within the block immediately south of Virginia Avenue SE between 5th Street SE and the Marine Corps Recreation Facility (turf field).

The residents of Capper Senior Apartments (Capper) will be subject to the construction effects of the Project, such as the operation of construction equipment that produce high noise levels (see Section 5.6) and changes to the visual character of the street during construction (see Section 5.13), similar to other residents who live near or adjacent to the LOD. However, not all Capper residents will be affected in the same manner. Those living in apartments facing K Street SE (south facing), and to a lesser extent those living in apartments facing 5th Street SE (west facing) and the Marine Corps turf field (east facing), will not be subject to the construction effects of the Project. The inconvenience to Capper residents will only occur during construction. Once completed, conditions prior to construction will return.

In terms of access and mobility, provisions will be made during construction to ensure access to Capper is maintained for residents, visitors, staff, para-transit and emergency response vehicles. This access will be part of the MOT plan described in Section 3..4. The MOT will include a 5th/6th Street SE crossing of Virginia Avenue SE for vehicles, bicyclists and pedestrians, including those who are wheelchair dependent. This will be the same provision as other cross streets along the Virginia Avenue SE.

Capper will be located adjacent to construction site or LOD, and construction activities, which may produce airborne dust emissions, construction-related noise levels and other construction effects, will be a concern to residents and staff, especially for those living in the apartments facing Virginia Avenue SE. Each of these construction effects as they relate to Capper is described below.

Because of the dust control measures that will be employed by the construction contractor (see Section 5.5.4), visible dust emissions outside of the LOD are not anticipated. As noted in Section 5.5.4, the construction contractor will be required to monitor dust emissions outside of the LOD, and if a problem is identified, certain measures identified in Section 5.5.4 will be employed.

Construction noise will be a concern. As noted in Section 5.6.2, the predicted noise levels at the apartments due to construction activities are predicted to exceed Construction Noise Impact Criteria if unmitigated. Extensive noise mitigation measures, as described in Section 5.6.4, will be employed to reduce construction noise levels at this sensitive receptor.

Certain construction activities have the potential to cause vibration levels in buildings near the LOD to be of human annoyance (see Section 5.7.2 for further information). This potential impact could apply to the Capper building, and the mitigation measures described in Section 5.7.4 would apply.

Visually, those Capper residents with existing views of Virginia Avenue SE will be subject to a construction site for 30 to 42 months under the Preferred Alternative or Alternative 2. It would be longer under Alternative 4. A rendering of this view is provided in Section 5.13. Under Alternatives 2 and 4, those residents living on the upper floors may be able to see temporary train operations within the runaround track (Alternative 2) or open trench (Alternative 4).

Other potential construction-related affects to soils, water resources, vegetation and wildlife, historic resources and parks as described in Sections 5.8, 5.9, 5.10, 5.11 and 5.12, respectively, will not apply to Capper or Capper residents. Utility disruptions may occur, but as noted in Section 5.14, Capper management and residents will be informed of utility disruptions in accordance with notification requirements of the affected utility company, and every attempt would be made to conduct the utility work during non-peak usage hours. In comparison to a utility disruption affecting a typical residential household where a disruption during working hours (i.e., between 9 AM to 4 PM) may not be overly problematic, a utility disruption affecting Capper may require special treatment. If proper approvals can be obtained, the utility disruptions may be scheduled to have the least impact to daily activities of Capper residents, such as occurring at late night to early morning.

In summary, construction of any of the Build Alternatives will pose a concern to Capper residents, especially to those living in apartments facing Virginia Avenue SE. Nevertheless, the construction effects on the Capper residents will not be considered a disproportionately high and adverse impact in the context of EO 12898 because (1) the Preferred Alternative or the other two Build Alternatives cannot avoid reconstructing Virginia Avenue Tunnel along generally same alignment for an extended period of time (30 to 42 months under the Preferred Alternative or Alternative 2, and longer under Alternative 4); and (2) other residents living near the LOD will experience the same construction impacts.

The potential construction impacts on the Capper Senior Apartments and it residents, visitors, and staff are unavoidable given the Purpose and Need of the Project, and the limited set of reasonable alternatives to address them (see Chapter 3). Therefore, in addition to implementing the mitigation measures addressing the construction impacts of the Project described throughout this chapter, communication with residents, management and staff will be an important element to minimize the effects of construction on residents. To ensure that residents were apprised of the status of the Project and could participate in outreach activities, Project briefings were held at the apartments and with Capper management. In addition, because public information meetings 2, 3, and 4 and the Draft EIS public hearing (see Section 6.2) were held at locations beyond walking distance of many seniors, the Project provided shuttle bus service for the residents. This outreach will continue as the Project moves to construction (see Section 5.3.4).

5.3.4 Mitigation Measures

Measures to mitigate the temporary effects to ambient air quality, noise, and vibration conditions at or near the LOD from construction activities are described in Sections 5.5.4, 5.6.4 and 5.7.4, respectively. These same measures will apply to the Capper Senior Apartments. In addition, the MOT plan (see Section 3.5.4), developed to maintain connectivity and transportation safety in and around the construction zone, includes measures to assist motorists, pedestrians and cyclists in finding important gathering places. The MOT plan will also specifically address the special transportation needs of the Capper Senior Apartments. Among these needs include provisions for para-transit, emergency response vehicles and visitation by residents' family and friends. Addressing these needs will involve providing temporary driveways. In terms of potential utility disruptions affecting Capper residents, additional mitigation measures will be used as described in Section 5.14.3.

The project sponsor will implement a Residential Property Mitigation (RPM) plan to address two primary concerns voiced by residents living adjacent to the LOD: (1) foreseeable impacts related to construction of the tunnel; and (2) acknowledging that during construction there is the potential that a seller may need to accept a lower purchase price in order to sell a property within a needed marketing time. The RPM plan addressing the latter concern is provided in Section 5.4.3.

In addressing the first concern, the RPM plan will involve compensation in the form of monetary payments to all qualifying residents. This compensation is meant to replace or provide a substitute resource for foreseeable impacts or activities related to the temporary inconvenience caused by major construction activities of the Project. For purposes of the RPM plan, major construction activities include installation of support of excavation elements, soil excavation activities, structural concrete work and demolition required to construct the new Virginia Avenue Tunnel. Major construction activities do not include:

- Utility work;
- Installation and maintenance of temporary ingress and egress points and driveways;
- Installation and maintenance of construction fencing;

- Installation and maintenance of sediment and erosion control measures;
- Equipment and material staging areas;
- Areas for construction and support trailers;
- Maintenance of traffic activities; and
- Vehicular construction traffic and road reconstruction/repaving activities outside of the above description for the applicable RPM area.

The temporary inconvenience compensation will be conducted in accordance with the following three categories:

1. "Front Row" Residences: These are residential properties located between 2nd Street SE and 12th Street SE, south of I-695, and are directly adjacent to major construction activities. The locations and addresses of the "front row" residences are provided in Appendix C. The "front row" residences include the 36 Capper apartment units facing Virginia Avenue SE and nine rental apartment units within Capitol Quarters. The resident of each "front row" property will be offered compensation of $500 per residence from the project sponsor for 42 months (the projected maximum time of construction). The resident will be informed about the payments by mail. Payments to a particular resident from the project sponsor will commence within 90 days of the start of major construction activities adjacent to the subject residence.

2. Capper Senior Apartments: The Capper Senior Apartments will receive a one-time lump sum payment of $250,000 from the project sponsor no sooner than 15 days prior to the start of major construction activities adjacent to the apartment building. In addition to offsetting temporary inconvenience, this payment is meant to support community enhancements of the Capper Senior Apartments.

3. Advisory Neighborhood Commission (ANC) - Directed Funds: To offset the temporary inconveniences to residences other than "front row" residences that are located between 2nd Street SE and 12th Street SE, south of I-695, as a result of major construction activities and to promote community enhancements, the project sponsor will provide a one-time lump sum payment of $500,000 split equally between ANC 6B and ANC 6D no sooner than 15 days prior to the start of major construction activities. Use of this funding will be at the discretion of these ANCs in accordance with DC Code § 1-207.38.

The specific process for distribution of the temporary inconvenience payments to front row residences will be approved by FHWA in consultation with appropriate agencies of the District of Columbia.

The CSX construction contractor will coordinate with the pastor of St. Paul AUMP Church to determine whether congregants are able to find on-street parking near the church to attend Sunday services, and if necessary, provide assistance in establishing special parking for Sunday services.

As described throughout this chapter, CSX will establish a community outreach program during construction, which will utilize the website (www.virginiaavenuetunnel.com) established for this Project, as well as more traditional forms of outreach, such as public meetings, newsletters and flyers. Through this outreach program, communication, which will include website postings email blasts and newsletters, will remain open to apprise the community, in particular with Capper Senior Apartments, about the status of construction, especially if something may affect daily activities or normal events, such as religious worship at St. Paul AUMP Church. In particular, residents and Capper management will be informed of construction activities near the building that have the potential to cause an increase in noise and vibration levels, and if a utility service disruption is required. Information sheets or flyers about construction activities or utility service disruption will be produced and given to Capper management for distribution to residents.

If a train derailment occurs within or near the tunnel, CSX will continue partnering with local first responders of the District and the surrounding jurisdictions in order coordinate protocols for responding to train derailments. This includes continuing to provide periodic training activities.

5.4 Economic Conditions

5.4.1 Construction Impacts

5.4.1.1 Employment

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not affect or provide additional employment to the local economy.

The Preferred Alternative or the other two Build Alternatives could provide about 200 construction-related jobs on any given day throughout the duration of construction. This is in addition to up to about 35 supervisory personnel on any given day. Many of these jobs may be filled by the local labor force.

5.4.1.2 Commercial/Residential

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would maintain the existing economic conditions described in Section 4.3.

The implementation of the maintenance of traffic (MOT) plan under the Preferred Alternative or the other two Build Alternatives as described in Section 3.5.4 will ensure that all businesses and residences near the LOD are accessible by auto, walking and cycling. Based on the traffic impact studies conducted for this Project, no substantial delays to vehicular access are predicted to occur. With the exception of Dogma (a dog kennel), located at the corner of Virginia Avenue SE and 9th Street SE, within the LOD Virginia Avenue SE does not have commercial businesses with storefronts directly facing the street. Most of the commercial businesses near the LOD have their storefronts on Barracks Row (8th Street). The other

businesses near the LOD have storefronts on L and M Streets SE. None of these storefronts will be affected by any of the Build Alternatives. The access to Dogma will be moved to 9th Street SE, outside of the LOD.

The MOT plan will require, however, the temporary displacement of on-street parking (see Section 5.15.4). Most of these impacts will occur on Virginia Avenue SE, in particular in the section between 2nd and 5th Streets SE, in an area with no commercial businesses along the street. In Phase 2 of the MOT plan, eastbound traffic exiting the 6th Street off-ramp will be detoured to the existing westbound Virginia Avenue SE / I Street SE, which will be converted to two-way operations between 6th and 8th Streets SE, and metered on-street parking, will be displaced. Because they are metered, these parking spaces are probably being used by those living outside of the community since Zone 6 residential on-street parking is available nearby. Some of the spaces, especially the 18 spaces located on the 700 block of I Street SE / Virginia Avenue SE, are most likely largely being used for patrons of Barracks Row or the adjacent shopping corridor along 8th Street SE. The Phase 2 MOT parking displacement will result in fewer public parking spaces in close proximity to Barracks Row. Off-street metered parking is available underneath I-695 on 8th Street SE, and on-street metered parking is available on 8th Street SE and adjacent streets. Residential Zone 6 parking is available on adjacent streets (non-Zone 6 residents may park for short periods). As a commercial district, Barracks Row does become extremely busy at times and finding nearby parking could be difficult. The displacement of the 18 spaces on the 700 block of I Street SE and others further west, which are likely being used by Barracks Row patrons, will make finding parking even more difficult. However, the temporary displacement of the parking to the overall economic /commercial conditions along 8th Street is not expected to be noticeable. Despite the availability of parking noted above, they do not by themselves support the number of businesses on Barracks Row. Because of the general lack of off-street parking, much of the business patronage in Barracks Row comes from those living within walking distance and use a form of transportation other than a private vehicle, such as Metrorail (the Eastern Market Metrorail Station is located nearby), Metrobus, and the DC Circulator (see Section 4.15.5).

Residential property values in any given area are influenced by a number of factors, including regional and local market conditions, as well as the particular needs of the seller and the buyer. It is possible that nearby construction activities could affect the willingness of buyers to enter into purchases of properties located in close proximity to the LOD, and therefore, construction could affect short term market values of properties immediately adjacent to the LOD. However, any such affect will dissipate towards the end of construction, and market conditions in areas immediately adjacent to the LOD will revert back to normal when the Project is completed. Nevertheless, the project sponsor is cognizant that property owners cannot always choose an appropriate time to sell their properties. Therefore, as described in Section 5.4.3, a program will be implemented to ensure that homeowners are not financially burdened if forced to sell their homes under hardship conditions when market values are adversely affected by construction of the Project.

5.4.2 Post-Construction Impacts

5.4.2.1 Employment

Under Alternative 1 (No Build), an emergency or unplanned major repair or rehabilitation could result in the creation of short-term construction jobs.

In the long-term, the Build Alternatives will not produce additional employment other than what is needed for regular maintenance.

5.4.2.2 Commercial/Residential

Under Alternative 1 (No Build), an emergency or unplanned major repair or rehabilitation could result in economic impacts in the form of disruption of access to businesses and residences.

Upon completion of construction under the Preferred Alternative or the other two Build Alternatives, the economic conditions in the general vicinity of the LOD will revert back to their pre-construction conditions as described in Section 4.4. For instance, because Virginia Avenue SE will be restored at the end of construction, the Project will not have any either positive or negative impact on long-term property values in the general vicinity of Virginia Avenue. The existence of a rebuilt Virginia Avenue Tunnel will not affect commercial and residential property market conditions in the general vicinity of Virginia Avenue SE. Upon completion of the tunnel, it will revert back to being as inconspicuous as it is today to the larger community.

5.4.3 Mitigation Measures

Any adverse economic impact will result from the displacement of parking during construction, in particular the 18 spaces near Barracks Row during the MOT Phase 2 when the westbound Virginia Avenue SE / I Street S between 6th and 8th Streets SE will be converted to two-way traffic. Parking mitigation will be handled through implementation of the MOT plan and is described in Section 5.15.4.3. In addition, the outreach program will be used to communicate (possibly through a website) where metered parking (on- and off-street) is available.

Although the hardship acquisition provisions of 23 CFR 710.503 do not apply to the Project, the project sponsor has elected to offer compensation for situations in which a residential seller is forced to accept a lower purchase price (i.e., below market value based on normal market conditions) in order to sell a property within a needed marketing time.

If a “front row” residential private property owner(s) is required to sell his or her home for an unforeseen reason, such as employment relocation or a change in military orders, the owner will be eligible for compensation of up to a maximum of $75,000 at closing to offset the sale price that an owner may be required to accept in order to market the home within the needed marketing time. The locations and addresses of the “front row” residential properties for the purposes of this compensation program are provided in Appendix C. In order to qualify, the owner(s) must:

1. Place his or her home on the market following the start of construction activities and sell his or her home prior to the end of construction.

2. Obtain and submit an appraisal performed by a qualified residential appraiser with a minimum of 10 years of experience in performing residential appraisals that concludes both fair market value of the home and reasonable marketing time of the home.

3. Be prevented from achieving fair market value during the reasonable marketing time set forth in the appraisal.

Prior to the start of construction, the "front row" residential property owners will be informed by mail about this compensation program.

5.5 Air Quality

This section summarizes the results of air quality impact analyses conducted for this Project and whether the Project would meet the requirements of the Final Conformity Rule. An air quality technical report is provided in Appendix D.

5.5.1 Conformity Regulations

EPA adopted regulations for "Determining Conformity of General Federal Actions to State or Federal Implementation Plans" (40 CFR 51 Subpart W and 40 CFR 93, Subpart B). These regulations, commonly referred to as the General Conformity (GC) Rule, apply to all federal actions except for those federal actions which are excluded from review (e.g., stationary source emissions, such as from power plants) or related to transportation plans, programs, and projects under Title 23 of the U.S. Code or the Federal Transit Act, which are subject to Transportation Conformity. The GC Rule applies to all federal actions not addressed by the Transportation Conformity Rule, which applies primarily to federal highway and transit projects.

The GC Rule is used to determine if federal actions meet the requirements of the Clean Air Act (CAA) and the applicable *State Implementation Plan* (SIP) by ensuring that air emissions related to the action do not:

- Cause or contribute to new violations of a National Ambient Air Quality Standards (NAAQS);
- Increase the frequency or severity of any existing violation of a NAAQS; or
- Delay timely attainment of a NAAQS or interim emission reduction.

A conformity determination under the GC Rule may be required if the federal agency determines that the action will occur in a nonattainment or maintenance area. The GC Rule would apply if the action is not included in the federal agency's "presumed to conform" list; the emissions from the proposed action are not within the approved emissions budget for an applicable facility; and the total direct and indirect emissions of a pollutant (or its precursors) are at or above the *de minimis* levels established in the General Conformity regulations. As described in Section 4.5.4, the National Capital Interstate Air Quality Control Region, which is

where the LOD is located, is classified as a maintenance area for carbon monoxide (CO), a nonattainment area for particulate matter of less than 2.5 microns ($PM_{2.5}$), a marginal nonattainment area for ozone.

An action will be required to conform to the applicable SIP for each pollutant that exceeds the *de minimis* emissions threshold provided in 40 CFR 93.153(b). In the general vicinity of Virginia Avenue Tunnel, the applicable *de minimis* emission thresholds are presented in Table 5-1.

The *de minimis* emission levels are applicable to both the operational and construction phases of the project. Ammonia and VOC are not included for $PM_{2.5}$ because they are not considered to be significant overall contributors to $PM_{2.5}$ overall air quality issues. SO_2 and NOx are included because they are considered to be significant overall contributors to $PM_{2.5}$ air quality issues. VOC and NO_X are included because they are ozone precursors. A 50 tons per year limit was used for VOC because the District is part of the ozone transport region, which is a multi-state region that works together to implement regional solutions to the ground-level ozone problem in the Northeast and Mid-Atlantic regions.

Table 5-1
General Conformity Applicability Thresholds

Pollutant	Applicability Threshold	Attainment Status
Ozone (volatile organic compounds or VOC and nitrogen oxides or NO_x)	50 tons per year for VOC 100 tons per year for NO_x	Nonattainment (Marginal)
Particulate Matter Smaller than 2.5 Microns ($PM_{2.5}$) • Direct emissions • SO_2 • NO_x	 100 tons per year 100 tons per year 100 tons per year	Nonattainment
CO	100 tons per year	Maintenance

Source: *http://www.epa.gov/air/genconform/documents/20100324rule.pdf*
http://www.ecfr.gov/cgi-bin/retrieve

5.5.2 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in construction impacts on air quality. The discussion provided in the Construction Impact section for Air Quality focus on the impacts of the Preferred Alternative and the other two Build Alternatives. Mitigation measures to address the air quality effects of construction activities, such as potential dust emissions, are provided in Section 5.5.4.

General Conformity Annual Emissions Analysis

Under the GC Rule, direct and indirect construction phase annual emissions must be compared to the *de minimis* thresholds. As such, a quantitative analysis was conducted to estimate the amount of annual emissions generated by the construction of each of Build Alternatives.

The following activities associated with the construction of the project will generate air emissions within and near the major construction areas:

- Excavation, demolition, and grading;
- Handling and transport of construction material and debris;
- Operation of heavy-duty diesel-powered construction equipment; and
- Operation of heavy-duty diesel trucks for transport of construction materials within construction areas and on adjacent roadways.

Emissions generated by construction activities and truck trips were estimated on an annual and monthly basis for the entire construction period, and potential air quality impacts were estimated during peak construction periods. Total annual estimated emissions generated during the project's construction period are provided in Tables 5-2, 5-3 and 5-4 for Alternatives 2, the Preferred Alternative and Alternative 4, respectively. The values for CO, NO_X $PM_{2.5}$, SO_2 and VOCs presented in these tables are at their peak on-site emissions during each analysis year, in addition to their peak off-site truck travel emissions for each year. These values, which will be the same for the Preferred Alternative and the two other Build alternatives, are less than the GC *de minimis* thresholds. As such, the predicted air quality emissions during construction are not considered to be significant and the Project, regardless of the Build Alternative, will not be subject to a conformity determination.

Table 5-2
Total Annual Emissions from Construction Equipment and Activities
under Alternative 2

Pollutant	GC Rule de minimis Threshold	Emissions (Tons/Year)			
		2013	2014	2015	2016
Carbon Monoxide	100	2.44	4.16	5.34	0.73
Nitrogen Oxides	100	5.26	7.95	10.76	1.68
Particulate Matter (< 2.5 microns)	100	0.41	0.94	1.52	0.23
Sulfur Dioxide	100	0.01	0.01	0.02	0.00
Volatile Organic Compounds	50	0.36	0.61	0.80	0.13

Table 5-3
Total Annual Emissions from Construction Equipment and Activities under the Preferred Alternative

Pollutant	GC Rule de minimis Threshold	Emissions (Tons/Year)			
		2013	2014	2015	2016
Carbon Monoxide	100	4.27	3.87	4.40	2.78
Nitrogen Oxides	100	9.11	8.14	9.37	5.67
Particulate Matter (< 2.5 microns)	100	0.77	0.82	1.05	0.58
Sulfur Dioxide	100	0.01	0.01	0.01	0.01
Volatile Organic Compounds	50	0.64	0.61	0.70	0.41

Table 5-4
Total Annual Emissions from Construction Equipment and Activities under Alternative 4

Pollutant	GC Rule de minimis Threshold	Emissions (Tons/Year)			
		2013	2014	2015	2016
Carbon Monoxide	100	1.28	3.83	3.14	3.63
Nitrogen Oxides	100	2.87	7.84	5.79	7.00
Particulate Matter (< 2.5 microns)	100	0.23	0.76	0.57	0.83
Sulfur Dioxide	100	0.01	0.01	0.01	0.01
Volatile Organic Compounds	50	0.20	0.58	0.41	0.48

It should be noted that the results presented in Tables 5-2 through 5-4 assumed that construction would begin in 2013. The construction start date is now estimated to be in 2014 or 2015. Trends indicate that emissions will decrease in future years due to fleet turnover (newer vehicles replacing older vehicles) and regulated emission reductions. Therefore, the results presented in Tables 5-2 through 5-4 would be slightly conservative as compared to an analysis that assumes a construction start year of 2014 or 2015. Any update of the analysis with construction starting in 2014 or 2015 will not adversely affect the results (i.e., higher predicted emission levels) as presented in Tables 5-2 through 5-4.

In summary, construction phase emissions under each of the Build Alternatives are not predicted to exceed the GC Rule's *de minimis* emission thresholds. As such, air quality impacts from construction of the Preferred Alternative or the other two Build Alternatives will not be subject to a conformity determination.

Localized On-Site Dispersion Modeling Analysis

Construction activities have the potential to affect ambient air quality levels primarily within 200 to 300 feet of these activities, as pollutants disperse beyond the point of emissions. Therefore, an on-site air quality dispersion modeling analysis was conducted to determine whether these construction phase emissions would adversely affect nearby sensitive land uses, which may result in exceedances of the NAAQS. This analysis is not required under the GC Rule. It was conducted to address community concerns regarding construction emissions.

The dispersion analysis included the criteria pollutants associated with construction operations, as well health risks associated with the emissions of mobile source air toxics (MSAT) from diesel equipment. All calculations of inhalation cancer risk and hazard quotients were based on EPA's *Human Health Risk Assessment Protocol* (HHRAP). Inhalation unit risk factors and reference concentrations were obtained from EPA's *Integrated Risk Information System* (IRIS).The dispersion modeling focused on nearby sensitive land uses, such as residences.

Although not the Preferred Alternative, Alternative 2 was used for the dispersion analysis because it is predicted to have the highest emission rates during construction. The dispersion modeling was conducting using the latest version of the U.S. Environmental Protection Agency (EPA) AERMOD atmospheric dispersion model (version 12060) with five consecutive years of meteorological data (2007-2011) from Reagan National Airport, which is located approximately three miles from the LOD. The modeling simulated the atmospheric conditions and predicted pollutant concentrations at nearby sensitive land uses (receptors). Two sets of receptors were included in the analysis: (1) ground-level receptors located along the roadways near the LOD; and (2) actual residences (and one hotel) located in the general vicinity of the LOD. Details of this analysis can be found in the Air Quality Technical Report in Appendix D.

Table 5-5 displays the highest predicted concentrations for each of the criteria pollutants: CO, nitrogen dioxide (NO_2), PM_{10} (less than 10 microns) and $PM_{2.5}$. As shown in this table, the predicted concentrations are below their respective NAAQS. Therefore, the impacts of criteria pollutants from construction activities are not considered to be a concern.

Table 5-5
Maximum Total Estimated Criteria Pollutant Concentrations at Sensitive Receptors

Pollutant	NAAQS		Concentrations		
	Time Period	Standard	Background	Max. Est. Impact	Max. Est. Concentration
CO (ppm)	1-hr	35	4.2	0.6	4.8
CO (ppm)	8-hr	9	3.8	0.4	4.2
NO_2 (ug/m^3)	1-hr	188	119	34	153
PM_{10} (ug/m^3)	24-hr	150	85	58	143
$PM_{2.5}$ (ug/m^3)	24-hr	35	28	6	34

Note: ug/m^3: micrograms per cubic meter

In summary, pollutant emissions from construction activities, such as excavation, and the operation of construction equipment within the LOD, are not predicted to cause exceedences of the NAAQS at sensitive land uses adjacent to the LOD.

Mobile Source Air Toxics (MSAT) Analysis

An MSAT analysis is not required under the GC Rule. It was conducted to address community concerns regarding this type of construction emissions.

The procedures to estimate cancer risk and the hazard index of toxic pollutants are based on inhalation exposure concentrations outlined in the HHRAP. The HHRAP is a guideline that can be used to perform health risk assessment for individual compounds with known health effects in order to determine the level of health risk posed by an increased ambient concentration of that compound at a potentially sensitive receptor. The derived health risk values from the HHRAP were used in this analysis to determine the total risk posed by the release of multiple toxic contaminants.

The air toxics emissions were considered as both carcinogens and non-carcinogens. Carcinogenic compounds were evaluated using unit risk factors (URF); non-carcinogenic compounds were evaluated using the reference concentrations for inhalation exposure (RfC) and/or acute inhalation exposure (AIEC). RfC and AIEC were used to estimate non-carcinogenic health effects of substances that are also carcinogens. A conservative cancer threshold of one in one million, as recommended by the EPA for health-risk related assessments, was used in the analysis to determine whether estimated impacts would be considered significant.

The air toxics analysis concluded that the Project's construction period emissions are well within acceptable ranges in terms of potential cancer, chronic non-cancer, and acute health risks. Details of this analysis can be found in Appendix A of the Air Quality Technical Report which is included as Appendix D to this Final EIS.

Off-Site Mobile Source Analysis

An estimate was made of the potential air quality impacts associated with the operation of construction-phase vehicles, which includes trucks transporting soil, debris and construction materials, and personal vehicles of construction workers, on the roadways adjacent to the LOD. This analysis is not required under the GC Rule. It was conducted to address community concerns regarding construction emissions.

The intersection of M Street SE and 8th Street SE was selected for analysis because it is predicted to experience a poor level of service during construction. This intersection is part of proposed truck hauling routes and is adjacent to the Eagle Academy Public Charter School. As shown in Table 5-6, the 1- and 8-hour CO levels predicted for this intersection during construction are predicted to be well below the NAAQS.

Table 5-6
Results of CO Analysis at the M Street SE / 8th Street SE Intersection

Pollutant	NAAQS (ppm)	Alternative 1 (ppm)		Alternative 2 (ppm)	
		AM	**PM**	**AM**	**PM**
CO 1-Hour[1]	35	4.8	4.8	4.8	4.8
CO 8-Hour[2]	9	4.2		4.2	

Notes ppm: parts per million
[1] 1-Hour results include a background concentration of 4.2 ppm.
[2] 8-Hour results include a background concentration of 3.8 ppm.

5.5.3 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts related to air quality are anticipated to occur as a result of Alternative 1 (No Build).

The Build Alternatives are also not expected to result in post-construction impacts to air quality because each will allow the amount of intermodal container freight passing through the District to be moved in fewer trains (see Section 5.15.1). The provision of double railroad tracks in the tunnel, matching the number of tracks on both the east and west ends of the tunnel, will allow more efficient train movements. In addition, none of the Build Alternatives will affect post-construction traffic conditions on surface streets even with modifications to Virginia Avenue SE as a community benefit (see Section 5.15.3). As such:

- The post-construction phase of the Project will not exceed the GC Rule's *de minimis* emission thresholds;
- The post-construction phase of the Project will not cause or exacerbate a violation of the applicable NAAQS for CO and $PM_{2.5}$;
- The post-construction phase of the Project has no potential for any MSAT effects; and
- The post-construction phase of the Project will not affect the level of greenhouse gas emissions.

5.5.4 Mitigation Measures

Under the Preferred Alternative or any of the other two Build Alternatives, construction will comply with local and federal regulations for fugitive dust control and mobile source emissions during construction. Dust control measures will be implemented during construction to prevent fugitive dust from excavation and other dust-producing activities from affecting areas beyond any particular construction site. District regulations (Title 20 of the District of Columbia Municipal Regulations) stipulate dust control and good housekeeping practices, and the following mitigation measures will be used during construction:

- Erecting windscreens between any construction site and dust sensitive land uses, such as residences;
- Use of watering trucks for haul roads, street sweeping for tracking on paved surfaces;
- Use of sprinklers, misters or hoses for wetting down demolition areas;
- Spray exposed and excavated soil with water or other dust suppressant to prevent visible dust emissions;
- Stabilize haul roads to reduce windblown dust and dirt deposited on local roads;
- Stabilized construction entrances will be installed to prevent haul trucks from tracking dirt onto paved streets;
- Routinely clean dirt tracked on public roads by using street-sweeper machines;
- Cover all trucks during transport of fill materials or soil, wetting materials in trucks or providing adequate freeboard to minimize dust emissions during transportation;
- Cover loads of hot asphalt to minimize odors to the extent practical;
- For material stockpiles, use of temporary stabilization if inactive for greater than 14 days, and use of tarps over finely-textured materials that are subject to wind borne travel;
- Remove temporary gravel or paving at the completion of construction and restore affected areas;
- Institute and conduct good housekeeping practices (e.g., routinely collect trash and place in the nearest receptacles or dumpsters), which will also help control against dust emissions dispersing outside the construction area; and
- Check dust conditions surrounding any construction site using visual observations and monitoring devices.

In addition to the above dust control measures, emission exhaust measures will be implemented during construction to minimize other air pollutants, such as assuring proper equipment operations that will include:

- Turning off the engines of construction vehicles if they are left idling for more than 30 minutes;
- Using appropriate emission-control devices (per EPA regulations) on all construction equipment powered by gasoline or diesel fuel to reduce CO, NOx and particulate emissions in vehicular exhaust; and
- Use relatively new, well-maintained equipment to reduce CO and NOx emissions.

Stationary equipment that has air emissions, such as compressors, will not be placed in direct proximity to sensitive land uses, such as residences, or where people tend to congregate, such as the Virginia Avenue Community Garden, to the extent feasible.

5.6 Noise

This section summarizes the results of noise impact analyses conducted for this Project. A noise technical report is provided in Appendix E. For construction impacts, FHWA's Roadway Construction Noise Model (RCNM) was used. To determine the impacts of train operations

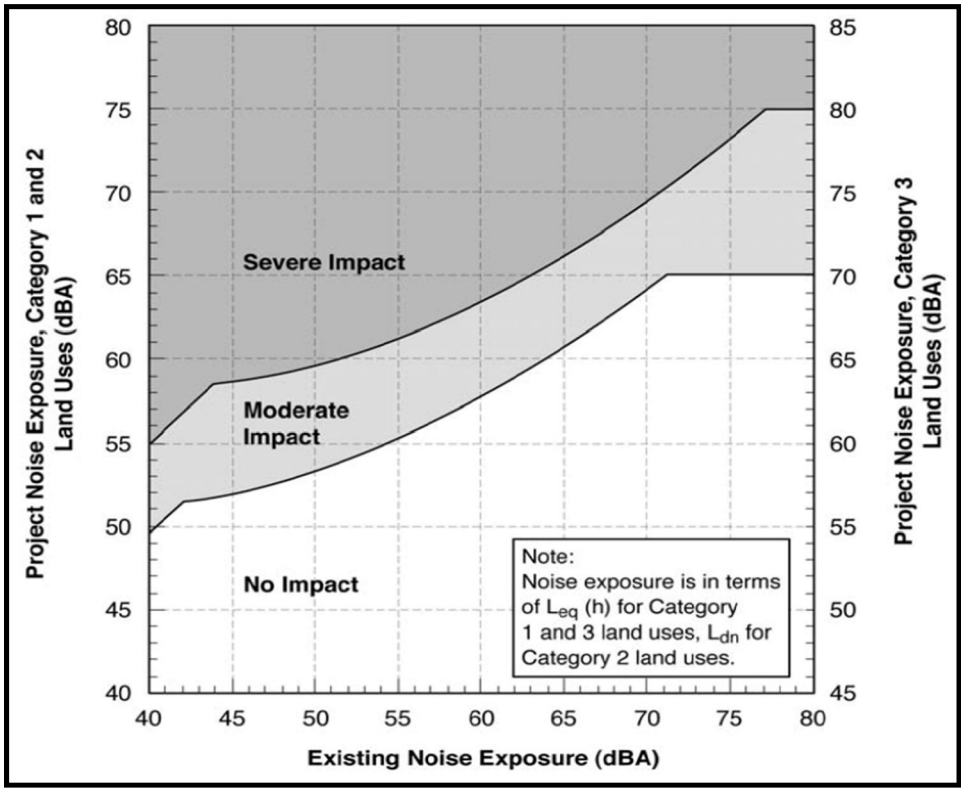
both during and after construction, the Federal Transit Administration (FTA) procedures were used. A description of the characteristics of noise is provided in Section 4.6 and in noise technical report in Appendix E.

5.6.1 Noise Impact Criteria

A noise impact according to FTA procedures is either moderate or severe. The criteria to determine whether the predicted noise generated by a project would cause a moderate or severe noise impact at noise sensitive receptors are illustrated in the enclosed chart, FTA Noise Impact Criteria Chart. Impacts are assessed based on a combination of the existing ambient noise conditions and the additional predicted noise exposure from the project. The chart shows that the thresholds for determining whether moderate and severe noise impacts would occur are defined by two curves that rise depending on the level of existing noise conditions. The higher the existing conditions, the higher the thresholds are for determining moderate or severe noise impacts. However, at certain points the curves are flat, meaning the impact is determined based on project noise alone, and the existing noise conditions are immaterial.

A predicted noise level at a receptor above the upper curve would mean that the project would cause a severe impact, which means that a substantial percentage of people would be highly annoyed by the new noise caused by the project. A severe impact would require the consideration of mitigation to reduce the predicted noise level by a certain amount. A predicted noise level between the two curves indicates that a project is expected to have a moderate impact, which means that the change in the cumulative noise level is noticeable to most people, but may not be sufficient to cause strong adverse reactions. Under a moderate impact condition, other project-specific factors would be considered

FTA Noise Impact Criteria Chart



Source: FTA, Transit Noise and Vibration Impact Assessment May 2006

to determine the magnitude of the impact and the need for mitigation, such as the existing level, predicted level of increase over existing noise levels and the types and numbers of noise-sensitive land uses affected by the project.

5.6.2 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in construction noise impacts. The discussion provided in the Construction Impact section for Noise focuses exclusively on the three Build Alternatives.

Construction Noise

Noise from construction activities is generated from various construction related sources inclusive of operation of a number of different kinds of equipment and vehicles: backhoes, bulldozers, cranes, concrete mixers, concrete delivery trucks, dump trucks, delivery trucks, frontend loaders, pile drivers and jack hammers. These noise sources are both mobile and stationary. The operation of some types of mobile equipment, such as dozers, scrapers, and graders, are cyclical, meaning they will operate in periods of full power (higher noise) followed by periods of reduced power (lower noise). Trucks on the other hand are a type of mobile equipment that produces a steady noise. Stationary equipment, such as pumps, generators and compressors, produces noise at a single location. They normally operate at a constant noise level and are classified as non-impact equipment. Other types of stationary equipment, such as pile drivers, jackhammers and pavement breakers, produce variable and sporadic noise and produce impact-type noises.

As noted above, predictions of outdoor construction noise were made using FHWA's Roadway Construction Noise Model (RCNM). Construction impacts are determined using the FTA Construction Noise Impact Criteria, which are used for the purposes of determining impacts rather than absolute standards that cannot be exceeded. For urban areas with very high ambient noise levels (Ldn greater than 65 dB), a construction impact would occur if Ldn from construction operations exceeds existing ambient conditions by 10 dB. As described in Section 4.6, Ldn is the cumulative 24-hour noise exposure that accounts for the moment to moment fluctuations in dBA (decibels weighted to human hearing measured on a logarithmic scale) from all sound sources during the 24-hour period. Also described in Section 4.6 is that the existing Ldn measured along Virginia Avenue SE varied between 68 to 73 Ldn for an average of about 70 Ldn. Therefore, a noise impact (impact criterion) would occur if an Ldn value of 80 dBA is predicted during construction even though construction would not occur at night unless under very specific circumstances approved by the District government (i.e., nighttime noise levels are generally lower than daytime).

Noise from construction could vary greatly, and is difficult to predict accurately. For example, the major source of noise during construction is heavy equipment, but they are constantly moving in unpredictable patterns and are usually not stationary for long periods of time. In order to gauge the level of potential noise impacts from the Project, preliminary construction scenarios were developed for each Build Alternative. The scenarios identified the types of

equipment likely to be used during construction of the Alternative, and their deployment locations within the LOD. The construction noise analysis assumed that the bulk of the construction will occur during weekday daylight hours when residents who are at home are less sensitive to construction activities, and when other community noise sources contribute to higher ambient noise levels.

Using the RCNM, predictions of outdoor construction noise were made at ten exterior receptor sites located various spots. Receptor R-1 is located near a commercial property, the 200 I Street building. The others are located near residential areas, such as Capitol Quarter (R-2 and R-3), Capper Senior Apartments (R-4) and bachelor quarters in the Marine Corp Recreation Facility (R-5 and R-6). The locations of the ten receptors are shown on Figure 5-1. At each receptor, noise predictions were made by type of noise-producing construction activity and by Build Alternative. The construction noise predictions are shown on Table 5-7. The construction noise predictions for the Preferred Alternative and Alternative 2 are the same, and therefore, these predictions are provided in a single column under each construction activity.

As shown on Table 5-7, the majority of the predicted noise levels are predicted to exceed the FTA Construction Noise Impact Criteria. The construction activity producing the highest predicted noise levels at the receptors is sheet piling, which would only be required under Alternative 4. All ten receptors are predicted to exceed the criteria if sheet piling is conducted nearby under an Alternative 4 scenario. Construction of the Preferred Alternative or Alternative 2 will not require the use of sheet piling. For the other construction activities identified on Table 5-7, which will occur under the Preferred Alternative and the other two Build Alternatives, predicted noise levels are predicted to exceed the criteria at three of the residential receptors (R-2, R-3, and R-4) representing Capitol Quarter and Capper Senior Apartments. The two residential receptors (R-9 ad R-10) located on the east end of the LOD south of Virginia Avenue Park are predicted to largely avoid noise impacts primarily because they are set back further from the LOD in comparison to the Capitol Quarter and Capper Senior Apartments receptors.

The results of construction noise modeling as provided on Table 5-7 indicate that noise from construction of the Project, which will involve use of heavy machinery and equipment that produce high noise levels, will be a nuisance or an annoyance, especially if unmitigated, to those living and working adjacent to the LOD, in particular those residences fronting Virginia Avenue SE at Capitol Quarter and Capper Senior Apartments. However, construction will be limited to daylight hours when high noise levels are usually more tolerable to humans. In addition, construction noise is typically intermittent and depends on the type of operation, location, and function of the equipment as well as the equipment usage cycle.

Noise from Construction-Period Freight Train Operations

During construction, trains would be operating within an open trench (Alternatives 2 and 4) or within a tunnel (Preferred Alternative). The noise effects of trains operating under such conditions were evaluated using the FTA's Transit Noise and Vibration Impact Assessment manual developed for the Chicago Rail Efficiency and Transportation Efficiency projects. This is

Figure 5-1
Construction-Period Noise Modeling Receptor Sites

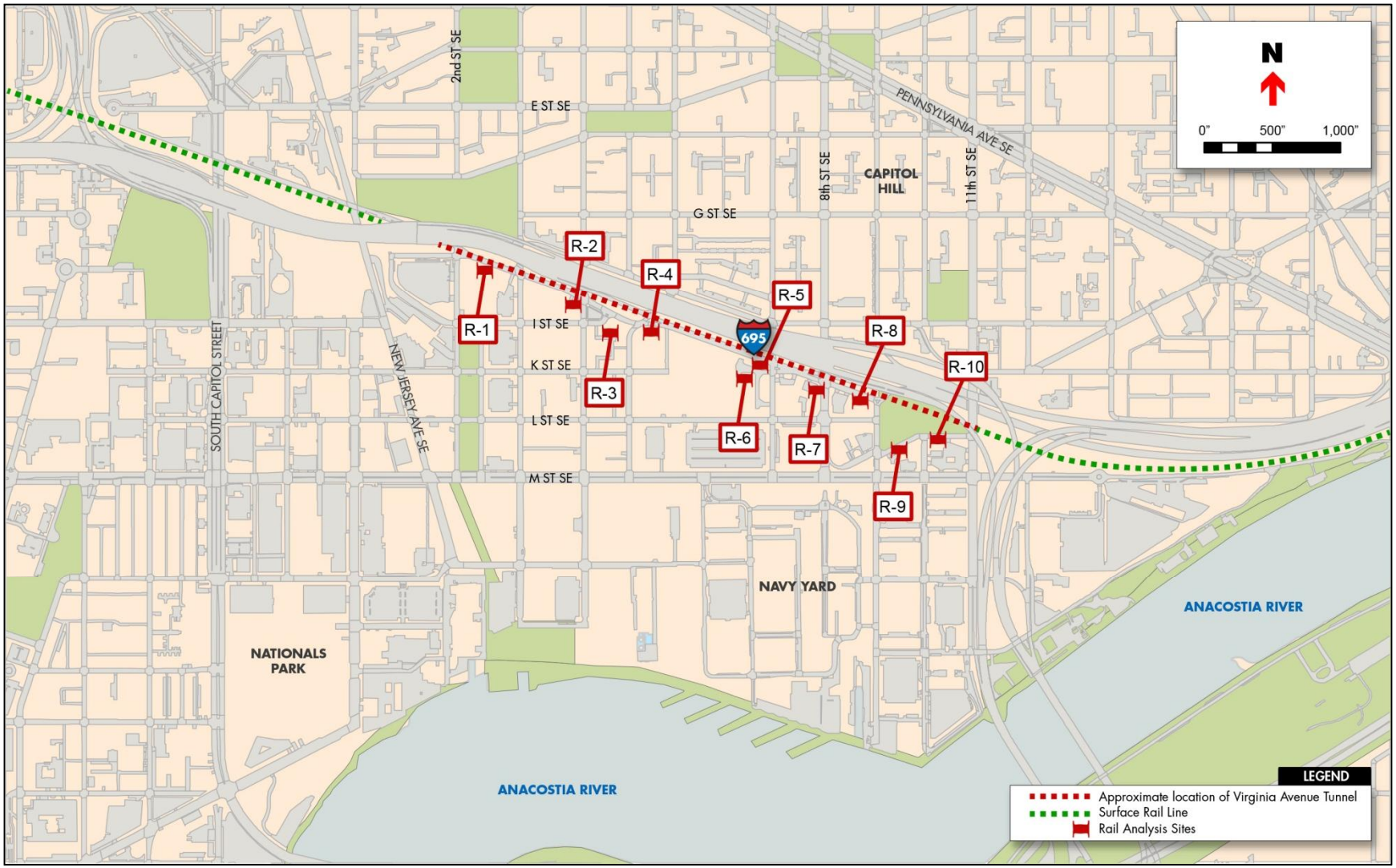


Table 5-7
Predicted Construction Noise Levels for the Build Alternatives by Receptor Location and Type of Construction Activity

Receptor[1]	Slurry Wall		Excavation		Excavation/ Demolition		Structural Concrete		Paving		Work/Backfill/ Drainage		Sheet Pile	
	Alt 2/3	Alt 4	Alt 2/3	Alt 4	Alt 2/3	Alt 4	Alt 2/3	Alt 4	Alt 2/3	Alt 4	Alt 2/3	Alt 4	Alt 2/3	Alt 4
R-1[2]	85	83	83	81	87	85	86	84	89	86	86	84	N/A	93
R-2	85	83	83	81	87	85	86	84	89	86	86	84	N/A	93
R-3	78	77	76	75	80	79	79	78	82	81	80	79	N/A	87
R-4	85	83	83	80	86	84	86	84	88	86	86	84	N/A	93
R-5	85	83	83	80	86	84	86	84	88	86	86	84	N/A	93
R-6	78	77	76	74	80	78	79	78	81	80	79	78	N/A	87
R-7	83	81	81	79	85	83	84	82	86	84	84	82	N/A	91
R-8	82	80	80	78	84	81	83	81	86	83	84	81	N/A	90
R-9	76	74	74	72	78	76	77	75	80	78	78	76	N/A	84
R-10	77	74	74	72	78	76	78	75	80	77	78	75	N/A	84

Notes: [1] See Figure 5-1 for locations, which are:

R-1: 200 I Street SE, DC Government office building(commercial land use)
R-2: Capitol Quarter (300 block)
R-3: Capitol Quarter (400 block)
R-4: Capper Senior Apartments
R-5 North side of Marine turf field
R-6: Marine quarters
R-7: Commercial building on 8th Street SE
R-8: Admiral at Barracks Row (future land use)
R-9: Residences on Potomac Avenue SE (900 block)
R-10: Residences on L Street SE (1000 block)

Measurements are in Leq dBA
N/A: The Preferred Alternative and Alternative 2 do not require sheet piling

typically known as the CREATE procedures. In addition, a number of operating assumptions (e.g., speed, etc.) were made, which are detailed in the noise technical report in Appendix E. To be conservative with the analysis, the number of trains passing through the construction area was assumed to be 25 percent higher than existing conditions.

The same ten receptors used to evaluate construction equipment noise were used to evaluate train operations noise during construction (see Figure 5-1). The predicted noise levels at these receptors for Alternatives 2 and 4 are presented in Tables 5-8 and 5-9, respectively. The Preferred Alternative's temporary train operation will be conducted almost entirely underground (no trains operating in a protected trench near residences). Therefore, its noise effects are predicted to be similar to those under existing conditions. All of the receptors are Category 2 land uses, with the exception of R-1, R-5 and R-7.

As shown on Tables 5-8 and 5-9, none of the receptors under Alternatives 2 and 4, respectively, are predicted to experience Project-related sound levels that would exceed the CREATE criteria, which are based on a certain increase in cumulative noise exposure from freight train operations when compared to existing sound levels. The total noise shown on Tables 5-8 and 5-9 (second to the last column) represents the cumulative or total ambient noise with the construction-period train operations. It is calculated by logarithmically adding the "build" noise levels to the "existing" noise levels, which as noted in Section 4.6 is largely affected by traffic noise from I-695. In both tables, the differences between total and existing levels are predicted to range from 0 to 2 dBA. A 2 dBA difference is not perceptible by humans. This means that by adding the noise from the temporary train operations to the existing ambient noise conditions, which are dominated by I-695 traffic noise, are predicted to result in no perceivable differences. Apart from the project-related noise effects discussed under construction, ambient noise levels among the receptors will continue to be primarily caused by normal traffic on I-695, not from the operation of freight trains. During work day hours, the noise effects from construction activities would further muffle the noise from trains passing through an open trench under Alternatives 2 or 4. This effect is not reflected in Table 5-8 and 5-9.

Noise from Maintenance of Traffic

As noted in Section 3.5.4, a MOT plan will be implemented to maintain mobility in community while Virginia Avenue SE is closed during construction. A highway noise analysis was conducted to determine if traffic detours as specified in the MOT plan would cause noise impacts to noise sensitive receptors near the LOD and the traffic detours.

Modeled existing and construction-period noise levels were developing using FHWA's Traffic Noise Model (TNM), Version 2.5. The TNM predicts noise levels at selected locations based on traffic data, roadway design, topographic features, and the relationship of the analysis site to nearby roadways. Traffic information used to predict intersection conditions under the MOT plan was also used for the noise modeling.

Table 5-8
Predicted Noise Levels from Temporary Train Operations under Alternative 2

Receptor		Dist. to Tracks Centerline (ft)	Existing Noise (Ldn dBA)	Train Noise Operating in Trench (Ldn dBA)	Cumulative Noise Exposure (Ldn dBA)	Increase Over Existing
ID*	Description					
R-1	200 I Street	43	70	59	70	0
R-2	Capital Quarter (300 Block)	43	70	66	72	2
R-3	Capital Quarter (400 Block)	95	70	61	71	1
R-4	Capper Senior Apartments	45	73	66	74	1
R-5	North Side Marine Turf Field	45	69	58	69	0
R-6	Marine Quarters	100	69	60	70	1
R-7	Commercial Building on 8th St	55	69	65	71	2
R-8	Admiral at Barracks Row	60	69	64	70	1
R-9	Potomac Avenue SE (900 Block)	120	68	59	69	1
R-10	L Street SE (1000 Block)	115	68	59	69	1

Note: * See Figure 5-1

Table 5-9
Predicted Noise Levels from Temporary Train Operations under Alternative 4

Receptor		Dist. to Tracks Centerline (ft)	Existing Noise (Ldn dBA)	Train Noise Operating in Trench (Ldn dBA)	Cumulative Noise Exposure (Ldn dBA)	Increase Over Existing
ID*	Description					
R-1	200 I Street	55	70	57	70	0
R-2	Capital Quarter (300 Block)	55	70	65	71	1
R-3	Capital Quarter (400 Block)	105	70	60	70	0
R-4	Capper Senior Apartments	57	73	65	74	1
R-5	North Side Marine Turf Field	57	69	57	69	0
R-6	Marine Quarters	115	69	59	69	0
R-7	Commercial Building on 8th St	70	69	63	70	1
R-8	Admiral at Barracks Row	80	69	62	70	1
R-9	Potomac Avenue SE (900 Block)	150	68	57	68	0
R-10	L Street SE (1000 Block)	160	68	57	68	0

Note: * See Figure 5-1

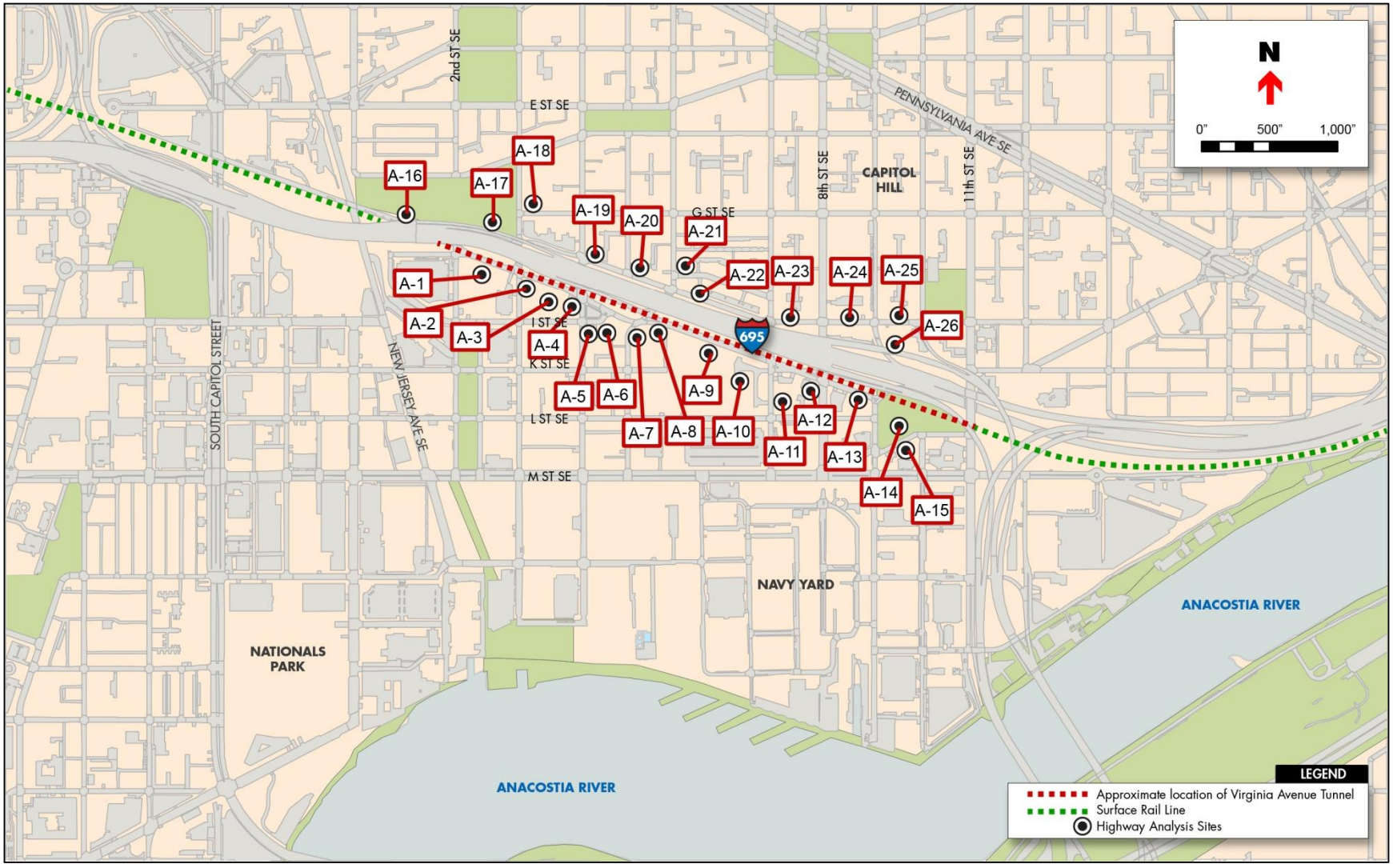
Table 5-10 presents the results of the MOT noise analysis. A new set of receptors was modeled and their locations are shown on Figure 5-2. As shown on Table 5-10, the "increase over existing" (I.O.E) noise levels under Alternative 1 (No Build) would be between 0 to 1 dBA (most were 0), which are likely the result of normal traffic growth. As noted above, a 1 dBA difference is imperceptible to humans. The modeled noise levels from traffic detours under the Build Alternatives would be almost identical to Alternative 1 (No Build). Four sites are predicted to be 1 dBA less than their existing noise levels. For all intents and purposes, these noise levels are basically the same as the existing noise levels. Therefore, the traffic detours are not expected to increase noise levels in the general vicinity of the LOD during construction.

Table 5-10
Predicted Noise Levels from Traffic Detours during Construction

Site*	Existing Conditions (Leq dBA)	Alternative 1		Build Alternatives	
		Noise Levels (Leq dBA)	Increase Over Existing	Noise Levels (Leq dBA)	Increase Over Existing
A-1	71	71	0	71	0
A-2	72	72	0	72	0
A-3	71	72	1	72	1
A-4	72	72	0	72	0
A-5	70	70	0	70	0
A-6	70	71	1	70	0
A-7	71	71	0	71	0
A-8	72	72	0	71	-1
A-9	70	70	0	70	0
A-10	69	69	0	69	0
A-11	70	70	0	70	0
A-12	72	72	0	72	0
A-13	70	70	0	69	-1
A-14	68	68	0	68	0
A-15	67	67	0	67	0
A-16	68	68	0	68	0
A-17	69	69	0	69	0
A-18	71	71	0	71	0
A-19	76	77	1	76	0
A-20	74	74	0	74	0
A-21	70	70	0	70	0
A-22	71	71	0	71	0
A-23	72	72	0	72	0
A-24	71	71	0	70	-1
A-25	69	69	0	68	-1
A-26	71	71	0	71	0

Notes: * See Figure 5-2 for locations

Figure 5-2
Highway Noise Analysis Sites



5.6.3 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. None of the Build Alternatives will result in post-construction impacts related to noise from freight operations at the receptors identified in Figure 5-1 because trains will operate in the rebuilt tunnel. The Build Alternatives were modeled and none of them are predicted to exceed the FTA thresholds for moderate noise impacts at any of the ten receptors.

Future noise conditions in and around Virginia Avenue SE will continue to be mostly influenced by auto traffic, especially from I-695, regardless of the Alternative.

5.6.4 Mitigation Measures

Under the Preferred Alternative or the other two Build Alternatives, the majority of predicted construction noise levels associated with activities that are essential to the reconstruction of Virginia Avenue Tunnel will exceed the FTA Construction Noise Impact Criteria (see Table 5-7). Therefore, the following mitigation measures, which are deemed at this time to be reasonable (i.e., cost effective) and feasible (i.e., physically achievable), could reduce the amount of noise generated during construction. Additional details to these measures will be developed during final design when more information about construction is developed:

- Adhere to DDOT construction noise specifications.
- Establish a community outreach program to notify nearby residents and businesses about upcoming high noise producing activities, such as pile installation.
- Establish procedures address noise complaints during construction.
- Use a type of LOD fencing (e.g., wood stockade or type of solid material) near noise sensitive receptors that could also serve as temporary noise barriers.
- Hang noise dampening blankets on the inside face of the solid fencing if the effectiveness of the noise barriers need to be improved.
- Where feasible, use drilled installation methods instead of driven methods when installing bearing and temporary support piles near residences.
- Properly maintain all motorized equipment in a state of good repair to limit wear induced noise (e.g., mufflers are in good working condition).
- Consider noise impacts in selecting construction equipment that need to run over extended periods of time, such as gen sets (whisper quiet line).
- Where feasible, use demolition equipment with crush/shear technology, instead of impact technology.
- Place stationary noise generating equipment as far from residences as reasonably practical and feasible.
- Limit high noise generating activities to daytime and weekdays as reasonably practical and feasible.

- Where feasible, combine operations or activities with high noise levels to occur in the same time period.
- Route heavily loaded delivery and disposal trucks away from residential streets as reasonably practical and feasible (e.g., using the west staging area and east end of the LOD where there are fewer residences).

A noise monitoring plan will be prepared and noise monitoring will be conducted during construction in accordance with the plan. Pre-construction noise monitoring will be conducted to establish baseline noise levels at sensitive locations, as well as for periodic equipment and lot-line noise monitoring during the construction period. The monitoring plan will outline the measurement and reporting methods that will be used to demonstrate compliance with the identified noise limits.

The plan will provide predicted construction noise levels at sensitive receptor locations based on the proposed construction equipment and methods. If the analysis predicts that the specified noise limits would be exceeded at certain locations, the plan would specify the mitigation measures that would reduce noise levels. The objective of this proactive approach is to minimize the likelihood of community noise complaints by ensuring that any necessary mitigation measures are included in the construction plans.

As a result of this Project's NEPA process, CSX has concluded that its practice to require every train to blow its horn before entering and exiting the tunnel is no longer mandatory due to other safety and security measures in and around the tunnel. Like all railroad companies and consistent with federal regulations, CSX still expects its locomotive engineers to use the train horn for safety reasons both during and after construction. However, an immediate benefit of the Project's NEPA process is the elimination of the mandatory horn-blowing practice, and the resultant overall reduction of horn noise in the surrounding neighborhood.

5.7 Vibration

This section summarizes the results of vibration impact analyses conducted for the Project. A vibration technical report is provided in Appendix F. FTA procedures were used for predicting the vibration impacts of this Project. This section includes quantitative construction-period assessments because buildings are located near the LOD, and therefore, there is the potential that construction-period vibration could cause building damage or human annoyance. A description of the characteristics of vibration is provided in Section 4.7 and in the vibration technical report in Appendix F.

5.7.1 Vibration Impact Criteria

Vibration impacts are evaluated in terms of: (1) human annoyance and (2) building damage. Human annoyance occurs when vibration rises above the threshold of human perception for extended periods of time. Building damage could vary since not all structures are equal in terms of their susceptibility to damage from ground-borne vibration. Typically, older buildings are more susceptible to vibration damage than newer buildings because their construction may

have been in accordance with building codes (or lack thereof) that may not have considered seismic standards or standards typical of today's practices or may have sustained wear-and-tear over the years.

Table 5-11 presents the human annoyance impact criteria by land use category. The impact would vary by the frequency of vibration-causing event. The impact criteria for acceptable ground-borne vibration are expressed in terms of VdB or peak particle velocity (PPV).

Table 5-11
Human Annoyance Vibration Impact Criteria by Land Use Category

Land Use Category	Ground-Borne Vibration Impact Criteria (VdB and PPV)					
	Frequent[1]		Occasional[2]		Infrequent[3]	
Category 1: Buildings where vibration would interfere with interior operations	65 VdB[4]	0.007 in/sec	65 VdB[4]	0.007 in/sec	65 VdB[4]	0.007 in/sec
Category 2: Residences and buildings where people normally sleep	72 VdB	0.016 in/sec	75 VdB	0.023 in/sec	80 VdB	0.040 in/sec
Category 3: Institutional land uses with primarily daytime use	75 VdB	0.023 in/sec	78 VdB	0.032 in/sec	83 VdB	0.056 in/sec

Notes: [1] More than 70 vibration events per day
[2] Between 30 and 70 vibration events of the same source per day
[3] Fewer than 30 vibration events per day
[4] Criteria based on levels that are acceptable for the most moderately sensitive equipment, such as optical microscopes
Source: FTA, Transit Noise and Vibration Impact Assessment, 2006.

Certain types of buildings, such as TV and recording studios, are sensitive to vibration, but do not fit into any of the three categories identified in Table 5-12. Because of their vibrations sensitivity, special impact criteria are used as shown on Table 5-12.

Certain construction activities could result in varying degrees of ground vibration, depending on the equipment and method employed. The types of construction activities that could cause ground-borne vibration include demolition, excavation, and shoring of tunnels. Since these activities have the potential to damage nearby buildings through ground-borne vibration, FTA vibration impact criteria for buildings as shown on Table 5-13 was used in the analysis.

Normally, vibration resulting from a train pass by would not cause building damage. However, the potential for damage to fragile older buildings located very near to or within the right-of-way could be a concern.

Table 5-12
Human Annoyance Vibration Impact Criteria for Special Buildings

Type of Building or Room	Ground-Borne Vibration Impact Criteria (VdB and PPV)			
	Frequent[1]		Occasional or Infrequent[2]	
Concert or Band Halls, TV Studios, Recording Studios	65 VdB	0.007 in/sec	65 VdB	0.007 in/sec
Auditoriums, Theaters	72 VdB	0.016 in/sec	80 VdB	0.040 in/sec

Notes: [1] More than 70 vibration events per day
[2] Fewer than 70 vibration events of the same source per day
Source: FTA, Transit Noise and Vibration Impact Assessment, 2006.

Table 5-13
Building Vibration Damage Impact Criteria

Building Category	PPV (in/sec)
I. Reinforced-concrete, steel, or timber (no plaster)	0.5
II. Engineered concrete and masonry (no plaster)	0.3
III. Non-engineered timber and masonry buildings, such as Capitol Quarter and the Marine bachelor quarters	0.2
IV. Buildings extremely susceptible to vibration damage, such as the St. Paul AUMP Church	0.12

Source: FTA, Transit Noise and Vibration Impact Assessment, 2006.

5.7.2 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in construction vibration impacts. The discussion provided in the Construction Impact section for Vibration focuses exclusively on the three Build Alternatives.

Vibration impact analysis was conducted to determine the potential that construction activities could cause human annoyance or damage to buildings located near the LOD. The analysis evaluated the major vibration producing construction equipment expected to be used during construction.

Vibration levels produced by construction equipment were obtained from the FTA publication, Transit Noise and Vibration Impact Assessment (2006). Based on the typical vibration levels for the various construction equipment listed in Table 5-14, calculations were conducted to determine the distances at which vibration impacts could occur from vibration sources.

Table 5-14
Construction Equipment Vibration Impact Distances

Equipment	PPV at 25 ft (in/sec)	VdB at 25 Feet
Large Bulldozer	0.089	87
Loaded Trucks	0.076	86
Hoe Ram	0.089	87
Caisson Drill	0.089	87
Sheet Driver (Sonic)	0.170	93
Jackhammer	0.035	79

Source: FTA, Transit Noise and Vibration Impact Assessment, 2006

Table 5-15 shows predicted PPV and VdB values, calculated based on available project information on expected construction activities and use of equipment. The prediction sites are at Capitol Quarter (nearest townhouses facing Virginia Avenue SE); Capper Senior Apartments (nearest north facing apartments); St. Paul AUMP Church; the building within the Marine Recreation Facility nearest to Virginia Avenue SE; 809 Virginia Avenue SE, a building that is a contributing resource to the Capitol Hill Historic District; and 200 I Street SE, a Government of the District of Columbia office building.

Vibration-related damage to buildings located near the LOD is not predicted because the PPV values shown on Figure 5-15 are well below the criteria provided on Table 5-13. However, it is anticipated that certain major vibration producing construction activities are predicted to cause human annoyance to those Capitol Quarter townhouses nearest to the LOD, as well as to the north facing units of Capper Senior Apartments. According to FTA guidelines, vibration levels of at least 80 VdB have the potential to cause human annoyance in residences. The construction activities predicted to cause human annoyance at these locations are excavation, tunnel construction and backfilling. Surface demolition and roadway construction could also cause human annoyance to the north facing units of Capper Senior Apartments. Human annoyance vibration levels are also predicted to occur at the District office buildings on 200 I Street. However, an office work setting is typically not as sensitive to annoyance-level vibration (80 VdB or slightly above) as in a home setting.

During construction, trains will be operating within a secured open trench (Alternatives 2 and 4) or within a tunnel (Preferred Alternative). The vibration effects of trains operating under such conditions are described under Post-Construction Impacts below, even though such operations will occur during construction.

5.7.3 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, under Alternative 1 (No Build) vibration conditions as described in Section 4.7 would continue.

Table 5-15
Highest Construction Activity Vibration Levels

Construction Activity	Capitol Quarter		Capper Senior Apartments		St. Paul AUMP Church		Marine Band Practice Hall		809 Virginia Avenue SE		200 I Street SE	
	PPV (in/sec)	VdB	PPV (in/sec)	VdB	PPV (in/sec)	VdB	PPV (in/sec)	VdB	PPV (in/sec)	VdB	PPV (in/sec)	VdB
Utility Relocation	0.025	76	0.021	74	0.001	45	0.002	52	0.009	67	0.025	76
Surface Demolition	0.035	79	0.069	85	0.017	73	0.002	54	0.008	66	0.015	71
Tunnel Demolition	0.017	72	0.014	71	0.002	53	0.003	59	0.010	68	0.017	73
Support Excavation	0.070	85	0.061	84	0.003	57	0.006	63	0.029	77	0.070	85
Excavation	0.065	84	0.057	83	0.003	57	0.006	63	0.027	77	0.065	84
Tunnel Construction	0.061	84	0.053	82	0.003	56	0.006	63	0.026	76	0.061	84
Backfill	0.065	84	0.057	83	0.003	57	0.006	63	0.027	77	0.065	84
Roadway Construction	0.021	74	0.061	84	0.003	56	0.004	60	0.017	73	0.033	78
Sheet Pile (Alt 4 Only)	0.034	79	0.029	77	0.004	59	0.007	64	0.021	74	0.036	79

For the Build Alternatives, vibration levels associated with train pass bys were calculated using the following parameters:

- Distance between the receptor and the location of the proposed track nearest to the receptor;
- Actual recorded vibration measurements taken during train pass-by events, with the highest recorded vibration level used in the modeling;
- Soil factors calculated from the train pass by measurements and the effects of disturbance from excavation activities;
- Adjustment factors to account for the possibility of two trains passing through the tunnel simultaneously, a condition that would result in the highest possible amount of vibration impacts;
- Adjustment factor to account for an increase in train speed (maximum 40 mph); and
- Adjustments that factor in the differences between surface and underground (tunnel) propagation of vibration.

A three-foot thick reinforced concrete slab will form the floor of the new tunnel. The existing tunnel floor is a hard soil surface. Although the concrete slab will absorb substantial amounts of vibration energy generated by passing trains, this effect was not considered in the modeling used to predict future vibration levels at sensitive receptors from train operations. The modeling assumed the same hard soil surface of the existing tunnel. In addition, the new tunnel will feature concrete walls, which will also be more effective than the existing tunnel walls in absorbing vibration energy, even though the existing walls are wider. The vibration-reducing benefits of the proposed concrete floor and walls cannot be precisely determined from standard vibration modeling or from a review of published literature. Therefore, the predicted vibration levels at sensitive receptors provided in this section from the operation of the new Virginia Avenue Tunnel are conservative or over-estimated. Actual vibration levels will be less than what is disclosed in this section due to benefits of the proposed concrete floor and walls.

The weight of trains passing through the new tunnel was not modified for purposes of modeling future vibration levels. Although the new tunnel will allow the operation of double-stack intermodal container trains, industry data indicates that intermodal containers are one of the lightest classes of freight shipped by rail. Trains that are primarily or entirely comprised of double-stacked intermodal containers weigh less than many other types of freight trains currently passing through Virginia Avenue Tunnel.

Among the construction scenarios, Alternative 2, which would have freight trains operating in a protected trench on the south side of the existing tunnel, was determined to have the highest potential among three Build Alternatives to cause vibration impacts along nearby buildings. As noted above, the source of vibrations from trains was doubled to take in account that two trains will be able to use the new rebuilt tunnel simultaneously under the Preferred Alternative and the other two Build Alternatives. Under Alternative 1 (No Build) and Alternative 2 during construction, just one train would be able to pass through the tunnel at a time.

Taking into account the parameters noted above, the outer limits of vibration that can cause human annoyance measured from the source of the vibration (centerline of the outer track) were calculated for Alternative 2 during construction and post-construction for the Preferred Alternative and the other alternatives, and are shown on Table 5-16. This area is referred to as the impact distance for human annoyance. Because all the sensitive receptors are located on the south side of Virginia Avenue SE, the modeled source of the vibration will be from the south side track of the new tunnel and the runaround track of Alternative 2 during construction. People within a building located in the impact distance may experience vibration annoyance. Under the Preferred Alternative or the other two Build Alternatives, a receptor located greater than a horizontal distance of 30 feet away from the center of the south side track (12 feet under Alternative 2 during construction) will not experience a vibration impact causing human annoyance.

Among the three Build Alternatives, the south side track of the Preferred Alternative and the runaround track under Alternative 2 during construction will be located closest to the buildings located along Virginia Avenue SE. Using the distance information in Table 5-16 and knowing the distance between the closest buildings along Virginia Avenue to the Preferred Alternative's center of the south side track is 42 feet, human annoyance impacts due to train operations are not predicted under any of the Build Alternatives.

Table 5-16
Human Annoyance Impact Distances During Train Pass By Events

Alternative	Horizontal Distance (feet)
Existing/Alternative 1 (No Build)	12
Alternative 2 (Construction)	12
Alternative 2	30
Preferred Alternative	30
Alternative 4	30

The enclosed illustration shows the impact distance for human annoyance under the Preferred Alternative at a location next to a building nearest to the new tunnel. The Preferred Alternative is used in the illustration because the tunnel under this alternative will be aligned the furthest south in comparison to the other two Build Alternatives. This illustration could also apply to Alternative 2 during the construction because the runaround track would be located at the same location as the Preferred Alternative's south side track. However, the impact distance would be much less primarily because only one train can pass through at any given time.

As shown in the illustration, the primary source of the vibration from train operations is at the track on a downward trajectory. However, secondary forces moving horizontally will occur along the tunnel wall. At grade, the calculated annoyance distance will be 45 feet from the centerline of the track because vibration waves generated by a train moving at grade (i.e., above ground) travel more effectively along the ground surface than when a train is moving through a tunnel or underground. With the application of the tunnel adjustment factors, including that the new tunnel floor will be at least 31 feet below surface, the human annoyance impact distance is reduced to a horizontal distance of 30 feet from the centerline of the track. As noted above, that the calculated impact distance for human annoyance does not take into account that the new tunnel will have concrete floor and walls. Therefore, the actual impact distance under the Preferred Alternative will more than likely be less than 30 feet.

Illustration of Human Annoyance Impact Distance

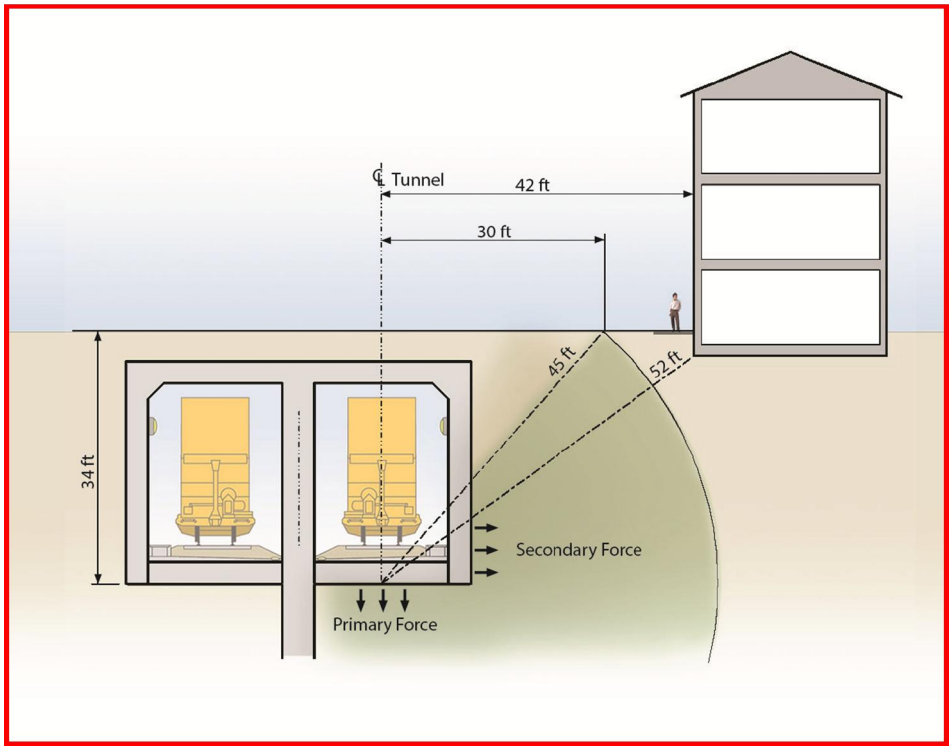


Table 5-17 shows the impact distances for human annoyance and building damage at the sensitive receptors identified along Virginia Avenue SE. No human annoyance or building damage impacts are predicted at any of the receptors.

5.7.4 Mitigation Measures

Prior to construction under the Preferred Alternative or any of the other two Build Alternatives, a vibration monitoring and mitigation plan will be prepared by a qualified vibration engineer, which will include vibration monitoring procedures at predetermined vibration sensitive sites, revised calculation of vibration levels for various construction activities when better information is developed during final design, and possible mitigation measures based on the re-calculations. No construction work or the operation of vibration generating equipment at any construction site will start until DDOT has approved the plan. The plan will be updated if there are any major changes to the planned construction activities.

Table 5-17
Impact Distances from Train Pass-By Events under the Preferred Alternative

Receptor Location	Min. Horizontal Distance to South Track (Feet)	Min. Net Tunnel Depth (Feet)	Radial or Diagonal Distance to South Track (Feet)	Est. Radial Impact Distance for Potential Human Annoyance (Feet)	Expectation for Human Annoyance	Est. Radial Impact Distance for Potential Building Damage (Feet)	Expectation for Building Damage
200 I Street SE	42	28	50	45	None	27	None
Capitol Quarter	42	31	52	45	None	27	None
Capper Senior Apartments	44	28	52	45	None	27	None
St. Paul AUMP Church	147	32	150	45	None	27	None
Marine Recreation Facility	107	37	113	45	None	27	None
809 Virginia Avenue SE	57	34	66	45	None	27	None

Tables 5-14 and 5-15 list construction equipment and activities that could affect people and buildings from ground-borne vibration, and they provide accepted standards for predicting the spatial relationship between vibration activities and potential human annoyance or building damage. The vibration monitoring and mitigation plan will update this information. For this project, it is possible that certain construction activities could cause intermittent localized concern due to vibration generated from construction activities within the LOD. Therefore, those tables will provide the criteria for employing procedures to minimize the potential for human annoyance or building damage from vibration. In particular, the owner of a building close enough to a construction vibration source that damage to that structure due to vibration is possible will be entitled to a building inspection to document the pre-construction condition of that structure. From the a property owner's perspective, the pre-construction survey documents the existing conditions so that it would be evident that any new damage or structural settlement would likely have been caused by construction activities of the Project.

The pre-construction survey will entail visually identifying all existing signs of exterior, interior and roof damage and any signs of structural settlement. Prior to the survey, a review of drawings for the proposed adjacent construction will be undertaken to assist in understanding the implication of the proposed work and specific areas at the subject property that should be more closely reviewed. For each crack or anomaly noted, the survey will document the location of the anomaly and its types, and include photography or video. If the anomaly is a crack, the documentation will include the size of the crack, type of crack and direction of crack. Crack monitoring gauges may be installed over cracks located adjacent to the proposed new construction. The purpose of the gauges is to monitor changes over the course of the construction and post-construction.

If an owner or resident does not allow a pre-construction survey, the surveyor will proceed with an exterior-only survey, and document that no interior survey was performed. The owner or resident will be made aware that surveying the interior of the property is preferable because it allows a more complete picture of the existing conditions of the property. For instance, plaster or drywall interior walls are more susceptible to cracking than vinyl exterior siding. In the event that damage occurs to the interior of the property during construction, it would be difficult or impossible to prove that construction activities caused the damage unless the condition of the interior was documented prior to construction. The interior surveys will only be used for comparison in the event damage occurs during construction.

The CSX and its contractor will be fully responsible to protect adjacent buildings from damage. All residents and businesses will have access to a dedicated Virginia Avenue Tunnel Project claims process to address unforeseen impacts on homes or businesses. If damage does occur due to construction operations, the CSX and its contractor will be fully responsible to make the appropriate repairs. If it is confirmed that a building was damaged as a result of a particular construction activity, the work activity near the building will immediately stop and measures will be taken to ensure that no further damage occurs. The damage will be evaluated to

determine the extent of the necessary repairs, which will be paid for by CSX or its contractor after coordinating with the property owner(s).

A post-construction survey will be required only where damage has been observed, or agreements are in place to provide a post construction survey as a comparative tool. The purpose of the post construction survey is to document any changes to the previously identified anomalies and to identify any new cracks or anomalies in the building structure.

High vibration equipment, such as vibratory rollers, which can cause human annoyance if located near buildings, will only be used during weekday daytime hours when many residents are away from their homes, absent urgent and unexpected circumstances.

Vibration monitoring will be an important activity to prevent vibration-producing construction activities from affecting nearby buildings. The general procedures for vibration monitoring will be as follows:

1. The nearest sensitive receptors (e.g., residence) to the construction area will be selected. The monitor will be buried approximately 10 to 12 inches below the surface next to the building set-back line. However, if vibration levels have to be measured on a hard surface, the monitor will be placed on the surface with a sandbag over it (must be smooth, clean, and dry). If the property owner does not provide permission to bury the monitor, then it can be anchored above ground with a sandbag on top of it.

2. The monitor will have a trigger mechanism set for distinct construction activities that generate high vibration levels. Each time the instrument is triggered, it will record the highest vibration level during that vibration event.

3. The continuous measurement mode will be used for measuring vibration levels associated with certain construction activities such as roadway surfacing, or other above ground construction activities.

4. Vibration readings will be checked regularly within residential areas. The criteria provided in Tables 5-11 and 5-13 will be used to determine if the affected structure is affected by vibration-producing construction activities. If vibration levels exceed the limits shown in Table 5-11 or 5-13, additional vibration mitigation measures than those listed below will be started immediately, such as further limiting the times of the day high vibration-producing equipment is used.

5. The results of the vibration monitoring will be documented. The monitoring locations vis-à-vis the construction area will be identified and the vibration-producing construction activities or equipment operating during the monitoring period will be identified.

6. The vibration data will be publicly available through the Project website, and at the Project community office located at 861 New Jersey Avenue SE.

In addition, to offering pre-construction surveys to nearby building owners and a fair and equitable process for resolving claims related to the Project, the following other mitigation measures that could reduce the amount of vibration generated during construction will be employed:

- Properly maintain all motorized equipment in a state of good repair to limit wear induced vibration;
- Where feasible, avoid the use of pile driving near residences, and instead use drilled piles or the use of a sonic or vibratory pile driver, which cause lower vibration levels, where the geological conditions permit their use;
- When there is the possibility of vibration annoyance from construction activities, such as the operation of vibratory rollers, limit the use of these activities to weekday daytime hours when many residents are away from their homes as reasonably practical;
- Schedule multiple high vibration generating activities so that they do not occur within the same place and time period near sensitive receptors, to the extent practicable;
- Avoid routing heavily-loaded trucks through densely concentrated residences, if reasonably possible;
- Pave or smooth the surface haul paths within the construction area;
- Where feasible, use demolition methods that do not involve impact; and
- Avoid the use of vibratory rollers and packers near sensitive areas, if possible.

5.8 Site Contamination - Soils

Several sources were used to evaluate the potential for soil or groundwater contamination within the LOD as a result of current and/or historical activities on nearby and adjacent properties. The results of this assessment are detailed in the Modified Phase I Environmental Site Assessment (Phase I ESA), which is provided in Appendix G, and summarized in Section 5.8. This section discusses potential construction and post-construction impacts related to soil and groundwater contamination, taking into consideration the facilities of concern identified within and surrounding the LOD.

5.8.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in construction impacts related to soil and groundwater contamination. The discussion provided in the Construction Impact section for Geology and Site Contamination focuses exclusively on the three Build Alternatives.

Construction activities associated with the Preferred Alternative or the other two Build Alternatives involve excavating the soil on top of, surrounding and beneath the existing tunnel, as well as other soils along the south side of the existing tunnel. Dewatering may also be required along excavated areas. Based on the information provided in Section 4.8.2, some areas that will be affected by the construction of the Preferred Alternative or the other two Build Alternatives contain legacy contaminated media (soil and groundwater) that will require proper handling and disposal. All contaminated soil uncovered during excavation will be

properly classified, and transferred to a facility approved for handling contaminated soil. No contaminated soil will be stored within the LOD. The handling of contaminated groundwater will require proper management and pretreatment prior to discharge to the sewers under a National Pollutant Discharge Elimination System (NPDES) permit. Despite the presence of contaminated media within the LOD, the proper and regulatory management of such media is not expected to be a major activity in the construction of the Preferred Alternative or any of the other two Build Alternatives.

Soil and groundwater sampling conducted for the Project identified possible locations of contaminated media that were probably caused by past activities or land uses. Depending on the nature and extent of these known pre-existing contamination areas, proper precautions will be taken to protect workers and the public against potential hazards, such as during the removal of the black felt paper, which contains asbestos, along the tunnel walls prior to the tunnel's demolition. Construction in any contaminated areas will be subject to regulatory requirements of EPA and the DC Department of the Environment (DDOE).

Beyond the information from sampling conducted for the Project, if pre-existing and unexpected contaminated media is uncovered based on visual and/or olfactory evidence during construction activities, the soil or groundwater will need to be tested to evaluate whether it is contaminated. If it is found to be contaminated, it will be properly classified and disposed of as noted above.

Under the Preferred Alternative or Alternative 2, it will be necessary to import additional clean soil for use as fill as part of the Project. This soil will be obtained from commercial gravel pits and will be clean, non-impacted soil. Under Alternative 4, it would be necessary to export soil from the project. This soil would be stockpiled and tested in accordance with applicable laws and regulations to ensure it is not contaminated before it is cleared for use at an off-site location. In the event the soil is found to be contaminated, it will be appropriately handled and disposed of in the manner noted above.

Dewatering activities near potential contaminated zones may result in the collection and discharge of contaminated groundwater from pre-existing sources. Where this occurs, treatment of the dewatering effluent will be necessary before discharging to the sanitary sewer. The treatment of the effluent will likely be done using a carbon filtration system. The dewatering treatment will be performed under a DDOE permit and a pretreatment permit from the DC Water & Sewer Authority (DC Water) for the discharge of treated groundwater.

The Build Alternatives will include stormwater management measures which will improve groundwater resources within and surrounding the LOD. These stormwater design elements will improve water quality by intercepting pollutants from construction areas and preventing their delivery to surface waters, such as the Anacostia River. Runoff from construction occurring south of the tunnel will be collected and treated in sediment traps or by super silt fencing and proposed or existing inlets. Runoff from construction occurring north and south of the tunnel may also drain into the tunnel to be treated there prior to being discharged into any of three combined sewer systems within the project limits. Since the runoff and underground

seepage water discharges into the combined sewer system, permission from DDOT/DC Water will be required.

5.8.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts related to soil and groundwater contamination are anticipated to occur as a result of Alternative 1 (No Build).

No long term impacts to soil or groundwater are expected to result from freight rail operations under any of the build alternatives. Occasionally, the rebuilt tunnel would likely require dewatering of the tunnel corridor, and the installation of sumps to maintain a dry condition. Any contaminated water encountered during long term dewatering would have to be disposed of in accordance with applicable laws and regulations.

5.8.3 Mitigation Measures

During final design of the Preferred Alternative or any of the other two Build Alternatives, a soil and groundwater management plan, subject to DDOT approval, will be prepared based on the sampling information collected for the Project. In addition to noting the locations of existing contaminated media (from the sampling information), the plan will include protocols for the unexpected discovery of contaminated media during construction.

CSX, through its construction contractor, will conduct excavation and dewatering activities based on the plan. CSX and its contractor will be required to take all appropriate regulatory precautions to properly handle and dispose contaminated soil or groundwater encountered (expected and unexpected) during construction. Elements of the plan will include frequent watering of excavated soil so as to not create excess dust when handling the soil, such as the loading onto trucks; coordinating with air monitoring described in Section 5.5.4; and preparing and implementing a health and safety plan for situations where contamination is identified and handled.

The removal of the black felt paper, which contains asbestos, along the tunnel walls prior to the tunnel's demolition will be conducted by a qualified firm in accordance with applicable federal and District regulations for asbestos removal.

5.9 Water Resources

5.9.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in impacts to water resources. The discussion provided in the Construction Impact section for Water Resources focuses exclusively on the three Build Alternatives.

5.9.1.1 Surface Water

The three Build Alternatives will have similar impacts to surface water resources. According to published data and a site visit, no water bodies or watercourses were identified within the LOD. However, small non-jurisdictional ditches located along the toe-of-slope of the rail ballast were seen sporadically within the LOD. These small ditches may contain water, but do not maintain hydrologic connectivity to the Anacostia River or any other jurisdictional waterway.

Regardless of the Build Alternative, all stormwater within the LOD will be treated to filter out debris and other pollutants before discharge from the LOD. Currently, stormwater runoff from Virginia Avenue SE and adjacent roadways is directed into combined sewer systems (stormwater included). Proposed site clearing, excavation and grading activities within the LOD, including the designated construction staging and stockpile area in Jersey Rail Yard, will be covered by stormwater treatment and control measures in coordination with the DDOE and DC Water.

Navigable Waters

The Build Alternatives do not require in-stream work. Therefore, no obstruction of the navigability of adjacent waterways will occur.

Chesapeake Bay Protection

Because of its present condition, the nearby Anacostia River has been designated one of three high-priority regions of concern within the Chesapeake Bay Region by the Chesapeake Bay Program. Total Maximum Daily Loads (TMDLs) have been established for the Potomac River, which is the District's major river basin within the Chesapeake Bay. The Chesapeake Bay is far removed from the LOD so it is unlikely that adverse impacts will occur to aquatic life, wildlife habitat, and water quality as a result of this Project. Nevertheless, the Project will include best management practices during construction to ensure that construction activities do not affect TMDL management and will not lead to pollutant runoff.

5.9.1.2 Groundwater

Groundwater is hydrologically connected to the Anacostia River in the vicinity of the LOD. The Anacostia River represents one of two major surface-water bodies in the District, and interactions between the river and groundwater are both induced and natural. Excavation of trenches for tunnel construction requires dewatering which will result in temporary impacts to groundwater. The quantities of water expected to be extracted due to trenching under all of the Build Alternatives will be of relatively small quantities, and will affect only the local groundwater table. Information collected from the soil borings and water wells conducted for this Project (see Section 4.8) indicate that the dewatering needed for any of the Build Alternatives will not cause damage to any nearby structure, such as I-695. Upon completion of dewatering, groundwater levels in the general vicinity of the LOD should return to pre-construction conditions.

5.9.1.3 Wetlands

As noted in Section 4.9, no jurisdictional or regulated wetlands were identified within the LOD. In accordance with survey methods presented in the 1987 Wetlands Delineation Manual prepared by the U.S. Army Corps of Engineers (USACE), no wetlands were identified within the LOD. For regulatory purposes, a wetland is (40 CFR 230.3(t)): "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas."

The Project, regardless of the Build Alternative, will not require a permit from the USACE in accordance with Section 404 of the Clean Water Act due to the lack of wetlands in the LOD. The Build Alternatives will, however, fill two small unregulated wet areas located within the construction staging and stockpile area in Jersey Rail Yard and along the toe-of-slope of the rail ballast near the east portal. These wet areas do not meet the definition of a wetland according to the 1987 manual, and will not be subject to the Section 404 regulations.

5.9.1.4 Floodplains

In accordance with Executive Order 11988, Floodplain Management, and corresponding NPS Floodplain Management Director's Order (DO) 77-2, Floodplain Management, floodplain encroachments should be avoided or minimized to the maximum extent practicable. Federal agencies are required to reduce the risk of flood loss, minimize flood impacts to human safety, health, and welfare and to restore and preserve beneficial floodplain values and functions.

Reconstruction of the Virginia Avenue Tunnel will not occur within a floodplain, but, a small portion of the construction staging and stockpile area within the Jersey Rail Yard lies within the 500-year floodplain of the Potomac River. A very small portion is also within the 100-year floodplain. This area is disturbed and functions primarily as flood storage. Impacts to the 100-year floodplain in this area will be approximately 0.05 acres while impacts to the 500-year floodplain will be approximately 1.20 acres, which will occur from staging and stockpiling of materials, grading, and tree clearing activities. Disturbance within this floodplain may result in flood displacement during construction. However, this effect to floodplain functions will be temporary. Re-grading of the Jersey Rail Yard will return the floodplain to preconstruction conditions, allowing it to return to its normal flood storage capacity.

5.9.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to water resources are anticipated to occur as a result of Alternative 1 (No Build).

5.9.2.1 Surface Water

Each of the Build Alternatives could result in a reduction of impervious surface due to the restoration of Virginia Avenue SE, which will result in a decrease in runoff volumes and downstream peak discharge rates into the nearby Anacostia River. The rebuilt tunnel will contain its own stormwater management system. The street restoration will, as part of the Build Alternatives, include elements of Low Impact Development (LID), such as providing small landscape features to absorb and manage a portion of the stormwater runoff from Virginia Avenue SE. Continuous tree root zones may allow for healthier tree growth, subsurface drainage, and absorption of stormwater. Furthermore, small landscape treatments will filter stormwater and allow it to be absorbed into underlying soils. As the design of the Project advances, LID elements will be considered where feasible for the restoration of Virginia Avenue SE.

Due to the reduction of impervious surfaces and the use of LID elements, contaminated stormwater runoff to surface waters associated with impervious surfaces is anticipated to stay the same or decrease slightly. Due to the urban conditions in the general vicinity of Virginia Avenue SE and the stormwater infrastructure within the tunnel, the Build Alternatives will have no impact on TMDL management established by the District.

Navigable Waters

Upon completion of construction, freight operations of the rebuilt tunnel will continue with greater efficiencies due to the additional track. Current operations of the tunnel do not impact navigable waters, nor will future operations are anticipated to occur as a result of the No-Build Alternative or any of the Build under the Build Alternatives.

Chesapeake Bay Protection

Because of implemented stormwater management measures, the Build Alternatives will not lead to any increases in nutrient, contaminant, and sediment releases from Virginia Avenue SE, and the TMDL established for the Anacostia and Potomac Rivers will be unaffected.

5.9.2.2 Groundwater

Upon completion of the Project, no post-construction impacts to groundwater resources in the general vicinity of the rebuilt tunnel are anticipated. Additionally, groundwater recharge may improve somewhat because the Project could reduce the overall amount of impervious surfaces on Virginia Avenue SE, depending on how this street is restored.

5.9.2.3 Wetlands

No new wetlands will be created as a result of the Project. As noted in Section 4.9.3, the LOD does not contain regulated wetlands.

5.9.2.4 Floodplains

The Build Alternatives will not result in any new infrastructure located within in the regulatory floodway. In addition, as noted in Section 5.1, the Project will have no affect on land use development. Therefore, it will not cause or influence urban development within the regulatory floodway.

5.9.3 Mitigation Measures

Surface Water

During construction of the Preferred Alternative or any of the other two Build Alternatives, temporary erosion control measures and stormwater management systems in accordance with DDOT construction specifications, the National Pollutant Discharge Elimination System (NPDES) permit program and DDOE requirements will be used as mitigation measures to reduce or eliminate contamination of surface water runoff resulting from exposure to construction sites. Adherence to DDOT and federal design criteria for the construction of roadways and bridges will eliminate the potential for long-term soil erosion from construction. In addition, appropriate spill prevention and control plans will be prepared in accordance with DDOT and DDOE requirements and regulations.

Floodplains

The construction staging and stockpile area in the Jersey Rail Yard will be designed in accordance with current drainage practices and standards to minimize the chances of increasing flood elevations. Such measures could include a combination of silt fences and sedimentation ponds. Coordination with local agencies and the Federal Emergency Management Agency, as required, will occur to ensure that the Jersey Rail Yard is managed in accordance with local flood hazard development permit requirements, flood conveyance capacity plans, and floodplain management programs.

5.10 Vegetation and Wildlife

5.10.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in impacts to vegetation and wildlife. The discussion provided in the Construction Impact section for Vegetation and Wildlife focuses exclusively on the three Build Alternatives.

5.10.1.1 Flora

Existing vegetation within LOD will be removed under each of the three Build Alternatives. This includes all street trees within public right-of-way and trees outside of the right-of-way (CSX, Virginia Avenue Park, and U.S. Marine Corps property). Because the Preferred Alternative and Alternative 2 have the same LOD, both will displace the same number of trees. Of the total

trees surveyed, 168 street trees located within the public right-of-way will be removed along with 15 trees located within Virginia Avenue Park and eight trees within the Marine Corps property. With a slightly smaller LOD, Alternative 4 would remove four fewer trees within the public right-of-way portion of the LOD in comparison to the Preferred Alternative or Alternative 2. The impacts within Virginia Avenue Park and the Marine Corps property would be the same. Additionally, all trees located within CSX property (Jersey Rail Yard and east end of Project limits) will be removed by each of the three Build Alternatives. However, not all trees within CSX property were surveyed since only those meeting a certain size are regulated by DDOT Urban Forestry Administration (UFA).

The UFA regulates all street trees within public right-of-way, and requires compensation for the removal of all healthy trees greater than 2-inches diameter at breast height (DBH). Trees in new and excellent to fair condition are considered healthy trees. Of the 168 trees that are located within public right-of-way that will be removed under the Preferred Alternative or Alternative 2, the UFA will require a mitigation fee for 110 of them (55 trees are between 2" and 6" DBH; eight trees are between 6.1" and 12" DBH; and 47 trees have a DBH of 12.1" or more). Of the 164 trees within public right-of-way that would be removed under Alternative 4, the UFA would require a tree removal fee for 104 of them (50 trees are between 2" and 6" DBH; seven trees are between 6.1" and 12" DBH; and 47 trees have a DBH of 12.1" or more). Mitigation for street tree removals is discussed in Section 5.10.3.

The UFA regulates trees on private property differently than trees within the public right-of-way. Only healthy trees with a circumference of 55-inches/17.5-inches DBH or greater (special trees) on private property are regulated and require mitigation. Each of the three Build Alternatives will remove every tree located within CSX property. However, only 20 of the removed trees will qualify as healthy special trees requiring mitigation tree removal permit. The remaining trees on CSX property that will be removed by any of the Build Alternatives are not considered special trees, and do not require permitting. The affected trees within Virginia Avenue Park and the U.S. Marine Corps property are also not considered special trees. Mitigation for tree removals on private property is discussed in Section 5.10.3.

A tree removal permit will be obtained from UFA just prior to construction. To obtain this permit, fees will be paid to UFA, based upon the number of healthy street trees (new and excellent to fair condition) of greater than 2-inches DBH for street trees within public right-of-way, and of special trees located on private property. The precise fee is based on the size of the tree, and could be waived for the removal for certain species of trees to be determined by UFA on a case-by-case basis. Based on UFA's fee schedule, the total fee for the Preferred Alternative or Alternative 2's removal of 110 street trees will be approximately $133,100. The total fee for Alternative 4's removal of 104 street trees would be approximately $130,300. The fee for removing the 20 special trees on CSX property will be approximately $15,600, and will be applied regardless of the Build Alternatives.

5.10.1.2 Fauna

Regardless of the Build Alternative, the potential impacts to wildlife during construction will the same or very similar. As noted in Section 4.10, the existing wildlife in the general vicinity of the LOD is adaptable to urbanized and disturbed habitats, and would unlikely be affected by construction activities other than localized losses of habitat resulting from tree and vegetation removals described above. In an urban setting, trees provide limited terrestrial habitat. The largest wooded areas within the LOD are located within Jersey Rail Yard, but still within highly urbanized environment. Affected species would seek habitat elsewhere or retreat to adjacent vegetated areas outside of the LOD.

Bats were not observed within the LOD during field visits. However, if bats using the existing Virginia Avenue Tunnel or tree stands within the LOD for roosting, their habitat will be lost during construction. Affected bat species would seek habitat elsewhere or retreat to adjacent vegetated areas outside of the LOD.

The LOD is located within the Atlantic Flyway, an important pathway for migratory birds. However, suitable habitat for migratory bird species does not exist in the LOD, which lacks of mature forests, fields or wetlands favored by migratory birds. Consequently, migratory birds are not expected to use the Project Site for habitat, foraging, or nesting during construction.

Because the Project involves reconstructing an existing tunnel, the presence of rats and other rodents is possible during construction. Therefore, a rodent control program will be initiated prior to the start of construction and maintained during the entire duration of construction. Activities before construction may include extermination and/or trapping. Controlling rodent populations during construction involves managing their food and water supply and their shelter. Food and construction waste will be separated, and trash containing food will be disposed of regularly. Fully enclosed and secure trash receptacles will be placed on-site for regular and frequent collection.

5.10.1.3 Threatened and Endangered Species

According to correspondence with the USFWS dated June 11, 2012 and a site visit, no federally listed or proposed endangered or threatened species or their habitats are known to exist within the LOD. Additional coordination with the NPS dated July 18, 2012, yielded no additional species.

The USFWS stated that bald eagles have increased their numbers within the Chesapeake Bay area. However, the LOD does not contain suitable habitat for the bald eagle, and the species was not observed during site visits. Additionally, Hay's spring amphipod is listed on the "Federally Listed Endangered and Threatened Species – District of Columbia" listing, but suitable habitat for this species does not exist within the LOD.

As such, construction of the Project, regardless of the Build Alternative, is not anticipated to affect threatened and endangered species.

5.10.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to vegetation and wildlife are anticipated to occur as a result of Alternative 1 (No Build).

5.10.2.1 Flora

Regardless of the Build Alternative, Virginia Avenue SE and other affected areas, including Virginia Avenue Park and the Marine Corps Recreation Facility will be restored to pre-existing conditions, including the provision of landscaping. For Virginia Avenue SE, the Project sponsor will work with the UFA to develop and implement a landscape plan that will include the planting of new street trees and other vegetation in appropriate areas, such as the blocks fronting Capitol Quarter. The precise number and locations of the new street trees will be determined after coordinating with UFA. The landscaping plan for Virginia Avenue Park will be coordinated with NPS and the DPR. The landscaping plan for the Marine Corps Recreation Facility will be coordinated with the Marine Corps.

5.10.2.2 Fauna

Upon completion of the Project, the trees and vegetation planted as part of the restoration of Virginia Avenue SE and Virginia Avenue Park will return the affected areas as a place that provides limited habitat for wildlife species that have adapted to urbanized and disturbed habitats. The new trees will provide species displaced during construction to repopulate once the necessary vegetation is reestablished.

5.10.2.3 Threatened and Endangered Species

The return to normal freight operation within under any of the Build Alternatives will not result in any long-term impacts to threatened and endangered species, in part because none exist in the general vicinity of the rebuilt tunnel.

5.10.3 Mitigation Measures

Under the Preferred Alternative or any of the other Build Alternatives, a tree removal fee will be paid to UFA, and street trees displaced by construction will be replaced based on total DBH impacts. Prior to developing the tree replacement plan, an International Society of Arboriculture (ISA) certified tree inventory survey will be conducted to confirm the size and health of the street trees evaluated in the survey noted in Section 4.10. The ISA survey will dictate the mitigation requirements used to prepare the replacement plan. The street tree replacement plan will be coordinated with UFA during the landscaping plan development. Upon agreement with the UFA, the plan will be implemented towards the end of the construction when the affected streets are restored. The replacement plan for Virginia Avenue Park and the Marine Corps Recreation Facility will be coordinated with NPS/DPR and the Marine Corps, respectively. For trees with circumferences of 55 inches or more within the CSX

property, compliance with the DC Urban Forestry Preservation Act will be required, in addition to the tree removal fees to be paid to UFA.

With regards to rodent control, CSX, through its construction contractor, will be required to prepare and implement a Rodent Control Management Plan for the project in accordance with the District health regulations, using a qualified rodent control company. The plan will target Norway and roof rats, and other pests (e.g., cockroaches). The rodent control program will combine elements of baiting and trapping to achieve the highest rate of success, which will be done by a qualified rodent control company both before and during construction. Exterior baiting, interior baiting, non-poisonous trapper glue boards, and conventional traps may be used.

As noted above, food source removal within the construction area is a key component for successful rodent control. Garbage and food debris will be stored in containers with lids. Spilled food and garbage will be cleaned up regularly. In addition, the CSX and its contractor will be required to store wood or other similar materials at least six inches above the ground. Unorganized or cluttered debris and weedy vegetation will not be allowed within the construction area or along the perimeter because they may provide harborage for rodents.

The effectiveness of the rodent control program will be monitored through periodic inspections by a qualified rodent control company, and adjustments will be made if necessary. Activity reports will be provided after each inspection.

5.11 Historic and Archaeological Resources

5.11.1 Section 106 Compliance

The FHWA formally initiated the Section 106 process on November 11, 2011. Section 4.11 introduced the NHPA Section 106 process and the concept of Area of Potential Effects (APE). With the establishment of the APE, potential historic properties are then identified within this area, with the conclusion being either “no historic properties affected” or “historic properties affected”

Because historic properties were identified within the Project’s APE (see Section 4.11), the following determinations are rendered by the lead federal agency (in this case, FHWA) for each historic property in the APE: “no effect”, “no adverse effect” or “adverse effect”.

In accordance with 36 CFR 800.6, a finding of adverse effect to historic properties requires that efforts to resolve such effects by developing and evaluating alternatives or modifications to the undertaking that could avoid, minimize, or mitigate adverse effects must be undertaken.

The glossary in the Table of Contents provides definitions of the Section 106 terminology used in this section as well as in Section 4.11.

5.11.2 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in impacts to historic properties. The discussion provided in the Construction Impact section for Historic and Archaeological Resource focuses exclusively on the three Build Alternatives.

Eighteen historic properties have been identified within the Project's APE (see Section 4.11). Two of the 18 are also designated as National Historic Landmarks: the Washington Navy Yard and the United States Marine Corps Barracks and Commandant's House. On September 10, 2013, the FHWA rendered a NHPA Section 106 "adverse effect" due to the construction effects of the Project on five historic properties (see Appendix A). Construction will require demolition of the existing Virginia Avenue Tunnel, an LOD that will include Virginia Avenue SE and other streets noted in the L'Enfant Plan and within a contributing resource (Virginia Avenue Park) of the Capitol Hill Historic District, the physical disturbance of the Virginia Block Paving, and will be in proximity to St. Paul AUMP Church.

Although the LOD under the Preferred Alternative or the other two Build Alternatives will be in the vicinity the church, the existing tunnel is located over 100 feet away. The vibration effects of demolishing the existing tunnel and reconstructing the new tunnel are not expected to migrate to the church site (see Section 5.7.2). Nevertheless, the church will be inspected prior to the start of construction and monitored during construction. In addition, Virginia Avenue Paving, an archaeological site of cut stone block paving that is a remnant of the original street within the 11th Street Bridges right-of-way, will be disturbed by the construction of any of the Build Alternatives. While the Virginia Avenue Paving stones are historic, they are not currently on or eligible for the National Register.

Construction of the Alternative 1 (No Build), or the other two Build Alternatives will have no effect on the remaining 13 historic properties in the APE identified in Section 4.11 because these properties are located well outside the LOD. The detailed effects assessment that led the FHWA to render the Section 106 "adverse effect" is provided in Appendix I.

On October 10, 2013 (see Appendix A), the DC State Historic Preservation Officer (SHPO) concurred with the FHWA Section 106 adverse effect determination and agreed to enter into consultation to resolve the adverse effect through the preparation of a Memorandum of Agreement (MOA). The FHWA also invited the Advisory Council on Historic Preservation (ACHP) to participate in the consultation to resolve the Section 106 adverse effect. As stated in a letter dated October 28, 2013 (see Appendix A), the ACHP concluded that the criteria for ACHP involvement did not apply to the Project, and therefore, they declined participation in the consultation to resolve the adverse effect.

5.11.3 Post-Construction Impacts

Under Alternative 1 (No Build), the tunnel would eventually need to be rebuilt or undergo major rehabilitation, which may adversely affect the historical integrity of the tunnel. An

emergency or unplanned repair may likely require at least a partial demolition of the tunnel. It is also uncertain if a major repair or rehabilitation of the tunnel would adversely affect the L'Enfant Plan. However, a major emergency or unplanned repair to the tunnel would not be a federal action unless a Federal approval is required. Therefore, it would not likely trigger the requirements NHPA Section 106.

Once completed, the Project, regardless of the Build Alternative, will not affect historic properties. The factors that led FHWA to make an "adverse effect" determination will all occur during construction. The post-construction condition of the rebuilt Virginia Avenue Tunnel will not be expected to cause an adverse effect to any of the historic properties in the APE. Upon completion of the Project, the rebuilt Virginia Avenue Tunnel would not be considered historic.

The restoration of Virginia Avenue SE will involve the straightening of the street between 4th and 5th/6th Streets SE. The current curvature of the street at this location was made at the time I-695 was originally constructed. A "straight" Virginia Avenue SE will be more in keeping with the original intent of the L'Enfant Plan than the current geometric configuration of the street. Therefore, this potential change, if desired by the stakeholders, did not factor in FHWA's decision to render an NHPA Section 106 "adverse effect" for the Project.

5.11.4 Mitigation Measures

Mitigation measures to resolve the Section 106 adverse effect were developed in consultation with the DC SHPO and consulting parties, which was documented in a MOA that was signed by the FHWA, DC SHPO, DDOT, the U.S. Marine Corps, NPS, DPR and CSX (see Appendix A). For Projects that would result in an "adverse effect" in accordance with Section 106, the signing of the MOA concludes the Section 106 process. The mitigation measures to address the Section 106 adverse effect, as provided in the MOA, are as follows. The MOA contains a more detailed description of these measures.

<u>Historic Built Environment</u>

- CSX shall notify the MOA signatories if previously unidentified historic built environment properties are discovered within the APE during final design or construction of the Project, or if CSX proposes to modify the Project in a manner that has the potential to result in previously unevaluated effects on the historic built environement.
- Prior to construction, a Construction Protection Plan (CPP) shall be prepared to avoid and minimize adverse effects on known historic properties, such as St. Paul AUMP Church. Construction would not begin until the CPP has been approved by the MOA signatories.

<u>Virginia Avenue Tunnel Historic Recordation</u>

- CSX will arrange for documentation and photographic recordation of the historic structure in accordance with the guidelines set forth in "Historic American Building Survey (HABS) / Historic American Engineering Record (HAER) Photographs: Specifications and Guidelines", "HABS/HAER Standards", and "HABS Historical Reports". A Level II HAER standard will be used.

- Alteration or demolition of Virginia Avenue Tunnel may commence only after proper recordation has been completed.

Establishment of a Preservation Fund

- CSX shall establish a preservation fund in the amount of $200,000.00 for the purpose of carrying out historic preservation-related projects for properties within the APE which are listed in or may be determined eligible for listing in the National Register of Historic Places (National Register) and/or the DC Inventory of Historic Sites by the DC SHPO.
- The preservation fund will be administered by a third party entity.
- Eligible projects may include "bricks and mortar" work, survey, evaluation, historical research, archaeological investigations, public outreach, interpretation, or other closely related topics.
- All "brick and mortar" work accomplished by the fund shall meet *The Secretary of the Interior's Standards for the Treatment of Historic Properties* and each project so funded shall have a public benefit.

Restoration of Virginia Avenue SE

- CSX shall carry out the restoration of those portions of Virginia Avenue SE that were closed during and affected by construction of the Project.
- The DC SHPO will be afforded an opportunity to review and comment on the draft plans for the restoration of Virginia Avenue SE

Restoration of Virginia Avenue Park

- Prior to any alteration of Virginia Avenue Park, CSX shall photographically record the existing conditions of Virginia Avenue Park. The photographs will be used for reference only and do not have to meet any particular standards.
- CSX shall restore the portions of Virginia Avenue Park that were affected by construction of the Project to a condition that is at least as good as the conditions documented in the pre-construction photographs.
- The restoration will include a dog park per DPR standards.
- Upon completion of the restoration, CSX shall photographically record the restored conditions of the park and provide copies of the recordation to the MOA signatories in order to document fulfillment of this stipulation.

Interpretive Signage for the Virginia Avenue Tunnel

- CSX shall consult with the DC SHPO to develop plans for an interpretive sign that will describe the history of the Virginia Avenue Tunnel and related historical topics.
- The interpretive sign shall be installed at a publically accessible site near the historic tunnel's original location.
- The design, general dimensions, images, narrative content and location of the interpretive sign shall be reviewed and approved by the DC SHPO.
- If necessary, CSX and DC SHPO shall consult with the DC Department of Parks and Recreation (DPR) regarding the proposed installation of any interpretive signs within a park under DPR jurisdiction.

Interpretive Signage for the L'Enfant Plan and Reuse of Virginia Avenue Paving

- CSX shall consult with the DC SHPO to develop plans for an interpretive sign that will describe the history of the L'Enfant Plan and Virginia Avenue, SE, in particular.
- The interpretive sign shall be installed at a publically accessible site within or near Virginia Avenue Park.
- CSX shall consult with the DC SHPO to identify the appropriate manner in which some of the salvaged Virginia Avenue Paving Stones should be removed from their existing site and relocated as an additional educational element near the interpretive sign. A high priority will be given to reusing the paving stones somewhere within the original right-of-way of Virginia Avenue, SE.
- If necessary, CSX and DC SHPO shall consult with the DPR regarding the proposed installation of any interpretive signs or paving stones within a park under DPR jurisdiction.

Donation and Relocation of the Virginia Avenue Tunnel Portals Stones

- CSX shall make the original stones that form the eastern and western portals of the tunnel available to eligible entities.
- Upon DC SHPO approval of any planned use of the stones, CSX shall transport any or all of the portal stones to any location within the District of Columbia selected by any or all of the eligible entities.

Designation and Rehabilitation of Control Point Virginia Tower

- CSX shall complete a National Register nomination package and a DC Inventory of Historic Sites nomination package for the historic railroad switching tower located near 2nd Street and Virginia Avenue SW and referred to by CSX as "Control Point Virginia" (CP Virginia).
- CSX shall develop and implement rehabilitation plans for CP Virginia in consultation with the DC SHPO to ensure that they meet *The Secretary of the Interior's Standards for Rehabilitation of Historic Properties.*
- At a minimum, the rehabilitation work shall include installing a new roof using a material that can be determined by historical photographs or records; cleaning and re-pointing the masonry elements; restoring or replacing the windows with appropriate replacements; scraping/repairing/repainting the metal bay and trim; and any other work that is necessary to ensure long-term preservation of the historic resource.

Virginia Avenue Paving (52SE062)

- CSX shall arrange for development of a Determination of Eligibility for the Virginia Avenue Paving (51SE062) by a qualified archaeologist.
- Removal of the paving stones shall be undertaken following preparation of a work plan submitted to the DC SHPO. A qualified archaeologist must be present during the removal operation.
- CSX shall arrange that sections of cross streets proximate to Virginia Avenue SE between 2nd and 11th Street SE be subjected to testing to assess the potential and verify the presence of any additional intact historic cut-stone block paving.

- As described noted above, CSX shall salvage and reuse some of the Virginia Avenue Paving as part of an interpretive sign and display relating to the L'Enfant Plan and Virginia Avenue SE.

5.12 Parks and Recreational Resources

5.12.1 Construction Impacts

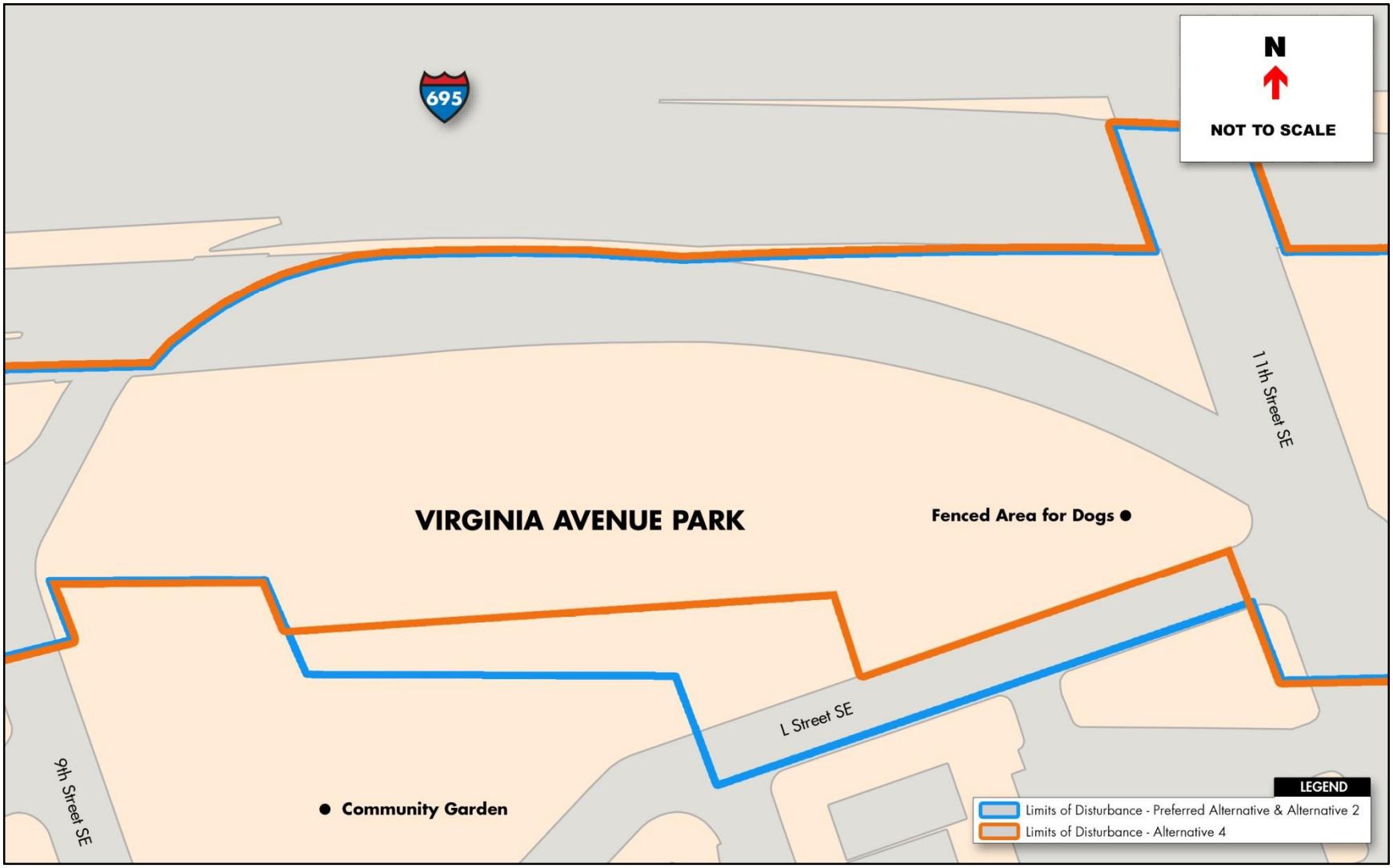
Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in impacts to parks and recreational resources. The discussion provided in the Construction Impact section for Parks and Recreational Resources focuses exclusively on the three Build Alternatives.

Virginia Avenue Park is considered a resource protected under Section 4(f) of the U.S. Department of Transportation Act of 1966 (see Chapter 6 for further information), as well as Section 6(f) of the Land and Water Conservation Fund Act (see Section 5.12.3 for further information).

The LOD for the Preferred Alternative or the other two Build Alternatives will require a portion of Virginia Avenue Park to maintain temporary train operations, demolish the existing tunnel, and construct the new rebuilt tunnel. Each of the three Build Alternatives would use the LOD in a different manner, as described in Section 3.5.2, which provides information about construction phasing. Regardless of the Build Alternative, a large swath of open grassy field and the fenced dog area will not be available during construction (see Figure 5-2). However, the Virginia Avenue Community Garden will not be displaced, and will remain open throughout construction. The park benches and picnic tables located near Potomac Avenue will not be displaced under any of the Build Alternatives. The Preferred Alternative or Alternative 2 will require about 1.76 acres of the 2.63-acre park. Alternative 4 would require 1.46 acres. Construction activities, some of which produce high noise levels and dust emission, within the park will degrade the park experience of garden users and park visitors.

Alternative 4's construction area in the park is smaller than the other two Build Alternatives because it does not include the proposed tunnel split (see Section 3.4.3). However, in terms of the duration of park occupancy, the Preferred Alternative or Alternative 2 will occupy a portion of the park for 30 to 42 months, the same as the entire duration of construction for these alternatives. Alternative 4 would occupy a portion of the park for 38 to 54 months or 20 to 24 percent shorter than its entire construction duration. In addition, the Preferred Alternative will operate trains within a tunnel at all times within the park, which may open up the possibility that a portion of the construction area (the areas near or partially over the new south side tunnel) could be returned back to park uses during construction. The Project will restore Virginia Avenue Park at the conclusion of construction. The restoration elements will be controlled by DPR, in consultation with other DC agencies, CSX, NPS and the community. CSX has committed to provide some enhancements and upgraded amenities in coordination with these organizations and stakeholders.

Figure 5-2
Limits of Disturbance within Virginia Avenue Park



As noted in Section 5.14, each of the three Build Alternatives will require the relocation of the Tiber Creek & New Jersey Avenue High Level Intercepting Sewer. This particular work is located adjacent to the west portal at 2nd Street SE and will require closing the area under I-695 for most of the construction period, which will temporarily displace the ad hoc skateboarding area. As noted in Section 4.12, the skateboarding area is not listed as an official park or recreation facility by the District or the federal government. At the conclusion of construction, the pavement will be restored and control of the property will be given back to DDOT and may revert back to a skateboarding area.

No other official park or recreational facility will be directly affected during construction, including the Marine Barracks Turf Field and Garfield Park. However, pedestrian access to Garfield Park from 2nd Street SE on the south side of I-695 will not be available during construction largely because of the Tiber Creek Intercepting Sewer work noted above. No other Garfield Park access point will be affected. The park is accessible from several different locations, including from New Jersey Avenue SE and 3rd Street SE from the south side of I-695. Fencing as identified in Section 3.5.5 (Safety and Security) will be installed between the construction area for the Tiber Creek sewer relocation work and Garfield Park to separate construction activities from the park.

The LOD needed by Preferred Alternative or the other two Build Alternatives will not encroach into the Marine turf field. Similar to the measures identified near Garfield Park, fencing as identified in Section 3.5.5 (Safety and Security) will be installed along the perimeter of the LOD within the Marine Corps Recreation Facility, which will separate construction activities from the field. Access to the turf field is through L Street SE, not Virginia Avenue SE.

The LOD of the Preferred Alternative or the other two Build Alternatives will include a portion of the Virginia Avenue SE right-of-way currently used as landscaping between the roadway and the Capitol Quarters residences within the 300 block of Virginia Avenue SE. Capitol Quarters residents have reported using this landscaped area for recreational purposes. During construction, the portion of the landscaping within the public right-of-way will not be available for recreational purposes. The portion of this landscaped area within private property will still be available for recreational purposes during construction. As described in Section 3.6 (Post-Construction Virginia Avenue SE), the affected landscaped area fronting Capitol Quarter will be restored at the conclusion of construction.

Due to the Project's MOT plan, construction on Virginia Avenue SE will not affect access to other nearby parks, other than what is noted above.

5.12.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to parks and recreational resources are anticipated to occur as a result of Alternative 1 (No Build).

As noted above, the Project will restore Virginia Avenue Park to its pre-construction conditions, and provide additional enhancements to the park. Once the park has been restored, its resources will revert back to their pre-construction conditions as described in Section 4.12, notwithstanding any enhancements made to the park as part of the Project. The operation of the new tunnel will not affect access to and user enjoyment of Virginia Park.

The Project will facilitate partial construction of the Garfield Connector, a planned connection between Garfield Park and the Anacostia Riverfront and Canal Park for cyclists and pedestrians. The area between Garfield Park and Virginia Avenue SE, in the vicinity of the west portal at 2nd Street SE, which is largely underneath I-695, will be completely rebuilt due to the relocation of the Tiber Creek & New Jersey Avenue High Level Intercepting Sewer. Within the project's LOD, the area will be made to be accessible for wheelchair-dependent persons. DDOT will decide future uses of this area in consultation with other District agencies, the Garfield Park Association and the larger community.

5.12.3 Section 6(f)

5.12.3.1 Legal and Regulatory Context

Section 6(f) of the Land and Water Conservation Fund (LWCF) Act - (codified at 16 U.S.C. 460l-4 et seq) states that:

> "No property acquired or developed with assistance under this section shall, without the approval of the Secretary [of the Interior], be converted to other than public outdoor recreation uses. The Secretary shall approve such conversion only if he finds it to be in accord with the then existing comprehensive statewide outdoor recreation plan and lonely upon such conditions as he deems necessary to assure the substitution of other recreation properties of at least equal fair market value and of reasonably equivalent usefulness and location."

This statute applies to a property, as a whole, that has received funding under the LWCF Act, regardless of where the resources were spent within an area.

Section 6(f) is intended to protect parks and other recreational resources from conversion to other uses. The Section 6(f) park conversion process applies only to those state, county, or local recreational resources that have received funding through the LWCF Act. The NPS makes the ultimate decision on whether to approve a conversion of land that has received funding under the LWCF Act. The NPS will consider conversion of public outdoor recreation areas to another use, if the following prerequisites have been met:

- All practicable alternatives to the conversion have been evaluated ad rejected on a sound basis;
- The property proposed for substitution is of at least fair market value as that of the property to be converted; and
- The property proposed for replacement is of reasonable equivalent usefulness and location for recreational purposes as that being converted.

5.12.3.2 Description of Section 6(f) Properties

The Virginia Avenue Park is the result of a land transfer from the 1960s. It was historically known as the Virginia Avenue Boxing Center, which was demolished in 2003 and followed by implementation of a landscaping program. Virginia Avenue Park is identified as one of the District's 71 recreational centers, and LWCF Act funds were used to improve the park.

5.12.3.3 Potential Impacts on Section 6(f) Properties

Although the Preferred Alternatives and the two other Build Alternatives will require a temporary occupancy of a portion Virginia Avenue Park during construction, the Project will not lead to a conversion of the park to other uses because the construction impacts are temporary and Virginia Avenue Park will be restored to its pre-construction condition at the conclusion of construction, with additional enhancements built as part of the Project.

5.12.3.4 Section 6(f) Coordination

The NPS is a cooperating agency in the preparation of this EIS. Coordination with the NPS will continue throughout the NEPA process, final design and construction to ensure that Virginia Avenue Park is restored to its pre-construction condition and enhanced for the betterment of the community.

5.12.4 Mitigation Measures

As there is no conversion of Section 6(f) lands attributable to the Project, there is neither a statutory obligation to replace converted lands. Nevertheless, at the conclusion of construction of the Preferred Alternative or any of the other Build Alternatives, CSX will provide the affected community with a number of benefits beyond conventional mitigation measures undertaken as part of the NEPA process. These benefits are expected to include enhancements to Virginia Avenue Park, and thereby acknowledge the temporary use of this park land during construction of the Project. The enhancements will include construction of an official dog park (the existing fenced area within the park used by dog owners is not considered an official dog park). DPR has indicated having discussions with the community to build a dog park at Virginia Avenue Park, and has prepared a basic conceptual plan. Other enhancements may be provided after the project sponsor consults with DPR and other stakeholders.

Temporary wayfinding signs will be provided showing alternatives routes (New Jersey Avenue SE and 3rd Street SE) to Garfield Park from the south side of I-695.

5.13 Visual and Aesthetic Conditions

5.13.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in impacts to visual and aesthetic conditions within the LOD. The discussion provided in

the Construction Impact section for Visual and Aesthetic Resource focuses exclusively on the three Build Alternatives.

The Preferred Alternative or the other two Build Alternatives will require the closure of Virginia Avenue SE, and part of Virginia Avenue Park in order to demolish the existing tunnel, build the new tunnel, and maintain freight rail operations. Along these areas, fencing and barriers will be erected around all construction sites, including anywhere that freight trains are operating (e.g., runaround trench under Alternative 2). The purpose of the fencing is to demarcate the construction area, but to also protect the general public from construction sites. How the fencing (and some construction equipment) may appear along Virginia Avenue is shown in three illustrations providing renderings from vantage points on Virginia Avenue SE at 3rd, 4th and 5th Streets SE. Much of the construction work (and any train operations) will be conducted below street level, and will be largely not visible from street level. However, a viewer within a nearby building with at least three levels will be able to look into the construction sites over the fencing and possibly peek into the trenching containing the reconstruction work and train operations if running in an open protected trench (see enclosed visual renderings).

The construction-period visual impacts of the Build Alternatives are largely the same. However, construction visual impacts of Alternative 4 are anticipated to last between 54 to 66 months, whereas these same impacts will last between 30-42 months under the Preferred Alternative or Alternative 2.

Rendering at 3rd Street SE, Looking East

Rendering at 4th Street SE, Looking West

Rendering at 5th Street SE, Looking East

5.13.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially some of the impacts described under the Construction

Impacts for the Build Alternatives. Alternative 1 (No Build) would not require any changes to the Virginia Avenue SE streetscape and therefore, no long-term impacts to the visual and aesthetic resources along Virginia Avenue are anticipated to occur as a result of Alternative 1 (No Build).

The Preferred Alternative or the other two Build Alternatives will restore the Virginia Avenue SE streetscape, potentially in a slightly different appearance with the possible addition of more landscaped areas, the provision of bicycle facilities and the reduction of lanes. Initially, the street trees planted along Virginia Avenue as part of the restoration will be younger with smaller canopies than the existing street trees that will be displaced by the Project (note that the tree inventory provided in Appendix H indicate that some of those trees are in poor health, dying, or dead). The immediate impact will be a lessening of the visual relief the street trees provide between the visual conflict of I-695 on the north side of Virginia Avenue SE and the row houses, and other land uses, on the south side. The 300 and 400 blocks of Virginia Avenue SE with the row houses (Capitol Quarter) have a neighborhood aesthetic feel, in part because of the type of housing, but also because of the street trees that somewhat mitigate the visual intrusion of the elevated I-695. Between 5th/6th and 8th Streets SE, the street trees are also a factor in the overall aesthetic environment. As the years goes by and as trees grow larger with fuller canopies, the street trees could enhance the visual environmental along Virginia Avenue SE.

The immediate post-construction visual changes in Virginia Avenue Park after its restoration will be less acute than along Virginia Avenue SE simply because the displaced trees in the park are not as mature as many of the street trees. Opportunities to plant more trees and other vegetation, change grading, and provide other improvements as part of the restoration of the park could enhance its overall visual and aesthetic appearance.

5.13.3 Mitigation Measures

During construction of the Preferred Alternative or any of the other two Build Alternatives, fencing surrounding the construction areas will be provided for safety and security reason as described in Section 3.5.5 (Safety and Security). Because land uses vary along Virginia Avenue SE, the type of fencing or barrier may vary as well. The areas of most concern are between 3rd and 5th Streets SE, due to the cluster of residences at this location, and in Virginia Avenue Park. Within these areas, screens will be attached to the chain link fencing facing the residences or the park. Alternatively, stockade fencing may be used in lieu of chain link fencing with screens. The advantages of stockade fencing are they could be used to display public art, such as allowing school children to paint murals on the fencing.

CSX, through its construction contractor, will be required to conduct good housekeeping practices, such as making sure equipment is orderly parked when not in use, daily regular clean-up is conducted, and that soil stockpiles are stabilized as required by District regulations

5.14 Utilities

5.14.1 Construction Impacts

Utility Relocations

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not require utility relocations. The discussion provided in the Construction Impact section for Utilities focuses exclusively on the three Build Alternatives.

There are no discernable differences among the Build Alternatives in terms of their utility relocations. The affected utilities include storm and sanitary sewer; water; natural gas; electric power; and communications. Tables 5-18 through 5-22 summarize how utilities under these categories will be affected by the Preferred Alternative or the other two Build Alternatives. The affected utilities will either be relocated (includes replacement or modification), protected (not moved but protected from damage due to the construction of the Project) or supported-in-place (not moved but provided additional structural support). These terms are used in Tables 5-18 through 5-22. The locations of the affected utilities are shown on Figures 5-4 through 5-8. It should be noted that the water lines noted on Table 5-19 were constructed over 100 years ago, utilizing "lead joint cast iron" pipes. Their relocation, noted on Table 5-19, will be designed to prevent failure of these older lines during construction.

Table 5-18
Storm and Sanitary Sewer Lines Affected by the Build Alternatives

Item*	Description	Impact
A	Tiber Creek Sewer	Relocate and Protect
B	12" Sewer Line	Relocate
C	15" Storm Sewer Line	Relocate
D	12" Combined Sewer Line	Relocate
E	36" Combined Sewer Line	Relocate
F	10" Sewer Line	Relocate
G	4'6" Concrete and Brick Combined Sewer Line	Relocate
H	12", 18" and 24" Storm Sewer Lines	Relocate
I	Capitol Relief Sewer Line (14.83' x 19.5')	Protect and Support-in-Place
J	54" Reinforced Concrete Storm Sewer Line	Protect
K	66" Combined Sewer Overflow Line	Protect
L	18" Encased Combined Sewer Line	Relocate
M	15" Storm Sewer Line	Relocate

Notes: *See Figure 5-4 for location of storm or sanitary sewer lines
Item G requires an inverted siphon within the Marine Corps Recreation Facility property. The siphon will require electric power and access by DC Water for regular inspection and maintenance.

Figure 5-4
Storm and Sanitary Sewer Lines Affected by the Build Alternatives

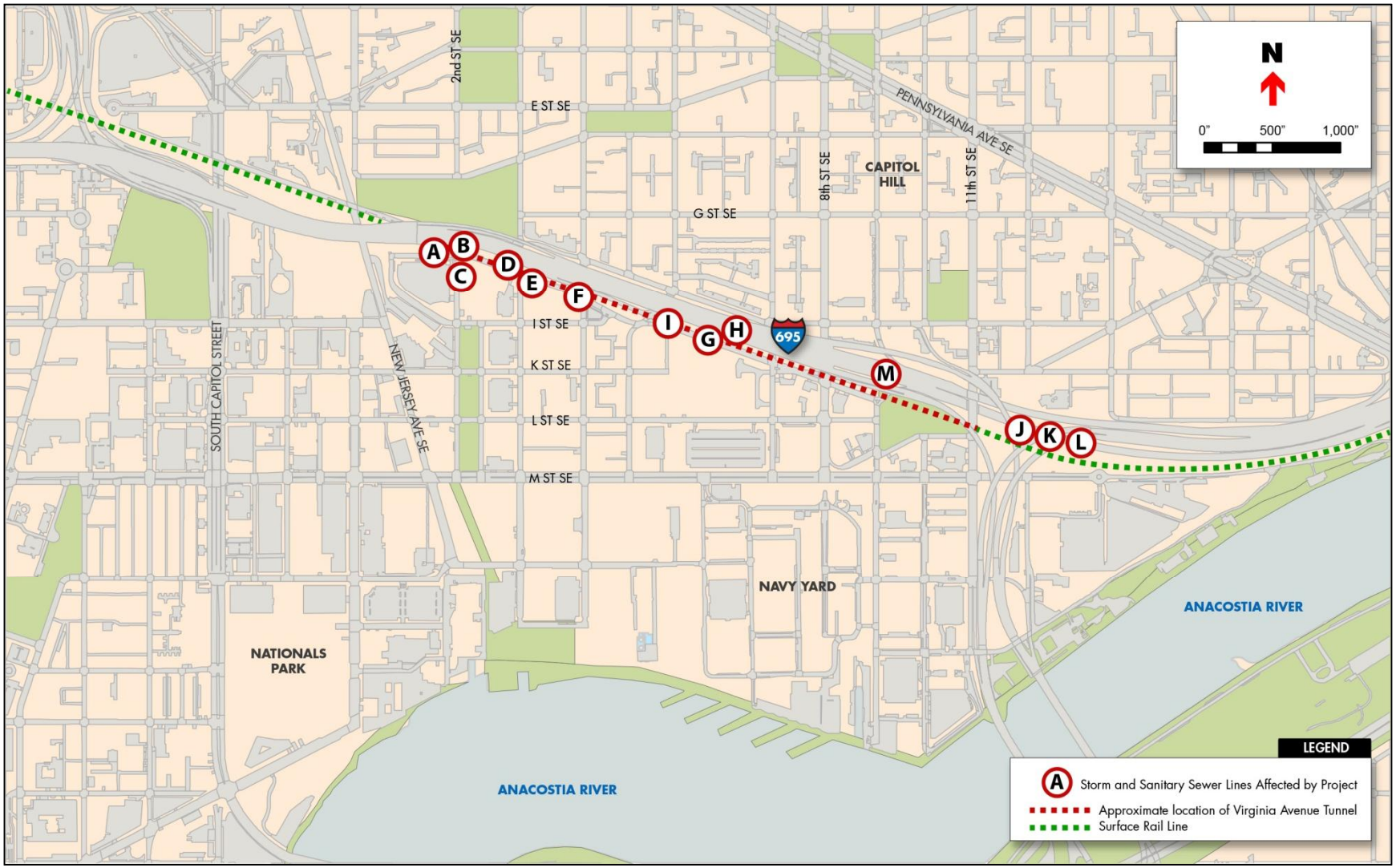


Table 5-19
Water Lines Affected by the Build Alternatives

Item*	Description	Impact
A	12” Water Line	Relocate
B	8” Water Line	Relocate
C	12” Water Line	Protect and Support-in-Place
D	12” Water Line	Relocate and Support-in-Place
E	12” Water Line	Protect and Support-in-Place
F	20” Water Line and Two 12” Water Lines	Relocate and Support-in-Place
G	10” Water Line	Relocate
H	3” Water Line	Relocate
I	30” Water Line	Relocate and Support-in-Place

Notes: *See Figure 5-5 for location of water lines

Table 5-20
Natural Gas Lines Affected by the Build Alternatives

Item*	Description	Impact
A	3” Gas Line	Relocate
B	Low Pressure 8” Gas Line	Support-in-Place
C	6” Gas Line	Relocate and Support-in-Place
D	2” Gas Line	Relocate
E	8” Gas Line	Relocate and Support-in-Place
F	Low Pressure 4” Gas Line	Relocate
G	24” Gas Lines	Relocate and Support-in-Place
H	Two 24” Gas Lines	Protect
I	2” Gas Lines	Relocate

Notes: *See Figure 5-6 for location of natural gas lines

Figure 5-5
Water Lines Affected by the Build Alternatives

Figure 5-6
Natural Gas Lines Affected by the Build Alternatives

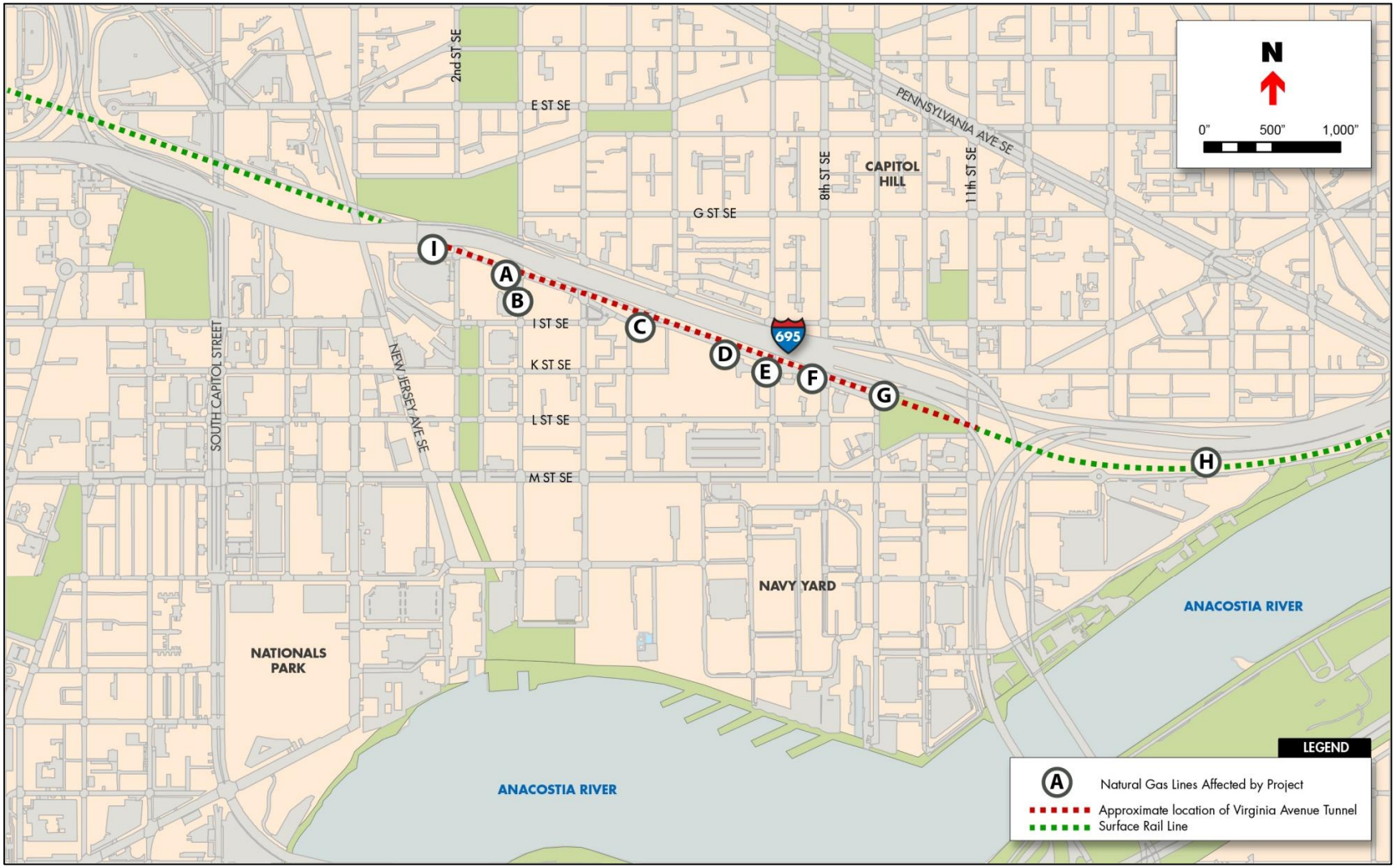


Table 5-21
Electric Power Lines Affected by the Build Alternatives

Item*	Description	Impact
A	Two 3-Way 132KV Electric Ductbank	Remove/Inactive
B	4-Way 13 KV Electric Ductbank	Relocate and Support-in-Place
C	8-Way 13KV Electric Ductbank	Relocate and Support-in-Place
D	4-way Electric Ductbank	Relocate
E	4-Way Electric Ductbank	Relocate and Support-in-Place
F	4-Way Electric Ductbank	Support-in-Place
G	4-Way 13KV Electric Ductbank	Relocate and Support-in-Place
H	4-Way Electric Ductbank	Relocate
I	4-Way 13KV Electric Ductbank	Relocate and Support-in-Place
J	8-Way 13KV Electric Ductbank	Support-in-Place
K	4-Way 69 KV Electric Ductbank	Relocate and Support-in-Place
L	4-Way 13 KV Electric Ductbank	Relocate and Support-in-Place
M	12-Way Electric Ductbank	Relocate
N	4-Way Electric Ductbank	Relocate
O	12-Way 4 KV Electric Ductbank	Protect and Support-in-Place
P	1-Way Electric Ductbank	Relocate

Notes: *See Figure 5-7 for location of electric power lines

Table 5-22
Communication Lines Affected by the Build Alternatives

Item*	Description	Impact
A	AboveNet Communications Conduit	Relocate
B	Level 3 20-Way Ductbank	Support-in-Place
C	9-Way Communications Ductbank	Relocate and Support-in-Place
D	9-Way Communications Ductbank	Relocate and Support-in-Place
E	2-Way Communications Ductbank	Relocate and Support-in-Place
F	2-Way Communications Ductbank	Support-in-Place
G	9-Way, 14-Way, and 18-Way Communication Ductbanks	Relocate

Notes: *See Figure 5-8 for location of communication lines

The Preferred Alternative or the other two Build Alternatives will not remove active utilities from the LOD without replacing them. Affected utilities will be upgraded to current standards. Moreover, in coordination with the affected utility companies, redundant utilities will be eliminated where possible. Abandoned utilities that conflict with construction of the Project could be removed following appropriate protocols with the owners of the abandoned utilities.

Figure 5-7
Electrical Power Lines Affected by the Build Alternatives

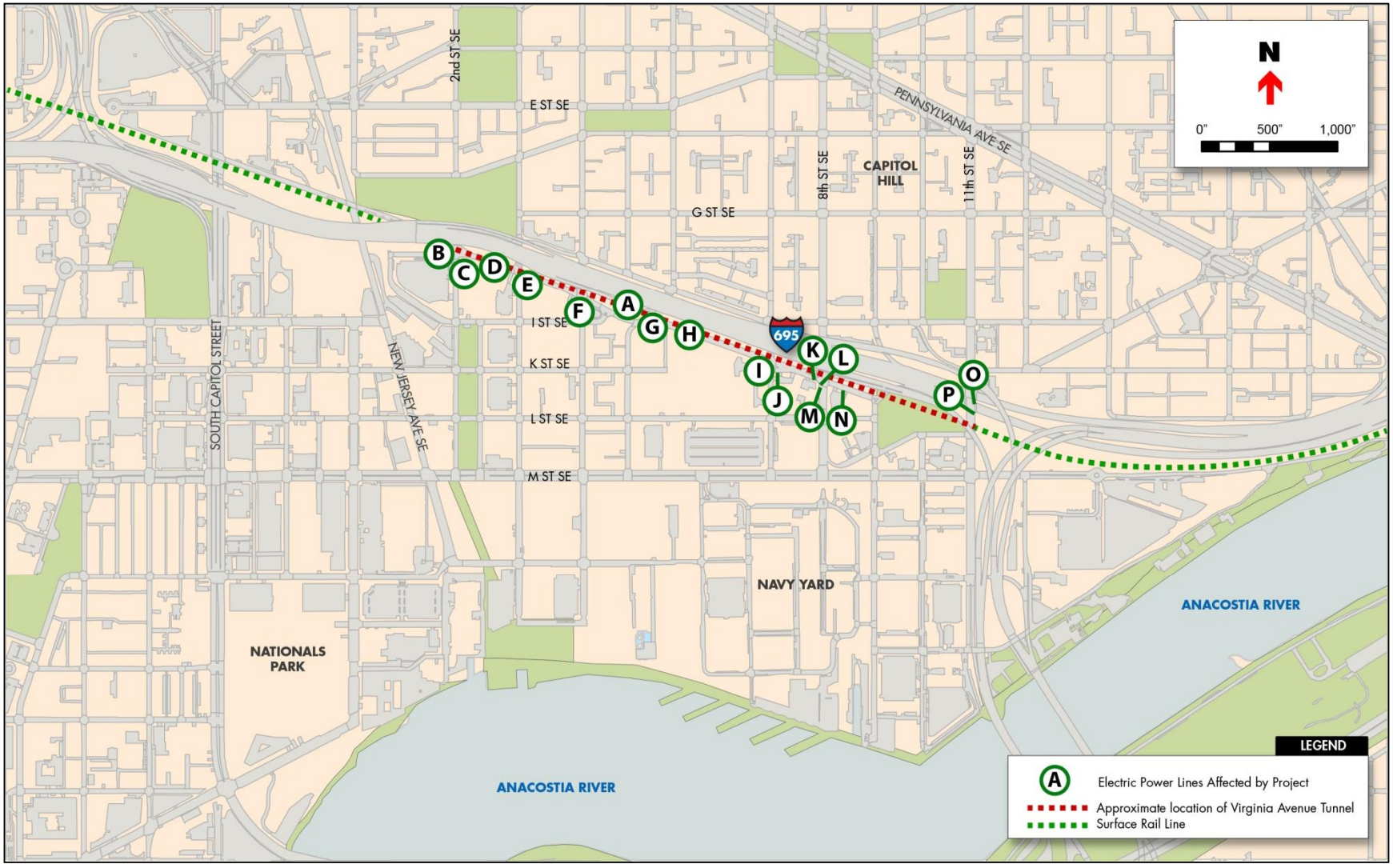
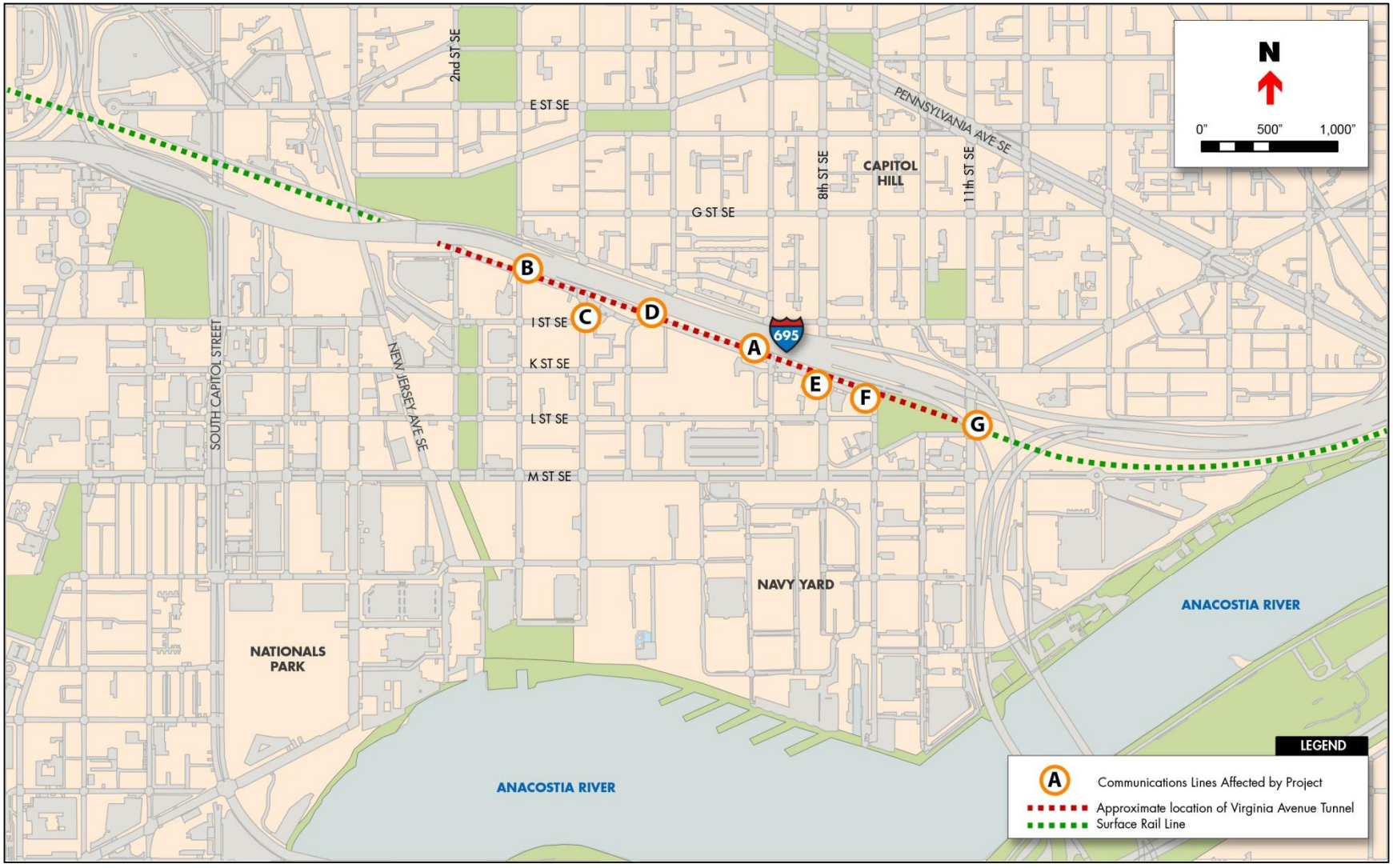


Figure 5-8
Communication Lines Affected by the Build Alternatives



Utility relocations or modifications will be conducted in a manner that will maintain service to the utility customers to the fullest extent possible. However, certain temporary service disruptions will be unavoidable. Coordination with the utility owners will be conducted to limit any service disruptions to as short duration as possible. In addition, all utility removal and relocation work will be conducted within the LOD described in Section 3.5.1. A utility relocation plan will be prepared during final design for notifying the public about utility service disruptions. Best management practices and requirements of the affected utility companies will be strictly followed, including making sure that all required permits and approvals are obtained.

In addition to the required utility relocations, the heating-ventilation-air conditioning unit (HVAC) of the Marine Corps Recreation Facility will have to be temporarily or permanently repositioned under each of the Build Alternatives. The HVAC is located near Virginia Avenue SE property line. Coordination with the Marine Corps will be conducted to maintain the operation of the HVAC unit during construction. In addition, water lines as shown as Item F in Table 5-19 may be relocated within the Marine Corps property.

Despite the extensive research and coordination with utility companies that have been conducted to date to determine the locations of the affected utilities listed in Tables 5-18 through 5-22, unknown utilities could be discovered during construction. The utility relocation plan will address the handling of unexpected utilities. In general, they will be handled in the same manner as other utilities affected by construction.

Vibration Effects to Underground Utilities

Because existing and proposed water and sewage pipes will be located in proximity to construction activities and the new tunnel, their vulnerability to damage from the vibration effects from construction and train operations in the tunnel were evaluated. The evaluation is provided in the vibration technical report in Appendix F, and a summary of this evaluation is herein provided.

Underground pipes have no federal or local vibration limits or standards. However, several published references provide vibration limits and prediction methodologies related to underground pipes.

Vibration levels were estimated for water and sewer pipes in close proximity to proposed major construction activates and the new tunnel. These levels were calculated using the results of vibration measurements conducted in proximity to the Project, measured vibration levels from typical major construction activities, and train vibration levels provided in the FTA Noise and Vibration Manual.

Table 5-23 provides the highest estimated vibration levels at water pipes caused by construction activities. None of these pipes will be affected by train operation vibration because they will be located on top of the tunnel. With the exception of one water pipe,

Table 5-23
Highest Vibration Levels at Water Pipes

Water Pipe Location	Depth BGS (ft)	Distance Between Pipe and Nearest (feet)		PPV(in/sec)	
		Track	Construction Activity	Train Pass-by Vibration	Construction Vibration
2nd Street and Virginia Avenue	5.5	--	10	--	0.16
Between 2nd and 4th Streets	4	--	20-60	--	0.13 - 0.24
West of 3rd Street	10	--	20-60	--	0.13 - 0.24
Immediately west of 7th Street	3	--	25	--	0.21
Between 7th and 8th Streets	3	--	2-5	--	0.49 – 0.79
11th Street	3	--	20	--	0.24

Note: "--" indicates train pass-by vibration will not be an issue at these locations because the pipes are located above the train tunnel.

Table 5-24
Highest Vibration Levels at Sewer Pipes

Sewer Pipe Location	Depth BGS (ft)	Distance Between Pipe and Nearest (feet)		PPV(in/sec)	
		Track	Construction Activity	Train Pass-by Vibration	Construction Vibration
3rd Street (west of)	10	--	25	--	0.21
5th Street (east of)	15-25	31–51	10-30	0.10– 0.14	0.19 – 0.34
Between 7th and 8th Streets	11	--	10-15	--	0.27 – 0.34
Between 8th and 9th Streets	8	--	20-25	--	0.21 – 0.24

Note: "--" indicates train pass-by vibration will not be an issue at these locations because the pipes are located above the train tunnel.

vibration levels are predicted to range between 0.13 and 0.24 PPV or well below the most stringent referenced standard of 1.2 PPV for any type of pipe. For the water pipe located between 7th and 8th Streets, the highest construction vibration levels are estimated to range between 0.49 and 0.79 PPV, which is still below the referenced standard. Therefore, construction is not expected to cause vibration damage to water pipes located along the LOD.

Table 5-24 provides the highest estimated vibration levels at sewer pipes caused by construction activities and train pass-by vibration. Sewer pipes can be made of different materials depending on their location and function. During construction, vibration levels are estimated to range between 0.19 and 0.34 PPV, which will be well below the most stringent referenced standard of 1.2 PPV for any type of pipe. Operationally, train pass-bys are predicted to cause vibration levels at one of the sewer pipes to be in the range of between 0.10 to 0.14 PPV, which are below the most stringent referenced standard of 0.6 PPV for continuous vibration. Since both vibration limits pertaining to intermittent (construction) and continuous (train pass-bys) vibration are not anticipated to be exceeded, damage to the sewer pipes along the LOD is unlikely to occur.

5.14.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to utilities are anticipated to occur as a result of Alternative 1 (No Build).

The reconstruction of Virginia Avenue Tunnel under any of the Build Alternatives will not result in post-construction impacts on the utility services.

5.14.3 Mitigation

Coordination with utility companies will be conducted throughout the design and construction phases of the Preferred Alternative or any of the other Build Alternatives. This will include pre- and post-construction inspections of existing and replaced utilities. Final connections of relocated lines may be conducted by the affected utility company.

Whenever possible, service disruptions will be avoided. If a service disruption is unavoidable, public notification requirements and protocols of the affected utility company will be followed, in addition to the Project's outreach program. Furthermore, every attempt will be made to conduct the utility work during non-peak usage hours. However, in comparison to a utility disruption affecting a typical residential household where a disruption during working hours (i.e., between 9 AM to 4 PM) may not be overly problematic, a utility disruption affecting Capper Senior Apartments may require special treatment. If proper approvals can be obtained, the utility disruptions may be scheduled to have the least impact to daily activities of Capper residents, such as occurring at late night to early morning. CSX, through its construction contractor, will provide whatever equipment and supplies necessary to maintain the health,

safety and well-being of Capper residents in the event of a prolonged utility disruption (e.g., lasting more than a few hours).

5.15 Transportation

5.15.1 Freight Operations

5.15.1.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would maintain current freight operations as described in Section 4.15.1. The discussion provided in the Construction Impact section for Freight Operations focuses exclusively on the three Build Alternatives.

During construction of the Project, the Preferred Alternative and the other two Build Alternatives will maintain a single railroad track that would allow operations in both directions (the same as current conditions and the current level of freight traffic). The Project contemplates continued active rail operations averaging 20 trains per day, but could range between 12 to 30 trains on a daily basis during construction. (For purposes of evaluating potential noise impacts from train operations during construction, a 25 percent increase from existing conditions was assumed.) All alternatives allow freight trains to operate at a maximum 25mph.

The three Build Alternatives have certain operational advantages or disadvantages in comparison to one another:

- Alternative 2 would provide the ability to accommodate double-stack intermodal container freight trains sooner than the other two Build Alternatives because the runaround track could be constructed relatively quickly in the terms of the overall construction duration.
- Trains operating under the Preferred Alternative will always be inside a tunnel, except a 230 feet section immediately east of the west portal at 2nd Street SE, which does not extend beyond 3rd Street SE;
- Alternative 4 would pose the greatest risks of service disruptions because temporary train operations and reconstruction of the tunnel would occur within the same trench. This would require additional operational and safety precautions and measures onto Alternative 4, and not under the Preferred Alternative or Alternative 2, which would keep train operations and construction activities separated.

5.15.1.2 Post-Construction Impacts

In order to determine the Project's effect on post-construction freight operations, future rail traffic demand must be considered. Government and industry information indicate that the amount of freight rail transportation is expected to substantially increase over the coming decades regardless if the Project is built or not. However, due to the variability of factors such as commodity flows, national and international economic conditions, cyclical variations, and

emerging needs and commodities in the fast-evolving freight industry, it is generally difficult to predict the future growth of freight traffic on any corridor accurately. However, the FHWA estimates that the total U. S. freight shipments would grow by 50 percent over the next 30 years. Also, it is generally accepted in the freight transportation industry that the opening of the expanded Panama Canal in 2015 would lead to a substantial growth in container traffic demand along the east coast of the U.S. Thus, it is expected that freight traffic along the east coast of the U.S. is due for substantial growth as well. Sizeable fluctuations in freight traffic are typical in the railroad industry and as a part of their operating franchise, railroads have the inherent freedom to expand or contract capacity as traffic demands vary. However, it must also be understood that investments in capital and expansion infrastructure in railroad entails long-term durations, which means improvements must accommodate fluctuations in rail traffic during and at the completion of the improvement projects.

The Build Alternatives will provide the same post-construction railroad operating conditions. This will be an improvement over Alternative 1 (No Build), which would maintain the current one-track configuration, as well as the inability to accommodate double-stack intermodal container freight trains. In addition, an emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could potentially result in substantial freight service disruptions. Depending on the severity of the repair or rehabilitation, wide ranging effects to the rail network could occur.

The Preferred Alternative or any of the other two Build Alternatives will provide capacity improvements through the District and the eastern seaboard freight rail network by adding a second railroad track within Virginia Avenue Tunnel and by providing the necessary vertical clearance to accommodate rail traffic pulling double-stack intermodal container cars.

The provision of two railroad tracks and the adequate clearance to allow double-stack intermodal container trains traffic will be a particularly important attribute of the post-construction Virginia Avenue Tunnel. The two-track operation will allow for trains moving simultaneously through the tunnel, which will reduce the overall time trains spend idling and improve the efficiency for the eastern seaboard freight rail network. Some of this efficiency may extend to passenger rail service, such as AMTRAK and VRE, since they use CSX rails in the Washington Metropolitan Area. The ability to accommodate double-stack intermodal container trains essentially doubles the capacity for this particular freight transportation market along the network. It will allow the same numbers of operating trains to handle growth in intermodal container traffic of up to 100 percent increase in comparison to existing conditions. In other words, in comparison to Alternative 1 (No Build), the Build Alternatives will allow CSX to move the same amount of freight with fewer trains.

5.15.1.3 Mitigation Measures

Because no adverse impacts to train operations are expected to occur during construction in part because of safety and security measures described in Section 3.5.5 and because freight transportation will be enhanced following construction, no mitigation measures are necessary. As noted in Section 5.6.4 (Noise Mitigation), CSX has concluded that its mandatory practice of

requiring every train to blow its horns while entering and exiting the tunnel is no longer necessary. Locomotive engineers do however have the discretion and authority to blow horns for safety reasons in accordance with industry practices and federal regulations.

5.15.2 Roadway Network

5.15.2.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in impacts to the roadway network. The discussion provided in the Construction Impact section for the Roadway Network focuses exclusively on the three Build Alternatives.

Regardless of the Build Alternative, the reconstruction of Virginia Avenue Tunnel will require the closing Virginia Avenue SE between 2nd and 9th Streets SE for the duration of the construction period. Temporary decking will be provided at all cross streets for autos, pedestrians and cyclists on existing cross streets including from 3rd to 8th Streets SE. However, the pedestrian path to Garfield Park from 2nd Street SE on the south side of I-695 will not be available during construction largely because of the Tiber Creek Intercepting Sewer (see Sections 5.12 and 5.14). Erecting the temporary decks at 5th/6th and 8th Streets SE may require the short term closure of I-695 ramps located at these locations. The closure of Virginia Avenue SE for this Project is two-phased. For the Preferred Alternative or Alternative 2, a single eastbound lane on Virginia Avenue SE (northernmost lane) will be maintained between the I-695 off-ramp at 6th Street SE and the 8th Street SE intersection during the first phase. Keeping this lane open will allow traffic exiting I-695 to make left turns at 7th and 8th Streets SE from the eastbound Virginia Avenue SE, the same movements currently allowed. Under Alternative 4, the first several months of construction would be concentrated in the area between 2nd and 5th/6th Streets SE. The I-695 6th Street off-ramp and the section of Virginia Avenue SE between 6th and 9th Streets SE will be unaffected. During Phase 2, the remaining section of Virginia Avenue SE south of I-695, between 5th/6th and 8th Streets SE, will be closed under each of the three Build Alternatives.

In addition to keeping north-south movements open along Virginia Avenue SE from 3rd to 8th Streets throughout construction, 11th Street SE will also be open throughout construction through the use of a temporary bridge deck. Under the Preferred Alternative or Alternative 2, however, the 11th Street / L Street SE intersection will be temporarily closed during construction of this deck.

To address the required closure of Virginia Avenue SE to construct the Project and to ensure that vehicular, pedestrian and bicycle mobility is maintained throughout the construction period, a MOT plan was prepared, and described in Section 3.5.4. It took into consideration the construction phasing of the Build Alternatives, as described in Section 3.5.2, and the schedules of other construction activities located in the general vicinity of the LOD that may overlap with construction of the Project. These other projects include:

- 11th Street Bridges Project;
- DC Water's Clean Rivers Project;

- Park Chelsea (DC Square 737); and
- National Community Church/Square 906.

The MOT plan also includes accommodations to maintain vehicular access (including emergency response vehicles) to all properties with current driveways on Virginia Avenue SE between 2nd and 9th Streets SE. These properties are identified in Section 3.5.4.

The MOT plan effects on traffic in the general vicinity of the LOD are discussed in Section 5.15.3.

5.15.2.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to the roadway network are anticipated to occur as a result of Alternative 1 (No Build).

Regardless of the Build Alternative, the Project will restore Virginia Avenue SE with the following changes as described in Section 3.6 (Post-Construction Virginia Avenue SE):

- Improved access to Garfield Park for wheelchair dependent individuals;
- Continuous bike path, using porous pavement, between 2nd and 9th Streets SE, which will connect Garfield Park and Virginia Avenue Park;
- Straightened alignment between 4th and 5th/6th Streets SE to be more consistent with the L'Enfant Plan;
- Reduction in the number of lanes from four to three between 5th and 7th Streets SE, which may help in traffic calming;
- Additional landscaping because the overall amount of hardscaped areas will be reduced;
- Wider use of permeable pavers for pedestrian ways or sidewalks; and
- Improved street lighting, traffic signals and crosswalks.

The Project essentially provides the opportunity to make physical changes to Virginia Avenue SE as desired by DDOT in consultation with the community. The specifics of the physical changes described in Section 3.6 will be determined during final design or during construction of the new tunnel, and will involve public outreach led or organized by DDOT. Principles such as context sensitive design will be considered. For purposes of this EIS, however, predicted long-term traffic conditions along Virginia Avenue SE as provided in Section 5.15.3 assumed certain conditions, in particular the reduction of lanes from four to three between 5th and 7th Streets SE.

As described in Section 3.4 (Project Description), the Build Alternatives were designed to avoid risking the structural integrity of I-695. In addition, existing and new columns associated with the rebuilt 11th Street Bridges, now under construction, were considered in the conceptual design of the Build Alternatives (see Section 3.4). Although the specifics of the tunnel alignment vary by Build Alternative, due to the coordination between this Project and the 11th Street Bridges project, the new tunnel within the 11th Street Bridge right-of-way will not

structurally or operationally affect I-695 when completed and in the foreseeable future. Alternative 1 (No Build) would not change the tunnel alignment.

5.15.2.3 Mitigation Measures

The effects of roadway closures needed to construct the Preferred Alternative or the other two Build Alternatives will be mitigated by implementing the MOT plan described in Section 3.5.4. The Project will coordinate with the 11th Street Bridges Project to complete the portion of this project where the reconstruction of the tunnel affects 11th Street SE.

5.15.3 Traffic Conditions

This section summarizes the results of traffic impact analyses conducted for the Project and documented in a reported provided in Appendix J. The traffic impact analysis cover both phases of the MOT plan as well as the post-construction period in a year 2040 time frame.

5.15.3.1 Construction–Period Impacts

To analyze the construction impacts of the Preferred Alternative and the other two Build Alternatives, the year 2015 was selected as analysis year based on the anticipated construction start by early 2014 (the estimated construction start date has since been revised to late 2014 or early 2015). Tables 5-25 and 5-26 provide the predicted peak morning (AM) and afternoon (PM) levels-of-service (LOS) at signalized and un-signalized intersections, respectively, in the general vicinity of the LOD. The traffic conditions under all of the Build Alternatives, and operating under the MOT plan described in Section 3.5.4, would be the same. Tables 5-25 and 5-26 also show predicted intersection conditions for Alternative 1 (No Build), which would not involve any construction in the short term. This scenario serves as the baseline condition to evaluate the traffic conditions under the Build Alternatives with the MOT plan in place. The traffic analysis considered new traffic generation caused by upcoming developments, such as the 200 I Street building.

The traffic analysis herein provided uses level-of-service (LOS) as a measure to describe the quality of the traffic conditions through a given roadway segment or an intersection. As described in Section 4.15.3, LOS is measured on a scale of A through F, with LOS A representing the best operating conditions with little or no delay and LOS F representing the worst with unacceptable delays. Table 5-27 contains the LOS definitions. The locations of the analyzed intersections are provided on Figure 5-9.

Table 5-25 shows predicted traffic conditions under Alternative 1 (No Build). Because these traffic conditions are just two or three years in the future from existing traffic conditions, as provided in Table 4-16, the level-of-service values shown in Table 5-27 for Alternative 1 (No Build) are very similar to existing conditions.

Table 5-25
Construction-Period Predicted Peak Hour Level-of-Service (and Overall Delay) at Selected Signalized Intersections in the General Vicinity of the Project

Loc*	Intersection	Alternative 1		Build Alternatives					
				Phase 1A		Phase 1B		Phase 2	
		AM	PM	AM	PM	AM	PM	AM	PM
1	South Capitol St and I St SE (Left)	B (11.7)	B (15.8)	B (11.7)	B (15.8)	B (11.7)	B (15.8)	B (11.7)	B (15.8)
2	South Capitol St and I St SE (Right)	C (20.4)	C (23.8)	C (20.4)	C (23.8)	C (20.4)	C (23.8)	C (20.4)	C (23.8)
3	Ramps from freeway at South Capitol St SB	F (155.4)	D (48)	F (155.4)	D (48)	F (155.4)	D (48)	F (155.4)	D (48)
4	South Capitol St at M St SE – Southbound Intersection	F (520.5)	E (61.8)	F (520.5)	E (61.8)	F (520.5)	E (61.8)	F (520.5)	E (61.8)
5	South Capitol St at M St SE – Northbound Intersection	F (88)	F (146.5)	F (88)	F (146.5)	F (88)	F (146.5)	F (88)	F (146.5)
6	M St SE at 1st St SE	E (57.8)	F (83.6)	E (57.8)	F (83.6)	E (57.8)	F (83.6)	E (57.8)	F (83.6)
7	M St SE at New Jersey Ave SE	B (16.4)	B (15.2)	B (16.4)	B (15.2)	B (16.4)	B (15.2)	B (16.4)	B (15.2)
8	M St SE at 3rd St SE	A (8.2)	B (14.6)	A (8.2)	B (14.6)	A (8.2)	B (14.6)	A (8.2)	B (14.6)
9	M St SE at 4th St SE	C (20.2)	B (16.2)	C (20.2)	B (16.2)	C (20.2)	B (16.2)	C (20.2)	B (16.2)
10	M St SE at 8th St SE	B (18.6)	F (136.9)	D (49.7)	F (151.9)	C (23.3)	F (135)	C (23.9)	C (20.1)
11	M St SE at 9th St SE	B (13.3)	B (15)	B (16.3)	C (27.3)	B (13.5)	B (14.7)	B (11.4)	B (17.8)
12	M St SE at 11th St SE	C (23.9)	F (139.1)	C (24.1)	F (234.4)	C (24.1)	F (238.8)	C (24.4)	F (163.1)
13	Virginia Ave SE EB at 5th St SE	D (35.1)	D (47)	N/A	N/A	N/A	N/A	N/A	N/A
14	I-695 off-ramp at 6th St SE/Virginia Ave SE (south of I-695)	B (17.6)	B (11.5)	C (31.7)	C (21.8)	C (31.7)	C (21.8)	B (12.9)	B (12.8)
15	Virginia Ave SE at 7th St SE (south of I-695)	A (6.2)	B (17.7)	C (20.3)	D (35.3)	C (20.3)	D (35.3)	N/A	N/A

Table 5-25 (continued)
Construction-Period Predicted Peak Hour Level-of-Service (and Overall Delay) at Selected Signalized Intersections in the General Vicinity of the Project

Loc*	Intersection	Alternative 1		Build Alternatives					
				Phase 1A		Phase 1B		Phase 2	
		AM	PM	AM	PM	AM	PM	AM	PM
16	Virginia Ave SE at 8th St SE (south of I-695)	C (32.1)	D (47.3)	N/A	N/A	N/A	N/A	N/A	N/A
17	Virginia Ave SE ramp at 8th St SE (south of I-695)	B (12)	B (15.4)	B (17.6)	D (40.5)	C (22.4)	D (51.1)	A (1.8)	A (3.1)
18	I St SE at 8th St SE	B (19.1)	C (20.1)	B (19.1)	C (20.1)	B (19.1)	C (20.1)	D (35.7)	C (23.8)
19	I St SE at Virginia Ave SE/7th St SE (north of I-695)	A (8.4)	B (12)	A (8.4)	B (12)	A (8.4)	B (12)	E (55.3)	C (23.3)
20	I St SE and Virginia Ave SE at 6th St SE (north of I-695)	A (7.2)	C (28.3)	A (7.2)	C (28.3)	A (7.2)	C (28.3)	D (41.1)	C (25.1)
21	Virginia Ave SE at 4th St SE (north of I-695)	C (30.3)	C (22.6)	C (30.3)	C (22.6)	C (30.3)	C (22.6)	C (30.3)	C (22.6)
22	Virginia Ave SE at 3rd St SE (north of I-695)	D (46.2)	F (125.4)	D (46.2)	F (125.4)	D (46.2)	F (125.4)	D (46.2)	F (125.4)
23	G St SE at 8th St SE	A (9.1)	B (10.9)	A (9.1)	B (10.9)	A (9.1)	B (10.9)	B (12.7)	B (16.5)
24	M St SE at Isaac Hall Ave SE	A (5.3)	B (17.5)	A (5.3)	B (17.5)	A (5.3)	B (17.5)	A (5.3)	B (17.5)

Notes: * See Figure 5-9 for location of intersection
Numbers in parentheses represent overall intersection delay in seconds
N/A: Full intersection not available due to the MOT or the 11th Street Bridges project
Yellow cell indicates change from Alternative 1 (No Build) or change from previous MOT phase
Blue cell indicates no change from previous MOT phase
Uncolored cell means that traffic conditions will be exactly the same as under Alternative 1 (No Build)

Table 5-26
Construction-Period Predicted Peak Hour Level-of-Service (and Overall Delay) at Selected Un-Signalized Intersections in the General Vicinity of the Project

Loc*	Intersection	Alternative 1		Build Alternatives					
				Phase 1A		Phase 1B		Phase 2	
		AM	PM	AM	PM	AM	PM	AM	PM
A	M St SE at 7th St SE*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
B	Virginia Avenue SE at 2nd St SE	A (7.1)	A (6.9)	DNE	DNE	DNE	DNE	DNE	DNE
C	Virginia Ave SE at 3rd St SE, South of I-695*	N/A	N/A	DNE	DNE	DNE	DNE	DNE	DNE
D	Virginia Ave SE at 4th St SE, South of I-695*	N/A	N/A	DNE	DNE	DNE	DNE	DNE	DNE
E	Virginia Ave SE at 9th St SE	A (7.2)	A (7.2)	DNE	DNE	DNE	DNE	DNE	DNE
F	G St SE at 4th St SE	B (10)	A (9.8)	B (10)	A (9.8)	B (10)	A (9.8)	B (10)	A (9.8)
G	G St SE at 6th St SE	B (12.6)	B (10.9)	B (12.6)	B (10.9)	B (12.6)	B (10.9)	C (21.2)	D (26.4)
H	G St SE at 7th St SE	A (8.1)	A (9.5)	A (8.1)	A (9.5)	A (8.1)	A (9.5)	A (8.1)	A (9.9)
I	E St SE at 6th St SE	B (11.7)	B (10.4)	B (11.7)	B (10.4)	B (11.7)	B (10.4)	C (15.8)	C (18.4)
J	D St SE at 6th St SE	B (11.4)	B (10.8)	B (11.4)	B (10.8)	B (11.4)	B (10.8)	C (15.1)	C (20)

Notes: * See Figure 5-9 for location of intersection
Numbers in parentheses represent overall intersection delay in seconds
N/A: The HCM procedures do not calculate an overall LOS for two-way stop controlled intersections
DNE: Does Not Exist; intersection does not exist during the MOT phase (crossings are provided)
Yellow cell indicates change from Alternative 1 (No Build) or change from previous MOT phase
Blue cell indicates no change from previous MOT phase
Uncolored cell means that traffic conditions will be exactly the same as under Alternative 1 (No Build)

Figure 5-9
Analyzed Intersections

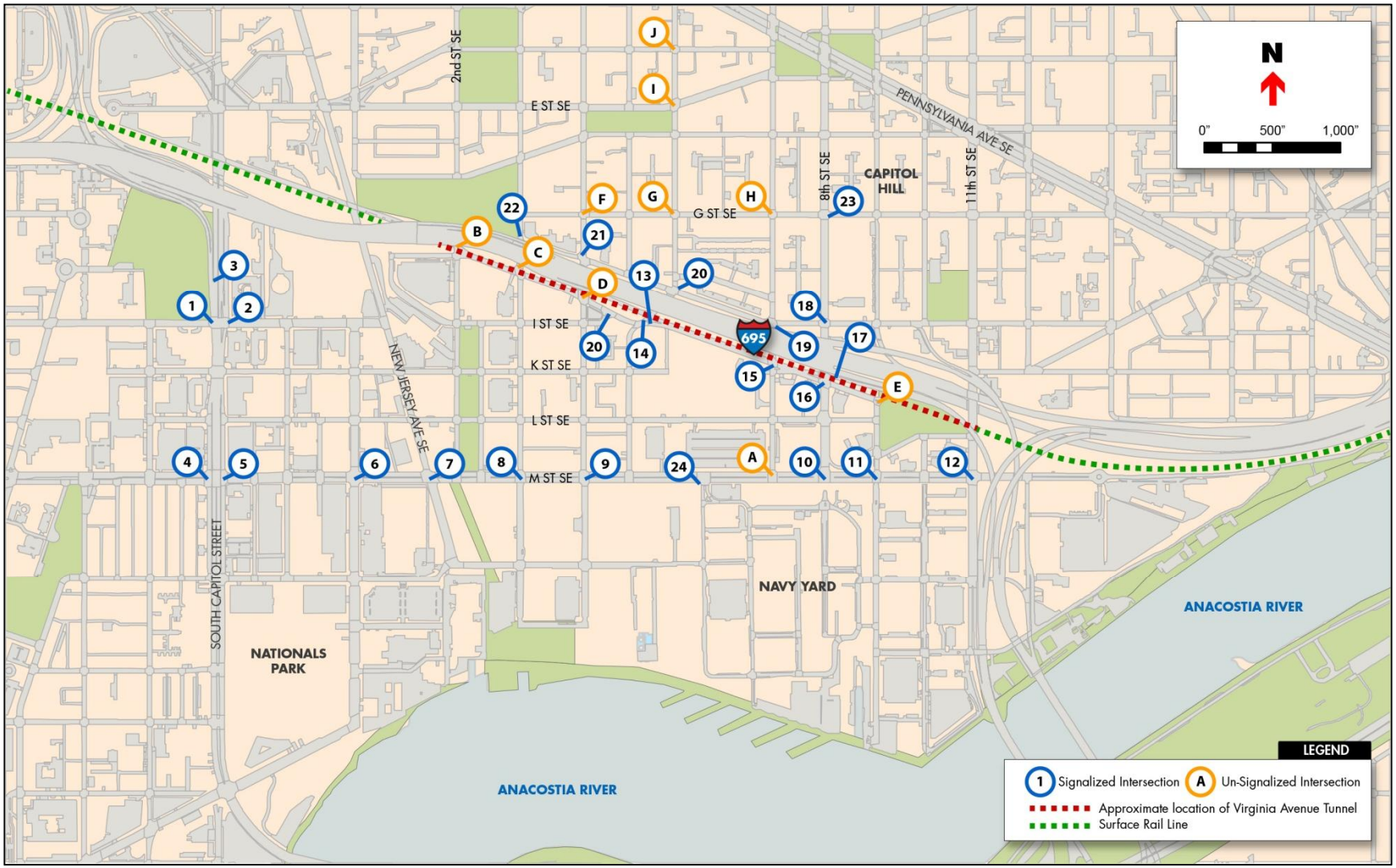


Table 5-27
Level-of-Service Definitions

LOS Level	Definition
A	Free flow conditions
B	Reasonably free flow conditions
C	Stable flow conditions
D	Approaching unstable flow conditions
E	Unstable flow conditions
F	Forced or breakdown flow conditions

Source: Highway Capacity Manual

As shown on Table 5-25, the following intersections and peak hours are predicted to operate at LOS F under Alternative 1 (No Build):

- Ramps from I-695 at southbound South Capitol Street (AM);
- South Capitol Street at M Street SW - Southbound Intersection (AM);
- South Capitol Street at M Street SE - Northbound Intersection (AM and PM);
- M Street SE at 1st Street SE (PM);
- M Street SE at 8th Street SE (PM) (Ordinarily, this intersection would operate at LOS B and C during the AM and PM peak hours, respectively. During the time frame analyzed,
- the Clean Rivers Project on M Street SE would reduce the number of lanes to one in each direction due to construction.);
- M Street SE at 11th Street SE (PM) (this intersection would be modified by the 11th Street Bridges project); and
- Virginia Avenue SE at 3rd Street SE north of I-695 (PM).

Table 5-26 shows that the un-signalized intersections in the general vicinity of the LOD would operate very well under Alternative 1 (No Build) (LOS A or B). Among the N/A intersections (full LOS cannot be calculated), all approaches would have acceptable LOS values except the southbound approach of 7th Street SE to M Street SE. This movement would operate at LOS F in both AM and PM peak hours.

Phase 1 of the MOT is divided into sub-phases A and B. As described in Section 4.15.2, the 11th Street Bridges project temporarily closed the I-695 on-ramp at 8th Street SE and the Southwest/Southeast Freeway ramp at 9th Street SE (the 8th Street SE ramp has since been re-opened). When construction of the Project begins under a Phase 1A MOT condition, the analysis assumed that these ramps would still be closed. Phase 1B will begin when the 8th Street ramp is re-opened, although it will be aligned slightly differently on 8th Street SE. The traffic impact analyses, summarized in Table 5-25, included separate evaluations for each of these sub-phases.

As indicated on Table 5-25, the following signalized intersections are predicted to experience a change in conditions during the Phase 1A in comparison to Alternative 1 (No Build) condition:

- M Street SE at 8th, 9th and 11th Streets SE;
- I-695 off-ramp at Virginia Avenue / 6th St SE;
- Virginia Avenue SE at 7th Street SE (south of I-695); and
- Virginia Avenue SE ramp at 8th Street SE (south of I-695).

All but two of these intersections (M Street SE/9th Street SE and I-695 off-ramp at 6th Street SE) are predicted to experience at least an LOS D (approaching unstable flow) during the peak hours. M Street SE at 8th Street SE and at 11th Street SE is predicted to have poor levels of service during at least one of the peak hour times. It should be noted that these delays would be caused by the Clean Rivers project, which as noted above would maintain only one lane in each direction on M Street SE during construction.

Although traffic conditions at the 6th Street off-ramp / Virginia Avenue SE intersection is predicted to worsen from LOS B to LOS C during both peak hours, this will not cause any queuing to extend onto the freeway due to the length of the ramp. This is predicted to remain unchanged as the MOT switches to a Phase 1B condition.

Traffic conditions at un-signalized intersections during Phase 1A are predicted to operate at acceptable levels-of-service. However, the southbound approach to the M Street SE / 7th Street SE intersection is still predicted to operate at LOS F in both AM and PM peak hours.

During Phase 1B, the following signalized intersections are predicted to experience a change in conditions from Alternative 1 (No Build) or Phase 1A:

- M Street SE at 8th and 9th Streets SE; and
- Virginia Avenue SE ramp at 8th Street SE.

The re-opening of the 8th Street ramp is predicted to change driver behavior by reducing volumes on M Street and increasing volumes at the Virginia Avenue SE ramp at 8th Street. The level-of-service is predicted to slightly improve at the M Street SE intersections with 8th and 9th Streets in comparison to the Phase 1A conditions, but would slightly worsen at the Virginia Avenue SE ramp at 8th Street.

The levels-of-service of the un-signalized intersections are predicted to be the same as those presented under Phase 1A because volumes at these intersections will not be affected by the re-opening of the 8th SE ramp.

During Phase 2, the following signalized intersections are predicted to experience a change in conditions from Phase 1B:

- M Street at 8th and 9th Streets SE (improved from Phase 1B conditions);
- I-695 off-ramp at Virginia Avenue / 6th St SE (improved from Phase 1B conditions);
- I-695 on-ramp at 8th Street SE (improved from Phase 1B conditions);
- I Street SE at 8th Street SE;
- I Street SE at Virginia Avenue SE WB/7th Street SE;

- I Street SE and Virginia Avenue SE WB at 6th Street SE; and
- G Street SE at 8th Street SE.

In MOT Phase 2, the remaining sections on Virginia Avenue SE between 5th and 8th Streets SE, on the south side of I-695, will be closed. All traffic from the 6th Street off-ramp will be diverted to the intersection of Virginia Avenue SE and 6th Street SE on north side of I-695, and Virginia Avenue SE on the north side of I-695 will be converted to two-way operation between 6th and 8th Streets SE. Before Phase 2 starts, it is assumed that the Clean Rivers project on M Street SE would be completed, and therefore, better traffic conditions are predicted along M Street SE than under Phase 1.

Of the seven intersections predicted to have different traffic conditions in Phase 2 in comparison to Phase 1B or Alternative 1 (No Build), the intersections on I Street SE at 6th, 7th and 8th Streets SE are predicted to operate at up to LOS E traffic conditions during the peak hours. These predicted traffic conditions are due to the diversion of freeway traffic and the conversion of this street to two-way operations during the Phase 2 MOT. The diversion would affect the G Street SE and 8th Street SE intersection, but the operation of this intersection is still predicted to operate fairly well (LOS B during both AM and PM peak hours).

The affected I Street SE intersections predicted to operate poorly were further analyzed to determine if signal optimization could improve their conditions. As a result, it appears that implementation of signal optimization along the three I Street SE intersections predicted to operate poorly could decrease wait time and improve level-of-service. For example, at the intersection of I Street SE and 8th Street SE, the AM peak hour delay could be reduced by approximately 20 seconds, leading an improvement from LOS D to a LOS B. At the intersection of I Street SE/Virginia Avenue SE and 7th Street SE, AM peak hour delay could be reduced by approximately 45 seconds, leading to change of LOS E to LOS A. The optimization potential of the I Street SE/Virginia Avenue SE and 6th Street SE intersection would not be as great as the other two. Overall delay could be reduced by a few seconds, but the overall level of service would not change.

5.15.3.2 Post Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in disruptions to traffic as parts of roadways over the affected tunnel are closed to allow the repairs. Emergency MOT plans would be implemented to maintain mobility in the community. Nevertheless, the operation of Virginia Avenue Tunnel would not affect traffic conditions in the general vicinity of the rebuilt tunnel.

As described in Section 3.6 (Post-Construction Virginia Avenue SE), Virginia Avenue SE will be restored to at least its pre-construction condition. Therefore, similar to Alternative 1 (No Build), no long term effects to traffic conditions in the general vicinity of the rebuilt tunnel will occur.

If desired by stakeholders, this Project could include changes to post-construction Virginia Avenue SE. Through coordination with DDOT and for the purposes of analyzing post-construction impacts of these changes, it is assumed that the number of lanes on Virginia Avenue SE between 6th and 8th Streets would be reduced from four to three and that two-way traffic would be provided between 8th and 9th Streets SE. The effect of these changes on Virginia Avenue SE to traffic conditions immediately after construction (2016) and in the year 2040 (roughly 25 years after Project completion) is shown on Table 5-28.

Regardless of the configuration on Virginia Avenue (Alternative 1 (No Build), the Preferred Alternative, or the other two Build Alternatives with the restored streetscape), traffic flow is predicted to be acceptable in the years immediately following construction. Traffic should return to previous levels or better after the completion of the Project. However, by 2040, projected traffic volumes are predicted to increase substantially due to projected and planned development in the region. As a consequence, traffic conditions along these intersections are predicted to degrade regardless of which Alternative is ultimately adopted.

5.15.3.3 Mitigation Measures

During final design, the results of further signal optimization analysis will be employed to study improved intersection conditions as an element of implementation of the MOT. Also during final design, the MOT plan will be subject to value engineering and additional coordination with DDOT to determine if traffic impacts could be improved than what is herein predicted.

Based on additional studies and working closely with DDOT, temporary traffic signal timing schemes will be employed along the westbound Virginia Avenue SE / I Street SE during the Phase 2 MOT, which will be affected by converting this street between 6th and 8th Streets into two-way operations. Temporary traffic signals will be installed for eastbound traffic. The optimization analysis indicates some improvements in traffic conditions at the three affected intersections. These intersections will be monitored at the beginning of the Phase 2 MOT to determine the effectiveness of the optimization schemes.

Other measures that may mitigate some of the traffic impacts include:

- Incentivizing the use of public transportation for construction workers;
- Although off-street parking will be provided for construction workers at the west staging area (New Jersey Yard), parking preferences will be provided for those construction workers who carpool;
- Minimizing the use of haul routes and traffic detours going through residential neighborhoods;
- Not allowing work activities within the construction work zone without first setting up approved traffic control measures in accordance with the approved MOT plan;
- In situations where traffic must be maintained through part of a construction work zone, assigning an inspector trained in traffic control to monitor the traffic and be allowed to recommend changes to the MOT plan;

Table 5-28
Post-Construction Predicted Peak Hour Level-of-Service (and Overall Delay) at
Signalized Intersections along Virginia Avenue SE

Loc*	Intersection	Alternative 1 (2016)		Build Alternative (2016)		Alternative 1 (2040)		Build Alternative (2040)	
		AM	PM	AM	PM	AM	PM	AM	PM
14	I-695 off-ramp at 6th St SE/Virginia Ave SE (south of I-695)	B (17.6)	B (11.5)	B (19.4)	B (18.3)	F (132.4)	D (47.4)	F (137.3)	E (55)
15	Virginia Ave SE at 7th St SE (south of I-695)	A (6.2)	B (17.7)	A (6.3)	B (19.6)	A (6)	C (34.3)	B (19.4)	E (60.2)
16	Virginia Ave SE at 8th St SE (south of I-695)	C (32.1)	D (47.3)	C (31.7)	C (31.5)	C (23.2)	E (70.7)	B (17.4)	D (41.9)
17	Virginia Ave SE ramp at 8th St SE (south of I-695)	B (12)	B (15.4)	A (7.9)	A (6.3)	B (12.6)	D (44.8)	B (18.1)	D (37)

Notes: * See Figure 5-9 for location of intersection
Numbers in parentheses represent overall intersection delay in seconds

- Maintaining records of the MOT management that will include when specific traffic control devices are placed and removed, inspection reports, and traffic crashes and injuries where traffic control devices are in place; and
- Monitoring traffic conditions throughout construction, and if necessary, make the adjustments to the MOT (e.g., signal timing) in coordination with DDOT.

5.15.4 Parking

5.15.4.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in parking impacts. The discussion provided in the Construction Impact section for Parking focuses exclusively on the Preferred Alternative and the other two Build Alternatives, all of which would have the same impacts to parking.

The closure of Virginia Avenue SE for construction of the Project and the MOT will require the temporary displacement of on-street parking. A breakdown and the locations of the displaced parking are provided in Table 5-29. During Phase 1 of the MOT, 63 on-street parking spaces on Virginia Avenue SE will be displaced for the duration of construction because of the closure of the street. The majority of these are two-hour spaces fronting the new District government offices at 200 I Street SE and Capitol Quarters between 3rd and 5th Streets SE. Capitol Quarter provides off-street parking for most its residents, but it is conceivable that some residents may use the two-hour residential parking on Virginia Avenue SE. In addition, this parking could be used by repair and tradesmen providing services to nearby residences. Residents and service providers could park along the north-south cross streets or the parallel streets to Virginia Avenue SE, which will be unaffected by the LOD. However, this will result in higher demand for the remaining on-street parking.

In Phase 2, 48 additional parking spaces will be displaced for the remaining duration of construction. These 48 spaces are located on the westbound I Street SE / Virginia Avenue SE between 6th and 8th Streets SE, and will be displaced because of the Phase 2 MOT's conversion of this street to two-way operations. These spaces are two-hour metered parking. The south side parking within the 700 block is not allowed during peak periods. Many of these spaces, especially those near 8th Street SE, appear to be used by patrons to Barracks Row. The potential impacts of these parking displacements are included in Section 5.4.1

The Project sponsor will compensate the District for losses of parking revenue during construction.

Construction workers will not be allowed to park in areas covered by the DDOT public space permit, nor will they be allowed to park on public streets (the streets surrounding the LOD are either metered or are two-hour residential spaces). Based on a preliminary site utilization plan for the west staging area (New Jersey Yard), a minimum of 90 parking spaces will be available for construction personnel. Although the total number of construction personnel on any given day will exceed this number, construction staff will be incentivized to car pool. In addition, the

LOD is well served by public transportation, which includes two nearby Metrorail stations (Eastern Market and Navy Yard) and a number of Metrobus and DC Circulator routes (see Section 4.15.6). It is expected that many construction personnel will use public transit to travel to and from work.

Table 5-29
Parking Displacements by Location and MOT Phase

Location	MOT Phase 1	MOT Phase 2
Eastbound Virginia Avenue SE (south of I-695)		
200 Block (north side)	13	13
300 Block (south side)	6	6
300 Block (north side)	14	14
400 Block (south side)*	9	9
400 Block (north side)	11	11
800 Block (north side)	10	10
Westbound I St SE / Virginia Ave SE (north of I-695)		
500 Block (north side)		10
600 Block (north side)		20
700 Block (south side)		10
700 Block (north side)		8
Total	63	111

Note: * Includes 6 parking space located on the 400 block of I Street SE, which intersects with Virginia Avenue SE mid-block.

5.15.4.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to parking are anticipated to occur as a result of Alternative 1 (No Build).

Under the Preferred Alternative or any of the other two Build Alternatives, the proposed post-construction street reconfiguration described in Section 3.6 will result in a net loss of 19 on-street parking spaces primarily because of the provision of a continuous bike path between 2nd and 9th Streets. Within the 400 block of Virginia Avenue, on-street space for approximately 11 vehicles will be eliminated from the north side of the street. In addition, on-street space for two vehicles within the 400 block of I Street SE, which intersects with Virginia Avenue SE at mid-block, will be eliminated because of the additional landscaping at this location as noted in Section 3.6. Within the 800 block of Virginia Avenue, on-street space for approximately six vehicles will be eliminated from the south side of the street.

5.15.4.3 Mitigation Measures

During construction of the Preferred Alternative or any of the Build Alternatives, temporary wayfinding signs will be provided as part of the MOT to direct motorists to available off-street parking, which include the parking lot underneath I-695 on 8th Street SE. This particular parking lot is near Barracks Row. Other nearby off-street parking lots are located on L Street SE and 3rd Street SE. These lots are two to three blocks south of Virginia Avenue SE.

As described above, a minimum of 90 parking spaces will be provided within the west staging area (New Jersey Yard) for construction workers. Parking preferences will be given to those construction personnel who carpool. Construction workers, including sub-contractors, will be prohibited from parking at metered or two-hour residential spaces. Construction workers not provided with parking within the west staging area may park in off-street parking lots.

The permanent net loss of approximately 19 on-street parking spaces will not be replaced because a shared-use bike path will be provided at the affected locations, and additional landscaping will be provided within the 400 block of Virginia Avenue. Adjacent and parallel streets already provide on-street parking.

5.15.5 Pedestrian and Bicycle Facilities

5.15.5.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in impacts to pedestrian and bicycling facilities. The discussion provided in the Construction Impact section for Pedestrian and Bicycling Facilities focuses exclusively on the three Build Alternatives, which would have the same impacts.

During construction, pedestrians and cyclists will not be allowed to travel along Virginia Avenue SE under the Preferred Alternative or any of the other two Build Alternatives. The MOT plan includes provisions for pedestrian and cyclists. The temporary decking structures crossing Virginia Avenue SE will accommodate north-south pedestrian and cyclist movements. These crossings over the temporary bridges will meet appropriate engineering and Americans with Disabilities Act (ADA) standards for the safe passage of cyclists and pedestrians, including those who are wheelchair dependent, and designed in accordance with the Highway Capacity Manual. Pedestrians and cyclists wishing to travel east-west will be directed to alternative parallel streets on I, K, and L Streets SE. Safe, accessible, and convenient alternative access routes will be maintained to allow pedestrians to reach bus stops, crosswalks, sidewalks, and other origins and destinations surrounding the LOD. As noted in Section 5.12.1, those wishing to access Garfield Park from 2nd Street SE, beneath I-695, will be directed to either New Jersey Avenue SE or 3rd Street SE.

Physical separation structures, such as concrete barriers and fencing, will be provided between construction zones and sidewalks to provide a safe environment for pedestrians and cyclists. Adequate temporary signage and markings will be in place to control safe movement around

construction vehicle access points. Flaggers, temporary traffic signals or other appropriate traffic control measures will be in place to control the safe operation of construction vehicles as they are leaving and entering construction zones.

During Phase 1 of the MOT when a single-lane will be provided along Virginia Avenue SE between I-695 off-ramp and 8th Street SE, traffic signal timing will be maintained to allow pedestrians to cross Virginia Avenue SE as they do under existing conditions.

5.15.5.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could result in potentially similar impacts described under the Construction Impacts for the Build Alternatives. Nevertheless, no long-term impacts to parking are anticipated to occur as a result of Alternative 1 (No Build).

At the conclusion of construction of the Project, pedestrian and cycling facilities movements will be improved due to the proposed streetscape of Virginia Avenue SE described in Section 3.6. The Preferred Alternative or the other two Build Alternatives will provide a continuous bike lane from 2nd to 9th Streets, which will connect Garfield Park and Virginia Avenue Park. Sidewalks will be fully restored to pre-construction conditions. Additional pedestrian facilities, usable by those who are wheel-chair dependent, will be provided along certain sections of roadways that currently lack pedestrian facilities and need them, such as along of the 700 block of Virginia Avenue SE on the north side of the street. Many pedestrians, especially Marines, use the grassy strip on the north side of Virginia Avenue SE. The heavy use is evident by the bare soil showing the de facto path way.

5.15.5.3 Mitigation Measures

In addition to addressing the impacts to vehicular traffic, the MOT plan was also developed to ensure the safe and convenient passage of pedestrians and cyclists through the LOD during construction. During construction, provisions will be made so that pedestrians and cyclists will be able to cross the construction area on Virginia Avenue SE at each cross street between 3rd and 8th Streets SE. Temporary wayfinding signs for certain facilities will be provided if necessary (e.g., alternatives for accessing Garfield Park from 2nd Street SE). Although east-west movements will be limited on Virginia Avenue SE, parallel detours will be established, including temporary wayfinding signs.

5.15.6 Transit Facilities and Services

5.15.6.1 Construction Impacts

Other than impacts from unplanned or emergency repairs, Alternative 1 (No Build) would not result in impacts to transit facilities and services. The discussion provided in the Construction Impact section for Transit Facilities and Services focuses exclusively on the three Build Alternatives, which would have the same impacts.

Several Metrobus and two DC Circulator routes cross Virginia Avenue SE along 8th Street SE. Three additional Metrobus routes use 11th Street SE when crossing the LOD. As discussed previously, the north-south roads will remain open during construction, including 8th and 11th Streets SE. Therefore no bus route will be subject to rerouting due to the Project.

5.15.6.2 Post-Construction Impacts

An emergency or unplanned major repair or rehabilitation under an Alternative 1 (No Build) scenario could potentially affect transit movements. But, if necessary, provisions could be made to maintain service similar to how the Build Alternatives would maintain service during construction.

At the conclusion of construction of the Project, Metrobus and DC Circulator movements will return to pre-existing conditions—the temporary need to cross Virginia Avenue SE over temporary bridge decking will no longer exist.

5.15.6.3 Mitigation Measures

No mitigation measures are required.

5.16 Energy

Section 5.21 discloses the irreversible and irretrievable commitment of energy resources in the construction of the Project. Given the size and scale of the Project, the amount expected energy use during construction would not be considered excessive or unusual.

As noted in Section 5.15.1, total U. S. freight shipments are expected to grow substantially over the next decades in part due to the opening of expanded Panama Canal in 2015. It is therefore expected that freight traffic along the east coast of the U.S. is due for substantial growth as well. The ability to accommodate growth in freight transportation by rail as opposed to other modes, in particular trucking, would have long term energy implications as freight rail transportation is about three times more fuel efficient than freight trucking transportation according to the Texas Transportation Institute. In comparison to Alternative 1 (No Build), the Preferred Alternative or any of the other Build Alternatives will allow CSX the ability to operate double-stack intermodal container trains throughout substantial portions of its eastern seaboard freight rail network. In addition to increasing the capacity for this particular freight transportation market, the ability to double-stack intermodal containers provides energy benefits through even greater fuel efficiencies above what freight rail transportation already provides in comparison to trucking. Although less substantial, providing two railroad tracks within Virginia Avenue Tunnel also provides energy saving benefits from reducing the overall time trains spend idling while waiting for an opposite moving train to clear the tunnel.

5.17 Indirect Effects

According to 40 CFR 1508.8, indirect effects are impacts that have the potential to occur "later in time or farther removed in distance, but are still reasonably foreseeable [and] may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems."

As noted in Section 5.1, the rebuilt Virginia Avenue Tunnel under the Preferred Alternative or the other two Build Alternatives will become as inconspicuous as it is today from the larger community. The Build Alternatives are not expected to have any indirect effects to the surrounding community primarily because the Project is essentially rebuilding existing infrastructure. The effects of Virginia Avenue Tunnel have already occurred, and are reflected in the existing environmental conditions described throughout Chapter 4. Upon completion of the Project, Virginia Avenue SE and surrounding areas will revert back to these environmental conditions. As noted in Section 5.15.1, the new tunnel will allow CSX to operate more efficiently in comparison to Alternative 1 (No Build), including doubling the capacity of intermodal container trains and eliminating the system bottleneck that is in close proximity to part of the network shared with passenger rail.

Alternative 1 (No Build) is also not expected to have any indirect effects to the surrounding community in the near future. However, doing nothing today carries risks into the future that at some point a section of tunnel would fail and would require emergency repairs. When such an event happens, the indirect effects could include disruption to the larger community. Associated construction impacts would also occur, but such effects would happen in an unplanned or emergency fashion. Because it cannot be reliably predicted when a major repair would be needed, the timing and nature of these effects also cannot be reliably predicted.

5.18 Cumulative Impacts

A cumulative impact, according to 40 CFR 1580.7, is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such other actions." According to FHWA, a cumulative impact includes the total effect on a natural resource, ecosystem, or human community, and the total of all impacts to a particular resource that have occurred, are occurring, and would likely occur as a result of past, present, and future activities or actions of federal, non-federal, public and private entities.

The vast majority of impacts of the Preferred Alternative or the other two Build Alternatives will occur during construction. Therefore, the cumulative impacts herein provided focused primarily on the construction period of the Project, and how it and other construction projects in the vicinity of the LOD could cumulatively affect the surrounding community.

Other than the proposed Project, the study area to evaluate the cumulative impacts of the Project encompasses the following activities, which are currently taking place or would be conducted in the near future in the general vicinity of the LOD:

- 11th Street Bridges project (currently under construction);
- South Capitol Street Corridor Project, including a new Frederick Douglass Memorial Bridge;
- Clean Rivers Project, a multi-billion dollar effort by DC Water, which would include a combined sewer overflow (CSO) tunnel under the Anacostia River, but also includes diversion tunnel beneath M Street SE (currently under construction);
- Garfield-Canal Park Connector, which would establish a pedestrian and bicycle connection linking Garfield Park and Canal Park;
- Southeast Boulevard, which would convert the segment of the Southeast Freeway from 11th Street Bridge to Barney Circle to an urban boulevard;
- Relocation of Marine Corps Enlisted Bachelors Quarters (Building 20); and
- Anacostia Waterfront Initiatives, such as the Southeast Federal Center.

Discussion of the expected cumulative impacts as they relate to pertinent environmental issues is provided below.

Transportation

The Project is located in proximity to a number of construction projects, notably two very important infrastructure projects--11th Street Bridges project and the Clean Rivers Project, which includes construction of a diversion sewer tunnel beneath M Street SE. Other projects relate to land use development, such as the 200 I Street office building. The land use developments would eventually affect traffic generation in the general vicinity of the Project. The infrastructure projects affect traffic patterns, such as what the 11th Street Bridges project has done (e.g., close the ramp to Martin Luther King Avenue SE) and would continue to do so as construction of this project progresses. The Project's MOT plan and traffic impact analysis conducted for the Project and presented in Section 5.15.3 have taken into account these other projects. For example, existing traffic generation zones in the general vicinity of the project were modified to include completion of developments. In addition, the Project's MOT plan has incorporated the 11th Street Bridges project's ramp closures at 8th and 9th Streets SE. In summary, the traffic impact analysis presented in Section 5.15.3 has already taken a cumulative perspective to predict traffic conditions during the construction of the Project.

From a rail operation perspective, the Preferred Alternative or the other Build Alternatives will provide a single rail line through the Virginia Avenue Tunnel corridor during construction. Therefore, the level of freight rail capacity and service will remain at least the same as current conditions (see Section 5.15.1). This also means that the current level of passenger service operated by AMTRAK and VRE will be unaffected during construction. Upon completion of the new tunnel, freight rail transportation in and around the District will operate more efficiently, meaning no bottleneck and the flexibility to carry the same amount of freight in fewer trains.

Passenger train service using CSX rail lines in Virginia and District will benefit because of the increased network capacity.

Land Use

Various plans for Capitol Hill and the Barracks Row/ Eight Street Corridor intend to keep these areas vibrant without any notable changes in development. However, the Capitol Riverfront is developing into a vibrant mixed-use higher-density district. These land use plans are expected to continue regardless of whether the Project proceeds or not.

Socio-Economic Conditions

There is no evidence that construction of the 11th Street Bridges project and other construction projects in the general vicinity of the LOD have adversely affected the socio-economic conditions of Capitol Hill or the Capitol Riverfront. This may be in part due to the 11th Street Bridges project's MOT plan to maintain mobility throughout the community during construction of this project. The Project also includes an MOT plan, in coordination with the 11th Street Bridges project, which will maintain mobility in the community. Notwithstanding some displacements of on-street parking near Barracks Row, the Project will not affect businesses or community services.

Air Quality

The Project along with 11th Street Bridges project and other transportation projects in the general vicinity of the Project, such as the South Capitol Street Corridor bridge reconstruction and the conversion of the Southeast Freeway into the boulevard, are identified in the CLRP or the TIP, which were approved by the TPB in July 2012. The air quality impacts of these projects are cumulatively accounted for in the approved SIP, which includes the Air Quality Conformity Report demonstrating that the mobile source emissions from the TIP projects adhere to all emissions ceilings of the EPA. As described in Section 5.5, the Project will not trigger the GC Rule's *de minimis* emission thresholds in either construction or post-construction conditions. The other projects in the general vicinity of the LOD will also not jeopardize the National Capital Interstate Air Quality Control Region's objectives in meeting the NAAQS.

Noise

As noted in Section 4.6, the ambient noise conditions at and near the LOD are mostly influenced by traffic noise coming from I-695. The noise conditions on the east end of the LOD did not appear to be influenced by construction from the 11th Street Bridges project. At the conclusion of the Project's construction, the ambient noise will return to pre-construction conditions.

Vibration

As noted in Section 4.7, the ambient ground vibration conditions at land uses located adjacent to Virginia Avenue SE are not affected by trains passing through the existing tunnel. Based on

vibration modeling, this is not going to change with the new rebuilt tunnel regardless of the Build Alternative (see Section 5.7). Certain construction activities of the Project are anticipated to cause localized vibration that may be of annoyance to those in residences or other land uses located directly adjacent to the LOD. Similarly, other construction projects would likely cause localized vibration impacts depending on their methods of construction.

Site Contamination

As noted in Section 4.8, concentrations of arsenic and chromium found in the soil beneath the LOD were recorded to be above EPA residential action levels. However, a statistical analysis of the data concluded that these concentrations are likely naturally-occurring, and therefore, areas surrounding the LOD probably contain similar concentrations. In addition, investigations for the Project uncovered evidence of some petroleum contamination, but not in great quantities. The Modified Phase 1 Environmental Site Assessment prepared for the Project identified dozens of existing and past land uses that could have caused soil and groundwater contamination in the LOD and areas beyond (e.g., those reported to have underground storage tanks, including those reported to have leaked). As noted in Section 5.8, the Project will take precautions to properly handle known and unknown contaminated soil and groundwater to protect workers and the public. In accordance with federal and District regulations, other construction projects are and will be required to do the same.

Water Resources

As described in Section 5.9, stormwater management measures are required during construction of the Project. This requirement also applies to other construction projects in the vicinity of the LOD. Therefore, adverse impacts to surface water resources from various construction projects occurring at the same time are not expected.

The DC Water's Clean Rivers Project seeks to improve the water quality of the Anacostia and Potomac Rivers. A substantial percentage of the District's stormwater system is combined with the sewer system. During heavy rain the combined sewer system could become overloaded and untreated sewage could be discharged into the Anacostia and Potomac Rivers. The purpose of the Clean Rivers Project is to construct CSO tunnels to capture this overflow, store it until after the storm event, and release the water gradually into the treatment system. Stormwater from the restored Virginia Avenue SE (after construction of the Project) and other projects in the general vicinity will be directed to DC Water's CSO system.

Vegetation and Wildlife

The area surrounding the LOD is an urban environment, with no notable biological resources. As described in Section 5.10, the Project will replace the existing trees within the LOD, many of which are mature and many that are younger, that will take many years to mature. In addition, short-term habitat loss for species adapted to urban conditions will occur because of the construction period displacement of street and other trees in the LOD. Other projects have the potential to improve biological flora conditions, in particular the Southeast Boulevard project,

which will replace an abandoned freeway that has very limited flora resources with an urban street with ample opportunities for flora landscaping. Nevertheless, the Project and other development activities are not going to change the overall vegetation and wildlife in the general vicinity of the Project, which will remain resources suitable for urban conditions.

Historic Resources

The area surrounding the LOD includes a number of historic properties and resources, such as the Capitol Hill Historic District, the Navy Yard Historic District and many individually historic buildings, such as the Marine Commandant's House and the Old Naval Hospital on Pennsylvania Avenue, SE. The Project will require the demolition of the existing Virginia Avenue Tunnel, which is eligible for the National Register. Because of this and other construction-period impacts, FHWA rendered an adverse effect determination in accordance with Section 106 (see Section 5.11). Construction-period impacts to other historic properties, such as the L'Enfant Plan (due to construction on a L'Enfant identified street, Virginia Avenue SE) and Capitol Hill Historic District (due to construction in Virginia Avenue Park) will be temporary. The other projects noted previously (e.g., 11th Street Bridges, Clean Rivers on M Street, etc.) are generally not expected to cause adverse effects to historic properties in Capitol Hill.

Parks and Recreational Resources

The area surrounding the LOD includes a number of parks and recreational resources, such as Virginia Avenue Park and Garfield Park. As described in Section 5.12, the Project will require closing a portion of Virginia Avenue Park during construction, but it will not affect access to other parks and recreational resources, with the exception of south side access to Garfield Park at 2nd Street beneath I-695 Viaduct. As described in Section 5.12, there are many other ways to access Garfield Park from the south side of I-695. Virginia Avenue Park will be restored and improved after construction. No other construction project in the vicinity of the LOD anticipated to occur at the same time as the construction of the Project will affect parks or recreational resources in the same or similar manner or affect access.

Visual and Aesthetic Resources

The Project and the projects in the general vicinity will not change the overall visual and aesthetic appearance of Capitol Hill and the Capitol Riverfront. The 11th Street Bridges project would probably present the greatest visual change simply because it will be replacing the old bridge with more prominent structures and embankments. However, aesthetics are being taken into account in the architecture of the structures. The Southeast Boulevard project has the potential to substantially improve the visual and aesthetic conditions of Capitol Hill. It would convert a freeway, which many perceive as unattractive, into an urban boulevard with street trees and other visual amenities. This project will also provide opportunities to connect Capitol Hill with the waterfront east of 11th Street SE.

In summary, with so many projects being completed and under construction within the same time frame, there is the concern that combined traffic impacts could cause congested

conditions in the neighborhoods surrounding the LOD. Therefore, the MOT plan prepared for the Project and the traffic impact analysis took into account the other projects, either by including their traffic generation or MOT plans. The conclusion of the traffic impact analysis as provided in Section 5.15.3 is that mobility in the surrounding community will be maintained. Although peak hour congestion is predicted at certain intersections, traffic signal optimization could be used to effectively relieve these congestion points. While the build alternatives would contribute to cumulative impacts to some resources during construction, such impacts would be localized within the LOD and would be temporary in nature.

5.19 Permits and Approvals

Permits will be required for construction of the Build Alternatives. These authorizations ensure that proper coordination pursuant to federal and District legislation has been satisfied. The anticipated permits, if applicable, include:

Federal Highway Administration

- Approval to temporarily affect I-695 ramps located at 6th and 8th Streets SE

U.S. Environmental Protection Agency, Region III

- NPDES Stormwater Permit for Construction Activities

U.S. Marine Corps

- Approval associated with construction activities within the Marine Corps Recreation Facility
- Approval associated with the location of the reconstructed tunnel under the Preferred Alternative and any relocated utilities within the Marine Corps Recreation Facility

DC Department of Consumer and Regulatory Affairs

- Building Permit
- Raze Permit
- Excavation/Sheeting and Shoring Service Permit
- Electrical Permit/Supplemental Systems Installation Permit

DC Department of Environment

- Dewatering/Groundwater Discharge Permit
- Stormwater Management Permit
- Air Quality Permit for Construction

District Department of Transportation

- Public Space Permit
- Tree Removal Permit
- Design and construction plan approvals
- MOT and Construction phasing approval

- Occupancy Permit
- Construction Permit

DC Water and Sewer Authority

- Design and Construction Plan Approvals for water main and sewer relocations and utility support-in-place work
- Review of Excavation/Sheeting and Shoring Permits

5.20 Relationship of Local Short-Term Uses vs. Long-Term Productivity

The Project will involve trade-offs between short-term environmental impacts associated with construction-period impacts and the long-term transportation and economic gains achieved by having a rebuilt Virginia Avenue Tunnel. However, the long-term productivity of the Project will offset the short term uses.

Construction-period impacts will be a nuisance and disruptive to the surrounding community, but such impacts will soon disappear upon completion of the Project.

Long-term conditions of the Project include:

- A rebuilt Virginia Avenue Tunnel that will last at least a century or more with routine maintenance;
- Elimination of the bottleneck at the Virginia Avenue Tunnel, which currently affects regional freight operations of the Mid-Atlantic and Midwest regions;
- Greater freight transportation efficiencies from the ability to operate double-stack intermodal container trains along much of the eastern seaboard freight rail network;
- Improved energy savings and subsequent reductions in GHG emissions; and
- A new, improved Virginia Avenue SE streetscape to benefit the community and meet the needs of the District and the surrounding community.

Considering the long-term productive uses listed above, and the fact that adverse construction impacts are temporary and will be minimized or mitigated, the Project appears beneficial to the District, the region and the nation.

5.21 Irreversible and Irretrievable Commitment of Resources

The Project will require an irreversible and irretrievable commitment of following physical and human resources:

- The existing historic Virginia Avenue Tunnel will be demolished;
- Equipment will be devoted to the construction of the Project, which cannot be used for other projects;
- Considerable amounts of fossil fuels will be expended, and a wide variety of both manmade and natural construction materials will be committed; and

- Considerable amounts of labor will be committed for management, planning, government and regulatory oversight, engineering design, purchasing and services, and construction.

The benefits of the Project, which include replacing an important, but aged, piece of infrastructure with a modern facility that will meet the freight rail transportation needs of the 21st Century, outweigh the commitment of the resources noted above.

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Chapter 6
Final Section 4(f) Evaluation

Chapter 6
Final Section 4(f) Evaluation

This Section 4(f) Evaluation has been prepared in compliance with Section 4(f) of the U.S. Department of Transportation Act of 1966, which is codified at 49 U.S.C. § 303 and 23 U.S.C. § 138, implementing regulations at 23 CFR § 774.

Section 4(f) permits the use of land from a publicly-owned public park, recreation area, wildlife or waterfowl refuge, or land of a historic site of national state or local significance only if there is no feasible and prudent avoidance alternative, to the use of land from the property; and the action includes all possible planning to minimize harm to the property resulting from such use.

The authority to administer Section 4(f) and make Section 4(f) approvals resides with the Secretary of the U.S. Department of Transportation (USDOT). The Secretary of Transportation has delegated the authority for administering Section 4(f) to the Federal Highway Administration (FHWA) Administrator in 49 CFR § 1.48.

The proposed reconstruction of Virginia Avenue Tunnel (the Project) requires FHWA approval because this Project will temporarily affect ramps of Interstate 695 (I-695) located at 6th and 8th Streets SE during construction. In addition, the Project requires use of land from properties protected by Section 4(f), and therefore FHWA approval is also required in order for this Section 4(f) use to proceed.

6.1 Project Description

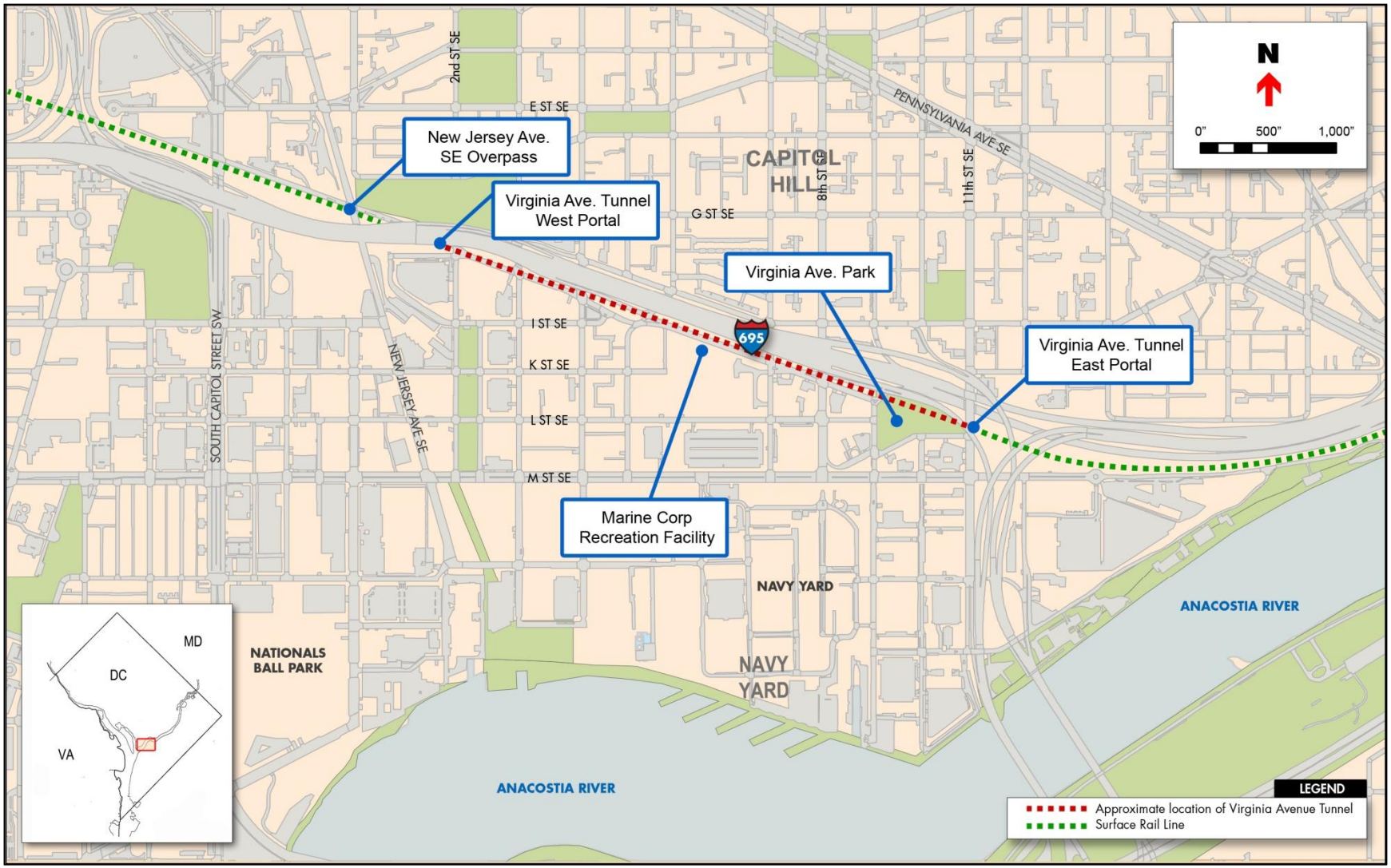
CSX Transportation, Inc. (CSX) is seeking permits and approvals from FHWA and the District Department of Transportation (DDOT) for the reconstruction of the Virginia Avenue Tunnel, a 3,800-foot long freight rail tunnel located in the District of Columbia. The tunnel is located beneath eastbound Virginia Avenue SE from 2nd to 9th Streets SE; Virginia Avenue Park between 9th and 11th Streets; and the 11th Street Bridge right-of-way. The tunnel is also aligned on the south side of I-695 (see Figure 6-1). The tunnel portals are located a short distance west of 2nd Street SE and a short distance east of 11th Street SE. The reconstructed tunnel's east portal will be moved to 12th Street SE. The tunnel connects with other CSX-owned rail lines running through the District, which are part of CSX's eastern seaboard freight rail corridor.

6.2 Purpose and Need

The purpose of the proposed action is to preserve, over the long-term, the continued ability to provide efficient freight transportation services in the District of Columbia, the Washington Metropolitan Area and the eastern seaboard. These services will continue if the following needs are met:

1. Address the structural and operational deficiencies of the century-old Virginia Avenue Tunnel;

Figure 6-1
Project Location



2. Accommodate expected increases in freight transportation that, in part, would stem from the Panama Canal expansion scheduled for 2015; and
3. Ensure that during construction freight transportation services remain uninterrupted while the functions of the tunnel are being replaced with a new facility.

6.2.1 Structural and Operational Deficiencies of Virginia Avenue Tunnel

Virginia Avenue Tunnel's horizontal clearance only allows a single railroad track, which causes a bottleneck in the rail network due to the existence of two railroad tracks on both sides of the tunnel. In addition, the tunnel's vertical clearance does not allow the operation of double-stack intermodal container freight trains, a type of operation that CSX and other major railroad companies have adopted as the norm in the freight rail transportation industry where the rail network allows it. Finally, as an aging piece of infrastructure nearing the end of its useful life, the tunnel is increasingly subject to inspection and preventive maintenance for safe rail operations. These frequent inspections and preventive maintenance activities are difficult to conduct without compromising normal rail operations.

6.2.2 Freight Transportation Demand

Virginia Avenue Tunnel and the eastern seaboard freight rail corridor need to accommodate expected increases in freight transportation demand over the next few years, in part due to the Panama Canal expansion scheduled to occur in 2015. The projected increased demand for freight transportation requires taking steps now to modernize the freight rail network, including replacing the tunnel with a more modern facility. By accommodating double-stacked intermodal containers, CSX will be able to transport the expected increase in freight in fewer trains than would otherwise be possible.

6.2.3 Commerce Demands

Reconstructing an existing and vital piece of transportation infrastructure presents challenges in terms of how to maintain freight operations during the construction of the replacement tunnel. The ability to quickly and efficiently move goods to markets throughout the country is vital to the U.S. economy. As one of the nation's major freight railroad companies, CSX provides a valuable service by facilitating the shipment of goods and services to the general public.

6.3 Proposed Action

The proposed action is to rebuild the existing Virginia Avenue Tunnel and its single railroad track configuration with a new two-track tunnel with the necessary vertical clearance (minimum 21 feet) to allow double-stack intermodal train operations. Two-track means that there would be two separate railroad tracks in the tunnel. Double-stack means that intermodal container trains operating within the tunnel would be able to transport rail cars carrying two vertically stacked intermodal freight containers. These types of containers are among other types of freight rail traffic that use the tunnel, such as coal and other merchandise. The new

tunnel will allow freight trains, including those with double-stack intermodal containers, to move in both directions, simultaneously, if necessary, and enabling more efficient freight movement. This will allow more efficient freight movement, especially in light of expected increases in freight traffic. Reconstructing the tunnel to allow double-stack intermodal container freight trains will require lowering the grade below the rail line's New Jersey Avenue SE Overpass.

6.4 Regulatory Requirements

6.4.1 Key Considerations in Section 4(f)

A Section 4(f) property is any publicly owned land of a public park, recreational area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance.

As noted in 23 CFR § 774.3, Section 4(f) Approvals, a transportation project approved by a U.S. Department of Transportation (U.S. DOT) modal agency (for this Project, FHWA) may not use a Section 4(f) property unless it is determined that:

1. There is no feasible and prudent avoidance alternative, as defined in 23 CFR § 774.17, to the use of land from the property; and
2. The action includes all possible planning, as defined in 23 CFR § 774.17, to minimize harm to the property resulting from such use; or
3. The use of the property, including any measure(s) to minimize harm (such as any avoidance, minimization, mitigation or enhancement measures) committed to, will have a de minimis impact, as defined in 23 CFR § 774.17, on the property.

As defined in 23 CFR § 774.17, the use of a protected Section 4(f) property occurs when any of the conditions below are met:

1. When land [of the Section 4(f) property] is permanently incorporated into a transportation facility;
2. When there is a temporary occupancy of land [of the Section 4(f) property] that is adverse in terms of the [Section 4(f)] statute's preservation purpose as determined by the criteria in 23 CFR § 774.13(d); or
3. When there is constructive use of a Section 4(f) property as determined by the criteria in 23 CFR § 774.15.

The FHWA may determine that the use of Section 4(f) property, including any measure(s) to minimize harm (such as any avoidance, minimization, mitigation, or enhancement measures) committed to by the applicant, will have a de minimis impact, as defined in 23 CFR § 774.17, on the property. The de minimis impact criteria and associated determination requirements vary by type of Section 4(f) property involved. For example, the use of a historic site may be de minimis if the Administration renders a "no adverse effect" in accordance with Section 106 of the National Historic Preservation Act (NHPA).

A feasible and prudent avoidance alternative avoids using Section 4(f) property and does not cause other severe problems of a magnitude that substantially outweighs the importance of protecting the Section 4(f) property. The feasible and prudent standard applies only to an alternative that fully avoids any use of a Section 4(f) property. It would not apply when choosing among alternatives that require the use of at least one Section 4(f) property. In assessing the importance of protecting the Section 4(f) property, it is appropriate to consider the relative value of the resource to the preservation purpose of the statute.

An alternative is not feasible if it cannot be built as a matter of sound engineering judgment.

An alternative is not prudent if:

- It compromises the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need;
- It results in unacceptable safety or operational problems;
- After reasonable mitigation, it still causes:
  - Severe social, economic, or environmental impacts;
  - Severe disruption to established communities;
  - Severe disproportionate impacts to minority or low income populations; or
  - Severe impacts to environmental resources protected under other Federal statutes;
- It results in additional construction, maintenance, or operational costs of an extraordinary magnitude;
- It causes other unique problems or unusual factors; or
- It involves multiple factors that while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

All possible planning to minimize harm means that all reasonable measures identified in the Section 4(f) evaluation to minimize harm or mitigate for adverse impacts and effects must be included in the project. With regards to parks or recreational resources, reasonable mitigation measures may involve a replacement of land and/or facilities of comparable value and function, or monetary compensation to enhance the remaining land. With regard to historic sites, reasonable measures normally serve to preserve the historic activities, features, or attributes of the site as agreed by the Administration and the official(s) with jurisdiction over the Section 4(f) resource in accordance with the Section 106 consultation process outlined 36 CFR § 800, Protection of Historic Properties.

If there is no feasible and prudent avoidance alternative and the use is not de minimis, then the FHWA may approve only the alternative that causes the least overall harm in light of the statute's preservation purpose. The least overall harm is determined by balancing the following factors, which are identified in 23 CFR § 774.3(c)(1):

- The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property);
- The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection;
- The relative significance of each Section 4(f) property;

- The views of the official(s) with jurisdiction over each Section 4(f) property;
- The degree to which each alternative meets the purpose and need for the project;
- After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f); and
- Substantial differences in costs among the alternatives.

If two or more alternatives are "substantially equal" in terms of the least overall harm to the 4(f) property, then FHWA may select any one of the alternatives being considered. Regardless, the alternative selected must include all possible planning to minimize harm to Section 4(f) property, such as compliance with Section 106, as applicable.

An "individual Section 4(f) evaluation must be completed when approving a project that requires the use of Section 4(f) property if the use . . . results in a greater than de minimis impact and a programmatic Section 4(f) evaluation cannot be applied to the situation." (Section 4(f) Policy Paper, July 20, 2012)

6.4.2 Assessing "Use" of Section 4(f) Properties

Section 4.1 briefly described the term "use" in Section 4(f).

The most common form of use is when land is permanently incorporated into a transportation facility. This can occur when land from a Section 4(f) property is either purchased outright as transportation right-of-way or when the applicant for Federal-aid funds has acquired a property interest that allows permanent access onto the property such as a permanent easement for maintenance or other transportation-related purpose.

The second form of use is commonly referred to as temporary occupancy and results when Section 4(f) property, in whole or in part, is required for project construction-related activities. The property is not permanently incorporated into a transportation facility but the activity is considered to be adverse in terms of the preservation purpose of Section 4(f). Section 23 CFR 774.13(d) provides the conditions under which "temporary occupancies of land…are so minimal as to not constitute a use within the meaning of Section 4(f)." If all of the conditions in this section are met, the temporary occupancy does not constitute a use. If one or more of the conditions for the exception cannot be met, then the Section 4(f) property is considered used by the project even though the duration of onsite activities is temporary.

The third and final type of use is called constructive use. A constructive use involves no actual physical use of the Section 4(f) property via permanent incorporation of land or a temporary occupancy of land into a transportation facility. A constructive use occurs when the proximity impacts of a proposed project adjacent to, or nearby, a Section 4(f) property result in substantial impairment to the property's activities, features, or attributes that qualify the property for protection under Section 4(f). As a general matter this means that the value of the resource, in terms of its Section 4(f) purpose and significance, will be meaningfully reduced or lost. The types of impacts that may qualify as constructive use, such as increased noise levels that would substantially interfere with the use of a noise sensitive feature such as a

campground or outdoor amphitheater, are addressed in 23 CFR 774.15. A project's proximity to a Section 4(f) property is not in itself an impact that results in constructive use. Also, the assessment for constructive use should be based upon the impact that is directly attributable to the project under review, not the overall combined impacts to a Section 4(f) property from multiple sources over time.

It should be noted that none of the identified Section 4(f) properties affected by or adjacent to the Project's limit of disturbance (see Sections 6.5 and 6.6) meet the criteria for a constructive use.

6.5 Section 4(f) Properties

Section 4(f) and the implementing regulations in 23 CFR Part 774 define a Section 4(f) property as publicly owned land of a public park, recreation area, or wildlife and waterfowl refuge of national, State, or local significance, or land of an historic site of national, State, or local significance. A historic site includes any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (National Register).

There are several protected Section 4(f) resources or properties within the limits of disturbance (LOD) of the Project, which are listed below:

- Virginia Avenue Tunnel
- The L'Enfant Plan of Washington DC;
- Capitol Hill Historic District; and
- Virginia Avenue Park.

The LOD refers to all areas where construction will take place, including areas needed for staging, materials stockpiling, utility relocations, and temporary freight train operations. The LOD will be restricted from the general public, except Virginia Avenue's cross streets, which will remain open for public passage throughout construction by means of temporary bridges.

6.5.1 Virginia Avenue Tunnel

Virginia Avenue Tunnel, which is owned by CSX, is eligible for the National Register, and is therefore, considered a Section 4(f) resource. It was originally constructed by the Baltimore & Potomac Railroad in two phases between 1872 and 1904, using a cut-and-cover construction method. The first phase consisted of the portion of the tunnel from 11th Street SE to a location between 7th and 8th Streets SE. The second phase of construction extended the location of the tunnel's west portal by an additional half-mile to 2nd Street SE. Most of the tunnel is an elliptical brick arch with 28 feet clear span (distance inside the tunnel wall to wall). A structural failure occurred in 1985, and 300 feet of tunnel was replaced. The walls are of cut stone masonry ten feet high and eight-and-a-half feet thick. The ceiling is also of brick masonry, with maximum vertical clearance of approximately 18 feet. As noted in Section 6.2, the tunnel structure is approaching the end of reliable service.

6.5.2 L'Enfant Plan of Washington, DC

The L'Enfant Plan of Washington, DC (L'Enfant Plan), which is listed on the National Register, is a Baroque city plan with Beaux Arts modifications designed by Pierre L'Enfant (1792). Roughly bounded by Florida Avenue from Rock Creek NW to 15 Street NE, south to C Street, and east to the Anacostia River, the plan consists of regular orthogonal street grids with numerically and alphabetically designated streets, intersected by diagonal avenues. It also consists of historic and contemporary system of parks and medians. The 1901-02 McMillan Commission recommendations resulted in physical changes to the L'Enfant Plan necessary for urban development. Virginia Avenue SE was identified as part of the L'Enfant Plan.

6.5.3 Capitol Hill Historic District

The Project Area is located within in a small portion in the southeast area of the Capitol Hill Historic District (CHHD) on the south side of I-695. Most of this historic district is located north of I-695. CHHD, which is listed on the National Register, is primarily a residential area with two- to four-story row houses and small frame houses in a variety of architectural styles including Federal, Italianate, Greek revival, Queen Anne, Romanesque revival, and vernacular interpretations. It also includes religious, commercial, institutional and military buildings, as well as parks. The neighborhood began as a boarding house community for members of Congress, and is one of the District's oldest and largest residential communities. CHHD is roughly bounded by the U.S. Capitol; F Street NE and Constitutional Avenue to the north; 14TH, 13th, and 11th streets SE to the east, and including some areas south of I-695 extending to the Washington Navy Yard. CHHD also contains a high number of contributing resources, including Virginia Avenue Park, which is described below.

6.5.4 Virginia Avenue Park

Virginia Avenue Park is owned by the National Park Service (NPS) but maintained and operated by the DC Department of Parks and Recreation (DPR). Not only is Virginia Avenue Park a publicly-owned, public recreational resource, it is also a contributing resource to the CHHD. In 1966, jurisdiction of the park was transferred to the District of Columbia, but the NPS still retains fee title. The 2.63-acre park is located between 9th Street SE and near 11th Street SE and between I-695 and Potomac Avenue SE / L Street SE. It contains the Virginia Avenue Community Garden, a fenced dog area, and passive recreational amenities that include grassy fields, park benches and picnic tables. The community garden offers residents opportunities to grow herbs, vegetables and fruits. Each participating household is limited to two plots.

6.6 Other Section 4(f) Properties

Other Section 4(f) properties adjacent to the Project's LOD include two recreational resources (Garfield Park and, the Marine Corps turf field) and two historic properties (St. Paul AUMP Church and Virginia Avenue Paving). As noted in Section 4.2, the Project will not require the actual or constructive use of these properties. The reasons for this assessment are provided below.

The rights-of-way of Virginia Avenue SE and the adjacent I-695 include half dozen, relatively small triangular-shaped NPS reservations. These properties are not considered Section 4(f) properties because they are either used for transportation purposes (i.e., part of Virginia Avenue SE or the freeway), roadway landscaping, or part of a military installation (Reservation 124 under the jurisdiction of the Marine Corps—see Section 6.6.2). The Virginia Avenue Paving (Site Number 51SE062), which was identified within the LOD at the 11th Street Bridges right-of-way, is not considered a Section 4(f) property because the DC Historic Preservation office will allow the paving to be removed and used at other locations.

6.6.1 Garfield Park

Garfield Park is located between New Jersey Avenue and 3rd Street SE immediately north of I-695, and is under the jurisdiction of DPR. Regardless of the Build Alternative, pedestrian access to Garfield Park from 2nd Street SE on the south side of I-695 will not be available during construction because of the need to relocate the Tiber Creek Intercepting Sewer. This work will be conducted under I-695 in the vicinity of 2nd Street SE. This temporary impact will not be a constructive use of Garfield Park because the park will remain accessible from several other locations from the south side of I-695 and none of these will be affected by the Project. From the south side of I-695, the park is accessible from New Jersey Avenue SE and 3rd Street SE. Fencing will be installed between the construction area under I-695 and Garfield Park to ensure that park users are not exposed to construction activities. The park is used for passive recreation, tennis and volleyball. These activities will be unaffected by construction activities underneath I-695.

6.6.2 Marine Corps Facility Turf Field

The Marine Recreation Facility includes a turf field striped for soccer. The field is primarily used by marines for physical fitness and the Marine Band for practice sessions. However, the Marine Corps allow the field to be available to Sports on the Hill, a volunteer youth sports organization, and other visiting recreational teams and spectators with prior approval by the facility. This level of public access does not qualify the turf field, apart from the larger facility, as a Section 4(f) resource because according to the Section 4(f) Policy Paper, the entire public must be granted access in order for the recreational facility to be considered a Section 4(f) resource. Providing access to a select group (e.g., Sports on the Hill) does not qualify this facility as a Section 4(f) resource. Nevertheless, access to and activities associated with the turf field will not be affected by any of the Build Alternatives. Access is through L Street SE, not Virginia Avenue SE, and fencing between the construction area and the turf field will be installed to ensure that Marines and visitors are not exposed to construction activities. The Marines acquired use of Reservation 124 along Virginia Avenue SE from the NPS, with the stipulation that the view corridor of K Street SE and Virginia Avenue SE between 6th and 7th Streets and the view corridor of 6th Street SE between Virginia Avenue SE and L Street SE will remain free of buildings or structures of any kind. A scenic resource is not necessarily a Section 4(f) resource unless it is a significant historic site. This scenic resource is adjacent to Virginia Avenue SE, which is part of the L'Enfant Plan. Therefore, this scenic resource is evaluated as part of the L'Enfant Plan.

6.6.3 St. Paul AUMP Church

St. Paul AUMP Church is an historic property listed on the National Register. The church is of a Gothic Revival style with gabled asphalt roof, arched windows, crenellated battlements, and a tower. Washington's second licensed African-American architect, R.C. Archer Jr., designed the church. It is the only church in the District that evolved from the oldest incorporated, independent African denomination in the United States. Although the church appears to be structurally sound, it has evidence of damage from water leakage. The LOD under each of the three Build Alternatives will be in the vicinity of the church, but the existing tunnel is located over 100 feet away. Although the Section 106 adverse effect determination was made partially due to the construction proximity effects to the historic character of the church, a Section 4(f) constructive use will not occur because the vibration effects of demolishing the existing tunnel and reconstructing the new tunnel is not expected to migrate to the church site. Nevertheless, the church will be subject to a pre-construction inspection and will be monitored during construction to check if any vibration-causing activity has damaged the structure, and if so, repair the damage at the expense of the Project (see Section 5.7.4).

6.7 Alternatives Considered

Three Build Alternatives are under consideration. They were selected for detailed study in the National Environmental Policy Act (NEPA) process from among 12 concepts that were considered as part of the scoping process. Seven of these concepts involved the rebuilding of the existing Virginia Avenue Tunnel generally along its current alignment but with two railroad tracks and sufficient vertical clearance to allow for double-stacking of intermodal containers (rebuild concepts). Four other concepts would have involved rerouting mainline freight rail traffic out of the Virginia Avenue Tunnel at its present depth and location in lieu of near-term reconstruction of the tunnel (reroute concepts). All four reroute concepts and four of the seven rebuild concepts were eliminated from consideration. However, they were considered as possible alternatives that may avoid the Section 4(f) resources identified in Section 6.5. Concept 1, which was later renamed Alternative 1, is the "no build", which is automatically considered in the Draft Environmental Impact Statement (EIS) as a viable option, and is also used as a point of comparison to evaluate the potential impacts of the Build Alternatives.

6.7.1 Alternative 1, No Build

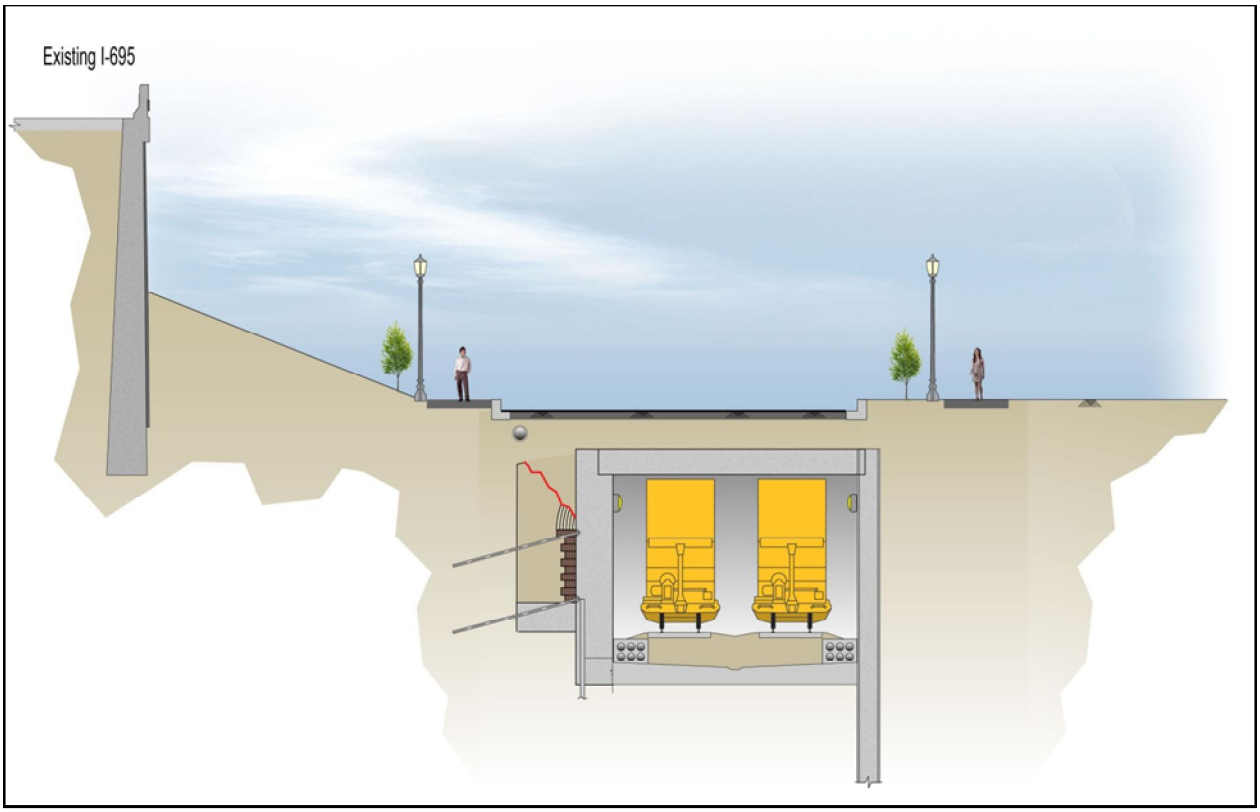
Under Alternative 1, No Build, Virginia Avenue Tunnel would not be rebuilt. The railroad would continue to operate trains through the tunnel, and at some point, emergency or unplanned major repairs or rehabilitation could be required to this critical, aging infrastructure that would probably be disruptive to the surrounding community.

6.7.2 Alternative 2, Rebuilt Tunnel / Temporary Runaround Track

Originally Concept 2, Alternative 2 involves rebuilding the existing Virginia Avenue Tunnel. It would be rebuilt with two railroad tracks and enough vertical clearance to accommodate double-stack intermodal container freight trains. It would be rebuilt in generally the same

location, except aligned approximately seven feet to the south of the existing tunnel center line. It would be rebuilt using protected open trench construction methods. During construction, freight trains would be temporarily routed through a protected open trench outside the existing tunnel (runaround track). The runaround track would be aligned to the south and generally parallel to the existing tunnel, and would be located below street level. Due to new columns associated with the rebuilt 11th Street Bridges, the runaround track would slightly separate from the tunnel alignment on the east end starting just west of Virginia Avenue Park. Safety measures such as securing fencing would be used to prevent pedestrians and bikers from accessing the runaround track. A typical cross section of post-construction Virginia Avenue Tunnel under Alternative 2 between 3rd Street and 9th Street SE is shown on Figure 6-2.

Figure 6-2
Cross Section View of Post-Construction Alternative 2
between 3rd and 9th Streets SE

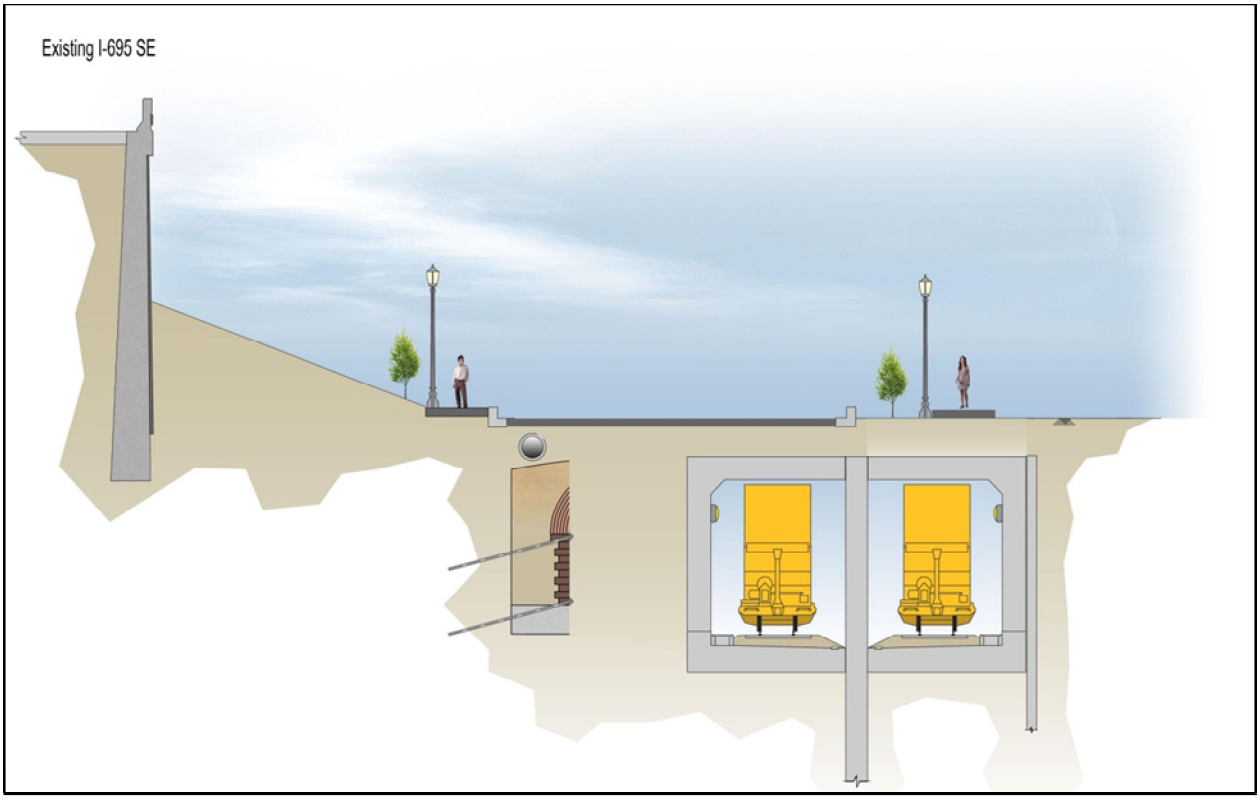


6.7.3 Alternative 3, Two New Tunnels

Alternative 3 was selected as the Preferred Alternative in the Final EIS. Originally Concept 5, Alternative 3 or the Preferred Alternative involves replacing the existing Virginia Avenue Tunnel with two new permanent tunnels. Each tunnel would have a single railroad track with enough

vertical clearance to allow double-stack intermodal container freight trains. A new parallel south side tunnel would be built first as trains continue operating in the existing Virginia Avenue Tunnel. After the south side tunnel is completed, train operations would switch over to the new tunnel and the existing Virginia Avenue Tunnel would be demolished and rebuilt. With the exception of operating in a protected open trench for approximately 230 feet immediately east of the 2nd Street portal (within the Virginia Avenue SE segment between 2nd and 3rd Streets SE), trains would operate in enclosed tunnels throughout construction under the Preferred Alternative. Throughout most of the length of the entire rebuilt tunnel, the two tunnels would be separated by a center wall. This center wall would be the new centerline of the two tunnels, and it would be aligned approximately 25 feet south of the existing tunnel centerline, between 2nd and 9th Streets SE. Due to new columns associated with the rebuilt 11th Street Bridge, the tunnels would be separated on the east end starting just west of Virginia Avenue Park, resulting in two separate single-track tunnels and openings at the east portal. A typical cross section of the two tunnels of the Preferred Alternative between 3rd and 9th Streets SE is shown on Figure 6-3.

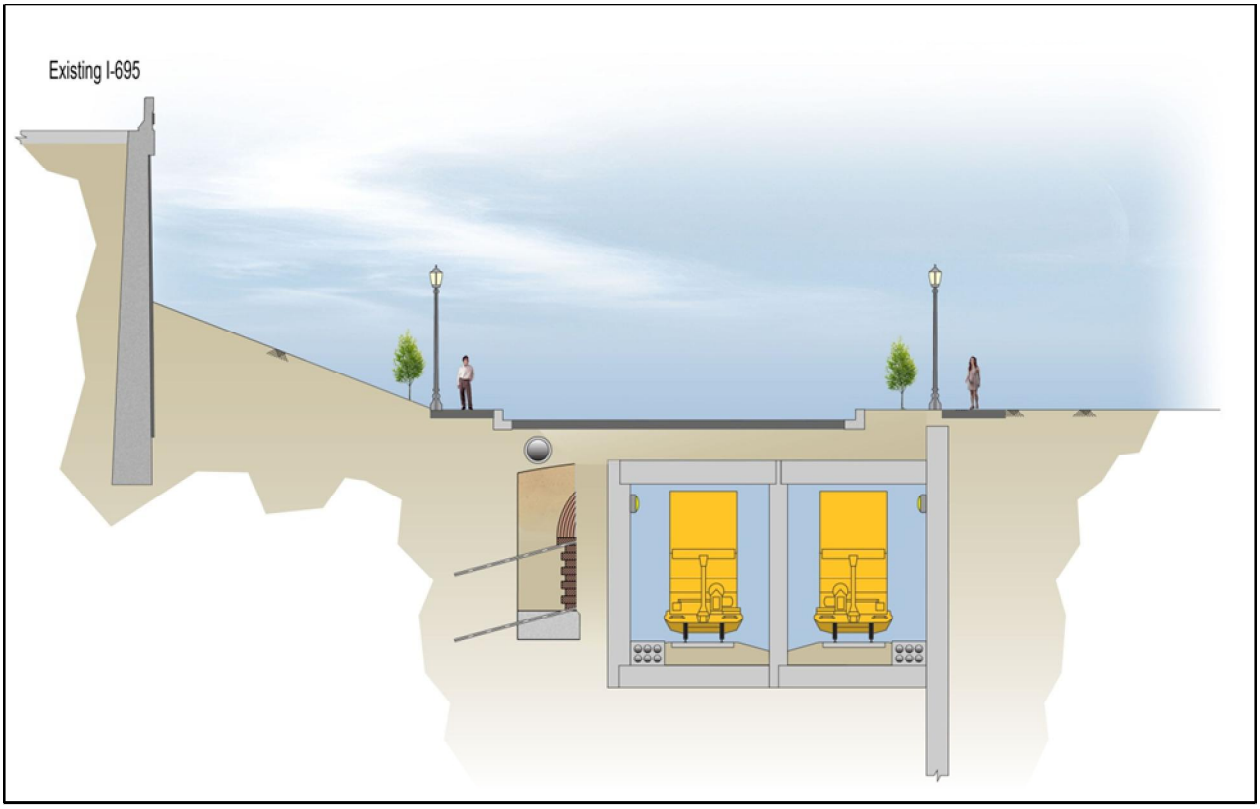
Figure 6-3
Cross Section View of Post-Construction Preferred Alternative
between 3rd and 9th Streets SE



6.7.4 Alternative 4, New Partitioned Tunnel / Online Rebuild

Originally Concept 6, Alternative 4 would result in a new tunnel with two permanent tracks. Similar to the Preferred Alternative, the new tunnel would be partitioned and have enough vertical clearance to allow double-stack intermodal container freight trains. It would be aligned approximately 17 feet south of the existing tunnel's centerline. The new tunnel would be built using protected open trench construction methods. The rebuild would occur 'online' meaning that during the period of construction, the protected open trench would accommodate both construction activities and train operations. Maintaining safe and reliable temporary train operations is a more complicated endeavor under Alternative 4 than under the other two Build Alternatives because of the online rebuild approach. A typical cross section of post-construction Virginia Avenue Tunnel under Alternative 4 between 3rd and 9th Streets is shown on Figure 6-4.

Figure 6-4
Cross Section View of Post-Construction Alternative 4
between 3rd and 9th Streets SE



6.8 Impacts on Section 4(f) Properties

This section describes the Project's potential impacts to the four Section 4(f) resources described in Section 6.5. Any differences among the Build Alternatives are noted. Regardless of the Build Alternative, the Project will require the demolition of existing Virginia Avenue Tunnel. It will also require construction-period occupancy of Virginia Avenue Park and relatively small portions of the L'Enfant Plan and Capitol Hill Historic District due to the proposed limits of disturbance (LOD). As noted in this section, the affected areas of these Section 4(f) resources will be restored at the conclusion of construction.

6.8.1 Virginia Avenue Tunnel

The Section 4(f) "use" will involve the demolition of the tunnel in order to accomplish its reconstruction. The demolition and rebuilding of the tunnel will constitute a permanent incorporation into a reconstructed transportation facility and will therefore be a "use" within the meaning of 23 CFR 774.17. An "adverse effect" determination in accordance with the National Historic Preservation Act Section 106 process was rendered for the Project by the FHWA on September 10, 2013 due in part to the required demolition of the tunnel under all three Build Alternatives. The DC State Historic Preservation Officer (SHPO) concurred with the adverse effect determination on October 10, 2013. As the result of the Section 106 adverse effect, the Section 4(f) "use" will not be considered de minimis. The reconstruction of the Virginia Avenue Tunnel will also not qualify for an exception from Section 4(f) under 23 CFR 774.13(a)(1) in that the tunnel will be completely rebuilt, not merely restored, rehabilitated or maintained with its potential historic qualities preserved.

Under Alternative 1, the No Build, the tunnel would eventually need to be rebuilt or undergo major rehabilitation. Even with CSX's active maintenance and inspection program, a major structural deficiency similar to what occurred in 1985 could possibly materialize over the next few decades due to the continued aging of the tunnel's masonry structure. This event would be "unplanned" and result in emergency construction that may likely require at least a partial demolition of the tunnel.

6.8.2 L'Enfant Plan of Washington, DC

The Section 4(f) "use" of the L'Enfant Plan will involve temporary longitudinal trenching on a L'Enfant Plan identified street -- Virginia Avenue SE -- during the period of construction, which will be required for each of the three Build Alternatives. As Alternative 4 does not include a runaround track (as in Alternative 2) or a new south side tunnel with the same alignment as the runaround track (as in the Preferred Alternative), its LOD along Virginia Avenue SE would be a few feet narrower. The trenching work on Virginia Avenue SE will not qualify for a temporary occupancy exception from Section 4(f) as defined under 23 CFR 774.13(d) because the temporary occupancy of the land will not be minimal and the scope of construction work will not be minor. However, Virginia Avenue SE will be restored to a condition at least as good as that which existed prior to construction, and CSX has committed to making enhancements and upgrades to the street.

The FHWA NHPA Section 106 adverse effect determination was rendered in part due to the extended duration of temporary trenching of a L'Enfant Plan street (Virginia Avenue SE). Therefore, the Section 4(f) "use" will not be considered a de minimis impact. The trenching needed by the Build Alternatives will not be minor and the use will be adverse within the meaning of de minimis impact contained in 23 CFR 774.17.

6.8.3 Capitol Hill Historic District

The LOD occupies a relatively small section of the Capitol Hill Historic District (CHHD). It is within Virginia Avenue Park, a contributing resource to the CHHD. Each Build Alternative requires construction-period occupancy of a portion of the Virginia Avenue Park because the park was established above the tunnel. The scope of work, although temporary, will not be minor in that local residents will not be able to make use of the affected area of the park during construction on that segment of the Project.

The Project will involve the "use" of the park (both as an historic property and a recreational resource) as a 4(f) property within the meaning of 23 CFR 774.17. The "use" will be construction-period occupancy of the park, which may require an approval from the NPS. The FHWA NHPA Section 106 adverse effect determination was rendered in part due to the construction-period occupancy of the park.

Notably, the temporary construction-period occupancy of the park will not qualify for an exception of Section 4(f) requirements in accordance with 23 CFR 774.13(d). In addition, the Section 4(f) "use" of the CHHD will not be considered a de minimis impact because a Section 106 "adverse effect" determination was rendered in part due to the construction impacts on the park as a contributing historic resource to CHHD. Occupancy of the park for construction and temporary rail operations would vary depending on the Build Alternative.

While all of the Build Alternatives will temporarily use a portion of the park during construction, the Preferred Alternative and Alternative 2 will use a slightly larger portion of the park than Alternative 4 (1.76 acres versus 1.46 acres). Under all of the Build Alternatives, a large swath of open grassy field and the fenced dog area will not be available during construction. The Virginia Avenue Community Garden will not be displaced by construction under any of the Build Alternatives. The garden will remain open during construction for users. The park benches and picnic tables in the park near Potomac Avenue SE will not be displaced. Temporary construction activities could be perceived as substantially reducing the experience of garden users and park visitors.

The park will be fully returned to a condition at least as good as that which existed prior to the construction, and CSX has committed to provide enhancements and upgraded amenities.

6.8.4 Virginia Avenue Park

The Project's Section 4(f) "use" of Virginia Avenue Park as an individual recreational resource will be the same as the "use" of the park as a contributing resource to the CHHD (see Section

6.8.3). This use of the park as a recreational facility will not be de minimus because the temporary use will adversely affect the recreational features, attributes, and activities that qualify the park from protection under Section 4(f).

6.9 Evaluation of Section 4(f) Use

The use of each of the four Section 4(f) properties identified in Section 5 was evaluated to:

1. Determine if any use would be de minimus;
2. Determine whether there is any feasible and prudent avoidance alternative to the use of land from the Section 4(f) property;
3. If there were no feasible and prudent avoidance alternative, determine which of the alternatives described in Section 7 would result in the least overall harm to the Section 4(f) property; and
4. Identify the planning and actions to be taken to minimize harm to the property resulting from the Section 4(f) use.

6.9.1 Avoidance Alternatives Considered

In the initial phases of project development, 12 concepts were developed and analyzed to determine whether they would meet the Project's Purpose and Need. These concepts were based on a preliminary assessment of the engineering and physical constraints along the alignment of the existing tunnel, and input from federal and District of Columbia agencies, interested parties and the general public. These 12 preliminary concepts include:

- Concept 1, the no action or no build condition;
- Concepts 2 through 7 (includes a Concept 3A or seven total concepts under this category) involve the reconstruction of Virginia Avenue Tunnel; and
- Concepts 8 through 11 involve rerouting the main rail line outside of the existing Virginia Avenue SE, but the tunnel would remain to service Washington Metropolitan Area regional customers.

Because Concept 1 is the no build condition, it was later renamed as Alternative 1 and would be automatically carried through EIS process. By definition, Alternative 1 would avoid the use of Section 4(f) properties, and in particular, it would not require the immediate demolition of Virginia Avenue Tunnel, but it would also not meet the Purpose and Need of the Project. For example, it would not resolve the deficiencies of the existing tunnel.

Concepts 2 through 7 all require demolishing the existing tunnel in order to reconstruct a new two railroad track tunnel, and require trenching and other construction along Virginia Avenue SE, a street identified in the L'Enfant Plan, and Virginia Avenue Park, a recreational resource and a contributing resource to the CHHD. Therefore, none of them would be considered a potential avoidance alternative. These rebuild concepts are:

- Concept 2: Rebuild, Temporary South Side Runaround
- Concept 3: Rebuild, Temporary North Side Runaround

- Concept 3A: Rebuild, Permanent Two Tunnels (New Tunnel on North Side of Existing Virginia Avenue Tunnel)
- Concept 4: Rebuild, Temporary Combination Runaround
- Concept 5: Rebuild, Permanent Two Tunnels (New Tunnel on South Side of Existing Virginia Avenue Tunnel)
- Concept 6: Rebuild with On-Line Construction
- Concept 7: Rebuild, Temporary Reroute

As noted in Section 6.7, Concepts 2, 5 and 6 were selected for further evaluation and were developed as the Preferred Alternative (Concept 5) and Alternatives 2 (Concept 2) and 4 (Concept 6).

Concepts 8 through 11 would avoid use of all Section 4(f) resources identified in Section 6.5. In addition to Concept 1/Alternative 1, the reroute concepts identified below were evaluated as potential feasible and prudent alternatives to avoid the Section 4(f) use of Virginia Avenue Tunnel, the L'Enfant Plan, CHHD and Virginia Avenue Park:

- Concept 8: Reroute, Deep Bore Tunnel
- Concept 9: Reroute, Indian Head Alignment
- Concept 10: Reroute, Dahlgren Alignment
- Concept 11: Permanent Reroute

6.9.1.1 Concept 1/Alternative 1 – No Build

Concept 1 or Alternative 1, the no build alternative; would not address the Project's Purpose and Need as described in Section 6.2. Alternative 1 would not address the deficiencies of operational and structural deficiencies of Virginia Avenue Tunnel, nor would it prepare for anticipated increases in freight transportation demand. Therefore, Alternative 1 is not a prudent avoidance alternative.

6.9.1.2 Concept 8 – Reroute, Deep Bore Tunnel

Concept 8 would involve construction of a nine-mile long tunnel stretching from Alexandria, VA to Deanwood, near the eastern border between the District and Maryland. Concept 8 is estimated to cost at least $2 billion. In comparison, the costs for the non-avoidance Build Alternatives are estimated to range from $168 to $208 million. In addition, Concept 8 would not address the structural deficiency of the existing tunnel, which would remain open under this concept in order to serve local customers. Therefore, in consideration of Concept 8's cost of extraordinary magnitude, and because it would not fully address the Project's Purpose and Need, Concept 8 is not a prudent avoidance alternative.

6.9.1.3 Concept 9 – Reroute, Indian Head Alignment and Concept 10 - Reroute, Dahlgren Alignment

Concepts 9 and 10 would require dozens of miles of new and expanded railroad tracks and a new bridge over the Potomac River, which would result in environmental impacts such as the

visual effects of a new bridge and potential losses of riparian habitat. The National Capital Planning Commission (NCPC), which introduced Concepts 9 and 10 in an earlier study, estimated these concepts would cost between $3.2 to 4.2 billion and $3.5 and 4.7 billion, respectively. In comparison, the costs for the non-avoidance Build Alternatives are estimated to range from $168 to $208 million. Like Concept 8, Concepts 9 and 10 would not address the structural deficiency of the existing tunnel even though the tunnel would remain open for local customers. Therefore, in consideration of Concept 9 and 10's costs of extraordinary magnitude, and because they would not fully address the Project's Purpose and Need, Concepts 9 and 10 are not prudent avoidance alternatives.

6.9.1.4 Concept 11 – Permanent Reroute

Concept 11 would require several hundreds of miles of new and expanded railroad tracks within several states along the eastern seaboard and Midwest. Although no cost estimate was made, Concept 11 would be even more expensive than Concepts 8, 9 and 10 as it would require substantial investments to expand rail corridors stretching from Georgia to Pennsylvania and Ohio. Similar to Concepts 8 through 10, Concept 11 would not address the structural deficiency of the existing tunnel. Therefore, in consideration of Concept 11's cost of extraordinary magnitude, and because it would not fully address the Project's Purpose and Need, Concept 11 is not a prudent avoidance alternative to avoid the Section 4(f) use of Virginia Avenue Tunnel.

6.9.2 Least Overall Harm

6.9.2.1 Analysis

There is no feasible and prudent alternative that avoids the use of Section 4(f) resources. Therefore, it must then be determined which of the three remaining Build Alternatives (the Preferred Alternative and Alternatives 2 and 4) would cause the least harm based on seven factors identified in 23 CFR 774.3(c)(1), which are listed in Section 6.4.1. Also noted in Section 6.4.1 is that only the alternative that causes the least overall harm may be approved. If two or more alternatives are substantially equal in terms of harm to the 4(f) property(ies), any one of these alternatives may be selected.

The use of each Section 4(f) resource was evaluated separately to determine which alternatives would result in the least harm to that particular resource. Use of the four Section 4(f) resources were then evaluated as a group to determine which alternative would result in the least overall harm to all four properties collectively.

The analysis herein provided considered proposed mitigation measures and the severity and location of the Section 4(f) use among the three Build Alternatives. As noted in Section 6.5, Virginia Avenue Tunnel, the L'Enfant Plan, and the CHHD are historic resources, and in addition to Section 4(f), are protected under Section 106. The Section 106 consultation process was used to inform minimization planning and mitigation.

Factor 1: The ability to mitigate adverse impacts to each Section 4(f) property (including any measures that result in benefits to the property).

The Preferred Alternative and Alternatives 2 and 4 would all result in the demolition and replacement of Virginia Avenue Tunnel. As noted in Section 6.8.1, an adverse effect determination in accordance with Section 106 was rendered, and therefore, a Memorandum of Agreement (MOA) was prepared to resolve, among other things, the adverse effect from the demolition of the existing tunnel. The MOA includes mitigation measures to address the demolition of the tunnel, including a construction protection plan for nearby known historic structures; formal recordation of the existing tunnel's historic characteristics in accordance with Historic American Engineering Records and Historic American Buildings Survey (HAER/HABS) standards; installation of interpretive signs or plaques at publicly accessible areas noting the history of the tunnel and Virginia Avenue SE; donating of original stone serving as the western portal to eligible entities, including Friends of Garfield Park; establishing a fund to be used for assisting eligible individuals or organizations seeking to conduct exterior preservation projects or historic education; nominating Control Point (CP) Virginia, an inactive switching tower located at 2nd Street SW adjacent to the CSX rail line, to the District and National Registers; conducting exterior rehabilitation of CP Virginia; preparing a determination of eligibility (DOE) for Virginia Avenue Paving (51SE062) by a qualified archaeologist; investigating the possible presence of additional Virginia Avenue Paving along cross streets of Virginia Avenue SE between 2nd and 11th Streets; making sure removal of the paving stones shall not be undertaken prior to review and approval of a work plan; and restoring Virginia Avenue SE and Virginia Avenue Park to at least their pre-construction conditions.

The Project's impact to the L'Enfant Plan that results in a Section 4(f) use is the need for temporary longitudinal trenching along Virginia Avenue SE. Although the nature of the trenching among the three Build Alternatives would vary, all three will require the closure of Virginia Avenue SE between 2nd and 9th Streets SE for substantial periods of time. Despite the differences in trenching among the Build Alternatives, the construction mitigation measures will be almost identical, with the only difference being the timing of certain maintenance of traffic (MOT) measures. The MOA includes additional mitigation measures identified above to address the Section 106 adverse effects from the use of Virginia Avenue SE and subsequently the L'Enfant Plan as well as the effects from the use of other historic resources. All of the MOA measures will apply regardless of the Build Alternative.

The reason for the Section 4(f) use of the CHHD and Virginia Avenue Park is very similar to the reason for the use of the L'Enfant Plan--trenching lasting dozens of months within the park--which will temporarily close a large portion of the park to the general public. Again, despite the differences in trenching among the three Build Alternatives, construction mitigation, which involves construction noise and dust control measures among other things, and the Section 106 mitigation measures, which are summarized above, will be largely the same among the Build Alternatives.

Conclusion

For Factor 1, all of these mitigation measures will apply regardless of the Build Alternative. Therefore, the ability to mitigate adverse impacts to the Section 4(f) resources is equal for all Build Alternatives.

Factor 2: The relative severity of the remaining harm, after mitigation, to the protected activities, attributes, or features that qualify each Section 4(f) property for protection.

The Build Alternatives will result in similar impacts on the four protected Section 4(f) resources identified in Section 6.5. For example, each of the Build Alternatives will result in the demolition and replacement of Virginia Avenue Tunnel. Upon demolition of the tunnel, the attributes and features that qualify it for protection will no longer exist. Regardless of the Build Alternative selected, mitigation measures as defined in the MOA will be implemented to lessen the severity of the harm to this resource.

The impacts to the L'Enfant Plan, CHHD, and Virginia Avenue Park will be temporary, and although they constitute a Section 4(f) use, the conclusion of construction allows for the complete restoration of these resources as noted in Section 6.8. As a matter of engineering, the Build Alternatives, as described in Section 6.7, have been developed to emphasize engineering feasibility and minimize disruption to the community affected.

The Build Alternatives differ in three important aspects. First, the LOD or temporary construction area for Alternative 4 would be slightly narrower or smaller than the Preferred Alternative or Alternative 2, which have the same LOD and construction area. Secondly, the Preferred Alternative or Alternative 2 will be constructed more quickly than Alternative 4. Additionally, the Preferred Alternative will operate freight trains within a tunnel throughout construction, except for a 230-foot section immediately east of the 2nd Street portal. This open trench will end west of 3rd Street SE. Under Alternatives 2 and 4, freight trains would operate within an open, but protected, trench along the entire limits of the tunnel, between 2nd and 11th Streets SE.

The narrower LOD under Alternative 4 is not significant in terms of least harm to L'Enfant Plan because the difference is just a few feet. In Virginia Avenue Park, Alternative 4's temporary construction area is smaller than what is needed for the Preferred Alternative or Alternative 2, primarily because of the need to split the tunnel beginning on the west side of the park for both the runaround track (Alternative 2) and the new south side tunnel (the Preferred Alternative). All three Build Alternatives avoid displacing the community garden and park benches along Potomac Avenue SE.

The Preferred Alternative and Alternative 2 will require between 30 and 42 months for construction (same for construction within Virginia Avenue Park), whereas Alternative 4 would require 54 to 66 months of construction (38 to 54 months for construction within Virginia Avenue Park). The Section 4(f) use of the L'Enfant Plan and Virginia Avenue Park will therefore

be shorter under the Preferred Alternative or Alternative 2 than under Alternative 4, which is an important difference due to community concerns about construction duration.

The third difference is pertinent to the Section 4(f) use of Virginia Avenue Park. Under the Preferred Alternative, at no time will trains be operating in an open trench in the park. Under Alternatives 2 and 4, trains would operate in an open trench throughout most of the construction duration, and these areas would need to be kept secured from the general public for safety reasons.

Conclusion

The Build Alternatives will result in very similar impacts, including those on the four Section 4(f) properties. With the exception of impacts on Virginia Avenue Tunnel, all the uses of and impacts on 4(f) properties are temporary and will occur only during the Project's construction period. However, the Preferred Alternative will result in less severe remaining harm after mitigation on the basis that it has a shorter construction period than Alternative 4 and that it enables freight rail operations to continue within an enclosed tunnel within Virginia Avenue Park and along much of Virginia Avenue SE, unlike Alternatives 2 and 4.

Factor 3: The relative significance of each Section 4(f) property.

The parties with jurisdictional authority over the Section 4(f) properties, which includes DC SHPO, NPS and DPR, have not communicated information on relative significance of each of those properties in comparison to one another. Nevertheless, because the three Build Alternatives will all require use of the same Section 4(f) properties in nearly the same amounts, the fact that one or more of them may be relatively more significant is immaterial for the purposes of identifying the least harm alternative.

Factor 4: The views of the official(s) with jurisdiction over each Section 4(f) property.

Agencies or organizations with jurisdiction over the four affected Section 4(f) resources include the DC SHPO for Virginia Avenue Tunnel, the L'Enfant Plan and CHHD, and NPS and DPR for Virginia Avenue Park. Although a Draft EIS was available for agency and public review, none of the other organizations with jurisdiction over the affected Section 4(f) properties have stated a preference for an alternative. The SHPO did concur with the Section 106 adverse effect determination by FHWA. In addition, SHPO, NPS and DPR have concurred with the mitigation measures stipulated by the MOA.

Conclusion

In the absence of views from the organizations with jurisdiction over the affected Section 4(f) properties, the conclusion is that all three Build Alternatives are equal in terms of Factor 4.

Factor 5: The degree to which each alternative meets the purpose and need for the project.

Upon completion and regardless of the Build Alternative, the rebuilt Virginia Avenue Tunnel will meet the freight rail transportation needs over the next several decades. All three Build Alternatives will provide adequate provisions to maintain freight rail operations throughout construction. However, there are greater risks of service disruptions under Alternative 4 because temporary train operations and reconstruction of the tunnel would occur within the same trench.

Conclusion

While the Build Alternatives are largely equal, Alternative 4 would involve the risk of potential disruptions to rail service during the construction. Therefore, the Preferred Alternative and Alternative 2 will meet the purpose and need of the project to a slightly higher degree than Alternative 4.

Factor 6: After reasonable mitigation, the magnitude of any adverse impacts to resources not protected by Section 4(f).

During construction, the LOD is limited to Virginia Avenue SE, Virginia Avenue Park, other public right-of-way associated with the 11th Street Bridges, CSX rail right-of-way and the Marine Corps Recreation Facility. No recreational elements of the Marine Corps facility would be affected. All of these properties will be restored to at least pre-construction conditions at the end of construction. In addition, the construction period impacts to air quality and noise conditions would largely be the same regardless of the Build Alternative, and none of the Build Alternatives would affect water resources, such as wetlands. When construction is completed, and the rebuilt Virginia Avenue Tunnel becomes fully operational, the LOD and the surrounding areas (both Section 4(f) and non-Section 4(f) resources) will revert back to the environmental and streetscape conditions that existed prior to construction. The Project is essentially rebuilding existing transportation infrastructure.

Conclusion

For Factor 6, the Build Alternatives are equal.

Factor 7: Substantial differences in costs among the alternatives.

The costs for the Preferred Alternative and Alternative 2 would be similar at approximately $168 and $175 million, respectively. At approximately $208 million, the cost for Alternative 4 would be approximately 24 and 20 percent higher than the Preferred Alternative and Alternative 2, respectively. One of the major factors affecting the higher cost of Alternative 4 is the more complicated construction phasing / temporary freight rail operations, which would also substantially extend the construction duration.

Conclusion

For Factor 7, Alternative 4 will have a substantially higher cost than the Preferred Alternative or Alternative 2.

6.9.2.2 Least Overall Harm Conclusion

To summarize the least harm analysis of the Build Alternatives:

- Factor 1: The ability to mitigate adverse impacts is equal for all Build Alternatives.
- Factor 2: The Preferred Alternative will result in less severe remaining harm after mitigation on the basis that it has a shorter construction period than Alternative 4 and that it enables freight rail operations to continue within an enclosed tunnel within Virginia Avenue Park and along much of Virginia Avenue SE, unlike Alternatives 2 and 4.
- Factor 3: All Build Alternatives are equal.
- Factor 4: All Build Alternatives are equal.
- Factor 5: The Preferred Alternative and Alternative 2 will meet the purpose and need of the Project to a slightly higher degree than Alternative 4 because Alternative 4 would involve the risk of potential disruptions to rail service during construction.
- Factor 6: All Build Alternatives are equal.
- Factor 7: Alternative 4 has a substantially higher cost than the Preferred Alternative or Alternative 2.

The Preferred Alternative will have the least overall harm to the affected Section 4(f) properties on the basis that: (i) it involves a substantially shorter construction period than Alternative 4; (ii) it enables freight rail operations to continue within an enclosed tunnel within Virginia Avenue Park and along much of Virginia Avenue SE, unlike Alternatives 2 and 4; and (iii) it costs substantially less than Alternative 4.

6.9.3 Planning and Measures to Minimize Harm

Virginia Avenue Tunnel, the L'Enfant Plan and CHHD qualify as Section 4(f) properties because they are also historic properties. An historic property is any district, site, building, structure or object that is on or eligible for listing on the National Register. NHPA Section 106 requires federal agencies, such as FHWA, to take into account the effects of their undertakings or actions on historic properties. The federal approvals needed to allow the Project to proceed are considered as federal undertakings or actions.

The Section 106 process requires that the federal agency first determine whether the undertaking could affect historic properties. If so, the federal agency must consult with the SHPO and others, which may involve the public and consulting parties (those with a particular interest in historic preservation). If not, the federal agency would have no further Section 106 obligations with respect to the undertaking by rendering a "no historic properties affected" determination. If historic properties are affected, the federal agency would render either an "adverse effect" or "no adverse effect" determination.

The Section 106 process for the Project was formally initiated on November 4, 2011, and involved four consulting parties meetings. A Section 106 "adverse effect" determination for the Project was rendered partially due to the required demolition of Virginia Avenue Tunnel and the temporary construction impacts to a L'Enfant Plan street (Virginia Avenue SE) and a contributing resource to the CHHD (Virginia Avenue Park). The results of the Section 106 consultations for the Project informed the Section 4(f) evaluation by:

- Obtaining the views of the SHPO, the official with jurisdiction over Virginia Avenue Tunnel and the L'Enfant Plan;
- Identifying the measures to minimize harm that could preserve the historic activities, features, or attributes of Virginia Avenue Tunnel and the L'Enfant Plan in consultation with the SHPO and CSX in accordance with the consultation process under 36 CFR part 800; and
- Understanding whether the measures to minimize harm to Virginia Avenue Tunnel and the L'Enfant Plan would result in any impacts or benefits to the surrounding community or environmental resources outside of the Virginia Avenue Tunnel corridor.

In addition to being a contributing resource to the CHHD, Virginia Avenue Park is also a public park and recreational facility, which qualifies it as a Section 4(f) property. The officials with jurisdiction over Virginia Avenue Park, a recreational resource, are the NPS and DPR. To initiate discussion to determine measures to minimize harm to Virginia Avenue Park, as a recreational resource, coordination with NPS has been conducted throughout the NEPA process. This included NPS's role as a cooperating agency, NPS participation in six agencies meetings held to date, and a meeting with NPS National Capital Parks-East (the NPS park agency with direct oversight over the park) to discuss the approvals needed to allow construction. In addition, a meeting with DPR was held to date to discuss District level approvals needed to allow construction in the park.

Regardless of the Build Alternative, mitigation measures to address the adverse effects to Virginia Avenue Tunnel were identified and outlined in a MOA prepared in accordance with Section 106. The MOA mitigation measures were subject to input from the SHPO and the consulting parties. The measures to minimize harm to Virginia Avenue Tunnel in the MOA includes a construction protection plan for nearby known historic structures; formal recordation of the existing tunnel's historic characteristics in accordance with Historic American Engineering Records and Historic American Buildings Survey (HAER/HABS) standards; installation of interpretive signs or plaques at publicly accessible areas noting the history of tunnel and Virginia Avenue SE; donating of original stone serving as the western portal to eligible entities, including Friends of Garfield Park; establishing a fund to be used for assisting eligible individuals or organizations seeking to conduct exterior preservation projects or historic education; nominating CP Virginia to the District and National Registers; conducting exterior rehabilitation of CP Virginia; preparing a DOE form for Virginia Avenue Paving (51SE062); investigating the possible presence of additional Virginia Avenue Paving along cross streets of Virginia Avenue SE between 2nd and 11th Streets; and restoring Virginia Avenue SE and Virginia Avenue Park to at least their pre-construction conditions.

Once the construction of the Project is concluded, traffic (including pedestrians and bicyclists) will be restored on Virginia Avenue SE. In addition, the Project will provide the following improvements to Virginia Avenue SE streetscape between 2nd and 9th Streets SE (see Section 3.6):

- New shared use bike paths connecting Garfield and Virginia Avenue Parks;
- Street alignment straightening between 4th and 5th/6th Streets SE (currently, the alignment bows to the south, deviating from the original L'Enfant Plan alignment);
- Additional landscaped green spaces, in particular between 4th and 5th/6th Streets;
- Widened and additional sidewalks, such as new sidewalks on the north side of Virginia Avenue between 7th and 8th Streets;
- Reduction of lanes between 5th/6th and 8th Streets to encourage lower speeds;
- Provision of additional on-street parking where appropriate; and
- Improved street lighting, traffic signals and crosswalks.

DDOT and the project sponsor, CSX, will conduct outreach with the community and other stakeholders to plan the specifics of these enhancements.

At the conclusion of construction, the Project will completely restore Virginia Avenue Park with additional amenities, such as a new dog park. Additional improvements, including landscaping, will be determined through consultation with NPS, DPR and the community.

The Project's complete Section 106 consultation process and other related Section 4(f) coordination activities, which has informed the Section 4(f) evaluation regarding the minimization of harm to the Virginia Avenue Tunnel, the L'Enfant Plan, the CHHD and Virginia Avenue Park, is fully disclosed in the Final EIS. The Final Section 4(f) Evaluation's measures to minimize harm are based, in part, upon the conclusion of the Section 106 consultation. A copy of the signed MOA is provided in Appendix A.

6.10 Agency Coordination

The NPS, DPR, NCPC, the Commission on Fine Arts, District Office of Planning, the U.S. Marine Corps, the U.S. Department of Navy, the Advisory Council for Historic Preservation (ACHP), the DC SHPO, and other interested stakeholders, such as the Capitol Hill Restoration Society and the Virginia Avenue Community Garden, participated as Section 106 consulting parties. The NPS is also a NEPA Cooperating Agency on the Draft EIS. In addition, dozens of briefings were held with a number of agencies, and Project interagency meetings were held. A summary of the agency coordination activities is provided in Table 6-1. To date, the SHPO, NPS, DPR, the Marine Corps or other agency have not stated a preference for an alternative. Coordination among the FHWA, DDOT, SHPO, NPS, DPR, FRA, NCPC, U.S. Marine Corps, and other stakeholders, consulting and interested parties will continue.

6.11 Section 4(f) Conclusion

Four Section 4(f) properties will be affected by the reconstruction of the Virginia Avenue Tunnel project. They are: (1) Virginia Avenue Tunnel; (2) the L'Enfant Plan; (3) the Capitol Hill Historic District; and (4) the Virginia Avenue Park. With the exception of the Section 4(f) "use" by incorporation of the existing Virginia Avenue Tunnel, all other Section 4(f) "uses" will occur during the construction period. At the conclusion of the construction, all surface areas, including the affected Section 4(f) properties, will be restored to at least their pre-construction conditions.

Table 6-1
Summary of Agency Coordination Activities

Date	Agency	Form	Purpose/Results
October 6, 2010	Various-Interagency	Meeting	Briefing on CSX projects in the District and obtained project input
July 28, 2011	Various-Interagency	Meeting	Obtained NEPA scoping comments
August 11, 2011	DC Fire and Emergency Medical Services Department	Letter	Obtained NEPA scoping comments
August 19, 2011	U.S. Environmental Protection Agency, Region III	Email	Obtained NEPA scoping comments
August 23, 2011	DC Department of Housing and Community Development	Letter	Obtained NEPA scoping comments
September 6, 2011	NCPC	Letter	Obtained NEPA scoping comments
September 8, 2011	DC SHPO	Letter	Obtained NEPA scoping comments
November 16, 2011	Various-Interagency	Meeting	Obtained input on Project concepts
November 22, 2011	DC SHPO	Letter	Section 106 initiation and comments
February 14, 2012	Various, including community organizations	Meeting	Section 106 consulting parties meeting #1: Project introduction
March 15, 2012	Various-Interagency	Meeting	Concepts screening process
March 21, 2012	DC SHPO	Meeting	Section 106 Area of Potential Effects (APE)
May 8, 2012	Various-Interagency	Meeting	Concepts evaluation
May 21, 2012	Various, including community organizations	Meeting	Section 106 consulting parties meeting #2: identification of historic properties in APE

Table 6-1 (continued)
Summary of Agency Coordination Activities

Date	Agency	Form	Purpose/Results
September 11, 2012	Various-Interagency	Meeting	Briefing on fourth public meeting
September 12, 2012	DC SHPO	Meeting	Preliminary effect determinations
September 26, 2012	Various, including community organizations	Meeting	Section 106 consulting parties meeting #3: preliminary effect determinations
January 10, 2013	DC SHPO	Meeting	Discussion on potential mitigation measures
February 12, 2013	DPR	Meeting	Information on approvals to allow construction in Virginia Avenue Park
February 12, 2013	NPS National Capital Parks-East	Meeting	Information on approvals to allow construction in Virginia Avenue Park
July 30, 2013	Various-Interagency	Meeting	Briefing on Draft EIS and public hearing
September 10, 2013	DC SHPO and Advisory Council on Historic Preservation	Meeting	Section 106 mitigation measures
November 5, 2013	Various-Interagency	Meeting	Preferred Alternative Discussion
February 25, 2013	DC SHPO, Marine Corps, NCPC, NPS and DPR	Meeting	Section 106 MOA

There is no feasible and prudent alternative, as defined in 23 CFR 774.17, to the "use" of land from the Virginia Avenue Tunnel, and the construction-period occupancy of the L'Enfant Plan, Capitol Hill Historic District, and Virginia Avenue Park. The Project includes all possible planning, as defined in 23 CFR 774.17, to minimize harm to Section 4(f) properties resulting from such "use". The project sponsor, CSX, has committed to improve the function and appearance of Virginia Avenue SE and provide additional amenities at Virginia Avenue Park as part of the Project as a community benefit, and will work with the agencies with jurisdiction over these properties (DC SHPO, NPS and DPR) to identify such measures to minimize or mitigate harm and enhance the properties, as appropriate. CSX will also work with FHWA, DDOT, the community and other stakeholders to identify the appropriate enhancements and amenities.

A final determination of the least overall harm alternative in light of preservation purpose of Section 4(f) was made by balancing the factors considered in Section 6.9.2 and the comments made by the agencies and the public. The Preferred Alternative was found to have the least overall harm to Section 4(f) properties among the Build Alternatives.

As it has the least overall harm to the Section 4(f) properties, Alternative 3 was selected as the Preferred Alternative.

Chapter 7
Comments and Coordination

Chapter 7
Comments and Coordination

This chapter summarizes the agency and public consultation and coordination activities for the Project conducted to date. Project scoping, coordination and outreach activities included correspondence and meetings with government agencies, and contact with community organizations and other interested stakeholders, through small group and public meetings.

7.1 Agency Consultation and Coordination

7.1.1 Early Agency Briefings

Prior to the initiation of the NEPA process, the project sponsor conducted briefings with officials from the federal government, the, Government of the District of Columbia and various regional agencies and elected officials about the Project. Some of these briefings included discussion of other projects in the District.

Federal Agencies

- Architect of the Capitol, February 17, 2010
- Department of the Navy, Navy Yard, October 5, 2009
- Department of Interior, National Park Service, September 10, 2009
- Marine Corps, Marine Barracks Washington, November 12, 2009
- National Capital Planning Commission
  - September 29, 2009
  - November 12, 2009
  - February 10, 2010
  - March 3, 2010

Government of the District of Columbia

- City Administrator, September 16, 2009
- Department of Consumer and Regulatory Affairs, June 2009
- Department of Environment, March 19, 2009
- Department of General Services
  - January 8, 2010
  - September 2, 2010
- Office of the Deputy Mayor for Planning and Economic Development
- Office of Planning
  - September 24, 2008
  - April 28, 2009
  - April 30, 2009
  - August 27, 2009
  - May 25, 2010
- State Historic Preservation Office

  - July 15, 2009
  - January 21, 2010
  - September 2, 2009
  - June 10, 2010

Regional Agencies or Organizations

- DC Water and Sewer Authority (DC Water), May 15, 2009
- National's Stadium Authority, November 11, 2009
- Metropolitan Washington Council of Governments
  - April 4, 2008,
  - July 24, 2008
  - October 16, 2008 (site tour included)
  - June 17, 2009
  - June 26, 2009
  - July 15, 2009
  - September 4, 2009
  - September 10, 2009
  - September 16, 2009
  - January 28, 2010
  - July 8, 2010
- Washington Area Metropolitan Transit Authority, March 17, 2010

Elected Officials

- US Congresswoman Eleanor Holmes Norton
  - May 1, 2008
  - November 10, 2009
  - September 2, 2010
- Former DC Mayor Adrian Fenty, April 29, 2010
- Then DC Council Chairman Vincent Gray and Staff, October 28, 2009
- DC Councilman Phil Mendelson
  - November 13, 2009
  - January 27, 2010
- DC Councilman Tommy Wells and Staff
  - July 6, 2009
  - December 14, 2009
  - June 10, 2008
  - September 24, 2009
  - November 20, 2009

7.1.2 NEPA Scoping

At the beginning of the NEPA process for this Project, the following agencies were contacted by letter from DDOT (see Appendix A) and were asked if they were aware of any environmental or social issues assocated with the Project, or if they had any environmental or other concerns. An

asterisk (*) appears next to those agencies that responded to the request for comments letter. Copies of the response letters or emails are provided in Appendix A.

Federal Agencies

- National Capital Planning Commission*
- U.S. Commission of Fine Arts
- U.S. Department of the Army
- U.S. Department of the Interior, National Park Service
- U.S. Environmental Protection Agency*
- U.S. Fish and Wildlife Service
- U.S. Marine Corps

Government of the District of Columbia Agencies

- DC Housing Authority
- Department of Consumer & Regulatory Affairs
- Department of Housing and Community Development*
- Department of Public Works
- Department of General Services
- Department of Parks and Recreation
- Department of the Environment
- Fire and EMS Department*
- Office of Planning
- Office of Unified Communications
- Public Schools
- State Historic Preservation Office*

Regional Agencies

- DC Water
- Metropolitan Washington Council of Governments
- Washington Metropolitan Area Transit Authority

At the time of the scoping letter (August 2, 2012) and responses from the agencies identified above, the FHWA's NEPA classification of the project was an EA process (Class III). FHWA initiated the NEPA process on May 9, 2011. FHWA later elevated the NEPA classification to an EIS process (Class I) and released a Notice of Intent (NOI) to prepare a Draft EIS in the Federal Register dated May 1, 2012. No agencies comments were received as a result of the NOI.

7.1.3 Interagency Meetings

Interagency meetings were held on the following dates, and all the meetings were held at the offices of DDOT:

- October 6, 2010
- July 28, 2011
- November 16, 2011

- March 15, 2012
- May 8, 2012
- September 11, 2012
- July 30, 2013
- November 5, 2013

The October 6, 2010 interagency meeting was held prior to the initation of the formal NEPA process (May 9, 2011). The purpose of the October 6th meeting was to brief the attendant agencies about the National Gateway Inititive (NGI) generally, and about the Project Sponsor's proposed projects in the District of Columbia, which include the reconstruction of Virginia Avenue Tunnel and lowering of the rail line beneath New Jersey Avenue (the proposed action or Project).

The July 28, 2011 interagency meeting was used to solicit NEPA scoping comments from the agencies. Unlike the interagency meeting held on October 6, 2010, the July 28th, meeting focused almost exclusively on the Project. The topics discussed during the meeting included Purpose and Need, Project elements, and the envrionmental resouces at and surrounding the Project Area.

The November 16, 2011 interagency meeting was used to introduce the Project concepts (see Section 3.7) to the agencies, and invite comments on these concepts.

The March 15, 2012 interagency meeting was used to explain the alternatives screening process. The screening criteria described in Section 3.7.2 were presented to the agencies.

The May 8, 2012 interagency meeting was used to present the materials planned to be presented at the May 21, 2012 public meeting (see Section 7.2.2). The results of the concepts evaluation (see Section 3.7.3) and information about expected construction and associated maintenance of traffic plans were presented.

The September 11, 2012 interagency meeting was used used to present the materials planned to be presented at the September 27, 2012 public meeting (see Section 7.2.2).

The July 30, 2013 interagency meeting was used to present the materials planned to be presented at the July 31, 2013 public hearing (see Section 7.3.2).

The November 5, 2013 interagency meeting was used to solicit input from the agencies regarding selection of the Project's preferred alternative.

7.1.4 Agency Regulatory Coordination

Since the Project would require compliance with certain federal environmental laws and regulations, additional agency coordination and consultation was conducted as described below. Further information about these additional environmental requirements is provided in Chapters 3 and 4.

Endangered Species Act (ESA), Section 7

ESA Section 7 requires that federally-funded, authorized or permitted actions be done in a manner that will not jeopardize the continued existence of any plant or animal species listed as threatened or endangered (T&E), or adversely modify designated critical habitat. The Section 7 process involves consultation with either the U.S. Fish and Wildlife Service (FWS) or the National Marine Fisheries Service depending on the potentially affected species. The following letter correspondence was conducted to date regarding compliance with ESA Section 7 (see Appendix A):

- DDOT letter to FWS dated August 22, 2011 requesting a list of T&E species or unique habitat that may be affected by the Project;
- FWS letter to DDOT dated June 11, 2012 in response to the August 22, 2011 letter stating that there are no T&E species known to exist near the Project Area, but recommended additional consultation with the National Park Service (NPS) and the DC Department of the Environment (DDOE);
- DDOT letter to DDOE dated June 22, 2012 requesting information about District T&E or critical habitat at or near the Project Area;
- DDOT letter to NPS dated July 7, 2012 requesting information about rare species at or near the Project Area;
- DDOE letter to DDOT dated July 13, 2012 providing a list of Species of Greatest Conservation Need that may be in the general vicinity of the Project Area; and
- NPS letter to DDOT dated July 18, 2012 stating that there no rare species known to existing in or near the Project Area.

National Historic Preservation Act (NHPA), Section 106

NHPA Section 106 requires that actions that are federally funded, authorized or permitted take into account the effect of such actions on any district, site, building, structure or object that is included in or eligible for inclusion in the National Register of Historic Places. The Section 106 process involves coordination and consultation with the State Historic Preservation Officer (SHPO), and other agencies and organizations that have an interest in or is mandated to protect historic properties. In addition, the Advisory Council on Historic Preservation (ACHP) is afforded the opportunity to comment on actions that may potentially affect historic properties. The following letter correspondence and other activities were conducted to date on behalf of the Project pursuant to NHPA Section 106 (see Appendix A):

- FHWA letter to potential consulting parties dated October 10, 2011 inviting them to participate in the Section 106 process.
- FHWA letter to the DC SHPO dated November 4, 2011 initiating the Section 106 process.
- DC SHPO letter to FHWA dated November 22, 2011 that:
  - Acknowledged the Section 106 initiation,
  - Noted that archaeological investigations were conducted on NPS-owned parcels Reservations 122 and 126, no archaeological resources were found and the DC SHPO has concurred with these findings,
  - Concurred with APE,

  - Noted the existence of two sites within the 11th Street Bridge right-of-way, and
  - Provided recommendations on consulting parties.
- Capitol Hill Restoration Society letter dated November 19, 2012 to FHWA that provided comments on the information provided to the Section 106 consulting parties for the Project (see below).
- Meeting with DC SHPO staff on March 21, 2012 to discuss the Project's Area of Potential Effects (APE) and Section 106 process.
- Meeting with DC SHPO staff on September 12, 2012 to discuss preliminary effect determinations and upcoming meeting with the consulting parties.
- Meeting with DC SHPO staff on January 10, 2013 to discuss potential mitigation measures.
- FHWA letter to the DC SHPO dated September 10, 2013 issuing an "adverse effect" in accordance with NHPA Section 106 for the Project.
- FHWA letter to the ACHP dated September 10, 2013 inviting ACHP to participate in the resolution of the "adverse effect".
- Meeting with DC SHPO and ACHP Staff on September 10, 2013 to discuss proposed mitigation measures to be included in the Section 106 memorandum of agreement.
- SHPO concurred with FHWA's "adverse effect" determination on October 10, 2013 by signing the bottom of the October 10, 2013 FHWA letter.
- ACHP letter to the FHWA dated October 28, 2013 declining to participate in the resolution of the "adverse effect".

The following consulting parties were invited or participated in the Project's Section 106 process:

- DC State Historic Preservation Officer
- Advisory Council on Historic Preservation
- National Capital Planning Commission
- U.S. Commission of Fine Arts
- National Park Service
- U.S. Department of the Navy
  - Marine Corps
  - Naval District Washington
- Federal Railroad Administration (FRA)
- DC Department of Housing and Community Development
- DC Department of Parks and Recreation
- Advisory Neighborhood Commission 6B
- Advisory Neighborhood Commission 6D
- Barracks Row Main Street
- Capitol Hill Restoration Society
- The Capitol Riverfront Business Improvement District
- Capitol Quarter Home Owners' Association
- The Committee of 100 on the Federal City
- DC Preservation League

- Friends of Garfield Park
- National Railway Historical Society
- The Pennsylvania Railroad Technical & Historical Society
- St. Paul AUMP Church
- Virginia Avenue Community Garden
- Washington Area Metropolitan Transit Authority
- Select approved individuals with a demonstrated interest

The following consulting parties meeting were held:

- February 14, 2012: Topics included an introduction of the Undertaking (Project), Section 106 Process and Next Steps
- May 21, 2012: Topics included introduction of the APE and historic properties identified in the APE
- September 26, 2012: Topics included discussion of effect determinations and potential mitigation

7.1.5 Other Agency Meetings

Other agency meetings were held to discuss particular topics pertinent to the preparation of the EIS and design of the Project. These meetings included:

- Federal Railroad Administration (FRA) on January 3, 2012 to provide a Project overview (FRA later accepted cooperating agency status);
- DDOE on February 10, 2012 and April 4, 2012 to discuss permitting requirements;
- DDOT Urban Forestry Administration on July 11, 2012 to discuss the potential tree displacement impacts of the Project and permitting requirements;
- DC Department of Parks and Recreation on February 12, 2013 to discuss the potential impacts to Virginia Avenue Park and the approvals needed to allow construction; and
- NPS National Capital Parks-East on February 12, 2013 to discuss the potential impacts to Virginia Avenue Park and the approvals needed to allow construction.

7.2 Community Outreach

Information about the Project and how to provide input were communicated to the general public through:

- Community group briefings;
- Four formal public information meetings;
- Project Website; and
- Newsletters.

7.2.1 Community Group Briefings

To reach people who may not typically attend public meetings or have special expertise or needs, project team members have provided briefings to a number of community and civic

organizations, businesses and individuals. The following briefings before community and civic organizations, businesses and individuals were held. Most of these briefings were held prior to the initiation of the NEPA process.

Advisory Neighborhood Commissions

- ANC 6B
  - November 10, 2009
  - April 13, 2010
  - September 7, 2010
  - September 21, 2010
  - July 21, 2011 (Transportation Committee)
- ANC 6D
  - April 12, 2010
  - November 8, 2010
  - December 12, 2011

Community and Private Organizations and Individuals

- Arthur Capper Senior Apartments, April 7, 2010
- Barracks Row Main Street, October 1, 2009
- Capital Motor Works, April 7, 2010
- Capitol Hill Restoration Society
  - November 11, 2009
  - December 9, 2011
- Capitol Quarter Residents and Home Owners Association
  - June 1, 2010
  - November 9, 2010
  - March 22, 2012 (Association Board)
- Capitol Riverfront Business Improvement District Staff and Board
  - October 28, 2009
  - November 18, 2009
  - July 1, 2010
  - July 22, 2010
- Claudia Holwill, DC VoiceontheHill Blogger and Garfield Park Resident, October 21, 2009
- Cohen Group, August 19, 2010
- DOGMA
  - January 9, 2010
  - April 7, 2010
- EYA Housing Authority, December 3, 2009
- Garfield Park Association
  - October 7, 2009
  - November 12, 2009
- Greater Washington Board of Trade
  - November 30, 2009

- Lower 8th Street Vision, November 17, 2009
- StoneBridge/Carras, January 8, 2010
- Southwest Neighborhood Assembly, June 28, 2010
- Various Local Bloggers (VoiceontheHill, JDLand (Washington Post), Greater Greater Washington; CHARTX; and HeardontheHill)
  - April 12, 2010
  - July 19, 2010 (walking tour)
  - February 3, 2010
- Virginia Avenue Park Community Garden
  - May 18, 2010
  - June 14, 2010
- William C. Smith Development Group, December 22, 2009

7.2.2 Public Information Meetings

A number of public workshops and meetings were held in advance of the public release of the Draft EIS. The purpose was to solicit feedback from the community on the Project and to involve the community in the development of alternatives for the Project. Various formats were used for the four public information meetings: traditional, open house, and modified open house/workshop. At each meeting, display boards containing project information were presented, forms for written comments were made readily available, and a verbatim reporter was available to record spoken comments. Copies of PowerPoint presentations, poster displays, completed comment forms submitted during and after the meeting (with personal information redacted), and meeting transcripts were made available on the project website.

Notices for the public meetings were placed in the Washington Post Express, the Hill Rag and El Tiempo (Spanish language newspaper). In addition, notices were placed on the project website and local community websites and blogs, including JDLand.com, Capitol Community News (ccn.com), and The Hill is Home (thehillishome.com). Meeting flyers in English and Spanish were prepared for all of the meetings and were mailed to households within the communities

Meeting Displays Boards

surrounding the Project Area. A mass flyer mail out was not conducted for the third and fourth public meetings, but email alerts were sent to those individuals who had signed up to be on the project email list through the project website.

All four public meetings were held near the Project Area to make it easy for residents living near the Project Area to attend the meetings. Shuttle service was provided for residents of the Capper Senior Apartments for the second, third and fourth meetings. The first public meeting was located one block from this residence.

Public Meeting 1

The first public meeting was held on September 14, 2011 at Van Ness Elementary School. An open house format was used, and the meeting principally served for public scoping to support the NEPA process. Display stations were available depicting the Virginia Avenue Tunnel, the freight transportation industry, the NEPA process, potential key environmental issues, Purpose and Need, Section 106 of the National Historic Preservation Act (NHPA), and the study schedule. Project team members staffed the stations to explain the information on the displays and answer questions from the public. Comments could be submitted on forms, noted on maps or verbally communicated to a verbatim reporter.

Public Meeting 1

Public Meeting 2

The second public meeting was held on November 30, 2011 at the Nationals Park. The purpose of the meeting was to present the project concepts as are described in Section 3.7.1. The traditional meeting format included a formal presentation followed by a moderated questions and answers session. Informational displays were staffed by the project team throughout the course of the meeting. The verbatim reporter transcribed the presentation and the comments, questions and answers that followed the formal presentation. Comment forms were also available.

Public Meeting 3

The third public meeting was held on May 21, 2012 at the Nationals Park, and again, a traditional meeting format was used, with open house displays. The purpose of the meeting was to present the concepts evaluation process and the concepts that were recommended to be further developed as the most viable candidate alternatives (see Sections 3.7.2 and 3.7.3). The maintenance of traffic plan was also presented. Similar to Public Meeting 2, the verbatim reporter transcribed the presentation and the comments, questions and answers that followed, and comment forms were available.

Public Meeting 3

Public Meeting 4

The fourth public meeting was held on September 27, 2012 at the Capitol Skyline Hotel. A modified open house format was used. The meeting began with a brief presentation. The participants were then asked to visit various stations where short presentations would be given by project staff. Following the presentation at a station, one-on-one conversations were initiated between the public and project staff. Each presentation and follow-up conversations were brief enough that a participant could visit several stations within the time frame provided. The stations included the following topics: sounds of transit (a tutorial about the nature and characteristics of sound), vibration, alternatives & construction sequencing, maintenance of traffic, construction practices, NHPA Section 106, and rail operations. The meeting ended with a general questions & answer session. Similar to previous public meetings, the verbatim reporter transcribed the opening remarks and ending questions & answers, and comment forms were available.

7.2.3 Project Website

The project website became active on August 16, 2011. The website contains a schedule of upcoming activities, public meeting materials, public comments, “frequently asked questions” and a webpage on the NHPA Section 106. Website visitors could submit comments or sign-up to be on the project email list.

7.2.4 Project Newsletters

Beginning in May 2012, seven project newsletters were published and distributed. The first newsletter appeared in May 2012, and subsequent newsletters were released starting in July 2012. The newsletters were posted on the project website, distributed to the project email list, and hand delivered to households near the Project Area. Copies of each of the newsletters released to date are provided in Appendix K.

7.2.5 Other Activities

Other public meetings were held or attended by elected officials wishing to obtain input from the community about the Project. These meetings were not held by the lead federal agency as part of the NEPA process. Staff from FHWA, DDOT and the project sponsor was not involved in the planning, organizing or facilitating the conduct of the meetings. However, they were asked by the elected officials to attend the meetings to be available to answer questions from the public. Two meetings were organized by Congresswoman Eleanor Holmes Norton. The first meeting was held on November 23, 2013 at the Capper Senior Apartments, and the second meeting was held on January 25, 2014 at 200 I Street SE (DC office building). The third meeting was held on January 16, 2014 at 200 I Street SE, which was hosted by the community. This meeting was attended by Mayor Vincent Gray, and was used to convey community concerns to the mayor.

7.3 Draft Environmental Impact Statement

7.3.1 Availability

The Project's Draft EIS was announced on July 12, 2013 edition in the Federal Register. This notice also announced a 45-day comment period ending on August 26, 2013. However, the FHWA extended the deadline by 30 days in response to requests. The July 26, 2013 edition of the Federal Register announced the comment deadline extension to September 25, 2013. Copies of the Draft EIS were mailed to federal and District of Columbia agencies that may an interest in the Project. In addition, hard copies of the Draft EIS were made available at the Southeast and Southwest Public Libraries; DDOT offices at 55 M Street SE; the FHWA Washington, DC Division office at 1990 K Street NW; and the CSX Community office at 861 New Jersey Avenue SE. Electronic files of the Draft EIS were available for download from the Project website, <www.virginiaavenuetunnel.com>. All parties who were sent copies of the Draft EIS were asked to provide comments.

7.3.2 Public Hearing

A public hearing was held on July 31, 2013 between the hours of 6:00 PM to 8:30 PM at the Capitol Skyline Hotel. Notice of the public hearing was published in the Washington Post Express, El Tiempo, and the Hill Rag, the Hill and JDLand websites. In addition, flyer advertising the hearing was distributed throughout the neighborhood surrounding the Project site.

The hearing included a formal presentation about the contents and findings of the Draft EIS. Following a short break, attendees were given the opportunity to publicly provide oral comments recorded verbatim by a stenographer. Another stenographer was made available for anyone who wished not to make comments in front of the public hearing audience. Those who commented at the public hearing are listed in Table 6-1. The public hearing transcript is available in Appendix L.

7.3.3 Comments

In addition to those who commented about the Draft EIS and Project at the July 31, 2013 public hearing, over 100 agencies, organizations and individuals provided written comments by letter or email. The names of these commenters are provided in Table 7-1, and their comments are provided in Appendix L. Responses to the comments are provided in Appendix L. The comments requiring responses are numbered, and the responses to these comments are provided on the same page.

Some of the comments received led to changes to the EIS. DDOT and FHWA considered all comments received in identifying the Preferred Alternative.

Table 7-1
Summary of Draft EIS Comments

Agency, Organization or Individual	Comments Provided	Page # of Comment
Public Places		
Southeast Neighborhood Library		NA
Southwest Neighborhood Library		NA
District Department of Transportation		NA
FHWA Washington, DC Division		NA
Federal Agencies		
Advisory Council on Historic Preservation		NA
Architect of the Capitol	❍	L-1
Council on Environmental Quality		NA
National Capital Planning Commission	❍	L-15
U.S. Commission of Fine Arts		NA
U.S. Department of the Interior, Office of Environmental Project Review	❍	L-17
U.S. Department of the Interior, Fish and Wildlife Service		NA
U.S. Department of the Interior, National Park Service		NA
U.S. Department of the Navy, Naval District Washington		NA
U.S. Department of the Navy, Marine Barracks Washington		NA
U.S. Department of Transportation, Federal Railroad Administration		NA
U.S. Environmental Protection Agency, Region 3 Regional Office	❍	L-21
Government of the District of Columbia Agencies		
Department of the Environment	❍	L-11
Department of Housing and Community Development		NA
Department of Parks and Recreation		NA

Table 7-1 (Continued)
Summary of Draft EIS Comments

Agency, Organization or Individual	Comments Provided	Page # of Comment
Office of Planning	❍	L-3
Historic Preservation Office		NA
Homeland Security and Emergency Management Agency		NA
Fire and EMS Department		NA
Metropolitan Police Department	❍	L-2
Housing Authority		NA
Office of the Deputy Mayor for Planning and Economic Development		NA
Regional Agencies		
Metropolitan Washington Council of Governments		NA
Washington Metropolitan Area Transit Authority		NA
State Agencies		
Virginia Department of Rail and Public Transportation	❍	L-34
Virginia Railway Express	❍	L-36
Elected Officials		
Congresswoman Eleanor Holmes Norton		NA
Mayor Vincent C. Gray		NA
Council Chairman Phil Mendelson		NA
Councilman Tommy Wells, Ward 6	❍	L-39
Commissioner Brian Flahaven, Chairperson, ANC 6B	❍	L-40
Commissioner Andy Litsky, Chairperson, ANC 6D	❍	L-139
Utility Companies		
District of Columbia Water and Sewer Authority	❍	L-6
Washington Gas		NA
Pepco		NA

Table 7-1 (Continued)
Summary of Draft EIS Comments

Agency, Organization or Individual	Comments Provided	Page # of Comment
Business, Civic, and Neighborhood Organizations		
Barracks Row Main Street		NA
Capitol Hill Restoration Society	❍(2)	L-77, L-92
Capitol Riverfront Business Improvement District	❍	L-72
Capitol Quarter Home Owners' Association, Phase 1	❍	L-52
Capitol Quarter Home Owners' Association, Phase 2	❍	L-66
Casey Trees	❍	L-76
The Committee of 100 on the Federal City	❍	L-100
National Railway Historical Society Washington DC Chapter	❍	L-150
Sierra Club Washington DC Chapter	❍	L-152
St. Paul AUMP Church		NA
Public Hearing Commenters		
Brian Huseman, Capitol Quarter Homeowners Association	❍	L-664
Laura Salmon, Capitol Quarter Homeowners Association	❍	L-669
Andrew Shields	❍	L-670
Claire Schaefer	❍	L-673
Matthew Johnson	❍	L-676
Elizabeth Purcell	❍	L-678
Maureen Harrington	❍	L-679. L-698
Jesse Skidmore	❍	L-683
Paul Ghiotto	❍	L-685
Monte Edwards, Committee of 100 on the Federal City	❍	L-687
Jen McPhillips	❍	L-689
Anne DarConte	❍	L-691

Table 7-1 (Continued)
Summary of Draft EIS Comments

Agency, Organization or Individual	Comments Provided	Page # of Comment
Shauna Holmes	❍	L-694
James McPhillips	❍	L-696
Karen Mills, St. Paul AUMP Church	❍	L-699
Rose Oliphant	❍	L-700
Elizabeth Lang	❍	L-703
Individual Commenters		
Toni Aluisi	❍ (2)	L-165, L-166
Amanda	❍	L-168
Malvika Bahadaran	❍	L-169
Mark Baker	❍ (2)	L-180, L-190
Meredith Baker	❍	L-202
Robin Barrett	❍	L-207
Kristen Belcourt	❍	L-209
Todd & Jill Marie Bell	❍	L-210
Raj Bharwani et. al.	❍	L-221
Adrian Black	❍	L-228
Scott Carlson	❍	L-229
Sarah Carr et. al.	❍	L-230
Elke Chen et. al.	❍	L-240
Jane Chittick	❍	L-241
Colin Clarke	❍	L-243
Nicole D'Ercole	❍	L-246
Anne Darconte	❍	L-256
Bruce Darconte	❍	L-258

Table 7-1 (Continued)
Summary of Draft EIS Comments

Agency, Organization or Individual	Comments Provided	Page # of Comment
Danielle Davidowitz	❍	L-260
Mark Dellinger	❍	L-268
Heather DiSabella	❍	L-277
Marc DiSabella	❍	L-279
Juliana Duffy et. al.	❍	L-281
Albert Epps	❍	L-289
Meredith Fascett	❍	L-299
Anya French	❍	L-309
Christopher French	❍	L-319
David Furman	❍	L-330
Ila Furman	❍	L-331
Andrea Gilliam	❍	L-332
Jason Goldsmith et. al.	❍	L-233
Bradley & Tristan Goodrich	❍	L-350
Trish Hamburger	❍	L-359
Maureen Cohen Harrington	❍	L-360
Dan Hartinger	❍	L-367
Sara Hayhurst	❍	L-368
Michael Hess	❍	L-378
Richard Holwill	❍	L-388
Claire Horton	❍	L-389
Jennifer Howard	❍	L-392
Brent Jackson	❍	L-393
Michelle Joffe	❍	L-402

Table 7-1 (Continued)
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Anjelina Keating	❍	L-408
Anne Kingery-Schwartz	❍	L-418
Brian Kirrane	❍	L-419
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Feza Koprucu	❍	L-421
Aaron & Jennifer Lancaster	❍	L-431
Todd Lard	❍	L-441
Elizabeth Latham	❍	L-442
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Derek Rall	❍	L-557
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Mary Strickland	❍	L-618
Irene Taguian et. al.	❍	L-619
Kenneth Thompson	❍	L-629
Maria Antonieta Trejo	❍	L-631
Eva Walter	❍	L-633
Jared Weaver et. al.	❍	L-644
Rhonda White	❍	L-651
Joshua Wiggins et. al.	❍	L-654

Chapter 8
List of Preparers

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List of Preparers

Management Oversight and Document Review

Federal Highway Administration, District of Columbia Division

Michael Hicks, Environmental/Urban Engineer

District Department of Transportation

Faisal Hameed

Saadat Khan

Lezlie Rupert

Jamie Henson

Eulois Cleckley

Document Preparation

Parsons Brinckerhoff, Inc.

Stephen Plano, Project Manager
M.A., Geography and Environmental Planning
B.S., Landscape Architecture
34 years experience

Jason Yazawa, Deputy Project Manager and EIS Author
M.U.R.P., Urban and Regional Planning
B.A., Economics
20 years experience

Pamela McNicholas, Natural Resources and EIS Author
M.S., Environmental Science and Policy
B.S., Environmental Analysis and Planning
20 years experience

Joseph Curtis, Land Use, Socioeconomic and EIS Author
M.C.P., City Planning
A.B., Geography
11 years experience

Allyson Reynolds, EIS Author
M.S., Transportation
B.A., English
23 years experience

John Winkel, Graphics
B.F.A, Graphic Design and Visual Communications
16 years experience

Eduardo Maeyama, Transportation
B.S., Civil Engineering
7 years experience

Erin Knauer, EIS Author
B.A., Sociology and Anthropology
1 year experience

Alice Lovegrove, Air Quality
M.S., Environmental and Waste Management
B.E., Engineering Science
24 years experience

Edward Tadross, Air Quality
B.A., Environmental Studies
B.A., Earth Sciences
15 years experience

Steve Allison, Biological Resources
B.S., Landscape Architecture
4 years experience

Michael Folli, Natural Resources & Wetlands
B.S. Environmental Science
17 years experience

Stephanie Foell, Historic Resources
M.H.P, Historic Preservation
B.S., History and Psychology
19 years experience

Henry Ward, Historic Resources
M.S., Anthropology
B.A., Anthropology and Sociology
33 years experience

Kelsey Britt, Historic Resources
B.A., Art History
2 years experience

John Page, Section 4(f)
M.U.P., Urban Planning
B.S., Urban Planning
38 years experience

Adam Heft, Site Contamination
M.S., Geology
B.S., Geology and Earth Sciences
20 years experience

Amanda Mendoza, Water Resources
B.S., Biology
5 years experience

Technical Contributors

Clark-Parsons Joint Venture

Philip Sheridan, Engineering
B.S., Civil Engineering
29 years experience

Prakash Patel, Engineering
B.S., Civil Engineering
33 years experience

Robert Brander, Transportation
M.S., Transportation Engineering and Planning
B.S., Civil Engineering
16 years experience

Winn Frank, Rail Operations
M.B.A, Business Administration
B.S., Transportation
46 years experience

Areg Gharabegian, Vibration
M.S., Energy, Resources and Environment
B.S., Mechanical Engineering
34 years experience

Gannett-Fleming

Ahmed El-Aassar, Noise
Ph.D., Environmental Engineering
M.S., Environmental Engineering
M.S., Water Resources Management
B.S. Civil Engineering
15 years experience

Geosyntec Consultants

Michael Berman, Site Contamination
M.E., Civil and Environmental Engineering
B.S., Chemical Engineering
19 years experience

Rick Jenson, Site Contamination
B.S., Geology
17 years experience

Hillis-Carnes Engineering Associates

Mike Hillis, Geotechnical Sampling
B.S., Finance
26 years experience

Mueser Rutledge Consulting Engineers

Francis J. Arland, Geotechnical Engineering
M.S., Civil Engineering
B.S., Civil Engineering
33 years experience

Shaw Environmental & Infrastructure Group

Roy Stancil, Site Contamination
B.S., Environmental Sciences
16 years experience

Stratacomm LLC

John Undeland, Public Outreach
B.A., Politics and Government
28 years experience

Wiles Mensch Corporation

Hank Sloan, Surveying
B.S., Forest Engineering
35 years experience

Matthew McComas, Utilities
B.S., Civil Engineering
13 years experience

Project Sponsor – CSX Transportation, Inc.

Ernest "Chip" Dobson, Project Coordinator

Keith Brinker, Environmental Coordinator

Charles Gullakson, Engineering Coordinator

Stephen Flippin, Community/Government Coordinator

Rick Hood, Real Estate Coordinator

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Chapter 9
Final EIS Recipients

Chapter 9
Final EIS Recipients

In addition to the Project's cooperating agencies and Section 106 MOA signatories, copies of the Final EIS will be provided to the federal and District agencies, other organizations and groups, and members of the public who provided substantive comments on the Draft EIS in accordance with 40 CFR 1502.19. The Final EIS will also be made available at public locations as noted below and on the Project website (www.virginiaavenuetunnel.com).

Public Places

Southeast Neighborhood Library

Southwest Neighborhood Library

District Department of Transportation

FHWA Washington, DC Division

Federal Agencies

Architect of the Capitol

National Capital Planning Commission

U.S. Department of the Interior
- Office of Environmental Project Review
- National Park Service (NPS), National Capital Region
- NPS, National Capital Parks - East

U.S. Department of the Navy
- Naval District Washington
- Marine Barracks Washington

U.S. Department of Transportation, Federal Railroad Administration

U.S. Environmental Protection Agency
- Office of Federal Activities
- Region 3 Regional Office

Government of the District of Columbia Agencies

Department of the Environment

Department of Parks and Recreation

Historic Preservation Office

Metropolitan Police Department

Office of Planning

State Agencies

Virginia Department of Rail and Public Transportation

Virginia Railway Express

District Elected Officials

Council of the District of Columbia
Councilman Tommy Wells, Ward 6

District of Columbia Advisory Neighborhood Commissioners (ANC)
Commissioner Brian Flahaven, Chairperson, ANC 6B
Commissioner Andy Litsky, Chairperson, ANC 6D

Utilities

District of Columbia Water and Sewer Authority (DC Water)

Business, Civic and Neighborhood Organizations

Capitol Hill Restoration Society

The Capitol Riverfront Business Improvement District

Capitol Quarter Home Owners' Association, Phase 1

Capitol Quarter Home Owners' Association, Phase 2

Casey Trees

The Committee of 100 on the Federal City

National Railway Historical Society Washington DC Chapter

Sierra Club Washington DC Chapter

DEIS Individual Commenters

See Table 7-1 for list commenters.

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Reports Prepared for the Project

Clark/Parsons, Joint Venture. *Virginia Avenue Tunnel Reconstruction Project – Traffic Operational Analysis Report*. September 2013 (Revised by Erata Sheet, April 2014)

Clark/Parsons, Joint Venture. *Virginia Avenue Tunnel Reconstruction Project – Transportation Management Plan Report*. November 2013

Clark/Parsons, Joint Venture. *Virginia Avenue Tunnel Reconstruction Project – Vibration Analysis Report*. March 2014

Environmental Acoustics, Inc. *Virginia Avenue Tunnel Reconstruction Project – Noise Assessment Report*. June 2013

Parsons Brinckerhoff. *Virginia Avenue Tunnel Reconstruction Project – Air Quality Technical Report*. April 2014

Parsons Brinckerhoff. *Virginia Avenue Tunnel Reconstruction Project – Concept Evaluation Technical Report Version 2*. July 2012

Parsons Brinckerhoff. *Virginia Avenue Tunnel Reconstruction Project - Modified Phase I Environmental Site Assessment*. May 2013

Parsons Brinckerhoff. *Virginia Avenue Tunnel Reconstruction Project* – Section 106 Assessment of Effects for Historic Properties. August 2013

Other References

56th Congress of the United States, February 12, 1901

American Farmland Trust for the U.S. Department of Agriculture and Natural Resources Conservation Service (September 2012). *Mitigation of Farmland Loss*. Retrieved from http://www.farmlandinfo.org/documents/29993/FPPA_Mitigation_Report.pdf. Accessed March 29, 2012.

Association of American Railroads (November 2009). "Rail Intermodal Keeps America Moving," November 2009. Retrieved from http://www.aar.org/Economy/~/media/AAR/BackgroundPapers/Intermodal%20Nov%202009.ashx.

Audubon Society of the District of Columbia. *DC Audubon Society* (website). Retrieved from http://www.dcaudubon.org/ Accessed July 22, 2012.

Barracks Row.org (March 21, 2011). *About Barracks Row*. Retrieved from http://www.barracksrow.org/what/about. Accessed March 5, 2012.

Cambridge Systematics, Inc. for the I-95 Corridor Coalition (December 2009). *Mid-Atlantic Rail Operations Phase II Study, Final Report.*

Capitol Hill Restoration Society. *Map of Capitol Hill Historic District.* http://www.chrs.org/Pages/3_HD1.html. Accessed January 31, 2012.

Capitol Riverfront Business Improvement District, *Capitol Riverfront* (website). http://www.capitolriverfront.org/. Access July 25, 2012.

Capitol Riverfront Business Improvement District. *Lower 8th Street, SE Vision Process Summary Report*. November 29, 2010. Retrieved from http://www.jdland.com/dc/files/8thstreet_201012_draftvision.pdf. Accessed January 30, 2012.

Capitol Riverfront Business Improvement District. *The Yards Park*. Retrieved from http://www.capitolriverfront.org/go/the-yards-park. Accessed February 12, 2012.

Capitol Riverfront Business Improvement District. *Tingley Plaza*. Retrieved from http://www.capitolriverfront.org/go/tingey-plaza. Accessed February 2, 2012.

Capitol Riverfront Neighborhood. *Neighborhood Overview*. Retrieved from http://www.capitolriverfront.org/neighborhood. Accessed January 31, 2012.

CIMP Project Team, Naval Facilities Engineering Command (NAVFAC) Washington. *Community Integrated Master Plan* (website). Retrieved from http://www.sedistrictcimp.com/Default.aspx. Accessed July 25, 2012.

Clark/Parsons, Joint Venture, Virginia Avenue Tunnel Reconstruction Project – Existing Utilities, Impacts and Proposed Relocations / Modifications, 2012

Council on Environmental Quality (n.d.). NEPA's Forty Most Asked Questions. Retrieved from http://ceq.hss.doe.gov/nepa/regs/40/40p3.htm.

CSX Transportation, Inc. (2010), National Gateway Initiative.

District (of Columbia) Department of the Environment (May 2008). *Anacostia 2032: Plan for a Fishable and Swimmable Anacostia River.* Retrieved from http://ddoe.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/Anacostia2032.pdf. Accessed January 11, 2012.

District Department of Transportation (January 2012), *District of Columbia Freight Forum, 1.* Retrieved from

http://www.godcgo.com/Portals/0/Content%20Images/District%20of%20Columbia%20Freight%20Newsletter.pdf. Accessed 3 September 2012.

District Department of Transportation (July 24, 2008). *Environmental Policy & Process Manual.*

District Department of Transportation, Noise policy, January 10

District of Columbia Water and Sewer Authority (n.d.). *DC Clean Rivers Project Division E – M Street Diversion Sewers, csos 015, 016 and 017*. Retrieved from http://www.dcwater.com/workzones/projects/pdfs/LTCP-Division-E.pdf

District of Columbia, Department of Human Services (n.d.). *211 Answers, Please!* (website). Retrieved from http://app.answersplease.dc.gov/services/resources/programDetails.asp?ssPID=DCAP0586AS&intID=DCAP0586&strLink=/services/resources/organizationResults.asp&intPg=4&intOtherPg=1&strType=browse&txtTitle=undefined&strBrowse=D&chkAKA=1&radWord=undefined. Accessed February 2, 2012.

District of Columbia, Department of Transportation. *2011 Bicycle Map*. Retrieved from http://www.dc.gov/DC/DDOT/About+DDOT/Maps. Accessed February 16, 2012.

District of Columbia, Department of Transportation. *Anacostia Waterfront Initiative (AWI) Projects*. http://ddot.dc.gov/DC/DDOT/Projects+and+Planning/Capital+Infrastructure+Projects/Anacostia+Waterfront+Initiative. Accessed February 29, 2012.

District of Columbia, Office of Planning (n.d.). 2005-2009 American Community Survey Report by Ward. http://planning.dc.gov/DC/Planning/DC+Data+and+Maps/DC+Data/Reports/Reports+2011/January+2011-+Key+Demographic+Indicators++ACS+2005-2009. Accessed February 27, 2012.

District of Columbia, Office of Planning (November 18, 2010). Historic Preservation Review Board; Historic Landmark Designation Case No. 11-011; Saint Paul African Union Methodist Protestant Church. Retrieved from http://planning.dc.gov/OP/hprb%20pdfs/nov/Historic%20Landmarks%20Nomination%20Saint%20Paul%20AUMP.pdf. Accessed July 25, 2012.

District of Columbia, Office of Planning. *2006 Comprehensive Plan for the Nation's Capitol.* http://planning.dc.gov/DC/Planning/Across+the+City/Comprehensive+Plan/2006+Comprehensive+Plan. Accessed January 5, 2012.

District of Columbia, Office of Planning. District of Columbia Profiles of General Demographic and Housing Characteristics: 2000 and 2010. http://planning.dc.gov/DC/Planning/Planning%20Publication%20Files/OP/State%20Data

%20Center/2010%20Census%20Data/DC%20Census%202010%20Population%20by%20Census%20Block%20Group.pdf. Accessed February 27, 2012.

District of Columbia, Office of Planning. *District of Columbia Profiles of General Demographic and Housing Characteristics: 2000 and 2010.* Retrieved from http://planning.dc.gov/DC/Planning/Planning%20Publication%20Files/OP/State%20Data%20Center/2010%20Census%20Data/DC%20Census%202010%20Population%20by%20Census%20Block%20Group.pdf. Accessed February 27, 2012.

District of Columbia, Office of Planning. *Land Use Map*. Retrieved from http://planning.dc.gov/DC/Planning/Across+the+City/Comprehensive+Plan/2006+Comprehensive+Plan/Generalized+Policy+and+Future+Land+Use+Maps. Accessed January 5, 2012.

District of Columbia, Office of Planning. Population by Race and Hispanic or Latino Origin in DC - Census Block Group: 2010.

District of Columbia, Office of Planning. September 2010. *Anacostia Waterfront Initiative*. http://www.capitolriverfront.org/_files/docs/awi10yearprog.pdf. Accessed January 31, 2012.

District of Columbia, Office of Planning. *Urban Design Framework for the Near Southeast (Draft)*. http://jdland.com/dc/files/awi_nearseurbandesignframework_2003.pdf. Accessed 3/1/12.

District of Columbia, Office of Planning. *Ward 6 Development Summary, Fall-Winter 2011*. http://planning.dc.gov/DC/Planning/In+Your+Neighborhood/Wards/Ward+6/Ward+6+Development+Summary. Accessed January 5, 2012.

District of Columbia, Office of Zoning. *Summary of Overlay Districts*. Updated November 5, 2010. http://dcoz.dc.gov/info/overlay.shtm. Accessed March 1, 2012.

Dupree, Jacqueline (editor). " 'The Yards'/Southeast Federal Center." *JDLand* (website) http://www.jdland.com/dc/sfc.cfm. Accessed January 31, 2012.

Dupree, Jacqueline (editor). "DCPS Nixes Idea of Bringing School Within School to Near Southeast." January 19, 2012. *JDLand* (website) http://www.jdland.com/dc/index.cfm/3617/DCPS-Nixes-Idea-of-Bringing-School-Within-School-to-Near-SE/. Accessed March 7, 2012.

Dupree, Jacqueline (editor). "New Capper Seniors Building." *JDLand* (website) http://www.jdland.com/dc/capperseniors.cfm. Accessed March 5, 2012.

Dupree, Jacqueline (editor). "New Marine Barracks." *JDLand* (website) http://www.jdland.com/dc/barracks.cfm. Accessed March 5, 2012.

Dupree, Jacqueline (editor). *JDLand: News and Photos Near Southeast/ Washington Navy Yard/ Capitol Riverfront/ Ballpark District* (website). http://www.jdland.com/dc/index.cfm. Accessed March 5, 2012.

Dupree, Jacqueline (editor).. "Capper/Carrollsburg Housing Redevelopment." *JDLand* (website) http://www.jdland.com/dc/capper.cfm?tab=no1. Accessed January 31, 2012.

Farmland Protection Policy Act. 7 U.S.C. §4201, et seq. http://www.farmlandinfo.org/index.cfm?function=article_view&articleID=29480. Accessed March 29, 2012.

Federal Transit Administration (FTA) guidelines, *Transit Noise and Vibration Impact Assessment* (2006)

Friends of Garfield Park (2012). "About the Friends." *Garfield Park – A Capitol Hill Landmark Since 1791*. (website). Retrieved from http://www.garfieldparkwashingtondc.org/About_the_Friends.html. Accessed December 28, 2012.

Friends of Garfield Park (2012). *Garfield Park: A Capitol Hill Landmark Since 1791* (website). Retrieved from http://www.garfieldparkwashingtondc.org/. Accessed July 23, 2012.

I-95 Corridor Coalition. 2002. *Mid-Atlantic Rail Operations – Phase I Study.* Retrieved from http://www.pooledfund.org/Details/Study/367. Accessed January 30, 2012.

I-95 Corridor Coalition. 2009. *Mid-Atlantic Rail Operations – Phase II Study*. Retrieved from http://www.pooledfund.org/Details/Study/367. Accessed January 30, 2012.

John Milner Associates, Inc. (July 2011). Phase 1B Archeological Survey for the Virginia Avenue Tunnel Railroad Project.

John Milner Associates, Inc. (November 2009). Phase I Cultural Resources Survey for New Jersey Avenue Track Lowering and Virginia Avenue Tunnel Rail Projects.

Johnson, Kyle. "Virginia Avenue Park – Plans Likely Delayed until Train Tunnel Project Completed." *Hillrag.com (website)* Retrieved from http://www.hillrag.com/CCN_Website09/publicationhtml/papers/HR/1209/VirginiaAvePark.html. Accessed December 28, 2011.

Land and Water Conservation Fund (LWCF) Act, 16 U.S.C. §4601-4 et seq (1964).

Marhamati, Joe. June 2010. *Drawing the Line: Capitol Hill*. Retrieved from http://dc.urbanturf.com/articles/blog/drawing_the_line_capitol_hill/2134. Accessed January 31, 2012.

McKone, Jonna. May 8, 2010. *Virginia Ave Community Garden Threatened by Development*. http://dcfoodforall.com/2010/05/virginia-ave-community-garden-threatened-by-development/. Accessed March 29, 2012.

Metropolitan Washington Council of Governments (November 17, 2010). *Transportation Improvement Program for the Metropolitan Washington Region: FY 2011-2016*. http://www.mwcog.org/clrp/projects/tip/fy1116tip/DC_FY_11-16_TIP.pdf. Accessed March 1, 2012.

Mooring, Pamela. "DC Water Breaks Ground on $2.6 Billion Clean Rivers Project -- Largest Construction Project in DC Since Building of Metro." *District of Columbia Water and Sewer Authority* (website). Retrieved from http://www.dcwater.com/news/listings/press_release522.cfm

Mueser Rutledge Consulting Engineers for Clark-Parsons Joint Venture, Tunnel Walk Report, Virginia Avenue Tunnel, Washington, DC, February 14, 2012

National Capital Planning Commission (n.d.). Retrieved at http://www.ncpc.gov/.

National Capital Planning Commission (NCPC) (April 1, 2010). *CapitalSpace Plan - Ideas to Achieve the Full Potential of Washington's Parks and Open Space, Final Plan*. http://www.capitalspace.gov/FinalPlan/Finalplan.htm. Accessed December 28, 2011.

National Capital Region Transportation Planning Board (November 17, 2010). *Financially Constrained Long-Range Transportation Plan* (CLRP). Retrieved from http://www.mwcog.org/clrp/projects/tip/fy1116tip/DC_FY_11-16_TIP.pdf. Accessed February 2, 2012 and March 1, 2012.

National Capital Region Transportation Planning Board and Metropolitan Washington Council of Governments (July 18, 2012). *Transportation Improvement Program For the Metropolitan Washington Region FY 2013-2018; As Approved by the TPD on July 18, 2012*. Retrieved from http://www.mwcog.org/clrp/projects/tip/fy1318tip/FULL_FY13-18_TIP.pdf. Accessed on July 22, 2012.

National Capitol Planning Commission (1997). *Extending the Legacy: Planning America's Capital for the 21st Century*. Retrieved from http://www.ncpc.gov/ncpc/Main(T2)/Publications(Tr2)/iframpages/monumental_core_framework_plan_a.html#LegacyPub. Accessed January 25, 2012.

National Capitol Planning Commission (2006). "Chapter 8: Parks, Recreation and Open Space Element." *Comprehensive Plan for the National Capitol Region*. Retrieved from D.C. Municipal Regulations and D.C. Register (website)

http://www.dcregs.dc.gov/Gateway/ChapterHome.aspx?ChapterNumber=10-A8. Accessed March 29, 2012

National Capitol Planning Commission (2006). *Comprehensive Plan for the National Capitol Region*. Retrieved from http://www.ncpc.gov/ncpc/Main(T2)/Planning(Tr2)/ComprehensivePlan.html. Accessed January 26, 2012.

National Capitol Planning Commission (April 2007). *Freight Railroad Realignment Feasibility Study*. Retrieved from http://www.ncpc.gov/DocumentDepot/Publications/RailRealignment/FreightRailroadRealingmentStudy_SectionOne.pdf. Accessed December 25, 2011.

Ogden Environmental and Energy Services Co., Inc. (November 5, 1998). *Material Evaluation Report of the Virginia Avenue Tunnel*. Washington DC: performed for CSX Transportation, Inc.

Robinson & Associates, Inc. (August 2007). *Garfield Park – Canal Park Connector Project Site History and Significance (95% Draft).* Retrieved from http://www.garfieldparkwashingtondc.org/uploads/Garfield_Park_History.pdf. Accessed December 28, 2011.

Schrank, David, Tim Lomax and Bill Eisele, Texas Transportation Institute (September 2011). The Texas A&M University System 2011 Urban Mobility Report, September 2011.

Section 106 of National Historic Preservation Act, 16 U.S.C. §470f (1966).

Smithsonian Institution, *National Museum of Natural History* (website), http://www.mnh.si.edu/ Accessed July 27, 2012.

Southwest Neighborhood Assembly, Inc (2011). *Parks and Recreation Centers*. http://www.swdc.org/culture_attractions/parks_centers.htm. Accessed December 28, 2011.

Southwest Neighborhood Assembly, Inc (2012). *Development Horizon*. http://www.swdc.org/neighborhood/development_horizon.htm. Accessed January 31, 2012.

Tatian, Peter et al. for the Urban Institute (September 30, 2008). *State of Washington, D.C.'s Neighborhoods*. UI project no. 08040-000-01. (http://www.neighborhoodinfodc.org/pdfs/neighborhoodindicators_2008_09_30.pdf. Accessed January 5, 2012.

Texas Transportation Institute and the Center for Posts and Waterways (December 2007). Modal Comparison of Domestic Freight Transportation Effects on the General Public, December 2007 (amended March 2009).

U.S. Department of Agriculture, Soil Conservation Service. July 1976. *Soil Survey of the District of Columbia*. Retrieved from http://www.sawgal.umd.edu/nrcsweb/DCsoils/maps/images/13wmap.jpg. Accessed December 29, 2011.

U.S. Department of Health & Human Services (2012). Prior HHS Poverty Guidelines (2010). Retrieved from http://aspe.hhs.gov/poverty/figures-fed-reg.shtml. Accessed February 29, 2012.

U.S. Department of Interior, National Park Service. *Capitol Hill Historic District*. http://www.nps.gov/nr/travel/wash/dc81.htm. Accessed 1/31/12.

U.S. Department of Transportation (November 3, 2010). Press Release, DOT Releases New Freight Transportation Data.

U.S. Department of Transportation, Federal Highway Administration (n.d.). Freight Analysis Framework Website, http://www.ops.fhwa.dot.gov/freight/index.cfm

U.S. Department of Transportation, Federal Highway Administration (October 20, 1987). Guidance for Preparing and Processing Environmental and Section (F) Documents.

U.S. Department of Transportation, Federal Highway Administration, Office of Planning, Environment and Realty; Project Development and Environmental Review (July 20. 2012). *Section 4(f) Policy Paper*. Retrieved from http://www.environment.fhwa.dot.gov/4f/4fpolicy.asp. Accessed September 3, 2012.

U.S. Department of Transportation, Federal Transit Administration, Office of Planning and Environment (May 2006). *Federal Transit Noise and Vibration Impact Assessment*, FTA-VA-90-1003-06.

U.S. Department of Transportation, Federal Transit Administration, Office of Planning and Environment (May 2006). *Transit Noise and Vibration Impact Assessment.* FTA-VA-90-1003-06. Retrieved from http://www.fta.dot.gov/documents/FTA_Noise_and_Vibration_Manual.pdf. Accessed September 3, 2012.

U.S. Environmental Protection Agency, Region 3. *Chesapeake Bay Total Maximum Daily Load for Nitrogen, Phosphorus and Sediment* (2010). Accessed online: http://www.epa.gov/reg3wapd/pdf/pdf_chesbay/FinalBayTMDL/CBayFinalTMDLExecSumSection1through3_final.pdf. Accessed June 10, 2012.

U.S. General Services Administration. *Southeast Federal Center*. Retrieved from http://www.gsa.gov/portal/content/104896 and http://www.gsa.gov/portal/content/103684. Accessed January 31, 2012.

U.S. Marine Corps. "Marine Barracks Washington History." Official U.S. Marine Corps Web Site http://www.marines.mil/unit/barracks/pages/barrackshistory.aspx. Accessed July 22, 2012.

U.S. Marine Corps. "Marine Barracks Washington: 8th and I." Retrieved from http://www.marines.mil/unit/barracks/pages/welcome.aspx. Accessed December 29, 2011.

University of the District of Columbia. October 1993. *Ground Water Resource Assessment Study For The District Of Columbia.* Retrieved from http://www.udc.edu/docs/dc_water_resources/technical_reports/report_n_145.pdf. Accessed July 23, 2012.

Virginia Railway Express. 2004. Strategic Plan, 2004-2025.

Washington Metropolitan Area Transit Authority (WMATA), Department of Operations Services (February 18, 2010). *Manual of Design Criteria for Maintaining and Continued Operation of Facilities and Systems, Section 16*, *Release 9*.

Wheeler Creek Community Development Corporation, *Wheeler Creek Community Development Corporation* (website) http://www.wheelerce.org/index. Accessed July 25, 2012.

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VIRGINIA AVENUE TUNNEL RECONSTRUCTION

FEDERAL HIGHWAY ADMINISTRATION

DISTRICT DEPARTMENT OF TRANSPORTATION