

# Executive Summary

## Issues

A mainline railroad carries freight trains through the Monumental Core of Washington, DC. The rail line's location and configuration cause significant problems:

- Proximity to the seat of the federal government and national symbolic sites creates serious security concerns.
- Outdated railroad infrastructure impairs railroad operations and constrains the movement of goods and people along the East Coast.
- Alignment of the railroad within historic street rights-of-way and through parks, employment areas, and neighborhoods disrupts the fabric of the nation's capital.

The rail line's location in the heart of Washington is shown in Figure ES-1. The line slices through the Southwest Federal Center, the location of twelve federal-agency headquarters buildings; runs within four blocks of the United States Capitol; and travels through densely populated residential neighborhoods.

The line's location raises security concerns because railroads carry hazardous materials. Railroads are a safe method of transport, but hazardous materials on this rail line would be a tempting target for attack because the line is in the Monumental Core. An attack here could have dramatic effects:

- Significant loss of life. An attack would jeopardize the lives of many federal

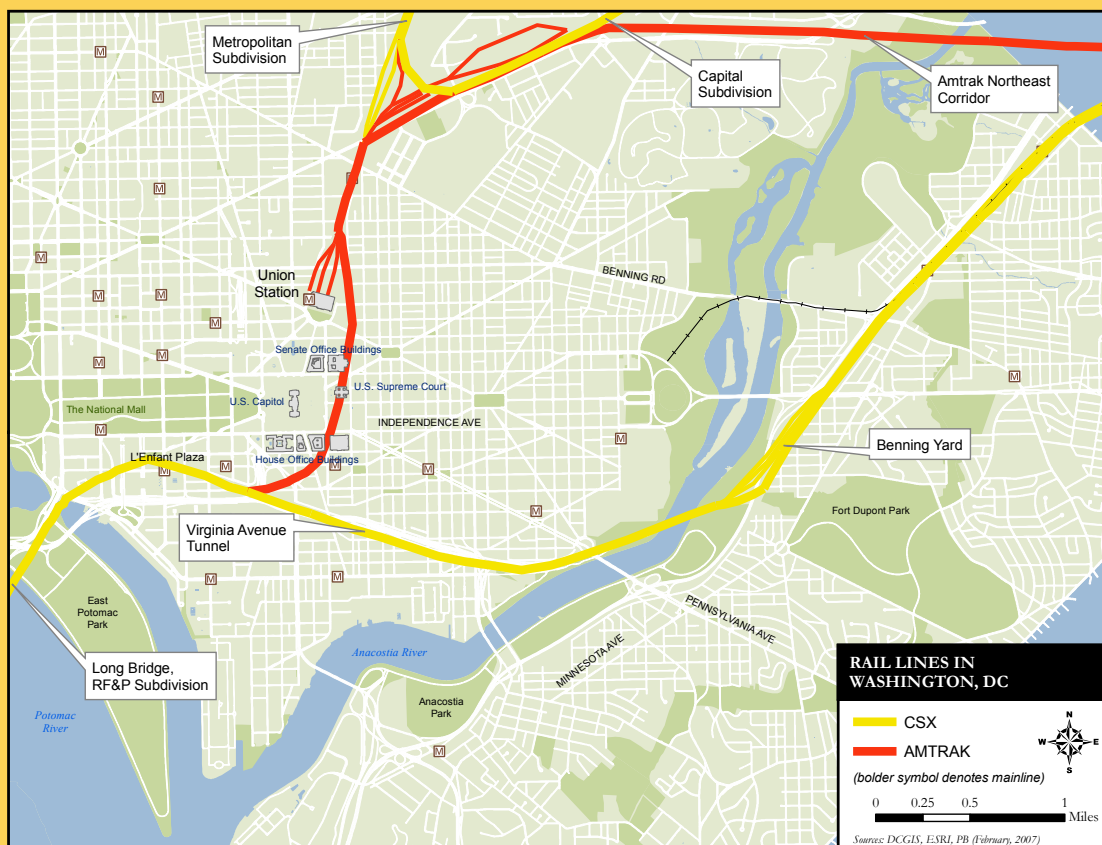


Figure ES-1. Washington, DC Railroads

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employees, elected officials, and nearby residents—more than 100,000 federal employees work within a half-mile of the line, and more than 54,000 people live in this same area within Washington, DC.

- Large economic losses. An attack could damage not only the rail line but also adjacent government offices and public facilities. Crippling the rail line would inhibit regional commerce, and wrecking buildings would interfere with the operation of government.
- Damage to national iconic structures. An attack would strike at Washington's Monumental Core, the symbolic center of the nation's governance. The result would register powerfully in the public consciousness.

Substantial efforts have been expended over the past few years to increase security in Washington, DC. Barriers have been installed to reduce the threat of intrusion on buildings and public places. Truck movements and parking have been restricted. Monitoring and public awareness have increased. Yet this rail line continues to carry freight through the Monumental Core, where hazardous materials could provide the means for an attack.

The outdated design of the rail line hampers interstate commerce and regional mobility because it is a bottleneck in railroad operations along the East Coast. The Long Bridge, the only rail crossing of the Potomac River within 70 miles of Washington, DC, is a major choke point because it carries only two tracks. The Virginia Avenue tunnel has only a single-track, and its limited clearance prevents the operation of double-stack container trains, which carry high-value, time-sensitive commodities elsewhere in the nation's rail system. The line is single-tracked in places, requiring trains to idle while waiting for clearance, not only reducing their

efficiency but also increasing opportunities for trains to be attacked. South and west of Union Station, this line also carries Amtrak and Virginia Railway Express service, so freight and passenger trains must share limited track capacity, creating more delays and reducing reliability for freight and passenger service alike. These problems are not the only ones that affect railroad operations along the East Coast, but they must be solved to allow the freight rail system to achieve its full potential. Previous efforts by the I-95 Corridor Coalition identified needed improvements to the entire mid-Atlantic corridor network including the Washington, DC region; realigning the CSX freight railroad from the District's core would complement these efforts.

Finally, the line intrudes upon Washington's civic spaces, parks, and neighborhoods. In the Monumental Core and through the Capitol Hill neighborhood, the rail line breaks the city's street grid by occupying rights-of-way designated for Maryland and Virginia Avenues in the historic L'Enfant Plan for the Capital City. Bridge structures that carry the rail line block vistas of the Capitol. The rail line bisects Anacostia Park, the focus of restoration efforts by the National Park Service and others through the Anacostia Waterfront Initiative.

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## Study Objectives

In response to these issues, the National Capital Planning Commission and the District of Columbia Department of Transportation partnered to conduct this study to determine the feasibility of relocating the freight rail line as a long-term solution to rail-related security issues. The identification and analysis of alternative railroad alignments in the study was guided by these objectives:

1. Mitigate security concerns related to the proximity of the current system to the Monumental Core of Washington, DC and the U.S. Capitol.
2. Eliminate the impediments to public access of the Anacostia River created by the current alignment.
3. Accommodate state-of-the-art railroad infrastructure.
4. Accommodate the expansion of the passenger and freight capacity within Washington, DC region of the East Coast rail corridor.

## Study Approach and Methods

Realigning freight railroad operations through the Washington, DC region would address the security concerns related to transporting hazardous materials through the Monumental Core. In search of locations for a new alignment, the study collected and reviewed extensive information on existing rail lines, highways, and utility rights-of-way. Data on environmental characteristics, land uses, and locations of population and employment were compiled. Railroad facilities, shown in Figure ES-2, operations; commodity flows; and freight customer locations were reviewed to create an understanding of the possibilities for modifying railroad services. Security factors were considered. A geographic information system database was created to organize this information and to allow its evaluation.

Characteristics of the region and the existing railroads were used to identify a comprehensive set of potential railroad corridors. Potential corridors were selected to avoid the Washington, DC core, connect with the existing regional rail network, maximize the use of potentially available right-of-way, and avoid known major obstacles. The potential corridors were to the east and west of the region and through its center.

A two-step screening process shown in Figure ES-3 identified three viable alignment alternatives from among the potential corridors. The evaluation process applied security, rail operations, engineering, and environmental considerations in successively greater detail. The three alternatives studied in more detail, designated DC Tunnel, Indian Head, and Dahlgren, are shown in Figure ES-4. The three viable alternatives are generalized alignments that include various combinations

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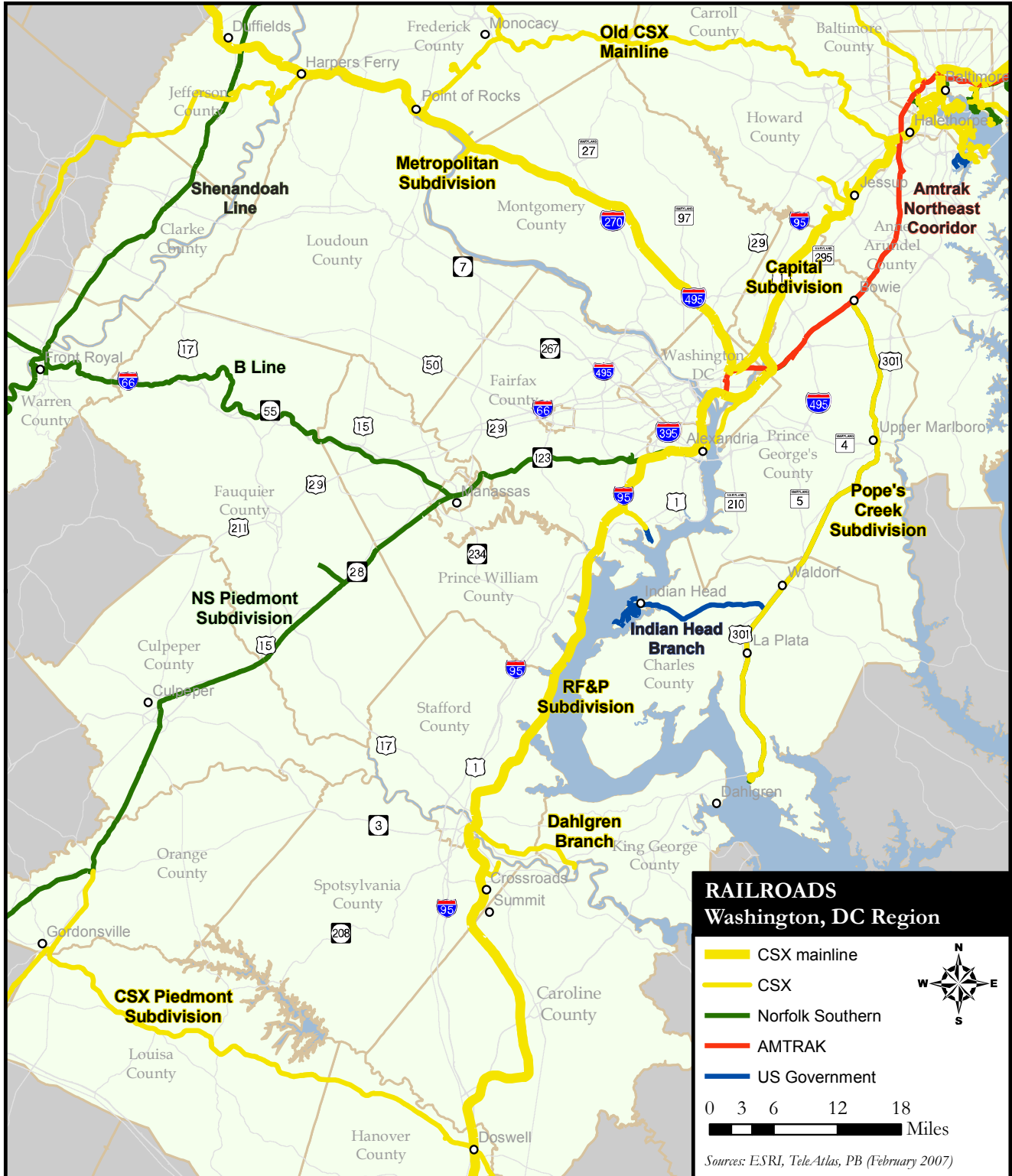


Figure ES-2. Regional Railroads

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of existing railroad right-of-way, government land, and private land. The DC Tunnel alignment would follow the existing RF&P Subdivision to Potomac Yard in South Arlington, where it would go into a nine-mile long secure tunnel beneath the District. It would emerge around the District-Maryland border and connect with the existing route for CSX south-northeast freight traffic. Both the Indian Head and Dahlgren alignments would provide an eastern bypass around the District including a new Potomac River railroad bridge and the utilization of the existing Pope’s Creek Branch, which parallels U.S. Route 301.

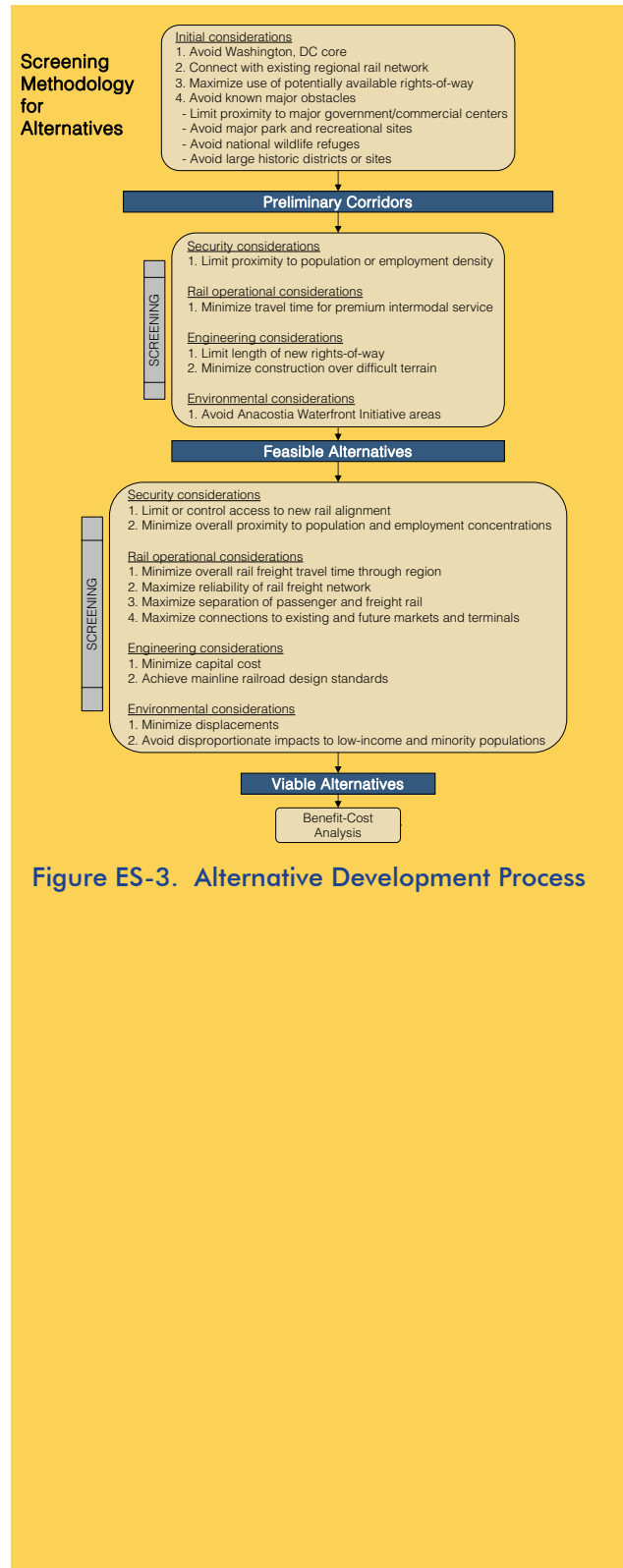


Figure ES-3. Alternative Development Process

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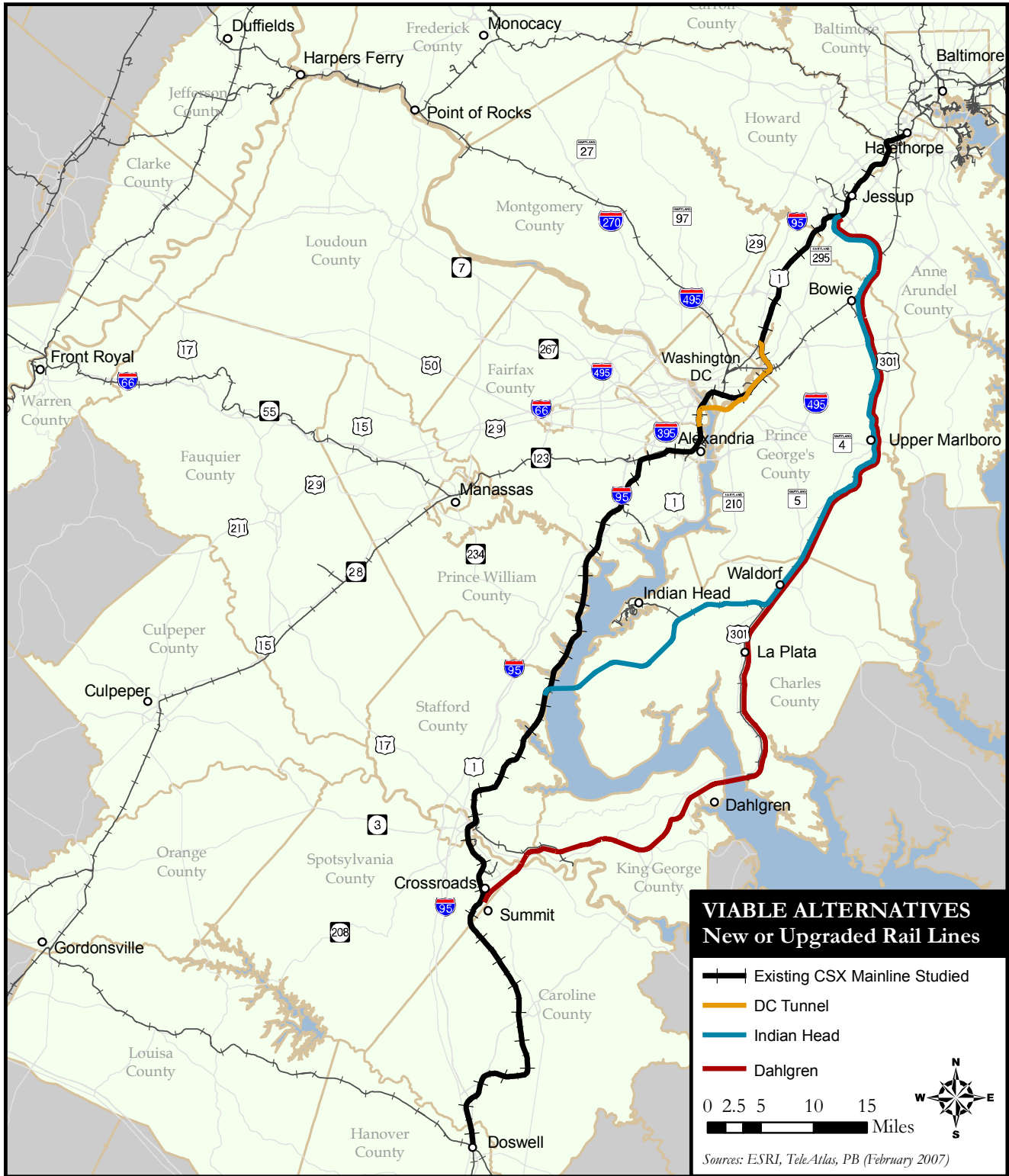


Figure ES-4. Viable Alignment Alternatives

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## Analysis

A benefit-cost analysis was performed on the three viable alternatives identified in the study. The analysis measured the potential benefits accruing to various public- and private-sector beneficiaries over a 40-year period and compared them with the investment costs associated with the railroad realignment alternatives.

Two categories of benefits were estimated for each alternative alignment, transportation-related benefits and real estate benefits. Because the rail line in this study is one segment in a larger freight railroad network, transportation-related benefits were estimated and a benefit cost analysis was done for two scenarios, railroad realignment in the Washington, DC region only and railroad improvements throughout the mid-Atlantic corridor. The second scenario reflected other improvements previously defined in the Mid-Atlantic Railroad Operations Study that would be necessary to remove freight rail bottlenecks and allow improved railroad operations through the corridor. Transportation-related benefits included railroad time and cost savings for both freight and passenger services, freight shipper benefits, reduced supply chain and logistics costs, and highway user and highway system benefits resulting from diversion of freight from trucks to rail.

Relocating this freight rail line to an alternative alignment away from the Monumental Core would allow the present right-of-way to be redeveloped in ways compatible with the surrounding areas. The potential for such redevelopment was assessed through both a technical analysis and a review by a panel organized by the Urban Land Institute. In locations where the existing rail line would be removed, two real estate dynamics

would come into play. One is the (re)development that would be possible on and adjacent to the rail right-of-way. The other real estate-related consequence is an increase in property values in the areas adjacent to the rail right-of-way resulting from an improved physical environment. To understand the market dynamics shaping growth in areas adjacent to the existing alignment, a study of existing conditions was conducted. The analysis found that development would likely occur east of the Anacostia River on and adjacent to the right-of-way as well as in the two Metrorail stations located in this segment: Deanwood and Minnesota Avenue. The value of this redevelopment and the increases in property values were estimated over a 40-year period.

Ranges of capital cost estimates for the railroad realignment alternatives were prepared. Although they are order-of-magnitude estimates because the alternative alignments were defined at a conceptual level of detail, they are sufficient for comparisons among alternatives. To be conservative, the high estimate in each range was used in the analysis.

All alternatives and all scenarios yielded benefit-cost ratios that are well in excess of 1.0, the threshold level for economically justifiable projects. Benefit-cost ratios are shown in Table ES-1. The results of the benefit-cost analysis, along with other security and environmental considerations, were used to compare the alternatives to identify their relative merits.

**Benefit-Cost Ratio:** The Indian Head alternative would have the lowest capital cost and the best benefit-cost ratio; both the Indian Head and Dahlgren alternatives would perform better on these measures than the DC Tunnel alternative. In spite of their greater length of new construction, the Indian Head and Dahlgren alternatives would

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Table ES-1. Comparison of Alternatives

Evaluation Factor			Outcome			
Category	Goal	Measure	DC Tunnel	Indian Head	Dahlgren	Existing
Benefit-Cost	Maximize benefits and minimize capital costs	Capital Cost (\$ billion)	5.3	4.3	4.7	-
		<i>Ranking</i>	3	1	2	-
		Benefit / Cost *	1.72	2.41	2.19	-
		<i>Ranking</i>	3	1	2	-
Security	Minimize proximity to population and employment concentrations within potential plume area	Number of 2030 residential population within 800 feet of alternative rail alignment	75,368	34,146	26,061	94,741
		<i>Ranking</i>	3	2	1	-
		Number of 2030 employees within 800 feet of alternative rail alignment	104,697	16,963	14,873	173,831
		<i>Ranking</i>	3	2	1	-
Environmental	Avoid disproportionate impacts to low-income and minority populations	Percent of population below poverty level within 800 feet of alternative rail alignment	7.3	5.0	4.8	10.6
		<i>Ranking</i>	3	2	1	-
		Percent of population that is a minority within 800 feet of alternative rail alignment	46.9	42.1	43.4	55.1
		<i>Ranking</i>	3	1	2	-

avoid the need for expensive tunneling and provide greater benefits to passenger railroad operations.

**Security:** All the alternatives would reduce the security threat to the Washington region by removing freight trains from the Monumental Core. In addition, all alternatives would improve security by reducing the number of people living close to the alignment compared to the existing rail line, as shown in Figure ES-5. The reduction for the Indian Head and Dahlgren alignments would be dramatic, dropping by fully two-thirds. The reduction in the number of nearby jobs would be even more stark—greater than 90 percent.

**Environmental Considerations:** The Indian Head and Dahlgren alignments would cut in half the proportion of the population near the rail alignment that is below the poverty level, a better performance than the DC Tunnel alternative. The Indian Head and Dahlgren alignments would also provide a greater reduction in the proportion of the population that is in minority groups; the DC Tunnel alternative would be similar to the existing conditions because so much of the existing line would remain in use.



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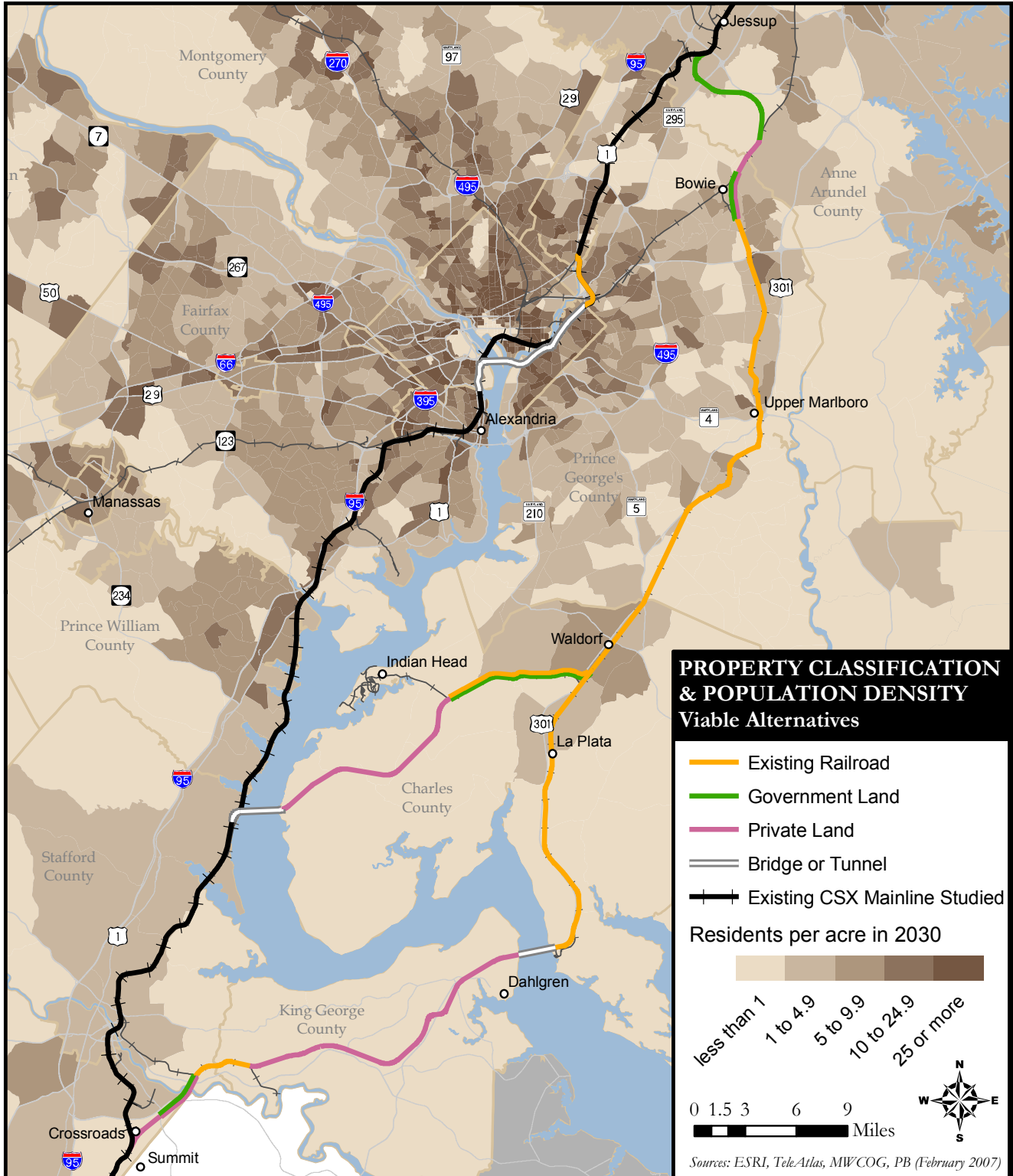


Figure ES-5. Property Classification and Population Density

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## Results of the Feasibility Study

The analysis in this study produced a set of conclusions that can assist decisions about moving ahead with a project to relocate freight rail service away from Washington's Monumental Core. These conclusions help define steps that would be necessary to initiate a railroad realignment project.

### CONCLUSIONS

***The present location of the freight railroad in Washington's Monumental Core creates security concerns***

The line's proximity to the U.S. Capitol, the National Mall, federal offices, and populous neighborhoods makes it an attractive target for attack because the consequences would be dramatic. Hazardous materials on a freight train could provide the means for an attack.

***There are viable alternative railroad alignments that would allow freight trains to be removed from the Monumental Core***

A rail line on any of these alternative alignments would connect with the existing railroad network, comply with engineering standards, and operate as an effective component of the nation's freight transportation system. None of these alignments would provide a simple solution—building a railroad on any of them would be a major undertaking. While all the viable alternatives identified in the study would include existing rail lines, some of these lines would need to be upgraded and new railroad segments would need to be built. All would require a new Potomac River crossing either in a tunnel or on a bridge.

***Railroad realignment would improve security***

Railroad realignment would reduce the threat of attack on the Washington, DC region by the removing freight trains from the Monumental Core. A freight train on some other alignment

would be a much less attractive target because it would not be near the iconic structures of the nation's capital, and the consequences of an attack, while still potentially serious, would be far more limited. The probability of an attack cannot be known, so the degree of improvement cannot be measured, but railroad realignment would reduce the threat, not simply relocate it.

***Railroad realignment could create new railroad facilities that would fit appropriately in their setting***

A tunnel alignment would separate the railroad entirely from its surroundings. At-grade rail segments would include new grade separations and design characteristics that would respect nearby development. Freight trains on any of the alternative alignments would be near places where fewer people live and work than the existing line. All the viable alternatives would meet environmental justice objectives better than the existing railroad.

***Railroad realignment would improve the freight railroad system***

Realignment would increase railroad capacity and eliminate major choke points. A realignment project would provide for increased railroad operating speed and reliability, increasing rail transportation's competitiveness and attracting greater volumes of freight. Transporting freight by rail would create savings for the highway network through reduced truck volumes.

***Railroad realignment would also improve passenger rail service***

Because both passenger and freight trains share the existing rail line, both would benefit from a project that would increase railroad capacity. More capacity would reduce conflicts between different types of trains, allowing higher speeds and greater reliability for passenger service. Separating freight and passenger services onto separate tracks would provide the greatest benefits by removing

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conflicts between train types entirely.

***The transportation benefits of a railroad realignment project would be greater if it were combined with other mid-Atlantic railroad improvements***

Solving operating problems would require railroad improvements throughout the mid-Atlantic corridor. The Mid-Atlantic Railroad Operations Study identified 71 needed railroad infrastructure and information-system projects. A railroad realignment project in the Washington, DC region would be more effective if it were combined with other projects elsewhere. Similarly, improvements in other areas, such as improving the Howard Street tunnel in Baltimore, would be more effective if a realignment project were built in the Washington, DC region.

***Railroad realignment would remove a barrier within the nation’s capital***

Removing the existing freight railroad would enhance the unity of the Monumental Core. Neighborhood access to the Anacostia River would be improved, and Anacostia Park would no longer be divided. Parts of the city’s street network could be restored to the intent of the historic L’Enfant Plan for the Nation’s Capital.

***Railroad realignment would allow for redevelopment of the existing right-of-way***

Some of the vacated right-of-way could be redeveloped in mixed-use extensions of adjacent neighborhoods. The opportunities for redevelopment are in neighborhoods east of the Anacostia River.

***The benefits of railroad realignment would be greater than the costs***

A realignment project on any of the three viable alternative alignments identified in this study would produce benefits that would exceed project costs. Even without accounting for the value of the most important benefit—security

improvement, which this study did not attempt to quantify—the benefit-cost analysis showed that a realignment project is worth doing. Capturing some of these benefits could help to pay realignment project costs.

***Developing a railroad realignment project would require further planning***

This study analyzed the characteristics of the region and the railroad at a broad, conceptual level because it was a first step in determining project feasibility. More detailed planning would be needed to define the characteristics of a project. A financial plan should identify funding sources and strategies to cover project costs. The preferred alternative alignment should be selected and specific location and design decisions made.

## NEXT STEPS

The security threat, railroad operations constraints, and community impacts created by the existing rail line will exist until a railroad realignment project is completed. Planning, design, and construction would take at least ten years. Beginning a railroad realignment project and completing it as quickly as possible would reduce the duration of the present problems and hasten the realization of project benefits. During the period of project development, short-term improvements should also be made to address railroad security and operational issues.

### Short-Term Improvements

Significant attention is of course already paid to both security concerns and railroad operations in the Washington, DC region. This study identified a program of short-term improvements that would supplement present practices. These short-term improvements are described in Appendix B, which is in a separate report volume.

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Operational improvements would be intended to keep trains moving, since this would not only increase rail line capacity but also enhance security, and to enable traffic growth in both freight and passenger services. Operational improvements could include additional inspection tracks, additional wheel-defect detectors, additional track and signal maintenance, continued reviews of train scheduling and dispatching, and increased freight operating speeds. Security improvements could include enhanced security and maintenance where trains stop, memorandums of agreement between railroad companies and law-enforcement units, a security-awareness campaign, and additional regional drills and training.

Though the short-term improvements could reduce the security risk, minimize the effects of a security incident, and improve railroad reliability and capacity, they would not solve the major capacity and security problems. Freight railroad capacity would still be constrained by the Virginia Avenue tunnel, passenger and freight rail service would continue to share the same alignment, and the freight railroad could continue to carry hazmats alongside federal office buildings and the U.S. Capitol.

## Funding

The large investment needed for a railroad realignment project makes the identification of funding a crucial step in project development. Efforts to develop a funding plan should begin early, as the ability to build a project will hinge upon the availability of adequate funds.

Project funding should reflect the distribution of project benefits. The security benefits would justify substantial project funding. The greatest benefits quantified in this study are real estate benefits that would accrue within Washington,

DC; some means to capture a part of this value for use in railroad realignment funding would be appropriate. Transportation-related benefits are more widely distributed; some national funding sources may be appropriate because some of the transportation benefits would be realized outside the Washington, DC region. Railroad participation in project funding would be appropriate because the improved infrastructure would create railroad operating benefits.

Project funding would likely involve a mix of federal grants, innovative financing tools, and public-private partnership mechanisms similar to those used in other large railroad projects, such as the Alameda Corridor project in Southern California and the CREATE project in the Chicago area. A railroad realignment project in the Washington, DC region may also have real estate value-capture and security funding components. The ability to leverage the various benefits and identify appropriate financing mechanisms for this realignment project should be thoroughly evaluated in the development of a comprehensive funding plan.

## Organization

A key step in project development would be the definition of the organizational structure with responsibility for project implementation. The scale of a new freight railroad would likely exceed the authority of any existing single entity, so some new entity or organizational structure would be needed. Depending upon the alignment alternative, new construction might occur in multiple jurisdictions. There would be both public- and private-sector benefits of railroad realignment, so both should be represented in implementation.

The organizational structure should be identified early in project development so that the entities

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that will have responsibility for construction will have a voice in project planning. The organization should also be related to project funding so that the sources of funds are appropriately represented in project decisions.

### Planning

Project development would require more-detailed planning. This planning should be conducted through the preparation of an environmental impact statement (EIS). An EIS is required for a major federal action that would significantly affect the human environment. A railroad realignment project would likely involve the federal government and would meet this test. An EIS would be a logical next step in planning, as it would be a systematic analysis of a wide range of characteristics of a project and its setting, would support the selection of an alternative and other project decisions, and would provide opportunities to involve a wide range of interested stakeholders.

Because a realignment project would affect many people and organizations, planning should be an open process with ample opportunity to share information and guide decisions. The affected local, regional, and federal agencies and private companies must participate in planning, and the public in affected parts of the region must be involved.

### Interregional Coordination

Railroad improvements in the Washington, DC region must be viewed as part of a comprehensive East Coast railroad improvement program. The issues addressed in this study—security threats, constraints on railroad operations, and impacts in urban areas—affect other locations as well. Significant improvements in railroad operations would be possible only if obsolete infrastructure is modernized along the entire railroad corridor.

Both organizational structure and funding decisions in the Washington, DC region should not be made in isolation. Institutional responsibilities for project implementation in the Washington, DC region should be compatible with similar responsibilities in other locations to ensure coordinated project development. Funding decisions must be coordinated because the cost of needed railroad improvement along the East Coast is large. Funding commitments in one area must not preclude investments in others. The Mid-Atlantic Railroad Operations Study set a precedent for such interregional coordination by bringing together a consortium of federal agencies, states, and railroads to address needed railroad improvements. A railroad realignment project in the Washington, DC region should follow that precedent.



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## Study Management and Coordination

The study was managed jointly by the District of Columbia Department of Transportation and the National Capital Planning Commission. Funding for the study was provided by an Urban Area Security Initiative grant from the U.S. Department of Homeland Security.

The conduct of the study was coordinated through three groups that represented the broad set of interests that would be affected by a new railroad alignment:

- The NCPC Interagency Security Task Force reviewed the study's security implications.
- The Railroad Working Group, created specifically for the purpose of this study, included representatives of federal, state, regional, and local government agencies with responsibilities that would be affected by a

new railroad alignment:

- ◇ Federal Railroad Administration
- ◇ Transportation Security Administration
- ◇ Maryland Department of Transportation
- ◇ Virginia Department of Rail and Public Transportation
- ◇ Virginia Railway Express
- ◇ District of Columbia Department of Planning
- ◇ District Department of Transportation
- ◇ Metropolitan Washington Council of Governments
- The Railroad Owner/Operators Group included CSX Transportation, which owns the existing rail line, Norfolk Southern Railroad, and Amtrak, all of whose operations would be affected.

A consultant team of PB, Cambridge Systematics, and Basile Baumann Prost performed the technical analysis.