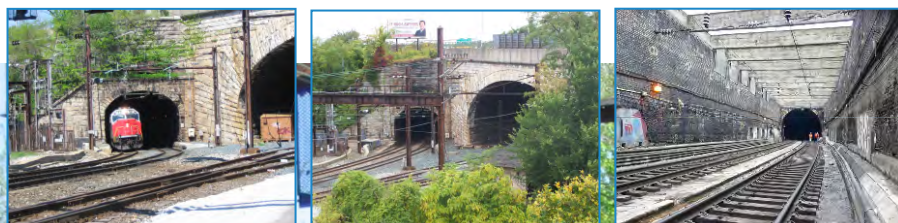




## B&P Tunnel Project Baltimore, Maryland

# PRELIMINARY ALTERNATIVES SCREENING REPORT

December 2014



## EXECUTIVE SUMMARY

The Baltimore and Potomac (B&P) Tunnel was built in Baltimore, Maryland, in 1873 and is one of the oldest structures on the National Railroad Passenger Corporation (Amtrak) Northeast Corridor (NEC) high speed rail line operating between Boston, Massachusetts, and Washington, DC. The tunnel lies beneath several West Baltimore neighborhoods and connects Baltimore's Pennsylvania Station (Penn Station) to the West Baltimore MARC Station. It provides service to Amtrak, Maryland's MARC Commuter Rail passenger trains, and Norfolk Southern Railway freight trains.

The existing B&P Tunnel is approaching the end of its useful service life. The Federal Railroad Administration (FRA) has awarded High Speed Intercity Passenger Rail (HSIPR) grant funding to the Maryland Department of Transportation (MDOT) in cooperation with Amtrak to conduct preliminary engineering and environmental analysis to study improvements to the B&P Tunnel. The HSIPR grant aims to address the structural and operational deficiencies of the B&P Tunnel, improve passenger rail services, and support existing and future demands along the NEC. A SAFETEA-LU grant was provided to MDOT and Amtrak to study potential reuse of the existing B&P Tunnel as a component of intended NEC improvements through Baltimore envisioned under the HSIPR grant.

The B&P Tunnel Project (the Project) is being prepared in accordance with the National Environmental Policy Act of 1969 (NEPA) with FRA as the lead federal agency. This *Preliminary Alternatives Screening Report*, prepared by FRA and MDOT, is an important step for identifying and developing project alternatives that will be evaluated in an Environmental Impact Statement (EIS) pursuant to NEPA. The report presents the process by which an initial range of sixteen preliminary alternatives were identified, evaluated using screening criteria, and narrowed to four alternatives. These four alternatives will be carried forward for further design development and environmental evaluation. The report includes:

- A description of each preliminary alternative;
- The screening methodology used to narrow the range of preliminary alternatives;
- Evaluation of the preliminary alternatives using the screening criteria;
- The results of the preliminary alternatives screening process; and
- The next steps for the alternatives carried forward for further design development and environmental evaluation.

This final *Preliminary Alternatives Screening Report* updates the draft report prepared in October 2014 to include consideration of input received from the public as well as Federal and state regulatory agencies.

### A. Range of Preliminary Alternatives

The alternatives considered in this *Preliminary Alternatives Screening Report* were identified from previous studies and by FRA and MDOT during the preliminary alternatives development phase of the project. A total of sixteen preliminary alternatives were identified, including the No-Build Alternative, Restore/Rehabilitate the Existing B&P Tunnel Alternative, and fourteen New Location Alternatives. The fourteen New Location Alternatives include five alternatives from previous studies (Alternatives 3 through 7), and nine additional alternatives that were newly identified for this Project (Alternatives 8 through 16). Alternative 16 was developed based on public comments received at the October 29, 2014 Public Open House. The alternatives are:



- Alternative 1: No-Build
- Alternative 2: Restore/Rehabilitate Existing B&P Tunnel
- Alternative 3: Great Circle Passenger Tunnel
- Alternative 4: Presstman Street
- Alternative 5: Route 40
- Alternative 6: Locust Point
- Alternative 7: Sports Complex
- Alternative 8: Wilson Street – Existing Tunnel
- Alternative 9: Mosher Street North
- Alternative 10: Mosher Street South
- Alternative 11: Robert Street South
- Alternative 12: Robert Street North
- Alternative 13: Wilson Street – Under Existing Tunnel
- Alternative 14: North Avenue Bridge
- Alternative 15: Gilmor Street –Existing Tunnel
- Alternative 16: North Avenue Tunnel (Alternative from Public Input)

## B. Screening Process

All the preliminary alternatives, except for Alternatives 1 and 2, were evaluated using a two-level, progressive screening approach depending upon the viability of the alternative. Alternative 1: No-Build and Alternative 2: Restore/Rehabilitate Existing B&P Tunnel were not subjected to the same screening process as the other alternatives. Alternative 1: No-Build would not meet the project Purpose and Need; however, it will serve as a baseline for evaluating the other alternatives throughout the project development and in the EIS. Regarding Alternative 2: Restore/Rehabilitate Existing B&P Tunnel, there is currently insufficient information to determine the most appropriate manner of tunnel restoration or rehabilitation; how the existing tunnel could be used in the future; or whether re-construction of the tunnel could reasonably accommodate train operations. Moreover, it is uncertain whether restoring or rehabilitating the existing tunnel could be considered in conjunction with other project alternatives as part of a configuration with more than two tracks. Thus, Alternatives 1 and 2 are both recommended to be carried forward for further design development and environmental evaluation.

FRA is advancing the NEC FUTURE program concurrent with the B&P Tunnel Project. Information from this program will aid in determining the future capacity requirements for the NEC. The existing B&P Tunnel includes two tracks; therefore, each of the preliminary alternatives assume two tracks to provide a standard baseline for alternative comparisons. However, regardless of this assumption, there is flexibility with the screening methodology such that the alternatives could be two, three, or four tracks without affecting the screening results.

Preliminary Alternatives 3 through 16 were evaluated using a two-level progressive screening process. Screening Level 1 evaluated each alternative for fatal flaws that clearly rendered the alternative infeasible or unreasonable. An alternative was considered to have a fatal flaw if it does not utilize existing infrastructure, or would result in an unacceptable engineering issue that cannot be reasonably avoided or solved during the early stage of an alternative's development. The six alternatives with fatal flaws are:

- Alternative 5: Route 40 – does not utilize existing infrastructure
- Alternative 6: Locust Point – does not utilize existing infrastructure
- Alternative 7: Sports Complex – does not utilize existing infrastructure
- Alternative 14: North Avenue Bridge – geometry is not feasible
- Alternative 15: Gilmor Street – Existing Tunnel – geometry is not feasible
- Alternative 16: North Avenue Tunnel – geometry is not feasible

The eight remaining preliminary alternatives that did not have a fatal flaw were evaluated in Screening Level 2. This second level of screening used criteria derived from the project Purpose and Need as well as functional needs identified by FRA, MDOT, and Amtrak. A total of nineteen screening criteria within three categories (Engineering, Operational, and Environmental) were identified.

### Engineering:

1. **Tunnel Separation:** The minimum separation between existing underground structures (especially the MTA Metro tunnel) and the proposed tunnel should be 30 to 40 feet.
2. **Tunnel Clearance:** Alternatives should be able to accommodate Plate H clearance for either twin single-track tunnels or a single double-track tunnel.
3. **Horizontal Curvature:** Alternatives should allow for design speed of 40 miles per hour or greater.
4. **Vertical Grade:** The maximum vertical compensated grade should not exceed two percent.
5. **West Baltimore MARC Station Service:** The alternative should be capable of serving the West Baltimore MARC commuter rail station.
6. **Track Grade at Penn Station:** Alternatives should not alter existing track alignments at Penn Station.
7. **Physical Constraints:** The alternative should not impact physical constraints, including MTA Light Rail, the CSX track under Howard Street, the Jones Falls Bridge, the Jones Falls Expressway and the Howard Street Bridge.
8. **Separated Right-of-Way:** Tunnels should be on physically separate right-of-way (ROW) within a well-protected perimeter.

### Operational:

9. **Amtrak and MARC Operations:** Amtrak and MARC should be able to maintain the volume and frequency of trains through Baltimore Penn Station with no significant interruptions.
10. **Number of Tracks and Throughput Capacity:** Tunnels should include at least two tracks<sup>1</sup> and a throughput capacity of at least 24 trains per hour per direction during and after construction.
11. **Travel Time:** Tunnels should reduce travel time between the northern and southern project limits.
12. **NEC Operational Reliability:** Each track should be bi-directional and the tunnel should have universal interlocking with the NEC mainline.
13. **Movement of Freight:** Alternative should accommodate movement of freight at current (2014) levels.

### Environmental:

14. **Primary Construction Method:** Tunnels should be primarily bored, and should require limited cut-and-cover construction.
15. **Parks:** Parks located within the surface disturbance footprint should be avoided or minimized.
16. **Residential Land Uses:** Residential land use areas within the surface footprint should be avoided or minimized.

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<sup>1</sup> There is flexibility within the screening methodology such that the alternatives could be two, three, or four tracks without affecting the screening results. Information from the NEC Future program will aid in determining the future number of tracks required for the NEC.



- 17. Existing Bridge over Jones Falls:** Alternatives should utilize the existing bridge over the Jones Falls.
- 18. Minority and Low-income Communities:** Alternatives should avoid or minimize impacts to low-income and minority populations.
- 19. Historic Districts and Structures:** Historic districts and structures within the surface footprint should be avoided or minimized.

Certain criteria became key differentiators in the preliminary screening and were important for determining which preliminary alternatives to eliminate and which alternatives would be recommended for further design development and environmental evaluation. These differentiating Engineering and Operational criteria include providing tunnel separation (i.e. the distance between the alternative and the MTA Metro tunnel); impacts to physical constraints; maintaining existing Amtrak operations; maintaining two tracks and throughput capacity of at least 24 trains/hour per direction; and providing NEC operational reliability (i.e. each track is bi-directional and the tunnel has a universal interlocking with the NEC mainline). For Environmental criteria, the differentiators were the primary construction method (i.e., bored versus cut-and-cover) and utilization of the existing Jones Falls Bridge.

Alternatives 4, 8, 9, 10, 12, and 13 failed to sufficiently meet Engineering, Operational, and Environmental requirements associated with the screening criteria. As a result, these preliminary alternatives were eliminated and are not recommended for further design development and environmental evaluation.

## C. Public Involvement

A Public Open House, the second public meeting for the B&P Tunnel Project, was held by FRA and MDOT on October 29, 2014. A comment period for the Public Open House extended until November 14, 2014. The purpose of the Public Open House was to share the preliminary alternatives developed by the project team, describe the methods for screening the preliminary alternatives, and gain public input regarding recommendations for alternatives being carried forward for further design development and environmental evaluation.

This final report updates the draft report (prepared in October 2014) to reflect the public concerns, ideas, and information collected at the Public Open House. Most notably, Alternative 16 was developed in response to public suggestion and was screened along with the other alternatives. Additionally, public input assisted the project team in identifying environmental resources and community concerns in the study area; these resources and concerns will be taken into consideration as the alternatives are carried forward for further design development and environmental evaluation.

FRA and MDOT will provide additional opportunities for agencies, citizens, elected officials, community associations, and other stakeholders to learn about the Project and provide input as the Project advances. Federal and state/regional agencies will be updated on the Project via regular correspondence and meetings. A third Public Open House will be held in connection with the *Alternatives Report*. A Public Hearing will be held after the completion of the *Draft Environmental Impact Statement*. Project comments submitted via the online comment form at the project website, [www.bptunnel.com](http://www.bptunnel.com), and/or postal mail, will continue to be considered by FRA and MDOT.

## D. Recommendations

Alternatives 1, 2, 3, and 11 are recommended as the alternatives to carry forward for further design development and environmental evaluation. As noted previously, Alternative 1: No-Build provides a baseline for comparison, and Alternative 2: Restore/Rehabilitate Existing B&P Tunnel requires additional

information to be sufficiently evaluated. Alternative 3: Great Circle Passenger Tunnel and Alternative 11: Robert Street South best satisfy the Engineering, Operational, and Environmental screening criteria. In particular, Alternatives 3 and 11 meet tunnel separation goals; have less impacts to physical constraints; maintain existing Amtrak operations; maintain at least two tracks and throughput capacity of at least 24 trains/hour per direction; support NEC reliability; and require a potentially less-invasive primary construction method.

This *Preliminary Screening Alternatives Report* identifies Alternatives 1, 2, 3 and 11 as the alternatives carried forward for further design development and environmental evaluation. Input received from resource agencies and the public regarding the preliminary alternatives has been considered in this report, including the addition of Alternative 16. FRA and MDOT will continue to seek agency and public participation as conceptual and preliminary design is advanced for Alternatives 1, 2, 3, and 11.

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## I. INTRODUCTION

This *Preliminary Alternatives Screening Report* for the Baltimore and Potomac (B&P) Tunnel Project (the Project) is being prepared by the Federal Railroad Administration (FRA)<sup>2</sup>, in coordination with the Maryland Department of Transportation (MDOT)<sup>3</sup>. This report has been prepared during development of an Environmental Impact Statement (EIS) in compliance with the National Environmental Policy Act (NEPA) of 1969 (42 United States Code [USC] 4321 et seq.); the Council of Environmental Quality (CEQ) NEPA Regulations (40 Code of Federal Regulations [CFR] 1500-1508); the FRA Procedures for Considering Environmental Impacts (64 Federal Register [FR] 28545 [May 26, 1999]); and FRA's Update to NEPA Implementing Procedures (78 FR 2713 [January 14, 2013]).

This report has been prepared to describe the development and evaluation of the preliminary alternatives based on screening criteria. This report is an important step for identifying and developing the project alternatives that will be evaluated in the EIS pursuant to NEPA. The report presents the process by which the initial range of preliminary alternatives were developed and narrowed to the alternatives which will be carried forward for further design development and environmental evaluation. This final *Preliminary Alternatives Screening Report* updates the draft report prepared in October 2014 in consideration of input received from the public at the Public Open House on October 29, 2014. This final report also incorporates input from Federal and state regulatory agencies.

The alternatives considered in this *Preliminary Alternatives Screening Report* were identified from previous studies and by FRA and MDOT during the alternatives development phase of the Project. No specific comments on the alternatives were received during the NEPA scoping period. A total of sixteen preliminary alternatives have been identified and screened for further coordination and input from the public. These sixteen preliminary alternatives include the No-Build Alternative, Restore/Rehabilitate the Existing B&P Tunnel Alternative, and 14 New Location Alternatives. The New Location Alternatives include five alternatives from previous studies (Alternatives 3 through 7), and an additional nine alternatives that were newly identified for this Project (Alternatives 8 through 16). Alternative 16 was developed in response to public suggestion.

The B&P Tunnel was completed in 1873 and lies under several West Baltimore neighborhoods including Bolton Hill, Madison Park, and Upton. The tunnel connects Baltimore's Pennsylvania Station (Penn Station) to the West Baltimore MARC Station and points south including Washington, DC. It is one of the oldest structures on the Northeast Corridor. The tunnel is approximately 7,500 feet (1.4 miles) long and is composed of three shorter tunnels: the John Street Tunnel, the Wilson Street Tunnel, and the Gilmore Street Tunnel. The narrow-profile, single-bored, double-track tunnel was originally constructed out of brick and stone masonry, though repairs have added additional building materials over time. Electrification was added in the 1930s as part of the New York, NY-to Washington, DC electrification program conducted by the Pennsylvania Railroad. The tunnel was rehabilitated in the 1980s as part of the Northeast Corridor Improvement Project (NECIP), a program initiated in 1976 with the goal of significantly

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<sup>2</sup> FRA is an administration of the US Department of Transportation which is charged with promulgation and enforcement of rail safety regulations, administering railroad financial assistance programs, conducting research and development in support of improved railroad safety and national rail transportation policy, and consolidating government support of rail transportation activities. FRA is serving as the lead Federal agency for the B&P Tunnel Project pursuant NEPA.

<sup>3</sup> The Maryland Department of Transportation (MDOT) oversees six modal state agencies, including the Maryland Transit Administration. The Department facilitates the safe and efficient movement of people, goods and services throughout Maryland and is the funding grantee for the B&P Tunnel Project.

improving rail service between Washington, DC and Boston, MA. However, that work was not intended as a permanent fix and continual repairs are required to maintain the aging structures.

The tunnel is approaching the end of its useful service life. In 2011, the FRA awarded High Speed Intercity Passenger Rail (HSIPR) grant funding towards preliminary engineering and environmental analysis to study improvements to the B&P Tunnel and/or replacement of the B&P Tunnel. The HSIPR grant aims to address deficient track geometry and tunnel characteristics which significantly hamper rail movement, creating a low-speed bottleneck on a high-traffic section of the NEC. Subsequently, a SAFETEA-LU grant was provided to MDOT and Amtrak to study potential reuse of the existing tunnel as a component of intended NEC improvements through Baltimore envisioned under the HSIPR grant.

## II. PURPOSE AND NEED

The primary purpose of the Project is to address the structural and operational deficiencies of the B&P Tunnel. In addition, the Project would improve travel time, accommodate existing and projected travel demand for passenger services (regional and commuter), eliminate impediments to existing and projected operations along the NEC, provide operational reliability, and take into account the value of the existing tunnel as an important element of Baltimore's rail infrastructure.

The purpose of the Project has been derived from the following needs:

- The existing B&P Tunnel is more than 140 years old and is approaching the end of its useful life with regard to its physical condition. While the tunnel currently remains safe for rail transportation, it requires substantial maintenance and repairs, and it does not meet current design standards. The tunnel is considered to be structurally deficient due to its age, the original design, and wear and tear.
- The tunnel is also functionally obsolete, meaning that it is not able to meet current and future rail demands due to its vertical and horizontal track alignment. The low-speed tunnel creates a bottleneck at a critical point in the NEC, affecting operations of the most heavily-traveled rail line in the United States.
- The tunnel does not provide enough capacity to support existing and projected demands for regional and commuter passenger service.
- The existing tunnel is not suited for modern high-speed usage due to the current horizontal and vertical track alignment, which limits passenger train speeds through the tunnel to 30 miles per hour (mph).
- The existing tunnel is a valuable resource. The disposition or reuse of the existing tunnel needs to be considered in the Project.

Additional information on the project's Purpose and Need elements is found in the B&P Tunnel Project *Purpose and Need* report, available on the project website, [www.bptunnel.com](http://www.bptunnel.com).

## III. PRELIMINARY ALTERNATIVES DEVELOPMENT

The preliminary alternatives considered in this *Preliminary Alternatives Screening Report* were identified from previous studies, and by FRA and MDOT during the preliminary alternatives development phase of the B&P Tunnel Project. Information obtained during the Project's NEPA scoping period, which included a Public Open House on June 19, 2014 and concluded on July 31, 2014, was also considered during preliminary alternatives development. Information from the NEPA scoping period, including public comments, is included in the *Project Scoping Report* available on the project website, [www.bptunnel.com](http://www.bptunnel.com).



This final *Preliminary Alternatives Screening Report* updates the draft report which was prepared in October 2014). Updates have been made in consideration of public comments regarding alternatives development and screening, as well as comments from Federal and state regulatory agencies regarding the alternatives screening methodology.

## A. Preliminary Alternatives Overview

A total of sixteen preliminary alternatives have been identified for evaluation in this report, including the No-Build Alternative, Restore/Rehabilitate Existing B&P Tunnel Alternative, and 14 New Location Alternatives. The New Location Alternatives include five alternatives (Alternatives 3 through 7) from the previous studies described in **Section III.B**; and nine additional alternatives (Alternatives 8 through 16) that were developed for this Project by FRA and MDOT. One alternative, Alternative 16, was developed in consideration of public suggestion.

The sixteen preliminary alternatives are:

- Alternative 1: No-Build
- Alternative 2: Restore/Rehabilitate Existing B&P Tunnel
- Alternative 3: Great Circle Passenger Tunnel
- Alternative 4: Presstman Street
- Alternative 5: Route 40
- Alternative 6: Locust Point
- Alternative 7: Sports Complex
- Alternative 8: Wilson Street – Existing Tunnel
- Alternative 9: Mosher Street North
- Alternative 10: Mosher Street South
- Alternative 11: Robert Street South
- Alternative 12: Robert Street North
- Alternative 13: Wilson Street – Under Existing Tunnel
- Alternative 14: North Avenue Bridge
- Alternative 15: Gilmor Street –Existing Tunnel
- Alternative 16: North Avenue Tunnel (Alternative from Public Input)

The preliminary alternatives were evaluated based on the screening criteria described in **Section IV**. Alternatives satisfying the screening criteria are recommended for further design development and environmental evaluation.

At this time, FRA and MDOT do not yet have sufficient engineering and operational information to analyze and determine the specific track configuration (two, three, or four tracks) needed for the B&P Tunnel Project. The existing B&P Tunnel includes two tracks; therefore, each preliminary alternative was developed assuming two tracks so there is a standard baseline for alternative comparisons. However, regardless of this assumption, there is flexibility with the screening methodology such that the alternatives could be two, three, or four tracks without affecting the screening results. That is, the number of tracks is not a differentiating factor for alternatives screening, which focused on the horizontal alignments and profiles of the preliminary alternatives.

FRA is advancing the *NEC FUTURE*<sup>4</sup> program concurrent with the B&P Tunnel Project. Information from this program will aid in determining the future capacity requirements for the NEC. Based on the flexibility regarding the number of tracks for the preliminary alternatives (described above), the future capacity requirements of the *NEC FUTURE* program will not be precluded by the alternatives considered for the B&P Tunnel Project. In consideration of evolving rail corridor planning for the NEC under the *NEC FUTURE*

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<sup>4</sup> *NEC FUTURE* is a comprehensive planning effort led by the FRA to define, evaluate and prioritize future investments in the Northeast Corridor. Refer to [www.necfuture.com](http://www.necfuture.com) for additional information.

program, the FRA has expressed an interest in evaluating a four-track configuration which may or may not include one or two tracks in a rehabilitated existing tunnel, should that prove feasible.

## B. Previous Studies

The B&P Tunnel Project is an independent project with roots in several previous Amtrak and FRA studies that focus on railway network issues at the regional (Baltimore) and corridor (NEC) levels. Specifically, two reports, *Baltimore's Railroad Network: Challenges and Alternatives* (2005) and *Baltimore's Railroad Network: Analysis and Recommendations* (2011) (collectively, *Baltimore's Railroad Network Study*), formed the basis for five alternatives (Alternatives 3 through 7 in this report) that are considered in this report. *Baltimore's Railroad Network Study* supports the need for the B&P Tunnel Project while offering a foundation for alternatives development required as part of the Project.

Congress requested this study in 2001 in order to evaluate the condition and capabilities of the Baltimore railroad network's fixed facilities and "examine the benefits and costs of various alternatives for reducing congestion and improving safety and efficiency in the rail operations" in the Baltimore region (FRA, 2005). *Baltimore's Railroad Network: Challenges and Alternatives* (2005) characterized the state of the network and demands placed on it. *Challenges and Alternatives* evaluated the existing B&P Tunnel, among other components of Baltimore's rail network, and underscored its importance to the overall Northeast Corridor system.

*Baltimore's Railroad Network: Analysis and Recommendations* (2011) supplemented the findings of the 2005 study. This report considered the potential actions that could improve passenger and freight railway capabilities in the Baltimore region, focusing on the principal elements of Baltimore's network of passenger and freight rail lines extending from Perryville (the junction of Amtrak's NEC with the Norfolk Southern principal route from Harrisburg, Pennsylvania and points west) to Halethorpe (where CSX Transportation and Amtrak lines from Washington, DC, cross).

The *Baltimore's Railroad Network Study* also identified the replacement of the B&P Tunnel as one of the stated recommendations and developed several passenger rail alternatives for replacement of the B&P Tunnel. Passenger alternatives included the No-Build alternative; rehabilitation of the existing tunnel; the Presstman Street alternative; the Great Circle Passenger Tunnel alternative; the Route 40 alternative; the Locust Point-Canton alternative; and the Sports Complex alternative. These alternatives then underwent a three-stage screening process based on functional/design criteria, external impact criteria, and additional analyses (including conceptual engineering; evaluations of critical system components, implementation methods, performance calculations, and required regional betterments; and a summary-level operations analysis).

The B&P Tunnel Project has evolved separately from the *Baltimore's Railroad Network Study* and will be advancing independently as part of the HSIPR grant awarded to MDOT in cooperation with Amtrak. However, the qualitative and quantitative information provided in *Baltimore's Railroad Network Study* remains comprehensive and valuable for input into the Purpose and Need as well as this preliminary alternatives screening for the B&P Tunnel Project. Passenger alternatives from *Baltimore's Railroad Network Study* merit inclusion in the environmental review process and are included in this report as Alternatives 3 through 7.

## IV. SCREENING METHODOLOGY

All preliminary alternatives, except for Alternatives 1 and 2, were evaluated using a two-level progressive screening approach depending upon the viability of the alternative. This section describes the overall

screening methodology and identifies the process for narrowing the alternatives to those carried forward for further design development and environmental evaluation.

Alternative 1: No-Build Alternative and Alternative 2: Restore/Rehabilitate Existing B&P Tunnel Alternative were not subjected to the same screening as the other alternatives. Alternative 1: No-Build would not meet the project Purpose and Need; however, it would serve as a baseline for evaluating the other alternatives throughout the studies. Regarding Alternative 2: Restore/Rehabilitate Existing B&P Tunnel, there is currently insufficient information to determine the most appropriate manner of tunnel restoration or rehabilitation; how the existing tunnel could be used in the future; or whether reconstruction of the tunnel could reasonably accommodate train operations. Moreover, it is uncertain whether restoring or rehabilitating the existing tunnel could be considered in conjunction with other project alternatives as part of a configuration with more than two tracks. Thus, Alternatives 1 and 2 are both recommended to be carried forward for further design development and environmental evaluation.

## **A. Screening Level 1**

The first level of screening for the preliminary alternatives was a general assessment of each alternative to determine if it had a fatal flaw that rendered the alternative infeasible or unreasonable. Fatal flaws are specifically defined as: the alternative does not utilize existing infrastructure, or would result in an unacceptable engineering issue that cannot be reasonably avoided or solved during the early development stage of an alternative. If an alternative location (alignment) was found to have a fatal flaw, it was eliminated from further analysis in the screening process.

### **1. Utilize Existing Infrastructure**

The project limits for the B&P Tunnel Project are framed by existing infrastructure, Baltimore's Pennsylvania Station to the north and the NEC Gwynns Falls Bridge to the south. These limits provide a sufficient study area and length to: 1) consider multiple alternatives that address the project Purpose and Need; 2) address the potential environmental impacts of the alternatives; and 3) take into account other potential improvements to the NEC, Penn Station, or the West Baltimore MARC Station which could occur regardless of the B&P Tunnel Project.

The project study area encompasses major rail infrastructure investments. For an alternative to be considered reasonable, it needed to utilize major existing infrastructure and support future rail infrastructure investments. The Amtrak NEC at the Gwynns Falls Bridge is a major four-track concrete arch structure built in 1913 that does not require replacement or significant modification in the context of this Project. Baltimore Penn Station and the West Baltimore MARC Station serve an important function on the NEC and do not require replacement.

### **2. Engineering Issues**

A preliminary alternative that had an engineering issue or design conflict which could not be reasonably avoided or solved during the early development stage was considered to have a fatal flaw. Examples of engineering issues include: the inability to develop a vertical alignment on a maximum compensated two percent grade because of existing topographic conditions, or a horizontal curvature (degree of curve) that exceeds requirements for rail operations. Compensated grade is applied when a horizontal curve is located on the grade; in this case the maximum allowed grade on the curve should be reduced by 0.04 percent for each degree of horizontal curve.



## **B. Screening Level 2**

The preliminary alternatives that did not have a fatal flaw moved forward to Screening Level 2. The second level of screening criteria was derived from the project Purpose and Need as well as functional needs identified by FRA, MDOT, and Amtrak. The Screening Level 2 criteria were grouped into three categories that are important evaluation elements: Engineering (screening criteria 1 through 7), Operational (screening criteria 8 through 13), and Environmental (screening criteria 14 through 19). The criteria were not weighted, as all the criteria are important. Each of the Screening Level 2 criteria is described in the following sections. Alternatives that satisfy the screening criteria are recommended for further design development and environmental evaluation.

### **1. Engineering Criteria**

Engineering criteria were identified to determine the technical engineering feasibility of the preliminary alternatives. The key questions used to establish engineering goals and determine the criteria addressing the engineering feasibility of each preliminary alternative include:

- Is there sufficient separation between the proposed tunnel and other existing tunnels?
- Is the proposed tunnel adequately sized to meet clearance requirements?
- Would the proposed geometry increase train speed while maintaining safe and efficient operation for passenger and freight rail trains?
- Is the tunnel and adjoining alignment feasible to construct?

#### **a. Tunnel Separation (Criterion No. 1)**

The goal would be for minimum separation between existing underground structures (in particular, the MTA Metro subway) and the proposed tunnel to be approximately 30 to 40 feet.

#### **b. Tunnel Clearance (Criterion No.2)**

The goal for tunnel clearance would be to accommodate, at a minimum, two tracks, however, three or four tracks would not be precluded. The number of tunnel bores required would be flexible based on the number of tracks and a future determination of whether bores could accommodate more than one track. Tunnels should accommodate Plate H clearances to allow for the possible future extension of Plate H<sup>5</sup> operations over this portion of the NEC. Plate H clearance issues throughout Baltimore and beyond will need to be addressed before practical Plate H service could be instituted through the project area.

#### **c. Horizontal Curvature (Criterion No. 3)**

The goal for horizontal curvature would be to accommodate design speed of 40 miles per hour (mph) or greater. All alternatives would be designed for a minimum of 40 mph design speed, although higher speeds are desirable wherever they can be achieved.

#### **d. Vertical Grade (Criterion No. 4)**

The goal for the vertical grade would not exceed two percent. When a horizontal curve is located on the grade, the maximum allowed grade on the curve is reduced by 0.04 percent for each degree of horizontal curve.

#### **e. West Baltimore MARC Station Service (Criterion No. 5)**

Maintaining service at a West Baltimore MARC Station was a screening criterion. The MTA has made significant investment recently at this station and maintaining service to MARC Station is priority. If the

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<sup>5</sup> Plate H clearance requires dimensions of 10' 8" wide by 20' 2" tall to allow for double-stacked freight containers.

station platforms were to be relocated from the current curve to the closest tangent track section, it is assumed a viable MARC station could be maintained.

**f. Track Grade at Penn Station (Criterion No. 6)**

To control costs and maintain operation of Penn Station, every effort was made to maintain the existing track alignments at Penn Station.

**g. Physical Constraints (Criterion No. 7)**

The existing tunnel traverses through a well-developed urban setting of residential neighborhoods with many surface level streets, row homes, community facilities, parks, aerial structures; and below grade rail lines, waterways and structural foundations. Three key physical constraints to be considered in the evaluation of preliminary alternatives are:

- (1) The CSX Mainline, which emerges from the Howard Street Tunnel and proceeds geographically north to cross the Jones Falls above grade on a multi-span structure;
- (2) The Jones Falls Railroad Bridge/Amtrak's Jones Falls Bridge (designated by Amtrak as MD 95.95), a four span concrete arch bridge has a total length of 80 feet and was built in 1916; and
- (3) The Gwynns Falls Railroad Bridge/Amtrak's Gwynns Fall Bridge (designated by Amtrak as MD 99.20).

Other constraints include:

- MTA Light Rail Line mainline and facilities; and
- Jones Falls Expressway and Howard Street bridge structures including piers/columns, abutments and foundations.

Impacts to these structures would require major construction resulting in a higher cost to replace the tunnel and significant disruptions to daily infrastructure activities and the built environment. Major conflicts between alternatives and the physical constraints listed above were avoided.

## **2. Operational Criteria**

Amtrak, MARC, and freight rail operations must be maintained during construction and in future years. The following screening criteria were used to determine whether a preliminary alternative would meet the required Operational criteria.

**a. Separated Right-of-Way (Criterion No. 8)**

Safety and security of the traveling public, as well as the neighborhoods the railroad operates through, require a physically separate right-of-way with a well-protected perimeter. The Project must, by location and design, prevent unauthorized intrusion into or upon the operating railroad environment, discourage vandalism, loitering, and dumping on the right-of-way or adjacent to facilities. Alternatives that cannot be constructed with a physically separate right-of-way and a well-protected perimeter will be removed from further consideration.

**b. Amtrak and MARC Operations (Criterion No. 9)**

Construction of the Project must enable Amtrak and MARC to maintain the projected passenger services and frequency of trains through Baltimore Penn Station with no long-term interruptions through the time period necessary to construct the Project. Single-track weekend outages along the NEC for cut-overs between the new and existing tracks and other minor construction interferences may be accommodated.

Major track outages when NEC traffic would need to be suspended on weekdays, other than late night, cannot be accommodated. There are no reasonable detours available to route rail traffic around the

tunnel; therefore the existing B&P Tunnel must remain operational as a two-track tunnel throughout construction of an alternative. Alternatives that would not maintain NEC operations pursuant to a minimum of the 2020 forecast service levels will be removed from further consideration.

**c. Number of Tracks and Throughput Capacity (Criterion No. 10)**

Alternatives must include at least two tracks and a throughput capacity of at least 24 trains per hour in each direction. There are currently two tracks in the existing tunnel; any alternative must be at least equivalent in order to be considered reasonable<sup>6</sup>. The specified capacity provides for scheduling and operating flexibility commensurate with the rest of the NEC operation, and allows a MARC train to merge as closely as possible behind an Amtrak train (or vice versa). Alternatives that do not include at least two tracks with a throughput capacity of at least 24 trains per hour in each direction will be removed from further consideration.

**d. Travel Time (Criterion No. 11)**

Alternatives should result in no increase in travel time between the northern and southern project limits. The length of the new alignment in combination with speed of operation determines the segment travel time. The combination of the length of a new alignment and the average speed traversing it cannot increase total travel time for this segment compared to the existing tunnel. The Project should either equal or reduce overall travel time through Baltimore. Alternatives that result in an increased travel time between the northern and southern project limits will be removed from further consideration.

**e. NEC Operational Reliability (Criterion No. 12)**

In order to achieve a desired level of operational reliability, for both the tunnel and the NEC corridor, each track must be bi-directional and the tunnel must be aligned so that the track geometry permits each end of the proposed tunnel to have universal interlocking with the NEC mainline. Bi-directional tracks would allow for operational and maintenance flexibility, including the ability to mitigate abnormal and emergency situations through contingency operations. Universal interlockings are necessary to permit the use of any tunnel track with any platform track to the north and any non-tunnel track to the south. Alternatives that cannot include bi-directional tracks and universal interlockings with the NEC mainline will be removed from further consideration.

**f. Movement of Freight (Criterion No. 13)**

The project must, at a minimum, accommodate the movement of freight at current 2014 levels. Amtrak has statutory and contractual obligations to permit the continued operation of freight trains over its system, including the B&P Tunnel. Therefore alternatives that do not accommodate the movement of freight at 2014 levels or meet statutory and contractual obligations will be removed from further consideration.

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<sup>6</sup> Alternatives are assumed to be two tracks so there is a standard baseline for alternative comparisons. However, there is flexibility within the screening methodology such that the alternatives could be two, three, or four tracks without affecting the screening results.



# Preliminary Alternatives

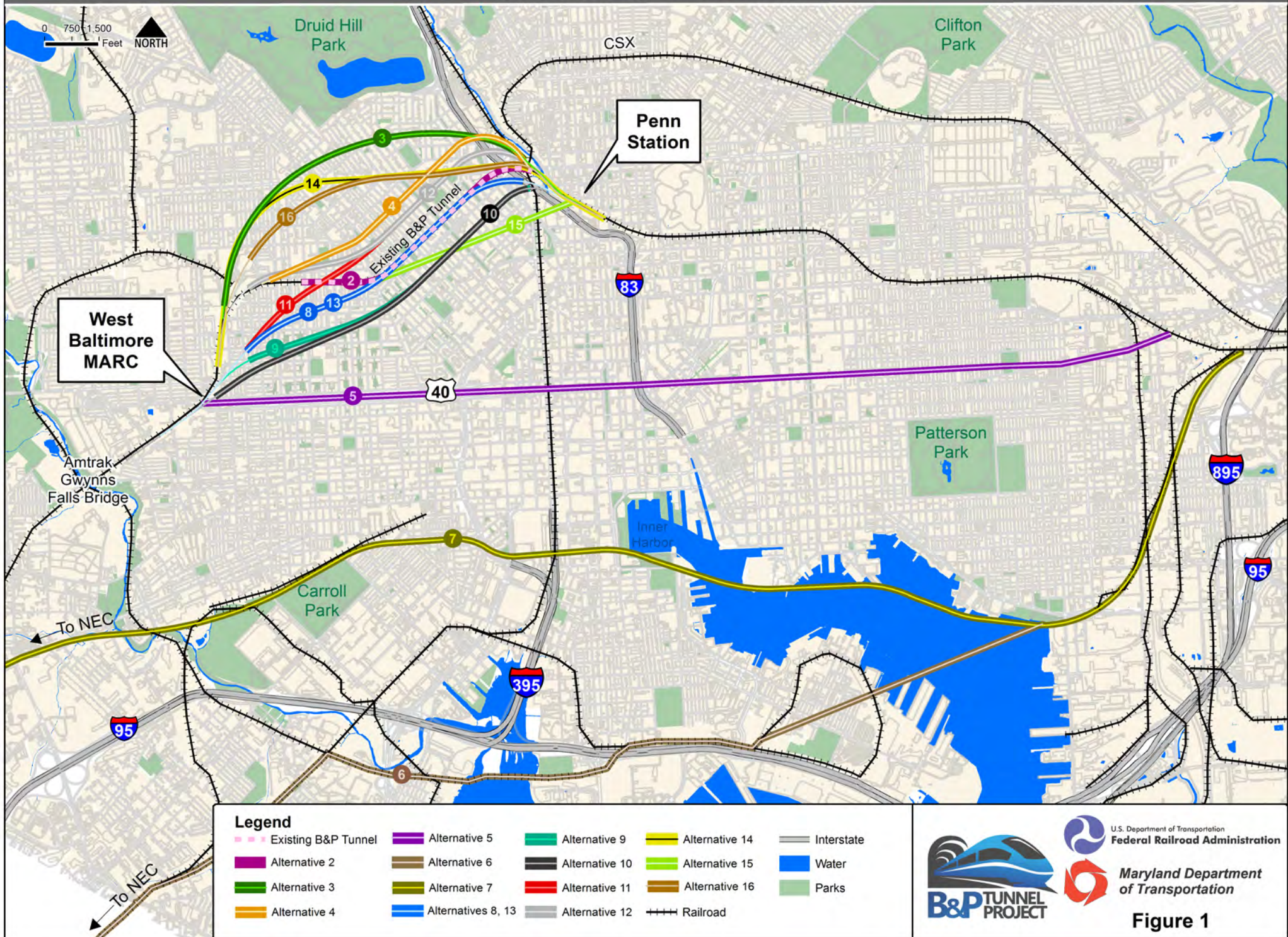


Figure 1



### **3. Environmental Criteria**

The potential environmental effects of the preliminary alternatives were assessed using Geographic Information Systems (GIS) data from the City of Baltimore and cursory field verification. The environmental features were identified within a 160-foot<sup>7</sup> wide surface area of surface disturbance (footprint of construction). For the purpose of this analysis, the surface disturbance area does not include portions of the alignment which are presently assumed to be deep enough below the surface to accommodate a bored tunnel. Alternatives retained for further study will be analyzed for environmental impacts in greater detail throughout the NEPA process. The environmental criteria considered in the screening process are described below.

#### **a. Primary Construction Method (Criterion No. 14)**

Although detailed engineering has not been undertaken, an important element was an assessment of whether a bored tunnel or cut-and-cover construction would be required. A bored tunnel would incur potential environmental impacts at the tunnel portal locations. For the purposes of this document, a tunnel portal is defined as where tunneling operations end, and cut-and-cover (excavation and fill) operations begin. Cut-and-cover would incur potential environmental impacts from excavation for the entire length of the proposed cut-and-cover construction area. Alternatives that could primarily utilize bored tunnels are preferable; those which would require substantial cut-and-cover construction were removed from further consideration.

#### **b. Parks (Criterion No. 15)**

This criterion considers the number of parks within the areas of surface disturbance based on parks identified in the Baltimore City Geographic Information Systems (GIS) Land Use database. The protection and preservation of parks is required by Section 4(f) of the US Department of Transportation Act of 1966 (49 U.S.C. §303). The number of parks located within the surface disturbance footprint should be minimized. Alternatives with fewer parks in the surface disturbance footprint are preferable to alternatives that could impact more parks.

#### **c. Residential Land Uses (Criterion No. 16)**

This criterion considered residential land uses within areas of surface disturbance based on the residential properties identified in the Baltimore City GIS Land Use database. Residential land use areas within the surface footprint should be avoided or minimized. Alternatives with less residential land use in the surface disturbance footprint are preferable to alternatives that could impact more residential land use.

#### **d. Existing Bridge over Jones Falls (Criterion No. 17)**

This criterion considered whether the alternative could utilize the existing bridge over the Jones Falls to avoid or minimize impacts to natural resources in this area as required by Clean Water Act of 1972 (33 U.S.C. §1251 et seq). Alternatives that utilize the existing bridge over the Jones Falls are preferable to alternatives that could require a new bridge.

#### **e. Minority and Low-income Communities (Criterion No. 18)**

This criterion considers low income and minority communities in proximity to an alternative based on a cursory review of Census data. Within the communities surrounding the existing B&P Tunnel (including Penn North, Reservoir Hill, Sandtown-Winchester, Harlem Park, and Upton/Druid Hill) minorities compose more than 90 percent of the population. In Midtown, which is located in the area surrounding Penn Station, minority persons compose 45 percent of the population. Low-income persons (persons with an

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<sup>7</sup> A 160-foot wide corridor is considered appropriate for a two-track tunnel system; however, if four tracks are to be considered the area of surface disturbance could be in excess of 210 feet wide.

income in the last 12 months below the poverty line) compose an average of 25 to 50 percent of the surrounding communities. Alternatives should avoid or minimize impacts to low-income and minority populations. Alternatives that are not within minority and low-income communities are preferable to alternatives that could impact these communities. Taking into account the potential impacts of the preliminary alternatives to these communities is important in light of Environmental Justice considerations (Executive Order 12898, Department of Transportation Order 5610.2a).

**f. Historic Districts and Structures (Criterion No. 19)**

This criterion considers whether the alternative is in proximity to historic properties (historic districts and structures) as required by the National Historic Preservation Act (16 U.S.C. 470). Alternatives should avoid or minimize impacts to historic properties. Alternatives with fewer historic properties in the surface disturbance footprint are preferable to alternatives that could impact more historic properties.

## **V. ALTERNATIVES IDENTIFICATION AND SCREENING**

A total of sixteen preliminary alternatives are presented in this section of the report. These include the No-Build Alternative, Restore/Rehabilitate the Existing B&P Tunnel Alternative, and 14 New Location Alternatives. The preliminary alternatives were screened based on the methodology described in **Section IV**. The first level of screening (Screening Level 1) was to assess the alternatives relative to fatal flaw criteria. The second level screening (Screening Level 2) evaluated the remaining preliminary alternatives using the Engineering, Operational, and Environmental screening criteria. The preliminary alternatives are shown on **Figure 1** and the evaluation is summarized in **Table 1**.

The following sections describe the preliminary alternatives, the outcome of an analysis based on the screening methodology, and the concluding factors that led to the recommendation of either eliminating the alternative from further consideration or carrying it forward for further design development and environmental evaluation.

### **A. Alternatives 1 and 2 — Not Screened**

#### **1. Alternative 1: No-Build**

**a. Description**

Alternative 1: No-Build would entail continued use with no significant improvements to the existing B&P Tunnel aside from the routine maintenance currently being conducted. The tunnel's basic geometry and structure would not be improved; the existing tunnel and tracks would be left in place (**Figure 2**). This alternative would not modernize the tunnel or bring it into a "state of good repair," but would rather maintain the existing service and ongoing maintenance as currently practiced with minimal disruption.

Repairs to the tunnel were completed in the early 1980s including repair of the tunnel lining, drainage improvements, replacement of the tunnel invert, and installation of an improved track system. Since completion of these repairs, recent evaluations concluded that the B&P Tunnel should be replaced within 20 years as the existing tunnel is increasingly difficult and expensive to maintain.

**b. Analysis**

Alternative 1: No-Build assumes that no new tunnel would be constructed. Train traffic would continue to use the existing tunnel. The No-Build Alternative would not meet the stated Purpose and Need of the Project, as it would allow the current physical and operational conditions of the tunnel to deteriorate over time. The No-Build Alternative would not involve any new improvements to the B&P Tunnel and therefore would have no impact on community facilities, historic properties, land use, parks, or property.

### c. Recommendation

Alternative 1: No-Build will be carried forward for further evaluation to serve as a baseline for comparing the other alternatives.

## 2. Alternative 2: Restore/Rehabilitate Existing B&P Tunnel

### a. Description

Alternative 2: Restore/Rehabilitate Existing B&P Tunnel includes the restoration and/or rehabilitation of the existing B&P Tunnel in place (**Figure 3**). This alternative could eliminate the deteriorating conditions of the (three sections of) tunnels and eliminate restrictions on the size of railcar traffic over the NEC through Baltimore. This alternative includes the possible tunnel reuse or abandonment options for the existing tunnels. Studies are currently in progress to determine the feasible options for use of the existing tunnel, such as disposition, rehabilitation, reconstruction, and/or adaptive reuse. These studies will also assist in determining if the existing tunnel could be considered in combination with other alternatives.

### b. Analysis

Several previous studies investigated possible options for rehabilitating the existing B&P Tunnel. The Northeast Corridor Improvement Project (NECIP) study team inspected the B&P Tunnel in the late 1970s and evaluated construction alternatives that would enable the existing tunnel invert to be lowered one track at a time, with the second track remaining in service during construction. NECIP findings are summarized below:

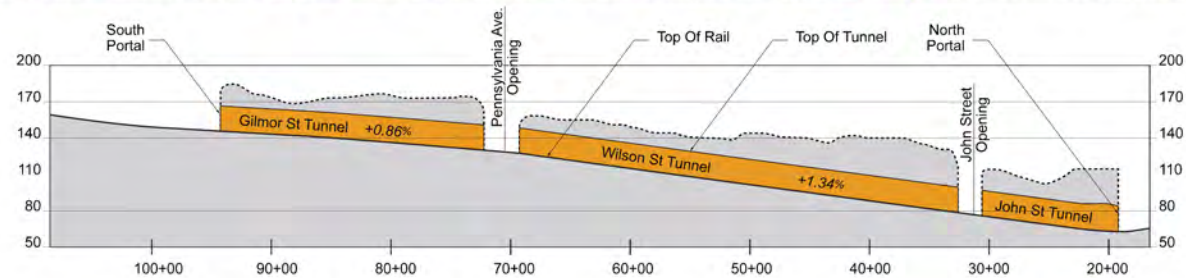
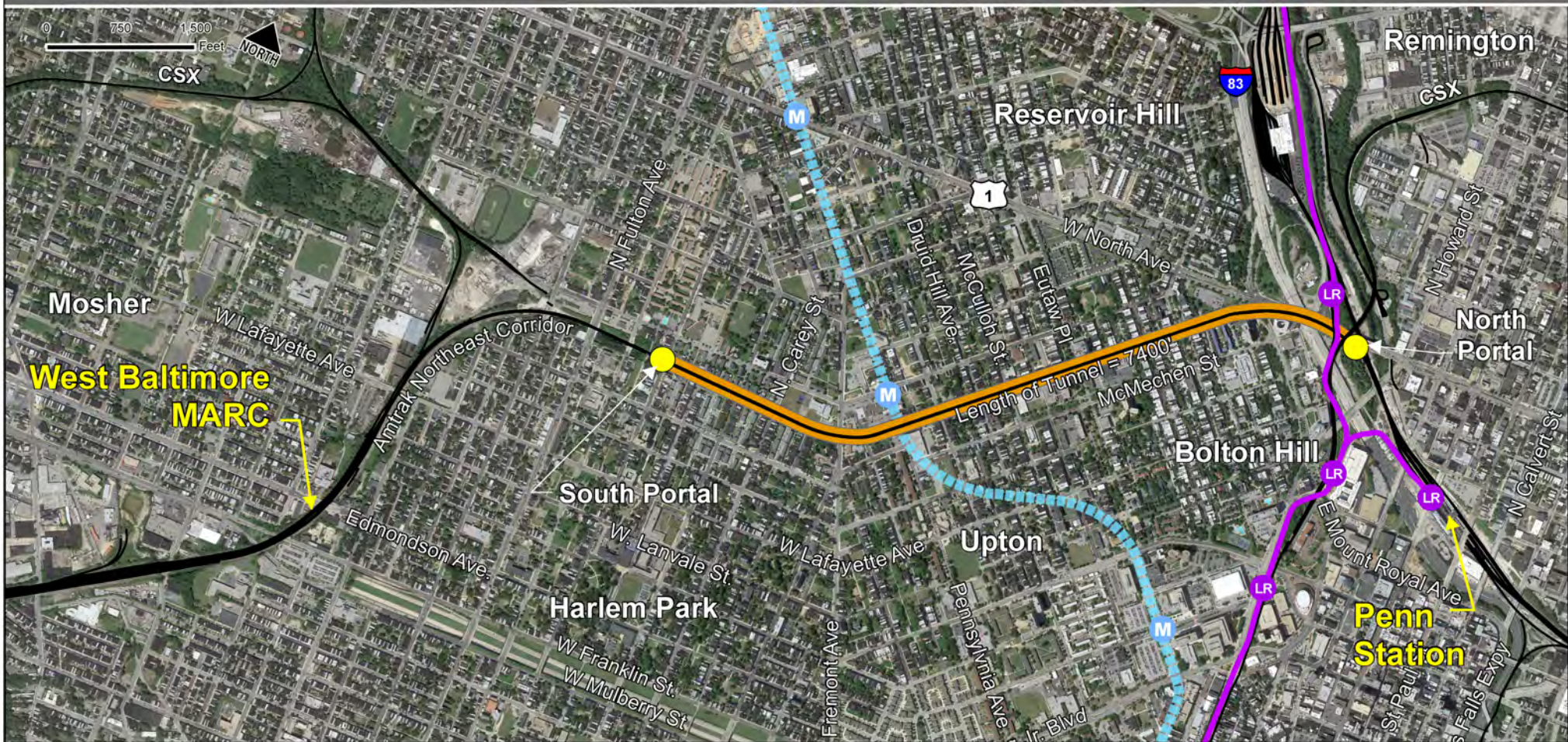
- The water table surrounding the tunnel has dropped from 10 feet to 20 feet, suggesting leakage of water through tunnel.
- The seepage of water into the tunnel has caused the tracks to deteriorate as the drainage pipes below the center of the tracks were clogged and not functioning.
- The water leakage into the tunnel was not restricted to ground water only but there was also evidence of leaking water pipes.
- To increase the clearance in the tunnel, the tunnel invert and top of rail would have to be lowered. Vertical clearance could be increased by approximately 44" by this method.
- To achieve this clearance for one track at a time while maintaining service on the adjacent track would be very expensive.
- The overall feasibility of rehabilitating the B&P Tunnel while maintaining train service would be highly questionable. The congested space along with the potential for long outages would make this alternative impractical.

Ultimately NECIP led to implementing minor repairs intended as a temporary solution due to the high costs and potential environmental impacts of full rehabilitation. High saturation of water in the soil beneath the tunnels causes its aging floor slabs to sink, forces Amtrak to repeatedly make repairs (NEC Infrastructure and Operations Advisory Commission, 2013). Drainage through the tunnel's walls, leakage from existing utility lines, poor drainage of the tunnel's invert, and insufficient clearance were noted in prior reports (FRA and MDOT, 2011).

Most recently, the existing B&P Tunnel has been inspected for the B&P Tunnel Project. Despite the age-related deterioration, the tunnel remains safe, albeit with increasing maintenance concerns and ever increasing costs to keep the tunnel operational.



# Alternatives 1 and 2 - Tunnel and Vicinity



## LEGEND

Alternatives 1 and 2, Existing Alignment Locations\*

B & P Tunnel Portals

Existing Rail

Metro Line

Light Rail Line

Metro Station

Light Rail Station

\* Alignment width not to scale



Based on the preliminary screening, Alternative 2: Rebuild/Rehabilitate Existing B&P Tunnel would have reasonable project limits, and would likely satisfy safety and constructability criteria. It would meet two engineering criteria, including tunnel separation and clearance. However, Alternative 2 could fail to meet the remaining three engineering criteria for minimum tunnel depth, horizontal curvature, and profile grade. Alternative 2 could also fail to meet all operational criteria. Other challenges posed by this alternative, as identified in the 2011 FRA study, include the safety of operating trains in the tunnel during restoration; the integrity of the tunnel structure; the unforeseen underground conditions; and potential damage to existing facilities.

### c. Recommendation

Alternative 2: Restore/Rehabilitate Existing B&P Tunnel is being carried forward for further evaluation because additional information is needed to determine the viability of this alternative. In particular, additional evaluation would aid with identifying the most appropriate manner of tunnel restoration or rehabilitation; how the existing tunnel could be used in the future; or whether construction of the alternative could reasonably accommodate train operations. There is also potential for the restoration or rehabilitation of the existing tunnel to be considered in conjunction with other project alternatives as part of a configuration with more than two tracks. A study focused on the restoration or rehabilitation of the existing tunnel is currently being funded through a SAFETEA-LU grant administered by FRA, MDOT and Amtrak. The results of that study will be used to further evaluate Alternative 2.

## B. Alternatives from Previous Studies

Five of the New Location Alternatives under consideration for the B&P Tunnel originated from alternatives previously studied and documented in the FRA Study, *Baltimore's Railroad Network* (2005 and 2011). The *Baltimore's Railroad Network* Study divided Baltimore into four geographic sectors in order to develop alternatives that met the stated goals of the *Baltimore's Railroad Network Study*, including replacement of the B&P Tunnel. The four sectors - the Far North; Near North; Central; and Harbor Sectors - were conceptualized as broad, concentric arcs radiating from the city center through which improvement alternatives might satisfy the line of traffic from roughly southwest to northeast. The *Baltimore's Railroad Network* Study considered the feasibility of using each of the four sectors to improve the movement of passenger and freight trains through Baltimore. The Far North Sector was removed from consideration as it would not be possible to provide passenger service to Baltimore on an alignment so far removed from the city. The three remaining sectors that underwent further analysis in the *Baltimore's Railroad Network Study* are:

- **Near North Sector:** This sector lies just north of the central business district (CBD) and is the current location of Amtrak's NEC. The Presstman Street, Existing B&P Tunnel, and Great Circle Passenger Tunnel alternatives were identified in this sector.
- **Central Sector:** This sector would cross the CBD proper abutting the Inner Harbor near Pratt and Lombard Streets, but was never an at-grade possibility due to the heavily developed nature of downtown Baltimore. The Route 40 Alternative was identified in this sector.
- **Harbor Sector:** Because the Harbor is extensive and complex, with multiple inlets and points on both sides, many alternatives are hypothetically possible in this sector. The Sports Complex and Locust Point alternatives were identified in this sector.

Within each of the three geographic sectors, the alternatives studied were developed along the most reasonable alignments and in consideration of various geographic constraints. The *Baltimore's Railroad Network Study* developed these alternatives in consideration of broad goals specific to the 2005 and 2011

studies and are not the same criteria used in this *Preliminary Alternatives Screening Report* for the B&P Tunnel Project. The following five alternatives identified in the *Baltimore's Railroad Network Study* were considered and evaluated as Alternatives 3 through 7 for the B&P Tunnel Project.

## **1. Alternative 3: Great Circle Passenger Tunnel**

### **a. Description**

With portals not far removed from those of the existing B&P Tunnel, Alternative 3: Great Circle Passenger Tunnel would follow a wide arc ranging up to approximately 3,600 feet north of the existing alignment (**Figure 3**). The route would retain the present NEC alignment south of where Fulton Avenue crosses the NEC through the West Baltimore MARC station. The southwest portal would be approximately 2,000 feet west of the existing B&P Tunnel portal near where Fulton Avenue crosses the NEC, and the northeastern portal would be approximately 600 feet northwest of the current B&P Tunnel portal in the Jones Falls Valley. The route at the northeast end of Alternative 3 would reconnect to the NEC at Charles Interlocking. The platforms at Penn Station would not be modified. The alternative would involve one continuous tunnel and would have a maximum grade of approximately two percent. The tunnel would travel below the Baltimore Metro tunnel.

### **b. Analysis**

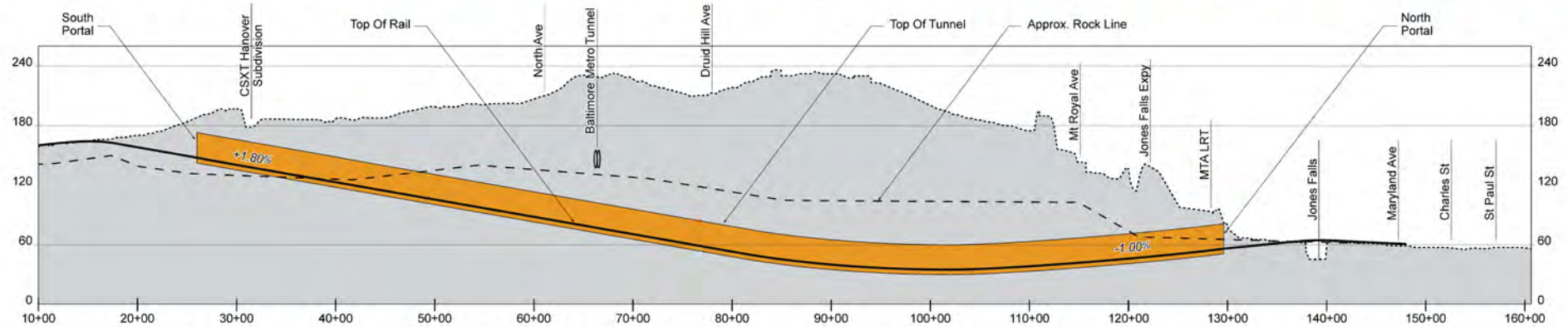
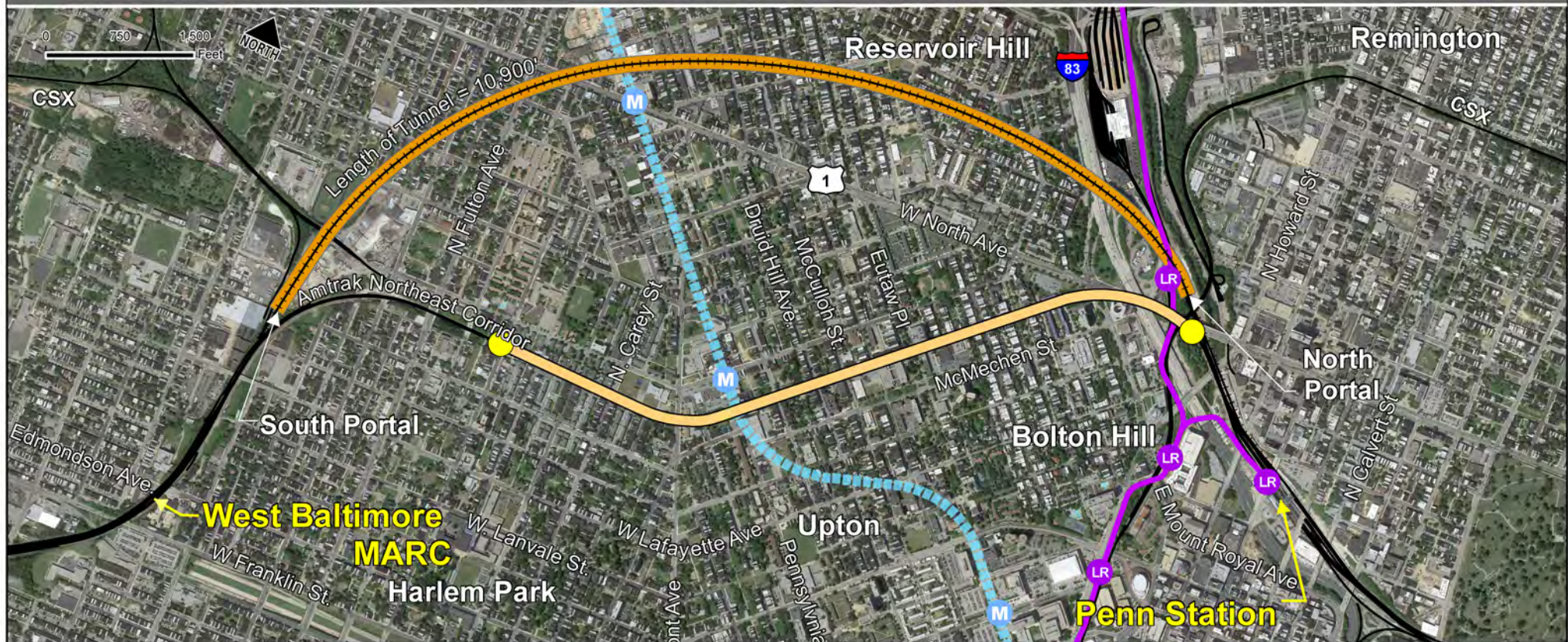
The Great Circle Passenger Tunnel was studied and presented in the 2011 *Baltimore's Railroad Network: Analysis and Recommendations*. The methodology, analysis and results from the report were reviewed and included the following:

- The portal locations are not very far from portal locations of existing tunnel and would not require changes in train operation. There would not be any impacts on Penn Station and West Baltimore Station.
- Gradual curvature permits higher train speed.
- Platforms at Penn Station would not be modified but some reconfiguration of tracks prior to Penn Station could be done to improve operations.
- Trains would operate at higher speed compared to other alternatives reducing the travel time.
- The tunnel would be deeper and within the rock. A Tunnel Boring Machine (TBM) could be used for construction, minimizing impacts that could be caused by other, more-invasive construction methods.
- Much of the tunnel alignment could be constructed using boring methodology, thereby minimizing environmental impacts. However, the alternative would travel beneath residences, minority and low-income populations, and historic districts.

Alternative 3: Great Circle Passenger Tunnel is not fatally flawed (Screening Level 1) because it could utilize existing infrastructure at Penn Station and the NEC Gwynns Falls Bridge, and its conceptual geometry is feasible. The alternative would satisfy all Engineering criteria in Screening Level 2 including maintaining the existing West Baltimore MARC Station, maintaining existing grades at Penn Station, avoiding physical constraints, achieving tunnel separation and clearance goals, and attaining horizontal curvature and vertical grade goals. The alignment would satisfy all operational criteria in Screening Level 2 including separated ROW, maintaining existing passenger operations, reducing travel time, NEC reliability goals, and maintaining existing freight movement.



# Alternative 3 - Tunnel and Vicinity



## LEGEND

- Alternative 3\*
  - Metro Line
  - Metro Station
  - B & P Tunnel Portals
  - Light Rail Line
  - Light Rail Station
  - Baltimore & Potomac Tunnel
  - Existing Rail
- \* Alignment width not to scale

**Figure 3**



The approximate locations of the tunnel portals, along with the ability to utilize boring as the primary construction method, would help to ensure that minimal residential land uses are impacted compared to the other alternatives (aside from Alternative 1: No-Build). No parks would be located in the estimated surface footprint area, and the alignment would utilize the existing Jones Falls Bridge. Similar to the other build alternatives, Alternative 3: Great Circle Passenger Tunnel could have impacts on low income and minority populations as well as historic districts and structures.

**c. Recommendation**

Alternative 3: Great Circle Passenger Tunnel is not fatally flawed under Screening Level 1 and would also meet the Engineering and Operational criteria under Screening Level 2. This alternative is therefore recommended to be carried forward for further design development and environmental evaluation.

## **2. Alternative 4: Presstman Street**

**a. Description**

Presstman Street has been studied as a potential location for a new tunnel roughly parallel to the existing B&P Tunnel since the early 1930s. Tunneling right-of-way along Presstman Street, just north of the existing route, had been previously acquired and was passed to Amtrak with its acquisition of the NEC. Adherence to the original alignment developed in the 1930s would require tunneling immediately above the Baltimore Metro tunnel.

Alternative 4: Presstman Street would depart from the existing NEC Main Line approximately 0.2 miles west of the existing B&P Tunnel southern portal, descending into a tunnel heading northeast roughly diagonal to the existing street grid towards Presstman Street (**Figure 4**). At Fremont Avenue the tunnel alignment would curve northward to run underneath Presstman Street between Pennsylvania Avenue and Eutaw Street. After Eutaw Street, the tunnel alignment would extend in a straight line underneath North Avenue and Lennox Street, before curving eastward at Park Avenue. The tunnel would then curve southeast underneath I-83 to rejoin the NEC Main Line near the northern portal of the existing B&P Tunnel.

This alignment would be a relatively short, shallow tunnel and would have an improved vertical compensated grade compared to the existing B&P Tunnel. Preliminary geotechnical investigations conducted by the NECIP study team in the late 1970s identified some advantages as well as substantial difficulties with the Presstman Street alignment.

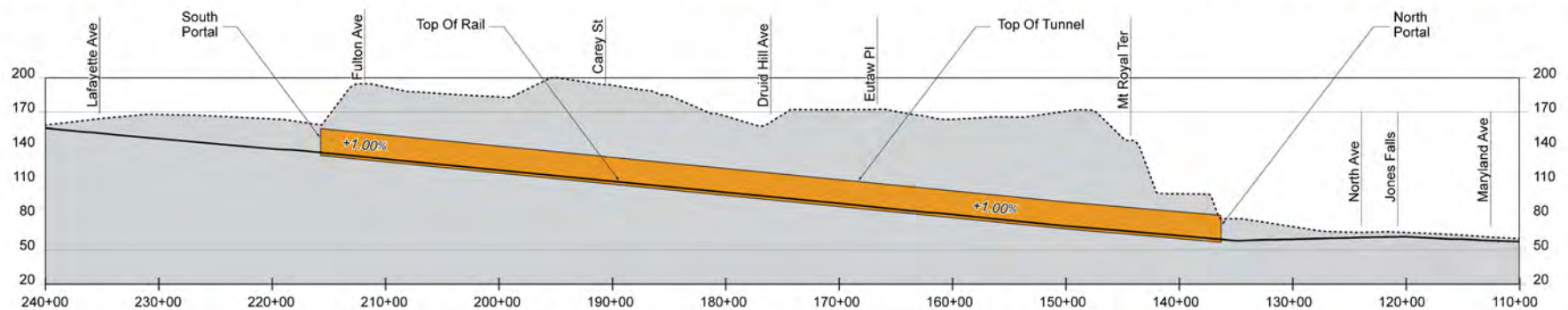
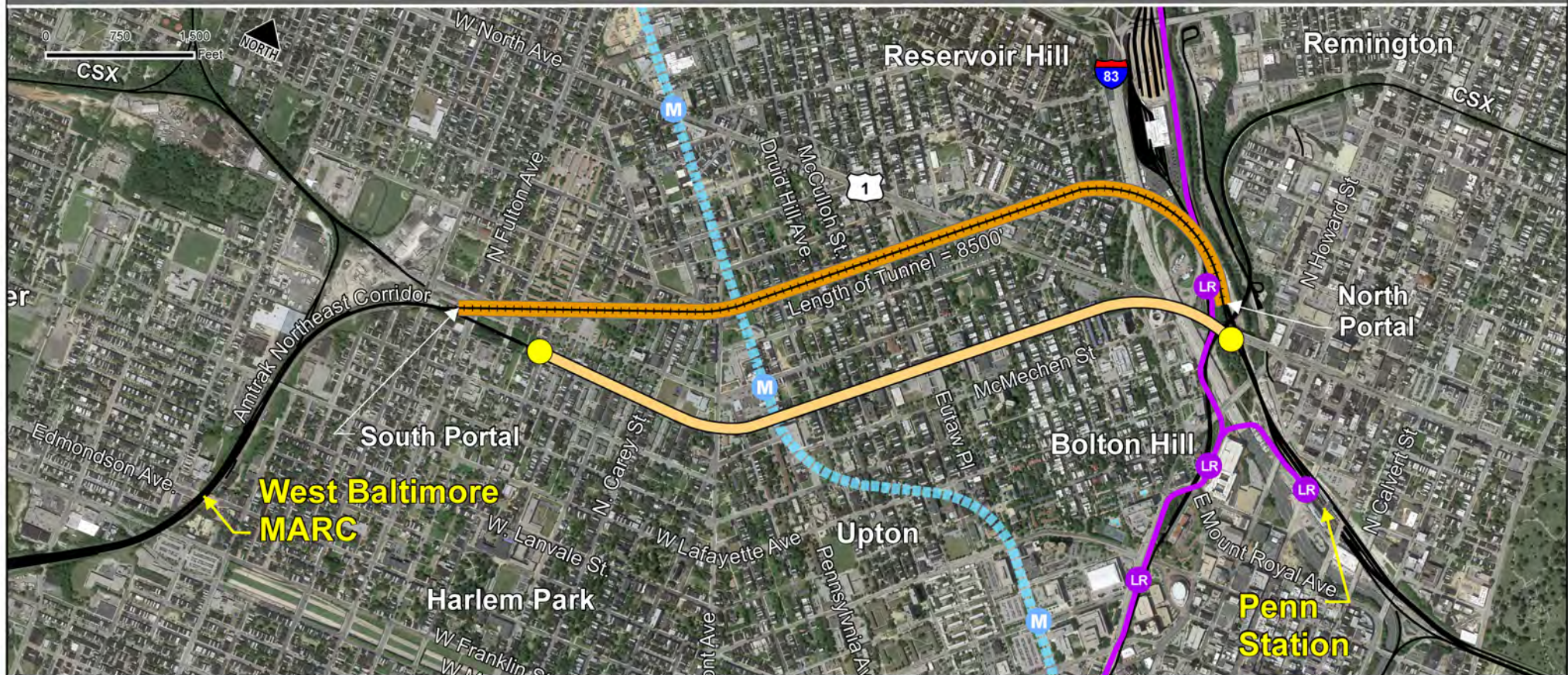
**b. Analysis**

Alternative 4: Presstman Street and its various options were studied in detail and are summarized in *Baltimore's Railroad Network: Analysis and Recommendations* (2011) study. The team reviewed methodology, analysis and results listed in the report. The report concludes the following about this alternative:

"At the high price entailed by any of the alternatives of Presstman Street Tunnels, all of which would require conventional instead of the cheaper deep-bore construction methods and would heavily impact the affected neighborhoods at least during the construction process, a more satisfactory travel time payoff should be expected."



# Alternative 4 - Tunnel and Vicinity



## LEGEND

- Alternative 4\*
  - Metro Line
  - Metro Station
  - B & P Tunnel Portals
  - Light Rail Line
  - Light Rail Station
  - Baltimore & Potomac Tunnel
  - Existing Rail
- \* Alignment width not to scale



As described in the 2011 *Baltimore's Railroad Network: Analysis and Recommendations* study, most of the tunneling right-of-way for this alternative has been previously acquired and is currently owned by Amtrak. However, Alternative 4: Presstman Street would likely have exorbitant costs associated with construction and impacts resulting from primarily cut-and-cover construction. Additionally, Alternative 4's curvature, while it satisfies the horizontal curvature criteria described in this document, would "still hamper the speed of (passenger) trains through Baltimore" (FRA, 2011) compared to an alternative with less curvature.

Alternative 4: Presstman Street is not considered fatally flawed under Screening Level 1 because it could utilize existing infrastructure at Penn Station and the NEC Gwynns Falls Bridge, and its conceptual geometry is feasible. The alternative would fail to satisfy the tunnel separation goal (Criterion No. 1), but would satisfy all other Engineering criteria in Screening Level 2 including maintaining the existing West Baltimore MARC Station, maintaining existing grades at Penn Station, avoiding physical constraints, achieving tunnel clearance goals, and attaining horizontal curvature and vertical grade goals. The alignment would satisfy all operational criteria in Screening Level 2 including separated ROW, maintaining existing passenger operations, reducing travel time, NEC reliability goals, and maintaining existing freight movement.

Alternative 4: Presstman Street would require primarily cut-and-cover construction, which would likely result in greater environmental impacts compared to the other New Location Alternatives that could be constructed with a TBM. This alternative has the most park properties within the surface footprint. There are no alternatives (aside from the No-Build) that avoid low income and minority populations and historic districts and structures.

### **c. Recommendation**

Alternative 4: Presstman Street would have reasonable project limits and would satisfy operational criteria, therefore it is not fatally flawed. However, the alternative would not meet the tunnel separation requirement (Criterion No. 1) from Screening Level 2. Furthermore, the amount of cut-and-cover construction required for this alternative would likely result in more severe environmental impacts relative to the other alternatives. As a result, this alternative has been eliminated from further consideration.

## **3. Alternative 5: Route 40**

### **a. Description**

An alignment traveling in a straight line along the US Route 40 corridor through central Baltimore was examined as the most obvious and direct route through the city, bypassing entirely the tight curves currently faced by NEC traffic. Alternative 5: Route 40 would consist of three main segments: the NEC at West Baltimore to Martin Luther King, Jr. Boulevard; Martin Luther King, Jr. Boulevard to the Jones Falls Valley; and the Valley to the NEC near Bay Interlocking.

A wide transportation right-of-way was acquired along the US 40 corridor, located between Mulberry and Franklin Streets, for the previously planned extension of I-70. The rail right-of-way potentially would replace one of the two lane roadways on either side of the median. Space was provided in the median for a light rail line, which would have to be maintained. The broad transportation corridor ends at Martin Luther King, Jr. Boulevard.

Approaching downtown from the west, Alternative 5: Route 40 would go into a tunnel that would pass under the Metro Tunnel, the Howard Street Tunnel, the central Enoch Pratt Free Library, and the Basilica

of the Assumption. Most of the tunnel alignment would be in mixed ground (soils and rock). Due to the sensitivity of the historic structures above, expensive low-impact tunneling techniques would be required.

The relatively deep Jones Falls Valley is located east of St. Paul Street, where Franklin and Mulberry Streets merge to become Orleans Street, which crosses the valley on a viaduct. The railroad alignment would emerge at, or above, ground level in the valley. This would be a potential station site. The station would be located about four blocks north of City Hall and about six blocks north of the financial district. The alignment was assumed to run northeastward under Orleans Street and Pulaski Highway all the way to the latter's intersection with the NEC, midway between Canton Junction and Bay Interlocking.

#### **b. Analysis**

A detailed description including alignment segments, evaluation, advantages and disadvantages of this alternative is provided in the 2011 *Baltimore's Railroad Network: Analysis and Recommendations* report.

Alternative 5: Route 40 would not follow the existing NEC corridor in Baltimore; rather, this route would bypass Penn Station and require construction of a new passenger station to replace Penn Station. This alternative was identified as having a fatal flaw in the first level of screening due to its inability to utilize existing infrastructure at Penn Station. Thus, it was not analyzed further in Screening Level 2 for the Engineering, Operational and Environmental criteria.

#### **c. Recommendation**

Alternative 5: Route 40 has a fatal flaw and has been eliminated from further analysis because it does not utilize existing infrastructure at Penn Station.

### **4. Alternative 6: Locust Point**

#### **a. Description**

Alternative 6: Locust Point crosses the Northwest Branch of the Inner Harbor to the north of the Fort McHenry Tunnel in order to provide a main station reasonably close to the CBD. The tunnel route from the southwest to the northeast connects Herbert Run (where CSX crosses the NEC) and Bay Interlocking in East Baltimore. Sited south of the CBD, this alternative would link Locust Point with Canton.

At Halethorpe/Herbert Run, northeast-bound passenger trains would divert from the existing NEC to the CSXT main line via a connection that is yet to be configured. Between Halethorpe and Curtis Bay Junction, the alternative could potentially have Amtrak, CSX, NS, and MARC all operating in the already overburdened CSX corridor. At a location east of Curtis Bay Junction, the Alternative 6 would diverge to the northeast from the CSX right-of-way. It would continue to the northeast, crossing over local roads and streets, to Westport, where it would have an intermodal station stop as it bridges over Baltimore's light rail line. Trains would then cross the Middle Branch of the Harbor on an elevated structure located above the former Western Maryland (WM) moveable bridge.

Neither an advantageous station location in either the Locust Point or Canton nor a consequent through-route could be identified within the Locust Point area. No obvious solution or ideal CBD station site could be located. Alternative 6: Locust Point would utilize two single-track passenger tunnels that would pass under a portion of Locust Point before rising to ground level north of I-95 in Canton. Northeast of the tunnel, Alternative 6 – threading its way through freight trackage and other obstacles in the Canton port area – would necessarily be slow and circuitous.

**b. Analysis**

A detailed description including alignment segments, evaluation, advantages and disadvantages of Alternative 6: Locust Point is provided in the 2011 *Baltimore's Railroad Network: Analysis and Recommendations* report. Alternative 6 would not follow the existing NEC corridor in Baltimore; instead this route would bypass Baltimore downtown altogether. This would require the relocation of Baltimore Penn Station, which renders the alternative as having a fatal flaw in Screening Level 1. Alternative 6: Locust Point was not analyzed further in Screening Level 2 for the Engineering, Operational and Environmental criteria.

**c. Recommendation**

Alternative 6 was identified as having a fatal flaw in the first level of screening due to its inability to utilize existing infrastructure at Penn Station. Thus, it was not analyzed further in Screening Level 2 for the Engineering, Operational and Environmental criteria.

**5. Alternative 7: Sports Complex****a. Description**

Alternative 7: Sports Complex was conceptualized to serve, in particular, the Inner Harbor area of downtown Baltimore. Alternative 7: Sports Complex would divert to the west from the existing Amtrak alignment at milepost 101.5 (about 0.5 mile north of the I-695 Baltimore Beltway over crossing in southwest Baltimore) and parallel the Amtrak route until reaching Wilkins Avenue. This segment would be in a cut-and-cover tunnel. The alternative would then curve to the east, cross under the Amtrak tracks, and follow Wilkins Avenue for about 0.5 mile. From Wilkins Avenue, the alternative would be in a tunnel section and would continue eastward to a location between the baseball stadium (Oriole Park at Camden Yards) and the M&T Bank football stadium. This would be the site for the potential downtown underground station. This site provides access for stadium events, affords accessibility to the Baltimore Light Rail Line and MARC Camden Line, and is in proximity to the Inner Harbor attractions. The underground station would be constructed using cut-and-cover methods.

Continuing eastward, sunken tube tunnels would be used under the Northwest Branch, past Fells Point to a point in the vicinity of Boston Street where the alignment would curve to the northeast. The principal reason for using the Northwest Branch for a tunnel corridor was to avoid complicated construction under buildings that would require underpinning and to avoid poor tunneling soil conditions. Cut-and-cover tunneling would begin in the Boston Street area with the portal located in the vicinity of Eastern Street on an existing Norfolk Southern route. The Norfolk Southern route would be used until Bayview where Amtrak trackage would be rejoined.

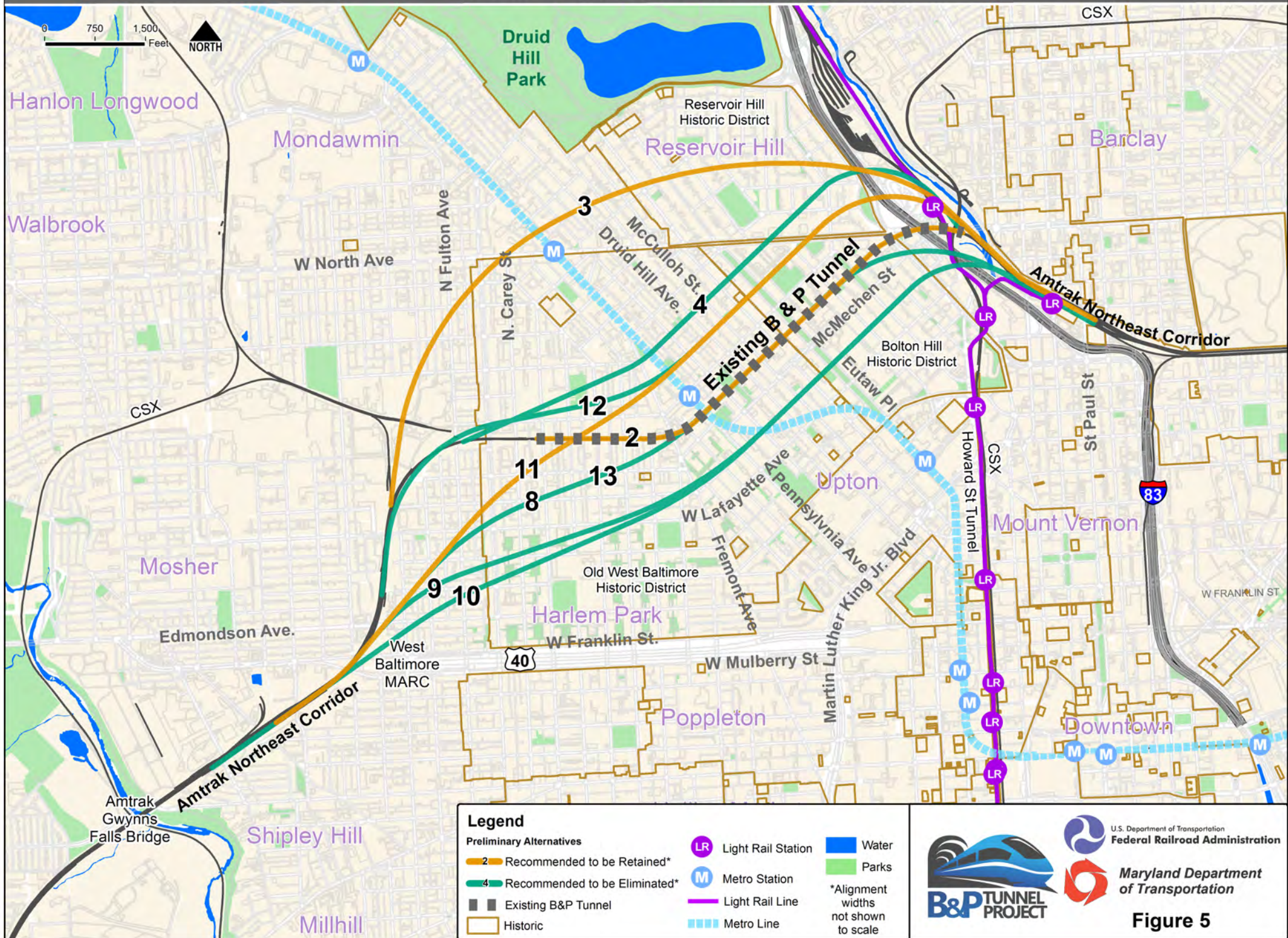
Alternative 7: Sports Complex in the Boston Street–Dillon Street–Haven Street area would have to be coordinated with a potential Red Line Corridor transit alignment. Because of the rising gradient from the tunnel portal, Haven Street may have to be closed just south of the Dillon Street intersection.

**b. Analysis**

A detailed description including alignment segments, evaluation, advantages and disadvantages of this alternative is provided in the 2011 *Baltimore's Railroad Network: Analysis and Recommendations* report. Similar to Alternatives 5 and 6, Alternative 7 does not follow the existing NEC corridor and would result in relocation of Baltimore Penn Station. Alternative 7: Sports Complex was therefore identified as having a fatal flaw in the first level of screening due to its inability to use existing infrastructure.



# Screening Level 2 Alternatives





### c. Recommendation

Alternative 7 was identified as having a fatal flaw in Screening Level 1. Thus, it was not analyzed further in Screening Level 2 for Engineering, Operational and Environmental criteria.

## C. Additional Preliminary Alternatives

Nine New Location Alternatives, in addition to the previous *Baltimore's Railroad Network Study* alternatives, were developed by FRA and MDOT following project scoping. One of these alternatives, Alternative 16, was developed based on public suggestion. Each New Location Alternative was evaluated to determine: 1) if it meets the Project Purpose and Need; and 2) how it meets the screening criteria. The alternatives are identified as Alternatives 8 through 16 and are shown on **Figure 5**.

### 1. Development of Additional Alternatives

Conceptual horizontal alignments and approximate profiles were developed for each of the nine additional New Location Alternatives, Alternatives 8 through 16. These nine New Location Alternatives include a variety of geometric configurations. A few are on an entirely new alignment north or south of the current tunnel, while others seek to reuse a portion of the existing tunnel. One alternative consists of an aerial structure to avoid the use of a tunnel; others transition from an underground tunnel section, to an at-grade track, to an aerial structure.

Although the tunnel limits were designated as Baltimore Penn Station to the north and the Gwynns Falls Bridge to the south, every effort was made to terminate the southern limit at the West Baltimore MARC Station. This station has recently opened two new parking lots serving the station and offers connections to the future MTA Red Line and near-by planned developments. No cost analysis was performed at this time.

### 2. Alternative 8: Wilson Street – Existing Tunnel

#### a. Description

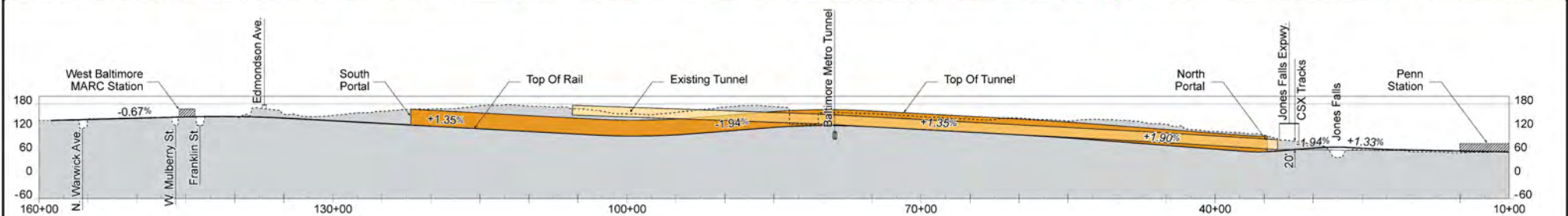
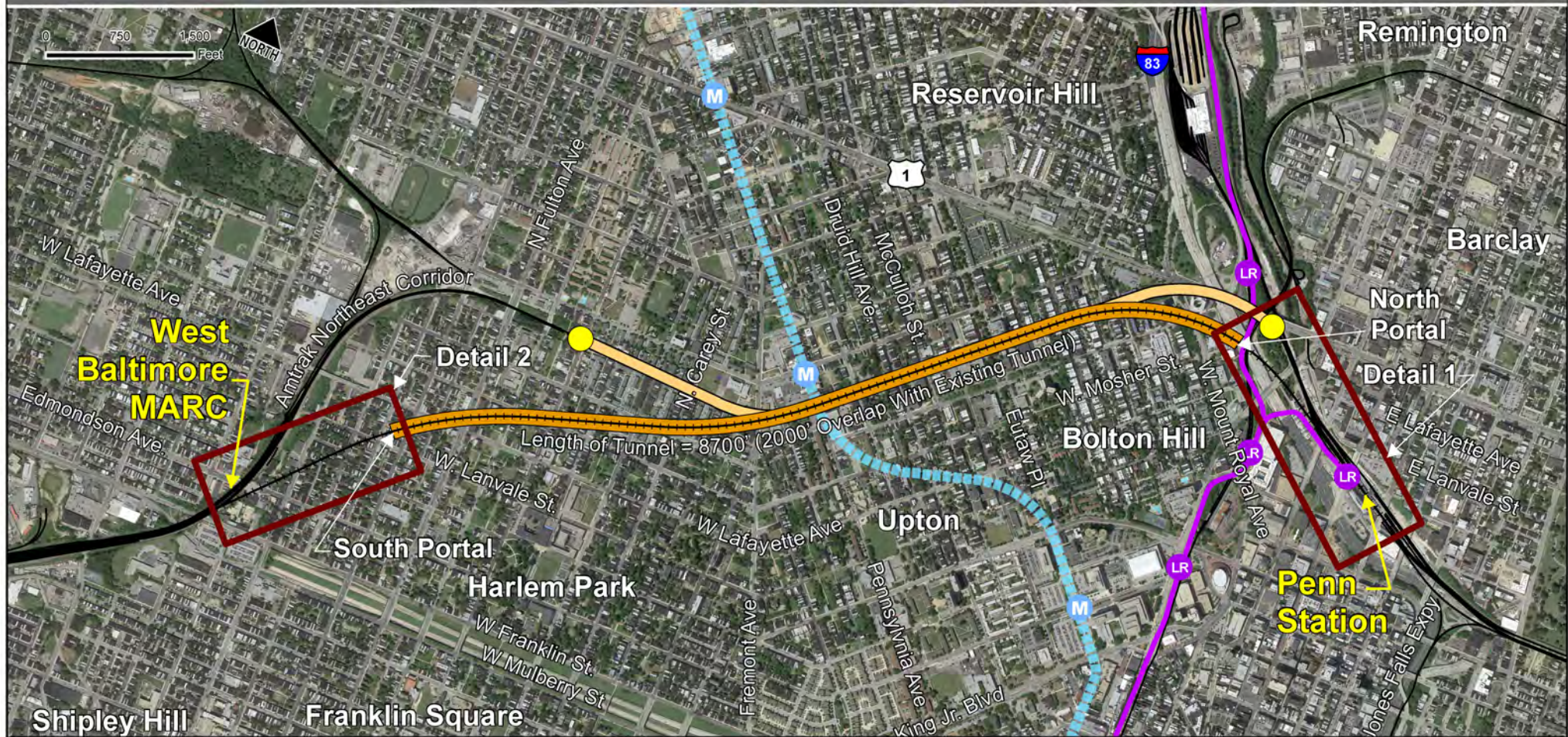
Alternative 8: Wilson Street – Existing Tunnel would entail a new tunnel alignment between the West Baltimore MARC Station and Gilmore Street Tunnel segment. Alternative 8 would reuse a portion of the existing Wilson Street tunnel segment and replace the remaining sections of the existing B&P Tunnel with a new tunnel south of its current location (**Figure 6**). This alternative would create an opportunity to improve the existing track geometry between the West Baltimore MARC Station and the Wilson Street Tunnel by flattening the curvature and reducing capital costs with a shorter tunnel. The alternative would be a combination of underground tunnels, aerial structures, and at-grade sections extending through the communities of Bolton Hill, Upton, Harlem Park, and the Old West Baltimore Historic District. It would follow the Wilson Street Tunnel, then continue on a southwesterly alignment via a series of smooth reverse curves until connecting to the West Baltimore MARC station. The north portal would be located under the Jones Falls Expressway Bridge near the MTA Light Rail tracks. The south portal would be located in a residential neighborhood of West Baltimore between Monroe Street and Appleton Street, and between Lafayette Avenue and Lanvale Street. The total tunnel length would be approximately 8,700 feet and vertical grades would vary between 1.35 percent and 1.94 percent.

#### b. Analysis

The existing West Baltimore MARC Station is located on a curve between two tangents. Alternative 8 would not maintain this curve and significant realignment of station platforms is necessary (**Figures 6a, 6b**). Prior to the north portal, the alternative crosses under multiple bridges including the Howard Street Bridge, Jones Falls Expressway Bridge and Light Rail Bridge. These bridges are within a congested corridor,



# Alternative 8 - Tunnel and Vicinity



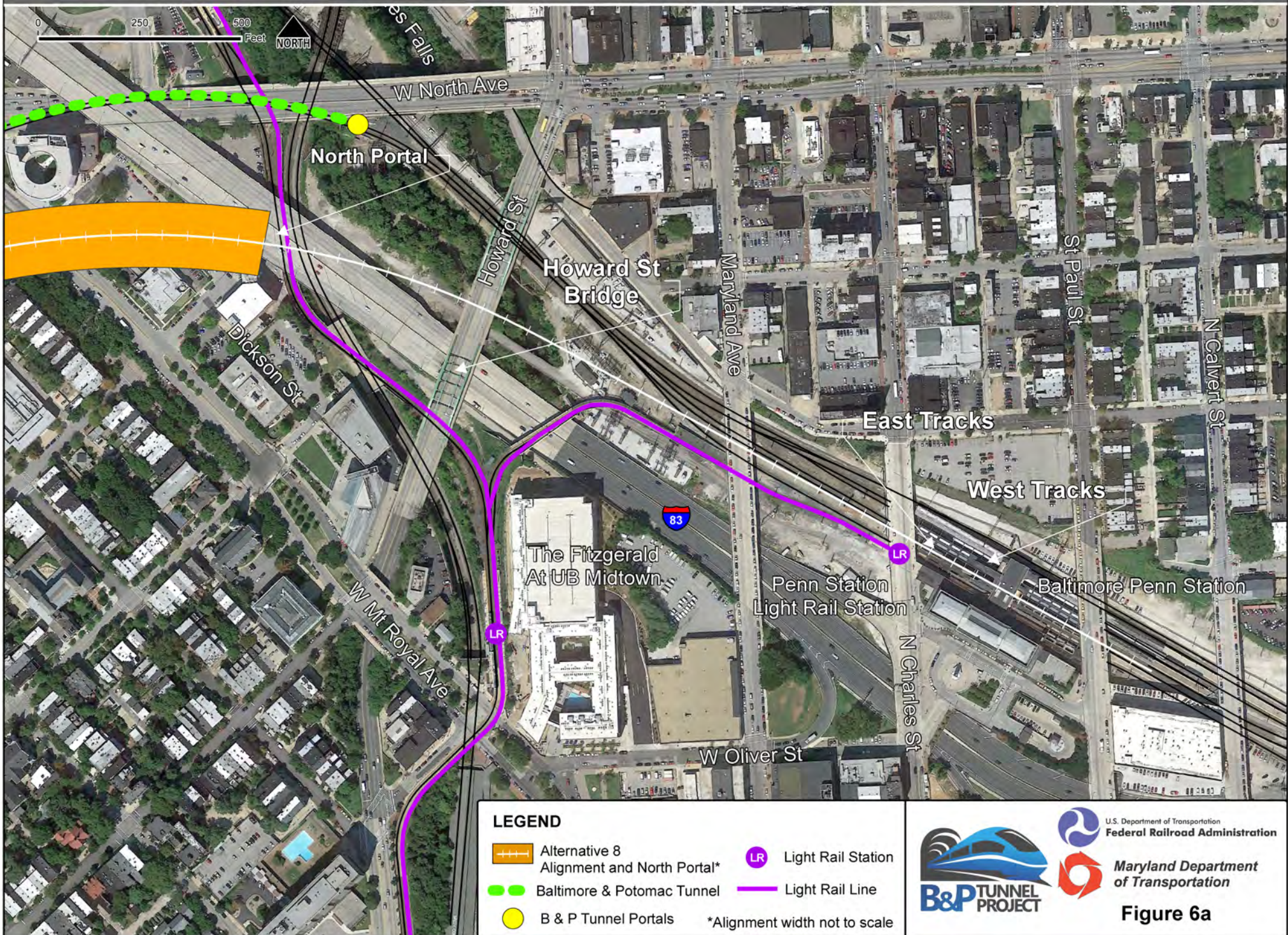
## LEGEND

- |                            |                 |                    |                                |
|----------------------------|-----------------|--------------------|--------------------------------|
| Alternative 8*             | Metro Line      | Metro Station      | * Alignment width not to scale |
| B & P Tunnel Portals       | Light Rail Line | Light Rail Station |                                |
| Baltimore & Potomac Tunnel | Existing Rail   |                    |                                |

Figure 6



# Alternative 8 - North Portal





# Alternative 8 - South Portal



Figure 6b



and crossing under them would be challenging to achieve adequate horizontal clearance from piers/columns and abutments of different bridge structures.

The Alternative 8: Wilson Street— Existing Tunnel alignment would maintain the existing grade while passing through Penn Station which is a requirement; however, it must cross Jones Falls on a new bridge and then cross under the CSX mainline. Approximately 20 feet of vertical clearance can be achieved under CSX to meet grade requirements of less than two percent. However, this elevation does not provide sufficient vertical separation between Amtrak tracks and CSX resulting in a conflict with this physical constraint. Furthermore, the north portal for the alternative would be located under the Jones Falls Expressway bridge, and the piers/columns, foundation and or abutment of this bridge may be adversely affected.

At a depth of 21 feet, the existing tunnel is very shallow. To use a portion of the existing tunnel, the proposed tunnel would also have to be very shallow. Consequently, the shallow profile would cause the proposed tunnel to day-light at multiple locations. This alternative would also require a new bridge over the Jones Falls, which would likely result in impacts to natural resources.

#### **c. Recommendation**

Alternative 8: Wilson Street – Existing Tunnel is not fatally flawed under Screening Level 1. This alternative addresses several of the existing B&P Tunnel deficiencies by improving travel time with gentler grades and flatter curvature, and achieving NEC reliability through the use of bi-directional tracks and universal interlockings with the existing system. Under Screening Level 2, all Operational criteria would be satisfied except for Criterion No. 9, because the existing tunnel would likely need to be closed to existing train services while construction takes place on the new tunnel.

Additionally, engineering analysis identified that this alternative would not provide sufficient vertical separation between Amtrak tracks and the CSX mainline, thus failing to avoid a key physical constraint (Criterion No. 7). All other engineering criteria would be satisfied including tunnel separation and clearance, horizontal curvature, vertical grade, maintaining West Baltimore MARC Station, and maintaining existing grade at Penn Station.

This alternative would require a new bridge over the Jones Falls, potentially impacting the surrounding natural environment. It would likely be a primarily bored tunnel, but could have considerable impacts to residential land uses near the tunnel portals. None of the alternatives (aside from the No-Build) would avoid low income and minority populations or historic districts and structures.

Based on the results above, Alternative 8 is not recommended to be carried forward for further design development and environmental evaluation. It would fail to meet Criteria No. 7 and 9, and would likely have substantial environmental impacts.

### **3. Alternative 9: Mosher Street North**

#### **a. Description**

Alternative 9: Mosher Street North would entail a new tunnel running relatively straight from the West Baltimore MARC Station to Penn Station, south of the existing tunnel (**Figure 7**). Alternative 9 would replace the existing B&P Tunnel with a new tunnel south of its current location. This alternative would improve upon existing B&P Tunnel deficiencies by replacing the sharp, tight curvature with gradual curves between north and south portals. Alternative 9 would be a combination of an underground tunnel, an aerial structure and an at-grade section extending through the communities of Bolton Hill, Upton, Harlem

Park, and the Old West Baltimore Historic District. It would curve southwest after leaving Penn Station—sooner than the existing B&P Tunnel alignment— paralleling Mosher Street, approximately two blocks below the Wilson Street Tunnel. Alternative 9 would then continue along a smooth curvilinear alignment after crossing underneath the MTA Metro Rail Line to the West Baltimore MARC Station. The north portal would be located under the MTA Light Rail Bridge at the Mount Royal Avenue and Lafayette Street intersection. The south portal would be located between Monroe Street and Payson Street and between Harlem Avenue and Lanvale Street. The tunnel length would be approximately 9,000 feet, with a maximum grade of 1.9 percent.

#### **b. Analysis**

The existing West Baltimore MARC Station is located on a curve between two tangents. Alternative 9 would not maintain this curve and significant re-alignment of station platforms would be necessary (**Figures 7a, 7b**). Alternative 9 would cross under multiple bridges including the Howard Street Bridge, Jones Falls Expressway Bridge, and Light Rail Bridge prior to the proposed north portal. These bridges are within a congested corridor, and crossing under them would be challenging to achieve adequate horizontal clearance for piers/columns, abutments and foundations of different bridge structures.

As Alternative 9 would be located south of the existing B&P Tunnel, it would curve south after leaving Penn Station, before the existing turnouts on the eastern tracks at Penn Station. It would not be possible to relocate these turnouts prior to the left curve. Therefore, this alternative would not be able to connect to eastern tracks in Penn Station and would restrict rail operations to the western tracks only.

Alternative 9 would maintain the existing grade while passing through Penn Station, which is a requirement; however, it would cross the Jones Falls on a bridge and then cross under the CSX mainline. Approximately 18 feet of vertical clearance could be achieved under the CSX tracks to meet grade requirements of less than 2 percent. However, this elevation does not provide sufficient vertical separation between the Amtrak mainline and CSX, resulting in a conflict with this key physical constraint.

The north portal for Alternative 9 would be located under the MTA Light Rail Bridge and buildings located in the northeast quadrant of the Mount Royal Avenue and Lafayette Street intersection. There would be adverse impacts to these buildings.

Alternative 9 would need to cross under the existing Baltimore Metro tunnel, which could be problematic during construction given the close proximity of the two tunnels. The south portal would be located between Monroe Street and Payson Street, and between Harlem Avenue and Lanvale Street.

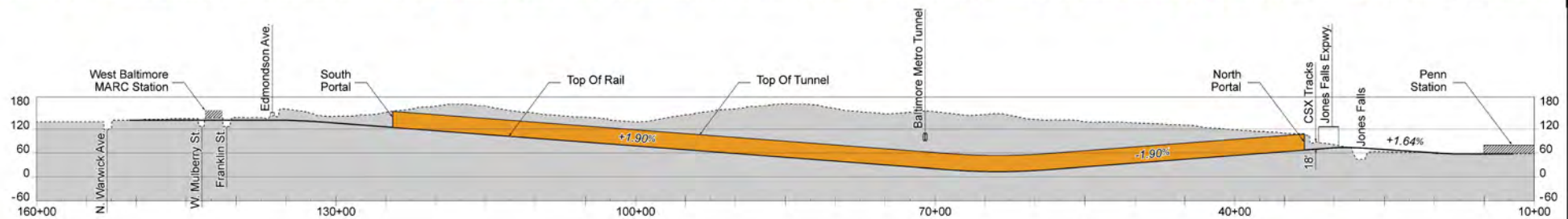
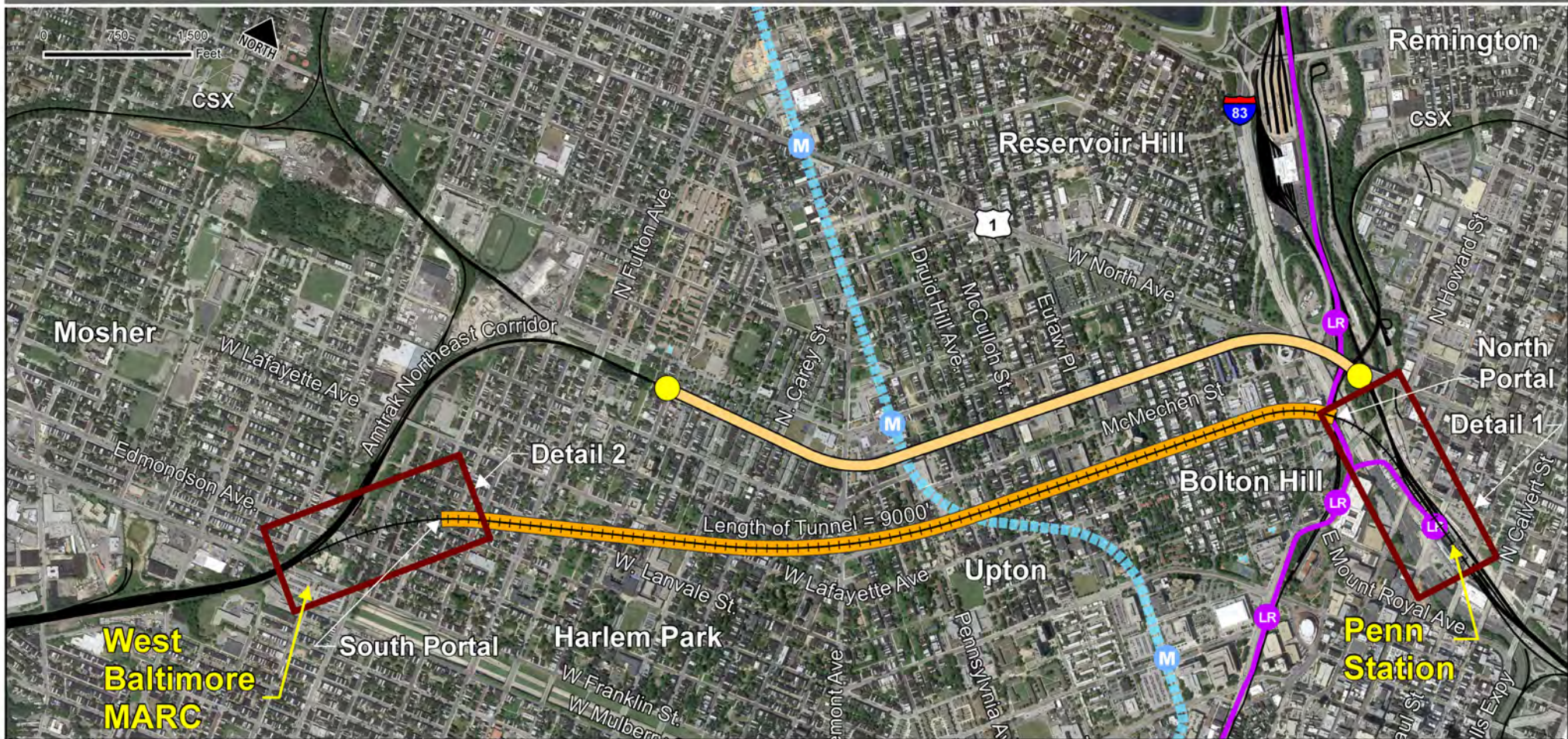
Alternative 9 would require a new bridge over the Jones Falls which would result in additional project costs and could result in impacts to natural environmental resources, including Jones Falls and the surrounding floodplain.

#### **c. Recommendation**

Alternative 9: Mosher Street North does not have a fatal flaw under Screening Level 1. However, the alternative would conflict with multiple rail lines at Baltimore Penn Station. The inability of southbound trains to cross existing tracks near Penn Station would restrict its capacity to one track at this location. This condition falls short of the Screening Level 2 Operational criteria, specifically Criterion No. 10. The one-track configuration would also fail to meet the NEC reliability criterion (No. 12) that requires two-track operation and universal interlocking with the existing NEC mainline. All other Operational criteria would be met.



# Alternative 9 - Tunnel and Vicinity



## LEGEND

-  Alternative 9 \*
  -  B & P Tunnel Portals
  -  Baltimore & Potomac Tunnel
  -  Metro Line
  -  Light Rail Line
  -  Existing Rail
  -  Metro Station
  -  Light Rail Station
- \* Alignment width not to scale

**Figure 7**



# Alternative 9 - North Portal



Figure 7a



# Alternative 9 - South Portal





Alternative 9 would fail to avoid physical constraints due to insufficient vertical separation between the tunnel and existing CSX tracks under the Howard Street Bridge, and thus not meet Criterion No. 7. Alternative 9 would also require a new bridge at Jones Falls, resulting in potential impacts to natural resources. Approximately five parks are within the estimated surface footprint of this alternative. The tunnel could likely be bored, but would still have considerable impacts to residential land uses near the tunnel portals. As with the other alternatives, this alternative would potentially impact low income and minority populations as well as historic districts and structures.

Based on these results, Alternative 9: Mosher Street North is not recommended to be carried forward for further design development and environmental evaluation. It fails to meet Engineering and Operational goals under Screening Level 2, including Criteria No. 7, 10, and 12.

#### **4. Alternative 10: Mosher Street South**

##### **a. Description**

Alternative 10: Mosher Street South is a variation of Alternative 9 that would connect to the existing NEC corridor south of the West Baltimore MARC Station (**Figure 8**). Instead of connecting at the West Baltimore MARC Station, Alternative 10 would tie into the existing NEC corridor just southwest of the existing station platforms near Franklintown Road. It would require either relocating the West Baltimore MARC Station south from its current location or using the existing tunnel for MARC trains (and freight trains) stopping at the West Baltimore MARC Station. Alternative 10's length would be approximately 10,400 feet with grades varying between 1.6 percent and 1.9 percent.

##### **b. Analysis**

Alternative 10: Mosher Street South would require the relocation of the West Baltimore MARC Station or rehabilitation of the existing B&P Tunnel if use of the existing MARC Station is necessary. The alignment would cross under multiple bridges including the Howard Street Bridge, Jones Falls Expressway Bridge and Light Rail Bridge prior to the north portal (**Figures 8a, 8b**). These bridges are within a congested corridor, and crossing under them would be challenging to achieve adequate horizontal clearance for piers/columns, abutments and foundations of different bridge structures.

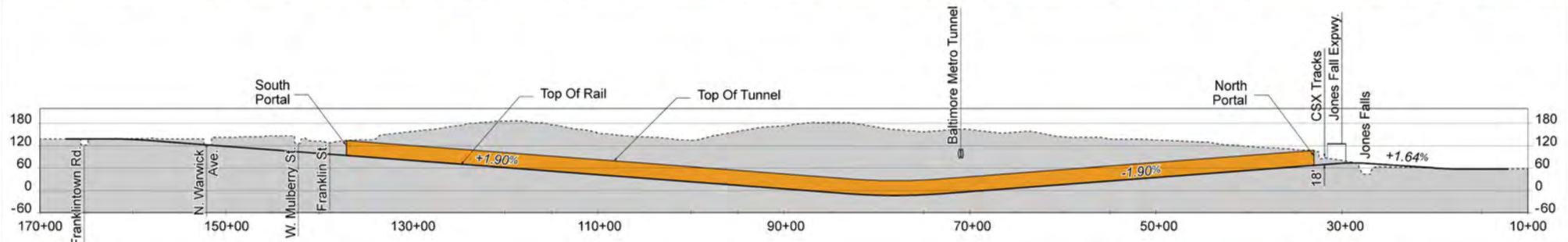
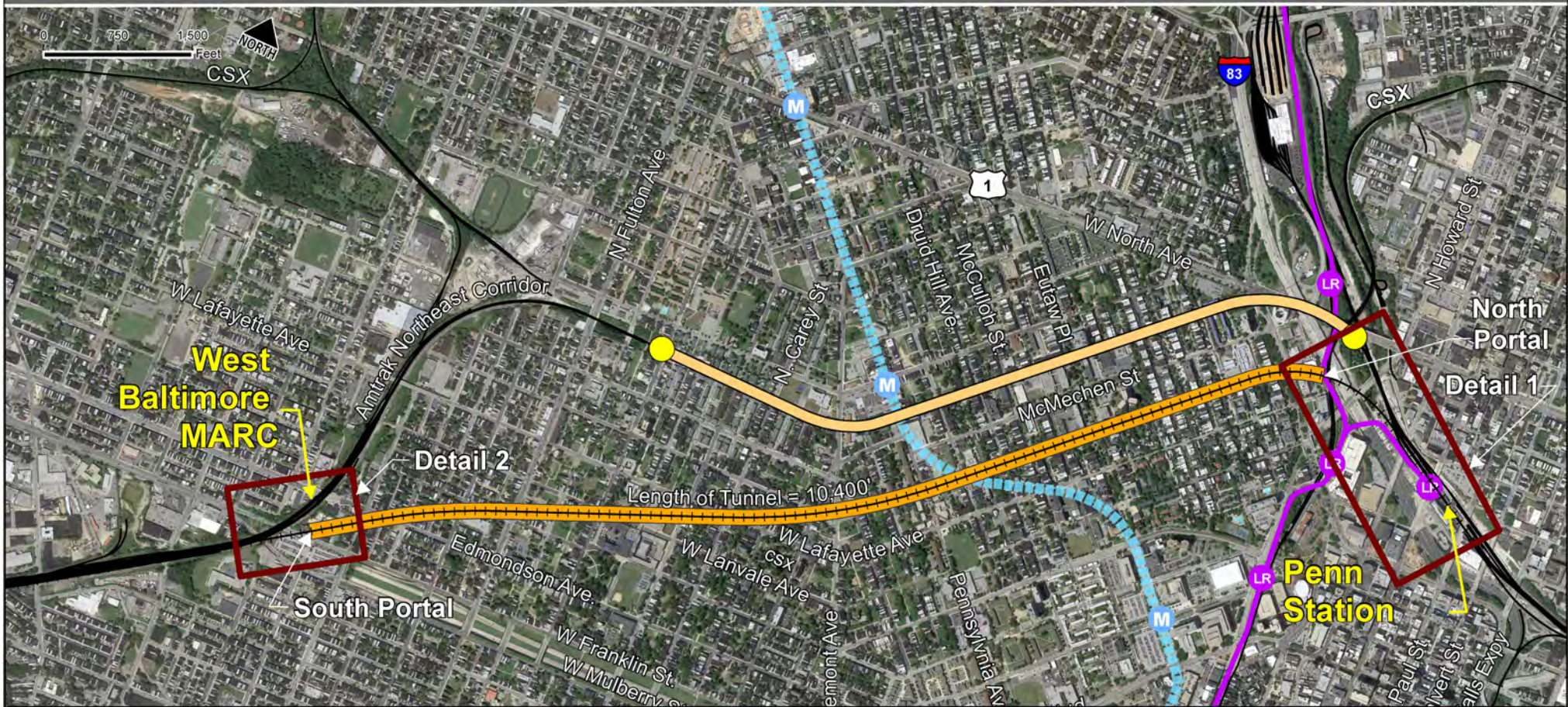
As Alternative 10 is located south of the existing B&P Tunnel, it would curve south after leaving Penn Station, before the existing turnouts on the eastern tracks at Penn Station. It would not be possible to relocate these turnouts prior to the left curve. Therefore, Alternative 10 would not be able to connect to the eastern tracks at Penn Station and would restrict rail operations to the western tracks only.

Alternative 10 would maintain the existing grade while passing through Penn Station, which is a requirement; however, it would cross the Jones Falls on a new bridge and then would cross under the CSX mainline. Approximately 18 feet of vertical clearance could be achieved under CSX tracks to meet grade requirements of less than 2 percent. However, this elevation does not provide sufficient vertical separation between the Amtrak mainline and a key physical constraint (CSX).

The north portal of Alternative 10 would be located under the MTA Light Rail Bridge and buildings located in the northeast quadrant of the Mount Royal Avenue and Lafayette Street intersection. There would be adverse impacts to these buildings. The tunnel would also need to cross under the existing Baltimore Metro tunnel, which could be problematic given the close proximity of the two tunnels. The south portal is located between Pulaski Street and the existing rail corridor, and between Franklin Street and Edmondson Avenue. The tie-in with the West Baltimore MARC Station would be challenging from an



# Alternative 10 - Tunnel and Vicinity

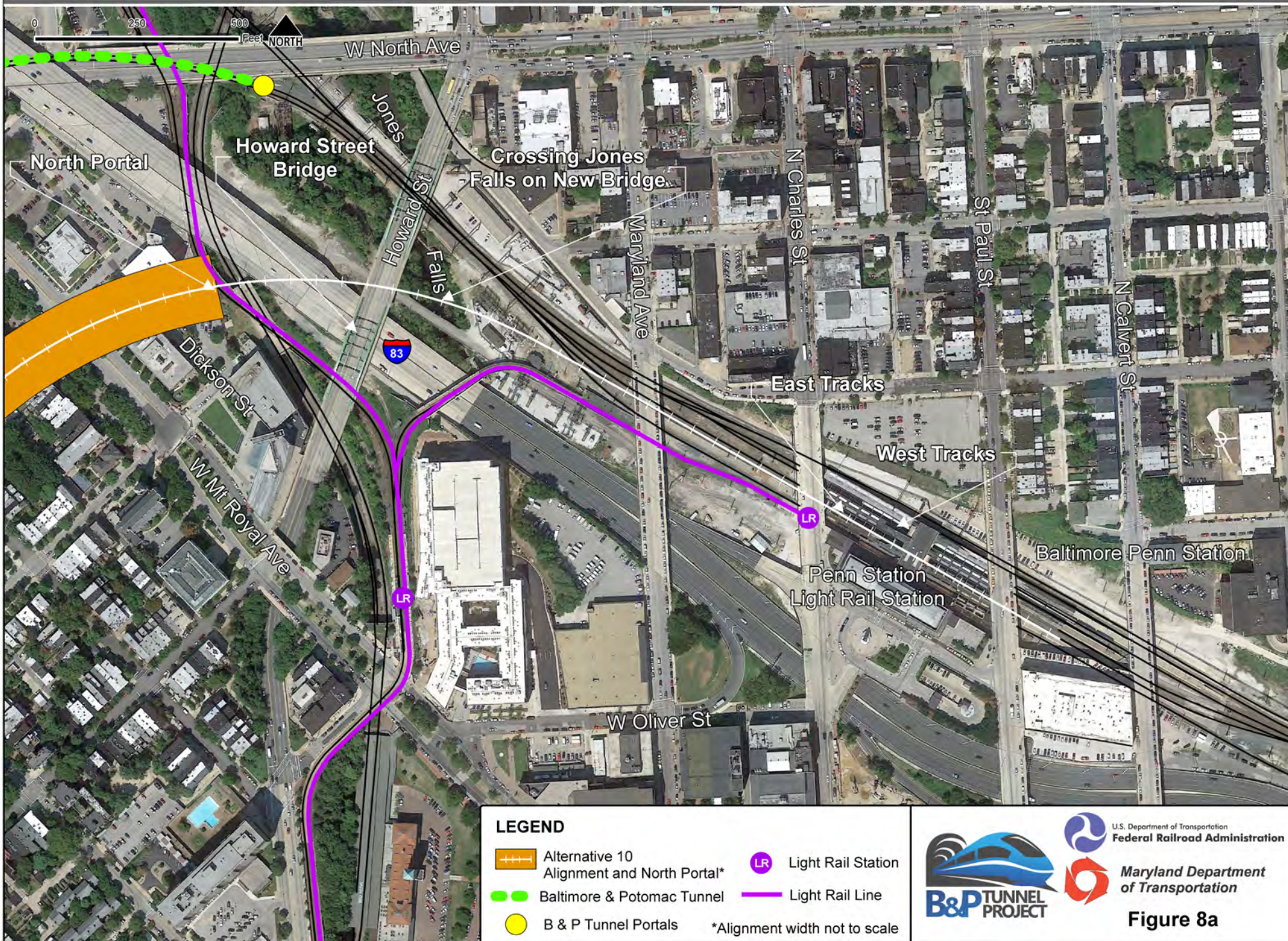


## LEGEND

-  Alternative 10 \*
-  B & P Tunnel Portals
-  Baltimore & Potomac Tunnel
-  Metro Line
-  Light Rail Line
-  Existing Rail
-  Metro Station
-  Light Rail Station
- \* Alignment width not to scale

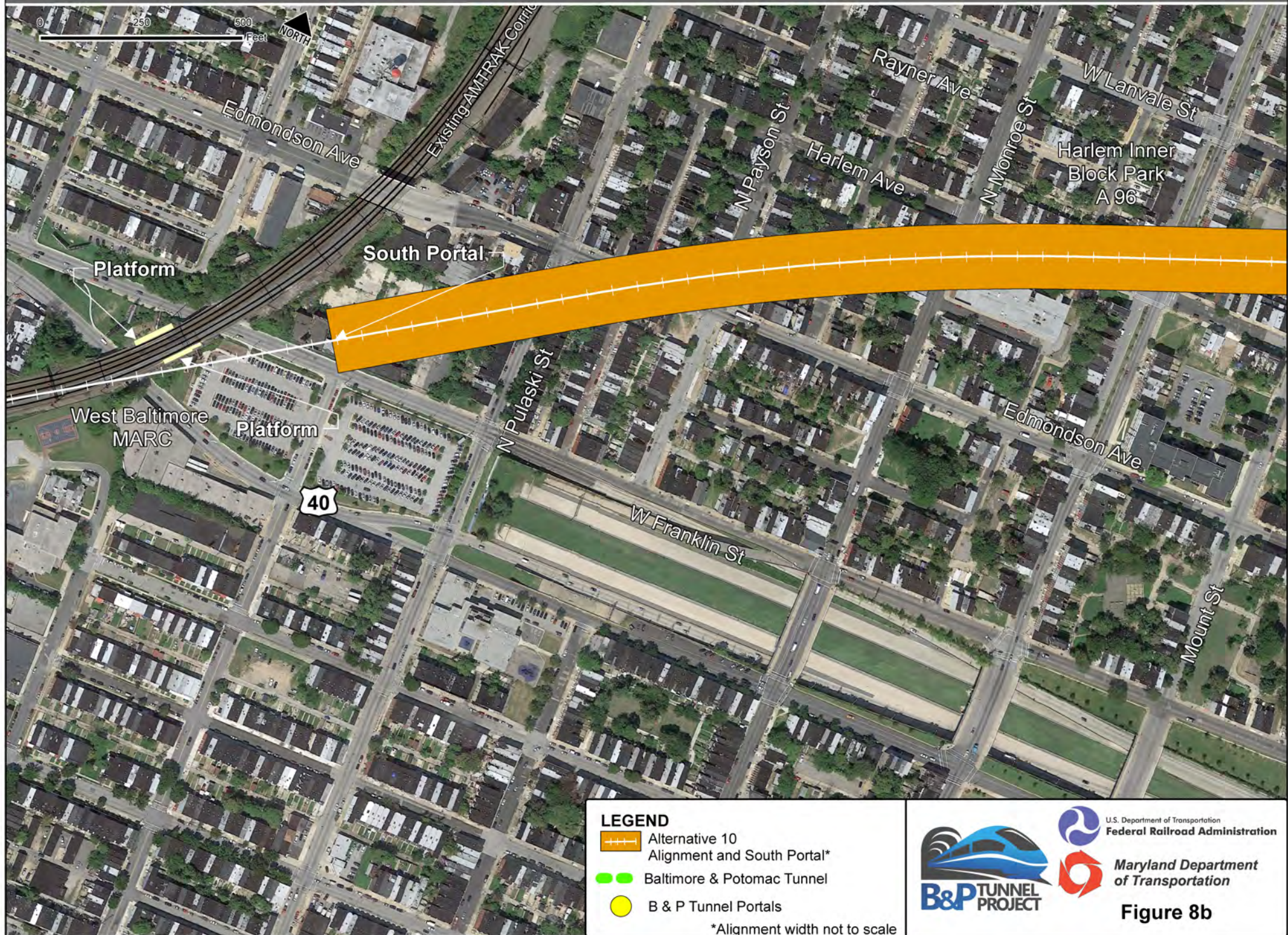


# Alternative 10 - North Portal





## Alternative 10 - South Portal





engineering perspective, and conflicts with the Franklin Street corridor would likely require grade separation.

Alternative 10 would require a new bridge over the Jones Falls, which would require additional project costs and could result in impacts to natural resources, including Jones Falls and the surrounding floodplain.

**c. Recommendation**

Alternative 10: Mosher Street South does not have a fatal flaw under Screening Level 1. However, the alternative would experience similar deficiencies as Alternative 9. It would conflict with multiple rail lines at Baltimore Penn Station by its inability to cross existing tracks, and its capacity would be restricted to one track at this location. These conditions fall short of bi-directional and universal interlocking operational and throughput capacity requirements associated with the Screening Level 2 Operational criteria (No. 10 and 12). All other Operational criteria would be met.

Alternative 10 would fail to avoid a key physical constraint (CSX) due to insufficient vertical separation between the tunnel and existing CSX tracks under the Howard Street Bridge, thus failing Criterion No. 7. All other Engineering criteria would be satisfied.

Alternative 10 would require a new bridge over the Jones Falls resulting in likely impacts to the natural resource. The tunnel could likely be bored, but would still have considerable impacts to residential land uses near the tunnel portals. As with the other alternatives, this alternative would potentially impact low income and minority populations as well as historic districts and structures.

Alternative 10 is not carried forward for further design development and environmental evaluation because it fails to meet Criteria No. 7, 10, and 12 under Screening Level 2.

**5. Alternative 11: Robert Street South**

**a. Description**

Alternative 11: Robert Street South would be a new tunnel alignment between Presstman Street and the existing tunnel (**Figure 9**). This alternative would create an opportunity to improve track geometry by replacing the sharp, tight curvature with gradual curves between north and south portals. Proposed as a combination of an underground tunnel, an aerial structure and at-grade sections, it extends through the communities of Druid Heights, Sandtown-Winchester and Harlem Park avoiding the central areas of Baltimore City.

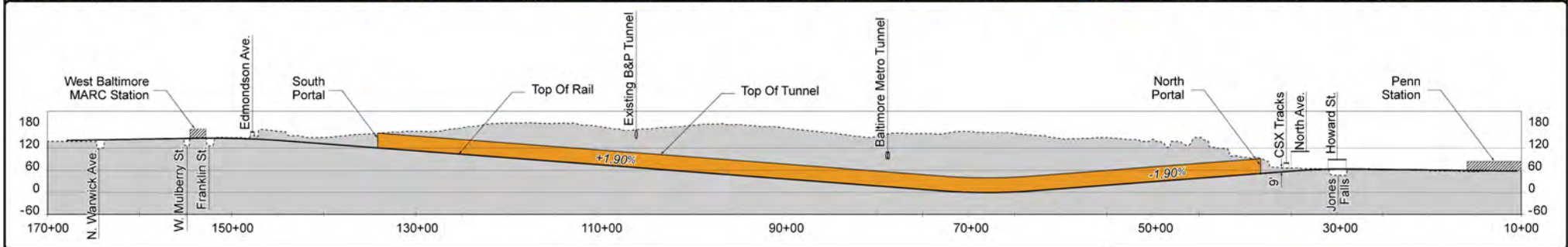
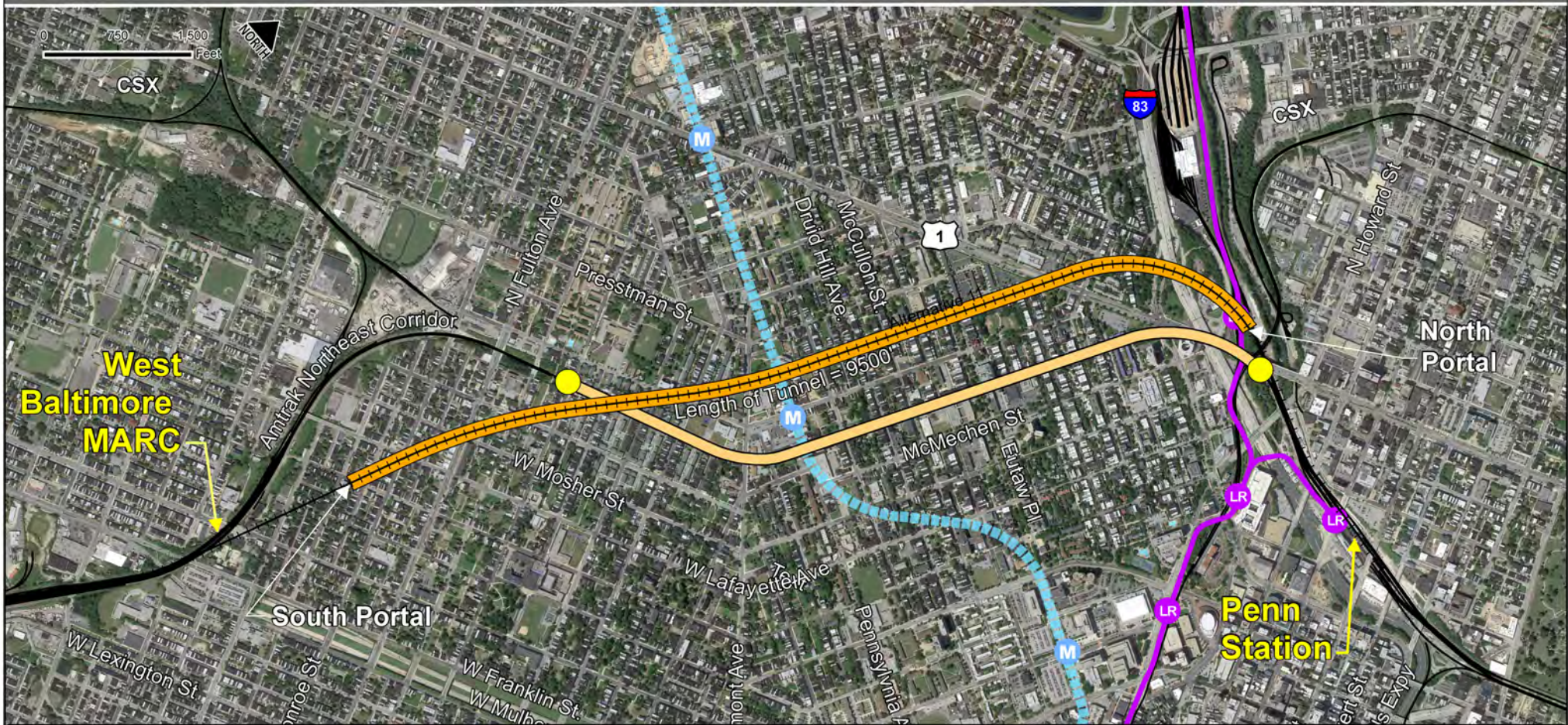
From the north, Alternative 11 would curve south after Penn Station, and then it follows Robert Street, until it reaches Pennsylvania Avenue where it would connect to the West Baltimore MARC Station. The south portal would be located between Monroe Street and Payson Street, and between Harlem Avenue and West Lanvale Street. The north portal would be located north of the CSX Bridge in the existing rail yard. The tunnel length would be approximately 9,500 feet, with a maximum grade of 1.9 percent.

**b. Analysis**

The existing West Baltimore MARC Station is located on a curve between two tangents. The Alternative 11 alignment would not maintain this curve and significant re-alignment of station platforms would be necessary (**Figures 9a, 9b**). Prior to the north portal, the Alternative 11 alignment would cross under multiple bridges including the Howard Street Bridge, Jones Falls Expressway Bridge and the CSX Bridge. These bridges are within a congested corridor, and crossing under them would create challenges to achieve adequate horizontal clearance from piers/columns and abutments of different bridge structures. More design information is needed to investigate these challenges and determine if they could be



# Alternative 11 - Tunnel and Vicinity



## LEGEND

- Alternative 11 \*
- B & P Tunnel Portals
- Baltimore & Potomac Tunnel
- Metro Line
- Light Rail Line
- Existing Rail
- Metro Station
- Light Rail Station

\* Alignment width not to scale

Figure 9



# Alternative 11 - North Portal





# Alternative 11 - South Portal





resolved. Since the alignment would be to the north of the existing tunnel, it can use existing turnouts to serve all tracks at Penn Station. The alternative would also use the existing bridge over Jones Falls.

The vertical alignment of Alternative 11 would maintain existing grade while passing through Penn Station. The Alternative 11 alignment would cross the Jones Falls on the existing bridge MD95.95, then under the CSX Bridge. The alignment would pass under the North Avenue Bridge through the existing arch. The vertical separation under the CSX Bridge would be adequate for trains to pass. The north portal would be located north of the CSX Bridge in the existing rail yard. This would minimize property impacts.

The tunnel would cross under the existing Baltimore Metro and B&P tunnels, possibly impacting the construction method, which would need to be monitored during construction. The south portal would be located between Monroe Street and Payson Street, and between Harlem Ave and Lanvale Street. This portal would be located at a residential block in a West Baltimore neighborhood.

### c. Recommendation

Alternative 11: Robert Street South does not have a fatal flaw under Screening Level 1. The alternative would meet all of the Operational criteria of a new tunnel in the study area. The alternative would improve travel time, accommodate existing and projected travel demand for passenger services, maintain a two-track throughput, provide operational reliability, maintain existing freight movement, and operate on a separated ROW.

Alternative 11 would meet the required tunnel separation of between 30 feet and 40 feet between the existing MTA Metro tunnel, a key factor. It would also avoid other physical constraints such as the CSX mainline and MTA Light Rail mainline and facilities. It would meet all Engineering criteria including tunnel clearance, horizontal curvature, vertical grades, maintaining West Baltimore MARC, and maintaining existing grades at Penn Station.

Alternative 11 would be primarily bored but would likely have substantial residential impacts near the tunnel portals. The alternative would not require a new bridge over the Jones Falls, and there is one park located in its estimated surface impact footprint. As with the other alternatives, this alternative would potentially impact low income and minority populations as well as historic districts and structures.

Given the preliminary assessment, it is recommended that Alternative 11 be carried forward for further design development and environmental evaluation.

## 6. Alternative 12: Robert Street North

### a. Description

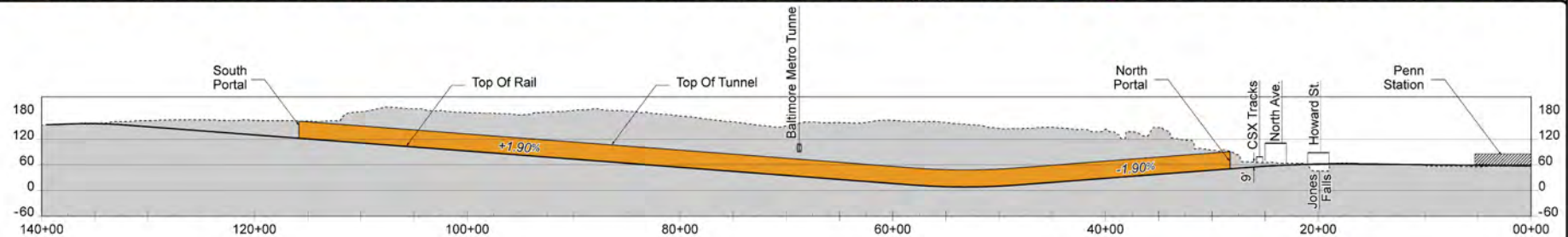
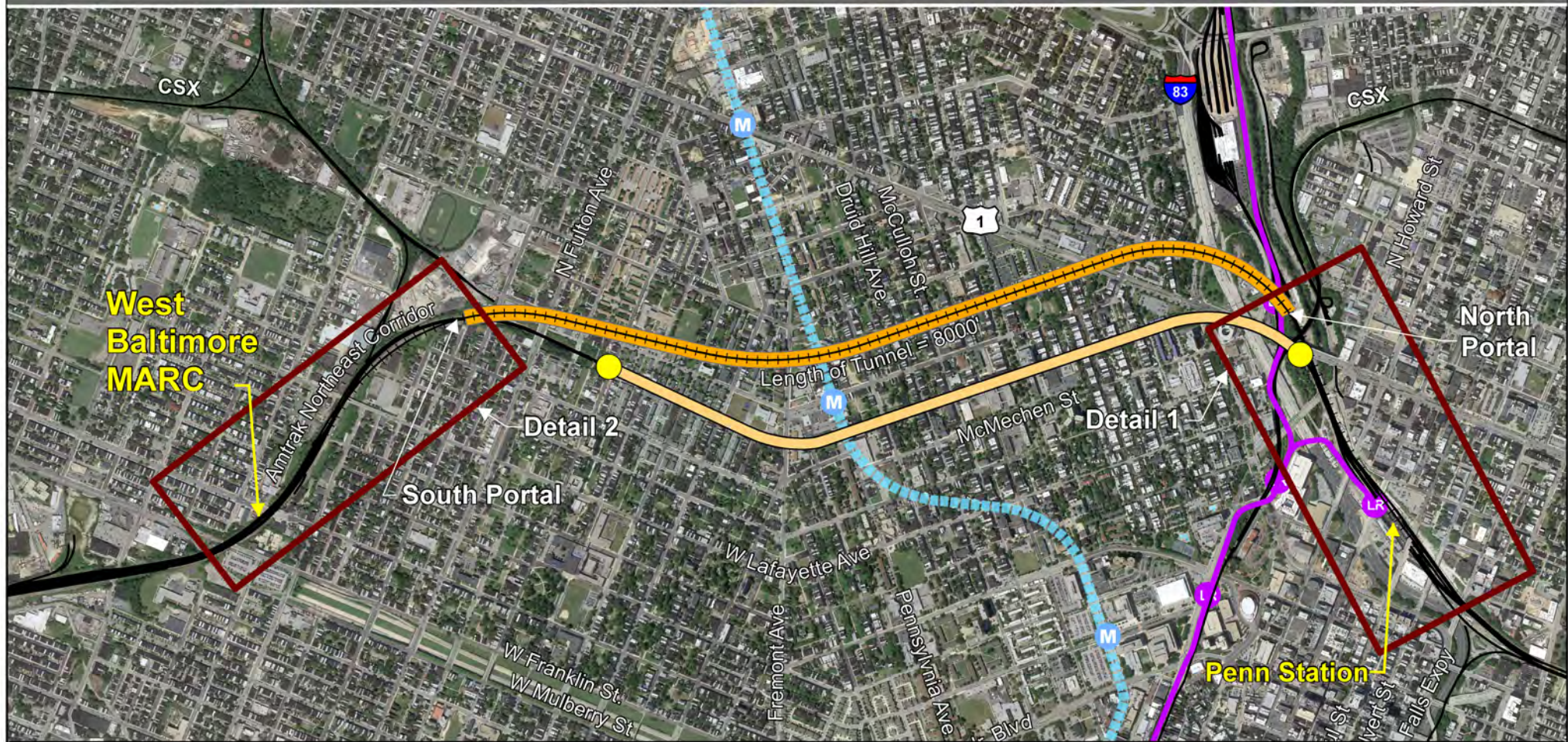
Alternative 12: Robert Street North is a variation of Alternative 11 that connects to the existing NEC Corridor alignment west of Gilmore Street (**Figure 10**). Similar to Alternative 11, it would be on a new tunnel alignment between Presstman Street and the existing tunnel. However, instead of extending south to the West Baltimore MARC Station, Alternative 12 would connect with the existing NEC rail corridor near the intersection of Monroe Street and Payson Street. The tunnel length would be approximately 8,000 feet, with a maximum grade of 1.9 percent.

### b. Analysis









Prior to the north portal, the Alternative 12 alignment would cross under multiple bridges including Howard Street Bridge, Jones Falls Expressway Bridge, and the CSX Bridge (**Figures 10a, 10b**). These bridges are within a congested corridor, and crossing under them would create challenges to achieving adequate horizontal clearance between piers/columns and abutments of different bridge structures.



# Alternative 12 - Tunnel and Vicinity



## LEGEND

-  Alternative 12 \*
-  B & P Tunnel Portals
-  Baltimore & Potomac Tunnel
-  Metro Line
-  Light Rail Line
-  Existing Rail
-  Metro Station
-  Light Rail Station

\* Alignment width not to scale



Figure 10



# Alternative 12 - North Portal





# Alternative 12 - South Portal





Since the Alternative 12 alignment would be to the north of the tunnel, it could use existing turnouts to serve all tracks at Penn Station. The alternative would be able to use the existing bridge over Jones Falls and would not have any impacts on the West Baltimore MARC Station. The vertical alignment would maintain the existing grade while passing through Penn Station. The Alternative 12 alignment would cross the Jones Falls on a bridge, and then would cross under the CSX Bridge. The vertical separation under this CSX bridge is adequate for trains to pass.

The north portal would be located north of the CSX Bridge in existing rail yard. This would minimize property impacts. The Alternative 12 alignment would cross very close to existing Baltimore Metro Tunnel and may have a major conflict with it. The south portal would be along the existing NEC rail corridor near the intersection of Monroe Street and Payson Street. There would be minimal property impacts.

### **c. Recommendation**

Alternative 12: Robert Street North does not have a fatal flaw under Screening Level 1. Under Screening Level 2, Alternative 12: Robert Street North does not meet the minimum tunnel separation of 30 feet to 40 feet between the existing MTA Metro rail line and proposed tunnel (Criterion No. 1). Alternative 12 would also fail to meet Criterion No. 9, maintain existing passenger operations. It would meet all other engineering and operational criteria.

This alternative would require extensive cut-and-cover, resulting in severe environmental impacts. It would have substantially more cut-and-cover requirements relative to all other alternatives (except for Alternative 4). The alternative would utilize the existing Jones Falls Bridge.

Alternative 12 would experience similar drawbacks as the Presstman Street Alternative (Alternative 4). The *Baltimore's Railroad Network: Analysis and Recommendations (2011)* report concluded that "At the high price entailed by any of the alternatives of Presstman Street Tunnels, all of which would require conventional instead of the cheaper deep-bore construction methods and would heavily impact the affected neighborhoods, [...] a more satisfactory travel time payoff should be expected." Like Alternative 4, Alternative 12 would yield minimal benefits at a very high cost. Based on these results of the screening, Alternative 12 is not carried forward for further evaluation. It would fail to meet Criteria No. 1 and 9, and would have likely result in large areas of surface impact due to the need for extensive cut-and-cover construction.

## **7. Alternative 13: Wilson Street – Under Existing Tunnel**

### **a. Description**

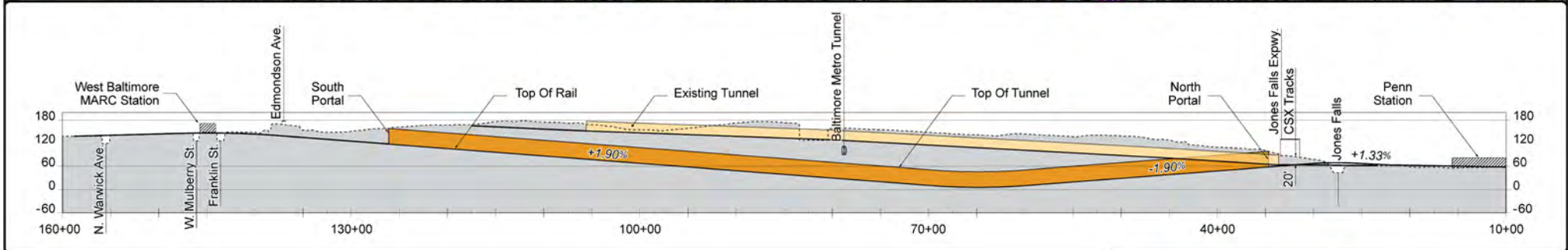
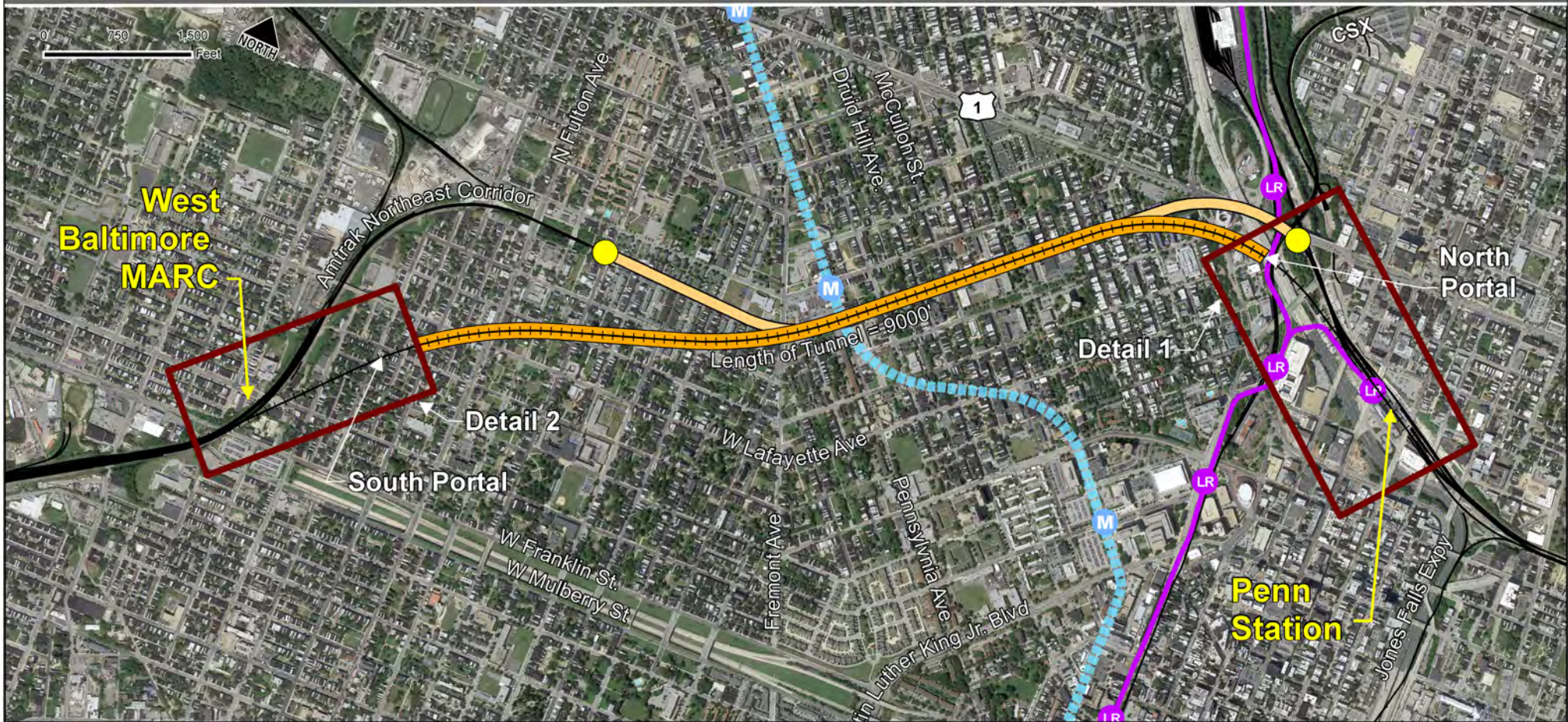
Alternative 13: Wilson Street – Under Existing Tunnel would be a new tunnel alignment that would follow Alternative 8: Wilson Street – Existing Tunnel, but would be bored deeper to go underneath the existing B&P Tunnel (**Figure 11**). This alternative would create an opportunity to improve geometry by flattening of curves, and minimizing or avoiding service disruptions during construction. The north portal would be located under the Jones Falls Expressway Bridge near the MTA Light Rail tracks. Both north and south portals would be the same as in Alternative 8, but the profile lengths and grades differ between alternatives. The total tunnel length for Alternative 13 is approximately 9,000 feet and vertical grades between 1.33 percent and 1.94 percent.

### **b. Analysis**









The existing West Baltimore MARC Station is located on a curve between two tangents. The Alternative 13 alignment would not maintain this curve and significant re-alignment of station platforms would be necessary (**Figure 11a, 11b**). Prior to the north portal, the alignment would cross under multiple bridges



# Alternative 13 - Tunnels and Vicinity



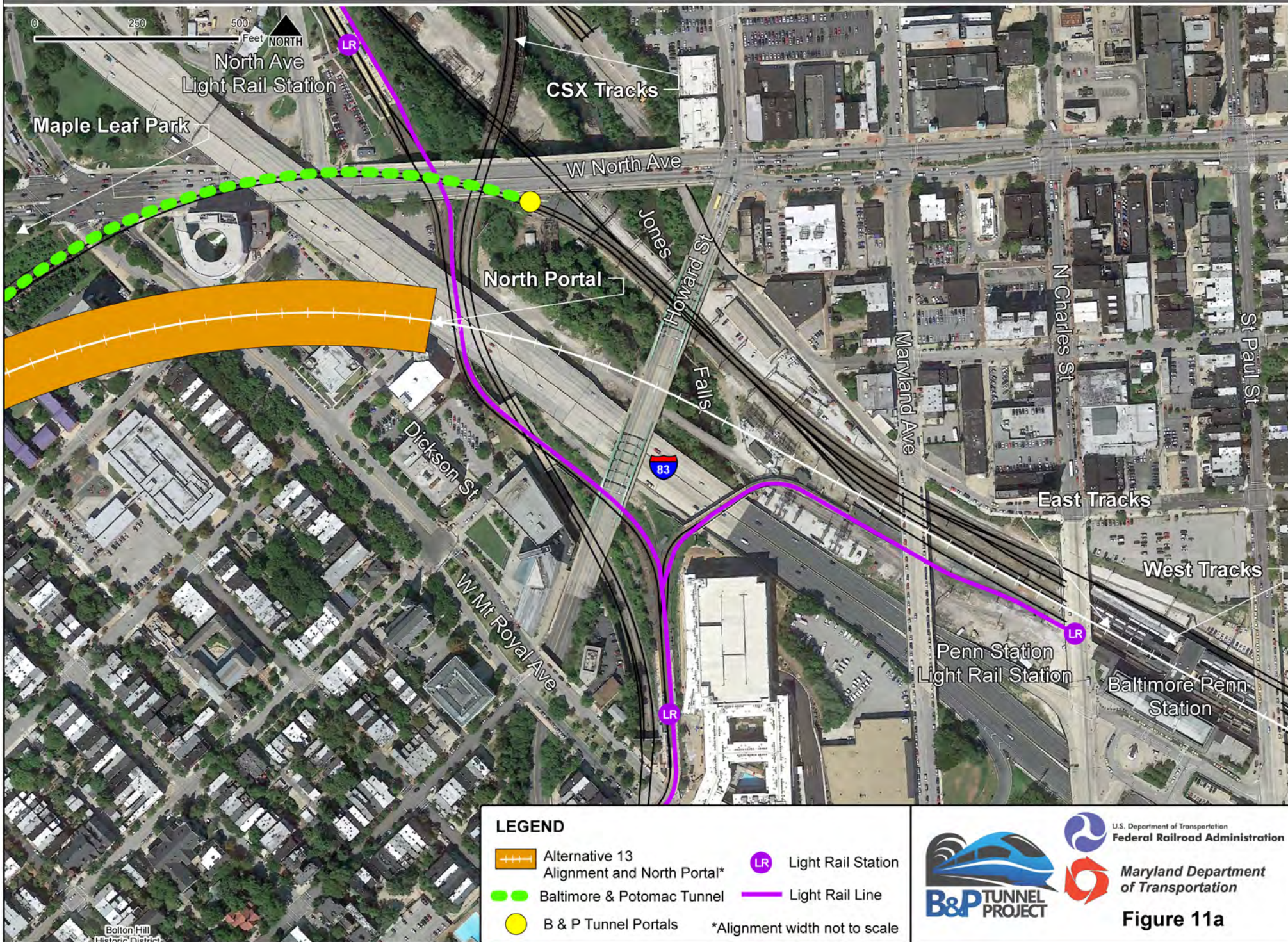
## LEGEND

-  Alternative 13 \*
-  B & P Tunnel Portals
-  Baltimore & Potomac Tunnel
-  Metro Line
-  Light Rail Line
-  Existing Rail
-  Metro Station
-  Light Rail Station

\* Alignment width not to scale



# Alternative 13 - North Portal





# Alternative 13 - South Portal



Figure 11b



including Howard Street Bridge, Jones Falls Expressway Bridge and the MTA Light Rail Bridge. These bridges are within a congested corridor and crossing under these bridges would be challenging to achieve adequate horizontal clearance from piers/columns and abutments of different bridge structures. The existing tunnel would have to be closed during construction.

The vertical alignment would maintain the existing grade while passing through Penn Station. Alternative 13 would cross the Jones Falls on a bridge, and then cross under the CSX Bridge. Approximately 20 feet of vertical clearance could be achieved under CSX tracks to meet grade requirements of less than 2 percent. However, this elevation does not provide sufficient vertical separation between the Amtrak mainline and CSX, a key physical constraint. The north portal would be located under the Jones Falls Expressway Bridge. The piers and/or abutment of this structure could be adversely affected, as well as buildings located between Mount Royal Avenue and Malster Avenue and at the intersection of Mount Royal Avenue and McMechen Street.

It would be impossible to keep the existing tunnel in operation as the required depth for the new tunnel would not be adequate to go under the existing tunnel prior to meeting horizontal alignments for both tunnels. The south portal would be located in a residential block between Monroe Street and Appleton Street, and between Lafayette Ave and Lanvale Street in a West Baltimore neighborhood.

#### **c. Recommendation**

Alternative 13: Wilson Street – Under Existing Tunnel does not have a fatal flaw under Screening Level 1. Under Screening Level 2, the Alternative fails to avoid a major physical constraint due to inadequate vertical separation between the proposed tunnel and existing CSX mainline tracks under Howard Street (Criterion No. 7). All other Engineering criteria would be satisfied.

Additionally, the Alternative 13 alignment would be located parallel and in close proximity to the existing B&P Tunnel, which could pose an unknown risk of damaging the existing tunnel during construction. The alternative would fail to meet Criteria No. 9, maintain existing passenger operations, because the existing B&P Tunnel could not remain in service during construction. All other Operational criteria would be met.

Alternative 13 would also need a new bridge to cross the Jones Falls, potentially disrupting the surrounding natural environment. The tunnel would be primarily bored, but could have considerable residential impacts near the tunnel portals. As with the other alternatives, this alternative would potentially impact low income and minority populations as well as historic districts and structures. Based on these results of the screening, Alternative 13 is not carried forward for further evaluation as it fails to meet Criteria No. 7 and 9.

### **8. Alternative 14: North Avenue Bridge**

#### **a. Description**

Alternative 14: North Avenue Bridge would be a new alternative on a bridge over North Avenue rather than a tunnel. Alternative 14 would replace the existing B&P Tunnel with a new aerial structure running along the median of North Avenue, then turning south to connect to the existing tracks before the West Baltimore MARC Station. This alternative creates an opportunity to lower the cost, ease the construction effort and replace the sharp, tight curvature with a large arc similar to the Great Circle Tunnel geometry. The alignment would traverse communities of Reservoir Hill, Druid Heights, Sandtown-Winchester, and Easterwood. From the north, the Alternative 14 alignment would curve north after leaving Penn Station and continue along North Avenue until turning south and connecting with the existing NEC corridor.



**b. Analysis**

Alternative 14 would pass through many existing buildings and structures before aligning parallel to the median of North Avenue. Vertically, this alignment could not rise fast enough to be designed as an aerial structure with a maximum profile grade of 2 percent. North Avenue has an existing grade of approximately 2.7 percent. It is also more than 30 feet higher in elevation than Penn Station. Therefore, an aerial or surface alignment would not be possible. This alternative was identified as having a fatal flaw in the first level of screening and was not analyzed further in Screening Level 2 for the Engineering, Operational and Environmental criteria.

**c. Recommendation**

Alternative 14: North Avenue Bridge experiences a fatal flaw under Screening Level 1, since it would not meet profile grade requirements. Additionally, it would likely experience significant neighborhood impacts that would cause difficulty in obtaining public support and would be unacceptable given that other alternatives would have substantially less impact. Therefore, Alternative 14 would not be carried forward for further evaluation.

**9. Alternative 15: Gilmor Street – Existing Tunnel****a. Description**

Alternative 15: Gilmor Street – Existing Tunnel would be a new tunnel alignment south of the John and Wilson Street tunnel segments, but would tie into the existing Gilmor Street tunnel segment which would be rehabilitated. Alternative 15 would be almost perpendicular to the existing tracks through Penn Station.

**b. Analysis**

Alternative 15 could not be designed or constructed due to the difficult geometry, since trains cannot make sharp turns. Therefore, Alternative 15 was identified as having a fatal flaw in the first level of screening and was not analyzed further in Screening Level 2 for the Engineering, Operational and Environmental criteria.

**c. Recommendation**

Alternative 15: Gilmor Street – Existing Tunnel experiences a fatal flaw under Screening Level 1, since it is impossible to design or construct the proposed geometry. Therefore, this alternative is eliminated from further consideration.

**10. Alternative 16: North Avenue Tunnel****a. Description**

Alternative 16: North Avenue Tunnel would consist of tunnel and at-grade sections between Penn Station and the West Baltimore MARC Station. Alternative 16 was developed based on public suggestion at the October 29, 2014 Public Open House. The proposed alignment would cross under multiple bridges including the Howard Street Bridge, Jones Falls Expressway Bridge and the CSX Bridge. It follows North Avenue between the Jones Falls Expressway and McCulloh Street. It then curves left under the MTA Metro line before terminating along the existing rail corridor just north of the West Baltimore MARC Station. The north portal would be bored under the Jones Falls Expressway Bridge and continue underneath the existing B&P Tunnel near Penn Station. The proposed tunnel length is approximately 8,600 feet with a maximum vertical grade of 2.0 percent.



**b. Analysis**

Alternative 16 has a fatal geometry conflict with the north portal of the existing B&P Tunnel due to their close proximity to each other. It would be impossible to construct the north portal under the existing tunnel as the proposed top of rail profile would have to be more than 70 feet below the existing tunnel track. To design this grade the track profile will have to be more than 8% which is not possible according to Amtrak design requirements. This alternative would also create challenges to achieving adequate horizontal clearance between pier/columns and abutments of different bridge structures prior to the north portal.

The proposed tunnel will not conflict with the Jones Falls and existing turnouts near Penn Station, since it follows the existing alignment north of the tunnel.

**c. Recommendation**

Alternative 16: North Avenue Tunnel experiences a fatal flaw under Screening Level 1 due to an engineering issue with the north portal of the existing B&P Tunnel, resulting in an inability to meet required grades. Therefore, this alternative is eliminated from further consideration.





Table 1: Preliminary Alternative Screening Results

Criteria/ Alternatives	Length (feet)	Screening Level 1			Screening Level 2																		
					Engineering							Operational						Environmental					
		Utilizes Existing Infra- structure <sup>a</sup>	Engineering Issue <sup>b</sup>	Contains Fatal Flaw	1 Meets Tunnel Separation Goal <sup>c</sup>	2 Meets Tunnel Clearance Goal <sup>d</sup>	3 Meets Horizontal Curvature Goal <sup>e</sup>	4 Meets Vertical Grade Goal <sup>f</sup>	5 Maintains W. Balt. MARC Station	6 Maintains Existing Grade at Penn Station	7 Avoids Physical Constraint <sup>g</sup>	8 Sepa- rated ROW <sup>h</sup>	9 Maintains Existing Passenger Operations	10 Maintains Two Tracks/ Through- put <sup>i</sup>	11 Reduces Travel Time <sup>j</sup>	12 NEC Reliability <sup>k</sup>	13 Maintains Existing Freight Movement <sup>l</sup>	14 Primary Construction Method	15 Number of Parks within Surface Footprint	16 Residential Land Uses within Surface Footprint	17 Utilizes Existing Jones Falls Bridge	18 Avoids Low Income & Minority Populations	19 Avoids Historic Districts and Structures
Alternative 1: No-Build	N/A	YES	N/A	N/A	N/A	N/A	N/A	N/A	YES	N/A	N/A	N/A	NO	NO	NO	NO	NO	N/A	N/A	N/A	N/A	YES	YES
Alternative 2: Restore/ Rehab	7,500	YES	N/A	N/A	YES	YES	NO	NO	YES	YES	YES	YES	TBD	TBD	TBD	TBD	TBD	TBD	0	NO	YES	NO	NO
Alternative 3: Great Circle Passenger Tunnel	10,400	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	BORED	0	MINIMAL	YES	NO	NO
Alternative 4: Presstman Street	9,100	YES	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	CUT-AND- COVER	13	YES	YES	NO	NO
Alternative 5: Route 40	26,800	NO	NO	YES	Alternative 5: Route 40 experienced a fatal flaw because it did not pass through Penn Station; it is dropped from further analysis.																		
Alternative 6: Locust Point	42,800	NO	NO	YES	Alternative 6: Locust Point experienced a fatal flaw because it did not pass through Penn Station; it is dropped from further analysis.																		
Alternative 7: Sports Complex	47,200	NO	NO	YES	Alternative 7: Sports Complex experienced a fatal flaw because it did not pass through Penn Station; it is dropped from further analysis.																		
Alternative 8: Wilson St – Ex.	8,700	YES	NO	NO	YES	YES	YES	YES	YES	YES	NO	YES	NO	YES	YES	YES	YES	BORED	1	YES	NO	NO	NO
Alternative 9: Mosher Street N	9,000	YES	NO	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES	NO	YES	BORED	5	YES	NO	NO	NO
Alternative 10 Mosher Street S	10,900	YES	NO	NO	YES	YES	YES	YES	YES	YES	NO	YES	YES	NO	YES	NO	YES	BORED	0	YES	NO	NO	NO
Alternative 11 Robert Street S	9,500	YES	NO	NO	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	BORED	1	YES	YES	NO	NO
Alternative 12 Robert Street N	8,000	YES	NO	NO	NO	YES	YES	YES	YES	YES	YES	YES	NO	YES	YES	YES	YES	BORED & CUT-AND- COVER	0	YES	YES	NO	NO
Alternative 13 Wilson St – Under Existing	9,000	YES	NO	NO	YES	YES	YES	YES	YES	YES	NO	YES	NO	YES	YES	YES	YES	BORED	3	YES	NO	NO	NO
Alternative 14 North Avenue Bridge	—	YES	YES	YES	Alternative 14 experienced a fatal flaw due to proposed geometry; it is dropped from further analysis.																		
Alternative 15 Gilmor St - Ex.	—	YES	YES	YES	Alternative 15 experienced a fatal flaw due to proposed geometry; it is dropped from further analysis.																		
Alternative 16 North Avenue Tunnel	8,600	YES	YES	YES	Alternative 16 experienced a fatal flaw due to proposed geometry; it is dropped from further analysis.																		

Alternatives carried forward for further evaluation

N/A = Not Applicable

TBD = Additional study for restoration or rehabilitation of the existing tunnel is needed to determine (refer to **Section V.A.2**)

a: Alternative alignment meets project limits between Penn Station and the NEC Gwynns Falls Bridge and would utilize this existing infrastructure.

b: Engineering issues include: the inability to develop a vertical alignment on a maximum 2 percent grade because of existing topographic conditions, or horizontal curvature (degree of curve) that exceeds requirements for rail operations

c: Minimum separation between existing underground structure (MTA Metro Subway tunnel) and proposed tunnel is 30 to 40 feet.

d: Ability to accommodate (1) twin, single-track tunnels (ID 25.8’); or (2) a single, double-track tunnel (ID 36.09’). Tunnel should accommodate Plate H clearance to enable high dimension freight service in the future.

e: Allows for design speed of 40 miles per hour or higher.

f: Maximum vertical grade not to exceed 2%. When a horizontal curve is located on the grade, the maximum allowed grade on the curve is reduced by 0.04% for each degree of horizontal curve.

g: Constraints include MTA Light Rail mainline and facilities; CSX track mainline under Howard Street; the Jones Falls bridge; and Jones Falls Expressway and Howard Street bridge structures, including piers/columns, abutments, foundations.

h: Tunnels are physically on separate right-of-way (ROW) within a well-protected perimeter.

i: Tunnels must include at least two tracks and a throughput capacity of at least 24 trains/hour per direction during and after construction.

j: Reduces travel time between northern and southern project limits.

k: Each track is bi-directional and the tunnel has universal interlocking with NEC mainline.

l: Alternative alignment accommodates movement of freight at current (2014) levels.



## **D. Summary of Preliminary Alternatives Screening Results**

The preliminary alternatives were evaluated using a two-level progressive screening approach depending upon the viability of the alternative. Screening Level 1 was a fatal flaw analysis. Screening Level 2 considered the remaining alternatives using 19 criteria in three categories: Engineering, Operational, and Environmental. The summary of the preliminary screening results are shown in **Table 1** and discussed below.

### **1. Screening Level 1**

Screening Level 1 was based on a fatal flaw analysis. Fatal flaws are specifically defined as: the alternative does not utilize existing infrastructure or unacceptable engineering issue that cannot be reasonably avoided or solved during the early development stage of an alternative. Alternatives with fatal flaws were eliminated and not considered in Screening Level 2.

Alternatives 5, 6, and 7, identified from previous studies, had a fatal flaw because they did not utilize the existing Baltimore Penn Station. Alternatives 14, 15 and 16, three of the nine New Location Alternatives identified by FRA and MDOT, had engineering fatal flaws involving the profile (Alternatives 14 and 16) and the horizontal curvature (Alternative 15) and were also eliminated and not considered in Screening Level 2.

### **2. Screening Level 2**

The remaining eight New Location Alternatives were screened against 19 criteria grouped into three categories that represent important elements of the evaluation. The three categories are: Engineering, Operational, and Environmental. The criteria were not weighted, as each group is important. Evaluation results are described in the context of these areas below.

#### **a. Engineering**

Engineering criteria were utilized to determine the technical feasibility of an alternative. If an alternative failed to meet these criteria, it was not recommended for further study, unless an acceptable resolution could be achieved or might be determined from additional design information.

Alternative 3: Great Circle Passenger Tunnel and Alternative 11: Robert Street South achieve an acceptable design that meets required Engineering criteria. Both would meet the required tunnel separation between the existing MTA Metro tunnel and other physical constraints. The remaining New Location Alternatives did not meet one or more Engineering requirements. Alternatives 8, 9, 10, and 13 did not meet the separation requirements between the proposed tunnel and CSX crossing under Howard Street near I-83 (Criterion No. 7). Alternatives 4 and 12 failed to achieve vertical separation requirements between the proposed tunnel and the MTA Metro tunnel (Criterion No. 1).

Physical constraints included the MTA Light Rail Line; the CSX tracks; the Jones Falls Bridge / stream channel; the Jones Falls Expressway; the Howard Street Bridge, and the Gwynns Falls Bridge. All of the preliminary alternatives would experience some difficulty crossing these facilities, either underground, at-grade or above ground. The locations of columns, piers, abutments and footings could pose significant problems during design and construction. Those alternatives that are carried forward for further design development and environmental evaluation will be analyzed further for exact locations of constraints and its impact on the alignment. Many of these constraints are common in urban construction, and methods to overcome construction difficulty may be identified during detailed engineering.



**b. Operational**

All preliminary alternatives would meet the safety and security requirement that the at-grade and above ground tracks be in a physically separated right-of-way with a well-protected perimeter to prevent unauthorized intrusion into or upon the operating railroad environment.

Amtrak, MARC and freight rail operations must be maintained during construction and future years. Proposed alternatives must maintain the volume and frequency of Amtrak and MARC trains through the project area with no significant interruptions, accounting for projected growth in train and passenger traffic through the construction period. It should also accommodate the continued operation of freight trains through the study area at current 2014 levels. Alternatives 8, 12 and 13 do not meet these requirements for maintaining Amtrak and MARC operations. Alternative 2: Restore/Rehabilitate could also fall short of this requirement.

The proposed alternatives must allow for two tracks in each direction and provide a throughput capacity of 24 trains per hour. Also, in order to meet operational reliability, each track must be bi-directional and the tunnel must be aligned so that the track geometry permits each end of the proposed tunnel to have universal interlocking with the NEC mainline. Alternatives 2, 9 and 10 would not allow for two tracks in each direction at Penn Station.

The existing tunnel consists of sharp curves and tight clearances, and train speeds are now limited to 30 mph. The New Location Alternatives were designed for a minimum design speed of 40 mph and maximum grade of two percent. Consequently, each New Location Alternative would likely reduce the travel time through the study area.

A review of the report entitled *Baltimore's Railroad Network: Analysis and Recommendations* (2011), indicates that most of the freight service operates at night to avoid conflicts with commuter trains. Further, it states that Amtrak restricts all freight trains to a maximum speed of 30 mph between 6 am and 10 pm and permits solid intermodal trains and solid empty hopper trains to operate at speeds up to 50 mph between 10 pm and 6 am. Using this information, all of the alternatives (except those with fatal flaws) would meet requirements to maintain freight movement at the current 2014 levels.

**c. Environmental**

The project area is a developed, urban setting which includes the Jones Falls, several parks, historic districts and structures, residences, and minority and low-income communities. The environmental features were identified within a 160-foot wide surface disturbance footprint based on GIS data and cursory field verification.

Although detailed engineering has not been undertaken, the key differentiator for this criterion was an assessment of whether a bored tunnel or cut-and-cover construction would be required. A bored tunnel would incur potential environmental impacts at portal locations. Cut-and-cover would incur potential environmental impacts for the entire length of the cut-and-cover tunnel. Therefore, Alternative 4 was dropped from further consideration because this alternative would require a cut-and-cover construction method for the entire length of the alignment.

The existing bridge over the Jones Falls was identified as both an Environmental criterion and a physical constraint in the Engineering criteria. An alternative that could utilize the existing bridge would reduce design issues and costs, as well as avoid or minimize effects to the natural resources in and around the Jones Falls. Alternatives 8, 9, 10 and 13 would not be able to utilize the existing bridge over the Jones Falls.



The communities within the project area are predominantly composed of minority and/or low-income populations. Therefore, except for Alternative 1: No Build, none of the preliminary alternatives would avoid these populations. Thus, this criteria was not a differentiating factor among alternatives.

## E. Recommendations

The twelve preliminary alternatives listed below did not meet criteria in Screening Level 1 or 2 and will not be carried forward for further design development and environmental evaluation.

- Alternative 4: Presstman Street
- Alternative 5: Route 40
- Alternative 6: Locust Point
- Alternative 7: Sports Complex
- Alternative 8: Wilson Street – Existing Tunnel
- Alternative 9: Mosher Street North
- Alternative 10: Mosher Street South
- Alternative 12: Robert Street North
- Alternative 13: Wilson Street – Under Existing Tunnel
- Alternative 14: North Avenue Bridge
- Alternative 15: Gilmor Street –Existing Tunnel
- Alternative 16: North Avenue Tunnel

Alternatives 5, 6, 7, 14, 15 and 16 were eliminated during Screening Level 1 due to fatal flaws. Alternatives 5, 6 and 7 had fatal flaws because they did not pass through Baltimore Penn Station to utilize existing infrastructure. Alternatives 14 and 15 were eliminated during Screening Level 1 due to fatal flaws involving the profile and the horizontal curvature, respectively.

Alternatives 4, 8, 9, 10, 12, and 13 were eliminated during Screening Level 2. Alternatives 4, 8, 12 and 13 do not meet the requirements for maintaining Amtrak operations during construction, and/or they fail to meet Criteria No. 1 and 7 (tunnel clearance goal and impacts to physical constraints, respectively). Alternatives 9 and 10 do not allow for two tracks in each direction at Penn Station and conflict with existing trains in opposing direction.

The following alternatives are recommended for further design development and environmental review:

- Alternative 1: No-Build
- Alternative 2: Restore/Rehabilitate Existing B&P Tunnel
- Alternative 3: Great Circle Passenger Tunnel
- Alternative 11: Robert Street South

Alternative 1: No-Build is being carried forward to serve as a baseline for comparison to other alternatives. Alternative 2: Restore/Rehabilitate Existing B&P Tunnel, is being carried forward so that additional information can be obtained regarding the most appropriate restoration or rehabilitation method, the best use of the existing tunnel, or whether restoration or rehabilitation of the existing tunnel can be incorporated with different New Location Alternatives. Alternatives 3 and 11 are New Location Alternatives that sufficiently meet the Screening Level 2 Engineering, Operational, and Environmental criteria.

These four alternatives will be carried forward for further design development and environmental evaluation. As design is advanced, impacts resulting from the alternatives will be taken into account as part of the more detailed evaluations which will be completed as part of the B&P Tunnel Project, including the *Alternatives Report*, environmental technical reports, and the *Draft/Final Environmental Impact*



*Statement.* Alternatives evaluation will continue to be coordinated with the public and resource agencies throughout the development of the Project.

## VI. AGENCY AND PUBLIC COORDINATION

Agency and public input has been continually encouraged during the development of the preliminary alternatives in order to identify additional alternatives, obtain input on the alternatives developed, critique the alternatives evaluation, and provide additional information on potential effects to communities and the environment. Information obtained from agency and public input was used to update this *Preliminary Alternatives Screening Report* from the draft prepared in October 2014 with an additional alternative (Alternative 16) and refined alternatives evaluation. The purpose of this chapter is to provide an overview of the comments received and to provide a preliminary responses to comments.

### A. Agency Coordination

Federal and state agencies have been kept informed of project updates via the project website, [www.bptunnel.com](http://www.bptunnel.com). An Interagency Review Meeting (IRM) was held on October 15, 2014 at the Maryland State Highway Administration (SHA) Headquarters in Baltimore. This IRM was one of the standing IRMs that regularly occur every month at SHA. Federal and state agencies were also invited to the IRM via an e-mail sent on October 8, 2014. Representatives from the following agencies attended the IRM:

- Maryland State Highway Administration and its Environmental Planning Division;
- National Oceanic and Atmospheric Administration, National Marine Fisheries Service;
- US Army Corps of Engineers;
- Maryland Port Administration;
- Maryland Department of the Environment;
- Maryland Department of Planning and Maryland Historic Trust;
- Maryland Department of Natural Resources;
- US Fish and Wildlife Service;
- Federal Highway Administration;
- Environmental Protection Agency; and
- Maryland Department of Transportation.

At the IRM, MDOT and FRA provided a PowerPoint presentation that included an overview of the B&P Tunnel Project as well as a summary of preliminary alternatives development, screening methodology, and evaluation of the preliminary alternatives. At the meeting, several agencies provided verbal comments which are included in **Appendix A**. Agencies were encouraged to provide continued input as the Project advances.

Following the IRM, the agencies were provided a copy of the draft *Preliminary Alternatives Screening Report* for review. One comment, from the US Environmental Protection Agency (EPA) was received. The EPA provided suggestions for clarifying the elements of the draft *Preliminary Alternatives Screening Report*. This comment is included in **Appendix A**.

### B. Public Coordination

The public has been kept informed of project activities and deliverables via updates to the project website. A Public Open House, the second public meeting for the B&P Tunnel Project, was held by FRA and MDOT on October 29, 2014 at Mount Royal Elementary School, from 5:00 pm to 8:00 pm. A comment period for the Public Open House extended until November 14, 2014. The purpose of the Public Open House was to share the preliminary alternatives developed by the project team; describe the methods for screening the



preliminary alternatives; and obtain public input on the preliminary alternatives, the evaluation process, and other public concerns. A complete summary of the Public Open House, including advertisements, attendees, and comments received are included in the *October 29, 2014 Public Open House Synopsis and Public Comments*, located in **Appendix B**.

The Public Open House also served as an opportunity for the public to provide information that ultimately aided the alternatives development process, led to an additional preliminary alternative, and resulted in updates to the draft *Preliminary Alternatives Screening Report* which are reflected in this final report. Most notably, Alternative 16 was developed in response to suggestions from the public and was screened along with the other alternatives. Additionally, portions of the report were modified in response to public comments to maintain consistent, understandable terminology. Public input also assisted the project team in identifying environmental resources and community concerns in the study area; these resources and concerns will be taken into consideration as the alternatives are carried forward for further design development and environmental evaluation.

**Table 2** summarizes the comments received during the Public Open House and its associated comment period which are relevant to preliminary alternatives screening. The table also provides preliminary general responses on how the comments have been and/or will be considered as the Project advances.

**Table 2: Comment Summaries and Project Team Responses**

Comment Summary	Project Team Response
Support for or objection to specific alternatives	Comments regarding support for or objection to specific alternatives that are recommended for further study will be taken into account as the alternatives are advanced for further design development and environmental evaluation. These comments will also be considered by FRA and MDOT when identifying a preferred alternative.



Comment Summary	Project Team Response
<p>Alignment shifts or modifications to reduce potential impacts.</p> <p><i>Specifically:</i> Consider an additional alternative that runs below North Avenue [suggested alternative was drawn on a map by a citizen at the Public Open House]</p>	<p>Alternatives which have been carried forward will be further developed to meet engineering requirements in consideration of potential environmental impacts and in light of the Project's Purpose and Need. As preliminary design is advanced, impacts resulting from the alternatives will be taken into account as part of the <i>Alternatives Report</i>, environmental technical reports, and the <i>Draft/Final Environmental Impact Statement</i> which will be completed for this study.</p> <p>FRA and MDOT developed and analyzed an additional conceptual alternative (Alternative 16) that follows North Avenue. Alternative 16 underwent the same screening process as Alternatives 1 through 15. The results of this screening are presented in this report.</p>
<p>Addressing Amtrak, Norfolk Southern, and CSX needs, including for the Howard Street Tunnel</p>	<p>Norfolk Southern and CSX have been kept informed of the alternatives development process. Their initial comments received during NEPA scoping were considered during the development of alternatives screening criteria for this report. Freight needs have been and will continue to be considered during alternatives development (see Criterion No. 13), including within the <i>Alternatives Report</i> and <i>Draft Environmental Impact Statement</i> which will be prepared for the B&amp;P Tunnel Project. Improvements to the Howard Street Tunnel are beyond the scope of the B&amp;P Tunnel Project.</p>
<p>Accommodation of Amtrak Superliner passenger trains and double-stack freight trains</p>	<p>Preliminary alternatives have been screened for their ability to meet future tunnel clearance requirements for Plate H (see Criterion No. 2). Plate H would accommodate Amtrak Superliner and double-stack freight cars. The B&amp;P Tunnel Project is also being completed in consideration of studies underway for the <i>NEC FUTURE</i> program, which will provide information on future requirements of Amtrak's NEC.</p>



Comment Summary	Project Team Response
Simultaneous implementation of Alternative 2 for freight and Alternative 3 for passenger	Use (or partial use) of the existing B&P Tunnel is being taken into account as part of Alternative 2, and potentially in combination with other alternatives, as alternatives are advanced for further design development and environmental evaluation. These comments will also be considered by FRA and MDOT when identifying a preferred alternative.
Use of existing Wilson Street Tunnel for slower train traffic	Use (or partial use) of the existing B&P Tunnel is being taken into account as part of Alternative 2, and potentially in combination with other alternatives, as alternatives are advanced for further design development and environmental evaluation. These comments will also be considered by FRA and MDOT when identifying a preferred alternative.
Compatibility with Amtrak's plan for high-speed rail through the existing West Baltimore MARC Station	The B&P Tunnel Project is being completed in consideration of future high speed rail needs, particularly those being identified in studies underway for the <i>NEC FUTURE</i> program. The West Baltimore MARC Station is an important element of NEC infrastructure and has been considered as part of this <i>Preliminary Alternatives Screening Report</i> (see Criterion No. 5). Compatibility with the station will be further incorporated into the preliminary design for the alternatives carried forward.
Consideration of East Baltimore rail stations, including an Edison Highway station	Consideration of improvements to stations in East Baltimore are beyond the scope of needed improvements to the B&P Tunnel. Thus, these stations are not being considered during alternatives development for the Project. Given their proximity to the existing B&P Tunnel, consideration of compatibility with Penn Station and the West Baltimore MARC Station is appropriate for the B&P Tunnel Project (see Criteria No. 5 and No. 6).



Comment Summary	Project Team Response
Clarity of materials and transparency of project process	Comments regarding the clarification and enhancement of the draft <i>Preliminary Alternatives Screening Report</i> have been considered and incorporated into development of this report. The project process will remain transparent through future community engagement and public meetings. The public will also be afforded an opportunity to review and provide comments at project milestones, including during development of the Alternatives Report and Draft Environmental Impact Statement.
<p>Provide information to residents on how potential damage to property would be prevented and mitigated.</p> <p>Address impacts to environmental features including:</p> <ul style="list-style-type: none"> <li>• Neighborhoods and communities</li> <li>• Residences and businesses</li> <li>• Historic properties</li> <li>• Utilities</li> <li>• Druid Hill Reservoir and future underground storage tanks</li> <li>• Groundwater</li> <li>• Noise</li> <li>• Bats and other habitats</li> </ul> <p>Address impacts due to portals, air shafts, and residual air rights</p>	<p>FRA and MDOT will evaluate environmental impacts of the alternatives carried forward during design development and the Draft Environmental Impact Statement phase of the Project.</p> <p>Alternatives development will take into account measures to avoid, minimize, or mitigate environmental impacts. The public will be informed of environmental impacts and be provided opportunity to provide input on potential minimization and mitigation measures in the Alternatives Report and <i>Draft/Final Environmental Impact Statement</i>.</p>

### C. Continued Coordination

FRA and MDOT will provide additional opportunities for agencies, citizens, elected officials, community associations, and other stakeholders to learn about and provide input as the Project advances. Federal and state/regional agencies will be updated on the Project via regular correspondence and IRMs. A third Public Open House will be held in connection with the *Alternatives Report*. A formal Public Hearing will be held after the completion of the *Draft Environmental Impact Statement*.

Both agencies and the public are encouraged to submit comments throughout the Project via the online comment form at the project website, [www.bptunnel.com](http://www.bptunnel.com), and/or postal mail. Further comments will be addressed in later documents, including the *Alternatives Report* and the *Draft/Final Environmental Impact Statement*.



## VII. REFERENCES

Federal Railroad Administration (FRA). November 2005. *Baltimore's Railroad Network: Challenges and Alternatives*.

<[http://www.fra.dot.gov/eLib/details/L04158#p1\\_z5\\_gD\\_kbaltimore's%20railroad%20network](http://www.fra.dot.gov/eLib/details/L04158#p1_z5_gD_kbaltimore's%20railroad%20network)>.

Federal Railroad Administration (FRA). January 2011. *Baltimore's Railroad Network: Analysis and Recommendations*.

<<http://www.fra.dot.gov/eLib/details/L04275>>.

Federal Railroad Administration and Maryland Department of Transportation. B&P Tunnel Project *Purpose and Need*. (September 2014).

<[http://bptunnel.com/images/PurposeAndNeed\\_BPTunnel.pdf](http://bptunnel.com/images/PurposeAndNeed_BPTunnel.pdf)>.

Federal Railroad Administration and Maryland Department of Transportation. B&P Tunnel Project *Scoping Report*. (September 2014). <<http://bptunnel.com/index.php/2014-05-18-15-35-19/project-scoping-report>>.

United States Federal Railroad Administration (FRA). "NEC FUTURE: A Rail Investment Plan for the Northeast Corridor— Overview." <<http://www.necfuture.com/about/>>.





## **Appendix A: Agency Comments**



## B&P Tunnel Project Agency Comments

Agency comments were received at the IRM on October 15, 2014 and via the project e-mail address.

No.	Agency	Date	Comment
1	Maryland Port Administration	10/15/14 (IRM)	What does the B&P Tunnel project primarily serve— passenger needs or freight needs? Will this connect to the Port of Baltimore? The existing connections need to be maintained. Will you accommodate double-stacked rail? Are you considering passenger and freight separately? The Port of Baltimore is concerned that NFS and CSX would face restrictions in their use of the tunnel.
2	Maryland Department of Planning	10/15/14 (IRM)	What is the speed goal for the project?
3	Environmental Protection Agency (Office of Env. Programs, Region 3)	10/15/14 (IRM)	Is the NEC Future document being considered in the development of the B&P Tunnel EIS? The B&P Tunnel project should be consistent with the goals of this FRA/Amtrak document.
4	Environmental Protection Agency (Office of Env. Programs, Region 3)	11/10/14	<p>Thank you for coordinating with EPA on the B&amp;P Tunnel Draft Preliminary Alternatives Screening Report. We appreciate your efforts to keep us engaged in this project and for allowing us the opportunity to provide you with comments for your consideration. If possible, please forward this message to the appropriate MDOT contact for this project.</p> <p>Below are some comments for your consideration on the report. Overall, the alternatives examined were clearly explained as were the various screening criteria. Of the 15 alternatives considered, four are recommended to be advanced for further study in the EIS. These include the no build alternative, restore/rehabilitate the existing tunnel, and two new location alternatives. While it was largely apparent why many of the alternatives considered were recommended to be dropped from further consideration, it was not always clear how each of the alternatives measured up against each of the identified screening criteria. We did see the screening criteria laid out for each alternative in Table 1, which we found very useful. We'd suggest including this information more explicitly in the narrative analysis and recommendation sections for each alternative in order to make it more clear throughout the document how alternatives 3-15 met each of the identified screening criteria. Currently for alternatives 3-7, the analysis sections only present reviewed and summarized information from the 2011 <i>Baltimore's Railroad Network: Analysis and Recommendations</i> report as opposed to focusing on how the alternatives were evaluated against the criteria. Again, we suggest including a more clear presentation</p>



No.	Agency	Date	Comment
			<p>of how the alternatives were evaluated against each of the screening criteria in order to further improve the report.</p> <p>One of the new location alternatives that was evaluated and recommended to be carried forward was Alternative 11: Robert Street South. The description of this alternative states that it would be a combination of underground tunnel, an aerial structure and at-grade sections. The map provided of this alternative currently shows the alignment and portal locations. If possible, we'd recommend noting the locations of the aerial structures and at-grade sections on the existing map, or adding a new map to show these areas. While we understand the provided discussion and rationale for retaining this alternative, if it hasn't already been considered, we'd recommend that FRA and MDOT consider evaluating a slightly modified Alternative 11 against the identified screening criteria. We're suggesting a modified Alternative 11 in addition to the other alternatives in an effort to think ahead about potential impacts to the community surrounding the south portal location. If possible, we'd suggest, that if it hasn't already been evaluated already, taking a closer look at potential slight alignment shifts or modifications to the south portal location and connection to the existing Amtrak corridor of Alt 11 to the north by a few blocks. It appears that if some modification were possible, the portal location could have potentially fewer adverse impacts to the community as well as reducing the length of track between the portal and existing track. EPA encourages FRA and MDOT to consider if efforts can be made to evaluate the south portal location in closer detail either further into the design of Alt 11, or evaluating at this stage a slightly modified Alt 11 in order to reduce adverse community impacts.</p> <p>I also had a few questions in order to try to better understand Alternative 12: Robert Street North. I understand this alternative has some portion of cut and cover, however could you clarify the length, extent, and location of the cut and cover operation that would be required for this alternative? I was also interested in finding out where or for what length of this alternative would not meet the minimum tunnel separation between the existing MTA Metro rail line and proposed tunnel. Has any evaluation been conducted to investigate if realigning or slightly modifying the southern portal to the north would allow for greater tunnel separation and maintenance of operations through the existing tunnel?</p> <p>The screening report considers environmental justice throughout the document. We encourage FRA and MDOT to conduct robust community outreach for this project, as it appears at this preliminary stage that many of the potential adverse impacts associated with the project could be to the community. We are aware that there are a number of large, influential churches in the vicinity of the southern portal locations, as well as community organizations, and suggest that project outreach include these organizations to the extent possible.</p>





## **Appendix B:**

### **B&P Tunnel Project October 29, 2014 Public Open House Synopsis and Public Comments**

**December 5, 2014**



## October 29, 2014 Public Open House

### Synopsis and Public Comments

A Public Open House was held by FRA and MDOT on October 29, 2014 at Mount Royal Elementary School, from 5:00 pm to 8:00 pm. This was the second Public Open House held for the B&P Tunnel Project. The purpose of the Public Open House #2 was to share the preliminary alternatives developed by the project team, describe the methods for screening the preliminary alternatives, and gain public input regarding recommendations for alternatives. The Public Open House #2 also served as an opportunity for the public to comment and ask questions about the draft *Preliminary Alternatives Screening Report*, which was made available on the project website, [www.bptunnel.com](http://www.bptunnel.com).

This document summarizes the October 29, 2014 Public Open House for the B&P Tunnel Project and includes the following elements:

- A synopsis of the B&P Tunnel Project Public Open House for preliminary alternatives screening (Public Open House #2);
- A summary of public comments received from initial announcement of the Public Open House #2 (October 3, 2014) through the close of the Public Open House #2 comment period (November 14, 2014); and
- Public comments received.

Public Open House #2 was advertised through a variety of methods, including the following:

- **Letter Invitations**— sent directly to 32 elected officials, 57 community associations, 13 Baltimore City agencies, and 14 stakeholders (October 3, 2014);
- **Project Website**— announced on October 13, 2014;
- **Postcard Invitations**— sent to 18,000 residences within five zip codes surrounding the project study area, 21201, 21202, 21217, 21218, and 21223 (October 14, 2014);
- **Newspaper Advertisements**— featured in the *City Paper* (October 15, 2014), the *Baltimore Sun* (October 16, 2014), and *The Afro-American* (October 17, 2014); and
- **Flyers**— posted at 43 locations surrounding the existing B&P Tunnel, including community organizations, local businesses, post offices, and schools (October 20, 2014).

Representatives from the Federal Railroad Administration (FRA), the Maryland Department of Transportation (MDOT), the Maryland Transit Administration (MTA), and Amtrak were available to converse with attendees and answer questions. Display boards provided an overview of the B&P Tunnel Project, specifically the preliminary alternatives development. Downloadable versions of these display boards were made available on the project website. Public Open House #2 was attended by 110 persons, including 96 citizens and representatives from the following organizations:

### **Elected Official Representatives: 3 persons**

- Justin Lane, City Council Assistant
- Eric Costello, City Council
- Liam Davis, Council President Representative

### **Agency Representatives: 6 persons**

- Maryland Department of Planning— Nasrin Rahman
- Baltimore City Recreation and Parks, Mount Royal
- Baltimore City Police— Leo Furman and Byron Conaway
- Baltimore City Planning Department—Theo Ngongang
- Baltimore City Department of Public Works— Jeffrey Raymond

### **Community Organization/Stakeholder Representatives: 5 persons**

- Historic Mount Royal Terrace Association— Carl Young
- Bolton Hill Community (Mount Royal Improvement Association)— Steve Howard
- P. Flanigan & Sons— Pierce Flanigan
- Midtown Community Benefits District— Joseph Palumbo
- Maryland Institute College of Art

## **Summary of Comments Received**

A total of 30 comments were received from the announcement of the Public Open House #2 through the close of the Public Open House #2 comment period on November 14, 2014. The comments are summarized below and categorized by the following common themes: alternatives, public involvement, and environmental. The actual comments received are included as **Attachment A**.

- **Alternatives**
  - Support for or objection to specific alternatives
  - Alignment shifts or modifications to alternatives to reduce potential impacts
  - Addressing Amtrak, Norfolk Southern, and CSX needs, including for Howard Street Tunnel
  - Accommodation of Amtrak Superliner passenger trains and double-stack freight trains
  - Simultaneous implementation of Alternative 2 for freight and Alternative 3 for passenger
  - Use of the existing Wilson Street Tunnel for slower train traffic
  - Compatibility with Amtrak's plan for high-speed rail through the existing West Baltimore MARC Station
  - Consideration of East Baltimore rail stations, including an Edison Highway station



- **Public Involvement**

- Timeliness of Public Open House notifications
- Clarity of materials and transparency of project process
- Implementation of a proactive public engagement process
- Meetings with neighborhoods, local officials, and other organizations such as Reservoir Hill Neighborhood Council, Bolton Hill/Mount Royal Improvement Association, and Historic Mount Royal Terrace Association

- **Environmental**

- Information to residents regarding potential damage to property
- Impacts to environmental features including:
  - Neighborhoods and communities
  - Residences and businesses
  - Historic properties
  - Utilities
  - Druid Hill Reservoir and future underground water storage tanks
  - Groundwater
  - Noise
  - Bats and other habitats
  - Impacts due to portals, air shafts, and residual air rights

# **Public Open House Summary: Attachment A**

## **Public Comments Received**



Public comments were received during a time period which extended from the announcement of Public Open House #2 (October 3, 2014) through the close of the comment period (November 14, 2014). Comments were received via the Public Open House comment form; via the project website; and by mail.

### Public Comments

No.	Date	Comment
1	10/20/14	It is essential to build a new B&P tunnel that can accommodate tall double-decker Amtrak Superliner passenger rail cars, double stack freight cars for late night freight trains, and a tunnel with a broad smooth curve to maintain Amtrak Acela speeds. The new B&P tunnel is setting the standard for high speed rail tunnels on the east coast, especially since the ARK tunnel was eliminated and Amtrak struggles to win support and funding for the Gateway Hudson River tunnels.
2	10/20/14	<p>I am very concerned that I was notified only today about next week's meeting. I would like to be involved and better understand this project. My home falls right on the line of one of the projected tunnels. What does this mean? The map is SO difficult to read and the numbers on the lines are never defined. Why is there not more transparency about this process? When are the next meetings? I would like more than 8 days notice to be able to arrange my schedule to attend.</p> <p>You MUST engage neighbors and stakeholder more proactively or expect to be subjected to lawsuits by affected homeowners. I am saving the information that I receive from you all and how poorly specified the information is that you provide. Anticipate significant push-back from the community if you continue to proceed with such poor clarity.</p>
3	10/23/14	I am concerned about preliminary alternative #3 that is very close to my house in Reservoir Hill. How would damage to property be prevented and mitigated?
4	10/29/14	<p>It seems as though #2 and #3 make the most sense-</p> <p>Perhaps keeping the existing tunnel for freight and use #3 for passenger, decreasing time for rail travelers</p>
5	10/29/14	Please consider the historic nature of the neighborhoods impacted by #4 Route. It comes so close to the most impressive housing stock in Baltimore (Reservoir Hill), much less the east coast. I'm not so sure these 100+ year old homes would not be shaken into oblivion. Please try any other route. Thank You.
6	10/29/14	<ul style="list-style-type: none"> <li>Both alignments for new tunnels go very close to historic homes. I have concerns about vibrations during construction and long term as a result of the tunnel being used by trains frequently, and the effect on the foundations of the homes.</li> <li>I also have concerns regarding Alt 3 and the potential changes to the ground water patterns in Whitlock Farm. This is a farm that sustains and enhances the community I live in.</li> </ul>

No.	Date	Comment
		<ul style="list-style-type: none"> <li>• What types of soil/geotech analysis will be done to determine the effect of the proposed tunnels?</li> <li>• Were alternatives considered that utilize existing roadway corridors? If so, why did they drop out? Will the alternative analysis be posted for review in further detail?</li> <li>• Should structural failures occur as a result of the potential tunnel either during construction or down the line, who would be liable?</li> <li>• Is there any research available regarding historic structures on top of tunnels?</li> <li>• What will be done with the existing tunnel should a new alignment be pursued? Will it be maintained? Filled? Secure?</li> <li>• Are there any potential impacts to the reservoir?</li> <li>• Will this be a high speed rail? What speeds can be expected?</li> <li>• Can you meet with the Reservoir Hill Neighborhood Council?</li> <li>• Please define what is meant by infeasible geometry</li> <li>• Alt 3 goes beneath a residential area however in the alternative analysis it is shown as minimal. What is the difference between minimal and yes?</li> <li>• What weighting was used in the analysis?</li> <li>• Why were alternatives that missed Penn Station eliminated?</li> <li>• Tunnel separation goal seems to be a deal breaker why is that? Why even consider or show them?</li> <li>• We already hear a lot of train noise as it is, will this increase as a result?</li> </ul>
7	10/29/14	<ol style="list-style-type: none"> <li>1. I got conflicting answers from staff tonight – yes I purposely asked different people the same question</li> <li>2. Experience tells me that at this point, alternatives presented, may already be squashed</li> <li>3. I was told cost of the 4 major alternatives have not yet been attached to the proposals – Really? Does that make sense?</li> <li>4. I will definitely take Ms. Thorne up on her offer to address a combination of Bolton Park Neighborhood, Mt. Royal Improvement Association, Historic Mt. Royal Terrace Association for a Q&amp;A – probably January-February 2015 and she will attempt to include our local political representatives</li> </ol>
8	10/29/14	After understanding the project and the proposed solutions, I can voice my strong opinion against Alternative 11. It's not understandable that a Historic Neighborhood like Bolton Hill can have a proposal with 2 tunnels going through it (current and Alternative 11). Residents of a historic neighborhood are required to maintain our houses is costly and require having many inspections. Having 2 tunnels though the neighborhood is not an option – No to Alternative 11
9	10/29/2014	If the existing tunnel is not chosen, please do not seal it up entirely. Bats come out of there at dusk and feed on our mosquitoes. Also keep this on mind for a new tunnel. Thanks
10	10/29/14	9 & 10 lines NO. 11 Yes



No.	Date	Comment
11	10/29/14	Reservoir Hill has been turning around slowly but surely. It has a history of brokenness and violence, but in the past 20 years people have been investing in the neighborhood, renovating houses, starting farms and gardens, and staying active with the school and neighborhood association. If option 3 cannot be achieved without boring underground and without tearing down houses, I ask that you please reject it. It would be a huge setback for the neighborhood to have it cut in half during construction as well as forcing people out of their homes. Please only consider option 3 if the construction can be done without forcing people out and tearing down homes.
12	10/29/14	I am strongly in favor of the recommended options to move forward, specifically options 3 & 4. I count the days will we have true high speed rail and hope this project can help in that regard.
13	10/29/14	Please build a new tunnel. We need it.
14	10/29/14	Exactly where is the tunnel going to run in neighborhood of Eutaw Place?
15	10/29/14	We are concerned regarding the relatively shallow route of option 11. With such a shallow route the vibrations are likely to damage fragile water lines and compromise existing homes' foundations.
16	10/29/14	Alternative 11- No. This is disastrous for a historic area where the houses owners are required to spend so much money to keep them in good shape.  Insulting to propose another tunnel under the neighborhood. Shame on you!
17	10/29/14	No to Alternative 11. Two tunnels though Bolton Hill is not an option. Look for areas where the houses are abandoned and blighted!
18	10/29/14	My historic row house is directly above the proposed route of Alternative #3. I am extremely concerned about the damage tunnel construction and operation will cause to a fragile historic home, mine as well as the entire Historic Reservoir Hill community (bus and truck traffic on Eutaw Place currently cause structural damage problems for residents). I realize your routes are geologically and geographically dictated, however, perhaps further exploration of routes south and west of this community – for example the Sandtown area in the blighted uninhabited urban areas would better serve us all.  What impact will #3 have on the underground water storage tanks proposed for construction in Druid Hill Park west of Druid Lake have?
19	10/29/14	The boards indicate that alternatives will be evaluated according to surface foot print and potential uses for the old, unused infrastructure. But nowhere are these matters explored (or even mentioned) relative to each alternative. I understand that

No.	Date	Comment
		subsequent engineering and design will address these, but as residents within the affected area our experience will be largely determined by portals, air shafts, and residual air rights. To omit even general information about these raises suspicion that bigger players than residents will have the most say in their location, design, and adaptive reuse. So, as to which alternative – it all depends.
20	10/29/14	<p>None of the proposed...</p> <ol style="list-style-type: none"> <li>1. Convert Howard Street Tunnel from freight to passenger to accommodate higher trains in new tunnel.</li> <li>2. Build new tunnel for freight to service the port.</li> </ol>
21	10/29/14	Route #3 goes right under my house and land. The potential for structural damage to a 125 year old house may be great depending not just on depth but geological formations, most of this section of #3 route has newly renovated housing. And #3 goes primarily through low-middle income African American community. Also, likewise I am ending row in the middle of a block so the potential for block housing shift is worrisome. The buses on Park Avenue to the curve of the road already shake walls and cupboard. I drew a black line to show potential for an underground route under North Avenue that would be shorter, less disruptive to housing and smoother curves. This is always going to be a problem with reconnects with existing tracks parallel to Xway.
22	10/29/14	A big no to Alternative 11! Are you kidding me? Community impacts? We have enough human traffic and crime near Robert Street!
23	10/29/14	<p>New construction should be a priority to replace the Civil War era B&amp;P Tunnel. China spends billions on its high speed rail infrastructure; the U.S. should be able to replace a Civil War era tunnel. Alternative 3 and 11 look great.</p> <p>It would be ideal for the new tunnel construction, Alternative 3 or 11 to be tall enough for Amtrak Superliner railcars and double stack Norfolk Southern trains.</p> <p>A public-private partnership might help fund the cost for a taller tunnel for double stack cars or Superliner equipment.</p>
24	10/29/14	<p>Regarding Alternative 11:</p> <ol style="list-style-type: none"> <li>1. Concern about access to Spicers Run parking lot at Robert and Linden (100 + homes)</li> <li>2. Noise, vibration concerns both during construction and after completion</li> <li>3. Subjacent and sub lateral support concerns</li> </ol>
25	10/29/14	<p>Alternative 11 is not an option.</p> <p>2 tunnels in a historic neighborhood is not fair. Horrible proposal –Shame! Restore existing rail tunnel. No to alternative 11</p>



No.	Date	Comment
26	10/29/14	<p>Plan/Option #3 makes the most sense. Using existing Wilson Street tunnel for slow traffic- after it is checked for issues- would be fine.</p> <p>Please keep us updated.</p>
27	10/29/14	<p>I live 4 houses above Whitelock Street. The tunnel on the map is very close to my house. Our houses are soft brick with soft mortar. Every time a bus goes by my house vibrates and windows rattle. The stone façade has cracks and stones have shifted. I do not want another destructive source of vibrations near my house. Upper Eutaw Madison is a historic district with some of the most significant and important houses in Baltimore. It should not be disturbed.</p> <p>The map that came in the mail showed the tunnel near the synagogue. The map at the school shows the tunnel at Whitelock.</p> <p>Everyone in the 2400 block has cracks in their walls (plaster &amp; brick &amp; stone). These are fragile properties and irreplaceable.</p>
28	10/29/14	<p>There appears to have been little cooperation with CSX. I'm surprised in light of the issues with the Howard Street Tunnel that the B&amp;P Tunnel is moving forward with no plans to address freight issues. Is it true that CSX is anticipating a separate tunnel of their own roughly parallel to the planned Amtrak tunnel?</p>
29	10/29/14	<p>Upon review of proposed alternative route #11 (Robert St. South), I count 5 city parks that the route passes underground. I know the names of three of the parks: Maple Leaf Park, Arnold Sumpter Park, and the median of Eutaw Place. On the map provided on this website, I saw two additional city parks. However, I do not know the names of those 2 additional city parks. On page 53 of your Draft Preliminary Screening Report (<a href="http://www.bptunnel.com/images/BPT_Draft_PASR.pdf">http://www.bptunnel.com/images/BPT_Draft_PASR.pdf</a>) under the column: number of parks within surface footprint, you list only one park and do not identify that park. (See Map on Page 22) I believe this needs to be corrected.</p> <p>Is it possible for the proposed underground railway tracks to run underneath W. North Avenue?</p>
30	11/07/14	<p>P. Flanigan &amp; Sons, Inc. submitted a letter noting the characteristics and importance of their property.</p>