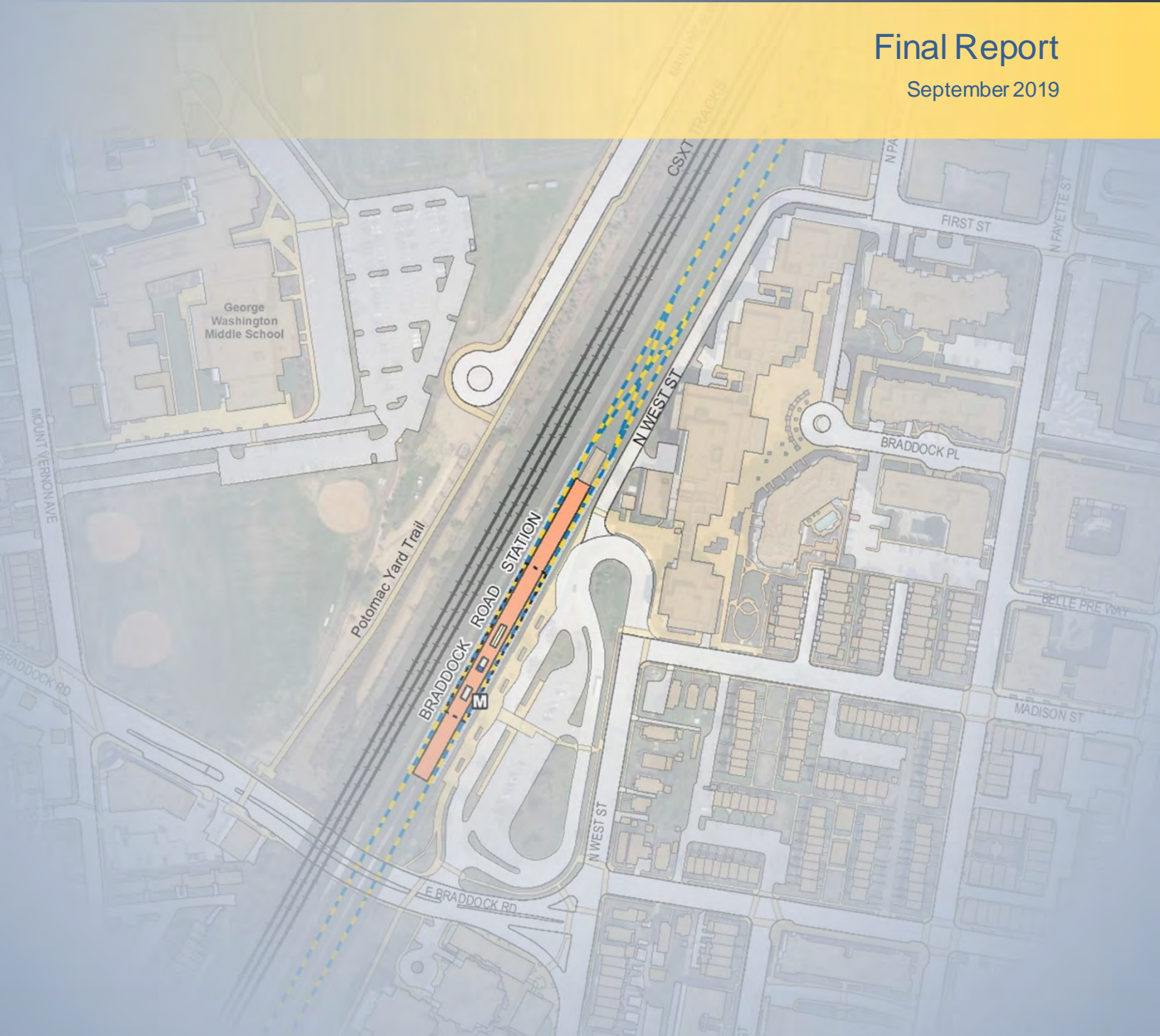


Braddock Road Metrorail Station Pedestrian Tunnel/Bridge Feasibility Study

Final Report

September 2019



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Contract FQ15190
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A/E Planning Services for
Braddock Road Metrorail Station
Pedestrian Tunnel/Bridge Feasibility Study

FINAL REPORT

September 2019

Prepared by:



Washington Metropolitan Area Transit Authority
Office of Real Estate and Station Planning

with the cooperation of



City of Alexandria, Virginia

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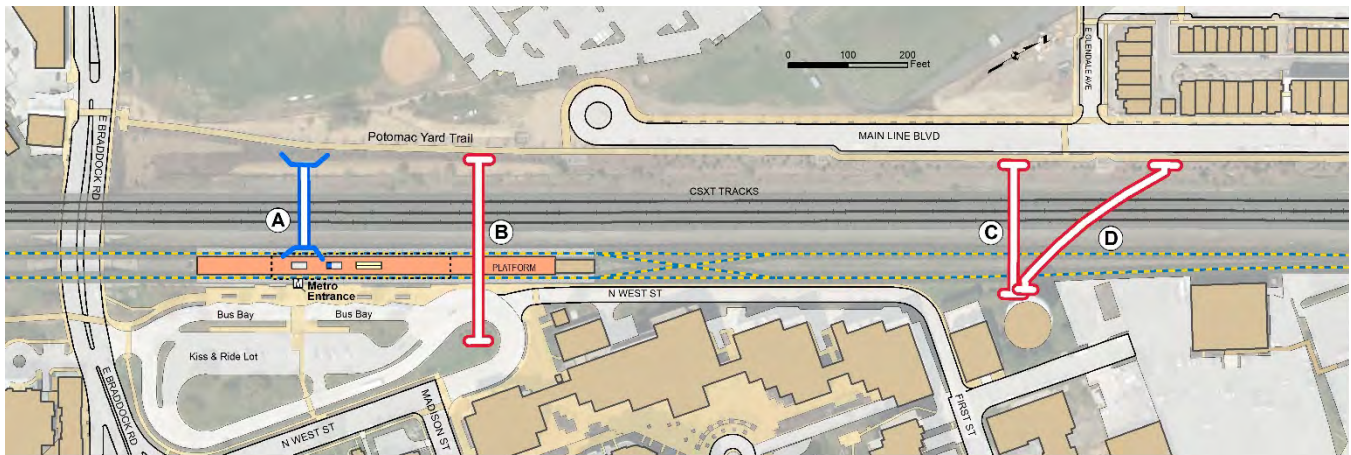
EXECUTIVE SUMMARY

The Washington Metropolitan Area Transit Authority (WMATA, Metro), in coordination with the City of Alexandria (City), prepared a feasibility study for a pedestrian connection between the east and west sides of the CSX Transportation (CSXT) and Metrorail rail corridor at the Braddock Road Metrorail Station (the station). The study determined the challenges associated with designing, permitting, and constructing an ADA-compliant pedestrian connection, in the form of either a pedestrian tunnel or bridge, to provide additional access to accommodate ridership growth attributed to development in the Del Ray and South Potomac Yards areas north and west of the station.

Current pedestrian access is limited to the east side of the station. Pedestrians accessing the station from points west must either cross under the CSX railroad at the Braddock Road bridge or over the CSX railroad at Route 1 to access sidewalks to the station. North of the station, the sidewalk is not ADA-compliant and measures approximately 5 feet wide. Given its proximity to the Metrorail corridor retaining wall, the sidewalk offers a unwelcoming pedestrian environment to those accessing the Metrorail station from the northeast.

To provide enhanced pedestrian access that meets the federal, state, and local regulations while balancing project needs, four initial concepts for a new pedestrian crossing of the CSX railroad and Metrorail line were identified for consideration as shown in **Figure ES - 1**.

Figure ES - 1: Planning Level Alternatives Considered



All four concepts would improve access to the station from the Del Ray and South Potomac Yard neighborhoods of Alexandria. Each of the initial four concepts would increase the number of residents within a 20-minute walk of the station by an average of 261 and the number of jobs by an average of 214 in 2020. The estimated average weekday demand for the crossing concepts ranged from 1,749 to 1,804 pedestrians, with negligible differences between alternatives (less than 4%).

Based on the results of a screening of the four initial concepts, three alternatives were advanced for further analysis. **Figure ES - 2** shows the location of the three alternatives and **Figure ES - 3** through **Figure ES - 5** show a bird's eye view sketch of each of the alternatives. The alternatives are described as follows:

- Alternative A consists of a tunnel beneath the CSXT tracks with direct connection into the station mezzanine.

- Alternative C1 consists of a single span, prefabricated truss bridge spanning perpendicular across the CSXT tracks and the WMATA Metro. Ramp and stair structures would bring the alignment from grade to the bridge level at the east and west ends of the crossing.
- Alternative C2 consists of a signature span bridge (one or two spans) along a similar alignment as Alternative C1 (North Bridge). Rather than a prefabricated truss, this structure type would be more complex, with the ultimate choice of structure type being determined during preliminary and final engineering.

Figure ES - 2: Alternatives Advanced for Analysis

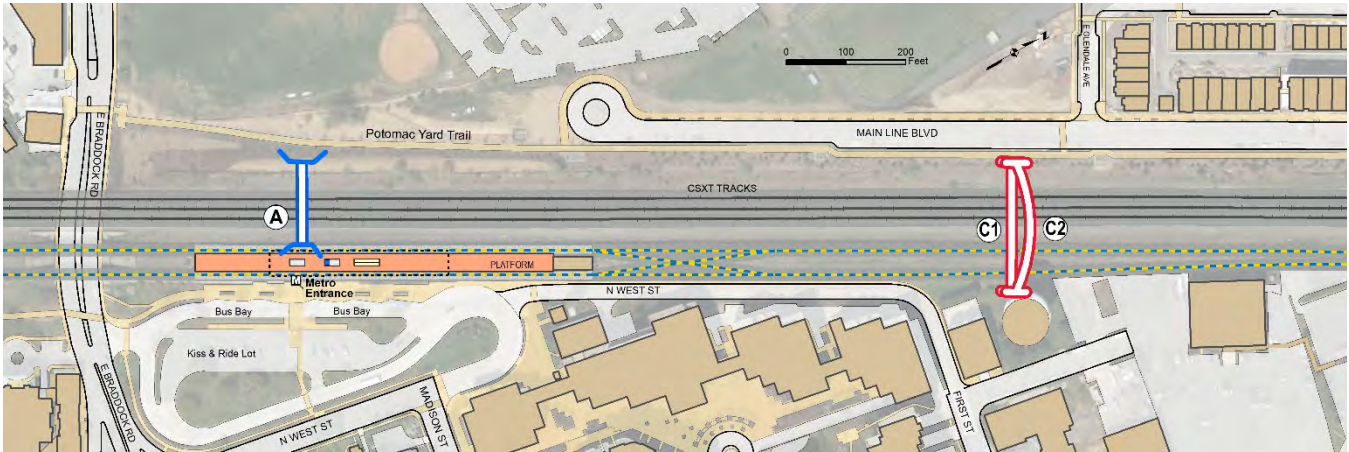


Figure ES - 3: Birds-Eye View of Alternative A

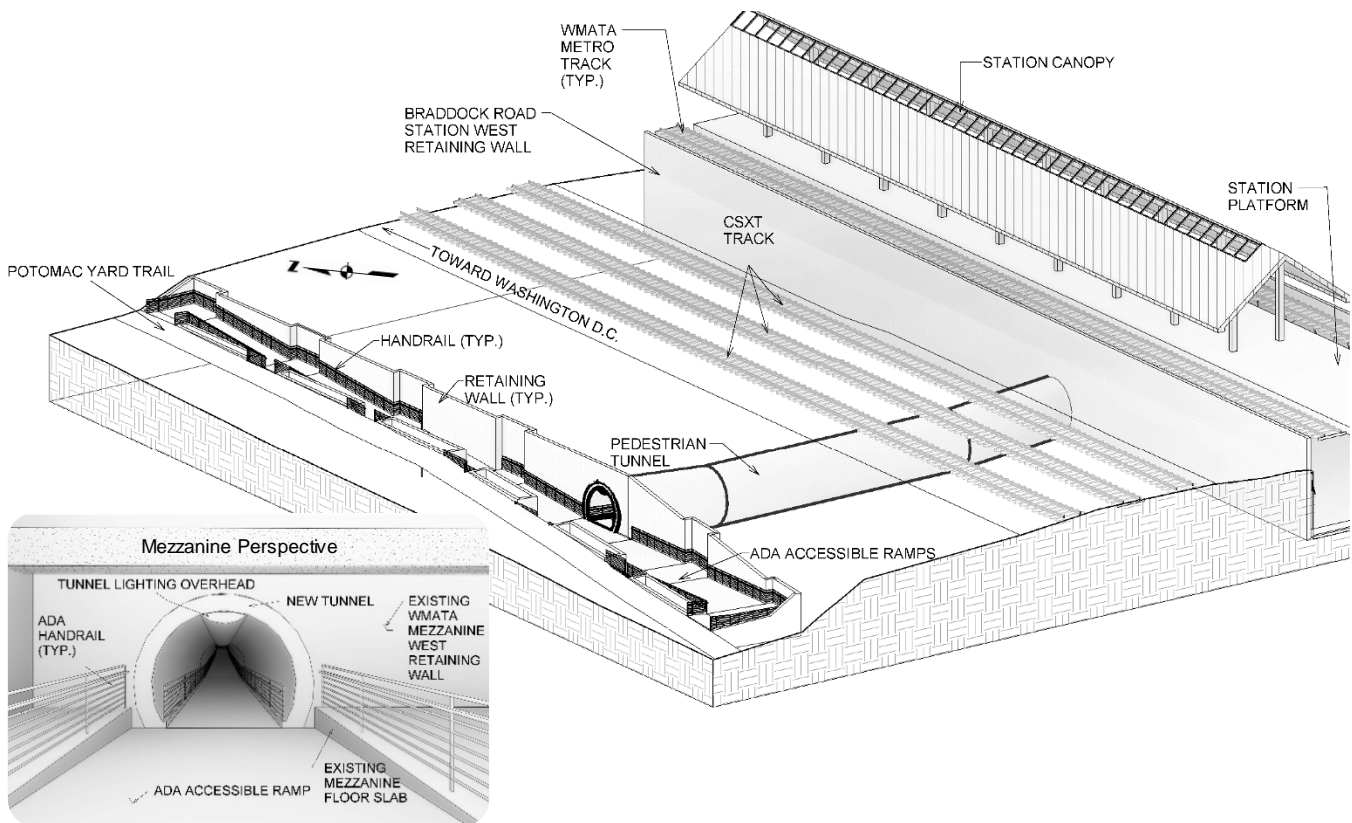


Figure ES - 4: Birds-Eye View of Alternative C1

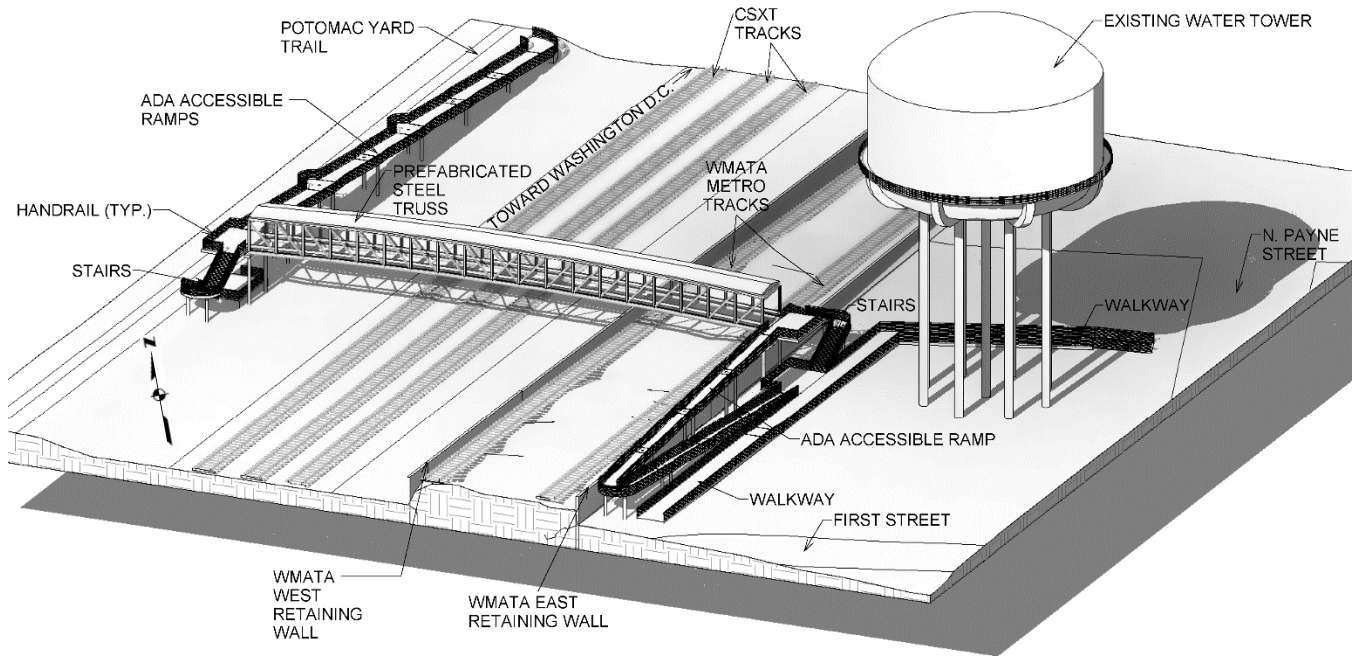


Figure ES - 5: Birds Eye View of Alternative C2

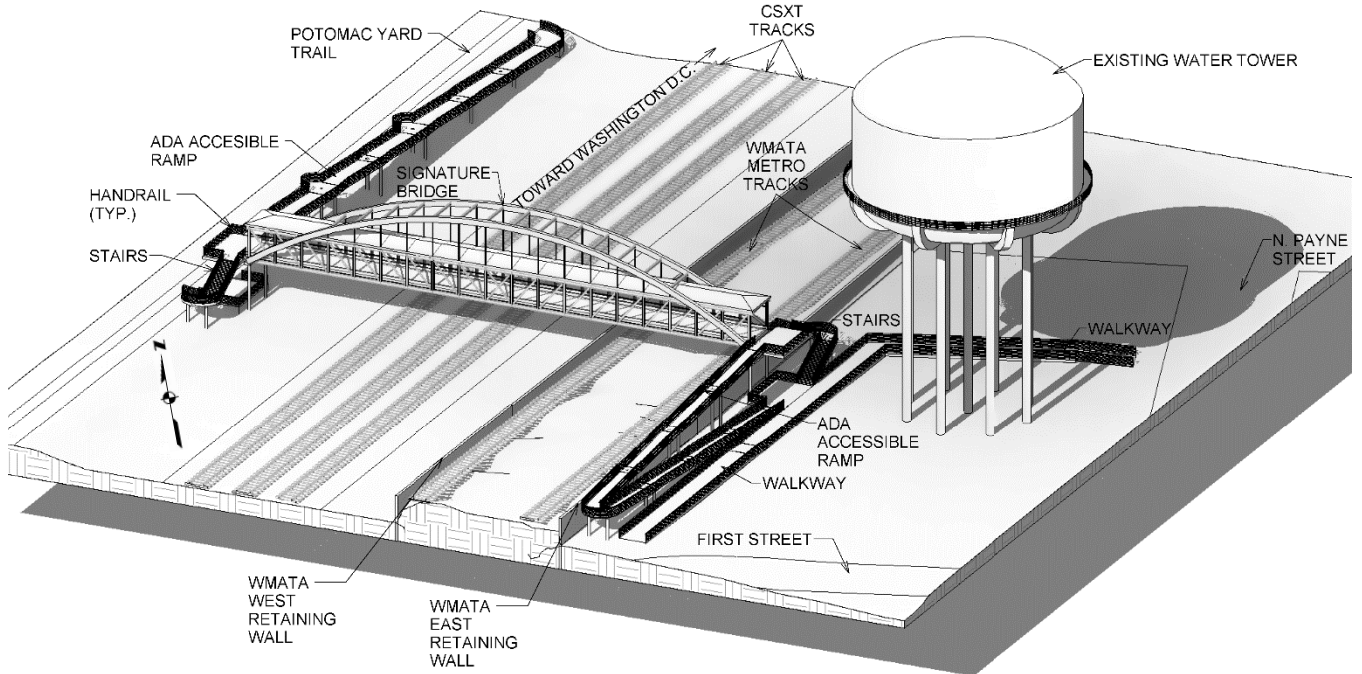


Table ES-1 summarizes the estimated capital costs for each of the three alternatives. Alternative C1 would most likely be the lowest cost alternative, followed by Alternative A and Alternative C2, depending on the structure type ultimately chosen for Alternative C2.

Table ES- 1: Summary Capital Cost Estimates Per Alternative

| | Alternative A Station Tunnel | Alternative C1 North Bridge | Alternative C2 North Signature Bridge |
|-------------------|---------------------------------|--------------------------------|---|
| Low End Estimate | \$18,852,920 | \$14,136,300 | \$16,322,850 |
| High End Estimate | \$21,753,630 | \$17,595,350 | \$22,866,800 |

The following key findings are based on the results of the engineering feasibility analysis conducted for each alternative.

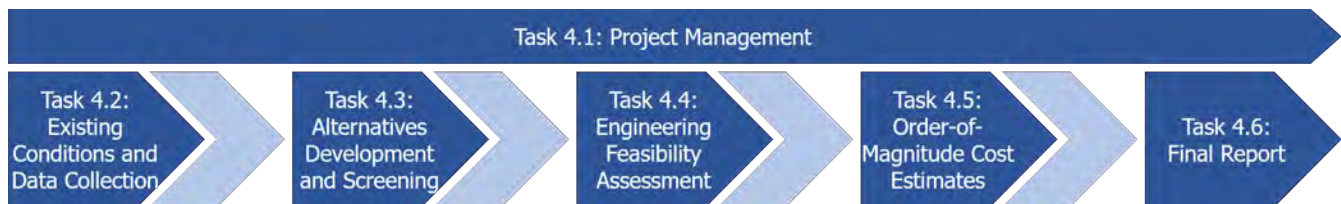
- The Alternative A pedestrian tunnel would require the relocation of an existing Plantation jet fuel pipeline that runs parallel to the Metrorail line and is located between the Metrorail Station and the CSX Railroad, significantly increasing the cost and complexity of this option. The relocation of the pipeline and challenges regarding 24-hour tunnel access at a metro station that closes each night may make this alternative infeasible.
- Alternative A tunnel requires ramping that would extend into the existing station area just outside the fare gates to meet accessibility standards. This may impact pedestrian flows into and out of the station.
- Alternative C1 has the lowest cost and least impact to the existing railroad operations.
- Alternative C2 may require a support pier within the Right-of-Way (ROW) area of the existing CSX Railroad. This may not be acceptable to CSX.
- Alternatives C1 and C2 would likely require the expansion of the sidewalk along North West Street for pedestrians to access the new pedestrian bridge, requiring relocation of the street right-of-way to the southeast and potentially impacting the private development and property on the southeastern edge of the street.
- Travel time savings for Alternatives C1 and C2 are minimal.

1 INTRODUCTION

The Braddock Road Metro Neighborhood Plan (March 2008) sought enhanced neighborhood access to and from the Braddock Road Metrorail station (the station). To that end, the Washington Metropolitan Area Transit Authority (WMATA, Metro), in coordination with the City of Alexandria (City), has prepared a feasibility study for a pedestrian connection between the east and west sides of the CSX Transportation (CSXT) and Metrorail rail corridor at or near the station. This study determined the challenges associated with designing, permitting, and constructing an ADA-compliant pedestrian connection, providing additional access to accommodate ridership growth attributed to development in the Del Ray and South Potomac Yards areas north and west of the station.

This study report outlines the process to assess the feasibility of a new pedestrian connection. The report first describes the existing conditions at and around the station. Second, it presents four planning-level concepts that were developed to enhance pedestrian connectivity, the projections for future ridership growth in the adjacent neighborhoods, and planning-level estimated walkshed benefits for each concept. Third, it presents a screening of the four initial concepts that results in three alternatives for further study and the results of engineering feasibility assessment of the alternatives. Fourth, it presents order-of-magnitude cost assessments for three alternatives. The study identifies the benefits and drawbacks of each of the alternatives which are summarized in the conclusion. This process follows the study flow chart shown below in **Figure 1**.

Figure 1: Project Process Flow Chart



2 EXISTING STATION CONDITIONS

2.1 PHYSICAL STATION CONDITIONS

The existing Braddock Road Metrorail station, which opened in 1983, is mostly carried on embankment retained with reinforced concrete retaining walls. Above the station mezzanine, the tracks and platform are carried on large prestressed concrete girders. The platform is partially covered with a steel canopy. The mezzanine is mostly open on the east face, protected by a wayfinding barrier to direct users into the faregate area. The west wall of the mezzanine is a retaining wall that supports the CSXT track area along the west face of the station. CSXT plans to expand this track area in the future. An aerial image of the station is presented in **Figure 2**.

Figure 2: Braddock Road Metrorail Station Site



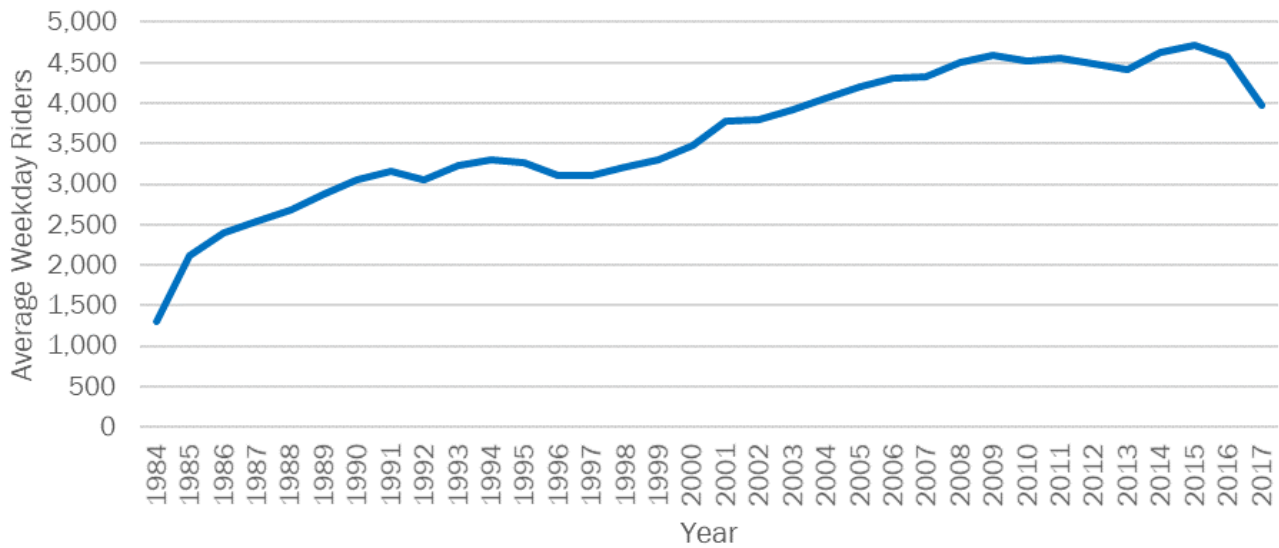
The station mezzanine features five faregates (four standard and one ADA-accessible) and one emergency gate. There are also four fare machines installed along the west mezzanine wall.

Outside the entrance of the station, along the east side of the facility, a parking lot, bus drop-offs, and bus turnaround lanes tie into Braddock Road and North West Street (a north-south access road for buses and site access). Five bus shelters are located along the sidewalk at the bus drop-off areas.

2.2 STATION RIDERSHIP

Figure 3 presents the average weekday ridership at the station from 1984 until 2017. The station had its highest average weekday ridership of about 4,700 riders per day in 2015. Average weekday ridership in 2017 declined to 3,969 riders per day. Despite the decline, the 2017 ridership is three times as much as the ridership during first full year that the station was open in 1984.

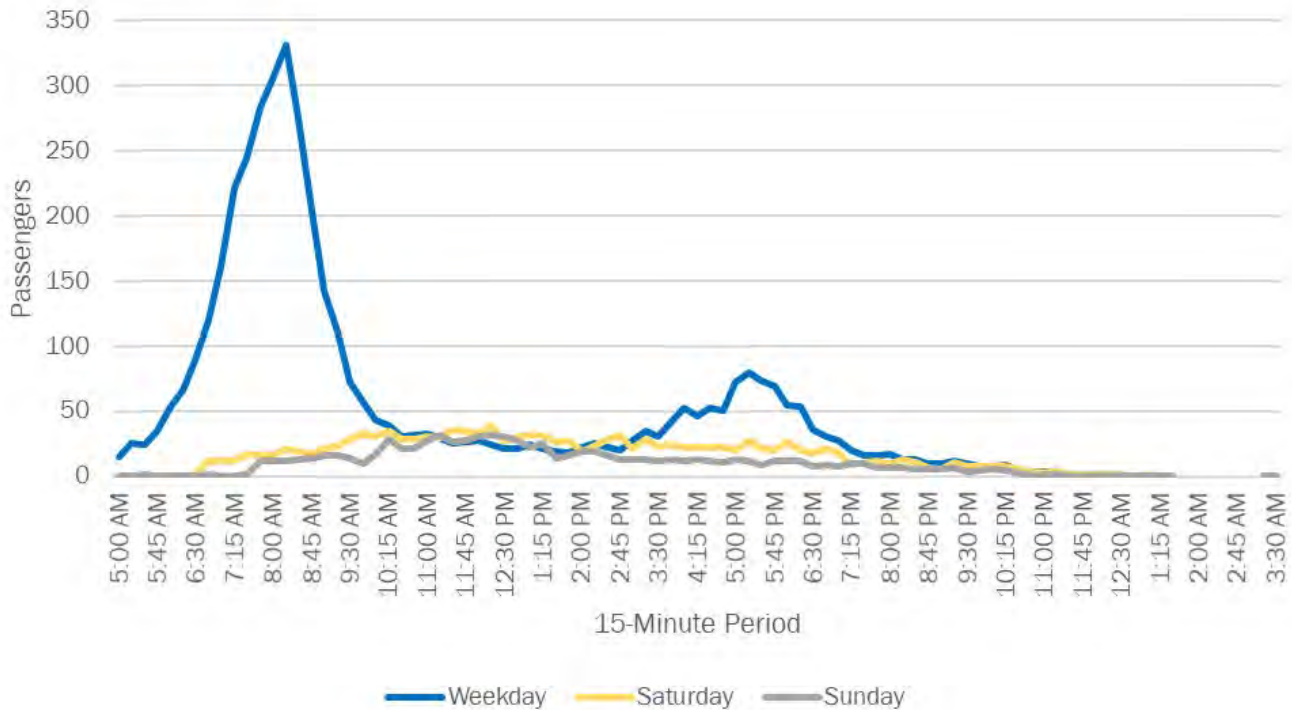
Figure 3: Braddock Road Metrorail Station Historical Ridership



Source: WMATA, 2017 Historical Metrorail Ridership

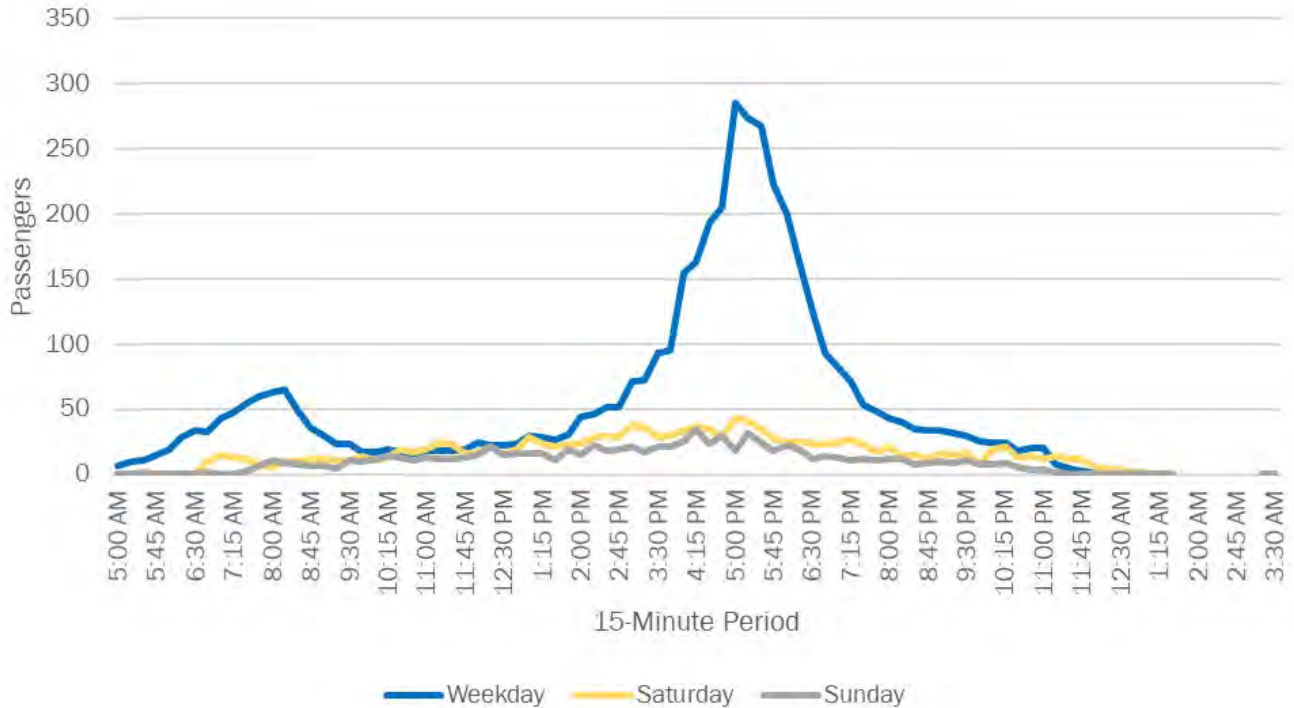
Figure 4 and Figure 5 present the average daily entries and exits for the station during May 2018. Weekday station entries reaches its peak between 8:00-8:45 AM, which coincides with the morning rush hour. Similarly, weekday station exits reaches its peak between 5:00-5:45 PM, which coincides with the PM rush hour.

Figure 4: Station Average Daily Entries (May 2018)



Source: WMATA, May 2018 Faregate Data

Figure 5: Station Average Daily Exits (May 2018)

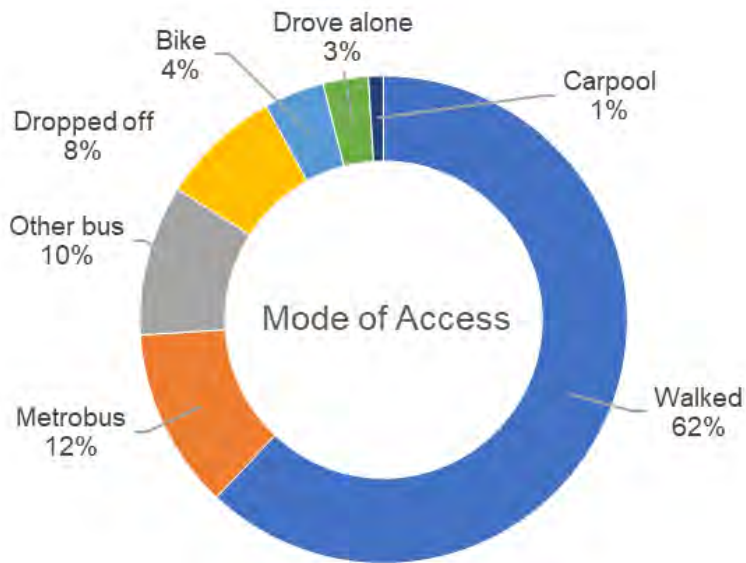


Source: WMATA, May 2018 Faregate Data

2.3 STATION ACCESS

Figure 6 presents a summary of the various modes that passengers use to access the station. The majority of passengers (62%) walk to the station.. 22 percent of passengers take Metrobus or another bus and transfer at the station. Only three (3) percent of passengers drive alone to the metro station. For a discussion of projected pedestrian station access trends under current and proposed conditions, see **Chapter 4**

Figure 6: Station Mode of Access

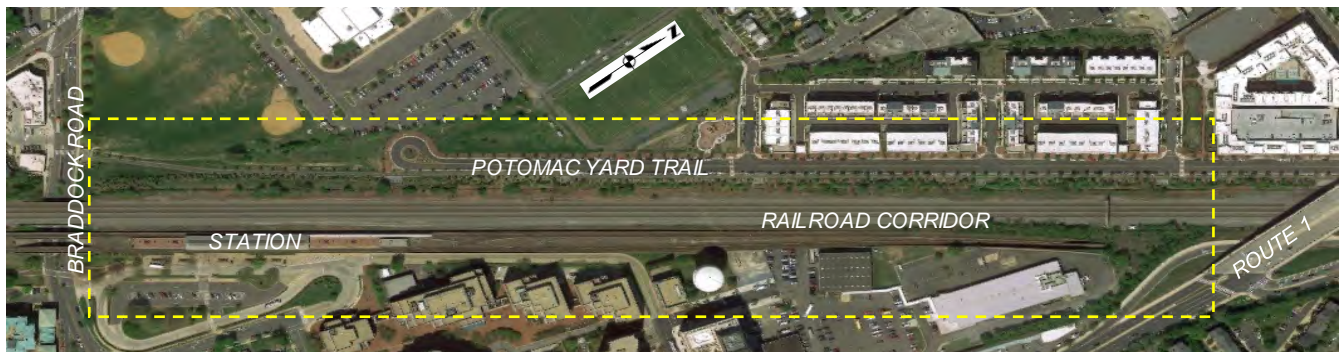


Source: WMATA 2016 Rail Mode of Access Study

2.4 SURROUNDING BUILT ENVIRONMENT AND PLANNED PROJECTS

The approximate geographic limits of the project site are bordered by East Braddock Road to the south and Route 1 to the north, as shown in **Figure 7**. The Potomac Yard Trail runs along the west side of the project site. North West Street and the station parking lot border the site to the east.

Figure 7: Overall Project Site Limits



Current pedestrian access is limited on the east side of the station. Pedestrians accessing the station from points west must either walk south to the Braddock Road underpass of the Metrorail line and CSX railroad or north to the Route 1 overpass of the railroad to access sidewalks to the station. North of the station, the sidewalk is not ADA-compliant and measures roughly 5 feet and 2 inches wide. Given its proximity to the Metrorail corridor retaining wall, the sidewalk offers an uncomfortable pedestrian environment to those accessing the Metrorail station.

The station offers ample bicycle parking in front of the east side station entrance.

CSXT owns, operates, and maintains three tracks in the north-south direction parallel to the Potomac Yard Trail, with a right-of-way between the trail and the station structure. The CSXT tracks are on

embankment relative to the trail. Amtrak and Virginia Railway Express (VRE) also operate on these tracks.

Parallel to the CSXT corridor, the Metro Blue and Yellow lines operate on two tracks, passing through station. The tracks are elevated on embankment and are carried through the station above the mezzanine, which is located at street level (see **Figure 2**).

2.5 DESIGN CRITERIA

The design of a pedestrian crossing at the station is subject to various design criteria, depending on the structure type and the railroad owners and operators. The primary resource documents used to identify criteria for engineering evaluation include:

- WMATA Manual of Design Criteria;
- WMATA Adjacent Construction Project Manual;
- CSXT Public Project Information Manual;
- CSXT Design and Construction Standard Specifications for Pipeline Occupancies; and
- Virginia and City of Alexandria building codes.

While Amtrak operates on the railroad corridor, CSXT criteria govern as they own the railroad right-of-way.

For different engineering disciplines, additional criteria and codes are required for engineering design. Several of these codes are listed in **Chapter 5 (Engineering Feasibility Assessment)**.

2.6 SITE CONSTRAINTS

Overall geometry of the tunnel and bridge alternatives are dictated primarily by railroad right-of-way, in addition to clearance requirements. These requirements are described in the respective CSXT and WMATA Design Criteria documents.

2.6.1 RIGHT-OF-WAY CLEARANCES

In accordance with the *CSXT Public Project Information Manual*¹, several criteria must be met for pedestrian crossings over CSXT right-of-way:

- Pedestrian overhead bridges shall span the entire width of CSXT's right-of-way. Intermediate piers or other supports will not be permitted.
- Pedestrian overhead bridges shall be completely enclosed with protective canopy or by other means to prevent users from dropping debris onto CSXT's right-of-way.

2.6.2 VERTICAL AND HORIZONTAL CLEARANCES

For under-grade tunnel crossings, available CSXT specifications and design criteria are silent on clearance requirements. As such, the *CSX Design and Construction Standard Specifications for Pipeline Occupancies* seems most appropriate for conceptual clearance criteria of under-grade tunnels.

¹ Overhead Bridge Criteria. July 2017. *CSX Public Project Information Manual*, pp. 77.

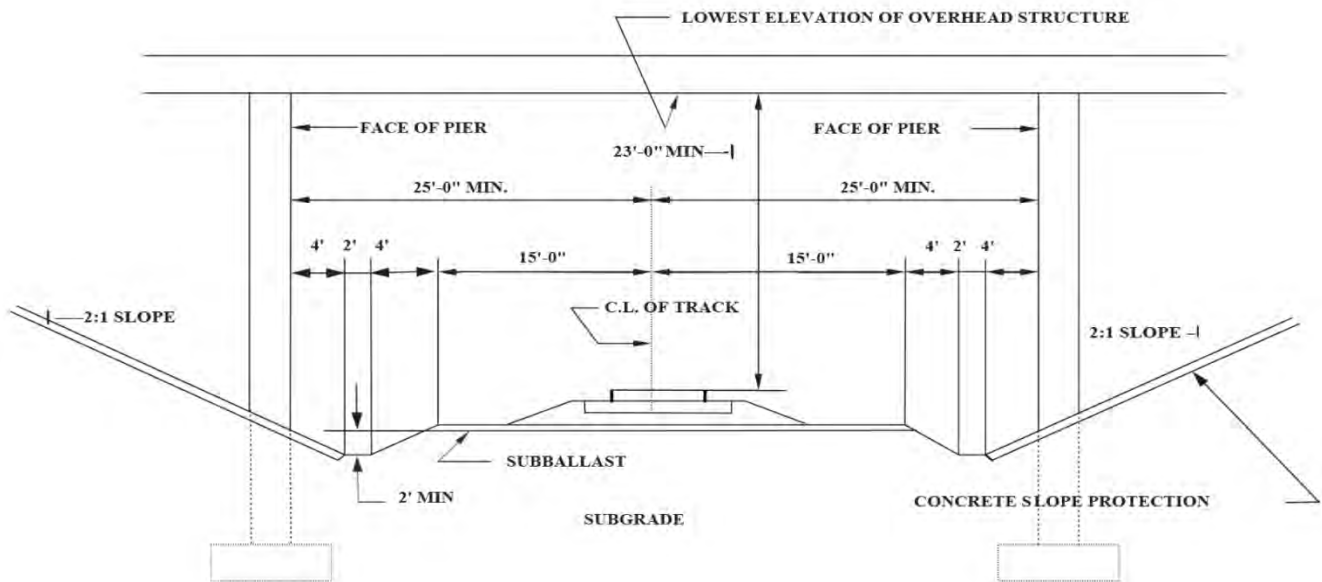
Pending discussion with CSXT, it may be reasonable to consider a circular tunnel as being like a pipe casing. Resultant review of this CSXT criteria² concludes the following basic assumptions:

- The structure is preferred to cross the right-of-way at approximate right angles to the tracks.
- Installation of the structure should not be designed as an open cut installation within the track area.
- The top of the proposed structure shall not be less than 5 feet and 6 inches from the base of the rail at its closest point. Outside of the track area, the top of the structure shall not be less than 3 feet and 0 inches from grade.

The *CSXT Public Project Information Manual* describes the following clearance requirements for overhead bridges (refer to **Figure 8**):

- **Horizontal Clearance:** The horizontal clearance, measured from centerline of track to the face of the pier or abutment shall typically be 25 feet or greater, but never less than 18 feet, measured perpendicular to the track. Accommodations for future tracks must also be accounted for in placement of the proposed structures. The toe of footings shall not be closer than 11 feet from centerline of track to accommodate sheeting installation.
- **Vertical Clearance:** A minimum vertical clearance of 23 feet shall be provided, measured from top of high rail to the lowest point of the structure.

Figure 8: CSXT Clearance Requirements for Overhead Structures



Source: *CXS Public Project Information Manual*

The *WMATA Manual of Design Criteria* also provides clearance information that is used for establishing geometry of the proposed structures:

- **Horizontal Clearance:** A minimum horizontal of 7 feet and 11 inches shall be provided, measured from centerline of track to the nearest horizontal obstruction³.

² Pipeline Occupancies. June 2015. *CSX Design and Construction Standard Specifications*, Sections 2.2-2.3.

³ Surface Track Section Design Tables. Adapted from *WMATA Manual of Design Criteria (Release 9, Revision 3)*, p. 11-94, Figure 11.56.

- Vertical Clearance: A minimum vertical clearance of 13 feet shall be provided, measured from top of high rail to the lowest point of the structure⁴.

The resultant governing clearances are dictated by both the CSXT and WMATA criteria, depending on which track the structure is crossing. In other words, a bridge structure must meet CSXT’s minimum clearance guidelines over CSXT’s tracks and WMATA’s minimum clearance guidelines over the Metrorail corridor. In addition, wherever feasible, the structure is expected to remain outside of the CSXT right-of-way.

2.6.3 EXISTING AND FUTURE TRACK CONFIGURATIONS

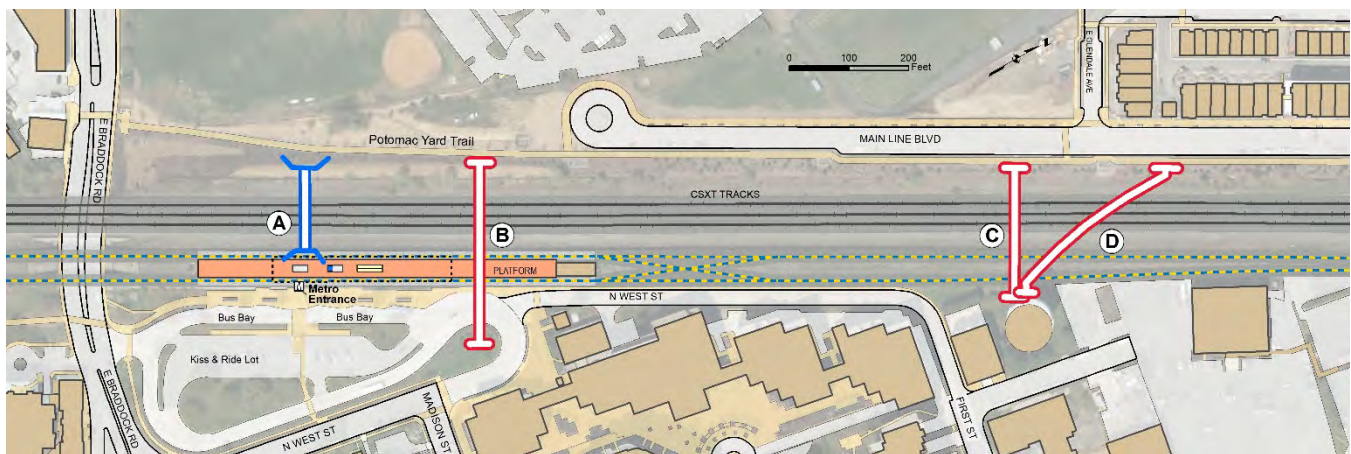
In the existing track configuration, CSXT operates on three tracks within its right-of-way. Additionally, Metrorail operates on two elevated tracks through the station area. A separate project, *Washington, D.C. to Richmond Southeast High Speed Rail (DC2RVA)*, envisions the addition of a fourth or fifth track within the CSXT right-of-way⁵. Any proposed pedestrian crossing alignment must accommodate this possible future condition.

3 INITIAL CONCEPTS

In order to provide a pedestrian crossing that meets the required criteria while balancing the project needs, several potentially feasible alignments were selected for consideration. The following preliminary alignments A, B, C, and D were considered at the planning level; three (A, C, and D) were advanced to engineering analysis. Alternatives C and D were renamed C1 and C2 because of their similarity.

The four planning-level concepts that were initially screened are shown in **Figure 9**.

Figure 9: Planning-level Alternatives Considered



3.1 CONCEPT A (STATION TUNNEL)

Concept A contemplates a station tunnel roughly perpendicular to the railroad tracks and extending from the Potomac Yard Trail directly into the station mezzanine. This concept would feature ramps

⁴ Surface Track Section Design Tables. Adapted from *WMATA Manual of Design Criteria (Release 9, Revision 3)*, p. 11-92 Figure 11.54.

⁵ U.S. Department of Transportation, Federal Railroad Administration, and Virginia Department of Rail and Public Transportation. 2017. *Tier II Draft Environmental Impact Statement*.

within the station mezzanine area and on the west side breakthrough, with a sloping tunnel to comply with ADA regulations.

3.2 CONCEPT B (CENTRAL BRIDGE)

Concept B contemplates a two-span bridge crossing over the CSXT tracks and the station platforms, landing in the station parking lot. A support pier would be located along the west wall of the station, and an elevator tower would be located at the east terminus. The central bridge would offer elevators and stairs on the east side, and the option of either ramps and stairs or elevators and stairs on the west side.

3.3 CONCEPT C (NORTH BRIDGE)

Concept C contemplates a single span bridge across the CSXT and WMATA tracks, at a location north of the existing station and landing on the west side near the intersection of East Glendale Avenue and Main Line Boulevard. The north bridge would offer ramps and stairs on both terminal sides.

3.4 CONCEPT D (SIGNATURE BRIDGE)

Concept D contemplates a single or multispan bridge across the CSXT and WMATA tracks, at a location similar to Concept C’s North Bridge. This alignment would allow for a signature span and could be skewed relative to the track alignments rather than perpendicular (but would not necessarily need to be skewed). Like the north bridge (Concept C), the signature bridge would offer ramps and stairs on both terminal sides.

4 ORDER-OF -MAGNITUDE DEMAND ASSESSMENT

4.1 EXISTING WALKSHED ANALYSIS

The walkshed for the station in its current configuration is illustrated in **Figure 10**. Calculations were based on an average walking speed of 3 feet per second, and correspond to the distances outlined in **Table 1**. Access to the station from the northwest is difficult, as people must walk to either Braddock Road or Route 1 to cross the Amtrak/Metrorail corridor. In terms of walking time, a development on the east side that is the same straight-line distance from the station entrance is generally five minutes closer than on the west side.

Table 1: Walkshed Analysis Distances

| Feet/Second | Minutes | Feet Traveled | Miles Traveled |
|-------------|---------|---------------|----------------|
| 3 | 5 | 900 | 0.17 |
| 3 | 10 | 1,800 | 0.34 |
| 3 | 15 | 2,700 | 0.51 |
| 3 | 20 | 3,600 | 0.68 |

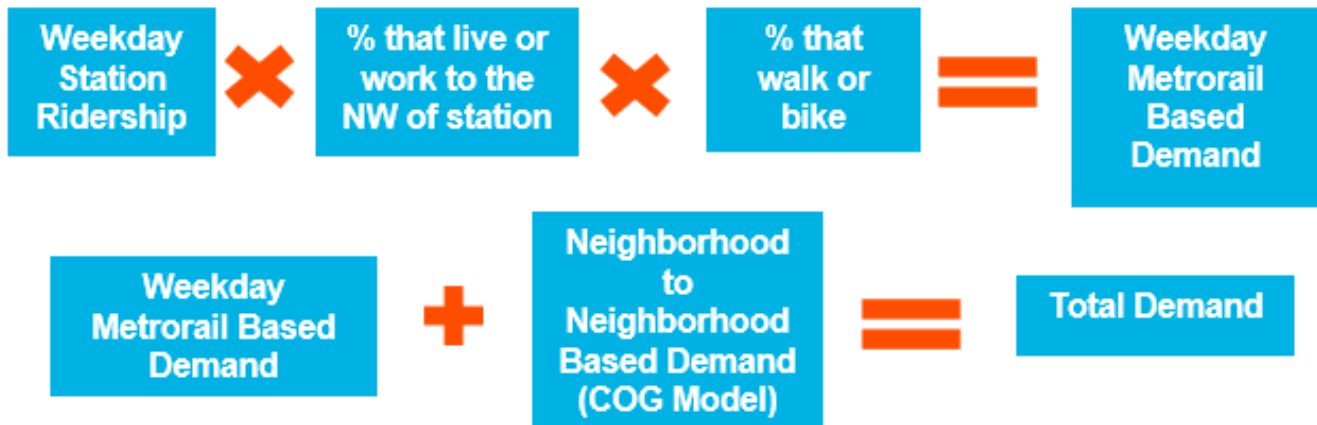
4.2 METHODOLOGY

The order-of-magnitude average daily demand estimate approximated the number of people who would likely use a pedestrian bridge or tunnel at the station under each alternative. The estimate was based on two forms of demand:

- Demand from Metrorail riders who live northwest of the station on the opposite side of the CSXT/Metrorail corridor; and,
- Demand from people making local trips from one side of the CSXT/Metrorail corridor to the other.

The Metrorail rider demand was based on a 20-minute walkshed. Access to transit is typically measured at the 15-minute level (which equates to approximately ½ mile walking distance). A 20-minute walkshed was used because Metrorail is a high capacity grade-separated service and therefore draws from larger areas than other types of transit. This 20-minute walkshed excluded the ADA ramping present in some concepts. To estimate the weekday Metrorail demand, the average weekday station ridership was multiplied by the percentage of people who live and work to the northwest of the station within a 20-minute walk of the station. This figure was then multiplied by the percentage of people who reported walking or biking to the station. The demand from people making local trips (that is, trips constrained to the analysis area where the Metrorail station was neither the origin nor the destination) was based on the 2019 MWCOG model trip flows between Traffic Analysis Zones (TAZs). The results of each analysis was then added together to estimate total demand. A summary of the methodology is illustrated in **Figure 11**. A detailed description of the methodology is included in the **Appendix D**.

Figure 11: Order of Magnitude Demand Estimate Methodology



4.3 DEMAND ESTIMATES

Demand estimates were developed for **Alternatives A, B, C, and D** (see **Section 3.1**). **Table 2** and **Figure 12** summarize the weekly demand estimated for each alternative. There are no significant differences in demand between the alternatives, although Alternatives A and B yield the highest demand. The horizon year of 2045 was selected to match the current horizon year of the MWCOG model.

Table 2: Demand Estimates

| | Data Source | Alternative | No-Build | A | B | C | D |
|------------------|------------------------------------|-------------------------|----------|--------------|--------------|--------------|--------------|
| Base Year | 20-Minute Walk Buffer | Total Population | 15,830 | 16,140 | 16,071 | 16,068 | 16,084 |
| | | Population to NW | - | 3,496 | 3,484 | 3,232 | 3,252 |
| | | Total Jobs | 18,844 | 19,051 | 19,063 | 19,060 | 19,057 |
| | | Jobs to NW | - | 602 | 601 | 583 | 600 |
| | | % Population/Jobs to NW | - | 11.64% | 11.63% | 10.86% | 10.96% |
| | May 2018 Metrorail Faregate Data | Weekday Entries | 4,359 | 4,359 | 4,359 | 4,359 | 4,359 |
| | | Weekday Exits | 4,522 | 4,522 | 4,522 | 4,522 | 4,522 |
| | Metrorail Mode of Access Survey | Walk Access (All Day) | 62.1% | 62.1% | 62.1% | 62.1% | 62.1% |
| | | Bike Access (All Day) | 3.2% | 3.2% | 3.2% | 3.2% | 3.2% |
| | Weekday Walk Total | | 5,519 | 5,519 | 5,519 | 5,519 | 5,519 |
| | Weekday Bike Total | | 288 | 288 | 288 | 288 | 288 |
| | Demand for Alternative from Riders | | - | 676 | 675 | 631 | 637 |
| | MWCOG Model (9.1) | Neighborhood Demand | - | 608 | 608 | 608 | 608 |
| | Total Demand | | - | 1,284 | 1,283 | 1,239 | 1,245 |
| 2045 | 20-Minute Walk Buffer | Total Population | 19,037 | 19,430 | 19,361 | 19,355 | 19,392 |
| | | Population to NW | - | 3,521 | 3,509 | 3,260 | 3,301 |
| | | Total Jobs | 20,375 | 20,732 | 20,742 | 20,733 | 20,766 |
| | | Jobs to NW | - | 780 | 780 | 757 | 809 |
| | | % Population/Jobs to NW | - | 10.71% | 10.69% | 10.02% | 10.23% |
| | May 2018 Metrorail Faregate Data | Weekday Entries | 6,015 | 6,015 | 6,015 | 6,015 | 6,015 |
| | | Weekday Exits | 6,240 | 6,240 | 6,240 | 6,240 | 6,240 |
| | Metrorail Mode of Access Survey | Walk Access | 62.1% | 62.1% | 62.1% | 62.1% | 62.1% |
| | | Bike Access | 3.2% | 3.2% | 3.2% | 3.2% | 3.2% |
| | Weekday Walk Total | | 7,617 | 7,617 | 7,617 | 7,617 | 7,617 |
| | Weekday Bike Total | | 398 | 398 | 398 | 398 | 398 |
| | Demand for Alternative from Riders | | - | 858 | 857 | 803 | 820 |
| | MWCOG Model (9.1) | Neighborhood Demand | - | 946 | 946 | 946 | 946 |
| | Total Demand | | - | 1,804 | 1,803 | 1,749 | 1,766 |

Figure 12: Order-of-Magnitude Demand Estimates by Alternative



4.4 ACCESS ESTIMATES

Overall access to the station under each alternative in terms of population and employment within a 20-minute walk is summarized in **Table 3**. All the alternatives show an increase in population and employment within a 20-minute walk over existing conditions (see **Figure 13**). Alternative A shows the highest increase in population in the base year (2020) and in 2045. Alternative B shows the highest increase in jobs in the base year, while Alternative D shows the highest increase in jobs in 2045. However, the overall difference between the alternatives is not significant.

Table 3: Population and Employment with a 20-Minute Walk Alternative

| | Alternative | Existing | A | B | C | D |
|---|-------------|----------|--------|--------|--------|--------|
| Base Year | Population | 15,830 | 16,140 | 16,071 | 16,068 | 16,084 |
| | Jobs | 18,844 | 19,051 | 19,063 | 19,060 | 19,057 |
| 2045 | Population | 19,037 | 19,430 | 19,361 | 19,355 | 19,392 |
| | Jobs | 20,375 | 20,732 | 20,742 | 20,733 | 20,766 |
| Base Year Increase Over Existing | Population | - | 311 | 242 | 239 | 254 |
| | Jobs | - | 208 | 220 | 216 | 213 |
| 2045 Increase Over Existing | Population | - | 393 | 324 | 318 | 355 |
| | Jobs | - | 357 | 366 | 358 | 390 |

Figure 13: Increase in Population and Jobs within a 20-minute Walk of the Station by Alternative



Figure 14 through Figure 17 illustrate the approximate location of each alternative and the resulting walkshed for the each. The most significant differences in the 20-minute walkshed for each alternative can be found to the north of the station west of the Metrorail tracks (see Figure 18):

- All the alternatives show an increase in access in this area; under existing conditions the 20-minute walkshed only extends to Nelson Avenue and Monroe Avenue, while it extends to Mason Avenue under the four build alternatives.
- Alternative D shows the largest increase in access in this area, with the 20-minute walkshed extending farther north along Route 1 than the other three alternatives.

Outside of this area there are few differences in access. The exceptions are the Braddock Road corridor west of the station, and the Maple Street, Linden Street, and Rosemont Avenue area southwest of the station (see Figure 19). The Alternative A 20-minute walkshed extends slightly further west than the other alternatives in these areas.

Figure 14: Alternative A Walkshed

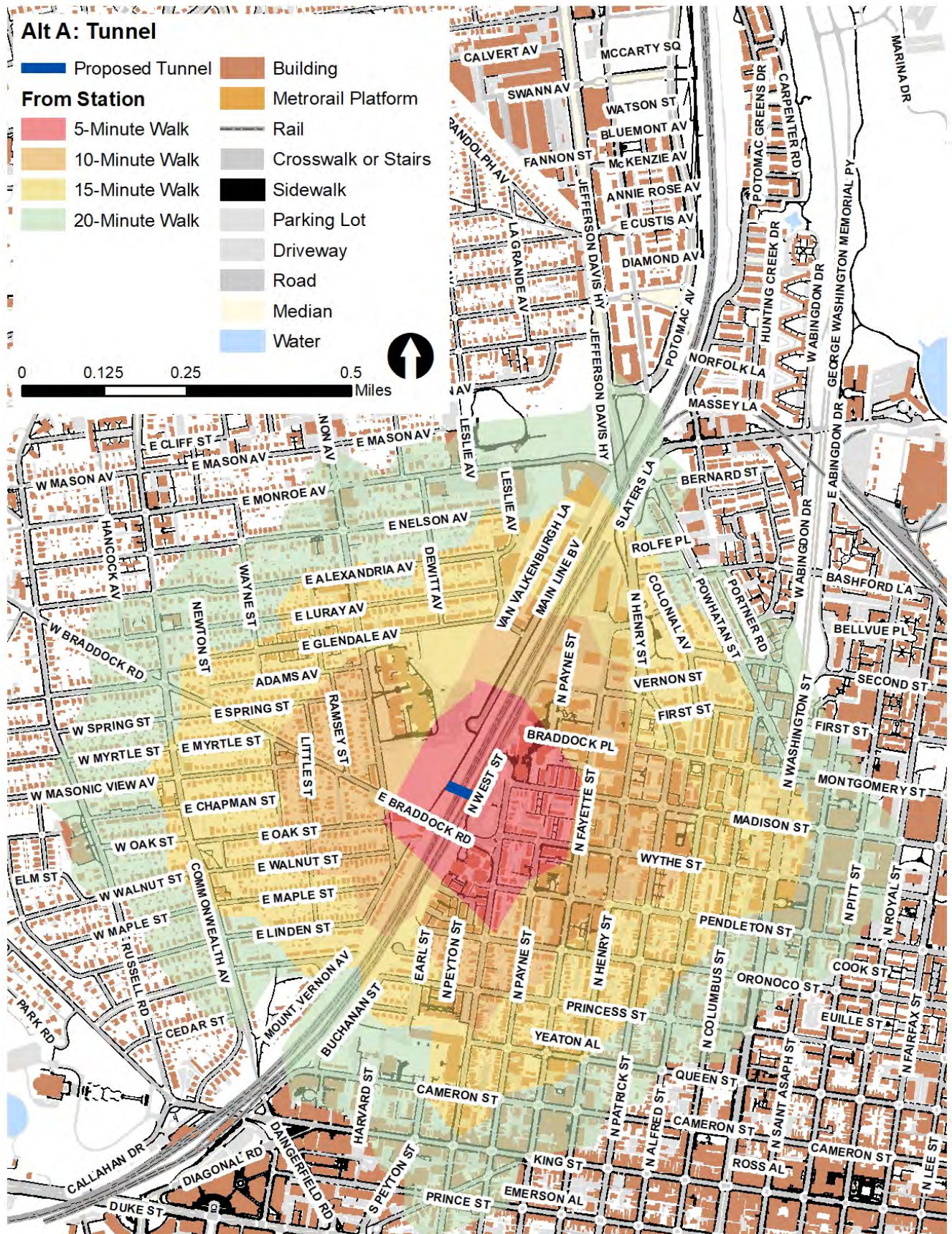


Figure 15: Alternative B Walkshed

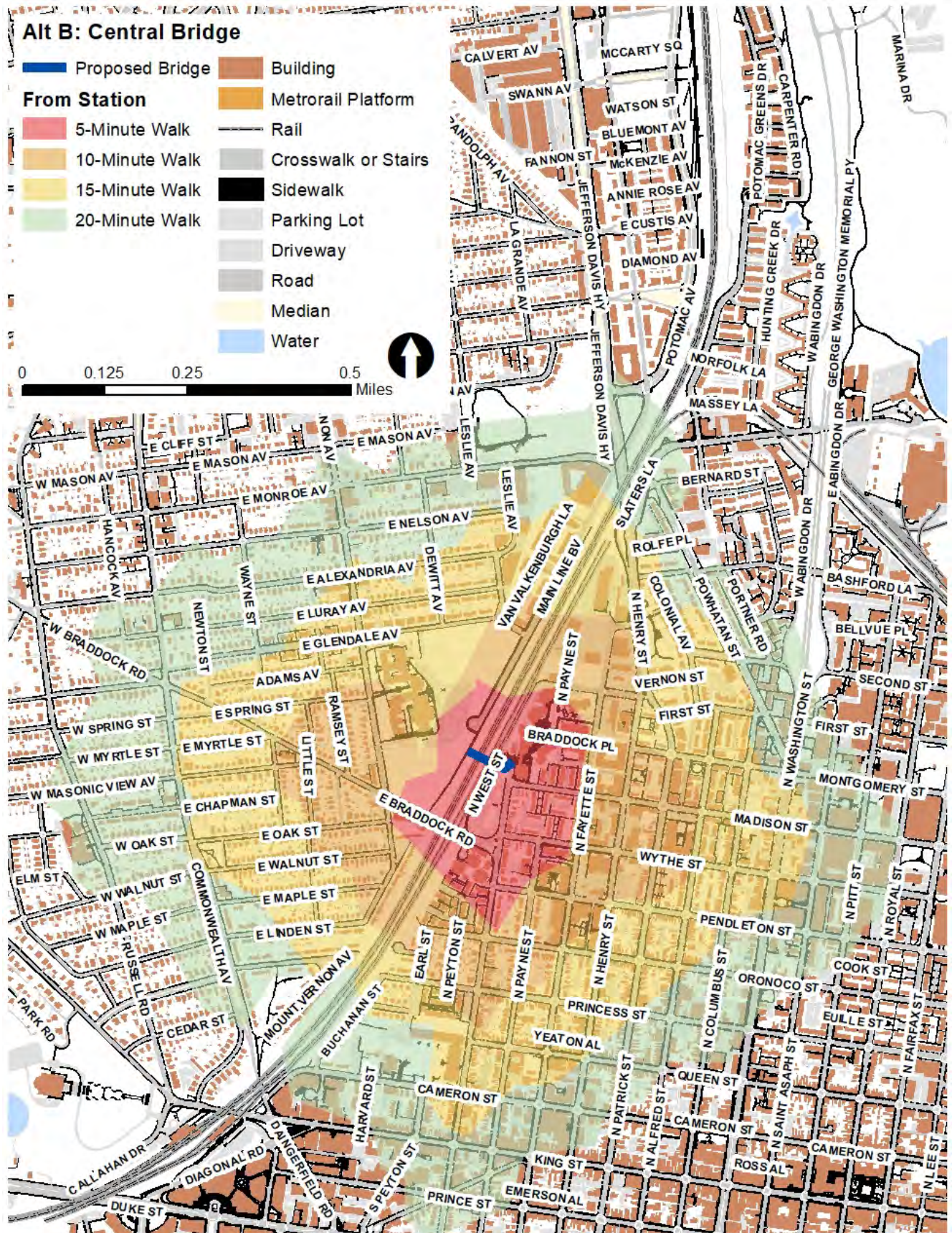


Figure 16: Alternative C Walkshed

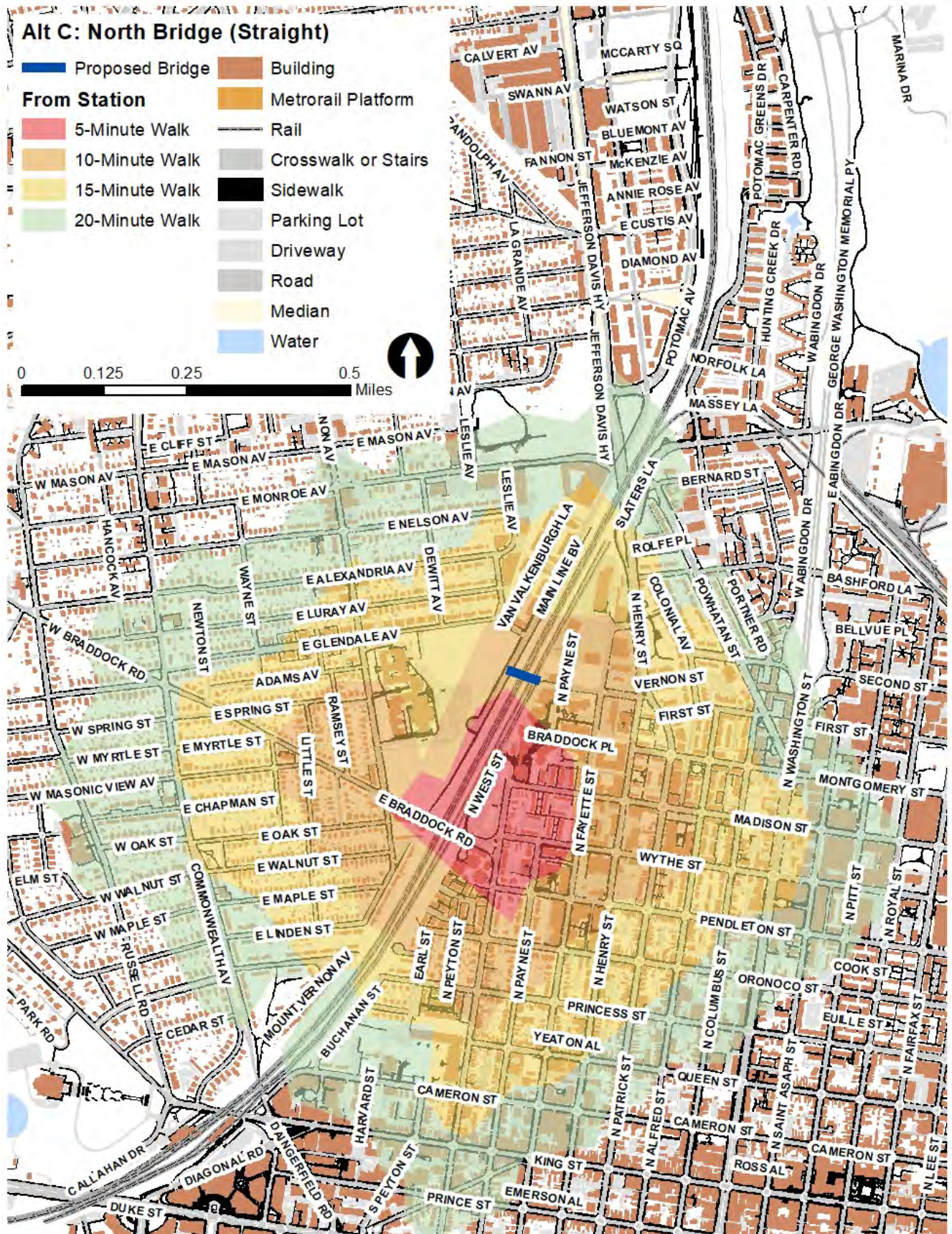


Figure 17: Alternative D Walkshed

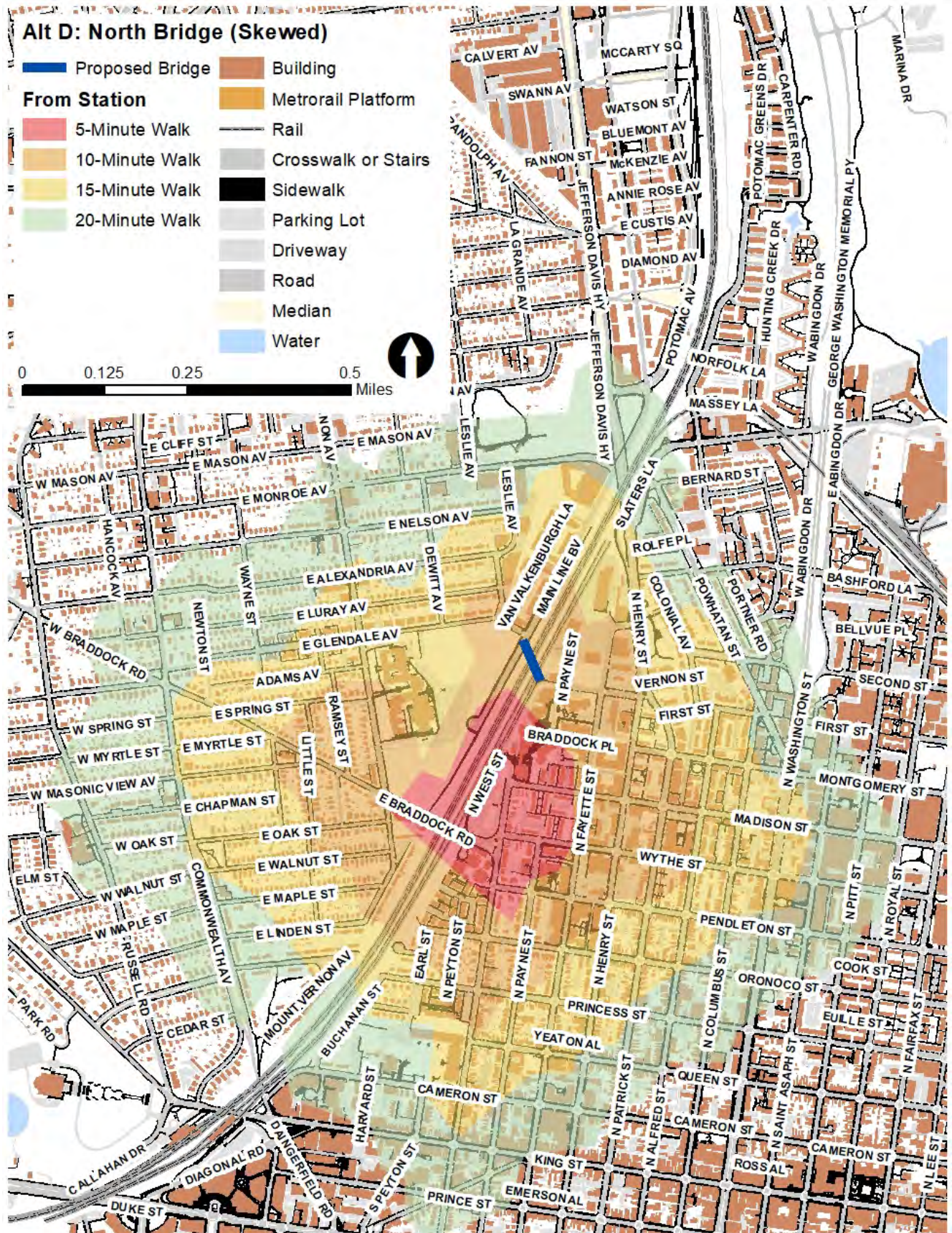


Figure 18: 20-Minute Walkshed Comparison by Alternative (North of Station)

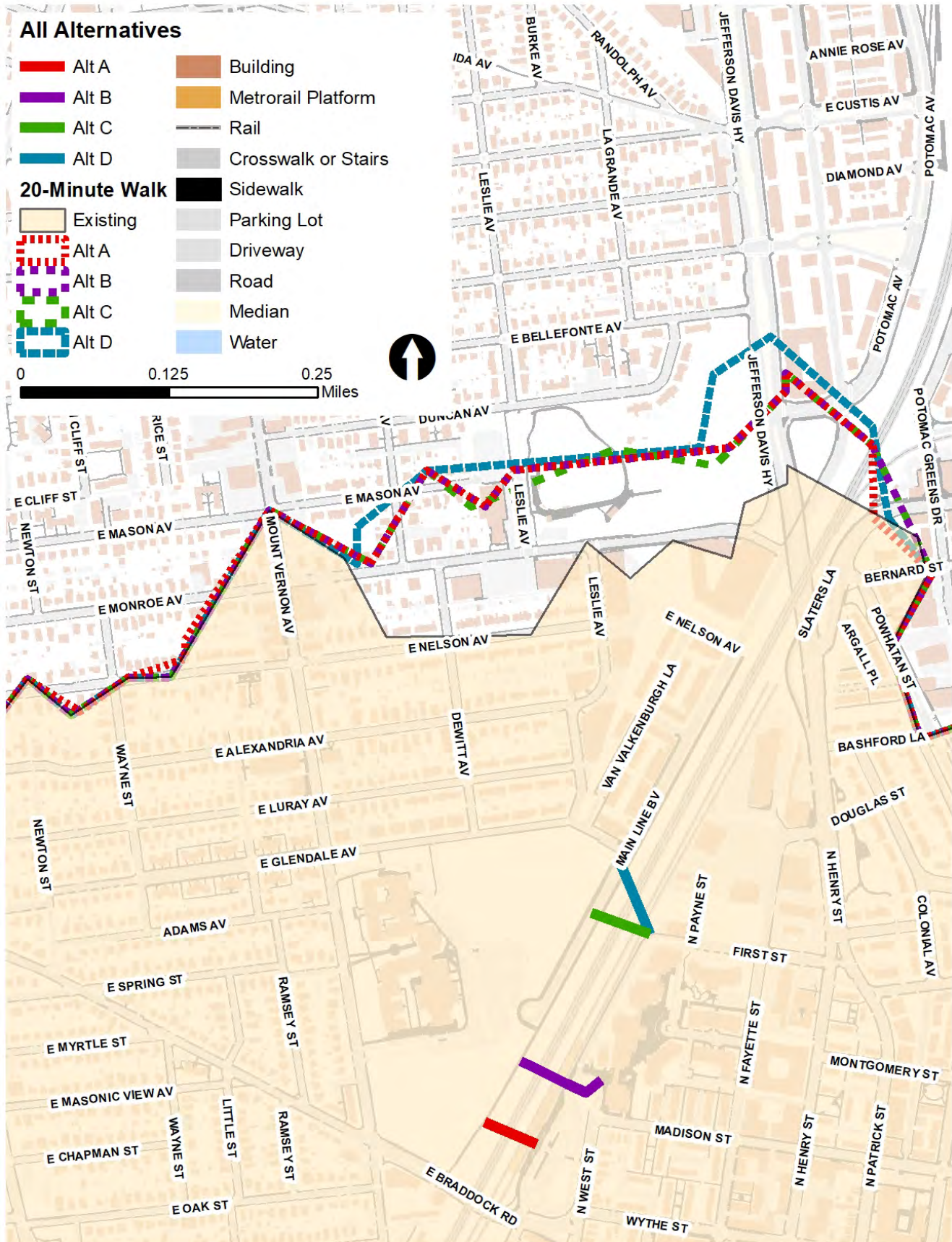
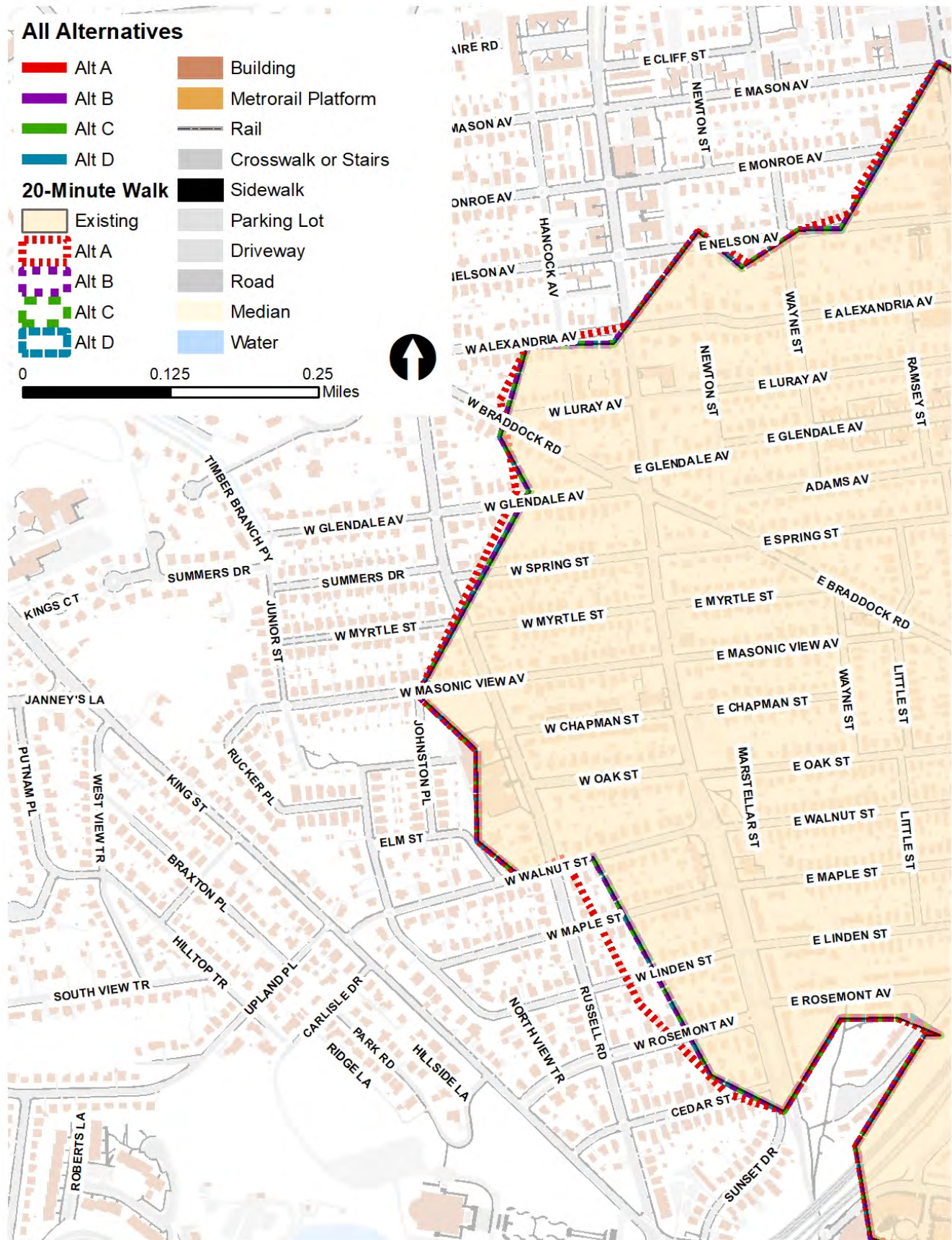


Figure 19: 20-Minute Walkshed Comparison by Alternative (West of Station)



4.5 DISCUSSION

All four of the alternatives would improve access to the station from the Del Ray and South Potomac Yard neighborhoods of Alexandria.

- The four alternatives developed would increase the number of residents within a 20-minute walk of the station by an average of 261 and the number of jobs by an average of 214 in 2020.
- Of the four alternatives, Alternatives A and D increase overall access the most in terms of population and jobs within a 20-minute walk of the station. Alternative C offers the smallest improvement.
- Alternative A has the highest demand in 2020 and 2045, however the differences between the alternatives are insignificant; all are within 4 percent of Alternative A.

5 ALTERNATIVE SCREENING AND FEASIBILITY ASSESSMENT

5.1 SCREENING OF INITIAL CONCEPTS

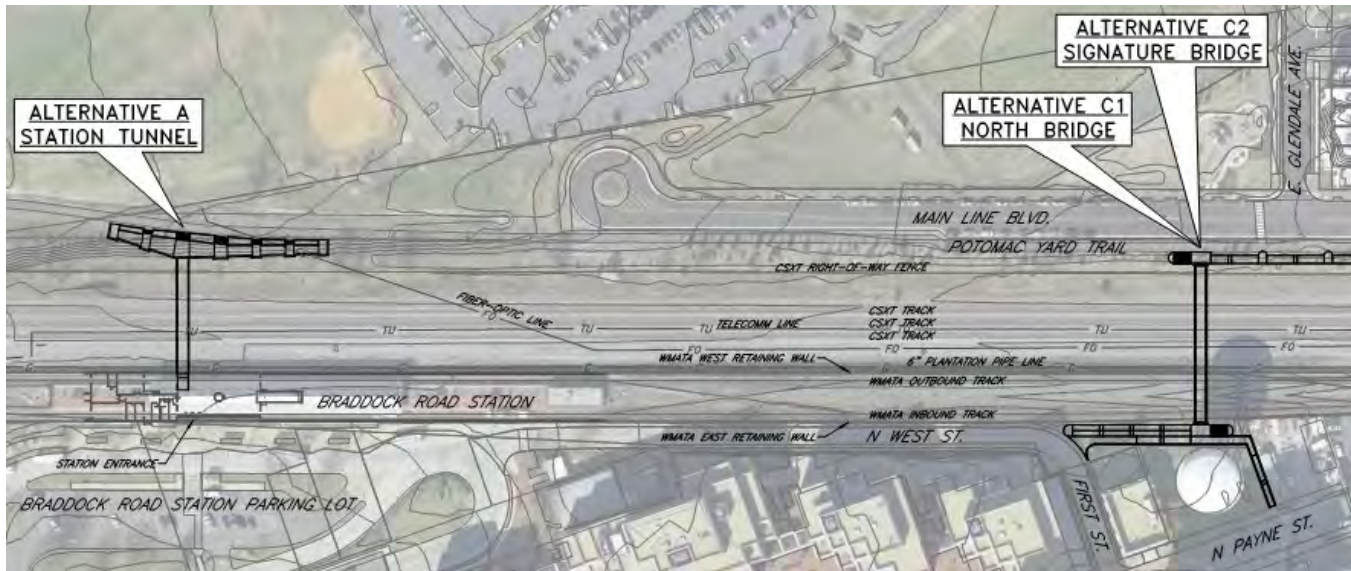
In addition to the four initial concepts described above, several other preliminary alignment possibilities were assessed and immediately dismissed due to various infeasibilities related to site constraints, impacts to railroad operations, and significant adverse effects on surrounding structures. Additionally, several variations of each alignment were considered.

After refined consideration and input from WMATA and City representatives, three specific alternatives were selected for further evaluation, as seen in **Figure 20**. This screening process resulted in two principal changes to the concepts under consideration:

- Concept B (Central Bridge) was considered infeasible because it would require an elevated structure above WMATA's station platform.
- Concepts C and D (North Bridge and Signature Bridge) were renamed C1 and C2, respectively, because of the similarities in their basic design considerations.

For each of the design alternatives, ADA-compliant ramp systems are proposed for access at the east and west entrances. Additional access is provided with staircases where possible. While elevators may be feasible for the bridge alternatives, this study assumed only stair and ramp structures will be provided to access the bridges. As such, no discussion of engineering considerations has been made regarding the use of elevators for structural access.

Figure 20: General Location Plan of Selected Alternatives



5.1.1 ALTERNATIVE C1 (NORTH BRIDGE)

Alternative C1 contemplates a single 190 foot span, prefabricated truss bridge spanning perpendicular across the CSXT tracks and the WMATA Metro. Ramp and stair structures would bring the alignment from grade to the bridge level at the east and west ends of the crossing. On site, the west ramps would land along Main Line Boulevard and the east ramps would terminate around North West Street and First Street. An additional landing on the east side would provide connections to North Payne Street.

5.1.2 ALTERNATIVE C2 (SIGNATURE BRIDGE)

Alternative C2 contemplates a signature span bridge (one or two spans) along a similar alignment as Alternative C1 (North Bridge). Rather than a prefabricated truss, this structure type would be more complex, with the ultimate choice of structure type being determined during preliminary and final engineering. Feasible structure types may include an arch truss, tied arch, or cable-stayed bridge. In addition, the structure alignment may vary away from being perpendicular to the tracks.

5.2 STRUCTURAL

Each of the pedestrian crossing alternatives requires assessment of structural considerations. The tunnel alternative must be designed to support earth loads and train live loads. The bridge alternatives would support pedestrian loading as well as wind and other loads. Depending on the structure type, various codes and owner-specific criteria dictate the structural design.

Structural design of the tunnel alternative is primarily governed by the *American Railway Engineering and Maintenance-of-Way Association* (AREMA) Manual for Railway Engineering. For the overhead bridge alternatives, several other codes and criteria are appropriate for structural design, including the following:

- Virginia Uniform Statewide Building Code (USBC), as supplemented by the International Building Code (IBC) and the American Society of Civil Engineers (ASCE).

- American Association for State Highway and Transportation Officials (AASHTO) LRFD Guide Specifications for the Design of Pedestrian Bridges.

For each of the structure types, WMATA, CSXT, and Amtrak design criteria will also need to be assessed during engineering design. Further assessment of structural implications for each of the alternatives are described in the following sections (see **Appendix A** for a summary of structural advantages and disadvantages for each alternative).

5.2.1 ALTERNATIVE A: STATION TUNNEL

Structural Description

For the Station Tunnel alternative, a circular structure is envisioned, measuring approximately 15 feet in outer diameter and providing a minimum clearance envelope of 8 feet tall by 10 feet wide for passengers. A reinforced concrete structure is anticipated for the tunnel, with an outer steel plate liner and tunnel membrane waterproofing. On the outside of the structure, cement grout would be pumped to form a solid bond between the tunnel and the surrounding earth. The floor system of the tunnel would be constructed of reinforced cast-in-place concrete.

Along the Potomac Yard Trail, ramp and stair structures are needed to bring the tunnel users back up to grade. The ramps run parallel to the CSXT right-of-way and the trail, beginning at an elevation below grade at the tunnel entrance, and sloping up to the trail level. To support the existing embankment and resist any train live load surcharge, retaining walls are required. Reinforced concrete cantilever-type walls are anticipated, although soldier pile walls may also be feasible if the walls are beyond the influence of loading from the train.

Design Loads

The tunnel requires sufficient strength to carry loading from three existing CSXT tracks plus one future track, in addition to earth fill and surcharge loads. Seismic loading and buoyancy should also be considered during engineering design, depending on site conditions and classifications.

Impacts to Existing Structures

The Station Tunnel concept has substantial structural impacts to the existing station mezzanine. The west wall of the station mezzanine currently supports the CSXT railroad embankment. This wall carries backfill earth pressure and live load surcharge⁶. In the proposed configuration, the east end of the tunnel penetrates through the west mezzanine wall. This requires structural modifications to the existing wall, including temporary support during construction and strengthening for final conditions.

Because the vertical reinforcement bars of the existing wall would be interrupted by the new opening, the wall may be unable to retain soil or live load surcharge. As such, it is likely that a wider portion of the existing wall would need to be removed and reconstructed with sufficient reinforcement to carry loads from the CSXT tracks and embankment backfill.

⁶ Note that the existing wall may not be designed to carry live load surcharge due to the potential future fourth CSXT track along the station. Evaluation should be made during engineering phases to ensure the walls are sufficient to carry the additional live load surcharge from an added track.

Future Maintenance

Buried structures typically have minimal long-term maintenance. If the structure is sufficiently waterproofed, the reinforced concrete should be protected from corrosion and should not require significant repairs or rehabilitation during its assumed 75-year service life.

5.2.2 ALTERNATIVE C1: NORTH BRIDGE

Structural Description

The North Bridge alternative envisions a one-span prefabricated steel truss spanning perpendicular to the tracks across the CSXT and WMATA corridor. The resultant span length is approximately 190 feet between supporting piers. The grade difference from the bridge floor level to the Potomac Yard Trail is approximately 22 feet” and is 25 feet to the east ramp entrances at N. West Street and N. Payne Street. To accommodate the grade differences, ramp systems and stair cases are proposed at both the east and west bridge entrances. On the east, approximately 420 feet of ramps are required. Approximately 335 feet of ramps are needed on the west entrance. Due to site constraints, the east ramp has several switchbacks, whereas the west ramp extends in the north direction only. The ramp lengths assume the maximum slope allowed by ADA standards and include landings throughout. There is flexibility to provide ramps with less slope, but this would make the ramps longer.

CSXT requires overhead pedestrian crossings to be enclosed to prevent users from dropping debris into the railroad right-of-way. As such, the bridge requires either glazing enclosures with a roof or a screen mesh and canopy. The bridge is anticipated to include a walkway width of 12 feet with a minimum vertical clearance inside the bridge of 10 feet.

For the main truss span across the tracks, either steel rolled sections (wide flange, angles, or channels) or steel tubes (HSS sections) are feasible. Commonly, prefabricated trusses are composed of steel tube members, welded together, and preassembled off site. The roof would be comprised of standing-seam roofing or other appropriate materials to be determined during engineering design. The floor within the bridge would be constructed using reinforced concrete, either precast or cast-in-place.

The ramp and stair structures are envisioned to be composed of reinforced cast-in-place or precast concrete, with the ramps spanning between circular concrete columns. However, other structure types are feasible, including steel girders or box members. Similarly, for the substructures, steel is also feasible. During engineering design, several structure types should be considered and evaluated in further detail.

Design Loads

Primary design loads to be considered during engineering of the bridge and ramps include structure dead loads, pedestrian live loads, wind loading, and seismic loading on the foundations. Snow loading on the roof and roof live load should also be considered. If glazing is used to enclose the bridge, stringent deflection criteria should be assessed and included to prevent cracking of the glass panels. This could increase member sizes and add to cost slightly.

Crash Wall Requirements

In accordance with AREMA and CSXT design criteria, bridge piers must be assessed for crashworthiness and may require additional crash walls to protect the bridge from derailed trains. During engineering design, the piers should be assessed for crashworthiness. If required, the piers can

be increased in size or a crash wall can be provided parallel to the tracks to protect the bridge substructures.

Future Maintenance

Future maintenance of the bridge is expected to be minimal during its assumed 75-year service life, depending on the structure materials selected during engineering design. To reduce future maintenance of the steel truss, the members can be galvanized and painted, allowing for long-term protection of the steel from corrosion. Additionally, the bridge should be designed to allow for simple access during routine, periodic bridge inspections.

5.2.3 ALTERNATIVE C2: SIGNATURE BRIDGE

Structural Description

The Signature Bridge alternative is somewhat similar to the North Bridge. The general location and vertical clearances are similar, as are the ramp systems. However, the bridge type is a signature span. Feasible bridge types may include any of the following: steel or concrete girder, enclosed truss, cable-stayed, or tied arch. These bridge types allow for more dramatic aesthetics of the structure and could represent an architectural landmark for the City. Because the structure type has not yet been determined, only a high-level assessment is provided.

Similar to Alternative C1, the bridge is enclosed in order to meet CSXT requirements. Glazing or mesh screening is necessary to enclose the bridge. At a minimum, the bridge walkway is approximately 12 feet wide with a vertical clearance in the bridge of 10 feet. Depending on the structure type chosen, these dimensions could vary.

The ramp systems are proposed to be essentially the same for the Signature Bridge alternative as for the North Bridge alternative. Grade differences, lengths, and general alignments would be the same. The only difference may be that the west ramp could be moved north or south depending on the whether the bridge span is perpendicular, skewed, or follows a different alignment across the tracks.

If a cable-stayed bridge is selected, then a tall pylon would be required to support the main cables. Placement of this pylon on site may be challenging, as the configuration may require the pylon to be located in the railroad right-of-way. This may be infeasible due to CSXT requirements, unless a design exception can be accommodated. For other structure types, it is expected that the bridge can span the entire railroad corridor and be supported on piers outside the CSXT right-of-way.

Design Loads

For bridge design, the basic loads are similar to Alternative C1 and include structure dead loads, pedestrian live loads, roof snow loads, roof live load, wind load, and seismic loads. Depending on the structure type, extra attention is required for vibration and deflections of various structural members.

Impacts to Existing Structures

Crash wall requirements for the Signature Bridge are equal to those of the North Bridge alternative. AREMA and CSXT design criteria should be evaluated during engineering design to determine the needs of the crash walls on the project.

Future Maintenance

Because of the complexity of the Signature Bridge structure alternative, it is expected that this bridge will require more future maintenance than Alternative C1 during its assumed 75-year service life. This is because the bridge has more components and accessibility may be more limited across the tracks. Also, because the bridge is more complex, future inspection requirements may be substantially more complicated than the North Bridge alternative.

5.3 MECHANICAL, ELECTRICAL, AND PLUMBING

In general, mechanical design considerations focus on ventilation and indoor space conditioning such as heating and cooling, plumbing, and fire protection. The primary code for fire protection design is the *National Fire Protection Association Standard for Fixed Guideway Transit and Passenger Rail Systems* (NFPA 130). For electrical design, the primary considerations are lighting, power for mechanical equipment, fire alarms systems, communications, and security equipment. The proposed design and construction approaches are discussed for each alternative below. Refer to **Appendix A** for a summary of mechanical, electrical, plumbing, and security considerations.

5.3.1 ALTERNATIVE A: STATION TUNNEL

Ventilation

The proposed tunnel length is 140 feet and is open to the environment at both ends. At the west, the tunnel entrance is completely open, and at the east entrance, the station is open to the surrounding environment along the entire east face of the mezzanine. In accordance with NFPA 130 design recommendations, a mechanical emergency ventilation system is not required for underground facilities less than 200 feet in length⁷. Therefore, natural ventilation through open ends of the proposed pedestrian tunnel provides sufficient required fresh air.

Heating and Cooling

Because the pedestrian tunnel is fully open to the environment, no heating or air conditioning systems are proposed inside the tunnel. No code provisions require space conditioning under the proposed circumstances.

Plumbing

The east end of the tunnel is proposed to open into the existing station mezzanine area, entering at approximately one foot below the existing floor slab. A short ramp inside the mezzanine brings the tunnel floor up to the station floor. The existing floor is sloped away from the station, toward the parking lot area. Accordingly, rainwater is unlikely to enter the tunnel from east end of the tunnel. At the west entrance, however, the tunnel is located below existing grade. There is a high possibility of driven rainwater entering the tunnel or having groundwater infiltration into the structure.

There are several opportunities to accommodate water that enters the tunnel structure. The pedestrian tunnel floor can be sloped from the east to the west at a maximum slope that does not exceed ADA guidelines. In this case, floor trenching with ADA-acceptable heel-proof trench covers along the length of the tunnel and across entryways would be required. From the trenches, a means of conveying the

⁷ Emergency Ventilation System. 2017. National Fire Protection Association NFPA 130: Standard for Fixed Guideway Transit and Passenger Rail Systems, Section 7.1.2.3(2).

infiltrated water to grade or to an underground storm water collection would be needed at the west entrance.

An alternative solution to accommodate water would be to provide an in-ground storm water lift station below the floor of the pedestrian tunnel. The lift station would include floor flush-fitting cover doors of adequate rating and a wall-mounted combined disconnect switch/control panel. This panel would be located in a wall recess behind a lockable cover. Storm water discharge piping and electrical conduits could be installed above the ceiling of the tunnel walkway.

Fire Protection

The east end of the tunnel is within reach of the existing station standpipe. However, the west end of the tunnel requires a new standpipe hose connection. New piping for the tunnel standpipe can be connected to the existing standpipe system if it is a Class I dry system. However, a superior and cost-effective solution would be to provide a new standalone standpipe system for the tunnel.

If a new standpipe system is provided, the following configuration should be provided in accordance with NFPA 130 fire-fighting provisions: Class I, dry system with a Fire Department Connection (FDC) and 2-1/2" hose valve at each entrance. Common lengthwise galvanized standpipe would be connected to the FDC and hose valve at each end. Fire department vehicular access would need to be provided within 100 feet of each tunnel entrance.

Lighting

It is proposed that the new lighting for the tunnel be fed from the existing electrical service of the station. Basic requirements of the proposed system include:

- Provide outdoor rated, wet location LED fixtures.
- Design for lighting levels based on the *WMATA Manual of Design Criteria* and applicable NFPA standards, including NFPA 130 and NFPA 101: Life Safety Code.
- Feed lighting from an existing lighting panel, to be assessed during engineering design to confirm location and capacity of existing panels. Feed emergency lighting from the existing emergency lighting system, to be assessed during engineering design to verify the capacity and location of the existing systems. The layout of emergency lighting and the amount of lighting provided is to be determined by NFPA 101 and the *WMATA Manual of Design Criteria*.
- At the west entrance ramps, provide pole-mounted lighting or bollard-style lights.

Fire Alarm

Typically, fire alarm detection and notification appliances are not provided for a short, open-air pedestrian tunnel. However, if a sprinkler system is provided, then flow and tamper switches must be connected to the Fire Alarm Control Panel (FACP) in the existing station. Any supplemental notification and detection appliances must be tied into the existing station FACP as well. The fire alarm system design must comply with WMATA standards as well as NFPA and building code standards.

Power

Multiple devices for the proposed tunnel require power, including lighting and mechanical devices such as a storm water lift station, as required. Power will be provided from the existing station electrical room. The system capacity and location must be verified during engineering design. Conduits for the

power can be surface-mounted on the tunnel wall or encased in the concrete floor of the tunnel. The design is governed by the National Electric Code (NEC), NFPA, and WMATA standards.

Security

The existing station is equipped with security cameras throughout the mezzanine and platform, as well as outside. Additional cameras should be provided to adequately monitor the tunnel and associated ramps at the west entrance. It is anticipated that new security devices can be tied into the existing security system and communications system. The design of new security features should be provided in accordance with WMATA requirements.

5.3.2 ALTERNATIVE C1: NORTH BRIDGE

Ventilation

To conform to CSXT requirements, the pedestrian bridge must be enclosed. The bridge may be enclosed using metal screening, which would require no supplemental ventilation, or using glazing. If glazing is used, the bridge may be ventilated mechanically (using fans) or using natural ventilation. Natural ventilation can be provided at no increased cost using fixed, open, architectural louvers at both ends and both sides of the bridge. The open area of combined louvers must be 4 percent, or greater, of the total bridge floor area. Any architectural louvers should include ¼" stainless-steel mesh for security while allowing for air flow. The louvers can be placed along the bridge roofline, out of reach by pedestrians. Solid glazing along the bridge, with louvers as required, has the added benefit of preventing any wind-driven rain or snow from entering the structure.

Heating and Cooling

Since the pedestrian bridge is primarily open to the environment, no heating or air conditioning is recommended. No code provisions exist that require space conditioning under the given circumstances.

Plumbing

Proper architectural design at each bridge entrance can eliminate rainwater entry. As such, no floor drainage system is required. However, CSXT requires that storm water from the bridge be collected through downspouts and piped off the bridge at the pier locations. The roof storm water can be collected using gutters and exterior downspouts. The downspouts should be connected to storm water mains on both ends of the bridge.

Fire Protection

Based on code review, no fire protection of the bridge is required due to the length of the structure. However, it is recommended that fire extinguishers be provided within the bridge at each end and at midspan.

Lighting

The proposed bridge location is a relatively far distance from the existing station. Therefore, the bridge and ramp lighting are proposed to be fed from a utility electrical service separate from the station. It is assumed that an emergency power feed is not provided, and emergency lighting is not included on the bridge or ramps. Basic requirements of the proposed system include the following:

- Provide outdoor rated, wet location LED fixtures;
- Design for lighting levels based on local building codes, as supplemented by the *Virginia Uniform Statewide Building Code* and applicable NFPA standards;

- Feed lighting from a new service; and
- Provide either pole-mounted or bollard style lights for the ramps and pathways that lead up to the bridge.

Fire Alarm

Because the bridge is open to the surrounding environment, no fire alarm is required.

Power

Power should be provided from a new service to be installed by the local utility company. The design will include a new utility meter, transformer, power panel, and a lighting control system that may be integrated into the power panel or a separate lighting contractor. Lighting is to be controlled by photocell. If ventilation fans are included, then these devices should be powered from the power panel. During engineering design, coordination will be required with the local utility company.

Security

Security requirements should be evaluated during engineering design and coordinated with the City. If cameras are included, then they must be connected to the associated communication networks.

5.3.3 ALTERNATIVE C2: SIGNATURE BRIDGE

All of the mechanical and electrical recommendations described for Alternative C1 are also applicable to the Signature Bridge alternative. No unique features of the mechanical and electrical systems are needed for this alternative.

5.4 GEOTECHNICAL

This geotechnical assessment is based on the subsurface data collected in 1974 by Mueser, Rutledge, Wentworth, and Johnston. This data for the project site is found in the as-built drawings from the original construction of the station and associated rail corridor. Substantial soil borings are available from these drawings and provide a sufficient level of data for feasibility assessment. This information will require supplementation upon selection of a preferred alternative during later phases of the project. Refer to **Appendix A** for a comparison of geotechnical considerations.

5.4.1 REVIEW OF EXISTING CONDITIONS

Near the southern project limits, at the intersection of East Braddock Road and the WMATA corridor, the soil conditions consist of a layer of granular fill approximately 4 feet thick, underlain by 32 feet of fine to medium sand, with trace silt and silty clay. SPT N values vary between 11 and 55, with an average of 25 blows per foot (BPF). Below the sands exists a 27-foot layer of grey to black silty fine sand with organic clay. This material is stiff to hard with isolated soft pockets which are compressible and subject to instability. These soils transition to medium-dense to dense-coarse to fine sand with mottled green clay of stiff consistency, encountered at the termination of boring 110 feet below grade. At the time the boring was taken, groundwater was encountered 12 feet below grade at an approximate elevation of 20 feet.

At approximately the center of station, near the alignment of Alternative A, the fill increases in thickness to approximately 10 feet, underlain by a similar series of dense sands and hard clays with isolated pockets of medium to soft organic sandy clay. Here, groundwater was observed around the elevation of 23 feet.

At the northern end of the project site, the materials remain consistent with the other areas described. However, the surficial fills diminish in thickness.

The existing station and retaining wall structures are mostly founded on shallow footings, designed to an allowable bearing capacity of 3 tons per square foot. Driven 12" square prestressed concrete piles support the existing bridge abutments over Braddock Road as well as several adjacent sections of retaining walls. The driven piles were installed to an allowable capacity of 30 tons for the retaining walls and 60 tons for the bridge foundations.

5.4.2 PROPOSED FOUNDATION TYPES

Based on geotechnical assessment of available existing data, both a pedestrian tunnel and bridge are considered feasible methods to provide access across the railroad corridor. Upon review of the existing station structure as-built drawings and the historic borings provided therein, the materials encountered offer adequate bearing and, while laboratory testing information was not provided, it is likely the soils will provide adequate service performance with tolerable post-construction settlement expected. A discussion of feasibilities is described for each alternative in the following sections.

Alternative A: Station Tunnel

From a geotechnical perspective, construction of a tunnel for Alternative A is viable. However, there are several risks associated with this structure type. The high groundwater and the unknown composition of soils beneath the CSXT railroad embankment pose the greatest challenges for a tunneled solution. As previously discussed, a cut-and-cover construction method is not viable due to CSXT requirements to avoid open cut excavations within the track area. Therefore, bored solutions are the likely approach. Either an open-shield jack and bore installation or a micro tunnel are viable options. If, during engineering design and further geotechnical investigation, it is found that groundwater poses a greater challenge than anticipated, an earth pressure balance machine could be considered. However, the costs are greater with this installation method.

Alternative C1: North Bridge

Shallow foundations, such as spread footings, are anticipated to be geotechnically feasible based on review of the existing structure types. The challenge of using a shallow foundation for the proposed bridge structure is the potential size required of the footings and the proximity to both existing structure and shallow groundwater. As such, site access becomes the driver in foundation type selection and a deep foundation may be preferable due to the smaller footprint they require. Both a driven foundation type as well as a drilled foundation, such as micro pile or drilled shaft, could be feasible in this setting. Given the adjacent shallow foundation of the existing retaining walls, it is anticipated a drilled foundation would be preferred to limit the risks of impacting the existing structures during construction.

Alternative C2: Signature Bridge

Similar to Alternative C1, spread footings may be feasible to support the loads. However, given that the signature span is likely more complex than the North Bridge, the foundation loads are expected to be substantially greater. As a result, deep foundations are likely more appropriate, depending on the structure type selected. Further assessment is required during engineering design if this alternative is selected. A wide range of considerations may govern the foundation type required. For example, if a cable-stayed bridge is selected, a large pylon will support the cables of the bridge. This pylon would

likely require a significantly larger foundation than a simple one-span truss. In summary, deep foundations, such as micro piles or drilled shafts are likely to be used for the main span of the bridge.

5.4.3 ADDITIONAL SUBSURFACE INVESTIGATION

Advancing the design beyond this feasibility assessment requires additional subsurface investigation efforts be employed to further define the site conditions and allow the geotechnical engineer to optimize a design. In support of the foundation design for the pedestrian structure and adjacent retaining walls, a qualified drilling contractor should be procured to advance standard penetration testing as per American Society of Testing Materials (ASTM D-1586) requirements to provide soil classification, location of change in stratum, and water table data.

An estimated total of 5 borings are needed. The borings are to be advanced to an anticipated 80 feet below existing grade, but these assumptions will be adjusted based upon actual conditions identified in the field. Borings should not be terminated until suitable bearing material is encountered. All drilling operations must be completed in the presence of a qualified geotechnical representative from the engineering designer. In-situ geotechnical engineering properties, such as unconfined compressive and shear strength, shall be measured utilizing pocket penetrometers and torvanes in the field to expedite assessment and reduce costs.

Upon completion of the subsurface investigation, a subsequent laboratory-testing program will be proposed to establish the engineering properties of the soils needed to design the most constructible and cost-effective foundation system. The investigation, in addition to the soil data collected under previous contracts, will provide the foundation designers the information necessary to advance the design through the various submissions to the development of final construction documents. Foundation alternatives will be assessed based on constructability and cost, and a final preferred alternative will be selected with consideration to minimizing impacts to operations during installation.

The findings will be incorporated into a Foundation Design Report. Boring logs, relevant drawings, laboratory testing results, and a geotechnical assessment of the existing subgrade conditions, as it relates to the support of the proposed structures, will be included. A foundation system recommendation based upon cost and constructability will be provided. Given the adjacent rail operations, the structural and geotechnical engineering team will provide a foundation system that can be installed with minimal impact to rail service. Installation of micro piles or drilled shafts during weekend outages and rolling technology of precast foundation caps and rail equipped slabs should be assessed.

5.5 SITE AND UTILITIES

In general, the overall project site allows for reasonable placement of the proposed alternatives with minimal impact on surrounding structures and facilities. However, there are several concerns for each of the alternatives. A 6" gas pipeline runs along the west side of the existing station throughout the project limits, carrying jet fuel to Ronald Reagan Washington National Airport in Arlington, Virginia. This pipeline is owned by Plantation Pipeline Company, which is a jointly-owned subsidiary between Exxon and Kinder Morgan. Throughout the project site, the pipeline is located between 5 feet and 10 feet below grade and is several feet west of the existing station retaining walls and about 30 feet east of the nearest CSXT track. Refer to **Appendix B** for reference to the existing pipeline geometry.

Additional descriptions of site and utility impacts are described for each alternative in the following sections. For a summary of impacts for each alternative, refer to **Appendix A**.

5.5.1 ALTERNATIVE A: STATION TUNNEL

The location of the gas pipeline presents a significant challenge for the tunnel alternative. The pipeline, given its depth below grade, intersects the proposed tunnel alignment. In order for the tunnel alternative to be feasible, relocation of the pipeline is required. For minimal impact to the existing line, relocation over top the proposed tunnel seems most constructible. However, only 4 feet of clearance is proposed between the top of tunnel and top of grade. Discussions with the utility owner would be required during preliminary engineering to determine if this clearance is sufficient. Further consideration should be made regarding public safety, both during construction and after construction during normal use. Lastly, with the likely fourth CSXT track being added within the track right-of-way in the near future, there is added risk that the pipeline may end up being too close to train surcharge loading if the line is relocated closer to the surface. If, instead, the pipeline can be relocated beneath the proposed tunnel, the limits of relocation would likely be significantly increased.

Careful assessment of the feasibility of relocating the Plantation Pipeline through the project site should be made during preliminary engineering. If it is found that the line cannot be relocated for any reason, the tunnel alternative is likely not feasible.

Based on input provided by City officials, it is understood that the existing station parking lot tends to flood during heavy rainstorms. While this area is outside the scope of this report, further consideration should be given to this civil and site concern during engineering design.

5.5.2 ALTERNATIVE C1: NORTH BRIDGE

The existing sidewalk along N. West Street (see **Figure 21**) is approximately 5 feet and 2 inches wide, bordered on the west by the Metro station retaining wall and on the east by the street. The road includes two lanes, one in each direction, and serves as a Metrobus route to and from the station.

Figure 21: Existing Sidewalk at N. West Street



The proposed eastern terminus of the bridge ramp system is located at the northern end of N. West Street. To reach the station, users must traverse the sidewalk between the bridge ramp and the station area. Given the narrow sidewalk width, it is anticipated that the user experience could be improved by widening the sidewalk to at least 8 feet wide. To widen the sidewalk, the lanes of N. West Street would be relocated to the east. The existing two travel lanes are approximately 11 feet wide, with a 3-foot-wide planter along the east side and supported on a retaining wall. Relocation of the lanes may require complete reconstruction of the roadway and the existing retaining wall, resulting in substantial construction costs and impacts to adjacent properties.

5.5.3 ALTERNATIVE C2: SIGNATURE BRIDGE

Because the alignment for Alternative C2 is similar to that of Alternative C1, equal considerations should be made to widen the sidewalk along N. West Street. Similar implications and impacts to the roadway would exist at this location.

5.6 CONSTRUCTABILITY

Working around the railroad requires careful consideration of constructability for each alternative. As discussed in previous sections, constructability is driven by physical site constraints as well as limitations due to railroad operations. Site access, staging areas, construction methods, and limitations are discussed in the following sections. Refer to **Appendix A** for a comparison of constructability for each structure type.

5.6.1 ALTERNATIVE A: STATION TUNNEL

Since CSXT does not allow open cut excavation for installation of structures beneath the track area, it is anticipated that drilled, bored, or hand-mined construction methods would be employed. These methods allow for horizontal construction beneath the railroad without interrupting track operations. From the west side of the CSXT right-of-way, a launch pit can be constructed from which the horizontal construction can commence. Work would proceed horizontally from the launch pit toward the station until a receiving pit is reached. Spoils from the tunnel excavation would be removed daily by dump trucks and hauled off site. Truck access would be required from a local road to the site. During all stages of tunneling, track monitoring and other accommodations may be required to ensure the safety of passing rail traffic and safe tunnel construction.

Outside of the track area, temporary or permanent sheeting may be installed parallel to the tracks, allowing for open cut excavation with cut-and-cover construction. Installation of sheeting will likely require temporary track outages, so coordination would be required with CSXT operations throughout construction. Additionally, a temporary grade crossing over all CSXT tracks would be necessary to enable construction equipment and materials to move between the trail side and the west side of the existing station structure.

Construction staging areas may be feasible in the existing Potomac Yard Park fields or the George Washington School parking lots. As mentioned above, a tunneling launch pit is required for construction. It is anticipated that this pit would intersect the Potomac Yard Trail and extend partially into the park. This would require closure or diversion of the southern end of the trail during construction, and temporary fencing would be established around the staging areas and launch pit.

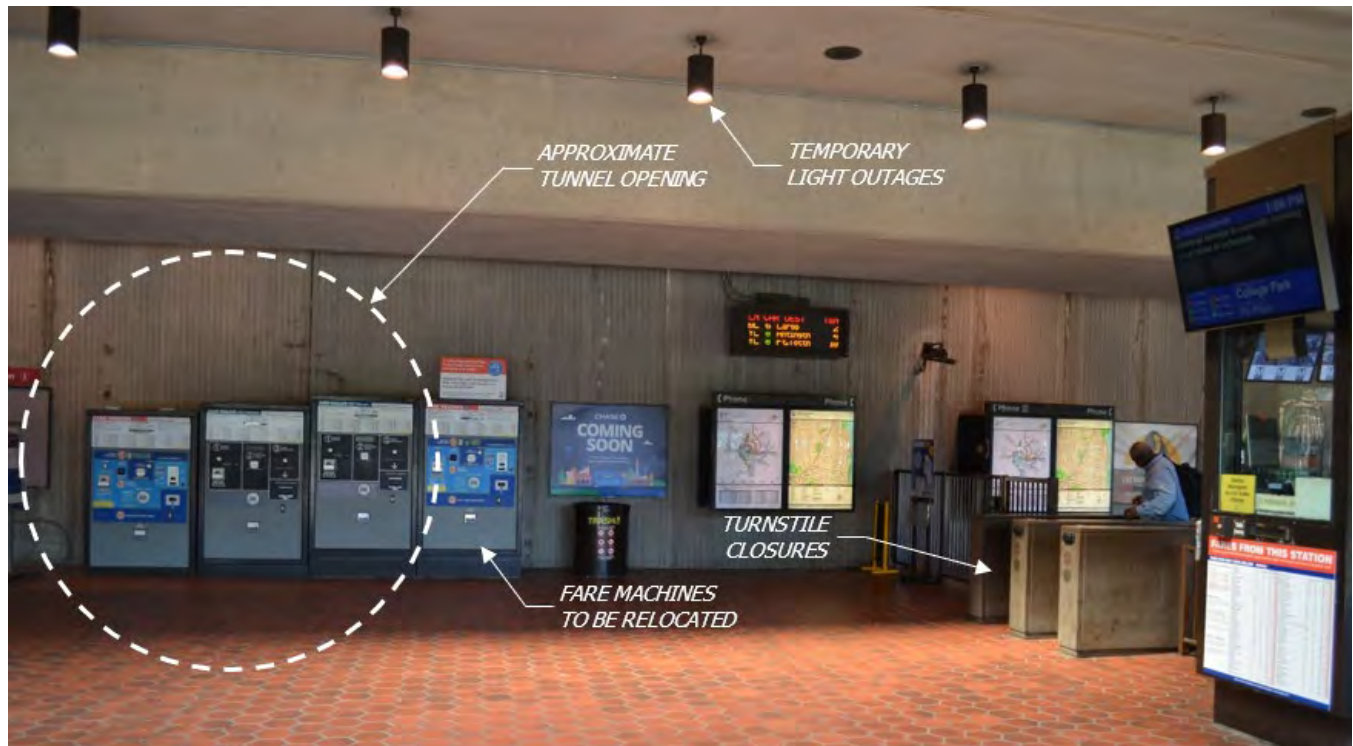
As described above, a significant challenge will be to work around the 6" liquid gas pipeline which runs along the west side of the existing station wall (refer to **Section 5.5** for general discussion of feasibility to relocate the pipeline). If the pipe can be relocated below the proposed structure, significant excavation is required. Temporary and permanent protection of the pipeline will also be required. If the pipeline can be relocated above the proposed tunnel, then the pipeline must be temporarily protected and supported with carrier beams to allow the pipeline to be carried above the temporary excavation of the tunnel. Working around active pipelines poses substantial risks and requires significant caution, planning, and coordination during construction.

At the station mezzanine, penetrating through the existing west wall presents several constructability challenges. Because the existing wall retains earth embankment, the wall may require temporary structural support prior to penetrating the wall. Penetrating the new tunnel into the station mezzanine will require cutting through 18 inches of reinforced concrete wall and partial removal of the existing 8-inch-thick reinforced concrete floor. During reconstruction of this wall area, the existing wall cannot retain any backfill. As such, the entire area behind the wall will have to be excavated down to the bottom of the wall. The excavated area will require temporary sheeting to the north, west, and south to retain the surrounding embankment.

For construction within the station, the mezzanine may be temporarily or permanently modified. This may require temporary adjustments to operations within the station, such as individual turnstile closures, relocation of fare machines, installation of safety barriers and dust curtains, and/or removal of

lighting in areas (see **Figure 22**). Accommodations for passengers may be necessary throughout construction, requiring coordination between the contractor, CSXT, and WMATA.

Figure 22: Potential Construction Impacts to Mezzanine (Alternative A)



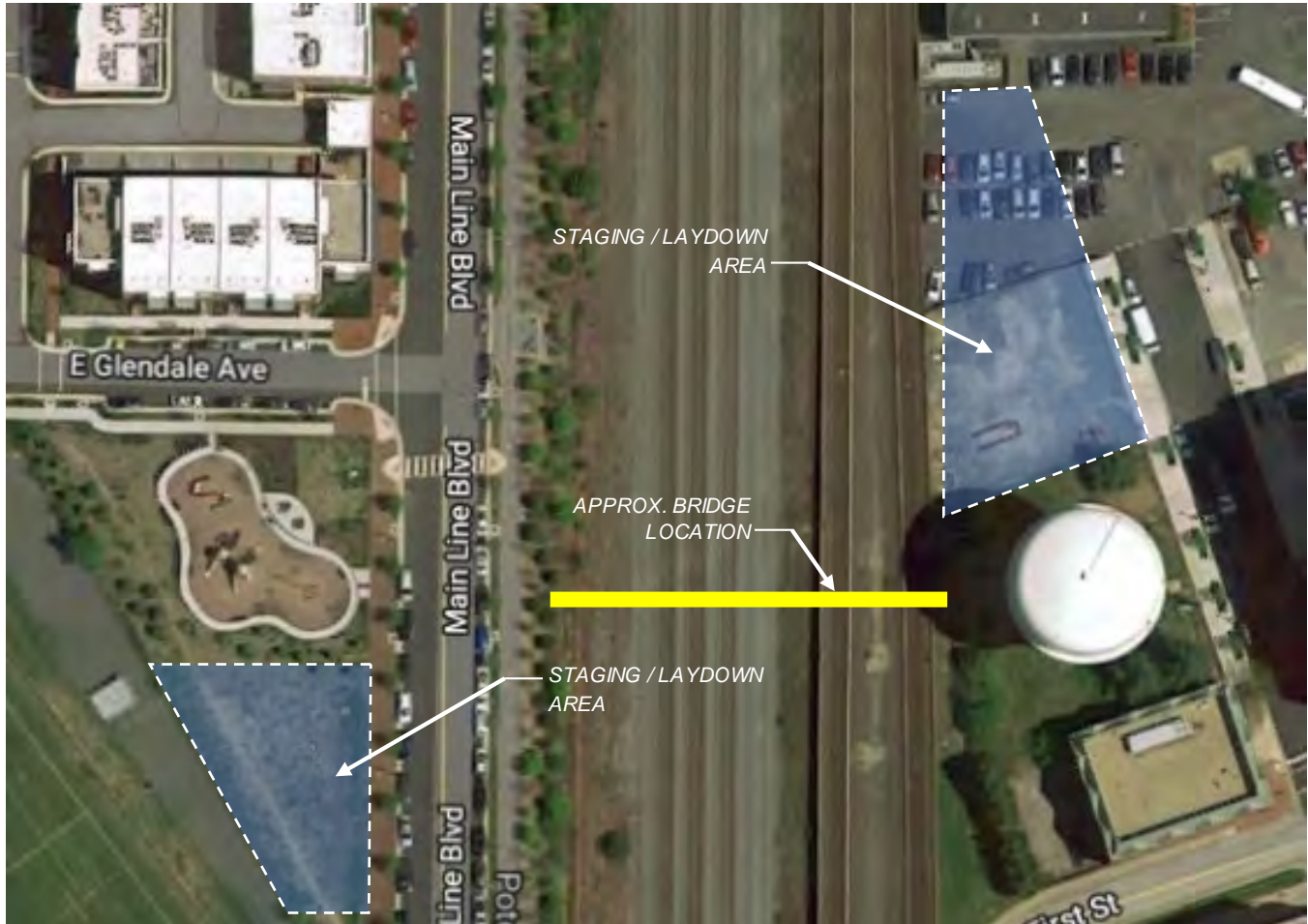
5.6.2 ALTERNATIVE C1: NORTH BRIDGE

Construction of the North Bridge alternative is anticipated to have minimal impacts to railroad operations, and similarly, building the ramp systems should not cause any substantial impacts to the surrounding roadways. Temporary relocations or detours may be needed along a small segment of the Potomac Yard Trail to construct the stair/ramp system. Construction of the bridge alternatives requires no modifications to the existing station. As such, station passengers are not anticipated to be affected during construction of the bridge.

Construction of the stairs and ramps would be performed prior to any bridge construction. These structures are expected to consist of reinforced concrete columns and ramps. Precast segments may be feasible to reduce the temporary construction footprint on the site. Since the ramps are outside of railroad right-of-way, temporary sheeting may not be necessary for foundation construction.

Staging areas may be located on both the west and east sides of the railroad corridor (see **Figure 23**). Potential sites on the west side include along the existing trail and across Main Line Boulevard, next to the playground. On the east side, the empty lot north of the water tower and/or portion of the existing parking lot at the Metro Church may be feasible for staging, if an agreement with the property owners can be established. For each of these staging areas, temporary construction fencing would be required for public safety. Construction easements or temporary right-of-way acquisitions may also be required.

Figure 23: Possible Staging Areas for Bridge Construction



To construct the bridge span, it is expected that the truss can be prefabricated and assembled on site along the railroad corridor. During a temporary short-term railroad outage, a crane can pick the assembled truss span and place the bridge onto the new piers. After this point, railroad operations may resume. Installation of the concrete deck and other bridge components, lighting, security features, and handrails can all occur after the bridge has been set and rail operations have commenced. As a result, the total outage time for the railroads could be as short as several hours. Because the bridge is proposed as a single span, no shoring towers or other temporary works would be required within the railroad right-of-way. Additionally, no temporary grade crossings would be expected.

For the bridge alternatives consideration is being made for widening the sidewalk along N. West Street to improve the user experience between the bridge and the station. This presents several constructability challenges. To widen the sidewalk, the lanes must be shifted to the east. This work may require demolition of the existing retaining wall along the east side of the road and construction of a new wall further east. The roadway would also require full-depth reconstruction. Because this road is a bus route, the reconfiguration would require staged construction, with one lane being rebuilt at a time. In addition, the buses may need to be detoured in one direction during each stage.

5.6.3 ALTERNATIVE C2: SIGNATURE BRIDGE

In some ways, the constructability of a Signature Bridge alternative is similar to that of the North Bridge option. At the approach ramps, the constructability is similar or equal to that of the North Bridge alternative. Site access for ramp construction is available along N. West Street and Main Line Boulevard. The reinforced concrete ramps would be built prior to the bridge erection, similar to Alternative C1.

The Signature Bridge alternative is expected to present more challenging construction methods than the North Bridge alternative and is likely to require moderate impacts to railroad operations during bridge erection. Because the bridge type is unknown, a detailed construction sequence cannot be presented until engineering design. However, a signature span is anticipated to require certain complexities in construction, including temporary shoring during erection, temporary grade crossings, and track outages for crane picks.

Temporary shoring within the CSXT right-of-way is very likely. This is to allow a portion of the bridge superstructure to be supported during construction. Erecting temporary shoring towers within the track area will also require temporary grade crossings for access to bring in and remove equipment and materials. This presents a moderate impact to railroad operations and would require some temporary track outages to install.

The signature span is expected to comprise heavy structural members and require complex erection over the tracks. As a result, the signature span is expected to require more interruptions to rail service during crane picks. Coordination between the contractor and the railroad operators would be required throughout construction to ensure safe and consistent operations. Because of the complexities in construction, the duration of bridge erection and completion for this alternative is anticipated to be substantially longer than that of Alternative C1. Furthermore, the added complexities of construction may require specialized contractors to do the work, potentially reducing competition during the bidding process which could increase costs.

Construction staging areas for the Signature Bridge alternative would be essentially the same as for the North Bridge alternative (see **Figure 23**). To obtain these staging areas, temporary easements or right-of-way acquisitions may be required. Safety fencing would be needed around all construction staging areas as well.

5.7 RAILROAD CONSIDERATIONS

Many of the railroad requirements are described in previous sections. The selection of a preferred alternative and the subsequent design and construction should consider railroad coordination as a primary driver in the process. Interference with railroad operations should be minimized wherever possible. Specific requirements will need to be accommodated during engineering design and construction. Additionally, coordination must be made with CSXT, Amtrak, VRE, and WMATA throughout design and construction. Any track outages must be scheduled with the affected railroad operators. Specific railroad criteria are discussed in the following sections, some of which has been previously described above. Refer to **Appendix A** for a summary of railroad considerations.

5.7.1 CLEARANCES AND ALIGNMENT

The basic criteria governing clearances around the railroad right-of-way are described in **Section 2.6**. As previously stated, the bridge alternatives should span the entire width of CSXT's right-of-way. CSXT directs that intermediate piers or supports are not permitted within their right-of-way. For Alternative C2, there is the possibility that a pylon, pier, or other support may be needed in the right-of-way area. For this alternative to be feasible, a design exception would be required from CSXT. Alternatives A and C1 are expected to be compliant with these requirements. CSXT criteria also indicates that overhead bridges be completely enclosed with a protective canopy or roof. For both bridge alternatives, it is expected that an enclosed structure is feasible.

All CSXT and WMATA vertical clearance and horizontal clearance requirements should be accommodated in the design. Similarly, the tunnel should be placed at sufficient clearance below the tracks to meet CSXT requirements. With the proposed DC2RVA project, which will add a fourth track to the CSXT corridor, the proposed structure should accommodate the fourth track and provide sufficient clearances from the anticipated track location. Each of the alternatives assessed are considered able to accommodate these needs.

CSXT prefers that structures cross the right-of-way at approximate right angles to the tracks. For each of the alternatives studied, this preference is feasible to accommodate. However, for Alternative C2, there may be opportunities to construct an alignment that deviates from being perpendicular to the tracks. If this alternative is further explored, CSXT may require a design exception.

5.7.2 REQUIREMENTS DURING CONSTRUCTION

In order to maintain safe working conditions during construction, several accommodations are likely to be required and should be considered during engineering design. First, any track outages or work around live rail traffic will require railroad flaggers (CSXT or WMATA, depending on which tracks are occupied or within fouling distance). Second, any excavation occurring within the railroad live load influence zones will require sheeting and/or shoring. This could be temporary or permanent, depending on how close the excavation is to occur to the railroad tracks. Lastly, ongoing track monitoring will likely be necessary for any tunneling operations, foundation installations, or other construction operations that may cause vibrations in the ground.

5.7.3 SAFETY FEATURES

Where possible, existing safety features should be maintained or improved to protect both the railroad and the bridge or tunnel users. Clear separation will be needed, with no possibilities of pedestrian intrusion into the railroad right-of-way. Safety fencing along the corridor should remain or, where impacted, replaced to meet railroad requirements. Fencing upgrades may be needed in certain locations, such as at the ramp entrances for each of the structure alternatives.

Lastly, for the bridge alternatives, the substructure units need to be considered for crashworthiness during engineering design. If the piers cannot meet the minimum crash wall requirements, then a supplemental crash wall should be provided parallel to the tracks to protect the bridge piers.

5.7.4 COORDINATION EFFORTS

The Project Team contacted CSXT's public projects representative for Virginia, and provided him with a project description and a set of design concept drawings for the three crossing options. As this feasibility assessment is pre-preliminary engineering, CSXT responded to the request for project comment with a copy of the general CSX Overhead Bridge Criteria. Further contact should be initiated when the project enters the preliminary engineering and design phase. CSXT also provided a CSX Public Projects Review Application form for submission when the project is ready for Preliminary Engineering review. **Appendix C** shows the communication between the Project Team and CSXT, CSX Overhead Bridge Criteria, and the CSX Public Projects Review Application form.

5.8 ACCESSIBILITY CODES AND STANDARDS

Accessibility standards are governed by the Americans with Disabilities Act (ADA) and other laws ensuring universal access to public transportation facilities and public rights-of-way. ADA codes and standards focus on three main requirement areas which apply wholly or in part to Alternatives A and C1/C2:

- Accessible entrances;
- Accessible routes; and
- Accessible means of egress.

Specifically, for Alternatives C1/C2, because the NEPA Class of Action may tie the pedestrian facility to the station, the accessible route must also consider the east-side access from the station entrance to the proposed ramp structure. Currently, the sidewalk that would form the accessible route is not ADA-compliant and would need to be widened for the pedestrian bridge to comply with ADA requirements.

5.8.1 ACCESSIBLE ENTRANCES

The accessible entrance requirements for all alternatives are covered by the components below under **Accessible Routes**.

5.8.2 ACCESSIBLE ROUTES

An accessible route is "a continuous unobstructed path connecting all accessible elements and spaces of a... facility"⁸ and consists of one or more of the following components per ADA Chapter 4, section 402.

Walking Surfaces

The running slope of these surfaces must not be steeper than a 1:20 grade. The walking surface must be at least 36 inches, with the exception of a reduction to 32 inches minimum for a maximum of 24 inches, provided that reduced width segments are separated by segments that are 48 inches long minimum and 36 inches wide minimum.

⁸ ADA Accessibility Guidelines, September 2002.

Doors, Doorways, and Gates

None of the alternatives considered feature doors, doorways, or gates which fall under ADA requirements, as any tunnel gate is designed to be operated only by security personnel and is excepted from the ADA requirements.

Ramps

The running slope of ramps must not be steeper than a 1:12 grade, and the cross slope must not be steeper than 1:48. The clear width of ramps must be at least 36 inches. Ramps must initiate and terminate at landings.

Elevators

Since elevators may be included in a bridge option, elevator call buttons and keypads must be located at an accessible reach, with clear floor or ground space to ensure their accessibility. Depending on their door location, the minimum interior space for the elevator is between 51 inches by 68 inches and 51 inches by 80 inches. Passenger elevators must comply additionally with ASME 17.1.

Platform Lifts

Platform lifts must comply with ASME A18.1. The doors must remain open for at least 20 seconds. End doors and gates must provide a clear width of at least 32 inches, while side doors and gates must provide a clear width of at least 42 inches.

5.8.3 ACCESSIBLE MEANS OF EGRESS

An accessible means of egress must be provided according to the International Building Code (IBC). A means of egress is “an unobstructed path to leave buildings, structures, and spaces” and is comprised of exit access, exit, and exit discharge⁹.

In Alternatives C1/C2, since the staircases are parts of the means of egress, the stairs must follow treads and riser specifications in Section 504.

5.9 ENVIRONMENTAL SCAN

The National Environmental Policy Act of 1969 (NEPA), as amended requires that projects conduct analysis to determine the level of potential impacts on both the natural environment and surrounding societal resources. The Commonwealth of Virginia also requires that project impacts be reviewed and documented throughout the Environmental Impact Review (EIR) process.

As part of the feasibility study for a pedestrian bridge or tunnel at the station, this preliminary environmental scan provides an initial inventory of notable environmental resources within the project study area and determines a likely NEPA Class of Action.

NEPA defines three levels of federal environmental review that can be required for a project, based on the level of potential impact on the environment. These levels are called Classes of Action:

- Class I: The project is likely to significantly affect the environment and requires an Environmental Impact Statement (EIS).

⁹ United States Access Board, “Guide to the ADA Standards,” Chapter 4.

- Class II: The project does not individually or cumulatively have significant environment impacts; in this case, the project may obtain a Categorical Exclusion (CE).
- Class III: The project’s impact on the environment is not clear and requires an Environmental Assessment (EA). An EA will result in a Finding of No Significant Impact (FONSI) or the identification of significant impacts, in which case the project is elevated to Class I and an EIS is required.

This preliminary environmental scan considered a project study area of ½-mile from the station and ½-mile from the intersection of North West Street and First Street (see **Figure 24**).

The project study area was scanned for potentially affected resources over twelve categories. These categories, and the sources consulted during the scan, are listed in **Table 4**.

Table 4: Sources Consulted for Resource Categories

| Resource Category | Source(s) |
|--|--|
| Soils | Web Soil Survey (USDA) |
| Air Quality | Green Book (EPA) |
| Noise and Vibration | Noise Control (City of Alexandria) |
| Water Resources | National Wetland Inventory Mapper (Fish & Wildlife Service) |
| Protected Species and Critical Habits | Environmental Conservation Online System Information for Planning and Consultation (Fish & Wildlife Service) |
| Environmental Justice | Environmental Justice Screening Tool (EPA) |
| Parks and Parklands | ParkLink (City of Alexandria) |
| Hazardous and Contaminated Materials | Superfund and NPL Mapper (EPA); EnviroMapper (EPA) |
| Neighborhood and Community Impacts | Environmental Justice Screening Tool (EPA); Community Association Viewer (City of Alexandria) |
| Property Acquisition and Displacements | Parcel Viewer (City of Alexandria) |
| Historic and Cultural Resources | National Register of Historic Places (NPS); Virginia Cultural Resource Information System (VA Department of Historic Resources) |
| Energy | N/A |

Figure 24: Environmental Scan Project Study Area



5.9.1 FINDINGS PER RESOURCE CATEGORY

Soils

A portion of the project study area on the western side of the CSXT right-of-way, roughly corresponding to the location of the Potomac Yard Trail, was found to be predominantly sandy loam with grist mill. This soil type is rated as having a high probability of corroding concrete and steel, and as having low suitability for landscaping. This is important to note, as the planned structure – whether a tunnel or bridge option is chosen – would interact with this soil type on the west side.

Air Quality

The project study area is a nonattainment area for two (2) pollutants under the National Ambient Air Quality Standards (NAAQS) and is a maintenance area for another two (2) pollutants under the NAAQS. Specifically, the area is in marginal nonattainment for the 2008 and 2015 8-hour ozone NAAQS, and is a maintenance area for the carbon monoxide and 1997 PM-2.5 NAAQS. Due to the small scale of this project, no change in air quality is anticipated as a result of construction or ongoing maintenance activities.

Noise and Vibration

Noise and vibration during construction must abide by the City of Alexandria's Noise Control ordinance. Sec. 11-5-4 (b)15 regulates the use of construction devices and power equipment to between 7:00 am and 6:00 pm Monday through Friday, between 9:00 am and 6:00 pm Saturday, and prohibits their use on Sunday. Sec. 11-5-4 (b)19 permits the use of pile drivers between 9:00 am and 6:00 pm Monday through Friday, between 10:00 am and 4:00 pm Saturday, and prohibits their use on Sunday.

All construction is prohibited on New Year's Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, and Christmas Day.

Water Resources

No wetlands were determined to be within the project area.

Protected Species and Critical Habitats

The project area was found to be a habitat for 21 migratory birds, including a bald eagle. A bald eagle nest was reported within the project area in 2009. The project will be designed and prepared for construction to avoid any unnecessary take of nests or habitat for migratory birds.

Environmental Justice

The surrounding community is below average state and regional percentiles for environmental justice consideration.

Parks and Parkland

The project area features several parks, including an adjacent park complex made up of Braddock Field, the George Washington School park facilities, and Potomac Yard Park, which extends along the Potomac Yard Trail. Together, this park complex includes open space, baseball diamonds, football practice fields, tennis courts, a trail system, and localized outdoor fitness areas (located along the trail).

As currently proposed, construction staging may involve temporary take from the Braddock Field/George Washington School Park area, with full restoration to existing conditions upon the end of construction. Depending on the final selected alternative, Potomac Yard Park would either be modified

at the mouth of the proposed tunnel or to accommodate the pedestrian bridge ramp structure. These modifications are intended to enhance the current connectivity of the park and associated trail and include proposed improvements to landscaping. No modification is proposed to the existing fitness facilities along the trail.

Other parks located within the project study area include Simpson Stadium Park, Powhatan Park, portions of Daingerfield Island Park, Chetworth Park, the Charles Houston Rec Center, Buchanan Park and Old Town Pool, Hoeff's Run Park and Greenway, and several private parks and pocket parks. No impacts are anticipated to any of these park facilities.

Hazardous and Contaminated Materials

The project study area includes 40 known sites that report to the EPA regarding hazardous or contaminated materials. The most proximate site to the project location is the George Washington School. Of these sites, 38 report hazardous waste under the Resource Conservation and Recovery Act (RCRA), one is a biennial reporter, and one reports toxic substances under the Toxic Substances Control Act (TSCA). None of these sites would be impacted by the project.

Neighborhood and Community Impacts

The project study area includes the following community associations:

- Braddock Metro Citizens' Coalition;
- Braddock Station Civic Association;
- Del Ray Citizens Association;
- North Old Town Independent Citizens;
- Northeast Citizens Association;
- Old Town Civic Association;
- Old Town North Community Partnership;
- Potomac Yard Civic Association;
- Rosemont Citizens Association;
- Taylor Run Civic Association;
- Upper King Street Neighborhood Association; and
- West Old Town Citizens Association.

Property Acquisition and Displacements

Alternatives C1 and C2 only may require partial acquisition and displacement on Parcel ID #054.01-02-01 (the water tower), owned by Virginia American Water Company, to accommodate the proposed ramp structure on the east side.

Alternatives C1 and C2 also require that the sidewalk along North West Street be widened to comply with ADA standards. To do so, the existing North West Street must shift slightly east, impacting existing parcels on the east side of the street. The impacted parcels are:

- Parcel #054.01-0B-00 (1310-1340 Braddock Place)
- Parcel #054.01-02-51 (814 N West Street)

Historic and Cultural Resources

The project study area includes multiple properties listed as architecturally significant in the Virginia Cultural Resource Information System; however, none are anticipated to be impacted by the project

during construction or as a result of its implementation. The project study area includes several historic districts, including the Richmond, Fredericksburg and Potomac Railroad District, the Parker-Gray Historic District, and the East Rosemont Historic District.

It is important to note that the Richmond, Fredericksburg and Potomac Railroad District only includes the railroad overpass at Braddock Road, and does not include the railroad ROW that would be impacted during construction under the alternatives proposed in this project.

Energy

During construction and operation, additional use of natural resources and energy will be required to power machinery, lighting, and related power systems, but is not anticipated to create a substantial increase in demand for local resources or utilities or strain the capacity or supply of the resources or utilities.

5.9.2 LIKELY NEPA CLASS OF ACTION

Per 23 CFR 771.118(c)(2), the likely NEPA class of action for this project is a Categorical Exclusion (CE). The CE determination is based on the language in the referenced statute:

Acquisition, construction, maintenance, rehabilitation, and improvement or limited expansion of stand-alone recreation, pedestrian, or bicycle facilities, such as: A multiuse pathway, lane, trail, or pedestrian bridge; and transit plaza amenities.

6 ORDER-OF-MAGNITUDE COST ASSESSMENT

6.1 ASSUMPTIONS

The order of magnitude cost assessment included various assumptions to arrive at a range of comparative costs. Additional detail for the cost estimate is provided in **Appendix E**. These assumptions are outlined below:

- All cost estimates assumed a construction year of 2025, as determined through consultation with the City of Alexandria and WMATA.
- All Alternatives included an 8% factor to account for engineering design costs and a 5% factor to account for City of Alexandria and WMATA project management costs, adding a total of 13% to the estimated base cost ranges.

For Alternative A:

- Low-end costs included 30% contingency, and high-end costs included a 50% contingency.
- The baseline contingency was increased for this Alternative to account for the need to relocate the Plantation Pipeline.
- The estimates include required modifications to the existing station concourse (e.g., changes to faregates and the vending area).

For Alternative C1:

- Low-end costs included 20% contingency, and high-end costs included a 40% contingency. This was done to provide an average contingency of 30%, which is a common estimate at the conceptual design level.

- The high-end cost also included the cost to realign North West Street. These costs included:
 - All new sidewalk and all new full-depth pavement;
 - Elimination of existing planter along roadway;
 - Two-stage traffic control to maintain bus operations; and
 - 3 foot wide right-of-way acquisition and new retaining wall.

For Alternative C2:

- Low-end costs included 20% contingency, and high-end costs included a 60% contingency. This higher contingency was used because the structure type is unknown. More complex bridge types can add significant project costs.
- The high-end cost also included the cost to realign North West Street. These costs included:
 - All new sidewalk and all new full-depth pavement;
 - Elimination of existing planter along roadway;
 - Two-stage traffic control to maintain bus operations; and
 - 3 foot wide right-of-way acquisition and new retaining wall.

6.2 COST ESTIMATES

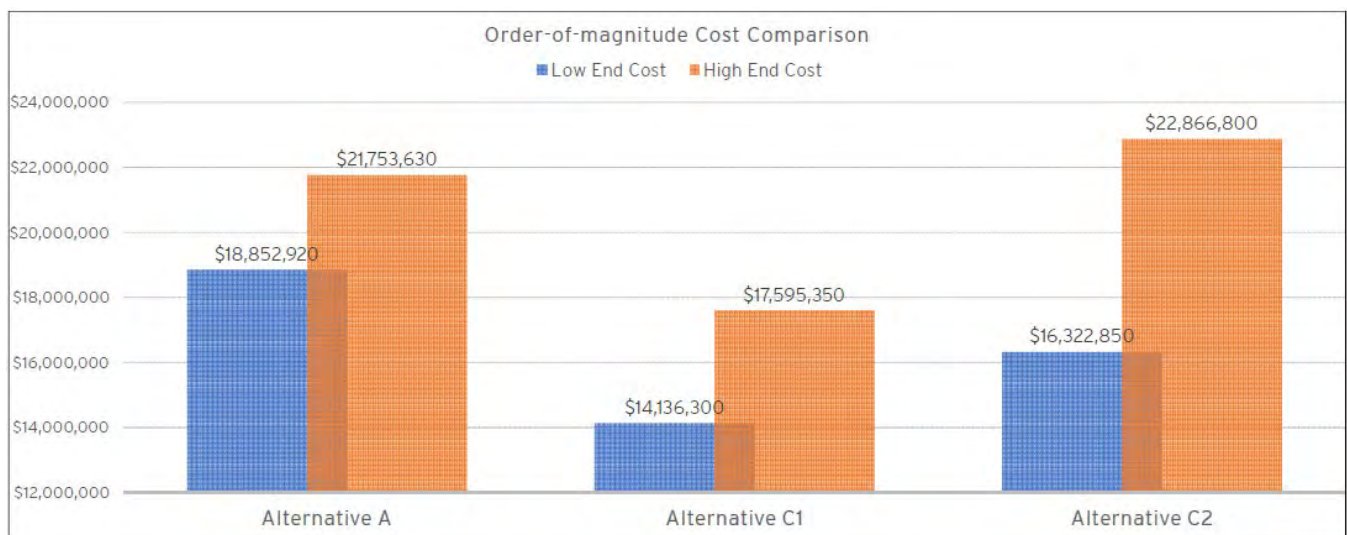
Figure 25 presents the order-of-magnitude cost comparison for Alternatives A, C1, and C2.

Alternative A was estimated to ultimately cost between \$18,900,000 and \$21,800,000, including costs to relocate the Plantation Pipeline and make necessary changes to the station mezzanine.

Alternative C1 was estimated to ultimately cost between \$14,100,000 and \$17,600,000.

Alternative C2 was estimated to ultimately cost between \$16,300,000 and \$22,900,000 because the unknown structure type adds considerable cost uncertainty in the estimation process.

Figure 25: Order-of-Magnitude Cost Comparison



7 CONCLUSION

Each alternative has unique benefits and issues, and ultimately, this study neither recommends nor specifically discourages any of the three alternatives. **Table 5** summarizes the results of the feasibility assessment.

Alternative A, the Station Tunnel alternative, offers a direct connection to the existing station mezzanine and likely offers the most attractive connection for pedestrian commuters. However, unknown variables surrounding the feasibility of relocating the Plantation Pipeline cast doubt over the feasibility of implementing this alternative. The tunnel would require additional ramping within the station mezzanine, near where the faregates are currently placed, which could potentially have a negative impact on pedestrian flows to and from the station. It also presents some challenges regarding 24/7 access, and for that reason, may not be a strong alternative if the project is viewed through the lens of community connections.

Alternative C1, the North Bridge alternative, offers a relatively low-cost connection that could serve more than just commuting foot traffic, connecting neighborhoods currently divided by the railroad and Metrorail corridor. It also requires the least amount of impact on railroad operations regarding construction and maintenance. However, the travel time savings that it presents are minimal, and the structure may not fit architecturally within the community. Furthermore, it requires right-of-way acquisition along North West Street to upgrade existing pedestrian infrastructure.

Alternative C2, the Signature Bridge alternative, offers the chance to provide hallmark architecture connecting the aforementioned communities. However, because of uncertainties regarding the class and type of structure that would ultimately be chosen, and its exact alignment, it is hard to estimate the ultimate cost of this alternative. The bridge type chosen would most likely require additional impact on railroad operations, beyond that contemplated in Alternative C1. Like Alternative C1, the travel time savings for commuters will most likely be minimal, but both bridges could serve additional users beyond Metrorail-bound pedestrians. Like Alternative C1, this alternative requires right-of-way acquisition along North West Street.

To determine a recommended alternative, the City of Alexandria will need to hold further discussions with the affected community and carry out additional engineering work, specifically around the feasibility of relocating the Plantation Pipeline tunnel and modifying pedestrian access along North West Street.

Table 5: Key Points from Engineering Feasibility Assessment

| Item | Alternative A – Station Tunnel | Alternative C1 – North Bridge | Alternative C2 – Signature Bridge |
|--|---|--|---|
| Structural Considerations | <ul style="list-style-type: none"> Minimal long-term maintenance Minimal future inspection requirements Substantial impacts to existing station west wall and concourse | <ul style="list-style-type: none"> Structure is outside of railroad right-of-way Relatively insignificant architectural opportunities Minor ongoing long-term maintenance Periodic bridge inspection requirements – challenging to inspect over railroad | <ul style="list-style-type: none"> Significant architectural opportunities Potential for pier in right-of-way Moderate ongoing long-term maintenance Periodic bridge inspection requirements – challenging to inspect over railroad |
| Mechanical, Electrical, Plumbing | <ul style="list-style-type: none"> No ventilation, heating, or cooling required Power and utilities can be connected to existing station Tunnel drainage system required | <ul style="list-style-type: none"> No heating or cooling required Power and utilities require new service connections | <ul style="list-style-type: none"> No heating or cooling required Power and utilities require new service connections |
| Geotechnical | <ul style="list-style-type: none"> Minimal railroad impacts during construction Conditions appear sufficient for tunneling methods | <ul style="list-style-type: none"> Deep foundations or shallow foundations are likely feasible | <ul style="list-style-type: none"> Spread footings may not be feasible for heavier loads |
| Site and Utilities | <ul style="list-style-type: none"> Significant impact to Plantation Pipeline may make this alternative infeasible | <ul style="list-style-type: none"> Minimal impact to utilities Significant impacts to N. West Street may be required | <ul style="list-style-type: none"> Minimal impact to utilities Significant impacts to N. West Street may be required |
| Constructability | <ul style="list-style-type: none"> Plantation pipeline presents significant constructability risks and added costs Temporary grade crossings needed Tunneling spoils need to be hauled off site Penetrating the existing mezzanine may require temporary shoring in the station | <ul style="list-style-type: none"> Minimal impacts to railroad operations No shoring towers are needed in the track areas Temporary track outages required for crane picks | <ul style="list-style-type: none"> Temporary track outages required for crane picks Moderate impacts to railroad operations Temporary shoring may be required in the track area Temporary grade crossings may be required in the track area |
| Railroad Considerations | <ul style="list-style-type: none"> Railroad flaggers required during construction Temporary excavation support required Track monitoring required | <ul style="list-style-type: none"> Railroad flaggers required during construction Temporary excavation support required Track monitoring required Piers need to be considered for crashworthiness | <ul style="list-style-type: none"> Railroad flaggers required during construction Temporary excavation support required Track monitoring required Piers need to be considered for crashworthiness A tall pylon may be required within CSXT ROW |
| Accessibility Codes and Standards | <ul style="list-style-type: none"> Trail-side entrance should be designed to exceed ADA standards for ramped walkways Requires ramp that would extend into the existing station area just outside the fare gates to meet accessibility standards. This may impact pedestrian flows into and out of the station. | <ul style="list-style-type: none"> North West Street sidewalk must be upgraded to be ADA-compliant | <ul style="list-style-type: none"> North West Street sidewalk must be upgraded to be ADA-compliant |
| Environmental Scan | <ul style="list-style-type: none"> Property acquisition may be required on one parcel | <ul style="list-style-type: none"> Property acquisition may be required on two parcels | <ul style="list-style-type: none"> Property acquisition may be required on two parcels |

APPENDIX A – ENGINEERING COMPARISON OF ALTERNATIVES



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ENGINEERING COMPARISON OF ALTERNATIVES

| Item | Structural Considerations | | |
|----------------------|--|---|---|
| | Alternative A | Alternative C1 | Alternative C2 |
| Advantages | <ul style="list-style-type: none"> Minimal long-term maintenance Minimal future inspection requirements | <ul style="list-style-type: none"> Relatively simple ramp structures Relatively simple structural design Structure is outside of railroad right-of-way | <ul style="list-style-type: none"> Relatively simple ramp structures Significant architectural opportunities |
| Disadvantages | <ul style="list-style-type: none"> Substantial impacts to existing station west wall and concourse Need retaining walls at west entrance that support rail live load | <ul style="list-style-type: none"> Relatively insignificant architectural opportunities Minor ongoing long-term maintenance Periodic bridge inspection requirements – challenging to inspect over railroad | <ul style="list-style-type: none"> Complex structural design Potential for pier in right-of-way Moderate ongoing long-term maintenance Periodic bridge inspection requirements – challenging to inspect over railroad |

| Item | Mechanical, Electrical, Plumbing | | |
|----------------------|--|---|---|
| | Alternative A | Alternative C1 | Alternative C2 |
| Advantages | <ul style="list-style-type: none"> No ventilation, heating, or cooling required Fire alarms not required Power and utilities can be connected to existing station | <ul style="list-style-type: none"> No heating or cooling required Fire protection not required Storm water can be piped off bridge | <ul style="list-style-type: none"> No heating or cooling required Fire protection not required Storm water can be piped off bridge |
| Disadvantages | <ul style="list-style-type: none"> Tunnel drainage system required | <ul style="list-style-type: none"> Power and utilities require new service connections | <ul style="list-style-type: none"> Power and utilities require new service connections |

| Item | Geotechnical Considerations | | |
|----------------------|--|---|---|
| | Alternative A | Alternative C1 | Alternative C2 |
| Advantages | <ul style="list-style-type: none"> Open-shield jack and bore installation allows for minimal railroad impacts during construction Conditions appear sufficient for tunneling methods | <ul style="list-style-type: none"> Deep foundations or shallow foundations are likely feasible | <ul style="list-style-type: none"> Spread footings may not be feasible for heavier loads, depending on complexity of bridge structure type |
| Disadvantages | <ul style="list-style-type: none"> N/A | <ul style="list-style-type: none"> Deep foundations may be preferred to minimize footprint and impact to railroad right-of-way, but may be costlier than spread footings | <ul style="list-style-type: none"> Deep foundations may be costlier than spread footings |

| Item | Site and Utilities | | |
|----------------------|--|--|--|
| | Alternative A | Alternative C1 | Alternative C2 |
| Advantages | <ul style="list-style-type: none"> N/A | <ul style="list-style-type: none"> Minimal impact to utilities | <ul style="list-style-type: none"> Minimal impact to utilities |
| Disadvantages | <ul style="list-style-type: none"> Significant impact to Plantation Pipeline may make this alternative infeasible | <ul style="list-style-type: none"> Widening of sidewalk along N. West Street may be required, with substantial impacts to existing road | <ul style="list-style-type: none"> Widening of sidewalk along N. West Street may be required, with substantial impacts to existing road |

| Item | Constructability | | |
|----------------------|---|---|---|
| | Alternative A | Alternative C1 | Alternative C2 |
| Advantages | <ul style="list-style-type: none"> Cranes likely not required for tunnel construction | <ul style="list-style-type: none"> Minimal impacts to railroad operations Staging areas likely available on each side of the railroad corridor No shoring towers are needed in the track areas | <ul style="list-style-type: none"> Staging areas likely available on each side of the railroad corridor |
| Disadvantages | <ul style="list-style-type: none"> Plantation pipeline presents significant constructability risks and added costs Temporary grade crossings needed Substantial amounts of temporary sheeting required Tunneling spoils need to be hauled off site Penetrating the existing mezzanine may require temporary shoring in the station | <ul style="list-style-type: none"> Temporary track outages required for crane picks | <ul style="list-style-type: none"> Temporary track outages required for crane picks Moderate impacts to railroad operations Temporary shoring may be required in the track area Temporary grade crossings may be required in the track area |

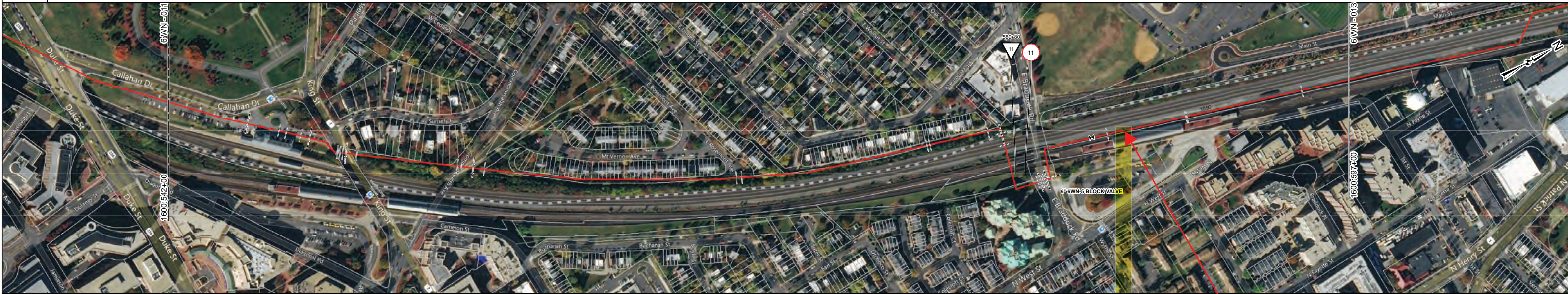
| Item | Railroad Considerations | | |
|----------------------|--|---|---|
| | Alternative A | Alternative C1 | Alternative C2 |
| Advantages | <ul style="list-style-type: none"> NA | <ul style="list-style-type: none"> NA | <ul style="list-style-type: none"> NA |
| Disadvantages | <ul style="list-style-type: none"> Railroad flaggers required for work around tracks Temporary excavation support required when working within live load influence areas Track monitoring required during tunneling | <ul style="list-style-type: none"> Railroad flaggers required for work around tracks Temporary excavation support required when working within live load influence areas Track monitoring required during foundation installation Piers need to be considered for crashworthiness | <ul style="list-style-type: none"> Railroad flaggers required for work around tracks Temporary excavation support required when working within live load influence areas Track monitoring required during foundation installation Piers need to be considered for crashworthiness |

APPENDIX B – PLANTATION PIPELINE ALIGNMENT AND PROFILE



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| | | | |
|---|-----------------------|-----------------------------------|--------|
| Ownership Tract Number Owner Footage | 542+00 | 3 R.F. & P. RAILROAD 5,500' | 597+00 |
| R/W Width | 54+00 | 5 | 597+00 |
| County, State | ALEXANDRIA COUNTY, VA | | |
| P.I.'s Angles & Stations | | | |



| | |
|---|--|
| Sheet Notes TIES TO PROPERTY CORNERS & ROAD INTERSECTIONS | <p>542+56 TIE LEFT 36' TO END OF WOOD RAIL P.R.R.</p> <p>543+62 TIE RIGHT 81' TO CL R.F. & P.R.R.</p> <p>543+00 TIE RIGHT 50' TO POWER POLE</p> <p>545+46 DRAIN MAIN LINE</p> <p>546+15 TIE RIGHT 27' TO BUILDING CORNER</p> <p>546+57 BUILDING CORNER</p> <p>546+76 TIE RIGHT 29' TO BUILDING CORNER</p> <p>546+93 BUILDING CORNER</p> <p>547+24 2" CONDUIT W/ POWER LINE</p> <p>547+35 BUILDING CORNER</p> <p>547+86 3" COMMUNICATION CONDUIT LINE</p> <p>547+88 SIDEWALK</p> <p>548+26 GAS LINE</p> <p>548+40 TIE RIGHT 36' TO SIDEWALK</p> <p>548+58 TIE RIGHT 39' TO SIDEWALK</p> <p>548+79 TIE RIGHT 19' TO SIDEWALK</p> <p>549+30 TIE RIGHT 36' TO POWER POLE</p> <p>549+61 WATER LINE</p> <p>549+72 16" WATER LINE</p> <p>549+85 4" POWER LINE</p> <p>549+99 6" WATER LINE</p> <p>549+85 30" SEWER LINE</p> <p>549+99 12" GAS LINE</p> <p>549+78 EDGE OF PAVEMENT</p> <p>549+85 30" SEWER LINE</p> <p>549+99 12" GAS LINE</p> <p>550+24 EDGE OF PAVEMENT</p> <p>550+45 4" POWER LINE (OVER)</p> <p>550+46 1" WATER PIPE LINE (OVER)</p> <p>550+64 TIE LEFT 20' TO HOUSE CORNER</p> <p>551+08 TIE LEFT 14' TO FENCE CORNER</p> <p>551+51 TIE LEFT 14' TO FENCE CORNER</p> <p>551+90 CORNER</p> <p>552+37 TIE LEFT 13' TO FENCE CORNER</p> <p>553+97 CORNER</p> <p>554+10 TIE LEFT 12' TO FENCE CORNER</p> <p>554+65 12" TO FENCE CORNER</p> <p>554+82 2" PVC CONDUIT W/ ELECTRICAL LINE</p> <p>554+98 30" SEWER LINE</p> <p>555+01 CAL.PPL-14</p> <p>555+13 EDGE OF PAVEMENT</p> <p>555+50 6" DRAIN LINE</p> <p>555+98 24" SEWER LINE</p> <p>556+89 TIE RIGHT 24' TO POWER POLE</p> <p>557+25 TIE LEFT 6' TO FENCE CORNER</p> <p>559+59 TIE RIGHT 21' TO POWER POLE</p> <p>560+59 TIE LEFT 5' TO FENCE</p> <p>564+91 TIE LEFT 6' TO FENCE CORNER</p> <p>564+91 TIE RIGHT 21' TO POWER POLE</p> <p>566+27 TIE LEFT 6' TO FENCE</p> <p>566+98 6" CABLE</p> <p>567+11 1" CABLE</p> <p>567+27 TIE LEFT 7' TO FENCE</p> <p>568+27 TIE LEFT 14' TO FENCE CORNER</p> <p>568+26 TIE LEFT 7' TO FENCE CORNER</p> <p>568+70 TIE RIGHT 43' TO CL R.F. & P.R.R.</p> <p>569+70 TIE LEFT 15' TO FENCE CORNER</p> <p>571+06 TIE LEFT 12' TO FENCE CORNER</p> <p>571+06 TIE RIGHT 45' TO CL R.F. & P.R.R.</p> <p>571+96 TIE LEFT 6' TO FENCE CORNER</p> <p>573+27 TIE LEFT 6' TO FENCE CORNER</p> <p>574+19 TIE LEFT 9' TO FENCE CORNER</p> <p>574+19 TIE RIGHT 17' TO POWER POLE</p> <p>576+09 42" CULVERT</p> <p>576+27 TIE LEFT 5' TO FENCE CORNER</p> <p>577+27 4" FIBER OPTIC CABLE</p> <p>578+46 12" VC PIPE LINE (OVER)</p> <p>578+99 21.125" COMMUNICATION CONDUIT</p> <p>578+99 PPL-14A (FCAP RAILROAD)</p> <p>580+70 CULVERT</p> <p>581+98 8" SEWER LINE</p> <p>582+08 10" SEWER LINE</p> <p>582+11 16" GAS LINE</p> <p>582+18 8" SEWER LINE</p> <p>582+20 8" CONDUITS W/ POWER LINE</p> <p>582+22 10" SEWER LINE</p> <p>582+42 CAL.PPL-15 BRADDOCK STREET</p> <p>582+55 6" WATER LINE</p> <p>582+41 1" x 11" DUCT</p> <p>582+48 6" GAS LINE</p> <p>582+48 6" GAS LINE</p> <p>586+59 10" SEWER LINE</p> <p>586+59 10" COMMUNICATION CABLE</p> <p>586+59 10" POWER LINE</p> <p>586+59 15" SEWER LINE</p> |
|---|--|

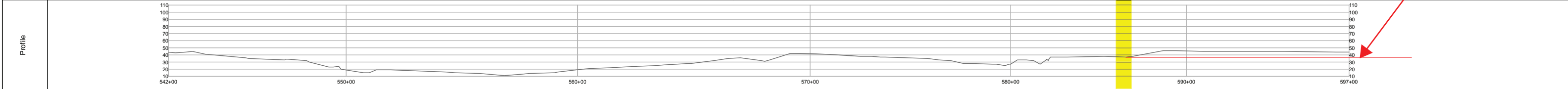
| | |
|----------------|--|
| Pipe Schematic | <p>548+67 BEGIN 11" CASING</p> <p>550+78 2" VENT PIPE</p> <p>550+79 TEST LEAD</p> <p>550+79 END CASING</p> <p>554+77 BEGIN 11" CASING</p> <p>556+15 2" VENT PIPE</p> <p>556+15 TEST LEAD</p> <p>556+15 END CASING</p> <p>576+30 TEST LEAD</p> <p>576+31 BEGIN 11" CASING</p> <p>576+32 2" VENT PIPE</p> <p>576+32 TEST LEAD</p> <p>576+32 END CASING</p> <p>580+80 BEGIN 13" CASING</p> <p>581+47 BEGIN 11" CASING</p> <p>581+48 2" VENT PIPE</p> <p>581+48 TEST LEAD</p> <p>582+50 END CASING</p> <p>586+59 TEST STATION</p> <p>586+59 6" 6" IN-5 BLOCK VALVE</p> |
|----------------|--|

PROPOSED TUNNEL LOCATION

| | |
|---|---|
| Pipe Material Diameter Wall SMYS Install Date | <p>542+00</p> <p>6.625" x 0.250" GR. B 3/1/1968</p> <p>574+65</p> <p>6.625" x 0.250" GR. B 11/26/1997</p> <p>597+00</p> |
|---|---|

| | |
|--------------------------------------|--|
| External Coating Material Type | <p>542+00</p> <p>COAL TAR 4/1/1968</p> <p>566+77</p> <p>COAL TAR 6/23/1978</p> <p>597+00</p> |
|--------------------------------------|--|

APPROXIMATE ELEVATION = 38'



| <table border="1"> <thead> <tr> <th>#</th> <th>DATE</th> <th>REVISION</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table> | # | DATE | REVISION | | | | <table border="1"> <tr> <td> <ul style="list-style-type: none"> Calculated Milepost Aerial Marker Railroad Milepost Station Equation Township-Range-Section </td> <td> <ul style="list-style-type: none"> Launcher Receiver Valve Check Valve Tee Branch Connect Stopple-T Reducer Sleeve </td> <td> <ul style="list-style-type: none"> Casing Vent Pipe Concrete Overcoat Concrete Slab Cathodic Test Station Ground Bed Rectifier Anode Bond </td> <td> <ul style="list-style-type: none"> KM Pipeline Other KM Pipelines KM Nat Gas Lines Section County Line State Line Water Crossing Railroad Right of Way River Weights </td> </tr> </table> | <ul style="list-style-type: none"> Calculated Milepost Aerial Marker Railroad Milepost Station Equation Township-Range-Section | <ul style="list-style-type: none"> Launcher Receiver Valve Check Valve Tee Branch Connect Stopple-T Reducer Sleeve | <ul style="list-style-type: none"> Casing Vent Pipe Concrete Overcoat Concrete Slab Cathodic Test Station Ground Bed Rectifier Anode Bond | <ul style="list-style-type: none"> KM Pipeline Other KM Pipelines KM Nat Gas Lines Section County Line State Line Water Crossing Railroad Right of Way River Weights | <p>Township Range Section</p> <p>Flow Direction</p> <p>FLOW</p> | <p>KINDER MORGAN ENERGY PARTNERS, L.P.</p> <p>System SOUTHEAST</p> <p>Sub System PLANTATION</p> <p>Line 6 WN</p> <p>Route ASHINGTON TO NATIONAL AIRPORT</p> <p>District SECTION 19B</p> <p>Scale 1" = 200'</p> <p>Line # 4906WN006 Sheet # 012</p> <p>Generate Date 12/05/17</p> |
|---|---|---|--|--|--|--|---|---|---|---|--|--|---|
| # | DATE | REVISION | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| <ul style="list-style-type: none"> Calculated Milepost Aerial Marker Railroad Milepost Station Equation Township-Range-Section | <ul style="list-style-type: none"> Launcher Receiver Valve Check Valve Tee Branch Connect Stopple-T Reducer Sleeve | <ul style="list-style-type: none"> Casing Vent Pipe Concrete Overcoat Concrete Slab Cathodic Test Station Ground Bed Rectifier Anode Bond | <ul style="list-style-type: none"> KM Pipeline Other KM Pipelines KM Nat Gas Lines Section County Line State Line Water Crossing Railroad Right of Way River Weights | | | | | | | | | | |

APPENDIX C – CSXT COORDINATION



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From: Creasy, Troy
To: [Mark Niles](#)
Subject: Pedestrian Bridge over CSX
Date: Monday, January 28, 2019 2:47:03 PM
Attachments: [CSX Public Projects Review Application FORM AEC-01.pdf](#)
[CSX Overhead Bridge Criteria.pdf](#)

Greetings,

In order to begin preliminary engineering review and coordination with CSX, please complete the attached PE Review application. Upon completion of the application return it to the point of contact designated therein. Copy myself and my assistant Kathy Cramme on the application submission. Kathy's e-mail address is Katherine_Cramme@csx.com. Please let me know if you have any questions.

The CSX Public Projects Manual is a good source of general information about working with CSX. Page 19 covers general guidelines for building overhead structures over CSX property. I have also attached the CSX Overhead Bridge Criteria for your reference.

[Link to the CSX Public Projects Manual](#)

Best regards,

Troy J. Creasy
CSX Public Projects

This email transmission and any accompanying attachments may contain CSX privileged and confidential information intended only for the use of the intended addressee. Any dissemination, distribution, copying or action taken in reliance on the contents of this email by anyone other than the intended recipient is strictly prohibited. If you have received this email in error please immediately delete it and notify sender at the above CSX email address. Sender and CSX accept no liability for any damage caused directly or indirectly by receipt of this email.



CSX Transportation, Inc. Application for Project Review

This document contains the instructions and application for CSX project review of public improvement projects which impact or have the potential to impact the property of CSX Transportation, Inc. (CSXT). Entry for environmental, large equipment movement, soil borings, surveys, inspections, non-construction investigations or wireline/pipeline access should be redirected to:

www.csx.com

In order to expedite the timely processing and ultimate execution of your request, please provide the following (instructions attached for each):

1. One (1) signed original application form.
2. One (1) copy of the work description statement.
3. One (1) letter size print or sketch depicting location of project. Additional plans may be submitted for clarification, if necessary.

All applications and drawings should be sent to:

E-mail (Preferred Method)

Assunta.Daprano@aecom.com

Or

Mail

AECOM - CSX Public Projects
1700 Market Street - Suite 1600
Philadelphia, PA 19103

General Information

Questions concerning technical aspects of the project and/or the application and agreement process should be directed to Project Manager Assunta Daprano at Assunta.Daprano@aecom.com. When the completed application documents as outlined above are received, the proposed agreement will be sent to you in approximately 14 days (provided the application is approved). Incomplete applications or drawings will be returned to the applicant and not handled until the correct information is received.

NO VERBAL AUTHORIZATION IS VALID TO WORK ON CSXT PROPERTY. FULLY EXECUTED AGREEMENTS, INSURANCE APPROVALS BY CSX, ADVANCED PAYMENT, AND ROADMASTER NOTIFICATION ARE REQUIRED PRIOR TO ANY APPROVAL OF ENTRY ONTO CSXT PROPERTY, OR WORK BEING PERFORMED. UNAUTHROZIED WORK WILL BE PURSUED TO THE FULLEST EXTENT OF THE LAW IN ADDITION TO THE DEPOSIT BEING FORFEITED IN ITS ENTIRETY.

If the work involves excavation, or other similar work requiring penetration below land surface, notification must be made to the state's or locality's one-call system and to CSXT's signal supervisor.

Instructions for Preparing Application Drawings

For uniformity in the preparation of prints and/or sketches to accompany applications, and in order to facilitate prompt processing, the following instructions will apply to all projects application drawings and/or sketches. Failure to include all pertinent information (either on the application or drawing) may result in the delay of processing or return of the application.

The size of the project application drawing shall be 8-1/2" x 11." Larger drawings or construction plans may be submitted if necessary for clarification but cannot be used in lieu of the project application drawing.

The project application drawing and/or sketch shall be to scale, or show adequate dimensional information, and must include:

- North arrow.
- Nearest road crossing showing milepost and DOT number as outlined below.
- Plan view clearly showing the proposed project, including stationing and legends if applicable.
- Centerline of all railroad tracks.
- Property and/or right-of-way lines if known.
- Location of all proposed work and routes of access.
- A statement indicating whether or not it will be necessary to: 1) physically cross any railroad track (with vehicles or on foot) and; 2) come within 25 feet of any railroad track at any point along the access route or while conducting work.
- Drawing number and date

Instructions for Preparing Application Form

- "Project Owner Information" and "Project Information" sections must be filled out completely.
- The agreement will be prepared in the name of the Project Owner. It is important to provide the complete Legal Name of the entity as well as its state of incorporation.
- Check the appropriate space to designate where the agreement should be mailed. If none or both are checked, the agreement will be mailed only to the Project Owner.
- **REQUIRED:** Provide the estimated distance to/from the nearest road crossing or milepost. Identify the road crossing by its CSXT Railroad Milepost number (including prefix, i.e. QC 292.83) and/or DOT number. The DOT number is a specific number assigned to each road crossing CSXT tracks and should be posted at or near the crossing (usually on a pole or signal mast). It is usually a rectangular white sign with black numbers/letters and will consist of 6 numbers followed by one letter (Example: 630 543 P). In lieu of the DOT number, an exact Latitude and Longitude may be provided to aid in finding the project location in the railroad's maps and files.
- Please remember to date and sign the application form.

Instructions for Preparing Proposed Work Description

Prepare a brief description of the proposed work (not to exceed three pages), providing sufficient information to justify the need to access CSXT property. The information shall include:

- the proposed start date and expected duration of the project;

- a description of the proposed work identifying the nature and location of any item or structure to be installed on CSXT property (e.g., culverts, monuments, ditches);
- Types of equipment to be used onsite (drill rigs, backhoe, excavator, etc.).
- Methods of restoring right-of-way if disturbed by work.

Please be aware that the Agreement will be strictly limited to the scope of services as defined in your work description. If, at any time, it becomes necessary to modify the scope of service, you must request a modification in writing and obtain a supplemental Agreement prior to performing the work.

Flagging Requirements

If required for your work, a CSXT flagman will be provided at the entire cost and expense of the work's owner and/or the applicant for the duration of the project. This protection cannot be provided by any personnel other than an authorized CSXT employee. CSXT will make the sole determination as to whether flagging protection is required based on the work to be performed. CSXT flagging costs are approximately \$1300 per day. While CSXT cannot guarantee the availability of flagmen at all requested times, every accommodation will be extended to the Contractor when forces are available.

Payment of CSXT's Costs and Expenses

Key Points and Procedures

- For non-State agencies, administrative costs and anticipated flagging services must be paid in advance of the proposed work.
- CSXT flagging expenses will be estimated during the preparation of the agreement. The estimated cost will be incorporated into the agreement. *Advance payment is required to cover these expenses prior to the start of project work.*
- If CSXT anticipates that actual expenses will exceed the advance payment, additional payment will be required. Project work may be stopped until additional payment is received.
- If CSXT's actual expenses are less than the sum of any deposits the difference will be refunded after final cost accounting.

Project sponsor shall reimburse CSXT for all costs and expenses incurred by CSXT in connection with the Right of Entry.

Examples of Costs and Expenses associated with Project Reviews include:

- All out of pocket expenses
- Travel and lodging expenses
- Costs for equipment, tools, materials and supplies
- Sums paid to CSXT's consultants and subcontractors
- CSXT labor in connection with the Project

PAYMENT INSTRUCTIONS

Following receipt of a completed application, a Force Account Estimate will be provided that will include a non-refundable Application Processing Fee in the amount of **\$1,500.00**, plus any necessary flagging and administrative cost. Advance payment of the estimate amount, payable to CSX Transportation, Inc., shall be delivered to the below address along with a completed Schedule PA form that will be provided with the estimate. Please send checks only! Agreements & Applications will be shredded!

CSX Transportation, Inc.
P. O. Box 530192
Atlanta, GA 30353-0192

- Deliver a scanned copy of the check and Schedule PA Form to Katherine_Cramme@csx.com for tracking purposes.
- Only a fully executed Agreement constitutes CSX approval of the project.
- Unused monies may be refunded following completion of the project.
- An example of a Force Account Estimate, with four (4) days of flagging, is provided below as general reference.

| | | | |
|---|--|----------------------------------|-------------------------|
| ESTIMATE SUBJECT TO REVISION AFTER: | | 3/8/2016 | DOT NO.: 123456A |
| CITY: City | COUNTY: County | | STATE: VA |
| DESCRIPTION: RIGHT-OF-ENTRY REQUEST: Estimate of cost to support Smith Street pavement resurfacing and striping | | | |
| DIVISION: C&O Division (Huntington) | | SUB-DIV: Subdivision name | MILE POST: RRMP |
| AGENCY PROJECT NUMBER: | | | |
| CONSTRUCTION ENGINEERING/INSPECTION: | | | |
| 212 | Contracted & Administrative Engineering Services (CSXT In-Office) | | \$ 200 |
| 212 | Contracted & Administrative Engineering Services (Application Fee) | | \$ 1,150 |
| | Subtotal | | \$ 1,350 |
| FLAGGING SERVICE: (Contract Labor) | | | |
| 070 | Labor (Conductor-Flagman) | | \$ - |
| 050 | Labor (Foreman/Inspector) | 4 Days @ \$ 1,200.00 | \$ 4,800 |
| 230 | Per Diem & Expenses (Engineering Department) | 4 Days @ \$ 100.00 | \$ 400 |
| | Subtotal | | \$ 5,200 |
| SIGNAL & COMMUNICATIONS WORK: | | | |
| | | | \$ - |
| TRACK WORK: | | | |
| | | | \$ - |
| PROJECT SUBTOTAL | | | \$ 6,550 |
| 900 | CONTINGENCIES: | 10.00% | \$ 655 |
| GRAND TOTAL ***** | | | \$ 7,205 |
| DIVISION OF COST: | | | |
| | Agency | <u>100.00%</u> | \$ 7,205 |
| | Railroad | | \$ - |
| TOTAL ***** | | | \$ 7,205 |
| NOTE: Estimate is based on FULL CROSSING CLOSURE during work by Railroad Forces. | | | |
| This estimate has been prepared based on site conditions, anticipated work duration periods, material prices, labor rates, manpower and resource availability, and other factors known as of the date prepared. The actual cost for CSXT work may differ based upon the agency's requirements, their contractor's work procedures, and/or other conditions that become apparent once construction commences or during the progress of the work. | | | |
| Office of Assistant Chief Engineer Public Projects—Jacksonville, Florida | | | |
| Estimated prepared by: | Approved by: | CSXT Public Project Group | |
| DATE: 9/10/2015 | REVISED: | DATE: | |

Example of CSX Force Account Estimate

Insurance Requirements

I. Insurance Policies

Agency and Contractor, if and to the extent that either is performing work on or about CSXT's property, shall procure and maintain the following insurance policies:

1. Commercial General Liability (CGL) coverage at their sole cost and expense with limits of not less than \$5,000,000 in combined single limits for bodily injury and/or property damage per occurrence, and such policies shall name CSXT as an additional insured.
2. Statutory Worker's Compensation and Employers Liability Insurance with limits of not less than \$1,000,000, which insurance must contain a waiver of subrogation against CSXT and its affiliates [if permitted by state law].
3. Commercial Automobile Liability insurance with limits of not less than \$1,000,000 combined single limit for bodily injury and/or property damage per occurrence, and such policies shall name CSXT as an additional insured.
4. Railroad Protective Liability (RPL) insurance with limits of not less than \$5,000,000 combined single limit for bodily injury and/or property damage per occurrence and an aggregate annual limit of \$10,000,000, which insurance shall satisfy the following additional requirements:
 - a. The Railroad Protective Liability Insurance Policy must be on the ISO/RIMA Form of Railroad Protective Insurance - Insurance Services Office (ISO) Form CG 00 35.
 - b. CSX Transportation must be the named insured on the Railroad Protective Liability Insurance Policy. The named insured's address should be listed as:

CSX Transportation, Inc.
500 Water Street, C-907
Jacksonville, FL 32202

- c. The Name and Address of the Contractor and of the Project Sponsor/Involved Governmental Agency must be shown on the Declarations page.
- d. A description of operations and location must appear on the Declarations page and must match the CSX Project description.
- e. Terrorism Risk Insurance Act (TRIA) coverage must be included.
- f. Authorized endorsements must include:

(i) Pollution Exclusion Amendment - CG 28 31, unless using form CG 00 35 version 96 and later

- g. Authorized endorsements may include:

- (i) Broad Form Nuclear Exclusion - IL 00 21
- (ii) Notice of Non-renewal or cancellation
- (iii) Required State Cancellation Endorsement
- (iv) Quick Reference or Index - CL/IL 240

h. Authorized endorsements may not include:

- (i) A Pollution Exclusion Endorsement except CG 28 31
- (ii) An Endorsement that excludes TRIA coverage
- (iii) An Endorsement that limits or excludes Professional Liability coverage
- (iv) A Non-Cumulation of Liability or Pyramiding of Limits Endorsement
- (v) A Known Injury Endorsement
- (vi) A Sole Agent Endorsement
- (vii) A Punitive or Exemplary Damages Exclusion
- (viii) A "Common Policy Conditions" Endorsement
- (ix) Policies that contain any type of deductible
- (x) Any endorsement that is not named in Section 4 (f) or (g) above that CSXT deems unacceptable

i. *At Railroad's option, in lieu of purchasing RPL insurance (but not CGL insurance), Licensee may pay Railroad a Construction Risk Fee, currently THREE THOUSAND DOLLARS (\$3,000) per location, and thereby be relieved of any obligation to purchase said RPL insurance.*

5. All insurance companies must be A. M. Best rated A- and Class VII or better.

6. Such additional or different insurance as CSXT may require.

II. Additional Terms

1. Contractor must submit the complete Railroad Protective Liability policy, Certificates of Insurance and all notices and correspondence regarding the insurance policies in an electronic format to:

insurancedocuments@csx.com

2. Neither Agency nor Contractor may begin work on or about CSXT property until written approval of the required insurance has been received from CSXT or CSXT's Insurance Compliance vendor, Ebix.

III. Insurance Contact Information

1. CSXT utilizes a third-party company to handle all insurance documentation submittals and approvals. For insurance questions contact:

Ariana Sladky

Phone: (619) 881-4251

Email: Ariana.Sladky@Ebix.com or insurancedocuments@csx.com.

CERTIFICATE OF LIABILITY INSURANCE

Date: MM/DD/YY

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

| PRODUCER Phone: _____ Fax: _____ Name & Address of Producer | CONTACT NAME: PHONE _____ (A/C, No, Ext): _____ FAX (A/C, No): _____ E-MAIL _____ ADDRESS: _____ PRODUCER _____ CUSTOMER ID #: _____ INSURER(S) AFFORDING COVERAGE <table style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 80%;">INSURER(S) AFFORDING COVERAGE</th> <th style="width: 20%;">NAIC #</th> </tr> <tr> <td>INSURER A: AM Best Rating A-, Or Better</td> <td>provide</td> </tr> <tr> <td>INSURER B: AM Best Rating A-, Or Better</td> <td>provide</td> </tr> <tr> <td>INSURER C: AM Best Rating A-, Or Better</td> <td>provide</td> </tr> <tr> <td>INSURER D: AM Best Rating A-, Or Better</td> <td>provide</td> </tr> </table> | INSURER(S) AFFORDING COVERAGE | NAIC # | INSURER A: AM Best Rating A-, Or Better | provide | INSURER B: AM Best Rating A-, Or Better | provide | INSURER C: AM Best Rating A-, Or Better | provide | INSURER D: AM Best Rating A-, Or Better | provide |
|---|---|-------------------------------|--------|--|----------------|--|----------------|--|----------------|--|----------------|
| INSURER(S) AFFORDING COVERAGE | NAIC # | | | | | | | | | | |
| INSURER A: AM Best Rating A-, Or Better | provide | | | | | | | | | | |
| INSURER B: AM Best Rating A-, Or Better | provide | | | | | | | | | | |
| INSURER C: AM Best Rating A-, Or Better | provide | | | | | | | | | | |
| INSURER D: AM Best Rating A-, Or Better | provide | | | | | | | | | | |
| INSURED Name & Address of Insured | | | | | | | | | | | |

COVERAGES **CERTIFICATE NUMBER:** _____
REVISION NUMBER: _____

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| INSR LTR | TYPE OF INSURANCE | ADDL INSR | SUBR WVD | POLICY NUMBER | POLICY EFF DATE (MM/DD/YY) | POLICY EXP (MM/DD/YYYY) | LIMITS |
|----------|--|-----------|----------|---------------|----------------------------|-------------------------|---|
| A | GENERAL LIABILITY <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY ✓ <input type="checkbox"/> CLAIMS MADE <input checked="" type="checkbox"/> OCCUR GENERAL AGG. LIABILITY APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PROJECT <input checked="" type="checkbox"/> LOC | | | | | | EACH OCCURRENCE \$5,000,000 DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS -COMP/OF AGG |
| | AUTOMOBILE LIABILITY <input checked="" type="checkbox"/> ANY AUTO ✓ <input checked="" type="checkbox"/> ALL OWNED AUTOS ✓ <input checked="" type="checkbox"/> SCHEDULED AUTOS ✓ <input checked="" type="checkbox"/> HIRED AUTOS ✓ <input checked="" type="checkbox"/> NON-OWNED AUTOS ✓ <input type="checkbox"/> CA 20 70 | | | | | | COMBINED SINGLE LIMIT \$1,000,000 (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) |
| | <input type="checkbox"/> UMBRELLA FORM <input checked="" type="checkbox"/> OCCUR <input type="checkbox"/> EXCESS LIAB <input type="checkbox"/> CLAIMS MADE <input type="checkbox"/> DEDUCTIBLE RETENTION | | | | | | EACH OCCURRENCE AGGREGATE |
| D | WORKERS COMPENSATION AND EMPLOYER'S LIABILITY ANY PROPRIETOR/PARTNER/ EXECUTIVE OFFICER/MEMBER EXCLUDED? <input type="checkbox"/> Y/N (Mandatory in NH) If yes, describe under DESCRIPTION OF OPERATIONS below | N/A | Y | | | | <input checked="" type="checkbox"/> WC STATUTORY LIMITS: OTHER E.L. EACH ACCIDENT \$1,000,000 DISEASE - EA EMPLOYEE \$1,000,000 E.L. DISEASE - POLICY LIMIT \$1,000,000 |

Railroad Protective Coverage Each Occurrence **\$5,000,000**

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES
 CSX Transportation is listed as an Additional Insured.

| | |
|---|---|
| CERTIFICATE HOLDER CSX Transportation Insurance Compliance 500 Water Street, Speed Code J-907 Jacksonville, FL 32202 RenewalCOI@CSX.com | CANCELLATION SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS. AUTHORIZED REPRESENTATIVE <p style="text-align: center;">Certificate Must be Signed</p> |
|---|---|

CSX Project Review Application

Date:

ALL FIELDS MARKED WITH AN ASTERISK (*) ARE REQUIRED FIELDS AND MUST BE COMPLETED

SECTION 1: PROJECT INFORMATION

Legal Name of Party Performing the Work (required)

*Owner's Complete
Legal Company Name

*Legal Address (1)

Legal Address (2)

*City:

*State:

*Zip:

*Business Type:

State of Incorporation (If
applicable)

Billing Address

Check box if same as above

(Billing address should match agreement agency/sponsor signatory)

Billing Address (1):

Billing Address (2):

City:

*State:

*Zip:

Project Contact Information

*Contact Name:

Contact Title:

*Office Phone:

Cell Phone:

*Email:

*24/7 Emergency
Phone:

SECTION 2: PROJECT REFERENCE

*Is this a time extension request or a request to add an additional location to an existing Right-of-Entry Agreement?

If Yes, Provide Agreement # and/or date:

*Is this project related to another transaction/project with CSX?

If Yes, Provide as much information as possible.

*Provide Applicant's Project Reference Number:

SECTION 3: PROJECT LOCATION/SCOPE/DESCRIPTION

Project Location

*City:

* County:

*State:

In addition to the above location information, a minimum of one of the below references must be provided for processing.

Latitude:

Longitude:

DOT#

RR Milepost:

*Nearest address:

feet

(Direction) from DOT Road Crossing Number

feet

(Direction) from CSX Railroad Milepost Number

Project Scope

*Please select a type of entry request

If Other, please describe here:

Railroad Operations

*How close will the proposed activity be to the nearest railroad track?

*Will the proposed activity require crossing railroad track(s)

Project Description

*Please provide an accurate project description, scope of work, and a detailed drawing(s). Please also include the type of equipment that will be used.

*Proposed Project Start Date:

*Proposed Project Duration (Days):

*Will this work be performed at night and/or on weekends?

SECTION 4: AGREEMENT INFORMATION

*Upon submission of a completed application, an agreement and estimated cost for flagging will be sent to you upon CSX approval. Who will be the signatory on the agreement?

Name:

Sponsor & Title:

**CSX TRANSPORTATION – GOVERNMENT BILLING DEPT
NEW PROJECT FORM**

To ensure compliance with Federal requirements, please provide the following information so that CSXT may accurately and appropriately setup and handle the necessary accounting associated with the proposed project.

***1) Is the project Federally Funded?**

***2) Funding Source:** If the project is funded by multiple sources please provide the approximate anticipated percentage of the total project cost to be paid by each source.

If multiple or other please describe here:

***3) Project Requirements**

- Procurement Restrictions (e.g. Buy America(n), Buy State, US Steel)
- Procurement Restrictions Waiver
- Suspended / Debarred
- Davis-Bacon Act
- E-Verify
- Other, please describe here:

***4) Single Audit Type:** Please advise if the project is subject to single audit requirements by completing the appropriate box below (complete only one box).

| | | |
|---|--|--|
| <p>Not Applicable <input type="checkbox"/></p> <p>CSX is not subject to the Single Audit.</p> <p>Note: This audit is not related to the project specific audit performed by your agency.</p> | <p>Federal Single Audit <input type="checkbox"/></p> <p>(OMB Circular A-133)</p> <p>Single Audit Status ¹ ² :</p> <p>Vendor (CFDA # Not Required)</p> <p>Recipient (CFDA # _____)</p> <p>Sub-Recipient (CFDA # _____)</p> | <p>Florida Single Audit <input type="checkbox"/></p> <p>(Florida Statute 215.97)</p> <p>CSFA # ³ _____</p> |
|---|--|--|

¹ **Single Audit Status:** If CSX is subject to the Federal Single Audit, please advise if CSX is considered a Vendor, Sub-Recipient or Recipient. The Federal Sub-Recipient and Vendor Determination Checklist is enclosed for reference.
² **CFDA Number:** If CSX is subject to the Federal Single Audit, please provide the Catalog of Federal Domestic Assistance (CFDA) number.
³ **CSFA Number:** If CSX is subject to the Florida Single Audit, please provide the Catalog of State Financial Assistance (CSFA) number.
 For Single Audit related questions, contact GBCompliance@csx.com.

5) Agency Billing Information

| | | | | |
|----------------------------|--|----------------|--|--------------|
| *Name: | | | | |
| *Legal Address (1): | | | | |
| *City: | | | | |
| *Email: | | *State: | | *Zip: |

****By signing this form you are authorizing CSXT to incur costs against this project****
Please sign, print (optional), and e-mail this form to the authorized CSX representative

| | |
|--------------------------------|---------------|
| Signature of Applicant: | *Date: |
|--------------------------------|---------------|

Print **Submit Electronically**

FEDERAL SUBRECIPIENT AND VENDOR DETERMINATION CHECKLIST
Reference 29CFR99.210 and OMB Circular A-133.210

Subrecipient and Vendor Determinations

- (a) **General:** An auditee may be a recipient, a subrecipient, and a vendor. Federal awards expended as a recipient or a subrecipient would be subject to audit under this part. The payments received for goods or services provided as a vendor would not be considered Federal awards. The guidance in paragraphs (b) and (c) of this section should be considered in determining whether payments rendered to CSX constitute a Federal award or a payment for goods and services.

SUBRECIPIENT

- (b) **Federal Award:** Characteristics indicative of a Federal award received by a subrecipient are when the organization:

1. Determines who is eligible to receive what Federal financial assistance
2. Has its performance measured against whether the objectives of the Federal program are met
3. Has responsibility for programmatic decision-making
4. Has responsibility for adherence to applicable Federal program compliance requirements
5. Uses the Federal funds to carry out a program of the organization as compared to providing goods or services for a program of the pass-through entity

VENDOR

- (c) **Payment for goods and services:**

1. Provides the goods and services within normal business operation
2. Provides similar goods or services to many different purchasers
3. Operates in a competitive environment
4. Provides goods or services that are ancillary to the operation of the Federal program
5. Is not subject to compliance requirements of the Federal program

- (d) **Use of judgment in making determination:** There may be unusual circumstances or exceptions to the listed characteristics. In making the determination of whether a subrecipient or vendor relationship exists, the substance of the relationship is more important than the form of the agreement. It is not expected that all of the characteristics will be present and judgment should be used in determining whether an entity is a subrecipient or vendor.

Source <http://www.whitehouse.gov/sites/default/files/omb/circulars/a133/a133.pdf> (§ ____ .210 Subrecipient and vendor determinations)

APPENDIX

CSX Transportation

OVERHEAD BRIDGE CRITERIA

Office of Director Fixed Plant Engineering
Jacksonville, FL
Date Issued: July 2017

CRITERIA FOR OVERHEAD BRIDGES

CSX Transportation (CSXT) has minimum requirements for outside parties constructing, rehabilitating, or replacing bridges over CSXT's railroad tracks. These requirements are intended to provide safe and continuous passage of all train traffic during and after construction of bridges over its tracks. Part of these requirements is for the outside party to submit a detailed plan of the project as well as provide details of the construction methodology. This document provides information on the requirements by CSXT for overhead bridges.

Plans and specifications for new or reconstructed bridges over CSXT's railroad tracks or right-of-way shall meet the following requirements:

I. GENERAL REQUIREMENTS:

- A. CSXT's valuation station and the distance from the nearest milepost at the intersection of the centerline of the track and the centerline of the bridge shall be shown on the General Plan.
- B. The existing and proposed minimum horizontal and vertical clearances shall be marked clearly on the General Plan and Elevation.
- C. At least one subsurface exploration boring for each substructure unit adjacent to the track shall be furnished to CSXT's during the design submittal. Borings shall provide enough information to design shoring and foundations.
- D. Prior to construction activities, all overhead bridge projects will require the procurement of the appropriate property rights from Real Estate and Facilities Management (REFM) and other construction agreement(s) with CSX Transportation.
- E. All lifting equipment and connection devices shall have capacity for 150% of the actual lifting load. The factor of safety provided by the manufacturer in the lifting capacity data shall not be considered in the 150% requirement. A licensed professional engineer, familiar with lifting and rigging, in the State where the construction work is proposed must sign and seal all plans and calculations related to critical lifting on the project.

II. CLEARANCES:

- A. Horizontal Clearance: Standard horizontal clearance from centerline of the track to the face of the pier or abutment shall typically be 25'-0" or greater, but never less than 18'-0", measured perpendicular to the track. Provisions for future tracks, access roads, other CSXT facilities, and drainage may require the minimum clearance be increased or use of multi-span structures. The toe of footings shall not be closer than 11'-0" from centerline of the track to provide adequate room for sheeting.
- B. Vertical Clearance: A standard vertical clearance of 23'-0" shall be provided, measured from top of high rail to lowest point of structure in the horizontal clearance area which extends 6'-0" either side of the centerline of track.
- C. Temporary Construction clearances to be used shall be subject to approval by CSXT. Typically reductions in clearance for construction are not permitted.
- D. CSXT shall be furnished as-built drawings showing actual clearances as constructed.

III. CRASHWALLS:

AREMA Specifications, Chapter 8, Article 2.1.5 covers the requirements for crashwalls. Crashwalls are required when face of the pier is closer than 25'-0" from centerline of the track, measured perpendicular to the track, except as noted below.

Crashwalls shall meet the following requirements:

- A. Crashwalls for single column piers shall be minimum 2'-6" thick and shall extend a minimum of 6'-0" above the top of high rail for piers located between 18'-0" and 25'-0" from the centerline of the nearest track. The wall shall extend minimum 6'-0" beyond the column on each side in the direction parallel to the track.
- B. For multi-column piers, the columns shall be connected with a wall of the same thickness as the columns or 2'-6"

whichever is greater. The wall shall extend a minimum of 2'-6" beyond the end of outside columns in a direction parallel to the track.

C. Reinforcing steel to adequately anchor the crashwalls to the column and footing shall be provided. For piers of heavy construction, crashwalls may be omitted. Solid piers with a minimum thickness of 2'-6" and length of 20'-0", single column piers of minimum 4'-0" X 12'-6" dimensions or any other solid pier sections with equivalent cross sections and minimum 2'-6" thickness are considered as heavy construction.

IV. DRAINAGE:

Drainage from the bridge shall be preferably collected with drain pipes and drained away from CSXT's right-of-way. When open scuppers are provided on the bridge, none shall be closer than 25'-0" of the centerline of nearest track. Flow from the scuppers shall be directed away from CSXT's drainage ditches.

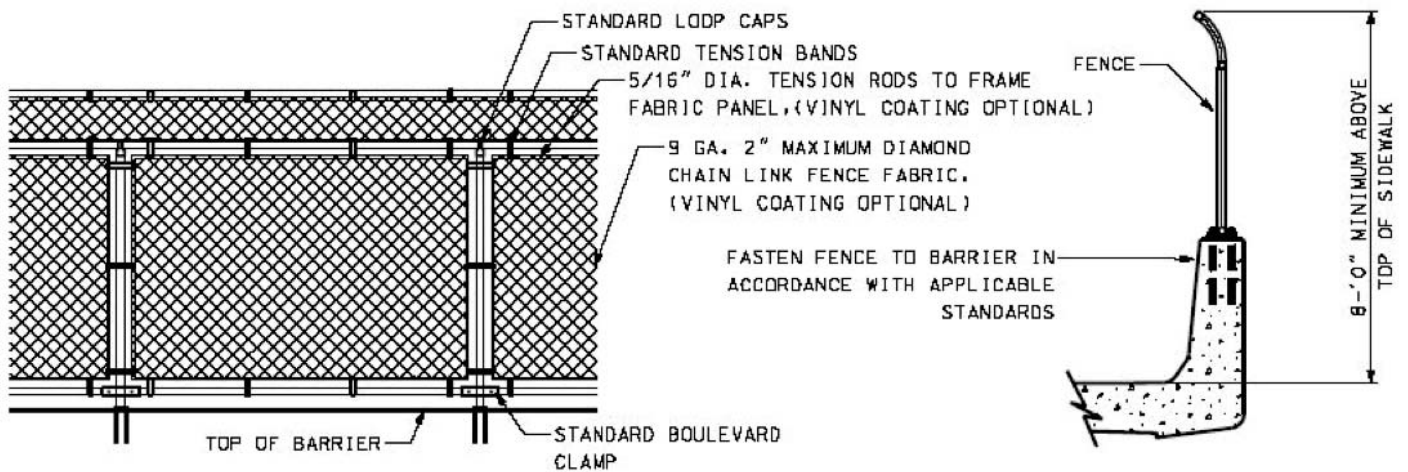
Projects including stormwater systems shall be designed for a 100-year storm event as a minimum. If stormwater is drained on or to CSXT's right-of-way, calculations must be submitted to CSXT to verify the 100-year storm event is properly handled. Improvements to the adjacent drainage systems may be required at project expense, to ensure the impacted system will meet the 100-year storm event minimum condition.

During and after completion of construction, the outside party or its contractor must clear CSXT's drainage ditches of all debris to the satisfaction of CSXT's construction engineering and inspection representative.

V. PROTECTIVE FENCING:

All highway structures shall have a protective barrier fence to extend at least 8'-0" from the top of the sidewalk or driving surface adjacent to the barrier wall. The fence may be placed on top of the barrier wall. The fence shall be capable of preventing pedestrians from dropping debris onto CSXT's right-of-way, and in particular, passing trains.

Openings in the fence shall not exceed 2" x 2". Fencing should also include anti-climbshields or be of a configuration to minimize the likelihood of climbing on the outside of the protective fencing. A chain link fence option is shown below:



VI. STRUCTURE EXCAVATION AND SHORING:

Shoring protection shall be provided when excavating adjacent to an active track. Shoring will be provided in accordance with *AREMA Manual for Railway Engineering* Chapter 8 part 28, except as noted below.

Shoring will not be required if both the following conditions are satisfied:

1. Excavation does not encroach upon a 1 horizontal to 1 vertical theoretical slope line starting at bottom corner of tie (live load influence zone).
2. Track is on level ground or in a cut section and on stable soil.

When the track is on an embankment, excavating the toe of the embankment without shoring may affect the stability of the embankment. Therefore, excavation of the embankment toe without shoring will not be permitted.

Preferred protection is the cofferdam type that completely encloses the excavation. Where dictated by conditions, partial cofferdams with open sides away from the track may be used. Cofferdams shall be constructed using steel sheet piling or steel soldier piles with timber lagging. Wales and struts shall be provided as needed. The following shall be considered when designing cofferdams:

- a. Shoring shall be designed to resist a vertical live load surcharge of 1,882 lbs. per square foot, in addition to active earth pressure. The surcharge shall be assumed to act on a continuous strip, 8'-6" wide. Lateral pressures due to surcharge shall be computed using the strip load formula shown in *AREMA Manual for Railway Engineering*, Chapter 8, Part 20.
- b. Allowable stresses in materials shall be in accordance with *AREMA Manual for Railway Engineering*, Chapter 7, 8, and 15.
- c. A construction procedure for temporary shoring shall be shown on the drawing.
- d. Safety railing shall be installed when temporary shoring is within 15'-0" of the centerline of the track.
- e. A minimum distance of 10 feet from centerline of the track to face of nearest point of shoring shall be maintained.

The contractor shall submit the following drawings and calculations for CSXT's review and approval.

1. Three (3) sets of detailed drawings of the shoring systems showing sizes of all structural members, details of connections, and distances from centerline of track to face of shoring. Drawing shall show a section showing height of shoring and track elevation in relation to bottom of excavation.
2. One set of calculations of the shoring design.

The drawings and calculations shall be prepared by a Licensed Professional Engineer in the State where shoring is to be constructed and shall bear his seal and signature. Shoring plans shall be approved by CSXT's construction engineering and inspection representative.

3. For sheeting and shoring within 18'-0" of the centerline of the track, the live load influence zone, and in slopes, the contractor shall use sheet pile. No sheet pile in slopes or within 18'-0" of the centerline of track shall be removed. Sheet piles shall be cut off 3'-0" below the finished ground line. The remaining 3'-0" shall be backfilled and compacted immediately after cut off.

VII. DEMOLITION OF EXISTING STRUCTURE:

The Contractor shall submit a detailed procedure for demolition of existing structures over or adjacent to CSXT's tracks or right-of-way. The procedure shall clearly indicate the capacity of cranes, location of cranes with respect to the tracks and calculated lifting loads (refer to Section I.E of this document). The demolition procedure must be approved by CSXT's construction engineering and inspection representative.

CSXT's tracks, signals, structures, and other facilities shall be protected from damage during demolition of existing structure or replacement of deck slab. As a minimum, both of the following methods shall be used:

A. During demolition of the deck, a protection shield shall be erected from the underside of the bridge over the track area to catch falling debris. The protection shield shall be supported from girders or beams. The deck shall be removed by cutting it in sections and lifting each section out. The protection shield shall be designed, with supporting calculations, for a minimum of 50 pounds per square foot plus the weight of the equipment, debris, personnel, and other loads to be carried.

Large pieces of deck shall not be allowed to fall on the protection shield

B. A ballast protection system consisting of geofabric or canvas shall be placed over the track structure to keep the ballast clean. The system shall extend along the track structure for a minimum of 25'-0" beyond the limits of the demolition work, or farther if required by CSXT's construction engineering and inspection representative.

C. The Contractor shall submit detailed plans, with supporting calculations, of the protection shield and ballast protection systems for approval prior to the start of demolition.

D. Blasting will not be permitted to demolish a structure over or within CSXT's right-of-way.

VIII. ERECTION PROCEDURE:

The Contractor shall submit a detailed procedure for erecting over or adjacent to CSXT's tracks or right-of-way. The procedure shall clearly indicate the capacity of cranes, location of cranes with respect to the tracks and calculated lifting loads (refer to Section. E of this document). The erection procedure must be approved by CSXT's construction engineering and inspection representative.

IX. PILE INSTALLATION:

A. For the installation of piles and sheeting for abutment foundations, pier foundations, retaining wall foundations, temporary and permanent shoring and other structures on or adjacent to CSXT's right-of-way, the contractor may be required to submit a detailed track monitoring program for CSXT's approval prior to performing any work near CSXT's right-of-way.

B. The program shall specify the survey locations, the distance between the location points, and frequency of monitoring before, during, and after construction. CSXT shall have the capability of modifying the survey locations and monitoring frequency as needed during the project.

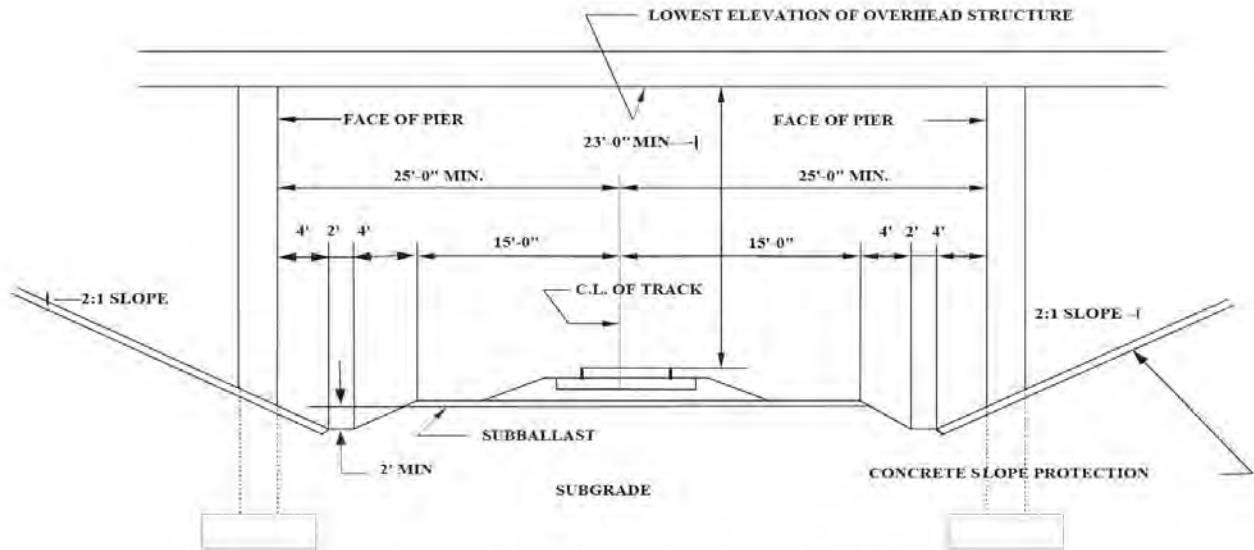
C. If any settlement is observed, CSXT's construction engineering and inspection representative shall be immediately notified. CSXT, at its sole discretion, shall have the right to immediately require all contractor operations to be ceased, have the excavated area immediately backfilled and/or determine what corrective action is required. Any corrective action required by CSXT or performed by CSXT including the monitoring of corrective action of the contractor will be at project expense.

X. PEDESTRIAN OVERHEAD:

Pedestrian overhead bridges shall be governed by this document in its entirety with the following exceptions:

A. Pedestrian overhead bridges shall span the entire width of CSXT's right-of-way. Intermediate piers or other supports will not be permitted.

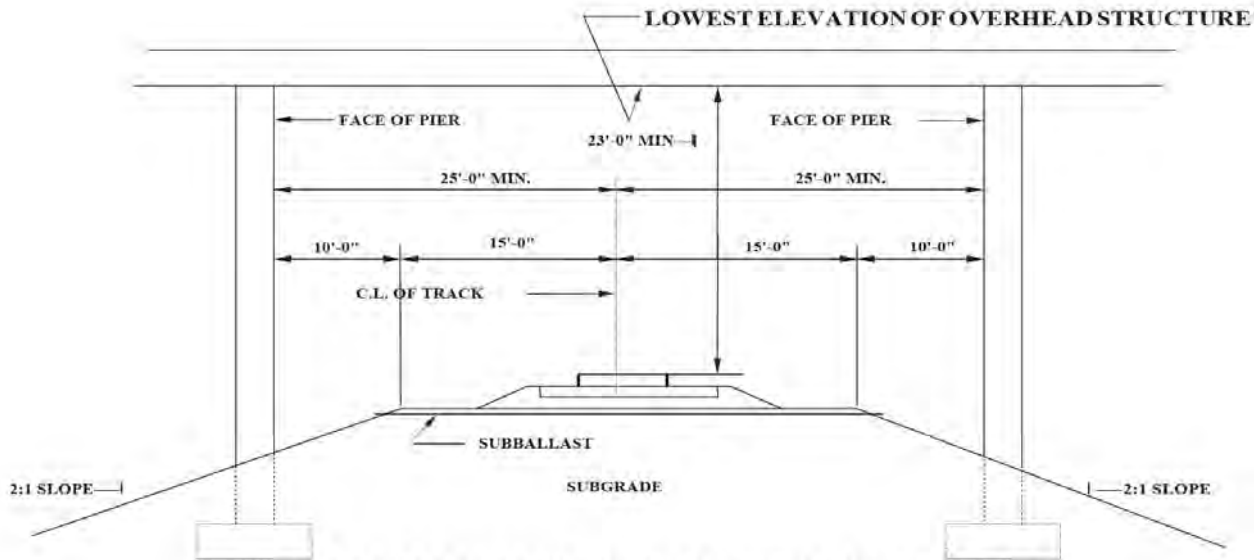
B. Pedestrian overhead bridges shall be completely enclosed with protective canopy or by other means to prevent users from dropping debris onto CSXT's right-of-way.



**CLEARANCES REQUIRED FOR OVERHEAD STRUCTURES
TYPICAL ROADBED SECTION WITH STANDARD DITCHES**

NOTE: FOR MULTIPLE TRACKS, STANDARD TRACK CENTERS IS 15'-0". AN ADDITIONAL 8'-0" WIDE ACCESS ROAD MAY BE REQUIRED TO PROVIDE 33'-0" MINIMUM DISTANCE FROM CENTERLINE OF TRACK TO FACE OF PIER.

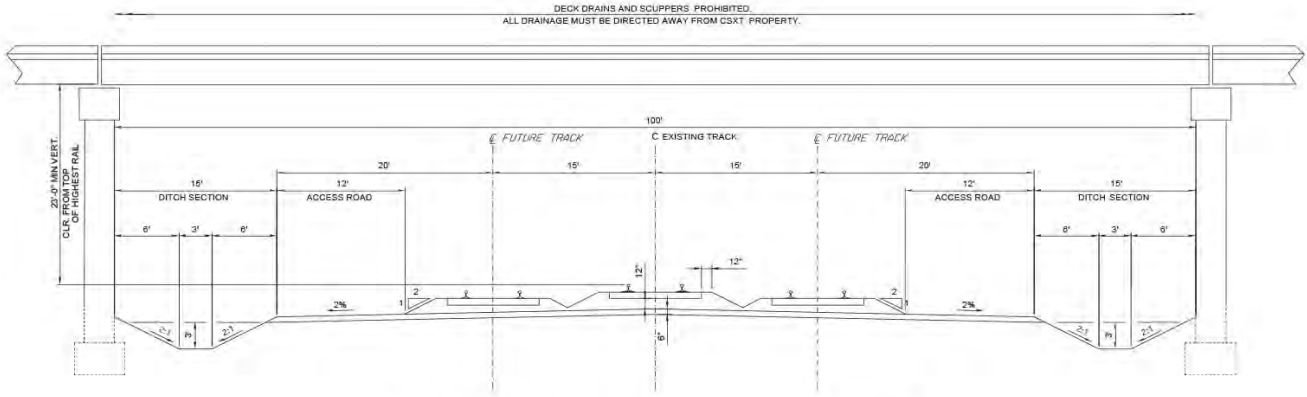
CSX ENGINEERING DEPARTMENT
STANDARD CLEARANCES FOR OVERHEAD STRUCTURES



**CLEARANCES REQUIRED FOR OVERHEAD STRUCTURES
TYPICAL SECTION FOR ROADBED IN FILL
(WHERE NO DEFINED DITCHES ARE NEEDED)**

CSX ENGINEERING DEPARTMENT
STANDARD CLEARANCES FOR OVERHEAD STRUCTURES

Drawing P 80227001 CSXT, DEC 2015 PROJECT (P) ELEMENT (T) TRACK (A) TRACKS (S) CONSTRUCTION (C) DESIGN (M) DRAWING (T) BUILDING

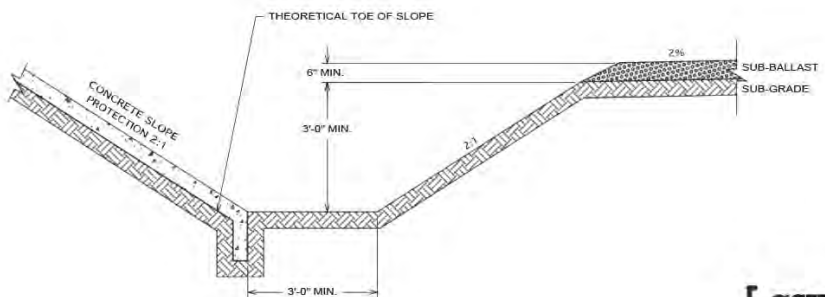


TYPICAL TRACK CROSS SECTION FOR OVERHEAD BRIDGE DESIGNS

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NOTES:

1. CLEAR SPAN WIDTH SHOULD ACCOUNT FOR THE NUMBER OF EXISTING TRACKS AT SPECIFIC PROJECT SITE. EACH ADDITIONAL TRACK ADDS 15' TO THE CLEAR SPAN WIDTH CALCULATION.
2. HORIZONTAL DIMENSIONS SHOWN ARE PERPENDICULAR TO C OF TRACK.
3. CRASH WALLS MAY BE REQUIRED BASED ON SITE SPECIFIC PARAMETERS.
4. ACTUAL REQUIRED HORIZONTAL CLEARANCES MAY NEED TO BE INCREASED DUE TO EXISTING ROADBED SECTION, LOCATION OF PARALLEL DITCHES, HYDROLOGICAL CONDITIONS AND FUTURE TRACK REQUIREMENTS.
5. THEORETICAL TOE OF SLOPE IS BASED ON THE STANDARD ROADBED SECTION. ACTUAL TOE OF SLOPE MAY VARY DUE TO EXISTING GROUND LINE.
6. THE DITCH SECTION SHOWN IS THE MINIMUM ACCEPTABLE SECTION.
7. THE DITCH SECTION IS TO BE INCREASED AS REQUIRED BY LOCAL CONDITIONS, BASED ON HYDROLOGICAL AND HYDRAULIC STUDIES.
8. HORIZONTAL DIMENSIONS SHOWN ARE THE MINIMUM WHICH WILL ALLOW THE CONSTRUCTION OF CSXT'S STANDARD ROADBED SECTION.



DITCH DETAIL

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APPENDIX D – ORDER OF MAGNITUDE DEMAND ASSESSMENT METHODOLOGY



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ORDER OF MAGNITUDE DEMAND ASSESSMENT METHODOLOGY

Current Metrorail Based Demand for Pedestrian Tunnel/Bridge

- Adjusted 2010 census block population and 2015 census block employment to 2020 using growth rates from the regional model. Adjusted any individual census blocks based on recent development (i.e. that along Main Line Blvd).
- Using the adjusted population and employment data, estimated the number of people living or working within a 20-minute walk of the station (approximately 3,600 feet or 0.68 miles) by intersecting the 20-minute walk buffer with census blocks. The 20-minute walk buffer assumed the pedestrian bridge or tunnel is in existence. The same buffer area was also be applied to bike trips.
- Estimated the proportion of the population and employment within the buffer area of the station located north of Braddock Road and west of the Metrorail tracks by isolating census blocks in that area.
- Estimated the number of people who currently walk to the station by multiplying the current weekday ridership by the all day proportion who indicated they walk to the station in the 2016 mode of access survey.
- Estimated the number of people who currently bike to the station by multiplying the current weekday ridership by the all day proportion who indicated they bike to the station in the 2016 mode of access survey.
- Estimated the number of people who would likely use a second pedestrian bridge or tunnel to access the station by multiplying the total riders in steps 4 and 5 by the proportion in step 3.

Add Current Neighborhood to Neighborhood Demand for Pedestrian Tunnel/Bridge

- Using 2019 MWCOC Model Trip Table, estimated the number of weekday trips between TAZ's within the buffer area on the northwest and southeast sides of the existing Metrorail tracks (that would not use other connection such as Route 1, see **Figure D1**). Since nonmotorized trips between TAZ's were not included in the COG Model, this analysis instead included trips of any mode, and it is assumed that regardless of the mode chosen in the model, these trips are short enough to be done by walking or biking.
- Added the estimated Metrorail based demand to the Neighborhood to Neighborhood based demand to determine the total order of magnitude demand estimate.

Future Metrorail Based Demand for Pedestrian Tunnel/Bridge

- Estimated the future population and employment within a 20-minute walk of the station by applying a growth rate (2020 to 2045) from the regional model to each intersected block in number 2. The growth rate was assigned to each intersected block from the regional model TAZ it primarily falls within.
- Estimated the proportion of 2045 population and employment within a 20-minute walk of the station located north of Braddock Road and west of the Metrorail tracks by isolating census blocks in that area.

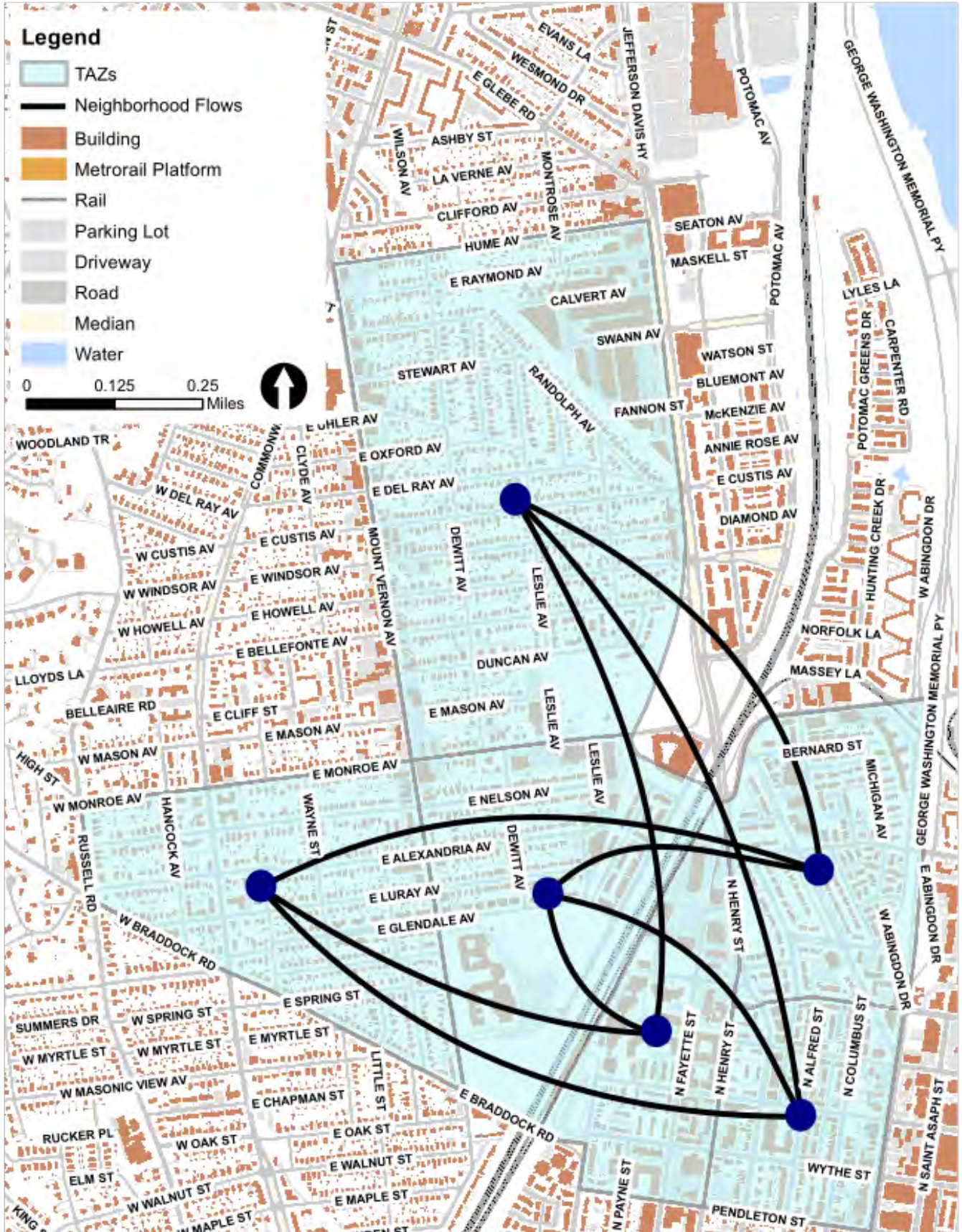


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- Adjusted the proportion of riders who walk or bike to the station used in steps 4 and 5 based on feedback from WMATA regarding any projected changes in the walk access mode.
 - Estimated the future number of people who would walk or bike to the station by multiplying the projected 2045 ridership at the station by the proportion of riders who walk or bike to the station in step 11. The projected 2045 ridership was calculated using growth rates from the regional model.
 - Estimated the future number of people who would likely use a second station entrance/pedestrian bridge or tunnel to access the station by multiplying the total riders in step 12 by the proportion in step 10.

Add Future Neighborhood to Neighborhood Demand for Pedestrian Tunnel/Bridge

- Using 2045 MWCOC Model Trip Table, estimated the number of weekday trips between TAZ's within the buffer area on the northwest and southeast sides of the existing Metrorail tracks (that would not use other connections such as Route 1, see **Figure D1**). Since nonmotorized trips between TAZ's were not included in the MWCOC Model, this analysis instead included trips of any mode, and it was assumed that regardless of the mode chose in the model, these trips are short enough to be done by walking or biking.
- Added the estimated Metrorail based demand to the Neighborhood to Neighborhood based demand to determine the total order of magnitude demand estimate.

Figure D1: Neighborhood Demand





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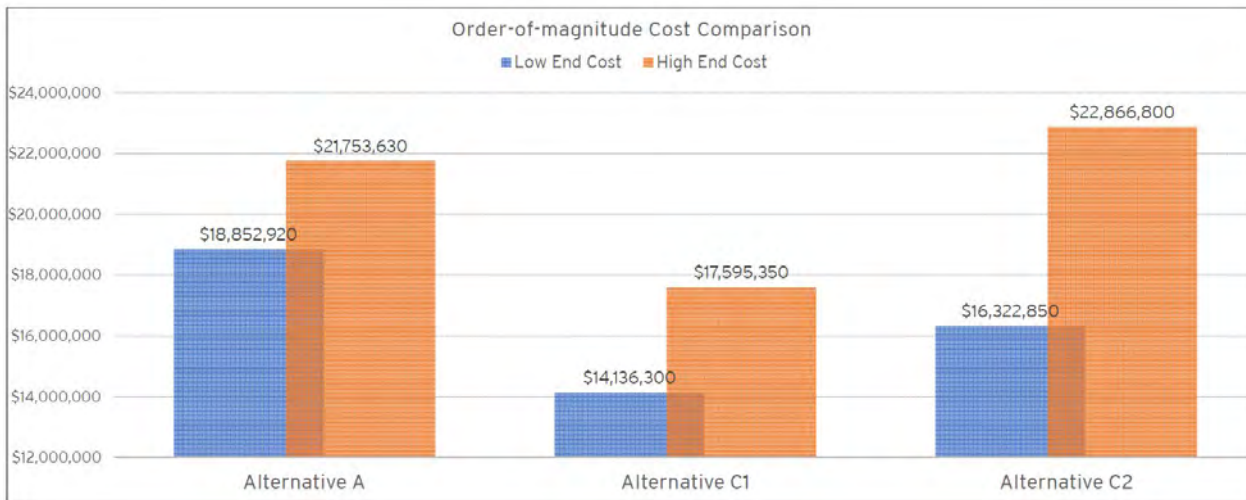
APPENDIX E – ORDER OF MAGNITUDE COST ESTIMATE



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ORDER-OF-MAGNITUDE COST ESTIMATE

| | Alternative A Station Tunnel | Alternative C1 North Bridge | Alternative C2 North Signature Bridge |
|---|---------------------------------|--------------------------------|--|
| Low End Estimate | | | |
| Base Construction Cost Estimate = | \$16,684,000 | \$12,510,000 | \$14,445,000 |
| Engineering Design (8%) = | \$1,334,720 | \$1,000,800 | \$1,155,600 |
| City/WMATA Project Management (5%) = | \$834,200 | \$625,500 | \$722,250 |
| High End Estimate | | | |
| Base Construction Cost Estimate = | \$19,251,000 | \$14,595,000 | \$19,260,000 |
| Cost to Realign North West Street = | \$0 | \$1,103,000 | \$1,103,000 |
| Engineering Design (8%) = | \$1,540,080 | \$1,167,600 | \$1,540,800 |
| City/WMATA Project Management (5%) = | \$962,550 | \$729,750 | \$963,000 |
| Order-of-Magnitude Estimate (Low End Range) = | \$18,852,920 | \$14,136,300 | \$16,322,850 |
| Order-of-Magnitude Estimate (High End Range) = | \$21,753,630 | \$17,595,350 | \$22,866,800 |



Assumptions

- Costs assume a construction year of 2025.
- The "low end range" and "high end range" are intended to provide a full range of possible order-of-magnitude costs for each alternative.
- For Alternative A, low end range of costs include a 30% contingency, and high end range of costs include a 50% contingency. The baseline contingency percentages are higher for this alternative to account for the need to relocate the Plantation Pipeline.
- For Alternative C1, low end range of costs include a 20% contingency, and high end range of costs include a 40% contingency. This results in an average contingency of 30% which is common at a conceptual design level.
- For Alternative C2, low end range of costs include a 20% contingency, and high end range of costs include a 60% contingency. The higher contingency is used because the structure type is unknown for this alternative. More complex bridge types can add significant cost.
- For Alternatives C1 and C2, the high end cost also includes the cost to realign North West Street.
- Alternative A estimate includes modifications to the existing station concourse (e.g., changes to fare gates and vending area)
- Cost to realign North West Street assumes the following:
 - o All new sidewalk and all new full-depth pavement
 - o Existing planter along roadway will be eliminated
 - o 2-stage traffic control will be required to maintain the bus route
 - o 3' wide right-of-way acquisition and new retaining wall required