B&P TUNNEL PROJECT

B&P Tunnel Project
Baltimore, Maryland

PHASE IA ARCHEOLOGICAL STUDY

October 2015

U.S. Department of Transportation
Federal Railroad Administration

Maryland Department of Transportation

Prepared for:
Federal Railroad Administration
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EXECUTIVE SUMMARY

This technical memorandum report presents a discussion of the methods and results of a Phase IA Archeological Study of the Baltimore & Potomac (B&P) Tunnel project, which is located in Baltimore City, Maryland. This report has been prepared pursuant to consultation with the Maryland Historical Trust (MHT) to fulfill Section 106 and National Environmental Policy Act (NEPA) compliance and documentation requirements.

At the time of the Phase IA Archeological Study, several project alignments and alternatives were under consideration. Given their cumulative linear extent and the stage of the project at the time of the survey, it was deemed prudent to conduct a systematic archeological assessment study in order to acquire a comprehensive understanding of the archeological sensitivity of the B&P Tunnel project corridor. This survey was also performed with the intent to provide information that could assist with project planning activities. The primary purposes of the Phase IA Archeological Survey were to, 1) develop a comprehensive overview of the archeological context and sensitivity of the B&P Tunnel project corridor that can be applied toward project planning activities, and 2) construct an archeological foundation for any additional archeological studies that may be warranted upon selection of the Preferred Alternative.

Based on the results of the Phase IA Archeological Study, it has been concluded that although large portions of the study corridors have been disturbed, the potential for both pre- and post-contact archeological sites still exists. While it is believed that the subsurface integrity of most sites that may be in the project APE is probably poor, it is also believed that an occasional intact archeological site could be encountered. By comparison, it is anticipated that the study corridors have a higher potential for containing post contact sites than pre-contact sites. These suppositions are based on previous discoveries of intact archeological sites in and around the study corridors, as well as the land use history of this portion of Baltimore City.

Due to the preliminary stage of the project at this time, the scale of the project APE, as well as the uncertainty of project variables pertaining to anticipated ground disturbance (e.g., cut and cover locations, cut locations, ventilation shafts), it has been deemed prudent to suspend detailed archeological impact studies until the selection of a Preferred Alternative. It is recommended that the next stage of the archeological study involve a careful examination of the project APE once the Preferred Alternative has been determined and the extent of anticipated ground disturbing activities have been ascertained. This study should involve an examination of the relationship of the proposed project to archeological resources in order to assess levels of studies that may be warranted. Study efforts would include discerning potential site locations within the project area through the use of predictive modeling and a detailed disturbance analysis of lands within the project APE. If applicable, fieldwork designed to confirm the presence/absence of archeological sites and evaluate any identified sites should also be performed. The results of these efforts would then be used to develop appropriate cultural resource treatment/recommendations. At this time, the several general settings within the study corridors have been targeted as locations that have a potential for containing archeological resources. These settings include areas where development has been limited; vacant lots; the surroundings of extant historic properties; open lands along roadsides; and areas with deep deposits of secondary-deposited fill.

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I. INTRODUCTION

This technical Phase IA Archeological Study presents a detailed analysis of the potential for archeological resources impacted by the alternatives being studied for the Baltimore and Potomac (B&P) Tunnel Project. The following Phase IA Archeological Study presents additional background and mapping studies associated with each of these alternatives, and presents potential for encountering both prehistoric and historic archeological resource within each of these alternative corridors. This technical report has been prepared in support of the Environmental Impact Statement (EIS)[1] being prepared by the Federal Railroad Administration (FRA)[2], in coordination with the Maryland Department of Transportation (MDOT)[3].

The project Study Area surrounds the existing 1.4-mile B&P Tunnel in the west-central portion of Baltimore City and includes Amtrak's Northeast Corridor (NEC) between Penn Station to the north and the Gwynns Falls Bridge to the south, as illustrated in **Figure 1**. For the purposes of moving forward, a one-mile radius off the centerline of each alignment alternative was established for the archeological study corridor. At this point in the design process, a center line and approximate limit of disturbance has been generated for each alternative. Detailed design information such as vent shafts numbers, types, sizes, and locations, excavation areas, excavation type, and construction staging areas are not known at this time. As the project develops and such details become established, the archeological study area will, in turn, be further refined to determine the specific Area of Potential Effect (APE) of the undertaking.

The Principal Investigator for the Phase IA Archeological Study was Jason P. Shellenhamer and the Project Manager was James R. Kodlick. The supervisory staff are Registered Professional Archaeologists (RPA) and meet standards set out in the Secretary of the Interior's Professional Qualification Standards (48 Federal Register 44738–44739; 36 CFR Part 61). The research and archeological assessment was completed by Mr. Shellenhamer. Mr. Shellenhamer also completed this technical report with assistance from Mr. Kodlick.

II. PROJECT BACKGROUND

As shown in **Figure 1**, the B&P Tunnel is located beneath several West Baltimore neighborhoods, including Bolton Hill, Madison Park, and Upton. The tunnel is currently used by Amtrak[4], MARC[5], and Norfolk Southern Railway (NS) [6], and is owned by Amtrak. Built in 1873, the tunnel is one of the oldest structures on the NEC. It is approximately 7,500 feet (1.4 miles) long and is comprised of three shorter tunnels: the

[1] The EIS and associated technical reports are being conducted in compliance with the National Environmental Policy Act of 1969 (42 United States Code [USC] 4321 et seq.), the Council of Environmental Quality NEPA Regulations (40 CFR 1500-1508), the FRA Procedures for Considering Environmental Impacts (64 FR 28545, May 26, 1999), and FRA's Update to NEPA Implementing Procedures (78 FR 2713, January 14, 2013).

[2] FRA is serving as the lead Federal agency for the B&P Tunnel Project.

[3] MDOT is the funding grantee for the B&P Tunnel Project. MDOT oversees six modal state agencies, including the Maryland Transit Administration (MTA).

[4] Amtrak is the nation's high-speed rail operator and owns the existing B&P Tunnel.

[5] MARC (Maryland Area Regional Commuter) is administered by MTA. MARC is a commuter rail system comprised of three rail lines of service. One of the lines (the MARC Penn Line) operates along the NEC and through the B&P Tunnel, providing service between Washington, D.C. and Perryville, Maryland.

[6] NS is a freight transportation provider that manages a nearly 20,000-mile rail network across the United States, including freight service through the existing B&P Tunnel (NS, 2014).

John Street Tunnel, the Wilson Street Tunnel, and the Gilmor Street Tunnel. The B&P Tunnel is a centerpiece of the Baltimore rail network that contributes to the economic vitality of the Northeast region. The B&P Tunnel is important not only for Baltimore, but also the NEC (NEC MPWG 2010). The NEC is the nation's most congested rail corridor and one of the highest volume corridors in the world (Amtrak 2010).

III. PURPOSE AND NEED

A. Purpose of the Project

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

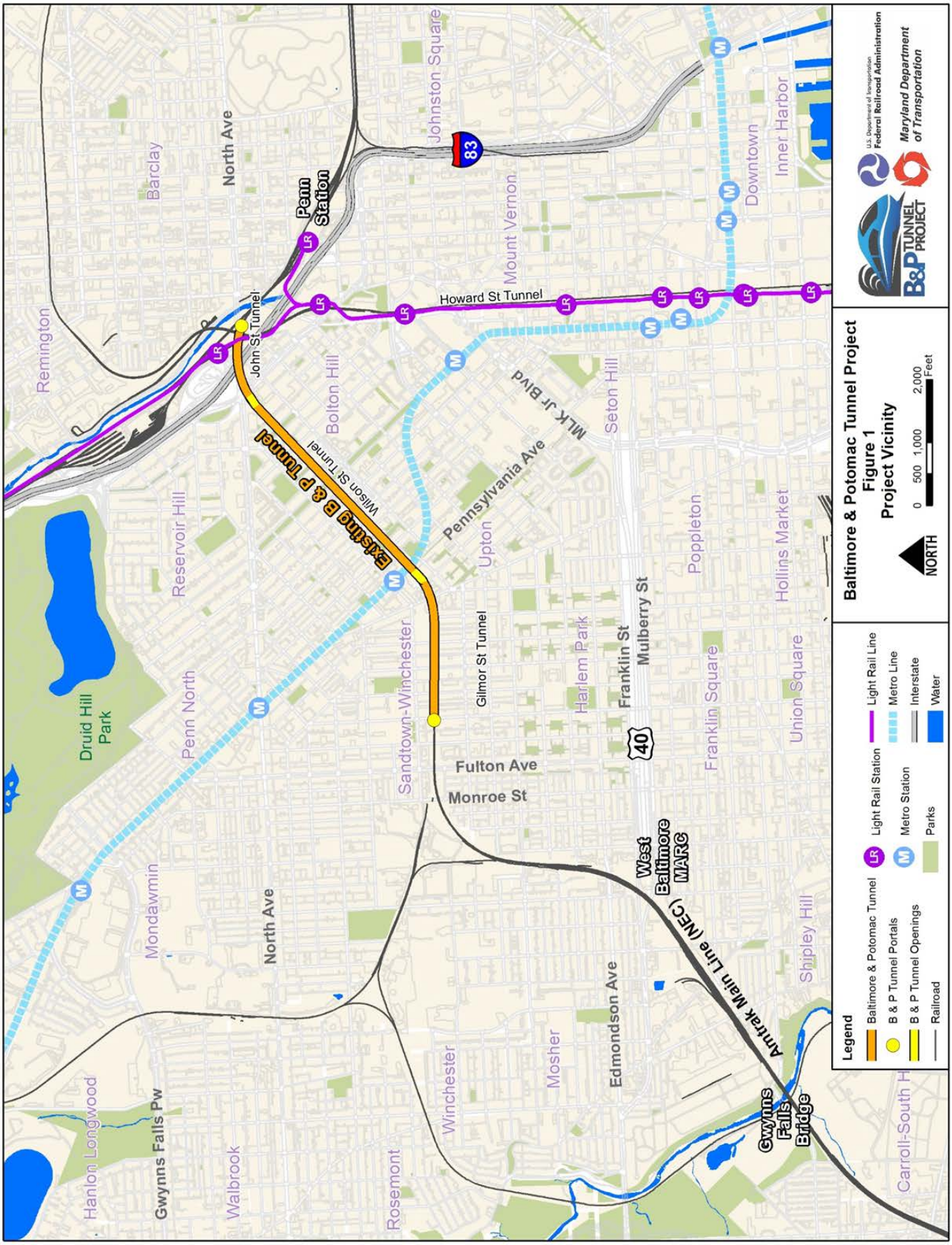
B. Need for the Project

The purpose of the project was derived from the following needs:

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

IV. ALTERNATIVES

Sixteen preliminary alternatives were identified, evaluated using a two-level progressive screening approach, and narrowed to four alternatives in the *B&P Tunnel Project – Preliminary Alternatives Screening Report* (FRA/MDOT, 2014). The four preliminary alternatives retained for further design development and environmental study include Alternative 1: No-Build, Alternative 2: Restore/Rehabilitate Existing B&P Tunnel, Alternative 3: Great Circle Passenger Tunnel, and Alternative 11: Robert Street South (**Figure 2**).


Baltimore & Potomac Tunnel Project
Figure 1
Project Vicinity
NORTH
0 500 1,000 2,000 Feet
Legend
Baltimore & Potomac Tunnel
B & P Tunnel Portals
B & P Tunnel Openings
Railroad
Light Rail Station
Metro Station
Parks
Light Rail Line
Metro Line
Interstate
Water
Existing B & P Tunnel
Howard St Tunnel
John St Tunnel
Wilson St Tunnel
Gilmor St Tunnel
Penn Station
North Ave
Fulton Ave
Monroe St
Pennsylvania Ave
MLK Jr Blvd
Franklin St
Mulberry St
West Baltimore MARC
Amtrak Main Line (NEC)
Gwynns Falls Bridge
Gwynns Falls Pw
Druid Hill Park
Penn North
Reservoir Hill
Sandtown-Winchester
Harlem Park
Upton
Bolton Hill
Mount Vernon
Seton Hill
Poppleton
Franklin Square
Union Square
Hollins Market
Downtown
Inner Harbor
Johnston Square
Barclay
Remington
Mondawmin
Hanlon Longwood
Walbrook
Rosemont
Winchester
Mosher
Edmondson Ave
Shipley Hill
Carroll-South H
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These conceptual alternatives have evolved as the preliminary designs advanced. It was determined upon more detailed study of Alternatives 3 and 11 that several options could be accommodated within the general corridors of each, and that each of the options should be considered as part of the Project. This technical report considers Alternative 3 Options A, B, and C as well as Alternative 11 Options A and B. Alternative 2 is hereafter referred to as "Reconstruction and Modernization of the Existing Tunnel" to more accurately reflect the components of the alternative.

A. Alternative 1: No-Build

Alternative 1 would entail continued use with no significant improvements to the existing B&P Tunnel. Routine maintenance of the tunnel would continue. The tunnel's basic geometry and structure would not be improved and the existing tunnel and tracks would be left in their current location. This alternative would not modernize the tunnel or bring it into a "state of good repair," but would maintain the existing service and ongoing maintenance as currently practiced with minimal disruption.

Necessary maintenance required to continue using the existing tunnel may include replacing damaged track slabs, repairing leaking utility lines above the tunnel, rebuilding deteriorated manholes, repairing brick and mortar, replacing catenary supports, and repairing the Gilmor Street portal.

B. Alternative 2: Reconstruction and Modernization of Existing Tunnel

Alternative 2 includes the complete reconstruction of the existing B&P Tunnel in its current location. This alternative would address the existing B&P Tunnel's deteriorating conditions and eliminate restrictions on the size of railcar traffic over the NEC through Baltimore. This alternative would completely replace the existing tunnel liner, lower the tunnel invert for greater vertical clearance, and widen the tunnel for greater horizontal clearance. The geometry of the existing tunnel, such as curves and grades, would not be altered. The resulting tunnel would accommodate a two-track alignment through the Study Area.

C. Alternative 3

Alternative 3 consists of three options (A, B, and C), all of which would extend in a wide arc north of the existing B&P Tunnel. Each option would include a north portal located in the vicinity of the MTA North Avenue Light Rail station, north of where I-83 crosses North Avenue. The south portal for each option would be constructed at one of two sites located south of Presstman Street, between Bentalou and Payson Streets. Each option would result in a four-track alignment through the Study Area, and would involve construction of four separate tunnel bores. Each option would require three ventilation plants – one at each portal and one mid-tunnel plant. All of the alternatives have similar north portal locations but differ in their south portal locations and underground alignment.

Alternative 3 Option A would include a south portal located at the existing P. Flanigan Asphalt plant, just south of the athletic fields at Carver Vocational-Technical High School, roughly a third of a mile west of the existing B&P Tunnel south portal. The alignment would rejoin the existing NEC corridor at the curve located south of the asphalt plant. Option A would result in a total travel distance of approximately 3.7 miles between Penn Station and the Amtrak Gwynns Falls Bridge. The tunnel segment of the alignment comprises 1.9 miles of this total length.

Alternative 3 Option B would include a south portal located southeast of the P. Flanigan Asphalt plant, adjacent to the existing NEC between Mosher Street and Riggs Avenue, roughly a third of a mile southwest of the existing B&P Tunnel south portal. Much of the underground portion of the alignment is identical to

Option A. However, the alignment south of the south portal would be located east of the existing NEC. Alternative 3 Option B would result in a total travel distance of approximately 3.7 miles between Penn Station and the Amtrak Gwynns Falls Bridge. The tunnel segment of the alignment comprises 2.0 miles of this total length.

Alternative 3 Option C would include a south portal located at the P. Flanigan Asphalt plant, just south of the athletic fields at Carver Vocational-Technical High School, roughly a third of a mile west of the existing B&P Tunnel south portal. The underground portion of the tunnel would parallel the alignments identified under Options A and B; however, the alignment would be shifted further north. The alignment south of the south portal would be located west of the existing NEC. Option C would result in a total travel distance of approximately 3.8 miles between Penn Station and the Amtrak Gwynns Falls Bridge. The tunnel segment of the alignment comprises 2.2 miles of this total length.

D. Alternative 11

Alternative 11 includes two options (A and B) that provide for relatively straight alignments between the Penn Station and West Baltimore MARC Station, crossing diagonally underneath the existing B&P Tunnel. Each option would include a north portal in the vicinity of the MTA North Avenue Light Rail station, north of where I-83 crosses North Avenue. The south portal for each option would be located in the general vicinity of the West Baltimore MARC Station in the Midtown-Edmondson neighborhood. Each option would result in a four-track alignment through the Study Area, and would involve construction of four separate tunnel bores. Each option would require three ventilation plants – one at each portal and one mid-tunnel plant. Options A and B differ primarily in the south portal location and underground alignments.

Alternative 11 Option A would include a south portal located just west of the intersection of Harlem Avenue and Appleton Street, northeast of the West Baltimore MARC Station. The alignment would cross over Franklin and Mulberry Streets. Option A would result in a total travel distance of approximately 3.3 miles between Penn Station and the Amtrak Gwynns Falls Bridge. The tunnel segment of the alignment comprises 1.90 miles of this total length.

Alternative 11 Option B would exit the bored tunnel portion at a south portal located just southwest of the intersection of Edmondson Avenue and Pulaski Street, adjacent to the existing West Baltimore MARC Station. The underground portion of the alignment would run parallel to Option A, but would be shifted slightly north for the length of the tunnel alignment. The alignment would cross under Franklin and Mulberry Streets. Alternative 11 Option B would result in a total travel distance of approximately 3.3 miles between Penn Station and the Amtrak Gwynns Falls Bridge. The tunnel segment of the alignment comprises 2.2 miles of this total length.

V. ENVIRONMENTAL SETTING

The Study Area is located in the Fall Zone between two physiographic provinces, the Piedmont Plateau Province and Atlantic Coastal Plain Province (**Figure 3**). The Piedmont Plateau Province is an area of varied topography, ranging from lowlands to ridges of moderate altitude and relief. The province is underlain by metamorphic and igneous rocks that range from Precambrian to Paleozoic in age. These rocks have been sheared, fractured, and folded by tectonic activity. The Fall Line, which is where the Piedmont Plateau Province descends steeply to the Coastal Plain, runs along the boundary for research units 7 and 14 (**Figure**

Figure 2. B&P Tunnel Project Alternatives

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4). At the point where rivers and streams cross the Fall Line, falls and rapids are typically encountered. This area is known as the Fall Zone and extends for several miles on either side of the Fall Line. The Coastal Plain Province is made up of unconsolidated sediments – silts, sands, and gravels – that create a wedge that increases from 0 m (0 ft.) at the Fall Line to approximately 3,048 m (10,000 ft.) at the Atlantic shoreline (Edwards 1981).

A. Geology

The proposed B&P Tunnel design alternatives pass through four geological formations (**Figure 5**). Three of these are in the Piedmont: Relay Quartz Diorite, Setters Formation, and Baltimore Gneiss. The remaining formation, the Potomac Group, is located on the Coastal Plain.

The Baltimore Gneiss Formation (pCbg) is mapped beneath the western portion of the B&P Tunnel Alternatives 11A and 11B alignment (Maryland Geological Survey [MGS] 1968). This formation extends from the Gwynns Falls Valley to Monroe Street and comprises a mixture of biotite-quartz-feldspar gneiss and biotite-hornblende gneiss. Its texture varies greatly. This formation has been dated to 1,100 million years B.P. via radiogenic dating.

Portions of the B&P Tunnel Alternatives 3A, 3B, and 3C alignments cross sections of the Settlers Formation (sf). The upper portions of this formation include feldspathic mica schist and mica gneiss, the middle portion is primarily quartzite with thin beds of mica schist, and the lower portion is feldspathic mica schist locally granitized. The formation is Late PreCambrian in age. The western portion of Alternatives 3A, 3B, and 3C are partially mapped on the Relay Quartz Diorite formation. Relay Quartz Diorite (Pzr) deposits are Early Paleozoic to Late Precambrian and consists of pink quartz diorite, composed of oligoclase, quartz and muscovite.

The majority of the design alternatives for the B&P Tunnel cross through the Potomac Group (Kp). The Potomac Group marks the beginning of the Coastal Plain Province. The Potomac Group consists of inter-bedded quartzose gravels, argillaceous sands and white, dark gray and multicolored silts and clays. These deposits date to the Cretaceous Era. Overall, the Potomac Group reaches a thickness of 0 to 240 m (0 to 800 ft.) There are four formations within the Potomac group. These are:

- Raritan and Patapsco Formations – gray, brown, and red variegated silts and clays; cross-bedded with argillaceous sands and minor gravels. These formations are between 0 and 122 m (0 and 400ft) thick.
- Arundel Clay – dark gray and maroon lignitic clays that are between 0 and 31 m (0 and 100 ft.) thick.
- Patuxent Formation - white or light gray to orange-brown, moderately sorted, cross-bedded, argillaceous sands and quartz gravels. The silts and clays are generally a pale gray. The formation is between 0 and 76 m (0 and 250 ft.) thick.

B. Soils

In Baltimore City, general soil mapping (**Figure 6**) places the proposed B&P Tunnel Design alternatives within six major soil groups (Levin and Griffin 1998). These are from west to east: Udorthents Association, the Urban Land-Joppa-Sassafras Association, Keyport-Urban Land Association, Urban Land Association, Matapeake-Urban Land Association, and the Urban Land-Udorthents Association.

Udorthents Association soils (40C; 42C) are mostly loamy fill material that has been cut or filled during grading the construction of buildings, roads, and recreational facilities. The fill has been placed on well drained or moderately well drained soils on uplands of the Coastal Plain. Udorthents Association soils compose approximately 20 percent of the total land in the city. The thickness of the fill varies but is typically more than 20 inches. The fill comprising this soil association was generally taken from Beltsville, Matapeake, Mattapex, Sassafras, and Sunnyside soils, so it is typically a heterogeneous, mixed loamy material. In a few places, small areas of the fill consist of building rubbish, cinders, industrial waste, and ash.

Urban Land-Joppa-Sassafras Association soils (14UB; 31UB) are very deep and excessively to well drained soils that overlay sandy and/or gravelly sediments on the uplands of the city's Coastal Plain. This association is approximately 18 percent of the land area in the city. It consists of 40 percent Urban Land (as described above), 15 percent Joppa soils, 10 percent Sassafras soils, and 35 percent minor soils. Joppa soils are excessively well drained, very deep, gravelly soils. While, Sassafras soils are very deep, well drained, loamy soils. Both are generally found on rolling or hilly, dissected side slopes. The minor soils in this association include somewhat excessively drained Brandywine and Manot soils on steep side slopes near major drainages; well drained Chester soils on gentle slopes near drainages; moderately well drained Mattapex, Beltsville, and Woodstown soils in upland depressions; Udorthents; and fluvents.

Keyport-Urban Land Association soils (15UB) are nearly level to gently sloping and are moderately well drained. Keyport soil and Urban land occur together in such an intricate pattern on the landscape that separating them was not practical at the scale used for mapping. About 40 percent of this unit is relatively undisturbed Keyport soils. Typically, the surface layer is a dark brown loam about four inches thick. In the upper eight inches the subsoil is mixed dark grayish brown and strong brown silty clay loam. In the lower 36 inches it is mixed yellowish red and pale brown clay that has distinct light brownish gray and dark yellowish brown mottles at a depth of 21 inches. The substratum to a depth of 65 inches or more is mixed brownish yellow and light gray clay. In some areas the surface layer is a silt loam or sandy loam or the surface has been covered by as much as 20 inches of fill material. About 40 percent of this unit is designated as areas of Urban land. In some areas the soils are largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. In some areas most or all the profile has been cut away. The fill material is most commonly from adjacent areas of Keyport soils that have been cut and graded.

Urban Land Association soils (44UC) are located in nearly level to moderately sloping areas of urban settings where more than 80 percent of the surface is covered by asphalt, concrete, buildings, or other impervious surfaces. This soil association represents approximately 20 percent of the land area in the city. Urban Land can be identified on all landscape positions of the Coastal Plain and the Piedmont Plateau and generally range from two to more than 1,000 acres in size. Typically large areas are mostly comprised of miscellaneous artificial fill. In some areas several feet of fill have been placed over streams, swamps, floodplains, and tidal marshes and are now almost completely covered by roads, buildings or other structures.

Matapeake-Urban Land Association soils (24UB), are nearly level to gently sloping well-drained soils. About 40 percent of this unit is relatively undisturbed Matapeake soil. Typically, the surface layer is black silt loam about four inches thick. The subsurface layer is a yellowish brown silt loam about 11 inches thick.

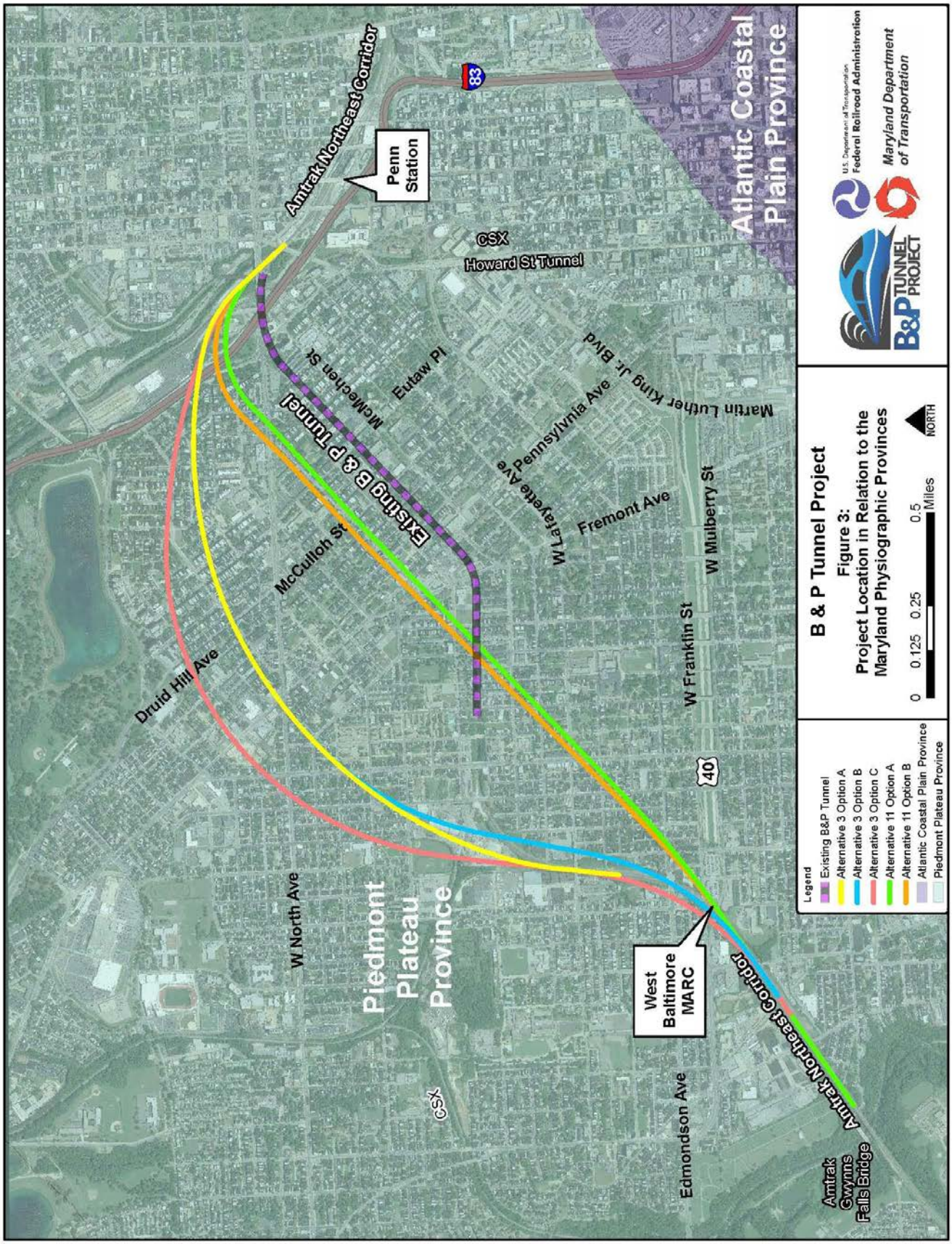
Amtrak Northeast Corridor
Penn Station
CSX
Howard St Tunnel
Atlantic Coastal Plain Province
Existing B & P Tunnel
McMechen St
Eutaw Pl
Martin Luther King Jr. Blvd
Pennsylvania Ave
Lafayette Ave
Fremont Ave
W Mulberry St
W Franklin St
McCulloh St
Druid Hill Ave
W North Ave
Piedmont Plateau Province
West Baltimore MARC
Amtrak Northeast Corridor
Edmondson Ave
Amtrak Gwynns Falls Bridge
CSX
83
40
Legend
Existing B&P Tunnel
Alternative 3 Option A
Alternative 3 Option B
Alternative 3 Option C
Alternative 11 Option A
Alternative 11 Option B
Atlantic Coastal Plain Province
Piedmont Plateau Province
B & P Tunnel Project
Figure 3:
Project Location in Relation to the
Maryland Physiographic Provinces
0 0.125 0.25 0.5 Miles
NORTH
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department of Transportation
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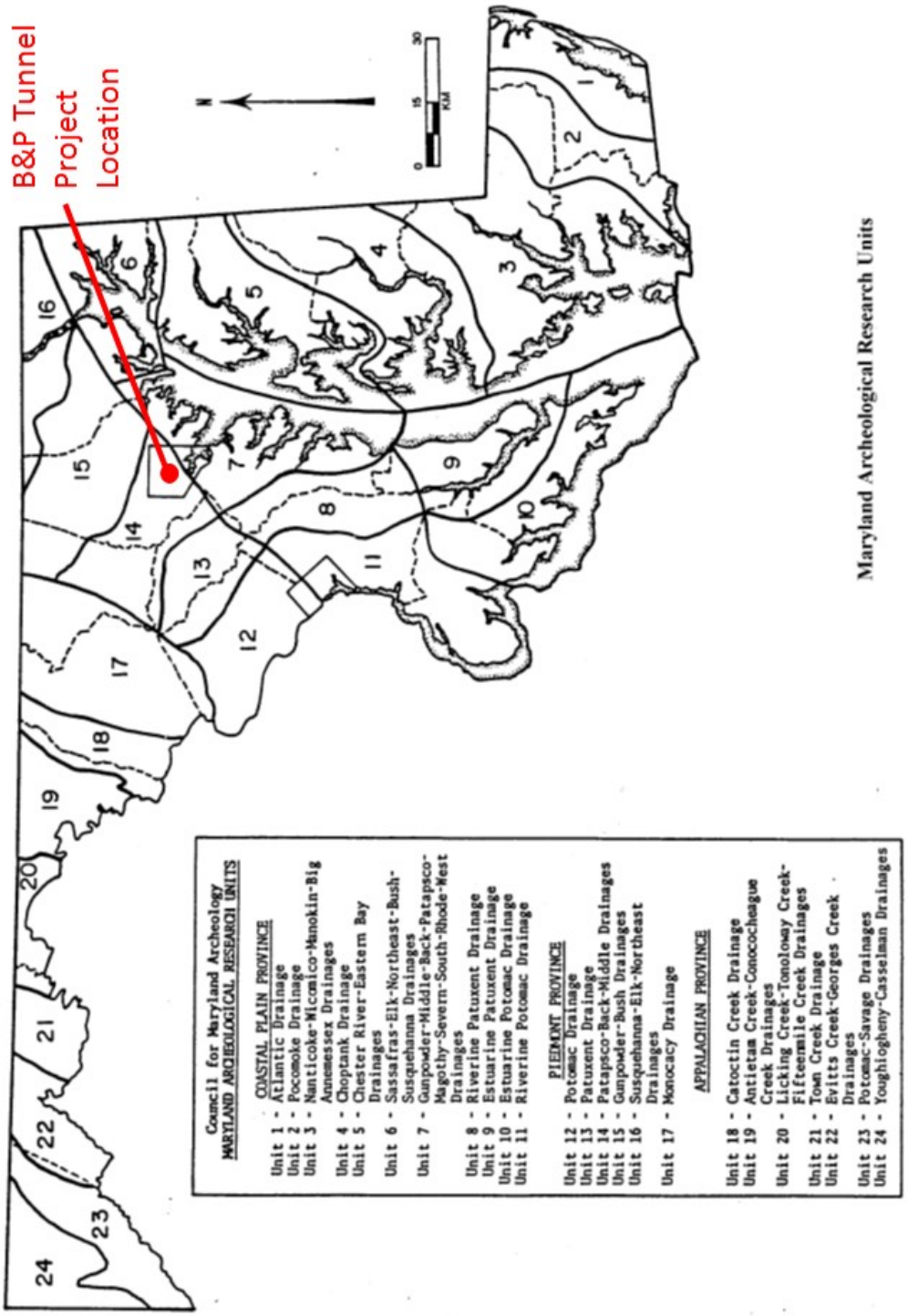
Figure 4: Project Location in Relation to the Maryland Archeological Research Units



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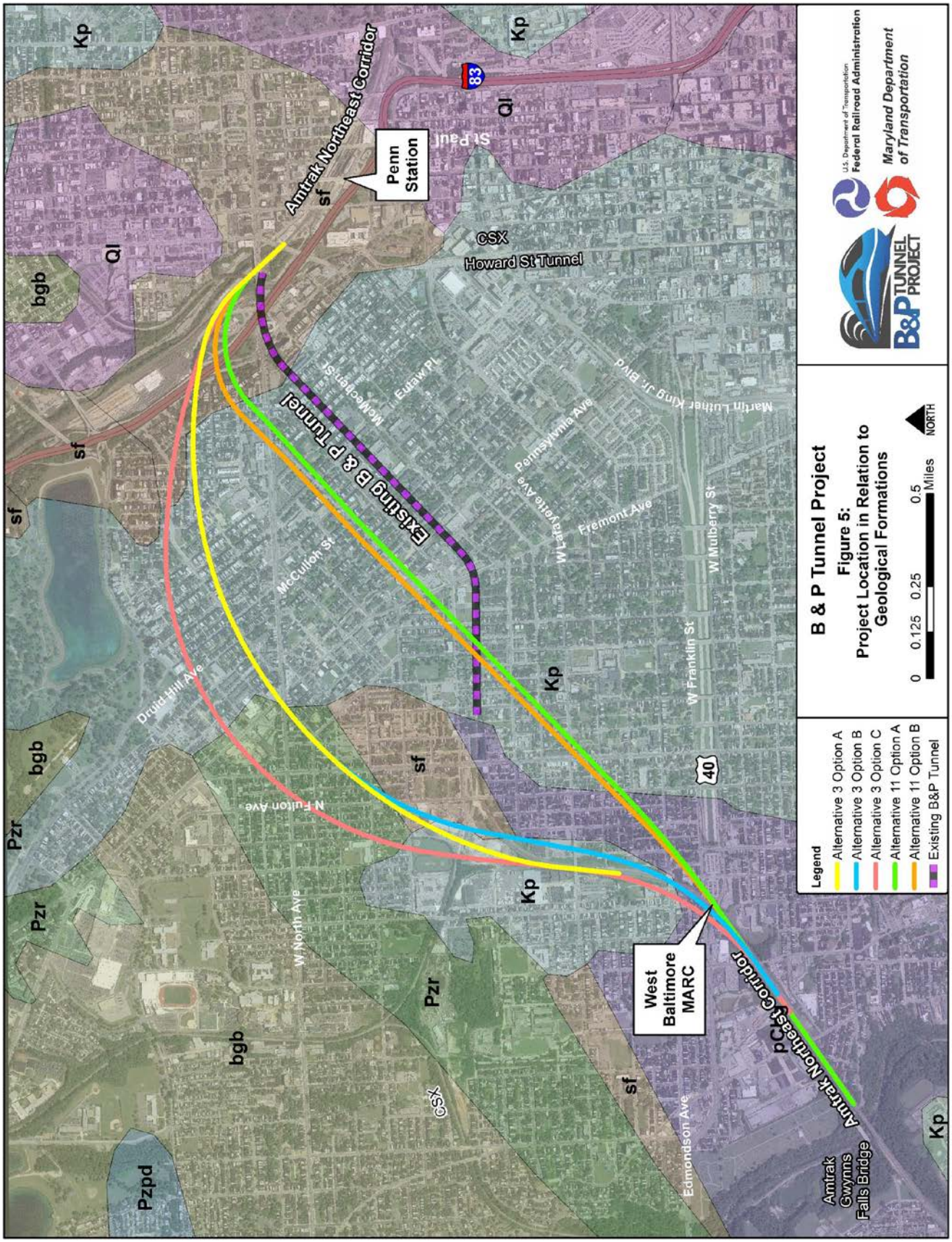
Penn Station
Amtrak Northeast Corridor
CSX
Howard St Tunnel
Existing B & P Tunnel
West Baltimore MARC
Amtrak Northeast Corridor
Amtrak Gwynns Falls Bridge
Druid Hill Ave
McCulloh St
McMechen St
Pennsylvania Ave
Fremont Ave
W Mulberry St
W Franklin St
W North Ave
N Fulton Ave
Edmondson Ave
Martin Luther King Jr Blvd
St Paul
Kp
Ql
sf
bgb
Pzr
Pzpd
Qcd
Legend
Alternative 3 Option A
Alternative 3 Option B
Alternative 3 Option C
Alternative 11 Option A
Alternative 11 Option B
Existing B&P Tunnel
B & P Tunnel Project
Figure 5:
Project Location in Relation to Geological Formations
0 0.125 0.25 0.5 Miles
NORTH
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department of Transportation
B&P TUNNEL PROJECT

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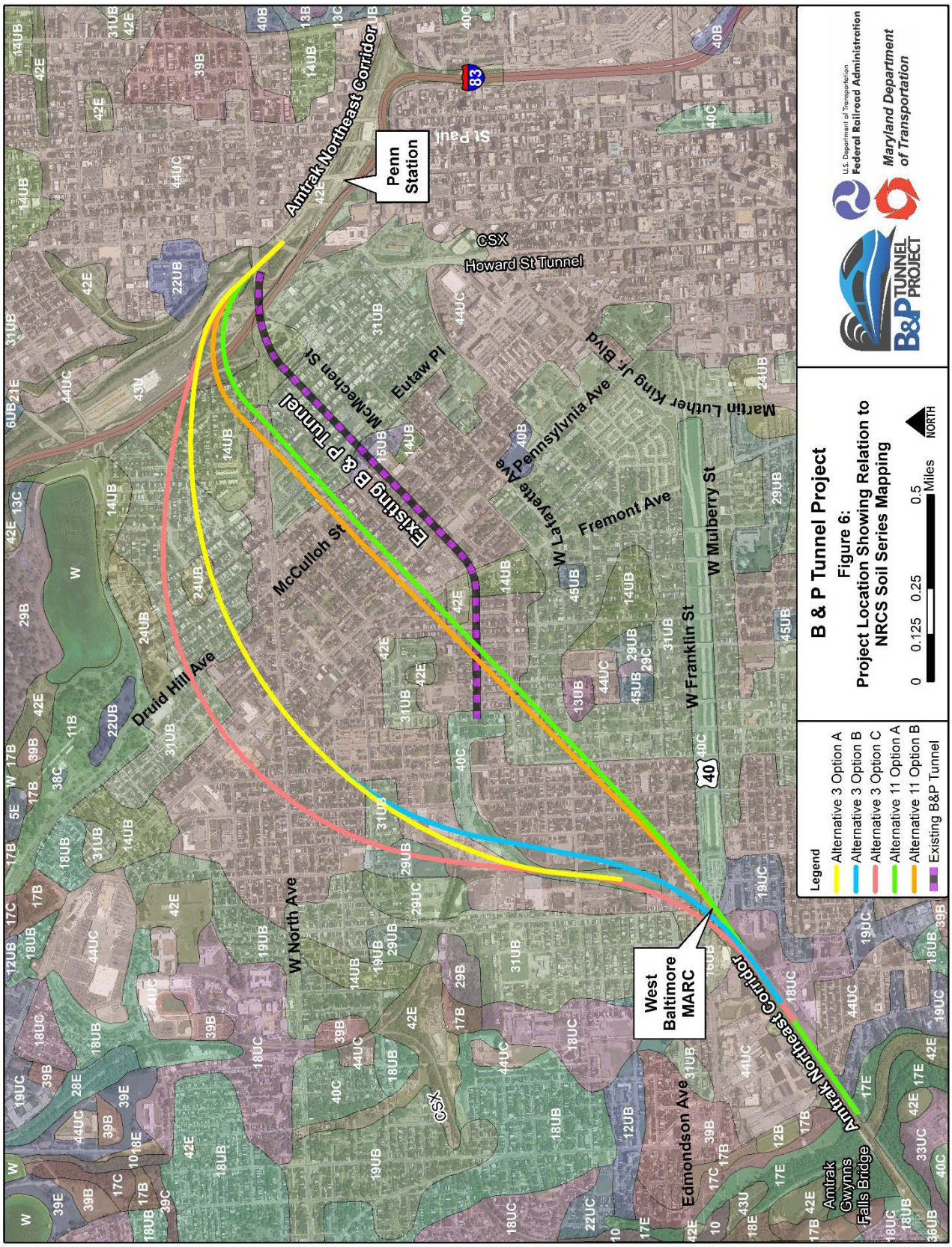
Figure 6: Project Location Showing Relation to NRCS Soil Series Mapping



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The subsoil is a strong brown and light brown silty clay loam about 35 inches thick. The substratum to a depth of 65 inches or more is a variegated strong brown, reddish yellow, and pink silty clay loam. In some areas the surface layer is a loam or has been covered by as much as 20 inches of fill material. Some pedons contain ironstone between the subsoil and substratum. About 40 percent of this unit is in areas of Urban land. In some areas the soil is largely covered by concrete, asphalt, buildings, or other impervious surfaces or by more than 20 inches of fill material. The fill material is most commonly from adjacent areas of cut and graded Matapeake soils.

The final association, Urban land-Udorthents Association soils (43U) are very deep to moderately deep soils. They vary from well to poorly drained in nature, and are found in a variety of locations that are level to very steep. The soils are underlain by a variety of stratified alluvial sediments, dredged materials, or cut and fill deposits. This association accounts for almost a quarter of the city soils. It is about 36 percent Udorthents, 29 percent Urban Land, and 35 percent minor soils. Minor soils include flooded Sulfaquepts in tidal marshes and in areas of dredged material deposits; Beltsville, Christiana, Keyport, Sassafras, Sunnyside, and Woodstown soils in isolated and/or relatively undisturbed area; and fluvents.

C. Hydrology

Baltimore City is located on the Patapsco River (**Figure 7**). The South Branch of the Patapsco originates at Parrs Spring, where Carroll, Frederick, Howard, and Montgomery counties meet. The North Branch originates in northern Carroll County. The two branches meet near Marriottsville, Maryland on the Carroll and Howard County borders to form the Patapsco River proper. The Patapsco River has a watershed of 1,760 square kilometers (km [680 square miles (mi)]). The last 16 km (10 mi) of the river is a tidal estuary inlet of the Chesapeake Bay. The tidal area of the river is comprised of the Northwest Harbor and Middle Branch of the Patapsco River (Baltimore County n.d.a.).

The Gwynns Falls Watershed originates in Baltimore County to the north and west of the city. Its headwaters are near the village of Glyndon. The watershed encompasses 158 square km (61 square mi) and includes 180.25 km (112 mi) of stream that flows through both the county and the city (Baltimore County n.d.b.). Several tributaries join the Gwynns Falls before it flows into the Middle Branch of the Patapsco near Carroll Park in the city. These streams include: Red Run, Horsehead Branch, Scotts Level Run, and Powder Mill Branch in Baltimore County, and Maiden Choice, Dead Run, and Gywnns Run in Baltimore City.

The largest of the streams flowing into the Patapsco River is the Jones Falls. Two-thirds of its 64.37 square km (40 square mi) watershed is located north of the city in Baltimore County in an area characterized by low density development and agricultural land. The stream is 28.8 km (17.9 mi) in length (Baltimore County n.d.c.). It flows above ground through the county and is channelized through much of the city in either a concrete lined streambed or in a tunnel. The steam enters a tunnel beneath the Jones Falls Expressway (I-83) at North Avenue and flows into the Inner Harbor area of the Patapsco River near the intersection of Pratt and President Streets. In the eighteenth century this stream had large areas of wetlands along its lower reaches and a delta area at its mouth known as Harrison's Marsh. The Jones Falls served as the boundary between Baltimore Town and Jones (or Old) Town in the second quarter of the eighteenth century (Olson 1980).

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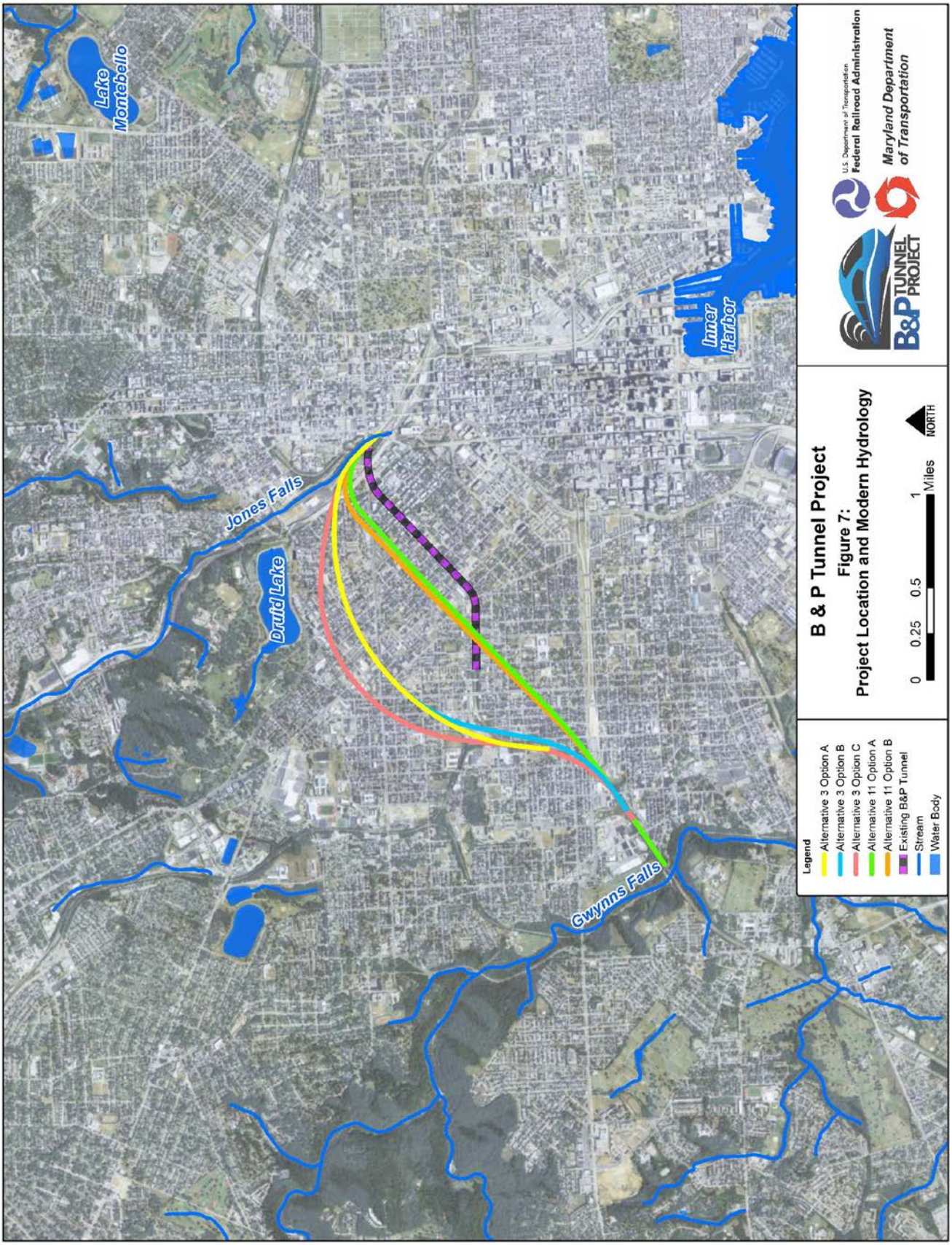
Lake Montebello
Inner Harbor
Jones Falls
Druid Lake
Gwynns Falls
B & P Tunnel Project
Figure 7:
Project Location and Modern Hydrology
0 0.25 0.5 1 Miles
NORTH
Legend
Alternative 3 Option A
Alternative 3 Option B
Alternative 3 Option C
Alternative 11 Option A
Alternative 11 Option B
Existing B&P Tunnel
Stream
Water Body
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department of Transportation
B&P TUNNEL PROJECT

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D. Paleoenvironment

Detailed paleoenvironment studies of the Middle Atlantic Region include those by Carbone (1976) and Gardner (1977) for the Shenandoah Valley of Virginia, and Funk and Steadman (1994) for upstate New York State. Closer to the project area, Brush (1986, 2001) and Kuzbach and Webb (2001) studied climate change and forestation in the Chesapeake Region, while Louis Berger and Associates were able to identify seven environmental zones at the Indian Creek V Site in Prince George's County, Maryland (LeeDecker and Koldehoff 1991). This site is located near the Prince George's County/Washington D.C. boundary on an abandoned channel of Indian Creek, a tributary stream of the Northeast Branch (which in turn flows into the Anacostia River). The Indian Creek V site is within an 80.5-km (50-mi) radius of the B&P Tunnel project area. It is assumed that the paleo-climates of Indian Creek and Baltimore City and Baltimore County were analogous.

Climatic trends documented for the area paint a picture of long-term environmental change. Between 12,800 and 10,800 years B.P. the region experienced a cool moist Pre-Boreal Climatic Phase. Pollen recovered from Zone 1 at the Indian Creek V site indicates that the area was covered by open spruce parkland that included pine and alder trees, as well as herbaceous plants. Zone 1 of the site is associated with the Paleoindian Stage of Native American prehistory in the Chesapeake region. However, no cultural remains associated with Paleoindian occupation were recovered during the excavation of Indian Creek V.

Based on ice cores from Greenland and northern Europe, it appears that initial human settlement of North America occurred during a period of climatic instability associated with the retreat of glaciers covering the northern portion of the continent and punctuated by occasional advances (Oeschger 1986). Data indicates that at 15,000 years B.P. the border of the ice sheet was at the St. Lawrence River. By 14,600 years B.P. the Bølling Allerød warm interval was underway and by 13,000 years B.P., essentially Holocene (or modern) climatic conditions existed in northern Europe, Greenland, and portions of North America. Climatic warming during this period resulted in retreat of the Wisconsin ice sheets, a rise in global sea levels, and varied local environmental responses. These changes were accompanied by occasional and sudden releases of massive quantities of meltwater from under or behind the ice sheets, which occasionally resulted in reversal of the overall warming trend. An abrupt climatic change is well documented for the northern hemisphere during the period between 12,900 and 11,500 years ago, that switched the climatic system back to a cold climate mode (Fisher and Schubel 2001; Meltzer and Holliday 2010; Weaver et al. 2003). This climatic change is known as the Younger Dryas cold spell, in which almost glacial conditions reappeared across the northern hemisphere.

Global ocean circulation has been the focus of recent models for most global climatic transitions (Stute et al. 2001). These models are based on the principles of fluid dynamics and thermodynamics. Recent paleoclimate research suggests that some past climatic transitions, such as glacial and interglacial cycles, were associated with the formation of deep water in the North Atlantic Ocean. The North Atlantic is about four degrees cooler than the North Pacific Ocean (at similar latitudes). A wide divergence in the temperature of the water circulating between the two oceans has the potential to cause significant and large-scale abrupt climatic change. Stute et al. (2001) believe that the Younger Dryas cold spell was a direct result of the shutdown of the North Atlantic thermohaline circulation due to an influx of fresh water from Lake Agassiz (a huge fresh water lake that existed in the center of North America and that was fed by glacial run off) and from deglaciation in North America. Global climate was then locked into the cold mode until around 11,500 years ago, when freezing removed the fresh water from the North Atlantic

Ocean (Broecker 2006). The climate system switched back to a warm mode, a condition that has essentially prevailed (with minor alterations) since that time. According to Oeschger (1986), large amounts of continental ice and global ocean circulation played an important role in the variability of the climatic system during the Wisconsin glaciations.

Zones 2, 3, and 4 of the Indian Creek V site are associated with Archaic Stage occupations of the site. Pollen samples from all three zones indicate that average annual temperatures were warm but the amount of precipitation varied greatly over time. Pollen from Zone 2 of the site (which coincides with the Early Archaic Period of Native American prehistory) indicates that between 10,800 and 7660 years B.P. the region experienced a gradual warming period characterized by dry conditions. Forest cover during this period changed from open spruce parkland to mixed deciduous forests of birch and oak, with pine and alder mixed throughout. During the Middle Archaic Period, which coincides with Zone 3 pollen samples (7660 to 5000 years B.P.), the annual rate of precipitation increased. Zone 3 forest cover was dominated by species of oak, hazelnut, and alder, with a decrease in pine and a complete absence of spruce. The Late Archaic Period (Zone 4 of the site) experienced a decrease in precipitation. The warm, dry conditions of this period persisted from 5000 to 3860 years B.P. These climatic conditions favored forests dominated by oak and hickory, with inclusions of pine (LeeDecker and Koldehoff 1991).

As the climate gradually warmed over the course of the Archaic Stage, the last of the Late Pleistocene glaciers began to retreat, releasing water back into the world's oceans. Global sea levels rose as much as 300 to 500 feet over several thousands of years (Whitehead 1972). During this period, the Chesapeake Bay was formed as rising sea levels flooded the lower reaches of the ancestral Susquehanna River. As the marine transgression filled the Chesapeake Bay, the rivers emptying into the Chesapeake Bay assumed their tidal character below the fall line. After 3000 years B.P., the climate and its floral and faunal associations assumed an essentially modern character.

Pollen from Zone 5 of the Indian Creek V site indicates that during the period between 3860 and 1770 years B.P. (the Early to Middle Woodland Periods of Native American prehistory), the area surrounding the Indian Creek V site experienced a marked decrease in the amount of arboreal pollen deposition, possibly due to increased horticultural activity. Although oaks continued to dominate the forest area, pollen in Zone V showed an increase in herbaceous species such as legumes, elderberry, blueberry, and arrowwood. Pollen, charcoal, and trace metals from sediment cores taken from the Nanticoke River on Maryland's Eastern Shore indicate that around 900 years B.P. the climate was warmer and drier than it current conditions. This period coincides with the Medieval Warm Period that ended around 700 Years B.P. with the onset of the Little or Mini Ice Age (Fagan 2000; Fisher and Schubel 2001). Pollen in Zone 6 of the Indian Creek Site, which coincides with the Late Woodland Period, indicates that between 700 and 350 years B.P., temperatures were cooler on average and annual precipitation was maybe 5 percent higher than it is now. Mixed deciduous forests reappeared across the landscape, although nonarboreal pollen continued to make up a significant part of the pollen found in this zone. Herbaceous plant pollen and blueberry pollen dominated the nonarboreal pollen (LeeDecker and Koldehoff 1991).

During the seventeenth and eighteenth centuries the Chesapeake Bay was almost entirely frozen during the winters of 1641-42, 1645-46, 1779-80, and 1783-1784. These colder conditions lasted until approximately one hundred years ago in the Chesapeake Region. These shifts between warm/dry conditions and cool/wet conditions are probably related to changes in the strength of North Atlantic

thermohaline circulation (Cronin et al. 2003; Fisher and Schubel 2001). Beginning in about 1850, world temperatures began a long warming trend which has continued to the present day (Fagan 2000).

VI. REGIONAL PREHISTORY

Research for this section concentrated on the creation of a general prehistoric context for the area surrounding the Baltimore & Potomac Tunnel design alternatives. In order to create the context, archeological reports, journal articles, monographs, and texts concerned with the Middle Atlantic region were consulted. The following overview of Native American regional history has been abstracted from several secondary sources including Delaware Prehistoric Archeology: An Ecological Approach (Custer 1984), Prehistoric Cultures of the Delmarva Peninsula: An Archeological Study (Custer 1989), Prehistoric Cultures of Eastern Pennsylvania (Custer 1996), Chesapeake Prehistory: Old Traditions, New Directions (Dent 1995), and Commoners, Tribute and Chiefs: The Development of Algonquian Culture in the Potomac Valley (Potter 1993). In addition to these book-length treatments of the subject, numerous journal articles, professional papers, and reports were consulted.

The Baltimore & Potomac Tunnel design alternatives falls within the Middle Atlantic Culture Area of the northeastern United States. This area is described as extending from the Hudson River estuary in New York south to the Great Dismal Swamp on the Virginia/North Carolina border and from the Atlantic Ocean west to the Appalachian Mountains (Willey 1966). In this discussion, the regional prehistory of the Middle Atlantic Culture Area will be divided into six specific time spans, which focus on specific innovations or lifeway traditions within the Middle Atlantic Culture Area. These periods are the Paleo-Indian/Early Archaic Period (circa 11,000 B.C. – 6500 B.C.), the Middle Archaic Period (circa 6500 B.C. - 3000 B.C.), the Late Archaic/Early Woodland Periods (circa 3000 B.C. – 200 B.C.), the Middle Woodland Period (circa 200 B.C. - A. D. 1000), the Late Woodland Period (circa A.D. 1000 – A.D. 1600), and the Contact and Settlement Period (circa A.D. 1600 - A.D. 1780). Together, these periods do not represent a simple linear cultural history but rather median dates of major changes in regional material cultural traditions. Some overlaps exist between the periods.

A. Paleoindian/Early Archaic Periods (ca 11000 B.C. – 6500 B.C.)

The Paleo-Indian and Early Archaic Periods span the terminal Pleistocene and the early Holocene. The transition between the Pleistocene and Holocene is marked by a change from cold glacial conditions to alternating wet and dry climates. Human occupation in the Baltimore Area may have begun before 11,000 years B.C. Excavation at the Meadowcroft Rock Shelter in southwestern Pennsylvania indicates that this area was occupied approximately 19,000 years ago (Adovasio et al. 1980, 1990). The Wisconsin ice sheet was located to the north in Upstate New York and did not extend as far south as Meadowcroft or into Maryland.

The adaptations made by prehistoric populations to fluctuating climatic conditions characterize both periods. For a long time scholars believed that PaleoIndians must have subsisted by hunting late Pleistocene megafauna, such as mammoths, basing this assumption on finds of large, fluted stone points of Clovis and similar types at megafaunal kill sites in the western half of the United States. However, during the 1960s and 1970s many archeologists began to downplay the importance of mammoths to PaleoIndian subsistence, particularly east of the Mississippi River (Griffin 1977; Jennings 1978; Willey 1966). Evidence

from Meadowcroft Rock Shelter, the Shawnee-Minisink Site on the upper Delaware River in Northeastern Pennsylvania, the Cactus Hill Site in Virginia, the Hiscock Site in western New York, and the Higgins Site in Anne Arundel County, Maryland suggest an economy based on broad spectrum foraging and not on big game hunting. As Adovasio and Carr (2009:521) note, this "broad spectrum foraging lifeway is essentially indistinguishable from the succeeding Early Archaic pattern". The only place that big game hunting seems to have been important was on the northern edges of the Middle Atlantic area where there was seasonal dependence on caribou. There is evidence that elk and black bear were also hunted (Funk 1972, 1978; Funk et al. 1970, 1990; Funk and Steadman 1994; Funk and Wellman 1984). Evidence recovered at archeological sites in the Eastern United States over the last half century indicate that the subsistence base also included smaller mammals such as hare, mink, and arctic fox and such plant foods as black walnut, blackberry, goosefoot, and wild grape (Dent 1995; Funk and Steadman 1994; Ritchie 1957). There is also evidence of fishing from the Shawnee-Minisink Site on the Delaware River (Kaufman and Dent 1982).

Some researchers have suggested that most Pleistocene megafauna were extinct on the East Coast by the time of the first human settlement. Russell Graham (1985) argues that the Pleistocene–Holocene transition was abrupt, occurring over an extremely short period. This transition caused mass extinction of a large number of paleo-megafauna species. Graham further states that humans living in the New World during this transition would have been confronted by rapidly changing environments that created variability in the availability of both animal and plant food resources. These populations were forced to continually adapt to the changing climatic conditions and to look for new resources to utilize. Graham's hypothesis is in direct opposition to the work of Paul S. Martin (2004, 2007) and others (Fiedel 2009; Haynes 2002, 2009) who argue that over hunting by the Clovis peoples not climate change killed off the Pleistocene megafauna. Fiedel (2005) has also published a paper in which he argues that domesticated dogs could have contributed to the extinction of megafauna by aiding humans in hunting and by transmitting "one or more Eurasian diseases to New World carnivores, provoking a devastating trans-species epidemic" (Fiedel 2005:18). Other researchers argue that the loss of species at the end of the Pleistocene is due both to a combination of climatic change, introduced pathogens, and over-hunting (Steadman 2001).

Regardless of the cause of the late Pleistocene mass extinctions, the PaleoIndian lithic tool kit from all regions of North America is specialized for hunting. It comprises scrapers, gravers, burins, denticulate flakes, utilized flakes, hammerstones, knives, bifaces, and fluted points (Custer 1984; Funk 1972; Gardner 1974, 1977; Kinsey 1972). Tools are characteristically made of high quality cryptocrystalline material such as chert and jasper, or of macrocrystalline material such as quartz or quartzite (Dent 1995). In addition, stone tools in these artifact assemblages show evidence of great care in stone tool maintenance and resharpening. One of the most distinctive artifacts associated with the Paleo-Indian Period is the fluted point, characterized by a channel that is removed from the center of the base to the center, or distal end, of the point.

PaleoIndian groups were probably seasonally mobile, exploiting new and different resources as they shifted locales. Gardner has identified several types of PaleoIndian sites using data from the Flint Run culture PaleoIndian Complex in Virginia (1974, 1977, and 1979). The largest of sites have been labeled "base camps," i.e., the main areas of habitation. They are identified by the variety of artifacts in the assemblage, the non-random distribution of stone tools and debitage (suggesting discrete activity areas), and pits and post molds. Aggregate bands may have occupied base camps at different times throughout

the year. Examples of base camps include the Thunderbird Site of the Flint Run culture complex and the Shoop Site in Pennsylvania (Gardner 1974; Witthoft 1952). Smaller sites are identified as special purpose areas, which were occupied for brief periods by smaller groups than those at base camps. These smaller sites include quarries, lithic workshops, base camp maintenance sites, and outlying hunting sites (Dent 1995). Many archeologists studying the prehistory of North America have long assumed that there is a direct correlation between the size of a site and whether it was a base camp or an auxiliary camp, or whether it was occupied by a large corporate group or a small band. This premise has been roundly criticized on the basis of ethnographic evidence (Binford 1983).

There are several recorded PaleoIndian sites in Delaware, Maryland and Virginia; many of these sites are represented by surface finds of fluted points and blade tools. A small number have been subjected to sub-surface archeological investigation. The latter include the Williamson Site on the western shore of southern Virginia (Callahan 1979; Dent 1995; McCary 1983; Peck 2004) the Thunderbird Complex in Warren County, Virginia (Gardener 1974, 1977, 1979), the Higgins Site on the western shore of Maryland (Ebright 1992), the Paw Cove Site on the eastern shore of Maryland (Lowery 1989, 1990, 2002, 2003), the Wise-Wix Site in Delaware, the Upper Ridge Site along the Atlantic coast of Virginia (Dent 1995), and the Cactus Hill Site in southern Virginia (Egloff and Woodward 2006; McAvoy 1992). The latter may contain components that predate 11,000 B.C. Based on the types of artifacts recovered from these sites—small utilized blades and lanceolate points of chert and chalcedony—it is probable that the sites functioned as interior hunting/camping sites. While these interior sites are fairly common in the Delmarva Peninsula, there is little information about sites located along the ancestral Susquehanna River and on the Continental Shelf portion of the Atlantic Coastal Plain Province. Site locations of this type are currently under water. They were inundated due to the rise in world sea level between about 11,000 B.C. and 2000 B.C., which flooded the lower reaches of the Susquehanna River and its tributaries and created the Chesapeake Bay (Dent 1995; Kraft 1971; Whitehead 1972). The retreat of the Wisconsin glacial sheet was the main factor in the overall rise in sea level.

Both Gardner (1978) and Custer (1989) see the Early Archaic as part of a broader Late Pleistocene to Early Holocene adaptation continuum. Parker (1990), however, believes that the settlement and subsistence patterns of the Early Archaic are more than a reflection of resource availability. He believes that the settlement pattern was a way to mitigate the risk factors produced by unpredictable resource availability (q.v. Weissner 1982). The location and size of the sites reflect efforts to feed groups and integrate diverse populations. The smaller groups came into contact with one another at the larger sites. This contact fostered reciprocity in terms of shared resources and cultural ideas. The smaller groups would then disperse to forage and hunt, knowing that the relationships they had established would enable them to tap into the resources of other groups when needed. Parker's model and those of Gardner and Custer are concerned with human economy, which is defined by Tankersley (1998) as the process of production, consumption, distribution, and exchange of materials that sustain or reproduce human livelihood.

The major difference between the tool kits of the PaleoIndian Period and the Early Archaic Period is the replacement of fluted points by a variety of notched points. Projectile points in the Middle Atlantic are characterized by two artifact traditions: the Corner-Notched Tradition (c. 7500 to c. 6800 B.C.) and the Bifurcate Tradition (c. 6800 B.C. to c. 6000 B.C.). The beginning of the Corner-Notched Tradition is marked by the replacement of fluted points with corner-notched points, reflecting changes in hafting techniques and utilization. Rhyolite from the Piedmont Province replaces cryptocrystalline stone as the material of choice. Point types from the Corner-Notched Tradition include assorted Amos, Charleston, Kirk and

Palmer notched variants. Those associated with the Bifurcate Tradition include LeCroy, St Albans and Kanawha points (Dent 1995). The artifact assemblages of both major traditions are similar to those of the PaleoIndian Stage, but there is greater regional variation. There is also greater variation in settlement patterns, with sites found in environments that are more diverse. The consensus is that Early Archaic peoples exploited a wider variety of game, fish, and forest resources (including fruit and nuts) (Dent 1995; Funk 1978). However, the people associated with both the Corner-Notched and Bifurcate Traditions probably continued to follow a seasonal hunting schedule, as suggested by their specialized tool kits and their settlement patterns. These patterns were based on large macroband base camps that were surrounded by numerous smaller microband base camps and special use sites that included activities such as hunting, fishing, gathering, and quarrying (Gardner 1974, 1977, 1979).

Faunal remains recovered in and around the District of Columbia indicate that Early Archaic populations hunted deer and elk (Humphrey and Chambers 1977). Smaller mammals were probably included in the diet. Plant remains from the Slade Site in Virginia and the Crane Point Site on Maryland's Eastern Shore indicate that Early Archaic populations exploited a wide variety of resources. These plants included forest mast such as hickory nuts, butternut, and possibly acorns, as well as starchy seed plants like amaranth and chenopod (Egloff and McAvoy 1990; Dent 1995; Lowery and Custer 1990). Excavations at sites in the southeastern United States indicate that Early Archaic populations also utilized plant materials to produce basketry and other items. At the Icehouse Bottom Site (now under the waters of the Tellico Reservoir) near Knoxville, Tennessee, impressions of basketry and netting were pressed into the clay surrounding hearths on the site (Chapman 1985). Although there is no direct evidence for these types of material culture items, it is likely that they were also produced in the Middle Atlantic Region.

B. Middle Archaic Period (ca 6500 B.C. to 3000 B.C.)

The Middle Archaic Period began about the time that the still dominant oak-hickory forest completely replaced the boreal forest associated with the last glaciation in the northern portions of the eastern United States (LeeDecker and Koldenhoff 1991; Whitehead 1972). The climate, which had begun to warm gradually during the Early Archaic Period, reached an average temperature level nearly the same as, if not slightly warmer than the present era, with a rise in precipitation as well. Morrow Mountain and Stanley points are the diagnostic tools of the Middle Archaic Period (Coe 1964; Custer 1989). Tool kits generally resemble those of the previous period, with the addition of such ground-stone tools as mortars and atlatl weights or bannerstones. The latter were used to balance atlatl spear throwers. These have been found in the Middle Atlantic Region, particularly along the Nottaway River in Virginia (Egloff and MacAvoy 1990) and at the Hardaway and Doerschuk Sites in North Carolina (Coe 1964). A possible bannerstone fragment was recovered at the Kettering Site in Prince George's County, Maryland (Jefferson Patterson Park and Museum 2002). Fragments of mortars and pestles of the mano-metate type were found at the Higgins Site on the Western Shore of Maryland (Ebright 1992). A substantial bone tool industry also developed during this period. Artifacts associated with this industry include atlatl hooks and projectile points (Dent 1995).

Settlement patterns appear to continue in the tradition of the Early Archaic (Dent 1995). Some researchers have suggested that coastal areas were abandoned in favor of the Piedmont during this period (q.v. Kavanagh 1982); however, the continuing rise in sea level until the end of this period may also account for the lack of coastal sites (Read 1990). Site locations include interior wetlands, areas near stream confluences, and floodplains. Until recently, there was no evidence of structures in the Chesapeake

Region, a series of overlapping houses excavated at the Pig Point site in Anne Arundel County may date to this period (Luckenbach 2010; Luckenbach et al. 2010). Sites of this period do show evidence of distinct activity areas associated with processing foodstuffs, tool production, and maintenance (Dent 1995).

Geoarcheological and archeological surveys along the Potomac River in the C&O Canal National Historical Park have identified deeply stratified prehistoric sites on the floodplains of the Potomac (Fiedel and Potter 2004, 2007). Radiocarbon dates place some of these sites prior to 2000 B.C. Using Coe's research in the Roanoke River basin (Coe 1964), Fiedel and Potter produced a predictive model for site location in the Fall Zone of river valleys. Coe theorized that early Holocene sites would be found at locations with the following specific characteristics:

- "A narrow valley forms a funnel neck where there was limited space for a campsite".
- "In narrow and rocky valleys, the high velocity of the water prevented the development of mature meander patterns".
- "Fingers of resistant rock extend from the valley wall to the edge of the river. Behind these projecting rocks, the river forms large eddies when it is in flood and deposits sand and silt at a faster rate than elsewhere along the narrow floodplains. Eventually these deposits become higher than the normal flood level" (as quoted in Fiedel and Potter 2004, 2007).

Coe also observed that deep alluvial deposits containing stratified sites may occur where a river confluence, located just above the narrowest point in the valley, creates eddies.

As part of this study, Daniel P. Wagner performed geoarcheological assessments of the Potomac River floodplain. Wagner took auger cores to a depth of 3.4 m (11 ft.) in areas identified by the predictive model. The survey located 16 new sites along the Potomac River, as well as relocating 14 previously recorded sites. Two of these sites were subjected to further study. Testing at the mouth of Tuscarora Creek (18FR798) "revealed a four-horizon cultural sequence: Late Woodland at the top, Early Woodland about 3 ft. below surface, a very faint late Middle to Late Archaic horizon at about 5.7 ft., and an Early Archaic and/or Paleoindian zone at ca. 7 to 8 ft. below surface". The Middle to Late Archaic horizon produced a radiocarbon date of about 5800 cal B.P. (5110±40 rcbp, 5740-5930 cal B.P. [Beta-187613])" (Fiedel and Potter 2004, 2007). While the PaleoIndian zone "yielded two AMS radiocarbon ages on charcoal fragments: 9290+40 rcbp (10,280-10,570 cal BP) and (from two inches deeper) 8360¬+40 rcbp (9270-9470 cal B.P. [Beta-187614 and 187615])" (Fiedel and Potter 2004, 2007).

There were no major changes in subsistence between the Early Archaic and Middle Archaic Periods. Fiber analysis of materials recovered from the Higgins Site in Anne Arundel County, Maryland suggests that turkeys were being hunted (Ebright 1992). Shellfish were probably not a major part of the diet. Continued marine transgression hindered establishment of sizable submerged oyster shell reefs in the Chesapeake Bay (Dent 1995).

Gardner (1978, 1980) and Custer (1984) have identified three types of sites associated with the Middle Archaic Period, which they feel reflect the social organization of the period (q.v. Gardner and Custer 1978). These sites include macro- and microband camps and procurement sites. In the fall when food resources were abundant same groups of people or bands fused together into macro- or corporate bands. These gathered at macroband base camps that tended to be located at the Fall Line. Artifact assemblages recovered at these sites indicate fairly long term occupation with a wide variety of activities. The microbands were comprised of family groups who tended to live in a single river valley. They moved

between the valley floor and adjacent upland areas throughout the year, living in microband base camps and utilizing procurement sites. Microband base camps tended to be located in environmental settings that could not support the larger populations associated with macroband base camps. Procurement sites yield fewer tool types and tend to be related to a limited number of activities. Location of these sites was dependent on the type of resource being utilized (i.e., quarry sites and interior hunting sites). See Binford (1980, 1983) for an alternative view of the relationship between site size and function.

C. The Late Archaic/Early Woodland Periods (ca 4000 B.C. to 200 B.C.)

The Late Archaic/Early Woodland Periods are often described as an era of transition between non-ceramic and ceramic cultures. This era of transition coincided with the beginning of the SubBoreal Climatic Period, which may be further subdivided into a series of warming and cooling episodes. The Xerothermic Maximum occurred at the beginning of the sequence and was characterized by a warm, dry climate, in which oak–hickory forests flourished. Around 5000 years ago the mid-postglacial Xerothermic began, ushering in a drier climate that supported xeric deciduous forests. During this period, hickory, chestnut, and oak would have been the dominant forest species. Climate shifts continued during the mid-postglacial Xerothermic that brought about slightly cooler temperatures and an increase in precipitation, so that by 3,500 years ago essentially modern climate conditions and associated forest cover characterized the Chesapeake Region (Carbone 1976, 1982; LeeDecker and Koldehoff 1991; Sears 1942). In riverine areas, soil profiles show the development of buried landscapes, or paleosols. Soil discontinuities have also been noted in these profiles, which include changes in soil particle size, which indicates changes in the rate of soil profile development (Custer 1996). During this era, riverine and estuarine environments stabilized as a result of the stabilization of sea levels. These areas were ideal places for intensive exploitation of resources, supplemented by interior foraging trips in the spring and fall.

Stabilization of estuarine areas increased the range for oyster beds and anadromous fish. By the end of the Early Woodland oysters had become a major food source and large oyster shell middens are a common find on coastal sites. Other estuarine resources that were gathered included gulf periwinkle that was found in cordgrass along the marshy margins of tidewater areas, ribbed mussels, and various clam species that were found in tidal mud-flats (Dent 1995). Anadromous fish, such as American shad, red drum, herring, perch, and striped bass (rock fish), began to make spring runs from the Chesapeake Bay up into the fresh water portions of rivers to spawn. To take advantage of these spring runs, fish weirs, constructed from stone, cane, or wood, directed fish into traps. Boudain (2008) documented stone weirs along the Potomac River during the drought of 2007. Moeller (2005) believes that Native Americans manufactured fish spears. He suggests that many of the lithic tools recovered in the Delaware River Valley that were previously identified as drills are actually barbed fish spears. Fishnets were also used to capture fish during the spring runs. Floats for fishing nets were made from gourds (Cucurbita pepo) and net sinkers were made of stone (Fritz 1999). Regardless of the method employed, large numbers of fish were caught during these spring runs, and they needed to be processed in an extremely short period. Fish were smoked on large stone platform hearths and on wooden platforms that were constructed over hearths. Native Americans were still using the same fishing and processing methods when Europeans arrived (Dent 1995; Harriot 1972[1588]).

Cooking technology changed greatly during this period. It has long been assumed that these changes were a direct response to the increased diversity and quantity of available resources (Sassaman 1999). Cobble ovens and roasting pits appear on sites throughout the Chesapeake Region (Dent 1995). The production

of steatite (soapstone) vessels began during this period. These vessels included cooking stones and slabs, as well as bowls and cups. Steatite is a talc-like stone that can be an easily carved and polished into vessel form. Prehistoric steatite quarries were located throughout the Piedmont Region in the Susquehanna Uplands of Pennsylvania, in Cecil County, Maryland (Ward 2010; Ward and Custer 1988), along the Patuxent River in Howard and Montgomery counties near Browns Bridge (Clark and Inashima 2003; Holmes 1992a; Read 2012), and in the Maryland counties of Baltimore, Carroll, and Harford (Brown 1980).

Throughout this period population continued to increase, while becoming more sedentary (Mouer 1991; Steponaitis 1980). Base camps were established at the mouths of streams and rivers, or in marshy embayments. Upland areas were the locus of food processing camps. Small lithic scatters are common throughout the uplands; probably representing debris from the manufacture of expedient tools used to process food resources (Custer 1996). Other sites were the locus of seasonal or short-term-procurement stations. In the past, these sites have been categorized as "quarries," but recent excavation of the Lyonsfield III Site in Baltimore County and the Anderson Branch Site in Montgomery County has contradicted this model. Both of these sites appear to be the locus of overlapping activities that include lithic procurement and processing, as well as the utilization of resources from nearby drainages and bogs (Ferguson et al. 2006; Maymon et al. 1997). On the Coastal Plain, groups focused on shell fish and fish. Multiple large macroband base camps were located on the Coastal Plain and were surrounded by smaller procurement sites. In the Piedmont, groups focused on harvesting nuts, deer, and turkey in the interior uplands. In the river valleys, they exploited the annual fish runs (Dent 1995).

Artifact diversity increases during this period, as represented by groundstone axes, hammerstones, net weights, and drills. Overall, there is an increase in the number and variety of groundstone tools. Caches of groundstone tools associated with plant food processing appear. It is assumed that these heavy tools were placed in pits and hidden away when a site was abandoned, implying that the occupants intended to return and retrieve them.

Diagnostic artifacts include narrow blade stemmed and broad blade point types. Narrow blades tend to be made from a wide variety of locally available quartz and quartzite, with lesser numbers manufactured from rhyolite found in the Piedmont. The broad blades show a preference for local quartzite (Custer 1996, Dent 1995). Custer (1996) and Mouer (1991) have noted that site assemblages with broad blades are more common along the Coastal Plain, while narrow blade assemblages appear more frequently west of the Fall Line. Custer further notes that 96 percent of the sites identified in the Piedmont west of the Fall Line that have broad blades in their assemblages were located along rivers. Mouer has noted a similar distribution in Virginia. Eighty-seven percent of the sites with broad blade assemblages were located on the water's edge and only 13 percent were found on sites located in interior regions. Most researchers now believe that the Narrow Blade Tradition was focused on the utilization of sylvan (or forest) resources, while the Broad Blade Tradition was a response to the newly available riverine and marine resources. However, contention arises among researchers when the origin of the broad blades is brought into focus.

Currently, most researchers believe that the Narrow Blade Tradition developed in situ, while the broad blades entered the Chesapeake Region from the southeast (Dent 1995; Custer 1996). However, some archeologists contend that the appearance of broad blades in the Middle Atlantic or Chesapeake Region is not due to the direct migration of peoples into the region, but is instead the result of broad-based trade networks in which items were traded hand-over-hand across long distances. The argument is that once some of the broad blades had entered the region, they were quickly adopted by the local populace and

became part of the archeological assemblage. What is not mentioned in many of the trade arguments is that other cultural attributes associated with the use of broad blades in the southeast – subsistence and settlement practices, possibly the social structure and similar burial practices – also appear at the same time (Dent 1995).

Dent (1995) argues that the stimulus for the Broad Blade Tradition in the Northeast and the Chesapeake Region was imported into the Chesapeake through the exchange of technology and ideas. He also argues that this exchange did involve the movement of small groups of outsiders into the region and that exchange probably occurred along the boundaries between the two cultural groups where the movement of people, technology and ideas is more fluid. Cultural ideas and new technology would be appropriated by one group, adjusted to fit their specific needs and cultural ideology, and then spread to others within the same cultural group.

However, Custer (1996) believes that the same cultural group used both types of blades – broad and narrow. He cites the co-occurrence of these blades in assemblages on sites across the Middle Atlantic Region. The contextual integrity of these sites is excellent – the blades have been found together on stratified sites, in clearly defined deposits. Custer argues that this supports the usage of these blades by a single cultural group and that it does not indicate the presence of a unique Narrow Blade Cultural Group and a unique Broad Blade Cultural Group. Dent (1995:114) on the other hand argues this co-occurrence of artifacts is more likely a case of expected interaction between very different yet contemporaneous groups. The distribution of these blade types does indicate a major break at the Fall Line, which historically served as a boundary between different cultural groups.

In the Piedmont Region, the Early Woodland Period is inaugurated with the invention or introduction of ceramics. Early ceramics are known as “Experimental Wares” and are often similar in form to earlier steatite vessels. Egloff and Potter (1982) argue that early Middle Atlantic ceramics were inspired by southeastern types. Ceramics first appeared along the Georgia and South Carolina Coast circa 1500 B.C. to 1000 B.C. In the Middle Atlantic, many of the early wares developed in the Piedmont Region and the technology spread rapidly through the rest of the region. While some ceramic types may have originated outside of the region, other types were probably local innovations and are unique to the Chesapeake Region. Included in this latter group are Selden Island (Slattery 1946), Bushnell, and Croaker Landing wares (Custer 1989). Dent (1995:225) notes that these wares appear to be “spatially restricted to the Piedmont Zone and sometimes the outer Coastal Plain. None are typically recovered in great quantities”. Other ceramic types associated with the Early Woodland include Marcey Creek ceramics, which are tempered with crushed steatite and whose forms are reminiscent of the carved steatite bowls of the previous period. That is, slab built with a flat bottom and lug handles. These wares first appeared in the southern reaches of the Middle Atlantic (Custer 1984; Manson 1948; Mouer 1991; Stephenson et al. 1963; Steponaitis 1980). Selden Island Ceramics, like Marcey Creek wares, are tempered with steatite. However, unlike Marcey Creek, Selden Island wares have a conical bottom and no lug handles (Slattery 1946).

In the Coastal Plain and Piedmont Regions, Marcey Creek was eventually replaced by Accokeek wares, which were tempered with sand and quartz and employed new forms (such as conical bottoms) and coil construction (Stephenson et al. 1963; Steponaitis 1980; Wright 1973). “Clark believes that the transition to conical-shaped vessels and the shift from steatite to quartz temper suggests that around 800 B.C. the steatite quarries [of the Rocky Gorge Reservoir] had ceased to be part of the annual exploitation round of

the Native Americans of the Patuxent River" (Clark and Inashima 2003:24). It is possible that other steatite quarries in regions also ceased to be an important part of the seasonal round.

Early Woodland settlement and subsistence patterns show strong continuity with Late Archaic life styles and a continuation of what Dent calls the "Intensification Process". The main difference is the appearance of ceramics. The chipped-stone industry reflects Late Archaic "intensification": drills, small bifaces, perforators, scrapers, and utilized flakes. Antler and bone tools have also been recovered (Dent 1995).

Local groups appear to have become more sedentary, occupying larger sites for longer periods that were served by outlying extraction sites (Gardner 1982; Mouer 1991). There is no evidence for the establishment of villages during this period, instead habitation sites appear to have been a number of seasonal camps (Waselkov 1982). Along the coast, major base camps seem to be linked to more transient, limited-purpose interior sites. A division appears in settlement patterns associated with freshwater and estuarine resource extraction (Custer 1984, 1989; Mouer 1991; Wright 1973). Wright (1973) postulated small family based groups moving between forest, riverine, and tidal sites. Tidal sites supported larger populations that gathered oysters and other estuarine resources, while inland forest and riverine sites were used for smaller hunting and gathering camps where a variety of animals were hunted and hickory nuts were gathered. The same pattern has been noted for the Susquehanna, Patuxent, Severn, South, and Potomac Rivers (Clark and Inashima 2003; Kent et al. 1971; Steponaitis 1980; Wright 1973). Steponaitis (1980) noted an increase in shell middens along the tidal portions of the Patuxent River, as well as increase of Accokeek components as compared to the number of earlier Marcey Creek components.

Storage pits and house features have been identified at numerous sites dating to this time period throughout the Middle Atlantic region (Custer 1989, 1994; Custer and Silber 1994; Dent 1995). The earliest known houses in Maryland are associated with the Pig Point Site in Anne Arundel County (Luckenbach 2010; Luckenbach et al. 2010). Research at this site has uncovered the remains of a series of overlapping oval wigwam or yeehakawn structures. A combination of dating methods, including radiocarbon 14, ceramic seriation, and natural stratigraphy date these house patterns from the Late Archaic (if not earlier) to the Late Woodland.

This new, relatively sedentary, settlement pattern also caused considerable changes in the social organization of populations living in the Middle Atlantic region. A more sedentary lifestyle combined with horticultural plant harvesting would have yielded occasional surpluses. Consequently, these factors often allowed incipient ranked societies to form. For example, during the Middle Woodland Period, intensified procurement of fish resources is thought to have played a significant role in subsistence strategies within the Abbott Farm National Landmark near Trenton, New Jersey (Stewart 1994). Across the Middle Atlantic region, objects such as polished celts, gorgets, pipes, and tools of non-local materials appear to be manifestations of developing social organization.

Perhaps the most striking assemblages of this period are the Adena culture artifacts, imported from the Ohio Valley and found in elaborate graves. These artifacts are found on Maryland's Eastern Shore and on the West River in Anne Arundel County. The artifacts recovered from the Maryland sites include block-end tubes, bifaces, gorgets, and large blades made of non-local chert (Dent 1995; Ford 1976). Some of the better-known Adena sites of Maryland are the eastern shore Sandy Hill Site (18DO30) on the Choptank River near Cambridge (Custer 1989; Dent 1995; Ford 1976) and the Nassawango Adena Site (Wise 1973) along a small tributary of the Pocomoke River. The only known site on the western shore is the West River Site near Annapolis (Ford 1976). Several Adena sites have also been found in Delaware. These sites include

two on the Murderkill River – the Killen Pond (Cubbage 1991) and Frederica (Jones 1965) sites – and one on the Saint Jones River – the Saint Jones Site (Bupp 2000; Thomas 1976).

In 1963, Dragoo hypothesized that the Adena on the East Coast were immigrants from the west. Adena developed out of an earlier Late Archaic Burial Tradition known in the literature as the "Cult of the Dead". According to Dragoo, this "Cult of the Dead" extended from the western Great Lakes into Upstate New York, New England, and Canada. It was also found in Central Ohio and the Middle Atlantic. These earlier burial cults included the Glacial Kame Complex (Cunningham 1948; Moorehead 1909), the Red Ocher Complex (Ritzenthaler and Quimby 1962), the Red Paint Complex or People (Moorehead 1922), and the Old Copper Complex or Cult (Wittry and Ritzenthaler 1957), all of which were fully in place by the Late Archaic (Milner 2004).

Adena developed between 500 B.C. and 250 A.D. as a distinct regional culture in Ohio. It spread along the Ohio River and up major tributaries. Trade items leaving Ohio ended up deposited in similar mortuary deposits spread over widely separated areas. However, it is also important to assume that more than material items were being exchanged in these long distance trade networks. Part of the exchange included the cultural ideal of the "Cult of the Dead". This ideal served as a unifying theme over hundreds of miles. It not only stylized burial customs and material remains, but also united diverse ethnic groups living in diverse ecological settings. In Ohio, the early burials contain mostly utilitarian objects. Later Adena burial mounds show definite evidence of social hierarchy with exotic goods in elaborate and large-scale interments, probably indicating the development of Big Man systems (Johnson and Earle 2000; Sahlins 1968).

Big Man systems occur at the same time that tribal groups begin to emerge. The status of a Big Man is acquired. He attains status through his personal charisma, his prowess as a warrior, magician, hunter, or gardener, and through the calculated disposition of his wealth. The Big Man uses and creates special relations that give him leverage over other people's production and that enable him to siphon off excess goods from his followers. In this way he amasses goods and redistributes them through the tribal group so that he builds his reputation for generosity. This in turn allows him to develop a coterie of men who owe him. A Big Man also uses goods culled from his followers to sponsor public feasts and giveaways that involve people from other communities and their Big Men. These public feasts build new relations of indebtedness. As Sahlins has stated: "generosity creates leadership by creating followership" (Sahlins 1968:88). Once the Big Man is established, members of his group leave critical external political and economic dealings with other groups to him. However, in the end the Big Man System defeats its own development. The Big Man's power and influence are dependent on the structure of the tribe and the community's involvement with other groups in terms of competition and cooperation. In addition, the death of a Big Man can precipitate a regional political crisis. His faction may dissolve wholly or in part, or it may regroup around a new aspiring Big Man. A Big Man's status is not necessarily passed on to his sons. They too must earn this status.

Adena and other burial cults may have started as a way of symbolizing the claims of egalitarian groups to territory. Over time, a Big Man and his elite group of followers emerged in the society and controlled the distribution and trade of luxury goods over a wide area. Initially, religious specialists probably carried out long-distance trade missions to obtain rare goods. Adena burial practices and goods were spread to other groups through ritualized long-distance trade relationships (Custer 1984; Dent 1995; Dragoo 1962; Milner 2004). Custer (1984) believes that the presence of Adena goods without the mortuary complex on a site

would simply signify trade. However, the building of Adena style mortuary complexes across great distances indicates an exchange not only of goods but also of the religious ideology and customs of the Adena ceremonial complex.

In the Ohio and Mississippi River valleys, Adena evolved into more complex mortuary practices associated with the Hopewell Peoples. Hopewell did not extend into the Chesapeake. Instead, Adena disappears from the Chesapeake by 200 B.C., or at the beginning of the Middle Woodland Period. The trade networks with Ohio also appear to have ended around this time (Custer 1984; Dent 1995).

D. The Middle Woodland Period (ca 200 B.C. to A.D. 1000)

Patterns established during the preceding transition from the Late Archaic to Early Woodland continued through the early portion of the Middle Woodland Period. Handsman and McNett (1974) and Potter (1993) based on their work in Virginia suggest that specific task groups were assigned to secure the various food sources and to bring them back to residential base camps. This type of fission-fusion cycle is also known ethnographically (Binford 1983). Very large midden sites begin to appear after A.D. 550, and increase in number between A.D. 700 and 900. Groups are larger, and while fission-fusion continues, some members of the group remain at the base camp/village year round. Along the tidal portion of the Potomac River, the major Popes Creek Phase settlements were occupied during the fall and winter. Satellite sites for specialized hunting and procurement activities were located beyond the Fall Line and in the interior portions of the Coastal Plain. The main base camp sites have dense shell midden accumulations. At the Popes Creek type site, approximately 14 hectares (35 ac) of shell accumulation was spread on both sides of the creek that was between 4.27 and 7.92 m (14 and 26 ft.) in depth. During the spring, part of the group would travel up river to the Fall Zone to take advantage of the annual runs of anadromous fish (Dent 1995).

Custer (1996) notes that transient camps and small procurement and processing stations continue to be as an important part of the Middle Woodland Period settlement patterns as they were during the Late Archaic/Early Woodland Periods. Transient camps are less ephemeral than procurement and processing stations, and ceramics are frequently found in their assemblages. Rock shelters were commonly used as the locus of transient camps. Stewart (1985) has referred to rock shelters as the “prehistoric motels" of the Early and Middle Woodland. These transient camps were probably associated with specific procurement activities such as plant resources, lithic outcrops, or riverine resources (Custer 1996).

Clark and Inashima (2003:25) note an expansion of population into new geographical areas during the succeeding Selby Bay Phase and state that the Middle Woodland Period is a time of “dynamic change”. There is a substantial shift in population location, lithic procurement activities, and subsistence patterns between the Popes Creek Phase and the Selby Bay Phase of the later Middle Woodland. Steponaitis (1980) notes that for the tidal portion of the Patuxent River, lithic materials used during the Popes Creek Phase tend to be primarily of local origin. Most of the Rossville points associated with Popes Creek components were made of either quartzite (46 percent) or quartz (41 percent). Smaller numbers were made of Piedmont rhyolite (11 percent), chert from Pennsylvania (one percent), or Pennsylvania jasper (one percent). In the Upper Patuxent, Severn and Magothy drainages, local quartz quarries were utilized both for lithic resources and for seasonally available resources at nearby drainages and bogs (Polglase et al. 1990, 1992; Polglase and Neuman 1991a, 1991b). During the Selby Bay Phase, expanding populations began to move into the Fall Zone. Eventually populations residing in the Patuxent drainage began to cross the ridge near what is now Mt Airy, Maryland and enter the Monocacy River Valley; from there they were

able to directly exploit Blue Ridge rhyolite quarries. Clark believes that at this point the old down-the-line trade network system gave way to direct procurement (Clark and Inashima 2003). Steponaitis (1980) also noted the change in lithic material preference in collections from the tidal Patuxent. Ninety-three percent of the Selby Bay Points in these collections were manufactured from rhyolite. Smaller numbers were made from argillite (three percent), chert (two percent), and quartz and quartzite (one percent). Potter (1993) also noted a direct correlation between rhyolite and Selby Bay Points at the Plum Nelly Site along the Potomac River in Virginia. Other items recovered from this site included bifaces made of local stone, green stone celts, and bone tools, needles, and awls.

Changes in pottery styles also characterize the phases of the Middle Woodland. During the early part of the Middle Woodland, Popes Creek ceramics were the predominate ware on the Coastal Plain of Maryland, as well as in parts of Delaware, Pennsylvania, and Virginia. Popes Creek is thick-walled, tempered with sand, and bears net impressions (Holmes 1992 [1903]; Stephenson et al. 1963). The core area for this ceramic was the tidal drainage of the Potomac River. Distribution extends to the Fall Line and into the Fall Zone, but is rare in the Piedmont proper.

Popes Creek ceramics are replaced by Mockley ceramics around A.D. 200, these found in the archeological record until circa A.D. 900. They are tempered with coarsely crushed, unburned oyster shell. The exterior surfaces are either plain or cord-marked and net impressed. Mockley is distributed across both the Western and Eastern Shores of the Coastal Plain in Maryland and Delaware and as far south as the James River in Virginia. It is also found in the Fall Zone, but is rare west of there. Small amounts have been reported from rock shelter sites in the Piedmont and Great Valley Regions of Maryland (Jefferson Patterson Park and Museum 2002). Between A.D. 700 and 900, distinct local pottery was produced along with Mockley and Nomini in Southern Virginia and Hell Island ceramics in Delaware (Custer 1996; Dent 1995; Egloff and Woodward 2006).

Initially, Selby Bay Phase settlement patterns mirrored those of the Popes Creek Phase. However, after a dry interval between A.D. 400 and 500, very large midden sites began to appear in the tidal portions of the Chesapeake Region's rivers next to coves or the embayments of tributary streams. Gilsen (1978, 1979) suggests that settlement and subsistence patterns during the latter portion of the Selby Bay Phase may be characterized as an "Estuarine Efficiency Model". Gilsen argues that there is a dual adaptation to both the tidewater and freshwater areas of the rivers that emphasizes shellfish as the primary food resource and anadromous fish as a secondary resource. Both sources are predictable in terms of location and timing, and both are abundant. He predicts a settlement pattern based on a main village or base camp located in the estuarine portion of the river that was occupied during the late summer, fall and early winter. During these seasons of the year, the population gathered shellfish and supplemented their diet with turtles, fish, deer, and plant materials. Then during the late winter, spring, and early summer, a secondary village or base camp was established along the riverine portion of the river near the spawning areas. Selby Bay peoples exploited the anadromous fish runs and supplemented their diets with plants, turtles, waterfowl, small mammals, deer, and wapiti (elk). Potter (1993) suggests that this may be the last intensive gatherer and hunter era in the Middle Atlantic, and further, that the rich Coastal Plain environment may have delayed plant husbandry until much later in the Late Woodland.

McLearn and Mouer (1994) argue that between A.D. 200 and 800 Middle Woodland peoples gradually changed their fission-fusion cycles, staying in one place for much longer periods of time until they began to live in more permanent settlements. Mobility decreased as groups increased their focus on collecting

specific resources. Large numbers of house patterns appear in the Middle Atlantic during the latter part of the Middle Woodland Period. A possible domestic structure was uncovered in Calvert County along the Patuxent River (Dent 1995). At the Indian Point Site on the Schuylkill River in Pennsylvania, semi-subterranean house pits with numerous hearths and storage pits were recovered during excavation. Household clusters were identified at the Clyde Farm Site in Northern Delaware. Each of these clusters contained a house and food storage/processing pits associated with an individual family. A pit house dating to this period has been identified at the Pig Point Site in Anne Arundel County (Luckenbach 2010; Luckenbach et al. 2010).

Boundary definitions between groups would have intensified as mobility deceased. Luckenbach et al. (1987) suggest that the during the Selby Bay Phase the local population, represented by the Accokeek and Popes Creek people, may have been replaced and/or absorbed by a large influx of Algonquian speaking Native Americans. Potter (1993) notes new territories on the Northern Neck of Virginia and in the Potomac Basin, along the Rappahannock River Basin South to the James River, along the Patuxent River Basin and in the Piedmont west of Fall Line. Custer (1996) notes similar territories in the Delaware and Schuylkill River Valleys affiliated with coastal groups to the south and east. Groups in the Susquehanna River Valley were more closely affiliated with interior Piedmont groups to north and west.

Rhyolite, which was the preferred lithic material for much of the Selby Bay Phase, could only be obtained in the Piedmont. After A.D. 700, trade or direct access to the resource declined, effectively ending around A.D. 900. Rhyolite points recovered from Coastal Plain sites post-dating A.D. 700 are heavily reworked, and an increasing number of points are made from local quartz and quartzite. This suggests that the Fall Line became a boundary between Coastal Plain and Piedmont groups that had settled into distinct territories. This is not due to the introduction of agriculture as Binford hypothesized in 1964, but is instead due to intensive gathering and hunting of select species. There are changes in the diet at the end of the Middle Woodland Period marked by a decrease in the diversity of species in oyster shell middens and an increase in the volume of oysters. Populations focused on deer, turkey, and anadromous fish. It is also possible that horticulture starts during this period (Dent 1995).

E. Late Woodland Period (ca. A.D. 1000 to A.D. 1600)

Agriculture was firmly established during this period. Selig (1993) suggests that plant domestication in the Eastern Woodlands began with indigenous seed plants. These included chenopod (goosefoot), marsh elder (gall bush), squash, sunflower, erect knotweed, little barley, and maygrass. According to Selig, between 3000 and 2000 B.C., significant morphological changes occurred to wild plants collected by Native populations living in what are now Tennessee, Arkansas, Illinois, Kentucky, Ohio, Missouri and Alabama. These morphological changes include thinning of the seed coats and increase in seed size due to manipulation by human populations who gradually changed the seeds as they were harvested and planted over a period of almost 1,700 years. Sometime between 250 B.C. and A.D. 200, small farming communities began to appear on the Mississippi and Ohio River Drainages, and along the Gulf Coast and river valleys of the southeast. The focus of these farming villages was on indigenous crops, not on maize. This type of food production begins at the same time as the emergence of Hopewell in the Midwest, a regional culture that does not reach into the Middle Atlantic (Selig 1993; Milner 2004).

Circa A.D. 800 maize began to dominate fields and diets in the southeast. Maize production spread rapidly through the Eastern Woodlands and by A.D. 900 it extended from Florida up the East Coast into Ontario Canada. The transition coincided with emerging Mississippian Chiefdoms in the Midwest, and the

beginnings of chiefdoms in the Middle Atlantic. In the Middle Atlantic, maize was part of a diet that included nuts, starchy tubers, amaranth, and goosefoot (Ameringer 1975; Dent 1995; Kinsey and Custer

1982; Moeller 1975). The diet was also supplemented by wild plants and faunal and aquatic resources, including freshwater shellfish and anadromous fish.

Lithic technology does not change appreciably during this period, although the appearance in the archeological record of triangular stone points probably indicates the manufacture and use of bows and arrows. Other tools include stone celts and hoes, and other lithic, bone and antler tools. Angular pipes have been recovered, as well as native copper beads and pendants, although the latter are rare (Dent 1995).

The cultural boundary demarcated by the Fall Line evident in settlement patterns and material culture before the Late Woodland persisted between the Piedmont and the Coastal Plain Provinces. As Potter (1993:155) notes, the fall line had been a dynamic place since at least 2,000 B.C., but it became particularly so during the Late Woodland. In Virginia, this was particularly true in the century or so preceding the settlement of Jamestown. The Fall Line became a cultural buffer zone between the Monacans of the Piedmont and the Powhatans of the Coastal Plain. This cultural buffer is also noted in the distribution of ceramic types throughout the area.

In Maryland, Late Woodland Period ceramics include Shenks Ferry, Shepard, Page, and Keyser wares. All of these wares have distribution patterns that are located to the west of the Fall Line. Townsend Series ceramics were distributed throughout the Coastal Plain to the Fall Zone. This series of ceramics includes several defined types: Rappahannock Fabric-Impressed, Rappahannock Incised, Rappahannock Plain, Townsend Herringbone, and Townsend Corded-Horizontal. Moyoane and Potomac Creek Ceramics also have a limited distribution in the Piedmont west of the Fall Line (Jefferson Patterson Park and Museum 2002). Distribution of all of these ceramic types appears to match the locations of two distinct linguistic groups – the Algonquians and the Iroquoians. Areas that were predominately inhabited by Algonquian speakers are associated with the distribution of Townsend series ceramics, Potomac Creek ceramics and Shepard ceramics, while areas with Iroquoian/Eastern Siouan affiliations are associated with the distribution of Shenks Ferry ceramics (Custer 1996; Dent 1995; Griffith and Custer 1985; Potter 1993).

Luckenbach et al. (1987) have suggested that Algonquian speakers appeared in the Chesapeake Region during the Selby Bay Phase and replaced and/or absorbed earlier populations represented by the Accokeek and Popes Creek peoples. Another hypothesis concerning the movement of ancestral Algonquian populations in the Chesapeake Region is the Montgomery focus hypothesis. This hypothesis was initially suggested by Karl Schmitt (1965) who as a graduate student in 1940, worked on the Potomac Creek Site. Schmitt noticed similarities between artifacts recovered from the Potomac Creek Site and from later components of the Accokeek Creek Site, particularly the Potomac Creek Cord-marked pottery. Sites with these attributes were grouped as the “Potomac Creek Complex”. Schmitt also noticed that there seemed to be a relationship between these two sites and sites along the Potomac River in the Piedmont Province. In particular, he noted similarities between the Shepard Site (18MO3) in Montgomery County and the Potomac Creek Complex sites. The defining pottery for the Piedmont sites was Shepard Cord-marked, which is similar to Potomac Creek Cord-marked. Schmitt hypothesized that during the very Late Woodland small groups living in the Piedmont formed close alliances and then moved east onto the Coastal Plain where they built large fortified villages. He suggested that “A possible stimulus to such a

movement and banding together would be a desire for security from tribes, possibly Iroquoian, to the west and north" (Schmitt 1965:30).

Subsequent work on Piedmont sites with Shepard ceramics led to these sites being grouped under the heading of the "Montgomery Complex" (Curry and Kavanagh 2004; Slattery and Woodward 1992). While there are many similarities between the Potomac Creek Complex and the Montgomery Complex, there are also major differences. The latter include house patterns, which are circular for the Montgomery Complex and rectangular or longhouse-like forms for the Potomac Creek Complex. Mortuary practices also differ. Montgomery Complex burials are generally flexed and placed in single graves. Bundle burials are extremely rare (Potter 1993). Potomac Creek Complex burials are generally secondary reburials in ossuaries (Curry 1999). Potter (1993) points out that when the postulated movement of the Montgomery Complex occurred (circa A.D. 1300-1400) secondary burials in either ossuaries or mounds were already common in Virginia and the Montgomery Complex peoples may have adopted the practice of secondary burials from their neighbors after moving onto the Coastal Plain.

Another avenue of evidence supporting the Montgomery Complex hypothesis is the movement of other peoples in the Piedmont Region. The Mason Complex peoples used Page Cord-marked ceramics and Levanna points. In A.D. 1300, these groups were based in the upper Potomac and northern Shenandoah Valley. Like the Montgomery Complex peoples, they too were pressured by other groups and eventually left the Piedmont. They were replaced by groups living in palisaded villages that engaged in agriculture and used Keyser Cord-marked pottery and Madison triangular points. During the Luray Phase, they spread through the Piedmont and by the 1400s had displaced both the Mason Complex and Montgomery Complex populations (Potter 1993).

While the distribution of ceramics is strongly correlated to the distribution of linguistic populations, overall settlement patterns remained much the same as during the previous period. Semi-sedentary villages appear throughout the region, which were associated with small seasonal hunting, fishing, and gathering camps (Potter 1982). Smaller villages appeared between A.D. 800 and 1300, while larger villages tend to appear after A.D. 1300. Between A.D. 800 and 1600, fortified villages appeared along river valleys. This may be due to the movements of population through the region that was described in the preceding paragraphs. A number of villages were fortified with substantial stockades that surrounded a central building, while others surrounded the whole settlement. The former may have marked precinct bounds, while the latter were defensive (Clark 1980; Dent 1995). Population increased and social organization throughout the Middle Atlantic exhibited a greater range of social complexity, increased social stratification, and corresponding social inequality (Potter 1993).

Small gathering and hunting communities generally do not organize on the tribal level unless an abundance of resources exists. In the Chesapeake Region there was an abundance of shellfish and other estuarine resources that became available during the Late Archaic/Early Woodland Periods. Groups tended to be more sedentary, although they were not living in villages. Seasonal dispersal of families hampered establishment of strong tribal entities as the coherence of the corporate group was continually disrupted. However, as communities became more sedentary through the Middle Woodland Period, they may have begun to organize into what Sahlins (1968) describes as segmentary tribes. Segmentary tribes tended to divide into independent local communities that were the primary political units or segments. The communities and their territories were small. Individual communities could be formed from a single descent group or lineage or by an association of several different lineages. Leadership of the groups was

generally in the form of either a petty chieftain or a Big Man. Neither position was hereditary. Eventually one of these leaders might be able to gain control of a group of villages and through time he and possibly his descendants were able to consolidate and centralize their political control over the group.

By the late 1400s to early 1500s, there was increasing social and political centralization in the Chesapeake Region. Potter (1993) believes that complex societies began to emerge at this time in the form of chiefdoms. Robert Carneiro (1981:45) defines chiefdom as an autonomous political unit comprising a number of villages or communities under the permanent control of a paramount chief. The earliest of these chiefdoms probably emerged from the Potomac Creek Complex and was comprised of the Piscataway of Maryland and associated groups such as the Nacotchtanks, Pamunkeys, Nangemoys, and Potapocos, and the Patawomekes of Virginia and associated groups. This chiefdom continued until the end of the 1500s when the Patawomekes broke away under their own chief (Potter 1993). This early chiefdom arose just to the east of the Fall Line on the inner Coastal Plain along the Potomac River. This is also the same setting where the Powhatan Chiefdom arose along the James River in Virginia.

Numerous explanations have been put forth as to why centralized chiefdoms emerged in the fifteenth and sixteenth centuries. These include the location of agricultural soils, population pressure on resources, control over resources (such as anadromous fish), and external pressure by non-Algonquian populations who entered the Fall Zone to exploit the area's resources. Alternative explanations include trade arrangements between Coastal Plain and Piedmont groups that allowed certain members of Algonquian society to secure trading monopolies that became hereditary. This in turn concentrated wealth in the hands of a few individuals who were eventually able to consolidate control over other Algonquian groups in the area through trade restrictions and alliances (Potter 1993). Rountree (1989) has also suggested that sporadic contact with Europeans during the sixteenth century introduced epidemic diseases among the Powhatans. She suggests that these diseases disrupted the social order and enabled an ambitious individual to establish control as paramount chief.

VII. REGIONAL HISTORY

Background research included review of the following: examination of cultural resource reports, and archeological site information at the Maryland Historical Trust, in Crownsville; as well as cultural resource data; local histories, historical maps and other documents held at the Maryland Historical Trust and the Maryland State Archives.

A. Contact and Settlement (A.D. 1570 to A.D. 1750)

Official European settlement in Maryland did not occur until 1634. In that year, St. Mary's City in southern Maryland was settled by a group of colonists sent to the Chesapeake by Cecilius Calvert, second Lord Baltimore. Earlier settlers, led by William Claiborne of Virginia, had colonized Kent Island illegally in 1631 (Brugger 1988; Carr 1974; Fausz 1988). Settlement in the northern Bay lagged behind that of Southern Maryland, in part due to the presence of the Susquehannocks at the head of the Bay.

Baltimore County was the sixth county established in Maryland. Formed around 1658, the county originally included parts of Anne Arundel, Howard, Carroll, and Kent counties, and all of Harford and Cecil counties and Baltimore City (Brooks and Rockel 1979). However, the first formal mention of the county boundaries does not appear until 1674, when Cecil County was formed. The first county seat was not

established until about 1671 in "Old Baltimore" on the Bush River (now Harford County). The town included a tavern, a ferry wharf and the courthouse. By 1695, the county court house at this site had been abandoned and the new seat was on the Baltimore County side of the Little Gunpowder Falls River at "Simms Choice". Since the "Simms Choice" location was difficult to reach, the county seat was again relocated in 1712 to the town of Joppa near the mouth of the Gunpowder River (Brooks and Rockel 1979).

The establishment of Baltimore County created a flurry of interest in the unsettled land surround the northwest branch of the Patapsco River (Power 1992). One of the first settlers in the area was David Jones. In 1661, Jones staked a claim to 380 acres on the east side of the run that flowed into the basin from the north. His patent was recorded the proprietor's land office in 1678 and was named "Jones his Range" (later known as Jones' Range). David Jones built a residence on the bank of the run and had his name attributed to the Jones Falls. Before Jones was able to record his 200-acre parcel with the land office, another speculator, Thomas Cole, laid claim to a portion of Jones' holdings. In 1668, Thomas Cole obtained a warrant and patented an expansive 550-acre lot called "Cole's Harbour". The parcel was cut in half by the Jones's Falls and including portions of Jones's Range. Since David Jones did not obtain a warrant for his land until 1678, his title to "Jones' Range" was secondary to Thomas Cole's patent of "Cole's Harbour" and Jones lost his claim to the parcel.

Like the majority of seventeenth century Chesapeake residents, the settlers in Baltimore County were tobacco planters. In 1700, the county population was under 2,000. For mid-seventeenth century Maryland as a whole, labor for tobacco plantations was supplied primarily by white indentured servants. After 1680, importation of African slaves increased rapidly, while importation of white indentured servants decreased. In 1699, there were about 96 slaves in Baltimore County. By 1715, when the population of the county had reached about 3,000, approximately one fifth or one sixth were of African descent (Brooks and Rockel 1979; Brugger 1988; Scharf 1881). Baltimore County ended the seventeenth century as a vast, under-populated area. The eighteenth century would witness a period of rapid growth and economic expansion.

B. Rural Agrarian Intensification (A.D. 1680 to A.D. 1815)

The tobacco economy spurred settlement along the Patapsco and Gunpowder Rivers and Chesapeake Bay as each planter needed access to deep water for shipping his tobacco to England. Land speculation was also a major force in the local economy. Speculator-settlers who arrived in the area included Charles Carroll and Jonathan Hansen. The land that became Baltimore's Inner Harbor and downtown was the same originally patented by Thomas Cole in 1668 (**Figure 8**). From 1695 to 1701, a Baltimore County gentleman, James Todd, purchased all of "Cole's Harbour" as well as two adjoining parcels on the east side of the Jones Falls: the 200-acre "Mountney's Neck" and the 160-acre "Bold Venture". In 1698, Todd resurveyed "Cole's Harbour" and renamed the tract "Todd's Range". By 1701, James Todd had acquired approximately 900 acres and immediately began selling portions of the massive property (Power 1992). In June of that year, James Todd sold approximately 600 acres to Charles Carroll and the remaining 300 acres to John Hurst. This division laid the groundwork for the subsequent parceling out of Baltimore during the eighteenth century. Carroll's portion of "Todd's Range" became the location of Baltimore Town and the Hurst tract became the site of Jones Town, commonly known today as Old Town (Power 1992).

Jonathan Hansen purchased part of "Todd's Range" from Charles Carroll in what is now the Baltimore Inner Harbor area and established the first grist mill on the Jones Falls in 1711 (Brooks and Rockel 1979; Greene 1980; Olson 1980; Power 1992). In addition, Hanson also patented 200 acres called "Mount Royal"

further up the Jones Falls in what today is part of the Reservoir Hill neighborhood. He surveyed the property in 1720 on escheated land called “Saint Mary Borne” which was originally patented by George Hickson in 1672. Other portions of Reservoir Hill lie within three other original land grants: “Hap Hazzard” (circa 1717), “Ivy Hills” (circa 1754), and “Spicer’s Stoney Hills” (circa 1761).

Several other large tracts patented during the late-seventeenth to early-eighteenth century were located west of Carroll and Hanson’s holding near the Jones Falls. The earliest was Edward Lunn’s 200-acre acquisition located west and adjacent to “Todd’s Range”. The 200-acre parcel, named Lunn’s Lot, was a somewhat crescent-shaped tract with its north apex being near the present-day Chase and Howard Streets and the southernmost point near the Patapsco River below Federal Hill. To the west of “Lunn’s Lott” was a massive 950-acre tract called “Chatsworth”. Patented by Captain William Lux in 1757, the enormous parcel consisted of nearly a half dozen smaller lots originally patented by his father-in-law, George Walker, and other earlier Baltimore County land speculators between 1717 and 1749. Captain Lux consolidated those parcels by 1755 and eventually built a grand plantation and gardens near the present day intersection of Pennsylvania Avenue and W. Franklin Street. For a time his Chatsworth estate encompassed a large proportion of present-day Baltimore City, including the neighborhoods of Harlem Park, Upton, Sandtown-Winchester, Bridgeview-Greenlawn, Coppin Heights, Rosemont, Mosterk, and parts of Edmondson. Over the remainder of the eighteenth century, the Lux family sold portions of their estate to other planters who established their own farms along the roads west of Baltimore Town. After Captain Lux’s death, his house and garden were sold and became a public pleasure garden called Gray’s Gardens.

At the beginning of the eighteenth century, the county’s population clustered along the coast of the Chesapeake Bay and the lower navigable portions of the county’s rivers. Settlement in the Piedmont region was slower, due in part to the lack of good roads into the interior regions of the county. In addition, the soils in the interior were not as well suited to tobacco cultivation (Gibb and Read 1992; Lukezic 1990). Few settlements were made in the interior of Baltimore County before 1695. In that year a garrison fort for Maryland Rangers was erected at the junction of the Susquehanna and Delaware Roads in what is now Garrison, Maryland. These wagon roads extended into the hinterland of western Maryland and southern Pennsylvania. The presence of the rangers at the garrison encouraged settlement in the interior. Southwestern Baltimore County (including what is now southwestern Baltimore City) was part of a massive tract of land known as “Hunting Ridge”. This tract occupied the uplands area between the Gwynns Falls and the Patapsco River. Few land grants were surveyed in “Hunting Ridge” before 1695 (Brooks and Rockel 1979; Keidel 1983).

In the early-eighteenth century, the increase of plantations and businesses along the Patapsco led a group of local planters to petition the Maryland General Assembly for formation of a town. The original site selected for Baltimore Town was Moale’s Point on the Middle Branch of the Patapsco River. However, John Moale, the tract owner, objected, as iron ore deposits had been found there. Daniel Carroll of Dudington and his brother, Charles Carroll of Annapolis, agreed to sell 60 acres of “Cole’s Harbour” or “Todd’s Range” to the town commissioners. Lots in Baltimore Town were laid out in December 1729 and sold in January 1729/30. Two years later, Jones Town was laid out across the Jones Falls from Baltimore Town (Greene 1980; McGrain 1985; Olson 1980).

While Baltimore was in its formative years, the economic base of Maryland underwent a profound shift. Wheat began to emerge as the cash crop of the eastern shore and the new western piedmont settlements.

Tobacco continued to be the dominant crop in southern Maryland. Local wheat production resulted in the development of mills for grinding flour. Flour proved a lucrative export to markets in England and other colonies. In addition to wheat farming, iron furnaces were developed, giving Maryland an early industrial base. In 1731, the Carroll brothers (Daniel and Charles), Dr. Charles Carroll, and Daniel Dulaney the Elder formed the Baltimore Iron Works Company. The furnace was located along the Gwynns Falls, close to Moale's Point (McGrain 1985). The diversification of Maryland's economy drove Baltimore's economy. Growth in the area prompted the merging of Jones Town with Baltimore Town in 1745 (Olson 1980).

By 1750, Baltimore had approximately 200 residents. John Moale (son of the John Moale of Moale's Point) drew a sketch of Baltimore Town in 1752. The sketch shows a small hamlet with 25 houses, St. Paul's Church, Payne's and Kaminsky's taverns, and a small wharf at the current base of Calvert Street (Greene 1980; Moale 1752). Twenty-five years later, the number of houses in Baltimore had increased from 25 to 564 (Olson 1980). Fells Point was patented, surveyed and settled between 1761 and 1770, contributing to the area's increase in population.

Population increase was fueled by the growth of Baltimore's economy. Flour and iron production meant the development of commercial outlets and warehouses on the town wharves, an increase in maritime exports, and the formation of ancillary businesses connected to maritime trade. After 1745, the economy expanded, in large part due to the Seven-Years War (or "French and Indian War"). The Baltimore harbor was large enough to accommodate numerous vessels and wharfs. Like Joppa, the former county seat, it was along the fall line between the Coastal Plain and Piedmont Provinces. However, Baltimore had numerous waterways, along which to build the mills associated with the growing grain economy (Brooks and Rockel 1979). In 1768, Baltimore Town became the seat of Baltimore County. Joppa continued to decline in economic importance, and remained a quiet country village through much of the nineteenth century.

Between 1745 and 1783, Baltimore Town made 12 separate annexations of adjacent county lands. The first annexation in 1745 was of the 10 acres that comprised Jones Town. The other 11 annexations, with the exception of Fells Point, were all of undeveloped land. These annexations each averaged approximately 65 acres in size. The owner of the tract was responsible for laying out the lots and streets in the new subdivisions within the town (Arnold 1978). By the late-eighteenth century, Baltimore was a major port. Lombard and Water Streets, between Charles Street and the Jones Falls, were along the City's original waterfront and were populated with shops, counting houses and banks, and warehouses, shipping offices and their associated wharves. Ships once lined the wharves and rode at anchor in the harbor (Greene 1980; Norman 1987; Olson 1980). The waterfront along what is now Lombard Street was fully developed by 1781.

In the early 1760s, tobacco prices rose. The county's merchants and planters had expectations of high economic returns. At the same time, Britain began to strictly enforce its Navigation Acts, which included duties on iron. Exports of iron dropped rapidly, sending the area's economy into a decline. The Currency Act of 1764, which prohibited the issue of paper money by the colonies, also had a detrimental effect on the county's economy. The Stamp Act of 1765 precipitated the formation of a local Sons of Liberty group. The group included many of Baltimore's prominent merchants. However, members of the planter class tended to avoid involvement with this group. Sons of Liberty groups throughout the thirteen colonies were successful in their campaign to have the Stamp Act repealed. After the repeal of the Stamp Act, prosperity returned to Baltimore's merchants and ironmongers. When the Townsend Acts were passed in

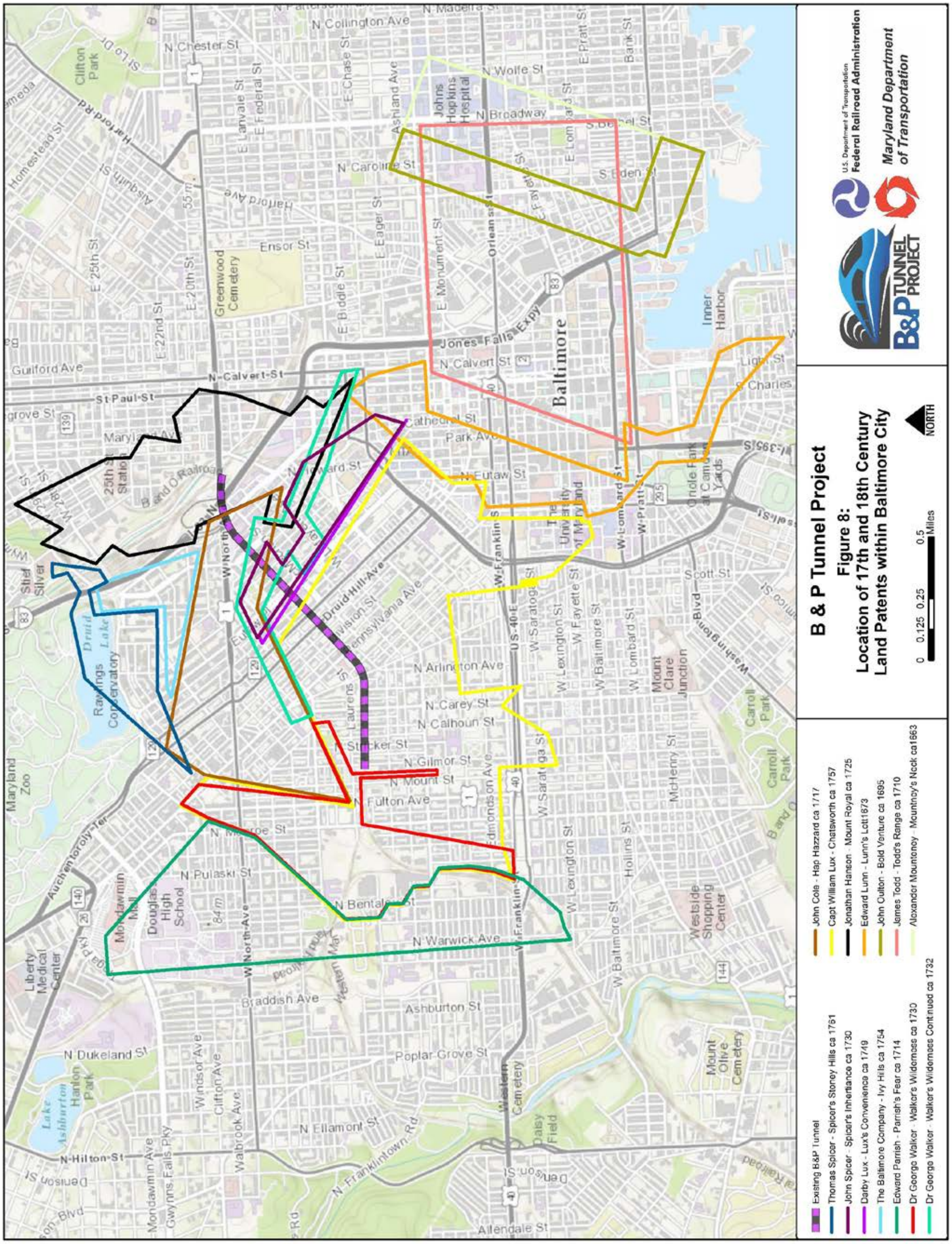
1767, few merchants in Baltimore County raised protest because their coffers were full (Brugger 1988; Greene 1980; McGrain 1985; Olson 1980).

Economic prosperity continued until the early 1770s when capital gains from tobacco and grain exports to Britain began to decrease. British creditors began pressing their American clients for payment of debts, and many merchants faced ruin as the economy went further into decline. Tensions rose, culminating on April 30, 1773 in a clash between Baltimore Town citizens and Robert Morton, a British customs official. Morton had impounded a ship's cargo for non-payment of duty. While Morton managed to escape the mob, two of his assistants were grabbed by the crowd, coated with tar and feathers, and marched through the streets of Baltimore (Read and Anderson 2003).

On July 4, 1776, the Continental Congress met in Philadelphia and formally declared independence from Britain. The former colonies adopted new constitutions. While the new Maryland Constitution placed the government in the hands of the propertied (the minimum amount of property required of a member of the lower house was £500), it did expand the suffrage (Brugger 1988). During the ensuing War for Independence, Baltimore County contributed a number of military leaders to the revolutionary cause. These men included John Eager Howard, who fought at Germantown and the Battle of Cowpens, and Mordecai Gist, son of Richard Gist of Milford Mill. In July 1776, Gist's troops reinforced Washington during the battle of Long Island. Refusing to yield to the British during the battle, Gist and the Maryland Line's accomplishments earned Maryland the nickname, "The Old Line State" (Brogan 1985; McCullough 2004).

After the war, Baltimore returned to the business of mercantile capitalism. The town's rival, Annapolis, went into a slow and steady economic decline. By the late-eighteenth century, Annapolis had become primarily a center of government. Baltimore continued to grow, linked to the world through trade networks (Ward et al. 2006). By 1792, Baltimore Town had spread from the original core around the Inner Harbor, east along the shoreline to Fells Point. In addition, the town had spread north, inland and away from the harbor (**Figure 9**). Development within the harbor area had spread as far north as what is now Saratoga Street. In East Baltimore, streets had been laid out as far north as the current location of Fayette Street (then Pitt Street) (Folie 1792; Olson 1980). In 1793, a group of Baltimore merchants was able to successfully lobby the General Assembly for a charter of incorporation as a city; which was granted in 1796 (Greene 1980).

In 1803, Britain and Napoleonic France began a war with one another. Britain was the largest trading partner of the United States. For four years the United States managed to stay neutral in the British and French altercation. Then in July 1807, the British frigate "Leopold" opened fire on the U.S.S. frigate


B & P Tunnel Project
Figure 8:
Location of 17th and 18th Century Land Patents within Baltimore City
0 0.125 0.25 0.5 Miles
NORTH
Existing B&P Tunnel
Thomas Spicer - Spicer's Stoney Hills ca 1751
John Spicer - Spicer's Inheritance ca 1730
Darby Lux - Lux's Convenience ca 1749
The Baltimore Company - Ivy Hills ca 1754
Edward Parrish - Parrish's Fear ca 1714
Dr George Walker - Walker's Wilderness ca 1730
Dr George Walker - Walker's Wilderness Continued ca 1732
John Cole - Hap Hazzard ca 1717
Capt William Lux - Chatsworth ca 1757
Jonathan Hanson - Mount Royal ca 1725
Edward Lunn - Lunn's Lott1673
John Oulton - Bold Venture ca 1695
James Todd - Todd's Range ca 1710
Alexander Mountenoy - Mountney's Neck ca1663
U.S. Department of Transportation Federal Railroad Administration
Maryland Department of Transportation

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"Chesapeake". The British suspected the "Chesapeake" of harboring British deserters. The "Chesapeake" sustained 22 shots in her hull and 21 casualties. She surrendered after firing one shot. The British boarded and removed four men; one was hanged, one died in captivity, and two were freed four years later (Toll 2006). The British continued to board United States ships looking for deserters. In December 1807, President Thomas Jefferson got the legislation he desired from Congress, a trade embargo on all foreign countries until the sovereign rights of the United States were recognized (Brogan 1985). In a port city like Baltimore, the embargo spelled disaster for many merchants. The embargo was harder on the United States than on her trading partners. In 1809, two days before leaving office, President Jefferson reluctantly signed a repeal of the Embargo Act. It was replaced by the Non-Intercourse Act, which allowed some trade with Britain. In 1810, under President James Madison, this act was replaced by Macon's Bill number 2. Trade with both Britain and France was restored for three months, provided one or the other of them recognized the principles of neutral trade. Napoleon managed to convince Madison that France did indeed recognize neutral trade. Normal trade relations were restored with France, while Britain was barred from trade (Brogan 1985, Perret 1989).

By 1811, Britain was boarding more ships (3,800 American sailors were impressed by the British before the war began). The Northwest Territory (Michigan, Wisconsin, Ohio, Illinois and Indiana) was in turmoil with fighting between British-backed Native Americans and settlers. President Madison concluded he had no other recourse than to declare war on Britain. He sent a war resolution to Congress on June 1, 1812. Seventeen days later, Congress passed a declaration of war. At the time, Baltimore was the fourth largest and third richest city in the United States. For the British the city was a top target. Over the course of the war, Baltimore privateers would take over 500 British ships (Perret 1989; Toll 2006). On the night of September 13 through 14, 1814, the British attacked Baltimore. The attack was, for the British, a complete failure. Admiral Alexander Cochrane sent five bomb ships into Baltimore. As the historian Geoffrey Perret (1989:125) has commented, Cochrane's bomb ships had enough firepower, if "properly handled, to flatten any port in the world. He made only one mistake. Fearful of losing any of his ships to Fort McHenry's guns, he kept them at maximum range, two-and-a-half miles. Cutting the fuses to fit that distance was virtually impossible. He provided the people of Baltimore with the greatest fireworks display they would ever see, and the country with a national anthem".

The War of 1812 lasted two-and-a-half years. The Treaty of Ghent was signed on December 24, 1814. Ironically, the news of the signing of the peace treaty reached Washington at the same time as the news of the victory of the Battle of New Orleans. This final battle, fought under the leadership of Andrew Jackson, began on December 23, 1814 and concluded on January 8, 1815 (Brogan 1985; Perret 1989).

C. Agricultural – Industrial Transition Period (A.D. 1815 to A.D. 1870)

Between 1776 and 1816, the population of the Baltimore area had expanded outside city limits into an area of the county known as "the Precincts". This area surrounded the city on the west, north, and east sides and covered an area of over 13 square miles. The population in this area stood at approximately 12,000 people, or one-third of Baltimore County's population. In 1816, Baltimore City was able to annex this area to the city (Arnold 1978) (**Figure 10**).

At the beginning of the nineteenth century, neighborhoods in Baltimore City began to be heavily segregated by class and race. The houses along the main streets of the older areas of the city were occupied by the working class and shop owners. The wealthier shipyard owners and merchants began to settle in the emerging upper class neighborhoods in the downtown area, north along Broadway and in

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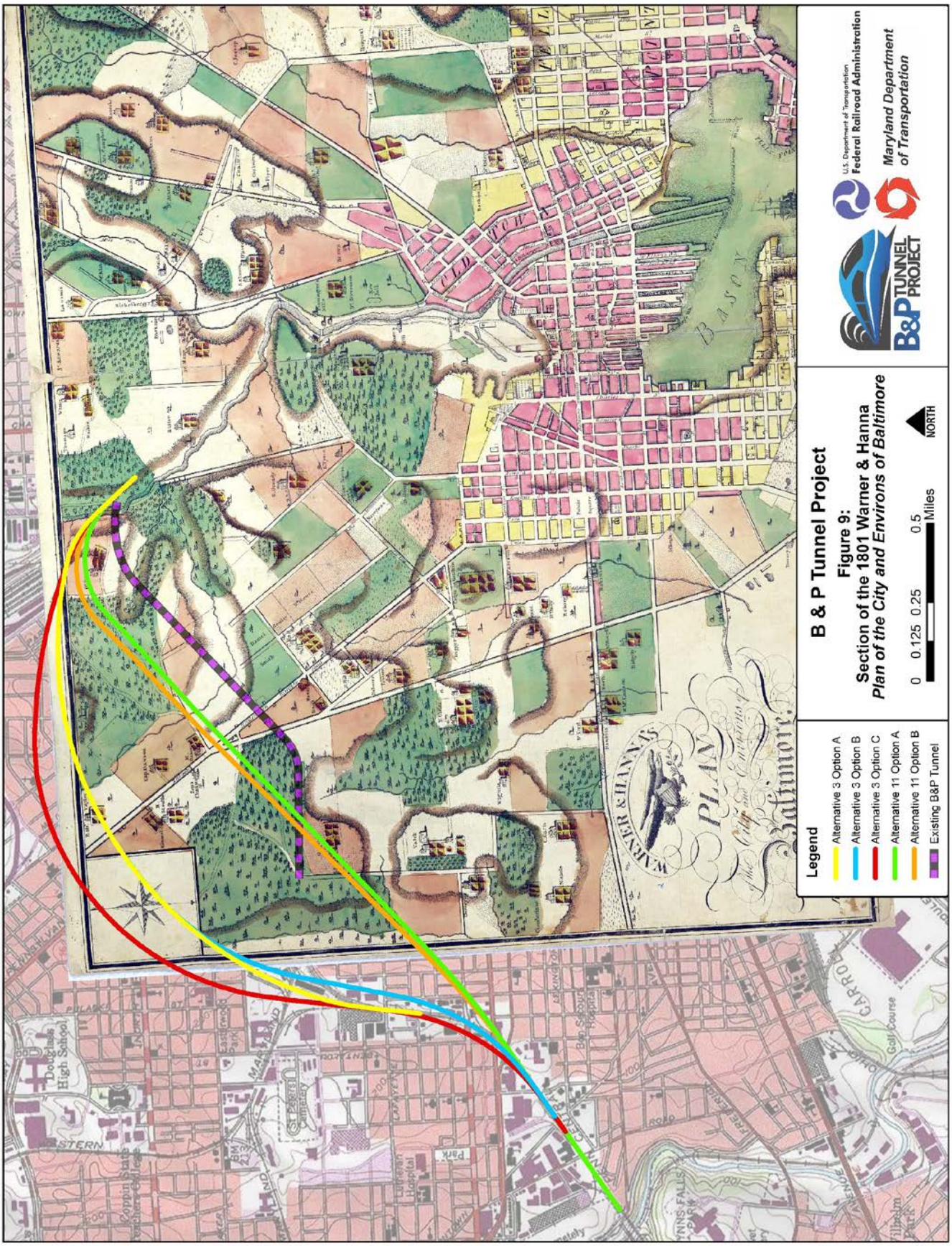
B & P Tunnel Project
Figure 9:
Section of the 1801 Warner & Hanna
Plan of the City and Environs of Baltimore
Legend
Alternative 3 Option A
Alternative 3 Option B
Alternative 3 Option C
Alternative 11 Option A
Alternative 11 Option B
Existing B&P Tunnel
0 0.125 0.25 0.5 Miles
NORTH
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department of Transportation
B&P TUNNEL PROJECT
WARNER & HANNAS
PLAN
of the City and Environs of
Baltimore
BASON
Douglass High School
Coppin State College
Lutheran Hospital
Park
Golf Course
CARROLL

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the area surrounding Mount Vernon (Etherton 1994). African Americans in Baltimore City were pushed to the periphery of living areas. In 1810, less than 20 percent of the Free Black households in the city were located in alley dwellings; by 1835 approximately 40 percent of these households were living in alley dwellings.

Economic opportunities for free blacks were also restricted. A large population lived in Fells Point working as skilled laborers (caulkers) in the shipyards (Clem and Sheehan 2004; Ernstein 1992; Farnham and Jones 2002). In 1865, Isaac Meyers founded the Chesapeake Marine Railway and Dock Company on Philpot Street. This African American owned business was founded in response to hostility by white shipyard laborers toward black laborers. The company operated until 1884.

By the 1840s immigrants began pouring into Baltimore. The 1840s and 1850s were decades of intense development for the city. Its location at the fall line had spawned a dense concentration of mills and other industries along the Jones Falls and Herring Run earlier in the century. By the middle of the century, the city was a leader in manufacturing. Her factories produced new transportation technologies (rail and steamship), furnishings, clothing, and even baked goods. During the 1830s, the canning industry arrived in Baltimore. Oysters, fruits and vegetables were packed in canneries across the city. Periodic influxes of immigrants supplied the labor needed for factories, rail lines and housing construction (Greene 1980; McGrain 1985; Olson 1980).

Despite the increase in population, development was slow to the west of the city limits. The land containing present-day west Baltimore was largely agricultural during this time period. Large plantations and smaller tenant farms occupied the landscape west of Freemont Avenue and north of Wilson Street. A preliminary street plan, in anticipation of the eventual urban expansion of Baltimore into this area, was devised in 1823 by Thomas H. Poppleton for the Baltimore Board of Commissioners (**Figure 11**). Poppleton's 1823 plan laid out streets primarily on a north-south grid, but in a few locations, most notably along Pennsylvania Avenue, Columbia Avenue, and Fort Avenue, the grid followed diagonal streets as those roads were preexisting turnpikes laid out during the eighteenth century. Although the remaining street pattern dates from 1823, few houses were built in the area prior to the Civil War (Shoken 2004b).

Baltimore City was not the only area of the county to experience industrial growth in the early-nineteenth century. Gunpowder was manufactured in the county as early as the War for Independence. Mills continued to be built along the Gwynns and Jones Falls after the war. Production of gun powder was dangerous. On August 28, 1820, an explosion at the Bellona Powder Mill produced shockwaves that were felt as far away as Washington, D.C. (Brooks and Rockel 1979). Textile mills appeared in the nineteenth century; the two earliest were the Union Manufacturing Company on the Patapsco River and the Powhattan mill on the Gwynns Falls. Other textile operations followed, and by the 1830s small mill towns dotted the banks of the Patapsco River, the Little Gunpowder Falls, and the Gwynns and Jones Falls.

Flour mills continued to be an important part of the county's industrial base. The Ellicott brothers erected their first mill on the Patapsco River in 1772. By 1833, the town of Ellicotts Mills (now Ellicott City) had three merchant mills that ground 200 barrels of flour and 300 bushels of grain daily. Samuel Owings began a mill complex in northern Baltimore County in the eighteenth century. The mills were run by several different individuals throughout the nineteenth century. Another long term miller was William Painter, who along with Samuel Owings is prominently remembered in the area in the place names of Owings Mills and Painters Mill Road (Brooks and Rockel 1979; McGrain 1985).

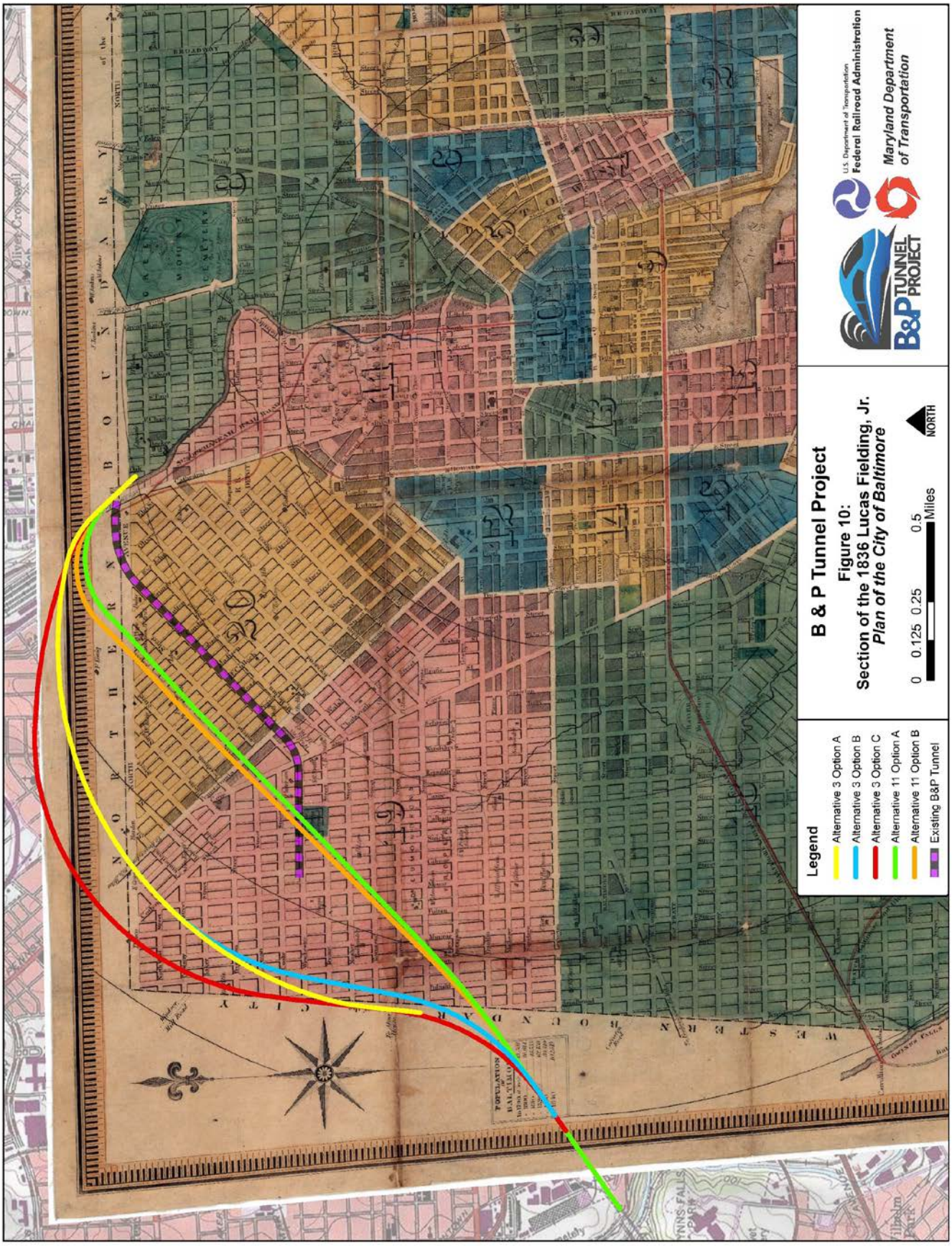
Isaac Tyson, Jr. began operating a chrome mine along the North Branch of the Patapsco in 1817, on a stretch of the river just north of Liberty Road. Tyson eventually extended his operations north along the river and into Pennsylvania. Between 1828 and 1850 he was the main producer of chrome worldwide. Tyson's chrome works in Baltimore was the first to produce chromium compounds (Arnett et al. 1999).

In addition to the chrome deposits in Baltimore County, there were also deposits of copper, steatite, quartz, magnetite, and cobalt minerals (Weed 1907). Mines were operated before the American Revolution, most notably at the English and Liberty Mines, but intensive mining didn't start until the nineteenth century. The Tyson family operated the Mineral Hill Mine near Louisville in Carroll County (at that time part of extreme western Baltimore County.)

Improved transportation routes through the area enabled the mines and mills to ship their products to Baltimore and to the new settlements in the western United States. On February 27, 1827, the Maryland Legislature granted a Charter to the Baltimore and Ohio (B&O) Railroad (Jacobs 1995; Reynolds and Orszi 2000). The cornerstone was laid on the Fourth of July 1828 and construction began soon afterwards. On May 13, 1830, the first 22 km (13.5 mi) of railroad track in the United States, between Mount Clare Station in Baltimore City and Ellicotts Mills in upper Anne Arundel County (now Ellicott City in Howard County), were officially opened. From Ellicott's Mills, the B&O would eventually head west along the Patapsco River. At the confluence of the North Branch and the South Branch, the railroad continued west along the South Branch. By mid-1831, the railroad reached Parr's Ridge (now Mt. Airy in Carroll County) and was in Frederick, Maryland by year's end. Other milestones in the construction of the railroad included reaching Point of Rocks along the Potomac River in April 1832, Harper's Ferry in December 1834, and Cumberland on November 5, 1842. In December 1852, the B&O reached its terminus at Wheeling (then in the Commonwealth of Virginia), 379 miles west of Baltimore.

The Baltimore and Susquehanna (B&S) Railroad was a north-south line that ran to the west of York Road (**Figures 11 - 13**). This railroad line was chartered in 1828, with construction underway by 1831. A portion of the line was built along what would become the western border of the village of Lutherville. The rail corporation hoped to run a line into Pennsylvania, but struggled to extend its lines north of Cockeysville.

The B&S eventually ran a line northwest from the Jones Falls into Westminster, but from there also struggled to extend lines to the north. After some corporate changes, track was extended from the Cockeysville area into north-central Pennsylvania in the early 1850s. This rail line became part of the Northern Central Railroad (NCR) in 1854 (Gunnarsson 1991). In 1861, the Pennsylvania Railroad Company acquired a controlling interest in the North Central Railroad stock in order to better compete with their rival, the B&O Railroad. After the acquisition, the North Central operated as a subsidiary of the Pennsylvania Railroad until the late-twentieth century. The Philadelphia, Wilmington, and Baltimore Railroad (PW&B) was chartered as the Philadelphia and Delaware County Rail Road in 1831, but changed its name to the PW&B in 1836. The original line in Baltimore was serviced by horse drawn cars on wooden rails with iron stretchers, the remains of these rails are still buried in the yard of the President Street Station (Lane 1997). The PW&B's line ended at President Street Station. In order to continue south, passengers disembarked and traveled across town to the Camden Street Station on the B&O line. On April 19, 1861, the Union Army's Sixth Massachusetts Regiment arrived in Baltimore on the PW&B and disembarked for the Camden Street Station where they were to take the B&O to Washington D.C. They were on their way to D.C. to protect the capital in the early days of the Civil War. Baltimore, which was


Legend
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Alternative 3 Option C
Alternative 11 Option A
Alternative 11 Option B
Existing B&P Tunnel
B & P Tunnel Project
Figure 10:
Section of the 1836 Lucas Fielding, Jr.
Plan of the City of Baltimore
0 0.125 0.25 0.5 Miles
NORTH
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department of Transportation
B&P TUNNEL PROJECT

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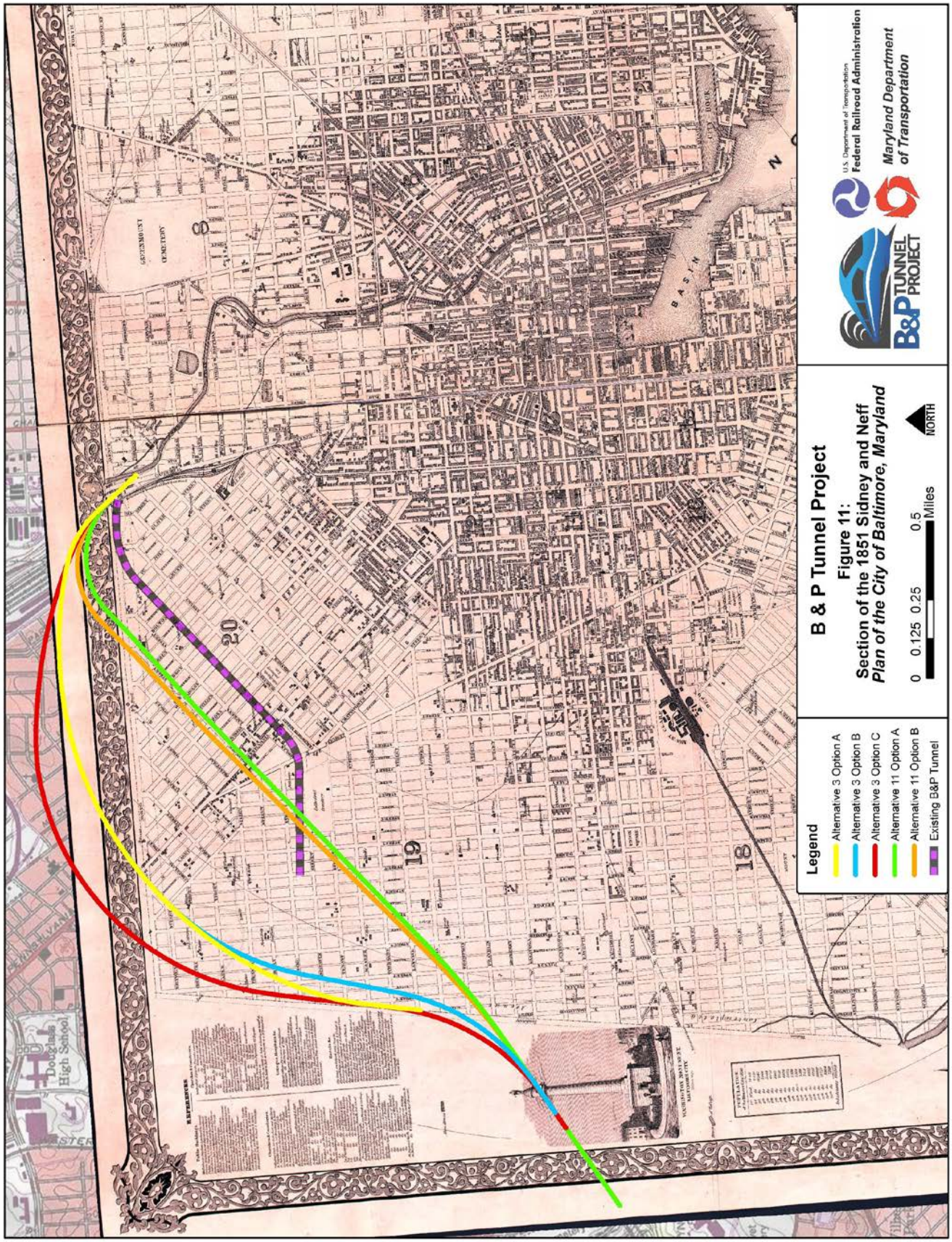
B & P Tunnel Project
Figure 11:
Section of the 1851 Sidney and Neff
Plan of the City of Baltimore, Maryland
Legend
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Alternative 11 Option B
Existing B&P Tunnel
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U.S. Department of Transportation
Federal Railroad Administration
Maryland Department of Transportation
B&P TUNNEL PROJECT

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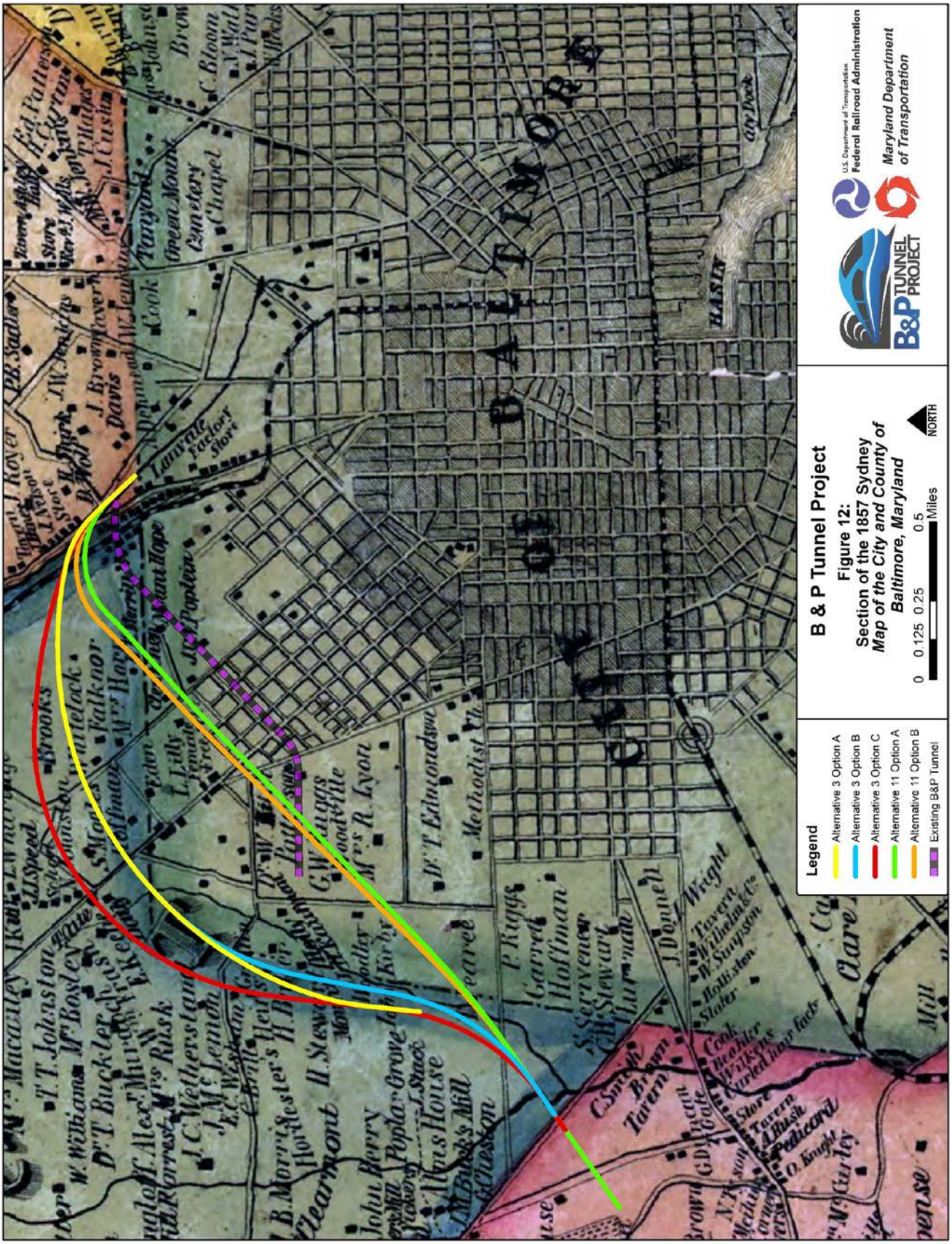
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Alternative 11 Option A
Alternative 11 Option B
Existing B&P Tunnel
B & P Tunnel Project
Figure 12:
Section of the 1857 Sydney
Map of the City and County of
Baltimore, Maryland
0 0.125 0.25 0.5 Miles
NORTH
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department
of Transportation
B&P TUNNEL PROJECT

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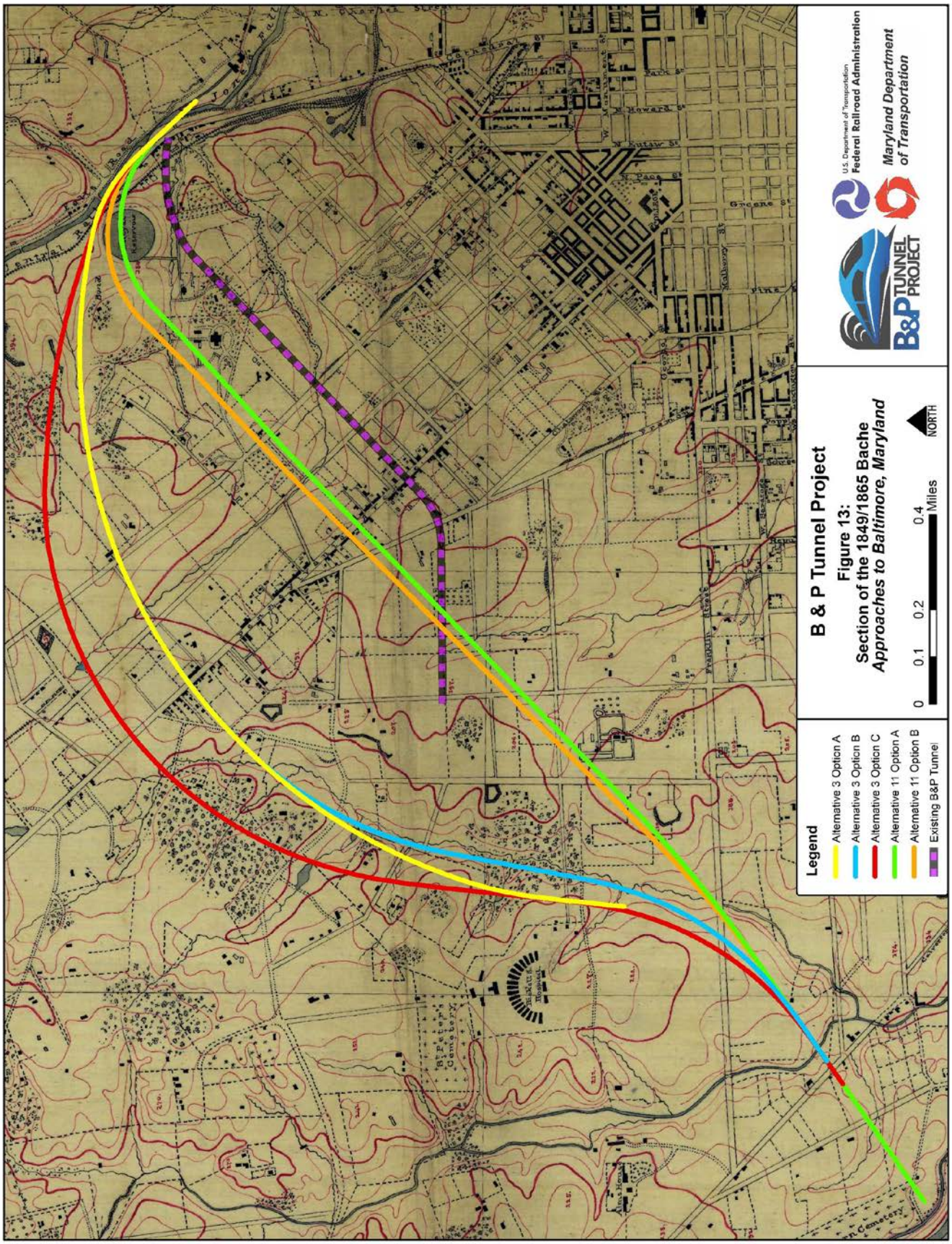
B & P Tunnel Project
Figure 13:
Section of the 1849/1865 Bache
Approaches to Baltimore, Maryland
0 0.1 0.2 0.4 Miles
NORTH
Legend
Alternative 3 Option A
Alternative 3 Option B
Alternative 3 Option C
Alternative 11 Option A
Alternative 11 Option B
Existing B&P Tunnel
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department of Transportation
B&P TUNNEL PROJECT

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very much a pro-Confederacy town, erupted in violence as the Sixth began their march across town on Pratt Street. Four soldiers and 12 civilians were killed in the riot that ensued. This encounter is regarded as the first bloodshed of the Civil War (Perret 1989). After the Civil War, the PW&B was able to expand its service and by 1866 it had built a wooden truss bridge across the Susquehanna River; before that time, rail cars were ferried across the river. The demand for passenger and freight service along the Washington, D.C. – New York corridor spurred the growth of the company and by 1870 it was the only independent rail line in the region. Both the B&O and Pennsylvania Railroad attempted to purchase the PW&B railroad, and in 1873, the Pennsylvania Railroad succeeded (May 2008).

The Baltimore and Potomac Railroad Company was chartered in May of 1853. The objective of the railroad was to unite the railroad system in Maryland and Pennsylvania with that in Virginia by building a rail line from Baltimore southwest and crossing the Potomac River to form a junction with the Richmond, Fredericksburg and Potomac Railroad at Aquia Creek. Construction on a spur of the Baltimore and Potomac (B&P) Railroad between Baltimore and Washington, D.C. began in 1860, but the outbreak of the Civil War halted any further construction until peace returned in 1865. In 1867, the project of building a branch of the B&P Railroad to Washington took definite shape (Scharf 1881). The Pennsylvania Railroad Company had long desired to secure a southern outlet for its North Central Railroad subsidiary, which it acquired twelve years earlier. Construction of the B&P afforded the opportunity. In order to create a junction with the North Central Railroad and the proposed B&P Railroad, the Pennsylvania Railroad Company invested nearly all the capital for construction of a tunnel through northwest Baltimore. The B&P Tunnel was a mile-and-a-half long and wide enough for a double track. Work began on the B&P Railroad from Washington, D.C. to the western outskirts of Baltimore in 1868 and was completed inside of four years (Scharf 1881). Trains began running on the B&P Railroad from Lafayette Station in Baltimore to Washington, D.C. on July 2, 1872. Construction of the B&P Tunnel commenced in June of 1871. Construction concluded nearly two years later and the first locomotive passed through it on June 26, 1873. The opening of the B&P Tunnel was seen as an immense achievement for the time. In his 1881 *History of Baltimore City and County*, J. Thomas Scharf observed: “The construction of the Baltimore and Potomac tunnel has solved the question of rapid transit in the city of Baltimore for a century at least, if not for all time”.

Baltimore City had been the Baltimore county seat since 1768. As early as 1835, parts of the county population outside the city began to lobby for complete separation of the City and the County. The main argument for separation was discontent with the combined functions of city and county government, which non-city residents saw as heavily biased in favor of city residents. The first referendum for separation was held in October 1837. Separation lost in a vote of 2,270 to 388. The towns near Baltimore City, where many of the city’s leading merchants had homes, returned the highest percentage of no separation votes. Over the next decade, non-city residents mounted a campaign in favor of separation. In 1851, the State of Maryland called a constitutional convention. The outcome of the convention included the separation of Baltimore City and County. On November 16, 1853, Baltimore County voters went to the polls to choose a new county seat. Three locations were selected by the voters, none with a clear majority. These included Clover Hill, the Alms House Property, and Towson (in that order). Voters returned to the polls on January 4, 1854; this time Towson took the lead. The corner stone of the new county courthouse was laid on October 19, 1854. The first sessions of the courts were held in the building in January 1857 (Brooks and Rockel 1979; Greene 1980; Olson 1980).

During the 1850s, Maryland entered a period of economic depression. Industry in the area suffered a decline in output and profit. The textile mills were especially hard hit in the early part of the decade. However, despite the slowdown in growth, immigrants continued to pour into Baltimore City. By 1860, "Baltimore [had] doubled its population, its work force, the number of houses, its built-up area, and its street mileage" (Olson 1980:103). The rapid growth of Baltimore City during the mid-nineteenth century pushed the city inland from its original core along the harbor. Between 1820 and 1870 the population of Baltimore increased from 63,000 to almost 269,000. Immigration was fairly heavy throughout this period. The new arrivals were primarily German or Irish (Browne 1980). All of this growth was slowed to some extent by the Civil War.

The mayor of Baltimore, a known southern sympathizer, was jailed during the war, as were Baltimore County Delegates Robert M. Dennison and Leonard G. Quinlan, and Senator A.A. Lynch. The Baltimore County group was detained in September 1861 in order to prevent their casting votes in favor of Maryland secession. During the war, Federal troops were stationed in Cockeysville. They patrolled the rail lines running through northern Baltimore County, as well as along the York Turnpike (Brooks and Rockel 1979; Brugger 1988; McClellan 1994). In Baltimore City, Union troops were stationed on Federal Hill in the Baltimore Harbor. Lookouts were also placed in the towers of Westminster Presbyterian Church and the Basilica of the Assumption of the Blessed Virgin Mary (the seat of the Archbishop of Baltimore). In Westminster Cemetery, military arms were stacked in the burial vaults and burials were permitted only with permission of the military (Read 2000a). The Union Army commandeered the estates of known southern sympathizers. One of the homes seized was Mount Clare (now in Carroll Park), which was the home of James Carroll, a wealthy slave owner. The Union Army set up a military camp on the Mount Clare property (Read 1997).

The only incursion by Confederate troops into Baltimore County occurred in July 1864 during General Jubal A. Early's campaign against Washington D.C. Major Harry Gilmor of the Glen Ellen Estate near the Gunpowder River was attached to General Bradley R. Johnson's unit. Gilmor's column arrived in the Glyndon area of northern Baltimore County on the evening of July 9. The following day, Gilmor and Johnson pushed into Cockeysville and burned several rail bridges. Johnson then moved through the Green Spring Valley and was in Painter's Mill on July 11. He and his troops entered Howard County on the 12th. Gilmor moved east to burn guarded bridges on the PW&B Railroad. During his raid on one of the bridges he was able to capture a passenger train, which included Union General William Buel Franklin as one of its passengers. Gilmor took Franklin prisoner and burned the bridge. Through the night of July 11, Union troops searched for Gilmor as he moved west to join Johnson and Early. Near Towson, Union troops skirmished with Gilmor's men without casualties on either side. Gilmor's men drove the Union troops down the York Turnpike toward Baltimore. Gilmor then moved west across Green Spring Valley, during which time General Franklin managed to escape his captors. On July 12, Gilmor and his men reached Pikesville and threatened to burn the U.S. Arsenal. They continued on through Randallstown and left the area by the day's end, rejoining Generals Johnson and Early near Poolesville in Montgomery County, Maryland.

Maryland rewrote its constitution in 1864. The new constitution outlawed slavery and was put to a popular vote on October 13, 1864. It barely passed into law, with 30,174 in favor of the change and 29,799 opposed. On November 1st, all slaves in Maryland were emancipated (Brooks and Rockel 1979; Brugger 1988; Maryland Constitutional Convention 1864). Five months later on April 1, 1865, the war ended with Lee's surrender at Appomattox Courthouse.

D. Industrial/Urban Dominance (A.D. 1870 to A.D. 1930)

Post-Civil War industry and commerce in Baltimore City continued to grow rapidly (**Figure 14**). Industries in this period included clothing, canning, metal work, and shipping. Numerous economic depressions throughout the nineteenth century caused a continuous flux in Baltimore City business and industry. Despite the economic turmoil, immigrants continued to pour into Baltimore City. These groups have included Greeks, Russians, Czechs, Poles, Lithuanians, Italians and Finns (Zeidman 1991).

The closing years of the 1860s were a boom period in the economic cycle of the United States. However, the Panic of 1873 ended economic prosperity and ushered in a long period of recession (Brogan 1985). Until circa 1880, the majority of immigrants arriving in Baltimore City were Irish or German. They found work on the docks, and in the rapidly expanding factory system of along the Jones Falls. These industries included garment factories, canning, and metal work (Olson 1980). By 1880, the makeup of the immigrant population had changed. Many of these immigrants were Germans who were escaping revolutions and wars sweeping through the various German principalities throughout the period. Between 1880 and 1920 changing social patterns in Eastern Europe and pogroms in Russia provided incentive for 2,000,000 Jews to immigrate to the United States (Dimont 1962:355, 361). Many of these immigrants were unskilled laborers who quickly entered the American factory system.

Between immigration and annexation of new land for the City, the population of the city increased from 332,000 in 1880 to 800,000 in 1930 (Arnold 1978; Olson 1980). This area of the county adjacent to the west, north, and east sides of the city was known as “The Belt”. Intensive development began after the 1818 annexation. Between 1860 and 1880, settlement increased on the city’s undeveloped periphery as wealthy families began to leave the center city area for new suburbs that were connected to the city by horse-drawn street cars. In addition to the residential development, new mill towns, such as Woodberry and Hampden, were developed outside of the city along the Jones Falls. The population in “The Belt” area stood at 20,000 in 1874 and had almost doubled by 1884. In 1888, Baltimore County residents living on the west and north sides of the “The Belt” voted in favor of annexation to Baltimore City. This brought an additional 7.5 square miles into the city and an additional 38,000 people. It included two-thirds of the area around the city that had been developed since 1865 as a direct result of the extension of horse cars into the county (Arnold 1978).

During the first half of the nineteenth century, the African American population of Baltimore was centered in the Fells Point area. After the Civil War, there was an influx of southern Blacks into the city. As the African American population in Baltimore increased, so too did the Euro-American population, largely as a result of waves of European immigration. Tens of thousands of European workers were drawn to the city as new industries, expanding shipyards, and new merchandising houses were established in downtown, Fells Point, and Canton. These new European immigrants largely settled in the eastern and southern sections of the city, close to the factories and shipyards. Many of the established African American families that resided in these neighborhoods were displaced as most major Baltimore employers largely reserved industrial work for the recent white immigrants. Shut out of neighborhoods close to industry, new and established African American families alike found themselves settling in a horseshoe pattern around the central city with “Old West Baltimore” forming the western side of this horseshoe. Segregation restricted the areas where they could settle to the blocks south of North Avenue, west of Pennsylvania Ave, and east of Fulton Avenue.

This portion of the city remained a patchwork of urban development and rural countryside until the end of the nineteenth century. While growth of the city expanded quickly in some parts north and west of the downtown during the late-nineteenth century, many of the original grand homes and spacious estates remained part of the landscape of west Baltimore until the end of the nineteenth century. The homes and lands of Thomas Edmondson, Jr., Edward Patterson, Dr. Thomas Bond, and many others appear in several maps from the period.

East of Pennsylvania Avenue many Euro-American residents from Baltimore's business and professional classes built large stately three-story townhouses along Madison Avenue, McCulloh Street and Druid Hill Avenue, as well as further east and north in what is today known as the Bolton Hill and Reservoir Hill neighborhoods. The opening of a street car line along Madison Avenue connected this area to the center of the city, which allowed people to commute easily to the expanding business district. At the same time, Druid Hill Park, opened in the fall of 1860, was located just to the north and added to the attractiveness of living in the area. The institutions attracted to this portion of Old West Baltimore Reservoir Hill and Bolton Hill corresponded to the social status of its residents. Three private schools, including the fashionable Boy's Latin School, were located nearby as well as Lafayette Market located at Laurens Street and Pennsylvania Avenue.

By the end of the nineteenth century, all of the major German Jewish synagogues moved from downtown and east Baltimore to Reservoir Hill, bound by Lanvale and McCulloh Streets and Park and North Avenues (Shoken 2004b). As a result, the neighborhood became one of Baltimore's largest and affluent predominantly Jewish neighborhoods of the late-nineteenth and early-twentieth centuries. The Jewish residents who moved into Reservoir Hill at the turn-of-the-twentieth century were part of Baltimore's established German Jewish community that was originally located in parts of east Baltimore and downtown. Many of the new Jewish immigrants during the period arrived to Baltimore from Eastern Europe, many times settling in the former neighborhoods the existing German Jewish community recently abandoned. Over time, many of the eastern European Jewish community began to prosper.

During the same period, construction began on more modest two-story homes west of Pennsylvania Avenue. By the 1870s, intense development within this working class neighborhood was focused in the northern portion of Old West Baltimore, extending between Fulton Street to the west, Pennsylvania Avenue to the east, North Avenue to the north, and Patterson Avenue (present-day Laurens Street) to the south. Unlike the homes east of Pennsylvania Avenue, these were intended for the expanding white working class as well as for Baltimore's growing population of European immigrants (Shoken 2004a). German immigrants were initially the largest ethnic group in this growing community. A growing African American population also settled within this area, living in close proximity to their white neighbors. While the white residences were located off the main streets, African Americans and poorer immigrant families resided in alley housing behind their Euro-American neighbors. As Baltimore's African American population continued to expand during the 1880s and 1890s, a substantial African American community began to develop and spread along these alley streets. Over time, numerous African American residents of the neighborhood established local businesses, founded churches and enrolled their children in schools. As the neighborhood prospered, some community members could afford the larger main street homes. At the same time, many of the original white residents on these main streets, left "Old West Baltimore" for other neighborhoods or left the city altogether for newly developing suburbs, thus providing an opportunity for African American residents to take their place. By the first decade of the twentieth

century, the majority of what once was an ethnically mixed population in Old West Baltimore became a predominately African American neighborhood.

In 1904, much of the business and financial district of Baltimore City burned to the ground. An after effect of this disaster was vast changes to and improvement of the city's water quality and flow. Before the fire was completely under control the mayor created the Burn District Commission to rebuild the city. While their stated duty was to rebuild the area of Baltimore that had been destroyed by the fire, their recommendations had a direct impact on parts of the city that had not been burned (Petersen 2004). A sewage commission was set up to revamp the city's waste and storm water control. By 1906, they had built a pilot sewage plant in Walbrook. In 1909, the Back River plant was up and running. "By the end of 1914 there were twenty-one thousand homes connected, and about that many drop privies were abandoned" (Olson 1980:250). The new sewers were gravity flow systems. A pumping station on Pratt Street forced the low-lying areas around the harbor to drain. Only those areas on the edges of the city and in low-lying elevations did not receive sewers.

This capital improvement project also benefited Baltimore County. The Maryland legislature approved the creation of the Metropolitan District, which served both the city and county's water and sewage needs. The county tied into the city's water and sewer lines and was able to extend service to many of its suburban residents. The Loch Raven Reservoir was constructed during this period and was completed in 1923. Later reservoir projects included Prettyboy Reservoir on the upper Gunpowder Falls (1933) and Liberty Reservoir on the Patapsco River (1954).

In 1918, Baltimore city made its last annexation of county property, despite the protests of many of the people living in these areas. Unlike the 1888 annexation, the people living in the proposed annexation area did not vote to join the city. Instead, the Maryland legislature passed an annexation bill that set the city's boundaries where they currently are today. The total area incorporated by the city included 46.5 square miles taken from Baltimore County, and 5.4 square miles taken from Anne Arundel County (Arnold 1978). This final annexation roughly included all the areas of the current city west of the Gwynns Falls, north of 28th Street, and east of Canton (from Baltimore County), as well as an area of land south of the Gwynns Falls and the Patapsco River (which was primarily from Anne Arundel County).

E. Modern Period (A.D. 1930 to present)

The beginning of the Modern Period roughly coincides with the start of the Great Depression on October 29, 1929. Although segments of the American economy were already in a slow downturn before the market crash, the Baltimore region's economy was affected only to a minor degree. After the market crashed in 1929, the region's diversified economy resulted, at least temporarily, in a city unemployment rate which was slightly lower than the national average. Nevertheless, by 1931 there were 42,000 unemployed Baltimoreans, roughly one-eighth of the city's work force (Olson 1980). In Baltimore County the County Children's Aid Society listed 242 families on their relief rolls in December 1931; by March 1932, the number of families had increased to 606 (Brooks and Rockel 1979). The region's high unemployment rate continued into the late 1930s. By 1937, increasing tensions in Europe were translating into a build-up of the defense industry in Baltimore County. Companies like Glen L. Martin and Bethlehem Steel began to expand production as orders arrived from Europe. During World War II, workers moved into Baltimore City from the rural south and West Virginia. Many of these laborers found jobs in the defense plants in eastern Baltimore County. Others worked for the rail yards in Baltimore City, settling in the area around Carroll Park known as "Pig Town".

By August 1941, 50,000 Baltimoreans were employed by the defense industry. Approximately half of these jobs were in aircraft manufacture at the Martin Company. However, this build-up in wartime industry did not come without risks to the region's economy. With the end of the war in 1945, 45,000 defense workers lost their jobs at the same time that 35,000 veterans were returning home. With approximately 80,000 people looking for work simultaneously, the region's economy needed to turn quickly from a war-time to peace-time economy. Companies such as Bethlehem Steel, Westinghouse, and Western Electric successfully converted their production to peace-time commodities by the early 1950s. Baltimore's post-war economy continued to grow into the 1970s (Olson 1980).

During the last two decades of the nineteenth century, African American laborers began to concentrate in housing in the alleys of Baltimore. Demographic profiles show an influx of rural native Maryland African Americans into Baltimore in the late-nineteenth century from southern Maryland. Baltimore's African American population nearly tripled from a population of 28,000 in 1860, to 79,000 in 1900 (Garonzik 1976; Hall 1912). This development in housing concentrated the city's poor into a classic "alley life" pattern, which has been described for Annapolis, Philadelphia, and Washington, D.C. in numerous site reports and studies (q.v. Aiello and Seidel 1994; Borchert 1980; Check 1986; Cheek and Friedlander 1990; Cheek and Seifert 1994; Greenberg 1981; Hayward 2008; Warner and Mullins 1993) (**Figure 15**).

During the early-twentieth century the demographics within the neighborhoods of Old West Baltimore, Bolton Hill, Harlem Park, and Reservoir Hill began to change. Racial discrimination and the high unemployment rate of the Depression Era kept many of the area inhabitants in low-paying jobs. Real estate values in the area had been in decline since the depression of 1893. In the 1920s, property values in the area had decreased in general. During this decade movement of the white population out of West Baltimore changed the racial composition of these neighborhoods. Vacant housing in the eastern portion of the city was rapidly filled by African American tenants moving into the city from rural areas of Maryland and the South. This migration of African Americans from rural to urban areas was part of a national trend which had begun early in the century. In 1910, 2,500 African Americans and 7,500 Euro-Americans lived in "Old West Baltimore". By 1930, African Americans were the largest population living in the same neighborhoods. To the south, Harlem Park remained predominately white until the end of the Second World War (McDougall 1993). After World War II, Harlem Park became and remains predominately African American.

In 1950, a survey of the city's 250,000 houses placed 90,000 within "blighted" areas of the city. Within the blighted areas, 45,000 houses were classified as substandard. Another 18,000 structures were classified as dilapidated. One-third of the city's population lived in these homes. In order to stimulate growth in the city, the city government embarked on a plan of urban renewal. In 1951 a twenty-seven block area of East Baltimore was selected as a pilot area. Many of the buildings in the pilot area were condemned and razed. In their place, subsidized housing projects for the poor were built (Greene 1980; Olson, 1980).

The end of the war also saw a rise in housing construction in the suburban Baltimore County communities ringing Baltimore City such as Lutherville, Pikesville, Randallstown, Woodlawn and Catonsville. During the 1950s, 1960s, and 1970s there was a huge exodus of middle-class white families from the city to the suburbs (Orser 1991, 1994). The shops and department stores frequented by the white, middle-class also slowly left the city and were re-established in new suburban malls. The results of this twenty-year trend were the loss of business in the city's central core, particularly along Howard Street, and a diminished tax base. The population of Baltimore County grew by more than 40 percent between 1940 and 1950, and by

another 45 percent between 1950 and 1960 (Forstall 1995). Road development in the area also spurred population growth.

By the beginning of the mid-1960s, residential development covered much of the former agricultural landscape in the portion of Baltimore County along the northern border of Baltimore City. By the end of the twentieth century, large-scale shopping complexes and highway facilities dominated the former farming communities. The Baltimore Beltway (I-695) was built through the county, with construction starting in the Towson area in 1955 (MD Roads n.d.). In 1966, plans to construct six rapid transit lines, from Baltimore to the surrounding suburb, were developed. This plan was not put into action until the mid-1980s, and only one of the six lines was built. In 1983, a line between Charles Center in downtown Baltimore and Reisterstown Plaza was opened. Four years later, the line was extended north to Owings Mills. At about the same time the Baltimore Metro System was under construction, I-795 was built between the Baltimore Beltway and Owings Mills. The final extension north to Reisterstown and the Westminster Pike was completed in 1987. The metro and the interstate opened the Owings Mills area to suburban development in the 1990s. Some of this development extended across the reservoir into the Sykesville Area of Carroll County.

Baltimore has undergone a period of rebuilding since the late 1970s. The city government and private developers both have made attempts to revitalize the city. While numerous projects have been initiated, two of the more notable include the revitalization of the Inner Harbor area and homesteading. Baltimore's Inner Harbor area has been developed successfully into a tourist and shopping mecca that draws dollars back downtown. Homesteading created a market to restore homes within the city through the sale of dilapidated and abandoned properties at low cost to middle-class buyers, both white and African American. Homesteading produced a viable environment in a once hostile landscape and brought tax dollars back into the city. The most recent round of revitalization has included the Howard Street corridor. Plans for this area include the creation of cultural centers for dance, music, and the arts. Another project includes the current construction of low-cost housing and rental units in the Jonestown area of East Baltimore. In addition, the Reginald F. Lewis Museum of Maryland African American History and Culture opened on 25 June 2005. The museum is located in Jonestown on the edge of the Baltimore Inner Harbor near the new housing units.

VIII. PREVIOUSLY DOCUMENTED CULTURAL RESOURCES

A. Previous Archeological Surveys

Documentary research conducted at MHT revealed than no previous archeological studies have been performed within the study corridors of any of the alignment alternatives for the B&P Tunnel Project. However, according to the most recent MHT GIS database, 22 archeological studies have been conducted within one-mile of the design alternatives in the last 33 years (**Figure 16; Table 1**). Past study efforts have ranged from assessments of archeological potential and preliminary reconnaissance surveys that involved the examination of both historic architectural and archeological resources to intensive archeological data recovery investigations of individual sites.

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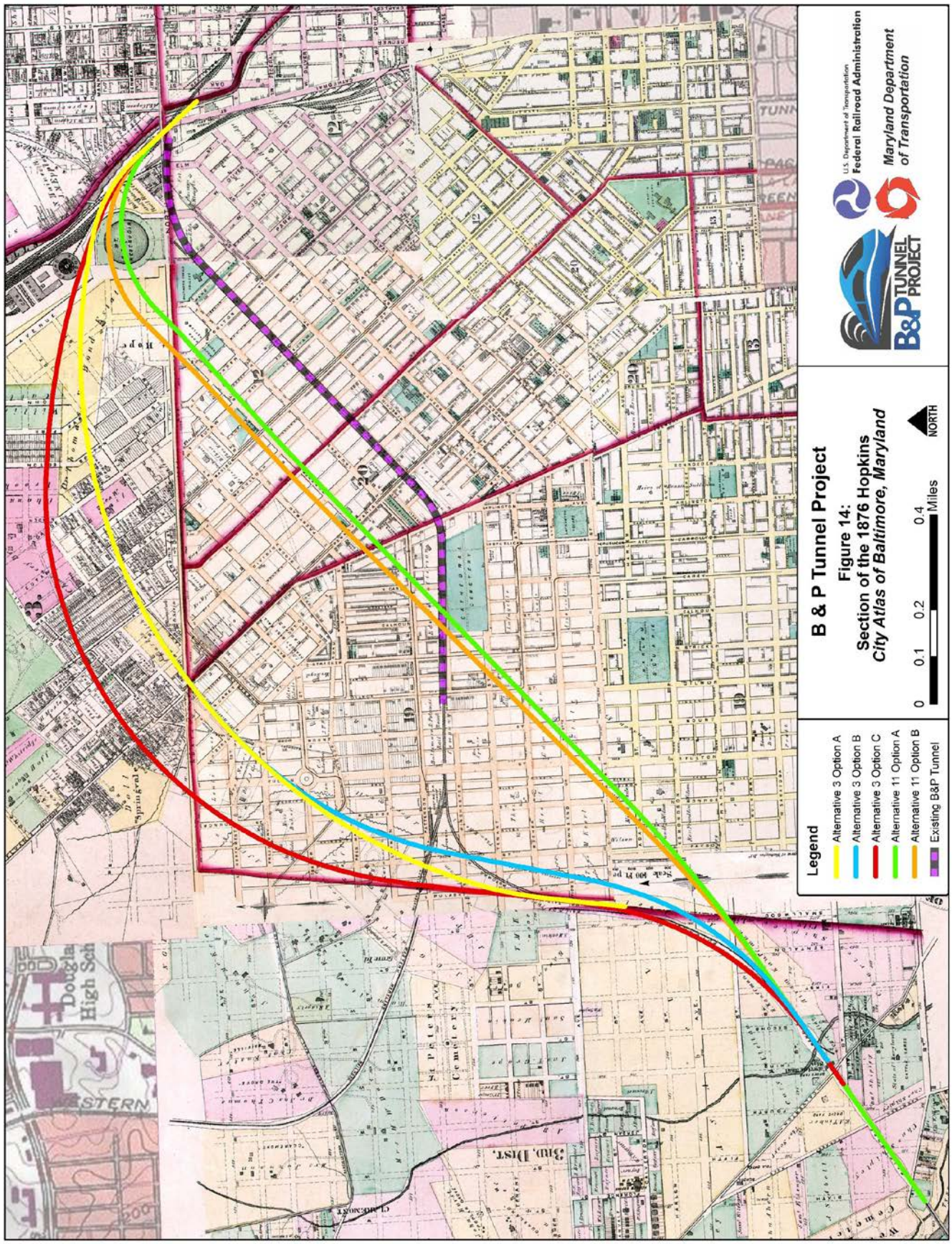
Legend
Alternative 3 Option A
Alternative 3 Option B
Alternative 3 Option C
Alternative 11 Option A
Alternative 11 Option B
Existing B&P Tunnel
B & P Tunnel Project
Figure 14:
Section of the 1876 Hopkins
City Atlas of Baltimore, Maryland
0 0.1 0.2 0.4 Miles
NORTH
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department
of Transportation
B&P TUNNEL PROJECT
Douglas High Sch
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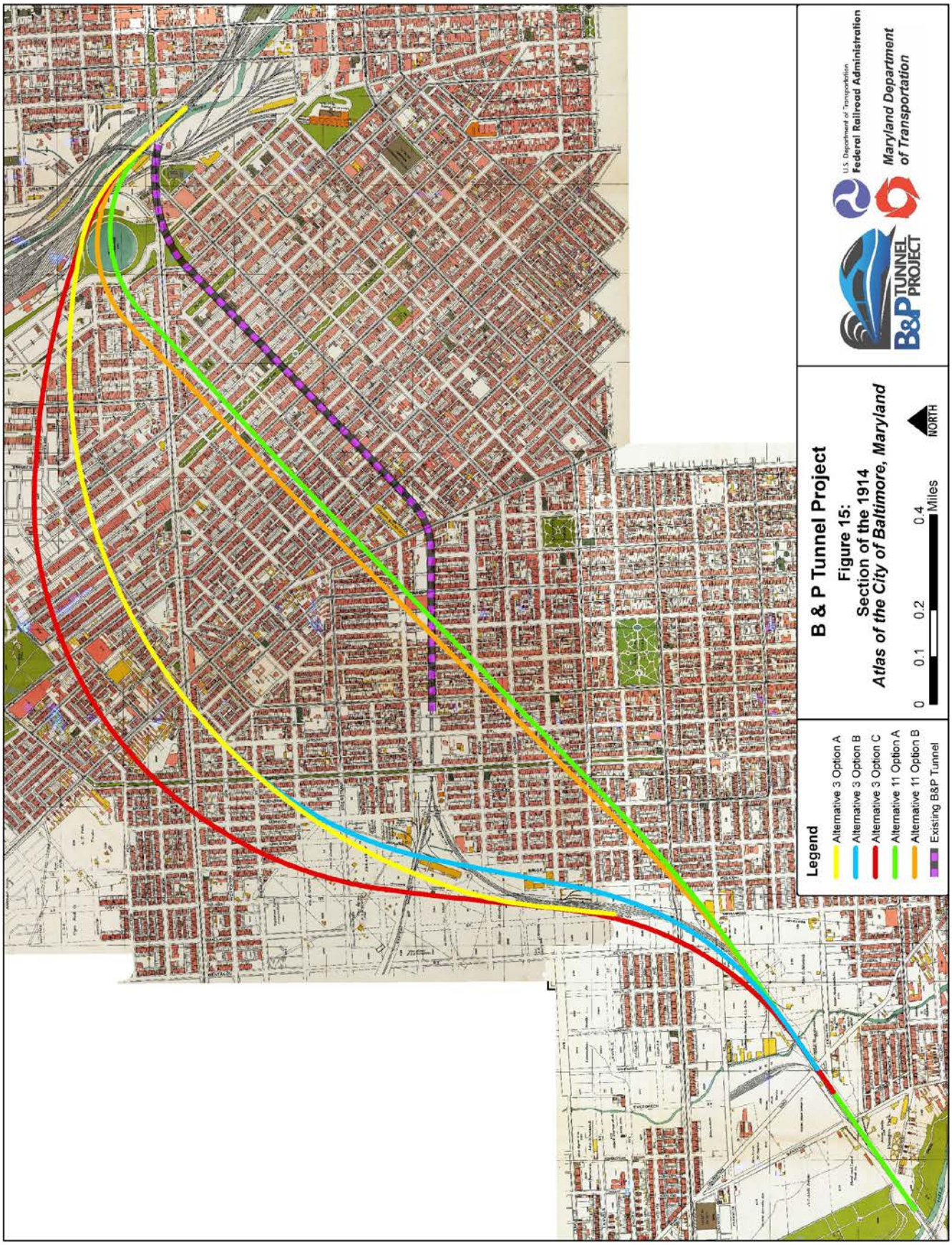
B & P Tunnel Project
Figure 15:
Section of the 1914
Atlas of the City of Baltimore, Maryland
Legend
Alternative 3 Option A
Alternative 3 Option B
Alternative 3 Option C
Alternative 11 Option A
Alternative 11 Option B
Existing B&P Tunnel
0 0.1 0.2 0.4 Miles
NORTH
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department of Transportation
B&P TUNNEL PROJECT

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Table 1: Previous Archeological Investigations Within a 1-Mile Radius of the Study Corridors

Study	Reference
Phase I Reconnaissance Survey of the Archeological Resources in the Proposed I-595 Corridor Between I-95 and I-170, Baltimore City, Maryland	Dinnel 1982
Preliminary Document Study: Block 1146 Oliver Place, Baltimore, Maryland	Basalik 1983
The Archeological Monitoring of Pascault Row and the Ronald McDonald House Site	Sacchi 1983
Orchard Street Church Archeological Monitoring	Weber 1984a
Phase I/Phase II Archeological Reconnaissance Survey for the Gwynns Falls Sewer Interceptor, Baltimore, Maryland	Weber 1984b
Baltimore Union (Pennsylvania) Station Driveways, Baltimore City, Maryland	Webster and Meyer 1987
Phase IA Historical Background Study and Phase IB Archeological Investigation of the Maryland Library for the Blind and Physically Handicapped, Baltimore, Maryland	Goodwin 1991
Preliminary Archeological Survey of Carroll Park Golf Course Expansion and Phase II Testing of Site 18BC34, Baltimore, Maryland	Ballweber 1991
A Well at Orchard Street Church, Baltimore, Maryland	Otter 1992
The 1984 Shovel Test Pit Survey of Mount Clare, In Carroll Park	Logan and Seidel 1995
Preliminary Site Examination of Three Sites in the City Boulevard Corridor	Harrison 1999
Archeological Investigations at the Juvenile Justice Center, Baltimore, Maryland	Williams et al. 2000
Phase I Archeological Survey of the Proposed 3.03-mile Phase 2 Gwynn Fall's Pathway	Hill 2000
Phase I Archeological Investigations of the proposed UMAB Health Sciences Research Park, 800-900 West Baltimore Street, Baltimore, Maryland	Williams 2005
Phase I Archeological Investigations at Block 24, University of Maryland Baltimore (600 Block West Lexington Street)	Williams and Child 2006
Phase II Archeological Investigation of Site 18BC154 (886-894 West Baltimore Street), Baltimore, Maryland	Child et al. 2006

Study	Reference
Phase I Archeological Investigations and Data Recovery of Feature 2-03, UMB Block 25 (200 Block of North Pearl Street, University of Maryland Baltimore	Williams and Child 2007
Phase IA Archeological Assessment Technical Report Red Line Corridor Transit Study Baltimore City and Baltimore County, Maryland	Ward et al. 2007
Archeological Investigation of University of Maryland, Baltimore Block 12, Baltimore, Maryland	Sanders et al. 2008
Phase I Archeological Investigations for the Center for Parks and People, Druid Hill Park, Baltimore, Maryland	Shaw and Roth 2011
Phase II Archeological Investigation of Site 18BC156, UMB Health Sciences Research Park, Baltimore, Maryland.	Child and Williams 2012
Stage 1 Phase IB Archeology Technical Report, Red Line Light Rail Transit Project, City of Baltimore and Baltimore County, Maryland.	Ward et al. 2013

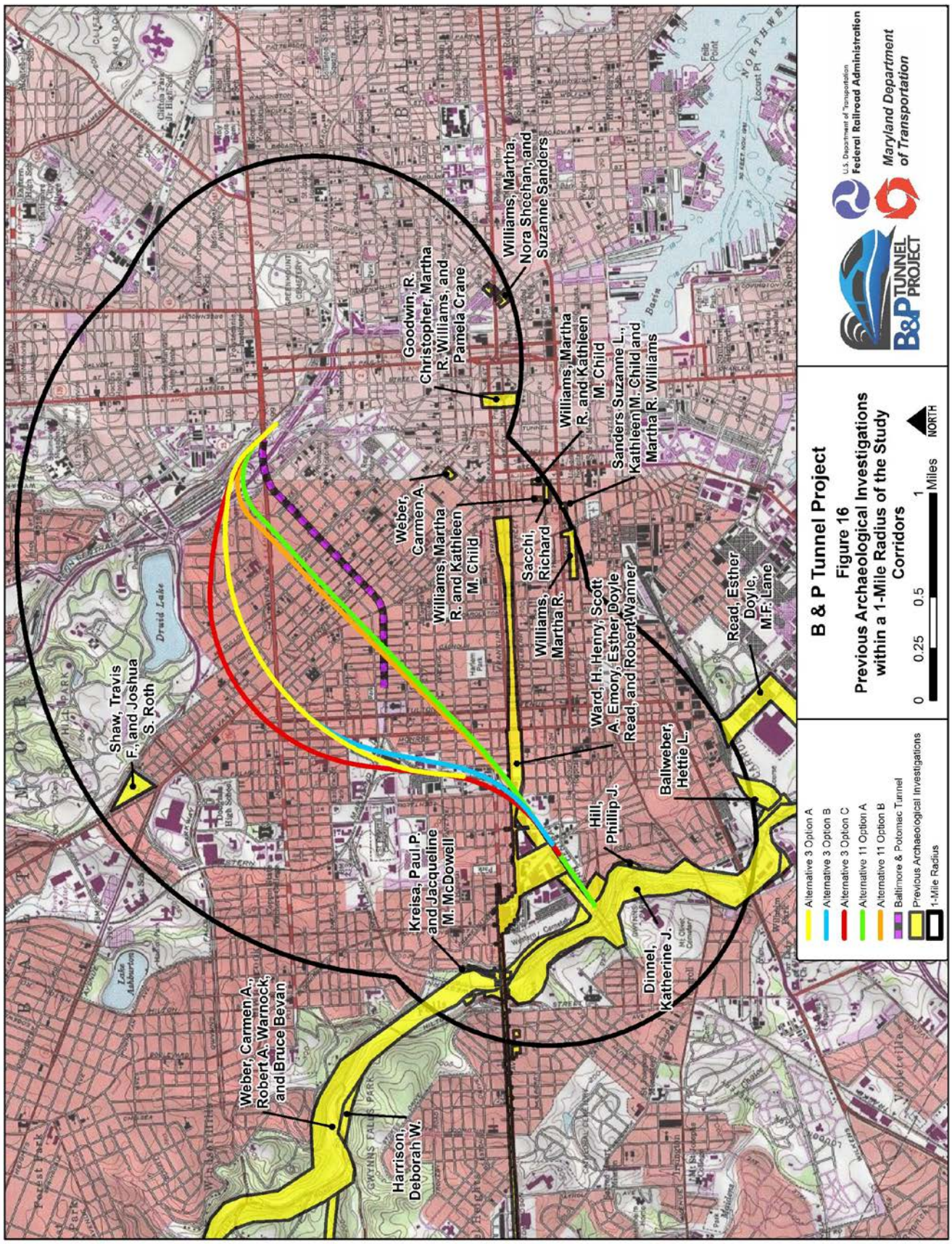
Note: Studies are listed in chronological order, the oldest first

B. Previously Documented Archeological Resources

According to the archeological site files maintained by MHT, no previously recorded archeological sites are located in the APE; however, 38 sites are present within a one-mile radius of at least one of the design alternatives (**Figure 17; Table 2**). The majority of previously documented archeological sites (N=32) lie south and east of the design alternatives. Four sites lies along the Jones Falls and a fifth was documented in the vicinity of Druid Hill Park. All five of the sites lie within one-mile of Alternatives 3A, 3B and 3C. Only one archeological site has been previously documented within one-mile of the western boundary of the study corridor. The site (Site 18BC177) is the only archeological site within one mile of any of the four alternatives that contained a prehistoric component. The site lies within Gwynn Falls Park and is situated on a bluff overlooking the tributary. The prehistoric component of Site 18BC177 consisted of a lithic scatter of unknown temporal affiliation. The site also contained a historic component consisting of a mid-nineteenth century domestic artifact scatter.

Aside from Site 18BC177, the remaining 37 previously documented archeological sites within one-mile of the design alternatives for the B&P Tunnel were historic and document occupation from the eighteenth through early-twentieth centuries. Previously documented historic sites include eighteenth to nineteenth century pottery kilns, late-eighteenth to early-nineteenth century rowhouses, nineteenth to early-twentieth century rowhouses, mills and mill worker housing, an African American church, portions of a nineteenth century African American neighborhood, a jail, sugar refinery, and a Civil War Union Army camp and hospital.

Of the total 38 previously documented archeological sites within one mile of the design alternatives, four of the sites are recommended eligible for the National Register of Historic Places (NRHP). One NRHP eligible site is Mechanics Court (Site 18BC132) located south of Alternatives 11A and 11B. It consists of a series of three house foundations associated with the occupation of several African American families


B & P Tunnel Project
Figure 16
Previous Archaeological Investigations within a 1-Mile Radius of the Study Corridors
0 0.25 0.5 1 Miles
NORTH
Alternative 3 Option A
Alternative 3 Option B
Alternative 3 Option C
Alternative 11 Option A
Alternative 11 Option B
Baltimore & Potomac Tunnel
Previous Archaeological Investigations
1-Mile Radius
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department of Transportation
B&P TUNNEL PROJECT
Shaw, Travis F. and Joshua S. Roth
Weber, Carmen A.; Robert A. Warnock; and Bruce Bevan
Harrison, Deborah W.
Kreisa, Paul P. and Jacqueline M. McDowell
Hill, Phillip J.
Dinnel, Katherine J.
Ballweber, Hettie L.
Ward, H. Henry; Scott A. Emory; Esther Doyle Read; and Robert Wanner
Williams, Martha R.
Sacchi, Richard
Weber, Carmen A.
Williams, Martha R. and Kathleen M. Child
Goodwin, R. Christopher; Martha R. Williams; and Pamela Crane
Williams, Martha; Nora Sheehan; and Suzanne Sanders
Sanders, Suzanne L.; Kathleen M. Child and Martha R. Williams
Read, Esther Doyle; M.F. Lane

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during the nineteenth century. In addition to the foundations, archeological investigations at the site revealed a well preserved site consisting of buried cultural deposits located in the rear yards of the homes. The Independent Grays Privy (Site 18BC133) is another NRHP eligible site located south of Alternatives 11A and 11B. The site consists of a sealed late-nineteenth to early-twentieth century privy shaft which may have the potential to address several research questions associated with the consumer behavior and living conditions of Baltimore residents during the turn-of-the-twentieth century.

The two other NRHP eligible sites, 426-432 North Exeter Street (Site 18BC135) and the Bull's Head Tavern (Site 18BC139) lie within one mile of the eastern terminus of the Alternatives 11A and 11B alignment in the vicinity of the Jonestown neighborhood of Baltimore. Site 18BC135 consists of a series of six nineteenth century rowhouses and an early-nineteenth century sugar refinery. Site 18BC139 contains eighteenth to early-nineteenth century rowhouses as well as the remains of an eighteenth to nineteenth century tavern. Both sites contained intact cultural deposits and were recommended eligible for the NRHP as they have potential to answer several research questions regarding a thriving mixed-use Baltimore neighborhood with residences, commercial enterprises, and industries.

Another fourteen of the archeological sites within one-mile radius of the study corridors were also evaluated for NRHP eligibility; however, due to the absence of subsurface integrity all were recommended as not eligible. A determination of NRHP eligibility has not been made for the remaining 20 sites. Of that number, archeological site forms indicate the presence of subsurface integrity at 10 of the sites, while another four were observed as having no subsurface integrity. The MHT archeological site forms make no indication of condition of subsurface integrity for the remaining six sites within the one-mile radius of the design alternatives.

C. Previously Documented Historic Resources

Background research was conducted at the Maryland Historical Trust (MHT) to review their files. In addition, the Maryland Environmental Resources and Land Information Network (MERLIN) Geographic Information System (GIS) database was utilized to identify all previously documented historic architectural resources within the study corridors. Data layers on these resources were also provided to Dovetail Cultural Resource Group (Dovetail) by the MHT in GIS format. The accuracy and currency of this data have been spot checked during this phase of the project, but a thorough vetting of the accuracy of the data has not been conducted. Data at the city and local level was gathered from the Baltimore Commission for Historical and Architectural Preservation (CHAP), including designated historic districts and landmarks.

For the purposes of this analysis, Dovetail identified four categories of architectural resources:

- National Register of Historic Places (NRHP) listed historic districts and individual resources;
- NRHP eligible historic districts and individual resources. Does not include individually eligible resources located within listed or eligible districts;
- Previously identified resources with no formal determination of significance under Section 106 of the National Historic Preservation Act (NHPA). Includes resources with Maryland Inventory of Historic Places (MIHP) numbers and Baltimore City designated resources located outside of existing NRHP listed and eligible districts but within the study corridors. Also includes individual resources located within survey districts with no formal determination of significance; and

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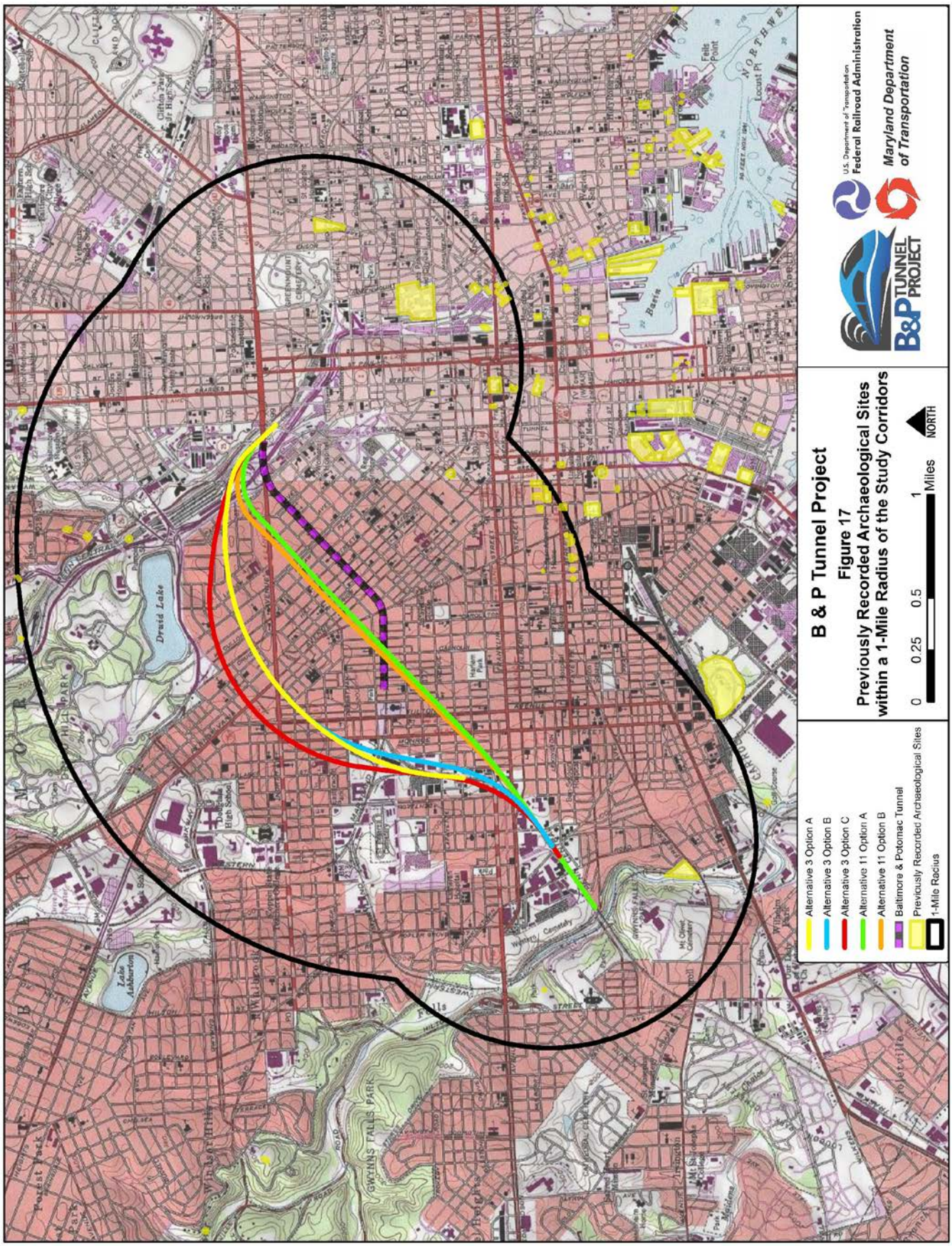
B & P Tunnel Project
Figure 17
Previously Recorded Archaeological Sites
within a 1-Mile Radius of the Study Corridors
0 0.25 0.5 1 Miles
NORTH
Alternative 3 Option A
Alternative 3 Option B
Alternative 3 Option C
Alternative 11 Option A
Alternative 11 Option B
Baltimore & Potomac Tunnel
Previously Recorded Archaeological Sites
1-Mile Radius
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department
of Transportation
B&P TUNNEL PROJECT
Druid Lake
Lake Ashburton
GWYNNS FALLS PARK
Basin
Locust Pt
Fells Point

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Table 2: Previously Recorded Archeological Sites within a 1-Mile Radius of the Study Corridors

Site Number	Site Name	Time Period	Description
18BC005	John Brown Pottery	Historic	Late-18th to early-19th century industrial Building/Pottery Kiln
18BC016	Steiger Meadow	Historic	19th century artifact concentration, possible dump site; no subsurface integrity
18BC020	Mauldin Perine Pottery	Historic	19th century industrial building/pottery kiln
18BC021	John Feast Botanical Garden	Historic	19th century botanical garden/florist commercial building and hot house; no subsurface integrity.
18BC026	Hillen Street	Historic	Two late-18th century frame houses, 19th century brick commercial building.
18BC029	Pascault Row	Historic	Early 19th century rowhouses; contains subsurface integrity
18BC035	Three Mill	Historic	Late-18th to early-20th century mill; contains subsurface integrity
18BC045	Oliver Johnson Square	Historic	19th to 20th century two block area of brick row houses and commercial structures; no subsurface integrity
18BC054	Orchard Street Church	Historic	Two mid-19th century African American church sites, and late-19th century African American Church; contains subsurface integrity
18BC093	Baetjer's Wine Cellar	Historic	Early to mid-20th century wine cellar; contains subsurface integrity
18BC094	Baltimore City Jail	Historic	19th to 20th century jail
18BC100	Curved Dam, Timanus Mill Site	Historic	Late-18th to early-20th century mill site; contains subsurface integrity
18BC131	414 North High Street	Historic	Portions of an early 20th century parking garage

Site Number	Site Name	Time Period	Description
18BC132	826-830 Mechanics Court	Historic	Three 19th century African American house foundations and backyard features, **National Register Eligible**
18BC133	The Independent Grays Privy	Historic	Late 19th to 20th century domestic privy shaft; **National Register Eligible**
18BC134	419 North High Street	Historic	Complex of 19th century row house foundations; not eligible for National Register
18BC135	426-432 North Exeter Street	Historic	Six 19th century row houses and early 19th century sugar refinery; **National Register Eligible**
18BC136	907-909 Hillen Street	Historic	Backyard lots of two mid-19th century dwellings and early 20th century pit feature; not eligible for National Register
18BC137	Rice Baking Company	Historic	Early 20th century industrial complex ruin; not eligible for National Register
18BC139	Bull's Head Tavern	Historic	18th to 19th century townhouse lots and tavern; **National Register Eligible**
18BC151	UMAB Site A-1	Historic	Late 18th to early 19th century domestic surface midden; contains subsurface integrity
18BC152	UMAB Site B-1	Historic	19th to 20th century brick house foundation; not eligible for National Register
18BC153	UMAB Site C-1	Historic	19th and early 20th century sheet midden; not eligible for National Register
18BC154	UMAB Site C-2	Historic	Early 19th century sheet midden and 19th and 20th century building foundations; not eligible for National Register
18BC155	UMAB Site D-1	Historic	Mid-19th to 20th century house site; not eligible for National Register
18BC156	UMAB Site E-1	Historic	Two mid-19th to early 20th century house sites; not eligible for National Register
18BC157	UMAB Site E-2	Historic	Mid-19th century house site; not eligible for National Register

Site Number	Site Name	Time Period	Description
18BC158	UMAB Site F-1	Historic	19th century house foundation; not eligible for National Register
18BC159	UMAB Site G-1	Historic	19th century house foundation; not eligible for National Register
18BC161	648-660 West Lexington Street	Historic	19th to 20th century building foundations: Church, row houses, and bakery; not eligible for National Register
18BC162	201-223 N. Arch/204-218 Pearl	Historic	19th to 20th century building foundations; not eligible for National Register
18BC163	18-20 North Pine Street	Historic	19th to 20th century building foundations; not eligible for National Register
18BC165	Wagner	Historic	Late 19th century dwelling; contains subsurface integrity
18BC167	Carder	Historic	19th century dwelling and mill workers housing; contains subsurface integrity
18BC168	Thistle	Historic	Early 19th century stone house, Mt. Vernon Mills' Mill Foreman's residence; contains subsurface integrity
18BC173	Lafeyette Square	Historic	Mid-19th century Union Army Camp containing barracks and hospital, late 19th to 20th century urban park; contains subsurface integrity
18BC176	RCGA Druid Hill Locus 1	Historic	Late 19th century stone ruin; no subsurface integrity.
18BC177	AOS #1	Prehistoric and Historic	Prehistoric lithic scatter and mid-19th century artifact scatter; not eligible for National Register

Note: All archeological site data collected from the MHT files.

- MHT Preservation Easements (one easement property is located within the Reservoir Hill Historic District, two are located in the Bolton Hill Historic District, one is located in the Old West Baltimore Historic District, and two are located within the boundaries of the North Central Historic District.

It should be noted that most of the individual resources identified within the study corridors that have MIHP numbers are located within larger districts. For the purposes of this document, due to the large

number of those individual resources (hundreds), and the fact that they are accounted for as part of large districts, they are not mentioned individually.

In total, 44 Historic Districts or individual resources not within a district were identified within the preliminary study corridor (**Figure 18; Table 3**). Given the boundaries of the identified historic districts and the location of some of the individual resources, several overlap with two or more of the design alternatives. A detailed discussion of the specific architectural resources and where they are situated in respect to each of the design alternatives is presented in the B&P Tunnel Project Architectural Resource Technical Memorandum.

Table 3: Preliminary Historic Architectural Resources Overview

RESOURCE NAME	MIHP NO.	NRHP STATUS	DESCRIPTION	EASE-MENT
1601-1830 St. Paul Street and 12-20 East Lafayette Street	B-4096	Listed	Brick and stone rowhouses built between 1876 and 1906.	
Baltimore Hebrew Congregation Synagogue	B-3702	Listed	Currently known as Berea Temple, ashlar granite building from 1891 in the form of a Byzantine church.	
Harlem Park Historic District	B-1320	Eligible	Baltimore rowhouse neighborhood, characterized by flat brick and stone facades, ornate cornices, marble steps, water tables. Eclectic architectural styles.	
Bon Secours Historic District	B-5117	Eligible	Late 19th-20th century rowhouses, primarily Italianate or Richardsonian Romanesque styles. Includes Bon Secours Hospital.	
United States Parcel Post Station	B-4198	Listed	Also known as Railway Express Building, constructed in 1929 in classical revival style.	
901-913 McKean Avenue	B-4457	No Eval.	Eleven brick rowhouses with Italianate and Queen Anne influences built 1899-1901.	
American Ice Company	B-1040	Eligible	Late 19th century industrial building. Damaged by 2004 fire, rear additions have been removed.	
1625 St. Paul Street	B-5214	Listed	Late 19th century, three-story rowhouse.	
St. Katherine of Alexandria	B-99	No Eval.	Victorian gothic revival church circa 1882.	Y
Eutaw Place/Madison Avenue Historic District	Balt. City HD	No Eval.	Variety of late 19th-early 20th century architectural styles (Italianate, Queen Anne, Renaissance Revival), location tied to important residents from period.	

Resource Name	MIHP No.	NRHP Status	Description	Ease-ment
Pennsylvania Railroad Station	B-3727	Listed	Constructed 1911, excellent example of Beaux-Arts Classicism, designed by noted firm of McKim, Mead and White.	
Hans Schuler Studio and Residence	B-4110	Listed	Eclectic brick building circa 1906-1912. Integrates examples of sculptor Hans Schuler's work into various façade elements.	
Baltimore City Passenger Railway Power House and Car Barn	B-3991	Listed	Brick Romanesque revival style building circa 1892. Also known as the Charles Theater/Famous Ballroom.	
Edmondson Avenue Historic District	B-5187	Listed	Over 1,600 buildings, mostly late 19th-to mid-20th century residences, some commercial and light industrial buildings.	
Bridge 2410	B-4553	Eligible	Lafayette Avenue bridge over Amtrak NEC.	
Monroe Riggs Historic District	B-5118	Eligible	Rowhouse neighborhood, 1890-1930s. Mostly two to three story brick Italianate style residences.	
Greater Rosemont Historic District	B-5113	Eligible	Primarily residential area, late 19th and early 20th century Colonial Revival, Spanish Revival, Craftsman, and Art Deco styles. Includes numerous commercial and industrial buildings, churches, government buildings.	
2535-2557 McCulloh Street (MD 129)	B-4455	No Eval.	Three-story "Swell-Front" rowhouses built by William T. McCaffrey, 1896-1899, Romanesque Revival style.	
2521-2533 McCulloh Street (MD 129)	B-4459	No Eval.	Seven "Marble House"/ Classical Revival style rowhouses, 1901-1914.	
2330-2356 McCulloh Street (MD 129)	B-4460	No Eval.	Block of rowhouses from 1902. "Daylight Houses" / Classical Revival style. Examples of the standard Baltimore type.	
2416-2452 Etting Street	B-4464	No Eval.	Block of Italianate style alley rowhouses, 1897-1901.	
1376-1394 W. North Avenue (US 1)	B-4476	No Eval.	Residential "Swell-Front" style rowhouses, 1890-1901, converted to ground floor commercial.	
Drugstore, 2500 Francis Street	B-4477	No Eval.	Italianate-style corner drugstore.	

Resource Name	MIHP No.	NRHP Status	Description	Ease-ment
Druid Hill Powerhouse, 2480 Druid Hill Avenue	B-4471	No Eval.	Large Romanesque Revival building, 1890. Notable for picturesque massing and fortress-like character.	
Zell Motor Car Building, 1370 W. North Avenue (US 1) & 1358 W. North Avenue	B-4484	No Eval.	Circa 1914-28 auto service building and a 1930s Art Deco showroom.	
William J. Tickner & Sons, Undertakers, 2500-2520 Pennsylvania Avenue (MD 26)	B-4475	No Eval.	Large brick corner building, 1901-1928.	
Dwellings/Slaughterhouses, 2500 & 2600 Blocks Pennsylvania Avenue (MD 26)	B-4479	No Eval.	Buildings appear to have been demolished.	
Etting Burial Grounds, 1500 Block of W. North Avenue	B-4435	No Eval.	Oldest extant Jewish cemetery in the city of Baltimore. Burials dating 1799-1881.	
1700 St. Paul Street	B-5215	No Eval.	Late 19th-early 20th century four-story brick rowhouse.	Y
Bolton Hill Historic District	B-64	Listed	Twenty blocks of residential buildings, primarily dating to second half of 19th century.	
North Central Historic District	B-1341	Listed	Twenty-five block district with late 19th to mid-20th century row houses, storefronts, industrial buildings, theaters, schools, and a church.	
Old West Baltimore Historic District	B-1373	Listed	Row house neighborhood of about 175 blocks dating from mid-19th to mid-20th century. Also includes mansions, small vernacular dwellings, churches, schools, commercial, and landscaped squares.	
Reservoir Hill Historic District	B-1379	Listed	Contains 32 blocks, mostly late 19th to early 20th century rowhouses. Also includes mansions, apartment buildings, religious and commercial buildings.	
North Avenue Bridge (BC1208)	B-4521	Eligible	North Avenue Bridge over Falls Road.	
Howard Street Bridge (BC1405)	B-4529	Eligible	Howard Street Bridge over I-83, Amtrak, and Jones Falls.	
Vincent Street Bridge (BC8010)	B-4532	Eligible	Vincent Street Bridge over Amtrak.	
1619 Park Avenue	B-490	No Eval.	Late 19th century four-story brick rowhouse.	Y

RESOURCE NAME	MIHP NO.	NRHP STATUS	DESCRIPTION	EASE-MENT
Beethoven Apartments	B-3744	No Eval.	Group of townhouses circa 1868. Designed and built to stand visually as a single notable building.	Y
Lt. Col. William H. Watson Monument	B-4265	No Eval.	Monument at intersection of North Ave. and Mount Royal Terrace.	Y
Madison Park Historic District	B-4491	No Eval.	Four blocks of brick rowhouses, late 19th to early 20th century. Also includes apartment/religious buildings.	
Baltimore & Potomac Railroad	B-5164	Eligible	Completed in 1873. Includes associate tunnel and bridges, most other structures and buildings date to early 20th century.	
Sandtown-Winchester/Penn North Survey District (Historic District)	B-4434	No Eval.	Approx. 72 blocks of primarily brick rowhouses, also includes commercial, educational, and religious buildings.	
Mount Royal Terrace Historic District	B-4251	No Eval.	Includes large individual houses, duplexes, small rowhouse groupings, and apartment houses. Architectural styles range from Queen Anne and Georgian Revival to simple row house forms, dated from mid-19th to early 20th century.	

IX. ASSESSMENT OF ARCHEOLOGICAL POTENTIAL

The archeological assessment of the Study Area consisted of the background research on the history of the area, discussed in Chapter 4.0, and on previously identified archeological sites (within a one-mile radius), discussed in Chapter 5.0. The results of the survey were then combined with the archeological predictive models and the review of historical maps and aerial imagery to divide the study corridor into areas of high, low, and no potential to contain archeological deposits.

A. Archeological Potential Predictive Model

The development of a predictive model that identifies archeological sensitivity in the Area of Potential Effects (APE) or study corridor is essential prior to the initiation of archeological fieldwork. The creation of a predictive archeological site location model and stratification of the APE or study corridor into areas of high, low, and no archeological sensitivity in consultation with a State Historic Preservation Office provides the basis for determining levels of effort to be conducted during the archeological fieldwork.

1. Predictive Model for Prehistoric Archeological Potential

RK&K developed a predictive model based on a sensitivity assessment that divided the prehistoric archeological potential of the study corridor into areas of high, low, and no potential. The basic criteria for prehistoric archeological sensitivity drawn from the predictive model are described as follows.

Areas in the study corridor were considered to possess a **High Archeological Sensitivity** if the area:

- is undisturbed;
- has a topographic slope factor of less than 15 percent;
- contains well-drained soils;
- is located within 500 feet or less from surface potable water; and
- is located within 500 feet or less from a previously documented archeological site.

Areas in the study corridor were considered to possess a **Low Archeological Sensitivity** if the area:

- is undisturbed;
- has a topographic slope factor of less than 15 percent;
- contains well-drained soils;
- is located between 500 feet and 1,000 feet from surface potable water; and
- is located between 500 feet and 1,000 feet from a previously documented archeological site.

Areas in the study corridor were considered to possess **No Archeological Sensitivity** if the area:

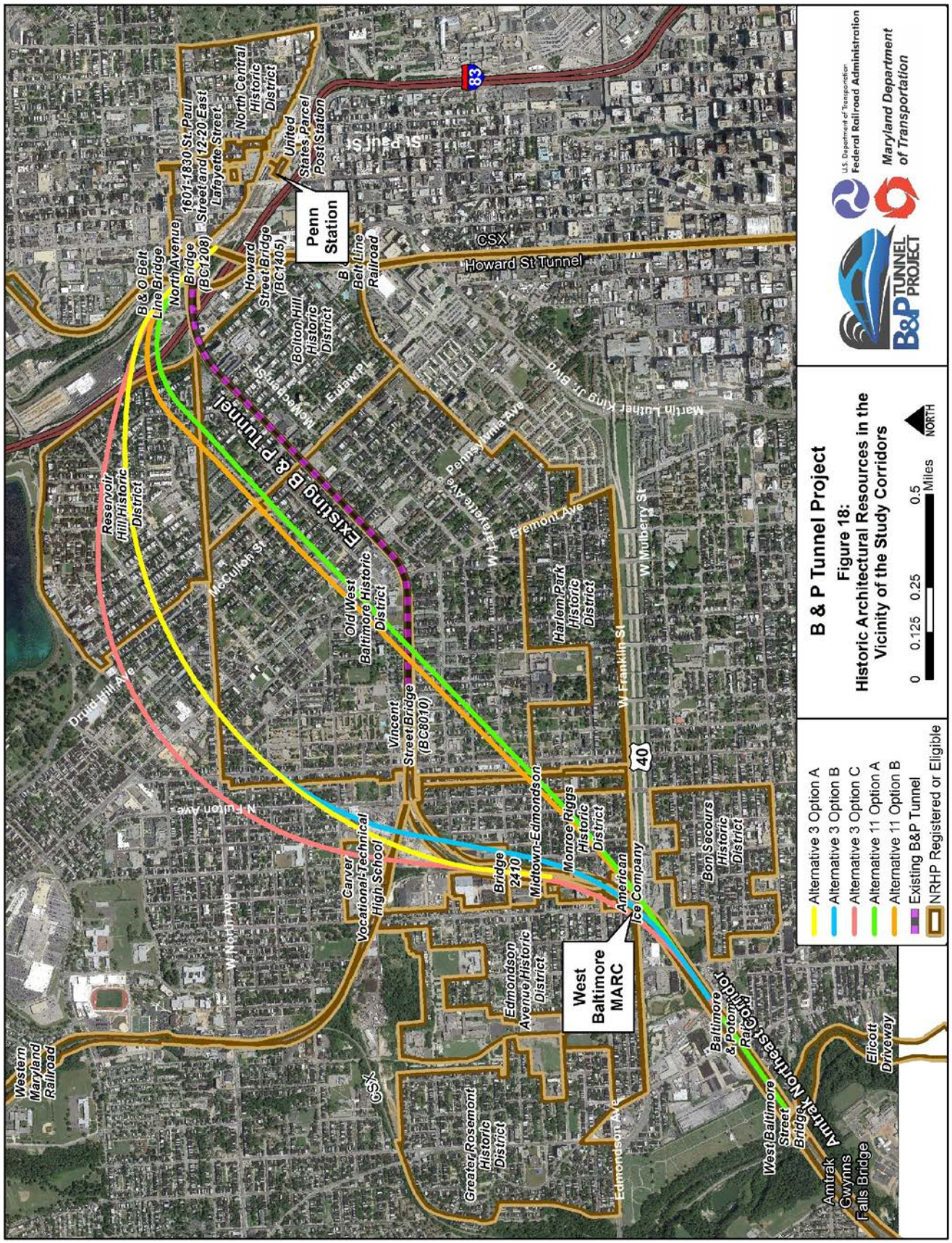
- is disturbed;
- has a topographic slope factor greater than 15 percent;
- contains poorly drained soils;
- is located more than 1,000 feet from surface potable water; and
- is located more than 1,000 feet from a previously documented archeological site.

2. Predictive Model for Historic Archeological Potential

The basic criteria for historic archeological sensitivity drawn from the predictive model are described as follows.

Areas in the study corridor were considered to possess a **High Archeological Sensitivity** if the area:

- is undisturbed;
- contains well-drained soils;


B & P Tunnel Project
Figure 18:
Historic Architectural Resources in the Vicinity of the Study Corridors
0 0.125 0.25 0.5 Miles
NORTH
U.S. Department of Transportation
Federal Railroad Administration
Maryland Department of Transportation
B&P TUNNEL PROJECT
Alternative 3 Option A
Alternative 3 Option B
Alternative 3 Option C
Alternative 11 Option A
Alternative 11 Option B
Existing B&P Tunnel
NRHP Registered or Eligible
Penn Station
West Baltimore MARC
Existing B & P Tunnel
Howard St Tunnel
CSX
B & O Belt Line Bridge
North Avenue Bridge (BC1208)
1601-1830 St. Paul Street and 12-20 East Lafayette Street
North Central Historic District
United States Post Station
Howard Street Bridge (BC1405)
Bolton Hill Historic District
Reservoir Hill Historic District
Old West Baltimore Historic District
Vincent Street Bridge (BC8010)
Harlem Park Historic District
Monroe Riggs Historic District
Bridge 2410
Midtown-Edmondson
Carver Vocational-Technical High School
American Ice Company
Bon Secours Historic District
Edmondson Avenue Historic District
Greater Rosemont Historic District
Baltimore & Potomac Railroad Tunnel
West Baltimore Street Bridge
Amtrak Northeast Corridor
Elicott Driveway
Amtrak Gwynns Falls Bridge
Western Maryland Railroad
McCulloh St
Druid Hill Ave
N Fulton Ave
W North Ave
Fremont Ave
W Mulberry St
W Franklin St
Martin Luther King Jr. Blvd
Pennsylvania Ave
Lafayette Ave
St Paul St
83
40

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- is located within 500 feet or less from a previously documented archeological site;
- is located within 300 feet or less from a former historic (pre-1900) structure; and
- is located within 300 feet or less from an extant historic (pre-1900) structure.

Areas in the study corridor were considered to possess a **Low Archeological Sensitivity** if the area:

- is undisturbed;
- contains well-drained soils;
- is located within 500 feet or less from a previously documented archeological site;
- is located between 300 feet and 1,000 feet from a former historic (pre-1900) structure; and
- is located between 300 feet and 1,000 feet from an extant historic (pre-1900) structure.

Areas in the study corridor were considered to possess **No Archeological Sensitivity** if the area:

- is disturbed;
- contains poorly drained soils;
- is located more than 1,000 feet from a previously documented archeological site;
- is located more than 1,000 feet from a former historic (pre-1900) structure; and
- is located more than 1,000 feet from an extant historic (pre-1900) structure.

B. Summary of Cartographic Imagery Review

Six historic maps of the Baltimore City dating from 1801 to 1914 were consulted as part of the cartographic review in order to assess the potential for historic archeological resources within the design alternatives. In order to meet the project objectives of developing a comprehensive overview, it was deemed prudent to select maps that would provide a chronological representation of the project location. Therefore, rather than concentrating the initial project efforts on a single time frame, a sample of maps spanning the eighteenth through early-twentieth centuries were selected. This effort also provided a standardized temporal base line to which later mapping could be readily geo-referenced and rectified. For the purpose of this project, all six selected historic maps were imported and georeferenced into GIS. It is almost impossible to perfectly align an old map to modern coordinate systems because mapping methods before the age of aerial photography often only very imprecisely represented scale, angle, distance, and direction. For most GIS projects, the value of the historical information on paper maps more than compensates for the residual error in their georeferenced versions. However, one should keep in mind that the relative location of the proposed B&P Tunnel design alternatives relative to the historic features (buildings, roads, streams, etc.) depicted on the map is an approximation.

The following maps were selected based on their levels of detail; their estimated level of accuracy; their compatibility with one another and modern landmarks; and relevance to the developmental history of the project location:

- Plan of the City and Environs of Baltimore (Warner and Hanna 1801);
- Approaches to Baltimore, Maryland (Bache 1849/1865);

- Plan of the City of Baltimore (Sidney and Neff 1851);
- Map of the City and County of Baltimore, Maryland (Sidney 1857);
- City Atlas of Baltimore, Maryland and Environs (Hopkins 1876); and
- Atlas of the City of Baltimore, Maryland (Topographical Survey Commission 1914)

The cartographic review and the site history indicated that the majority of the design alternatives lay within dispersed, agrarian settlements until the mid-nineteenth century. The rapid growth of Baltimore City during the mid-nineteenth century pushed the city inland from its original core along the harbor. Despite the expansion of the city north and west of its original core, by the mid-1850s the area containing the four design alternatives was sporadically settled. South of North Avenue, a grid street plan was established but the construction of row homes and commercial buildings along those streets and avenues were limited. Above North Avenue the area remained rural; containing large open tracts with country estates and farms. It was not until the 1870s, spurred on by the success of industrial mills along Jones Falls, that development began in earnest within the vicinity of the project area. Sustained growth and development continued through the late-nineteenth to twentieth centuries within the project area vicinity and beyond the city limits. A detailed review of each cartographic source as it relates to the four design alternatives is as follows:

1. Warner & Hanna's 1801 Plan of the City and Environs of Baltimore

The earliest cartographic source to depict portions of the project area is Warner and Hann's *Plan of the City and Environs of Baltimore*, published for Mayor and City Council of Baltimore in 1801 (see **Figure 9**). As it depicts only the original core of the city along the harbor and its immediate surroundings, some portions of Alternatives 3 and 11 do not appear on the historic map; however, it is still useful in determining the conditions and improvements within the project area at the beginning of the nineteenth century. From those portions that are depicted, the future location of the existing B&P Tunnel and the three alternatives were situated among plantations and forests by 1801. While the urban development within Baltimore City was situated to the south of the current project, the design alternatives do pass through and adjacent to numerous improvements present within the rural landscape at that time.

All design alternatives intersect a series of turnpikes and roadways that are still extant today. Alternatives 1, 2, 3, and 11 intersect Reisterstown Turnpike Road (present-day Pennsylvania Ave). All but Alternatives 11A and 11B also pass through present-day Freemont Ave, which in the 1801 map is an unnamed road connecting Reisterstown Turnpike and Frederick Turnpike Road (present-day West Baltimore Street). In addition the eastern terminus of all four alternatives terminate near another early road which eventually became present-day Falls Road.

While all the design alternatives pass through what was originally uninhabited farmland or wood lots, five alternatives (Alternatives 3A, 3B, 3C, 11A and 11B) do appear to pass in close proximity to at least a few plantation homes depicted in the 1801 map. According to the map, Alternatives 3A, 3B, and 3C passes through, or in close proximity to, the estate of Robert Taylor. To the south, the proposed Alternatives 11A and 11B lies in close proximity to several nearby estates owned by Paul Charles Gabriel de Ghequiere, M. Baker, and Dr. Mann. Two other estates, owned by Dr. Birkhead and Mr. Rutter, lie in the direct path of Alternatives 11A and 11B. Alternatives 1 and 2 also pass in close proximity of M. Ghequiere's estate as well as a small farm owned by a Mr. Smith along the Reisterstown Turnpike Road. On the east end, Alternatives 1 and 2 terminate at the mill Dr. Birkhead owned along the Jones Falls.

2. A.D. Bache's 1849-1865 Approaches to Baltimore, Maryland

A.D. Bache's *Approaches to Baltimore, Maryland* was published in 1865 by the U.S. Coast Survey, predecessor of the National Oceanic and Atmospheric Administration (NOAA). While the map was published in the 1860s, the title block indicates Baltimore City and the immediate vicinity was surveyed in 1849 by J.B. Glick, Assistant Coast Survey.

By 1849, the project area was still largely rural, although the large plantations depicted in the 1801 Warner & Hanna map had since been supplanted by smaller farms (see **Figure 13**). By the mid-nineteenth century, several new roads leading out of the city core were established through the project area. The newly built Ross Street (present-day Druid Hill Ave) and Madison Ave ran northwest out of the city core, parallel to Pennsylvania Ave. To the west of the city, both Franklin and Lexington Street were also constructed by this time. Agricultural fields and farm houses lined many of these new streets and avenues; however, the Bache map depicts a substantial number of urban residences and commercial properties within the project area along Pennsylvania Ave and Freemont Street.

In addition to an expanding road network, the Bache map also depicts the presence of the North Central Railway at the eastern terminus of the project area. Built in 1832, the North Central Railway ran between Baltimore and Sunbury Pennsylvania. Within Baltimore, the railway ran along the west bank of the Jones Falls, terminating near the present-day location of Penn Station. Bache's *Approaches to Baltimore, Maryland* suggests many of the mills identified along the Jones Falls in the early 1801 Warner & Hanna Map were razed during the construction of the railway. In addition to the railway, Bache map depicts a number of additional improvements at the eastern terminus of the project area which likely consisted of a number of warehouses and other buildings associated with the North Central Railway.

While the Bache map suggests the most extensive improvements are situated near the eastern terminus of the project area, the design alternatives individually pass in close proximity to other noteworthy buildings and landmarks. By 1849, a variety of new farmhouses, dwellings, and commercial buildings were constructed in close proximity of all four of the design alternatives. The Mount Royal Reservoir, added to the Bache Map prior to its being published in 1865, was located within Alternatives 11A and 11B and adjacent to Alternatives 3A, 3B and 3C. Likewise, Alternatives 11A and 11B also pass directly adjacent to a large cotton factory depicted on the east bank of the Jones Falls. The georeferenced Bache map illustrates Alternatives 1, 2, 11A and 11B lay close to the Mount Hope Institution, with portions of Alternatives 11A and 11B situated on the northern grounds of the former psychiatric hospital.

3. Sidney and Neff's 1851 Plan of the City of Baltimore, Maryland and J.C. Sidney's 1857 Map of the City and County of Baltimore, Maryland

Both J.C. Sidney and James Neff's 1851 *Plan of the City of Baltimore, Maryland* and J.C. Sidney's 1857 *Map of the City and County of Baltimore, Maryland* were consulted to determine the condition and improvements located within the project area in the years just preceding the Civil War (see **Figures 11 and 12**). Individually, each map does not adequately illustrate, in much detail, all the design alternatives for the B&P Tunnel project. The 1851 map of Baltimore City is useful for analyzing Alternatives 1, 2, and the majority of Alternatives 11A and 11B; while a large portion of Alternatives 3A, 3B and 3C and a portion of Alternatives 11A and 11B lie outside the mid-nineteenth century city boundaries and do not appear on the map. Likewise, the 1857 map of Baltimore City and County, show those portions of Alternatives 3A,

3B, 3C, 11A and 11B that are not depicted in the 1851 map, but show little detail of the existing mid-nineteenth century improvements within the city.

In 1818, the jurisdictional boundaries of Baltimore City had expanded beyond the original eighteenth century city core at the harbor. With respect the project location, the new boundaries of the city extended north to present-day North Avenue and west to the approximate location of Pulaski Street. While surveying for Bache's Map (1865/1849) began decades after the Baltimore City annexed this territory, the 1851 Sidney and Neff and 1857 Sidney maps are some of the first to illustrate those boundaries. One earlier map, Fielding Lucas' 1822-1836 Plan of the City of Baltimore, also shows the city boundaries but was not used for this cartographic analysis given the limited level of detail it depicts for the project area.

A comparison of the 1851 and 1857 maps illustrate an inconsistency between the two sources. The 1851 Plan of the City of Baltimore, Maryland depicts a street grid fully laid out to the circa 1817 city boundaries. However, the 1857 Map of the City and County of Baltimore, Maryland and Bache's 1849-1865 Approaches to Baltimore, Maryland illustrate a different scenario with the street grid consisting of only a few major thoroughfares but not the fully laid out grid system depicted in the 1851 Sidney and Neff map. Given the discrepancy, it appears the 1851 Sidney and Neff map presents the planned organization of streets and avenues and not environment that existed in the 1850s. Other than the one discrepancy, both the 1851 and 1857 maps appear to be an accurate illustration of the built environment within the project area at the time.

Within Baltimore City, a review of the 1851 Plan of the City of Baltimore, Maryland shows mid-nineteenth century development along Alignment Alternatives 1, 2, 11A and 11B as relatively sporadic. The majority of Alignment Alternatives 1 and 2 lies underneath Wilson Street. By 1851, development along Alternatives 1 and 2 was largely concentrated along Wilson Street at the intersections with Pennsylvania Ave and Freemont Street (present-day North Freemont Ave). To the west of Freemont Street, the western terminus of Alternatives 1 and 2 run parallel to Winchester Street, passing in close proximity to three farm buildings depicted in the 1851 Sidney and Neff map as belonging to a Mr. Patterson. In addition, the western terminus also lies adjacent to the north border of a large lot that, in the 1850s, was identified as the Cathedral Cemetery. The Cathedral cemetery remained on several other historic maps throughout the nineteenth century, but was replaced by several blocks of row homes by the early-twentieth century. According to the 1851 Sidney and Neff map, the end terminus of Alternatives 1 and 2 terminates at the B&S Railroad, on the western bank of the Jones Falls. Several buildings are depicted in the location and were likely associated with the rail operations.

A large portion of Alternatives 11A and 11B are present on the 1851 *Plan of the City of Baltimore, Maryland*. Although the western terminus of the line is off the map, the majority of the design alternatives running from the 1818 western boundary of the city to Freemont Street (present-day North Freemont Ave) is depicted. According to the map, few buildings were present along this portion of Alternatives 11A and 11B in the 1850s. At the corner of Mosher Street and Addison Alley (present-day McKean Ave) the alignment passes in close proximity to John Kirby's Woodley farm. Kirby's farm is also present in close proximity to Alternatives 11A and 11B in Sidney's 1857 Map of the City and County of Baltimore, Maryland. East of Freemont Street and Pennsylvania Ave, Alternatives 11A and 11B follows Robert Street. Several commercial and residential buildings are depicted near Alternatives 11A and 11B at the intersection of Robert Street and Pennsylvania Avenue. Running along Robert Street, Alternatives 11A and 11B pass in close proximity to several buildings depicted in the 1851 map including St. Paul's Orphan

Asylum, the Mount Hope Institution, a Roman Catholic Cemetery, and a German Protestant Cemetery. Besides the railroad buildings located at the Jones Falls, the 1851 map depicts several other buildings that are in the vicinity of the eastern terminus of Alternatives 11A and 11B. On the east bank of the Jones Falls, a cotton factory and associated mill race are north and adjacent to Alternatives 11A and 11B as well as the Baltimore Water Company and a reservoir located at the intersection of Federal and St. Paul Streets.

Very little of the route for Alternatives 3A, 3B and 3C can be seen on Sidney and Neff's 1851 Plan of the City of Baltimore, Maryland, save for the western terminus that runs roughly parallel with the 1818 western boundary of Baltimore City. While this portion of the city was sparsely populated in the mid-nineteenth century, three farm estates are located within the route for Alternatives 3A, 3B and 3C. They include the estates of H.J. Baker, W. Baker, and Dr. J.J. Graves. For an analysis of the existing conditions of the remainder of Alternatives 3A, 3B and 3C for the mid-nineteenth century, J.C. Sidney's 1857 *Map of the City and County of Baltimore, Maryland* was consulted. That map shows several other farm estates in close proximity of the Alternatives. Farms owned by S. Moales and a Mr. Hoffman are depicted in close proximity of Alternatives 3A and 3B as they pass between Pennsylvania Ave and Madison Street (present-day Madison Ave). East of Madison, Alternatives 3A, 3B and 3C also come in close proximity to the mid-nineteenth century estates of Messrs. Brooks and Whitelock. Beyond these farms, the alignments pass by the same mid-nineteenth century improvements the other design alternatives encounter near the Jones Falls.

4. G.M. Hopkins' 1876 City Atlas of Baltimore, Maryland and Environs

The next map used in the historic cartographic analysis was G.M. Hopkin's 1876 *City Atlas of Baltimore, Maryland and Environs* (see **Figure 14**). Between 1860 and 1880 settlement increased on the city's undeveloped periphery as wealthy families began to leave the center city area for new suburbs that were connected to the city by horse-drawn street cars. In addition to the residential development, new mill towns, such as Woodberry and Hampden, were developed outside of the city along the Jones Falls. Hopkins' atlas reflected the increased development north and west of the city's original core. The proposed street grid depicted in Sidney and Neff's 1851 *Plan of the City of Baltimore, Maryland* was completed by the 1870s and areas that were formerly large farm estates were supplanted by parceled city lots containing row homes and commercial buildings. Construction of these new neighborhoods in the vicinity of the project area was driven by the influx of African American migration into the city in the years following the Civil War. Many of these new African American residents settled in Old West Baltimore which was located north and west of Franklin and Dolphin Streets. At the same time, an influx of German and Eastern European immigrants to the city began to settle north of Old West Baltimore in what became known as Reservoir Hill, spurring development there as well.

In 1873, the Baltimore and Potomac Tunnel (Alternatives 1 and 2) was completed. The newly constructed tunnel extended from Gilmor Street to Cathedral Street (present-day Mt. Royal Ave) and passed underneath the growing Baltimore City neighborhoods of Old West Baltimore and Bolton Hill. The construction of the tunnel allowed the Pennsylvania Railroad direct access to Washington, D.C. by connecting its North Central Railway to the Baltimore and Potomac's new spur located west of Baltimore City.

Despite the growing population and construction of new transportations networks, large portions of the project area, particularly in Old West Baltimore, were depicted as vacant in Hopkins' 1876 City Atlas. In the vicinity of Alternatives 1 and 2, the 1876 map shows the existing alignment of the 1873 B&P Tunnel.

Overlying the tunnel, urban development near Alternatives 1 and 2 remains largely concentrated at the Pennsylvania Ave and North Freemont Ave corridors as well as at the eastern terminus adjacent to the Jones Falls. Other improvements present in the 1876 atlas in the vicinity of Alternative 1and Alternative 2 include a handful of residential buildings along Wilson Street, the Baltimore Female College, Baltimore and Potomac Rail Road Company buildings, the Cathedral Cemetery, and Edward Patterson's house on Winchester Street.

According to Hopkins' 1876 atlas, the majority of the land in the vicinity of Alternatives 11A and 11B was relatively undeveloped during by the late-nineteenth century. West of the 1818 city limits the alignment is on the existing Baltimore and Potomac Rail Road. West of the city boundary, it passes through parceled but undeveloped lots until reaching Gilmor Street where it passes through several residential buildings. Alternatives 11A and 11B continues through several more blocks of row houses as each reaches Pennsylvania Ave. From Pennsylvania Ave, the alignment of Alternatives 11A and 11B follow Robert Street. Few improvements are constructed on Robert Street in 1876, but those present include Public School No. 21, St. Paul's Orphan Asylum, Mount Hope Insane Asylum, the Mt. Royal Reservoir, and six residential dwellings. East of the Mt. Royal Reservoir, Alternatives 11A and 11B linked with the Baltimore and Potomac Rail Road's North Central Railway.

By the late-nineteenth century, development within the project area appears most heavily concentrated in the vicinity of Alternatives 3A, 3B and 3C. The 1876 Hopkins atlas depicts the western terminus of Alternatives 3A, 3B and 3C beginning at the Baltimore and Potomac Rail Road adjacent to the 1818 western boundary of the city. From the boundary, it extends north toward North Ave passing several still extant farm houses associated with the estates of Mrs. Kavanaugh, Miss Baker, and Dr. J.J. Graves. From North Ave the alignment intersects a number of row houses and commercial buildings located along Pennsylvania Ave, Division Street (present-day Woodbrook Ave), Francis Street, Druid Hill Ave, McCulloh Street, Madison Ave, Eutaw Place, and Garden Street (present-day Jordan Street). East of Colton Street (present-day Lindon Ave) Alternatives 3A, 3B and 3C cross the estate of Dr. Thomas E. Bond and pass to the north of the Mt. Royal Reservoir. From there it connects with the North Central Railway.

5. Topographical Survey Commission 1914 Atlas of the City of Baltimore, Maryland

The final map used in the cartographic analysis was the Topographical Survey Commission's 1914 *Atlas of the City of Baltimore, Maryland* (see **Figure 15**). In 1888, Baltimore County residents living on the west and north sides of the 1818 city boundaries voted in favor of annexation to Baltimore City. This brought an additional 7.5 square miles into the city and an additional 38,000 people. By the early-twentieth century, the neighborhoods within the project area were fully developed, populated in large part by the influx of African American and European immigrants who came to the city in the previous decades. Many of the farm estates present on the former western boundary of the city had been sold to developers for the construction of additional row homes to accommodate the increasing population. In addition the former burial grounds associated with the Cathedral cemetery and smaller lots along Robert Street were also developed.

The only portions of the city within the project area not fully developed at the time of the 1914 atlas was a small area near the western terminus of the Baltimore and Potomac Tunnel, west of Payson Street and between Baker Street and Edmondson Ave. This section of the project area, in the vicinity of Alternatives 3A, 3B, 3C, 11A and 11B, consisted largely of open land with several industrial buildings and a warehouse situated adjacent to the Baltimore and Potomac Rail Road. The factories included the Baltimore Car Wheel

Company, the Baltimore Asphalt Block and Tile Company, and a number of warehouses and machine shops associated with the railroad. Other portions of land in this area were also owned by various land speculator and development companies including Hubner and Hunting, and Walbrook Land Corporation. In the years that followed, these lots were also developed into an assortment of residential, commercial, industrial buildings, many of which remain to this day.

C. Cultural Resource Sensitivity and Recommendations

1. Sensitivity for Prehistoric Archeological Resources

Results of the Phase IA Archeological Study suggest that from a regional perspective, the project study corridors falls within a portion of Maryland that has considerable potential for containing prehistoric archeological sites. The geographic location of the project and the environmental setting within which it falls are generally considered to be a high probability zone for containing a diversity of Native American archeological sites. Although few intact Native American archeological sites have been found in the Baltimore metropolitan area, several Native American artifacts have been recovered from this portion of the state, even within the limits of Baltimore City.

Although the general region is considered to have a high probability for containing archeological resources, ascertaining the overall archeological sensitivity of the study corridors associated with the B&P Tunnel design alternatives present an interesting challenge. For example, while Pre-contact populations may have once occupied the general region, the extent of modern urbanization must be taken into consideration when assessing the likelihood of discovering such archeological remains in urban settings.

The results of the Phase IA cultural resource investigation clearly revealed that while the location of the design alternatives have the potential for containing archeological resources, landscapes within the study corridors have been subjected to considerable repeated alteration since the late-eighteenth century. These alterations have ranged from urban expansion north of the city center in the early-nineteenth century; transportation improvements; to modern urbanization and suburbanization. During documentary review and field inspections, it became clear that remains of the region's pre-contact natural landscapes are limited within the study corridors. Given the severity and extent of past disturbance, most of the land within the study corridors is considered to have a low probability for containing any intact prehistoric archeological resources (**Figure 19**). It is quite likely that these locations may have once contained various intact prehistoric archeological resources, particularly in the vicinity of Jones Falls. However, it is also likely that the integrity of many such resources therein have since been compromised, if not destroyed, by past earthmoving activities from the nineteenth through twentieth centuries.

2. Sensitivity for Historic Archeological Resources

One of the most interesting findings of the Phase IA Archeological Study was the number of historic archeological sites that have been identified in the vicinity of the study corridors. Many previous archeological surveys in the vicinity of the study corridors revealed that many previously identified sites possessed good subsurface integrity, even along road side edges. At several sites in the urban core of Baltimore City, intact cultural features were found beneath thick overburdens of fill relatively close to the edges of pavement surround city lots. The presence of these intact deposits at previously identified archeological sites demonstrate that while much of urban core of the city has experienced subsurface disturbance, the study corridors still retain the potential for containing intact archeological sites.

The preservation and subsequent discovery of intact historic archeological sites, largely to the south of the study corridors, can be attributed to several factors. Documentary records indicate that by the third quarter of the eighteenth century, most of the major streets and roads in Baltimore City's downtown area were established. During that period, the land containing the study corridors were part of the immediate northern and western periphery of the city. The area was largely rural but several major roads were already established in this location as well, including present-day Pennsylvania Ave, Freemont Ave, and parts of Edmondson Ave and Gilmor Street. Other roads were also present in the area in the form of farm roads and estate lanes, sections of which were eventually incorporated into the present-day street grid of Baltimore City. The present-day street grid within the study corridors were planned by city engineers in the early-nineteenth century and construction began in earnest in the years leading up to the Civil War, thus dividing the large farm estates into smaller city lots.

Although road and utility construction over the past two centuries have disturbed road right-of-ways and roadside edges of lots, these activities have tended toward the widening of corridors, which have resulted in the consumption of lot peripheries. In many instances, the core occupation area of any given lot is now closer to the edge of roadways. Corner lots have been most affected by roadway expansion as they possess two roadside edges. Consequently, it is unsurprising that intact refuse middens, garden plots, well, cisterns, privies, and the remains of other historic outbuildings have been encountered just off the edges of pavement of existing roadways at various Baltimore City historic archeological sites. As a result, lots with known former historic occupations, as well as those with extant historic aboveground architecture, that have not been subjected to large-scale modern redevelopment must be recognized as having at high potential for containing subsurface historic archeological resources (see **Figure 19**). Areas within the study corridors of particularly high potential for containing potential intact historic archeological resources would be those lots bordering Freemont and Pennsylvania Avenues as well as those parcels bordering Robert (Alternative Alignments 11A and 11B) and Wilson Streets (Alternative Alignments 1 and 2) between Pennsylvania Avenue and Jones Falls. These locations were the earliest streets to be constructed within the study corridors and settlement along these thoroughfares began in earnest during the late-eighteenth to early-nineteenth centuries. Another area of particularly high potential would be portions of Alternative Alignments 3A, 3B and 3C, north of North Avenue, between Pennsylvania Avenue and Jones Falls. By the mid-1870s, row house and commercial development in this portion of Baltimore City boomed as European immigrants were drawn to this area as industrial mills expanded operations along the Jones Falls.

Another factor for the potential preservation of intact historic archeological sites has much to do with the composition of existing soils within the study corridors. As noted earlier, land reclamation in Baltimore City began during the late-eighteenth and early-nineteenth centuries with the infilling of wetland environments. Within the vicinity of the study corridors, several unnamed tributaries of Jones Falls and Gwynns Falls once passed through the area. Those tributaries appear in several early historic maps of the area (see **Figures 9 and 13**); however, by the late-nineteenth century, those streams were buried by historic fill. The soil survey of Baltimore City indicates that extensive areas of historic fill exist within the study corridors beyond these former stream valleys. Urban Land Associations soils (44UC) cover sizeable sections of the southern and central portions of the Alignment Alternatives 3A, 3B, 3C, 11A, and 11B (see Figure 5). Areas within the study corridors containing this soil association are largely covered by several feet of artificial fill. Under certain circumstances, land filling has been instrumental in the protection of archeological deposits. Modern archeological research has shown that, on occasion, intact sites have

survived urban setting as a result of deep burial by past historic earthmoving activities (Marshall 1982; LeeDecker et al. 2009; Shellenhamer and Bedell 2010). Several such regional examples are the deeply buried, intact archeological deposits which were discovered at the Metro Station Sites (Sites 18BC65, 18BC66, and 18BC69) as well as below fill deposits at the Columbus Plaza Site (Site 18BC67) (Ward 1989a; 1989b). Since substantial portions of the study corridors lie on land considered buried by artificial fill, the likelihood of those locations containing intact historic archeological resources is high.

X. SUMMARY AND CONCLUSIONS

Based on the results of the Phase IA Archeological Study, it has been concluded that although large portions of the study corridors have been disturbed, the potential for both pre- and post-contact archeological sites still exists. While it is believed that the subsurface integrity of most sites that may be in the project APE is probably poor, it is also believed that an occasional intact archeological site could be encountered. By comparison, it is anticipated that the study corridors have a higher potential for containing post contact sites than pre-contact sites. These suppositions are based on previous discoveries of intact archeological sites in and around the study corridors, as well as the land use history of this portion of Baltimore City.

Due to the preliminary stage of the project at this time, the scale of the project APE, as well as the uncertainty of project variables pertaining to anticipated ground disturbance (e.g., cut and cover locations, cut locations, ventilation shafts), it has been deemed prudent to suspend detailed archeological impact studies until the selection of a Preferred Alternative.

It is recommended that the next stage of the archeological study involve a careful examination of the project APE once the Preferred Alternative has been determined and the extent of anticipated ground disturbing activities have been ascertained. This study should involve an examination of the relationship of the proposed project to archeological resources in order to assess levels of studies that may be warranted. Study efforts would include discerning potential site locations within the project area through the use of predictive modeling and a detailed disturbance analysis of lands within the project APE. If applicable, fieldwork designed to confirm the presence/absence of archeological sites and evaluate any identified sites should also be performed. The results of these efforts would then be used to develop appropriate cultural resource treatment/recommendations. At this time, the several general settings within the study corridors have been targeted as locations that have a potential for containing archeological resources. These settings include areas where development has been limited; vacant lots; the surroundings of extant historic properties; open lands along roadsides; and areas with deep deposits of secondary-deposited fill.

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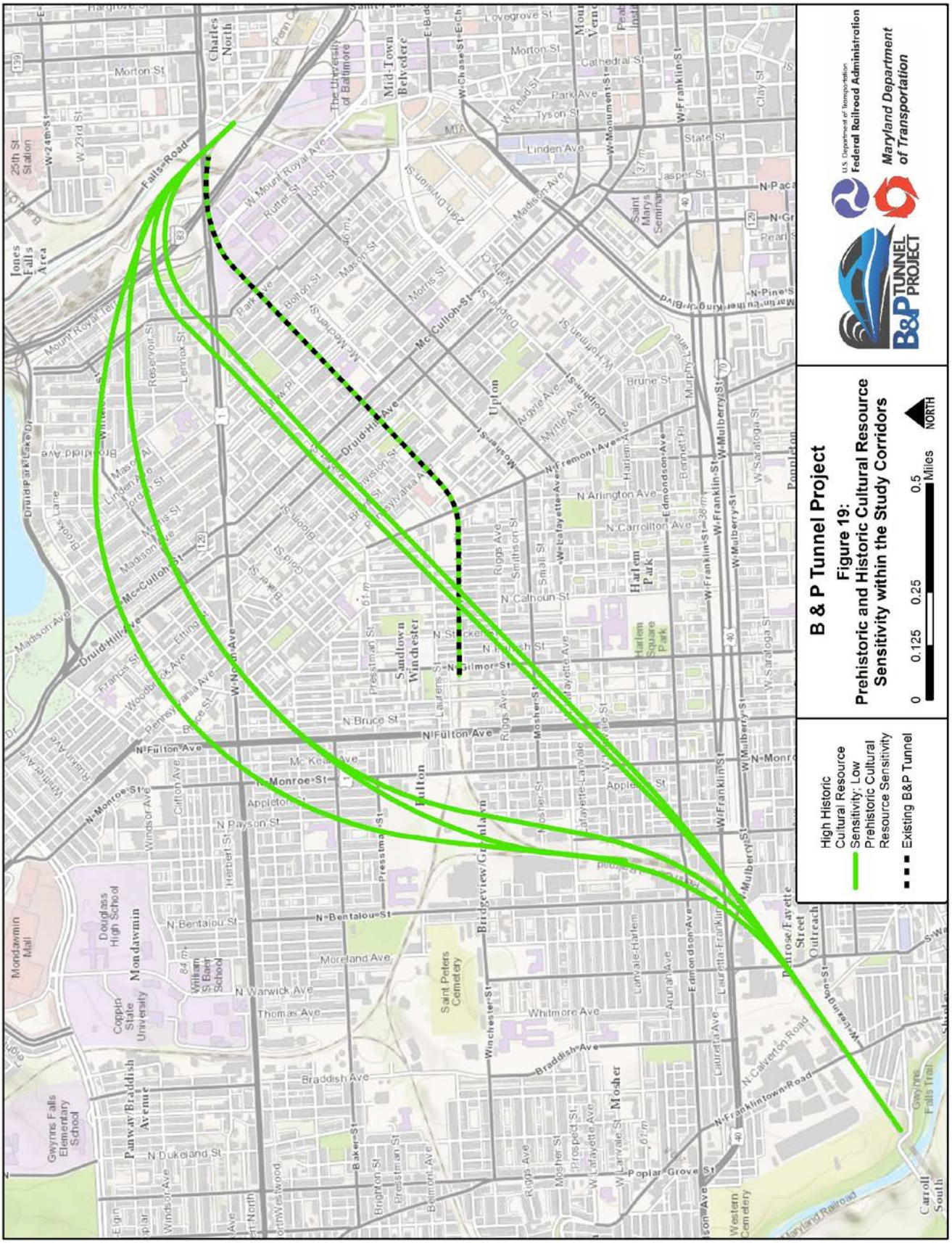
B & P Tunnel Project
Figure 19:
Prehistoric and Historic Cultural Resource Sensitivity within the Study Corridors
0 0.125 0.25 0.5 Miles
NORTH
High Historic Cultural Resource Sensitivity: Low Prehistoric Cultural Resource Sensitivity
Existing B&P Tunnel
U.S. Department of Transportation Federal Railroad Administration
Maryland Department of Transportation
B&P TUNNEL PROJECT
Falls Road
Druid Hill Ave
McCulloh St
Fulton Ave
Monroe St
Bentalou St
Braddish Ave
Franklintown Road
Mosher
Harlem Park
Sandtown Winchester
Upton
Jones Falls Area
Mondawmin
Penrose/Fayette Street Outreach
Gwynns Falls Trail
Maryland Railroad

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XII. ACRONYMS

B&P	Baltimore and Potomac
CFR	Code of Federal Regulations
EIS	Environmental Impact Statement
FR	Federal Register
FRA	Federal Railroad Administration
MARC	Maryland Area Regional Commuter
MDOT	Maryland Department of Transportation
MPWG	Master Plan Working Group
NEC	Northeast Corridor
NS	Norfolk Southern Railway
USC	United States Code